Technical FAQ

FAS9000 Technical FAQ

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1 FAS9000 Overview

The FAS90000 is the new high-end NetApp® storage controller. The FAS9000 has dramatically enhanced performance and high-performance I/O density in a new 8U HA form factor. The FAS9000 includes options for 40GbE and 32Gb FC along with the latest in SAS connectivity, the SAS 3.0 standard with 12Gb speeds. This controller also continues providing the most versatile I/O interface available, the UTA2 connections that support 10GbE and 16Gb FC and that can be easily changed between these two protocols in the field.

What is the FAS9000 series platform?

Answer: The FAS9000 series is NetApp's next-generation high-end platform.

Are there other FAS9000 models?

Answer: No, the only model is the FAS9000.

What are some of the new features in the FAS9000 family?

Answer:

- Broadwell 18-core architecture
- Onboard NVMe SSD flash
- PCIe Gen 3 16x wide architecture
- High-speed DDR4-2133 memory
- Modular RAS-focused architecture—I/O slots individually serviceable and separate from controllers
- External USB port that can be used to recover boot media or install a NetApp ONTAP® image
- Modern micro-USB serial console port

Does the FAS9000 come with protocols included?

Answer: The base bundle for FAS9000 includes all protocols.

What are the new FAS9000 model transitions?

Answer: The FAS9000 replaces the FAS8060 and the FAS8080 EX.

2 FAS9000 Controller and Chassis

Which components make up the FAS9000?

Answer: The FAS9000 components are the controller module, chassis, power supplies, fans, possibly SFP+ modules, and adapters supported in the controller.

What is the rack unit for the FAS9000 components?

Answer: The FAS9000 chassis is 8U high.

What are the FAS9000 model numbers?

Answer: The FAS9000 is the new high-end model number.

Which model string extensions denote HA?

Answer:

- The FAS9000 single-controller model string is FAS9000 and is supported only with NetApp MetroCluster™ technology.
- The FAS9000 dual-controller model string is FAS9000A.

Are the FAS9000 controllers hot swappable?

Answer: The FAS9000 controller is hot swappable and does not require you to turn off either power supply (PSU).

3 FAS9000 HA and Standalone Configurations

Which standalone and HA configurations are supported on the FAS9000?

Answer: Table 1 lists the configurations supported on the FAS9000.

Table 1) Supported FAS9000 configurations.

Single-chassis controller with blank	Yes; only supported with MetroCluster configurations
Single-chassis HA dual controllers	Yes

What is the naming convention for the FAS9000 configurations?

Answer: The FAS9000 is known as a single-chassis configuration and is supported only with MetroCluster. FAS9000A is a single-chassis HA configuration.

Are dual-chassis HA configurations possible on the FAS9000 series?

Answer: No, the FAS9000 cannot span its chassis unless MetroCluster is used.

Is MetroCluster available on the FAS9000 series?

Answer: Yes, MetroCluster software is available on the FAS9000 series.

What is the rack unit for FAS9000 configurations?

Answer: The FAS9000 chassis is 8U each.

Which field upgrades are available with the FAS9000?

Answer: All FAS9000 standalone controllers can have a second controller of the same model added to become HA. Since the standalone FAS9000 is supported only with MetroCluster, a second controller must be added at the remote site and MetroCluster must be set up to work with the new controllers.

Does hardware-assisted takeover work on the FAS9000?

Answer: Yes. Hardware-assisted takeover on the FAS9000 uses the SP, and the hardware-assisted takeover functionality is similar to that of the SP in the FAS2200, FAS2500, and FAS8000 controller families. More information about the SP is in section 4.

What is the NVRAM interconnect in FAS9000 series HA configurations?

Answer: The FAS9000 NVRAM uses two 40Gb connections for the HA interconnect over the backplane, providing 80Gb total bandwidth.

What reliability, availability, serviceability, and manageability (RASM) improvements were made to the FAS9000 chassis?

Answer: The FAS9000 chassis has been designed to have no single points of failure. The improvements made to the FAS9000 chassis to maximize its RASM are:

- Redundant and isolated power pathways with no common components:
  Power delivery to each controller and controller's I/O modules is completely isolated.
- Isolated fans and airflow:
  If all fans fail on one side, the other controller continues to run normally.
- Midplane component hardening:
  Termination resistors are oversized to reduce electrical and thermal stress.
  Four capacitors implemented in a series topography so a short circuit in one cannot lead to a node power failure.
- The FAS9000 chassis does not use resistors to set static '0' or '1' values:
  '0' values are implemented through a short to ground.
  '1' values are implemented by pull-up when the FRU is plugged into the midplane.

Which RASM improvements were made to the FAS9000 I/O?

Answer: The FAS9000 I/O modules are connected directly to the chassis and are outside the controllers. This approach enhances serviceability and manageability by not requiring a controller takeover to replace or add I/O adapters.

Later, ONTAP enhancements will make the FAS9000 I/O modules completely hot swappable.

Does the FAS9000 series support FlexArray?

Answer: Yes, the FAS9000 supports NetApp FlexArray® licensing to virtualize storage arrays.

Does the FAS9000 support SnapLock?

Answer: NetApp SnapLock® software is supported in ONTAP 9 and later and can be used on the FAS9000 at release.

Where is the upgrade procedure to replace existing controllers with FAS9000?

Answer: Here is a link to the Controller Upgrade Express Guide.

4 FAS9000 System Features

Does the FAS9000 have onboard flash?

Answer: Yes, the FAS9000 features onboard NVMe SSD flash, which provides similar functionality to that of NetApp Flash Cache™ intelligent caching.

How much onboard flash does the FAS9000 have?

Answer: The FAS9000 has 1TiB of flash per node and 2TiB for an HA pair.

Can the FAS9000 have additional onboard flash added?

Answer: Yes, the FAS9000 can have up to an 8TiB NVMe module per node and 16TiB in an HA pair.

How much memory and NVRAM does the FAS9000 have?

Answer: Table 2 shows system memory.

Table 2) System memory for HA configurations.

HA Pairs	Physical Memory	Total NVEM
FAS9000A	1024GB	64GB

Does the FAS9000 use all of the memory and NVRAM?

Answer: Yes. All FAS9000 models fully utilize the available memory and NVRAM at launch.

Which type of processors and how many processing cores does the FAS9000 have?

Answer: Table 3 gives processing core information.

Table 3) Processing cores for HA configurations.

HA Pairs	Architecture	Processors	Processing Cores	Processor Speed	Processor Model
FAS9000A	Broadwell	4 x 64-bit 18 core	72	2.3 GHz	E5-2697 v4

Which ONTAP release is required for the FAS9000?

Answer: The FAS9000 is supported starting in the ONTAP 9.1 RC1 release.

Which ONTAP build does the FAS9000 use?

Answer: The FAS9000 uses the x86_64 build. This same build supports both AMD and the latest platforms based on Intel.

Does the FAS9000 destage NVRAM contents to flash?

Answer: Yes. In the event of unexpected loss of power, the FAS9000 destages NVRAM contents to flash for a permanent, persistent write log of data not committed to disk when power was lost. During initial bootup after power is restored, the destaged NVLOG is replayed, enabling the file system contents to include any acknowledged writes since the last consistency checkpoint to disk.

Does the FAS9000 encrypt NVLOG data before destaging NVRAM contents to flash?

Answer: Yes, all data in NVRAM is encrypted before being stored in flash.

How does FAS9000 use its NVRAM battery?

Answer: In the event of a dirty shutdown, NVRAM9 uses its battery to keep the NVLOG DIMMs refreshed while it destages their contents to flash memory. The operation takes about a minute, and afterward the NVRAM9 subsystem turns itself off.

How many destages does the NVRAM battery support?

Answer: A fully charged NVRAM battery can handle 50+ destage events.

How long does it take for the FAS9000 NVRAM battery to charge?

Answer: Given the NVRAM9 architecture, in which only a small amount of battery capacity is consumed during destaging and turning itself off after destaging, we don't expect the FAS9000 bootup to be interrupted waiting for the battery to reach sufficient charge before continuing the boot process. A completely discharged battery should reach sufficient charge to continue the boot process within an hour.

Where are the NVRAM battery material safety data sheets (MSDS)?

Answer: Here are links to the Lithium Ion MSDS on the Field Portal:

LG Lithium Ion MSDS

Sony Lithium Ion MSDS

How does NetApp design their NVMEM batteries to avoid potential lithium-ion fires?

Answer: Here are some of the design considertations for NetApp NVMEM lithium-ion batteries and why NetApp has not had fire issues.

- NetApp does not use any rapid charge modes and does not allow the battery to be charged to an excessively high voltage.
- When the battery is charged to the correct voltage level, the charger is turned off until it requires a recharge.
- When the battery is in use, it is not in a high current discharge mode.
- The battery has protection circuitry that prevents high discharge currents.

Does the FAS9000 have an LCD display?

Answer: No. However, LEDs are provided on the chassis front to help determine the state of the controller. Remote management has proven to be the primary source for monitoring system information versus LCDs. Also, with the SP, the state of LEDs can be determined remotely.

Can I make an LED blink on the FAS9000 to identify it in a data center?

Answer: From the SP you can use the command `sp identify led 60` to have the fault LED on the controller rear blink for 60 seconds. Or you can toggle it on or off with `sp identify led on` and `sp identify led off`.

Does the FAS9000 series support remote management?

Answer: The FAS9000 uses the service processor (SP) used on FAS2200, FAS2500, and FAS8000 systems. The SP has all the features of RLM and BMC along with new ones that improve RASM capabilities. The new features are covered in the next few questions and answers.

What are some of the service processor management features?

Answer: The SP performs FRU reporting and tracking, monitors and reports on internal sensors, reports on and can set LED states, and actively manages fan speed.

Besides the Ethernet management port interface (the external management port is shared by SP and e0M), the SP can also be accessed from the serial console by toggling with Ctrl-G. Use Ctrl-D to get back to the serial console.

Is the SP connected to both the Ethernet and the serial console?

Answer: The SP is always connected to the Ethernet and the serial console and can be accessed from either. If the SP is accessed over the Ethernet, you can toggle to the serial console with Ctrl-D. If you log in to the serial console, you can toggle into the SP using Ctrl-G. To get back to the serial console, toggle with Ctrl-D.

Is the SP an FRU like the RLM?

Answer: No. The SP is integrated on the motherboard but runs its own kernel outside ONTAP and is always available.

What are the recommended SP firmware levels?

Answer: Table 4 lists the SP firmware levels, which depend on the ONTAP release used.

Table 4) Recommended SP firmware levels by ONTAP release.

	SP Firmware Level
ONTAP 9.1 RC1	4.0

What are the recommended BIOS levels on the FAS9000?

Answer: Table 5 lists the BIOS levels, which depend on the ONTAP release used.

Table 5) Recommended BIOS levels by ONTAP release.

	BIOS Level
ONTAP 9.1 RC1	10.0

There is no NMI button on the FAS9000. How do I generate a core?

Answer: The SP is required to generate a core file. After you log in to the SP, run the command system core.

What are the system diagnostics in the FAS9000?

Answer: The FAS9000 uses system-level diagnostics, or SLDIAG, in place of the older SYSDIAG on most platforms. SLDIAG is accessed using maintenance mode during bootup. If sysdiag is entered at the loader prompt, the system will boot into maintenance mode.

What is the boot medium in the FAS9000?

Answer: The FAS9000 uses an mSATA USB flash in place of CompactFlash.

Is NetApp Volume Encryption supported on FAS9000?

Answer: Yes, NetApp Volume Encryption (NVE) is supported on FAS9000.

Are FlexGroups supported on FAS9000?

Answer: Yes, FlexGroups are supported on FAS9000

Does the FAS9000 have Trusted Platform Module (TPM) on the motherboard?

Answer: Yes, the FAS9000 does have the TPM onboard on the motherboard.

Does ONTAP or onboard key manager (OKM) use the TPM?

Answer: No, not at this time.

5 FAS9000 I/O

What is the FAS9000 base configuration per node?

Answer: Refer to Table 6 for the FAS9000 base configuration per node.

Table 6) FAS9000 base configuration per node.

	Slot
NVRAM	6
40GbE adapter (both ports used for cluster interconnect)	4
12Gb SAS adapter	9[1]
1TiB NVME SSD flash	6-1

[1] With other adapters included in the Quote Tool, the 12Gb SAS adapter could be in a different slot.

What are the default and recommended cluster interconnect ports on the FAS9000?

Answer: Refer to Table 7 for cluster interconnect port defaults and recommendations.

Table 7) FAS9000 cluster interconnect options.

Default	Recommended
e4a, e4b (40GbE ports)	e4a, e8a (requires second 40GbE adapter)

What are the onboard FAS9000 ports?

Answer: Refer to Table 8 for FAS9000 onboard management ports.

Table 8) FAS9000 onboard ports.

Port Type / Number per PCM	Label
GbE e0M / SP	Wrench
Serial console (micro-USB)	IOIOI
Serial console (RJ45)	IOIOI
USB 2.0	

How many slots does the FAS9000 have?

Answer: The FAS9000 has 10 PCIe Gen3 16x wide slots per node and 20 slots in an HA pair.

Which PCIe architecture does the FAS9000 use?

Answer: The FAS9000 uses the PCIe Gen 3 X16 wide architecture for motherboard connectivity to I/O slots.

What are the supported SFP+ and cables on FAS9000?

Answer: See the Hardware Universe (HWU) for the latest information on supported SFPs and cables.

Which protocols are available by host I/O adapter type on FAS9000?

Answer: Refer to Table 9 for FAS9000 host-side protocol support by adapter type.

Table 9) FAS9000 protocol support.

Adapter	Protocols	Supported Speeds
40GbE	NFS, CIFS, iSCSI (stateless offload)	40GbE 10GbE
32Gb FC	FC	8/16/32Gb FC
UTA2	FC, NFS, CIFS, iSCSI, FCoE	10GbE 4/8/16Gb FC
10GbE Base-T	NFS, CIFS, iSCSI	GbE 10GbE

Can the FAS9000 32Gb adapter ports be set to initiator?

Answer: No, the 32Gb FC ports support only target mode.

Do the 32Gb FC ports autorange?

Answer: Yes, the 32Gb FC ports can autorange down to 8Gb and 16Gb speeds.

What is the bandwidth for the dual-port 40GbE adapter?

Answer: The total bandwidth of the two 40GbE ports is around 80Gbps.

Can the 40GbE ports be broken down into separate 10GbE ports?

Answer: Both 40GbE ports on the adapter can be broken down into four separate 10GbE ports, resulting in eight 10GbE ports per dual-port 40GbE adapter. In this case, each of the 10GbE ports will have a unique port name, depending on which port the fan-out cable is plugged into.

Why does the 40GbE adapter allow both ports to be broken out into 10GbE ports?

Answer: The 40GbE adapter on the FAS9000 features two ASICs and only one port per ASIC has an external connection. So although the ASIC behaves the same way as on the FAS8200, the port that is disabled when using 40GbE break-out cables is not connected externally and has no effect on the second 40GbE port.

What are the port names when breaking the 40GbE port into 10GbE ports?

Answer: In this case, each of the 10GbE ports will have a unique port name, depending on which port the fan-out cable is plugged into. The ‘a’ 40GbE port results in 10GbE port names ‘a,’ ‘b,’ ‘c,’ and ‘d.’ The ‘b’ 40GbE port results in 10GbE port names ‘e,’ ‘f,’ ‘g,’ and ‘h.’

What is the maximum number of Ethernet ports supported on the FAS9000?

Answer: The maximum number of Ethernet ports on the FAS9000 is 32 per node and 64 per HA pair. When using the fan-out cable to break down 40GbE ports into 10GbE ports, each resulting 10GbE port counts against the maximum Ethernet port limit.

Can 10GbE ports from legacy cluster interconnects be fanned into a single 40GbE port on the switch?

Answer: Yes, you can convert four 10GbE cluster interconnect ports into a single 40GbE port on the switch.

Where is the guide showing how to setup Cisco cluster interconnect switches?

Answer: Here's the link - Cluster switch setup guide for Cisco switches..

What are Unified Target Adapter 2 ports?

Answer: Unified Target Adapter 2 (UTA2) ports can be configured as 16Gb FC or 10GbE and, in the case of 10GbE, support FCoE, iSCSI, NFS, and CIFS. The previous generation of UTA ports supported only the 10GbE personality. With the addition of FC capabilities, UTA2 becomes the second generation of NetApp UTA ports.

What are the configuration rules for UTA2 ports?

Answer: UTA2 ports are based on dual-port ASICs, and both ports have to be set to either 16Gb FC or 10GbE. The X91143A-R6 has four ports across two ASICs, and both ports on each ASIC have to be set to the same type: 10GbE or 16Gb FC.

When UTA2 ports are set to the FC personality, individual ports on the ASIC can be set to either target or initiator mode.

What are the UTA2 port pairs?

Answer: The 'a' and 'b' ports on the X91143A-R6 are considered port pairs, and the 'c' and 'd' ports are the second port pair.

What is the SFP+ part number for X91443A ASIC set to Ethernet?

Answer: The correct part number for 10GbE is X6589-R6.

What causes frame length errors on UTA2 ports in tagged VLANs?

Answer: This is an issue in the UTA2 ASIC and affects only CGMP, STP, DDP, and SNA prototols. Other more common UTA2 protocols such as NFS, CIFS, iSCSI, and FCoE use Ethernet II frame formatting and are not affected by this issue.

Which management interfaces does the FAS9000 have?

Answer: See Table 10 for FAS9000 management interfaces.

Table 10) Onboard management interfaces.

Active-Active	Micro-USB Serial Console	RJ-45 Serial Console	Management SP/e0M (Wrench)
All models	2	2	2 x GbE (e0M) 2 x 10/100Mb SP[1]

[1] The SP port links to an external switch at GbE speed, but the internal path is limited to 10/100Mb.

Do the e0M and SP ports support IPv6?

Answer: Yes. Both e0M and SP support IPv6.

Is the external USB 2.0 port supported?

Answer: Yes, the external USB port can be used to boot ONTAP if the onboard boot media failed to install a particular release of ONTAP or to install a firmware service image. The external USB port is enabled only during these activities and its activation is based on specific commands.

Which USB device is formatted for use with the FAS9000?

Answer: The USB device needs to have FAT32 formatting to use on the external USB port.

Which use cases are allowed with the FAS9000 external USB port?

Answer: Table 11 shows use cases for which the external USB port can be used.

Table 11) External USB port use-case scenarios.

Scenario	Prerequisites	Command
Perform boot device recovery from Loader prompt	- USB 2.0 device formatted to FAT32 with correct ONTAP netboot.tgz and image.tgz image - Not hot pluggable; need to boot to Loader prompt after USB device is inserted into external USB port	- Boot_recovery using the netboot image at the Loader prompt - Select appropriate ONTAP image at the boot menu
Fetch ONTAP software for installation	- USB 2.0 device formatted to FAT32 with correct ONTAP image	- System node image update/get - Command has an additional option to fetch ONTAP from USB device
Fetch service image for firmware update	- USB 2.0 device formatted to FAT32 with correct service image	- System node firmware download - Command has an additional option to fetch ONTAP from USB device

At what speed does the FAS9000 serial console port run?

Answer: The FAS9000 serial console port runs at 115K baud rate.

6 FAS9000 Storage

What are the maximum spindle counts and capacities supported on the FAS9000 series?

Answer: Table 12 shows maximum spindle counts and capacities.

Table 12) Maximum spindle counts and capacities.

Standalone and HA	Maximum Spindles SAS / SATA	Maximum SSDs	Maximum SSD + SAS and / or SATA
FAS9000	1,440	480	1,440

What are the supported flash limits on the FAS9000?

Answer: Table 13 shows these limits.

Table 13) Flash limits on the FAS9000 HA pairs in ONTAP.

	Flash Limit
Maximum onboard flash (8TiB per node)	16TiB
Maximum onboard flash + NetApp Flash Pool™ cache (HA and standalone)	144TiB

What are the maximum aggregate and volume sizes on the FAS9000 series?

Answer: Table 14 shows the maximum aggregate and volume sizes.

Table 14) Maximum aggregate and volume sizes.

	FAS9000
Maximum number of volumes	1000
Maximum aggregate size	400TB
Maximum volume size	100TB
Minimum root volume size	962GB

What is the maximum number of volumes on the FAS9000?

Answer: FAS9000 supports up to 1,000 volumes.

Which shelves and shelf modules are supported on the FAS9000 series?

Answer: Table 15 shows the supported shelves and shelf modules.

Table 15) Supported shelves and shelf modules.

Shelf	Shelf Module
DS224C (quotable)	IOM12
DS212C (quotable)	IOM12
DS2246 (shelf migration)	IOM6 IOM12
DS4246 (quotable)	IOM6 IOM12
DS4486 (quotable)	IOM6

Which hard disk drives (HDDs) are supported in the FAS9000?

Answer: Any disk supported in the shelves listed in Table 12 in ONTAP 9.x is supported on the FAS9000 series. For the latest on supported drive options on FAS9000, see the Hardware Universe (HWU).

Are all-SSD configurations supported on the FAS9000?

Answer: Yes, all-SSD configurations are supported on FAS9000.

What is the maximum shelf depth for stacks with SSDs?

Answer: The maximum shelf depth for stacks containing SSDs is four. This number applies to pure SSD stacks and Flash Pool stacks with SSD and HDD disks.

Does the FAS9000 use ACP cabling for out-of-band management?

Answer: No, there is no locked wrench port on the FAS9000 for traditional ACP cabling.

How is SAS storage management handled on the FAS9000?

Answer: Starting in ONTAP 9, SAS storage management is handled in-band over the SAS cables.

How many shelves are configured with each FAS9000 node?

Answer: FAS9000 systems are configured in the factory with only one shelf per node (node + 1 shelf). Additional shelves are not configured and will arrive having shelf IDs set to ‘0’ and no disk ownership assigned.

Is there a demo video on how RAID-TEC works?

Answer: Yes, here is a link to the YouTube video that can be shared with customers:

RAID-TEC Demonstration

7 FAS9000 Chassis Power Supplies, Weight, and Thermals

What are the FAS9000 chassis dimensions?

Answer: For the most comprehensive information on FAS9000 dimensions and weights across various configurations options, refer to the Hardware Universe (HWU).

Table 16) FAS9000 chassis dimensions.

	Metric	English
Height	8U	
Height (measured)	35.6 cm	14"
Width	45 cm	17" (fits 19" rack)
Chassis depth	78.2 cm	30.8"
With cable management	93.5 cm	36.8"

What are the FAS9000 environmentals?

Answer: For the most comprehensive information on FAS9000 environmental details, refer to the Hardware Universe (HWU).

Table 17) FAS9000 environmentals.

	Operational	Storage	Transit
Temperature Range	From 41°F up to 113°F (5°C up to 45°C)	From -40°F up to 158°F (-40°C up to 70°C)	From -40°F up to 158°F (-40°C up to 70°C)
Relative Humidity	From 8% up to 90%	From 10% up to 95%	From 10% up to 95%
Altitude	Up to 9999ft (3048m)	Up to 39999ft (12192m)	Up to 39999ft (12192m)

What are the FAS9000 weights?

Answer: For the most comprehensive information on FAS8200 weight information across various configurations options, refer to the Hardware Universe (HWU).

The FAS9000 standalone is 169.53 pounds (76.9 kg) and HA is 214.46 pounds (97.28 kg).

What are the wattage and BTU ratings for the standalone FAS9000?

Answer: For the most comprehensive information on FAS9000 wattage and BTU ratings across various configurations options, refer to the Hardware Universe (HWU).

Table 18) Standalone FAS9000 watts and BTU ratings.

	110V		220V	
	Worst Case	Typical	Worst Case	Typical
Amps (A)	10.17	11.03	5.41	4.99
Watts (W)	996	1,080	1,059	997
BTU	3,400	3,686	3,615	3,335

What are the wattage and BTU ratings for FAS9000 HA pairs?

Answer: For the most comprehensive information on FAS9000 wattage and BTU ratings across various configurations options, refer to the Hardware Universe (HWU).

Table 19) FAS9000 HA watts and BTU ratings.

	110V		220V	
	Worst Case	Typical	Worst Case	Typical
Amps (A)	19.84	18.97	9.73	9.3
Watts (W)	1,944	1,859	1,906	1,822
BTU	6,635	6,345	6,505	6,219

Does the FAS9000 support both 110V and 220V power?

Answer: Yes. Both voltage levels are supported on the FAS9000.

Are the FAS9000 power supplies assigned to a particular controller?

Answer: Yes. The four power supplies (PSU)are assigned to particular controllers and controller I/O modules. The first and third PSUs are assigned to controller-A and its I/O while the second and fourth PSUs are assigned to controller-B and its I/O.

What is the recommended rail kit for the FAS9000?

Answer: The recommended rail kit for FAS9000 is the super rail kit with part number X-02659-00 and description “Kit, 4-Post, Square or Round-Hole, 24”-32” Rail.”

What is the de-pop tray with part number X90102A used for?

Answer: These trays are meant to hold FRUs from the chassis to lighten overall weight making rack installation easier.

8 Supported Adapters

For the latest information on FAS9000 FRUs, refer to the Hardware Universe (HWU).

Card Category	Description	Marketing PN	Slot Priority
NVRAM	NVRAM10,IO,CARD	X93140A	6
MetroCluster	IO Module,MC,4xFC-VI,16Gb,w/o SFP	X91929A	5
Networking (high performance)	IO Module,2-PT 40GbE	X91440A	4,8,9,1,10,2,11,3,7
Block Access (high performance)	IO Module 2 port 32Gb FC Target	X91134	9,1,10,2,11,3,7,8
Performance Acceleration	Flash Cache,1.0TB NVMe SSD Module	X9170A	61,62
	Flash Cache,4.0TB NVMe SSD Module	X9172A	61,62
Storage	IO Module,4-PT CNA,10GbE,16Gb FC	X91143A	9,1,10,2,11,3,7,8
	IO Module,4-PT SAS,12Gb	X92071A	9,1,10,2,11,3,7,8
Block Access	IO Module,4-PT CNA,10GbE,16Gb FC	X91143A	9,1,10,2,11,3,7,8
Networking	IO Module,4-PT 10GBASE-T	X91120A	9,1,10,2,11,3,7,8
	IO Module,4-PT CNA,10GbE,16Gb FC	X91143A	9,1,10,2,11,3,7,8
Tape	IO Module,4-PT SAS,12Gb	X92071A	9,1,10,2,11,3,7,8
	IO Module,4-PT CNA,10GbE,16Gb FC	X91143A	9,1,10,2,11,3,7,8

9 FRU List

For the latest information on FAS9000 FRUs, refer to the Hardware Universe (HWU).

FRU Unit Type	Marketing PN	Description
Battery	X1847-R6	Lithium System Battery CR2032,R6
Bezel	X98000A	Bezel,FAS90XX
Blank	X93100A	Blanking Panel,PCM
	X93101A	Blanking Panel,IO Module
	X93102A	Blanking Panel,NVS
	X93103A	Blanking Panel,NVMe
	X93104A	Blanking Panel,Power Supply
	X93105A	Blanking Panel,Fan Assembly
	X93106A	Blanking Panel,DPCM
Cable Management Guide	X98600A	Cable Management Bracket
Chassis	X9000XA	Chassis,no PSU, no PCM, no Fan, with MP
Destage Control Power Module	X98100A	DCPM Unit,90XX
Fan	X98500A	Fan Assembly,Module
LED USB	X91400A	LED Assembly
Memory Module	X93141A	DIMM,16GB (NVS)
	X93142A	DIMM,32GB
Power Supply Unit	X97600A	Power Supply,1600W for 90XX
Processor Controller Module (PCM)	X93400A	PCM,Memory,mSATA,FAS9000
Rail Kit	X-02659-00	Kit, 4-Post, Square or Round-Hole, 24"-32" Rail
	X8783A-R6	Rail Kit III, NetApp Cabinet, R6
	X90100A	RKMT KIT,FRONT-MOUNT,2-POST
	X90101A	RKMT KIT,MID-MNT,2-POST
	X90200A	Mounting Bracket,Rear Tie Down,4-POST
Transceiver	X65402	Conn,QSFP,40GbE SR, for NetApp controller cluster (Ethernet 40Gb)
	X65403	CONN,SFP,16Gb FC,LR,10km (FC-VI ,Fibre Channel 16Gb ,Fibre Channel 4/8/16 Gb)
	X6567-R6	SFP Optical 1GB Shortwave Multimode (Ethernet 1000Mb)
	X6596-R6	XCVR,SFP+,Optical,16Gb,FC,Shortwave (Fibre Channel 16Gb ,Fibre Channel 4/8/16 Gb ,Fib
	X6599A-R6	XCVR,SFP+,Optical,10GbE,Shortwave (Ethernet 10Gb)
	X6600A-R6	XCVR,SFP+,Optical,10GbE,Shortwave,X1143A (Ethernet 10Gb)
	X6602A-R6	XCVR,SFP+,Optical,16Gb,FC,Shortwave (Fibre Channel 16Gb ,Fibre Channel 4Gb ,Fibre Cha
	X6604A	Conn, adapter, 10GbE, LR, 10km, LC (Ethernet 10Gb)

10 Sysconfig Output

```
plat-9000-1C::> run local sysconfig -a
    NetApp Release ONTAP 9.1: Mon Aug  8 03:06:35 PDT 2016
    System ID: 0537029346 (plat-9000-1b); partner ID: 0537029298 (plat-9000-1a)
    System Serial Number: 791545000233 (plat-9000-1b)
    System Rev: 50
    System Storage Configuration: Mixed-Path HA
    System ACP Connectivity: Inband Active
    All-Flash Optimized: false
    Backplane Part Number: 111-02392
    Backplane Rev: 50
    Backplane Serial Number: 031542002452
    slot 0: System Board 2.3 GHz (System Board XXI 51)
        Model Name:        FAS9000
        Part Number:       111-02587
        Revision:          51
        Serial Number:     031544000059
        BIOS version:      10.0X16
        Loader version:    6.0X20
        Processors:        36
        Processor ID:      0x406f1
        Microcode Version:  0xb00001b
        Processor type:    Intel(R) Xeon(R) CPU E5-2697 v4 @ 2.30GHz
        Memory Size:       524288 MB
        Memory Attributes:  Node Interleaving
                    Bank Interleaving
                    Hoisting
                    Rank Interleaving
                    Channel Interleaving
                    Chipkill ECC
        Controller:        B
        PCIE Switch 0:     id 0 469 2.01
        PCIE Switch 1:     id 1 469 2.03
        PCIE Switch 2:     id 2 469 2.03
        PCIE Switch 3:     id 3 469 2.01
    Service Processor          Status: Online
        Firmware Version:   4.0X33
        Mgmt MAC Address:   00:A0:98:8D:71:A1
        Ethernet Link:     up
        Using DHCP:        no
    IPv4 configuration:
        IP Address:        172.16.52.68
        Netmask:           255.255.254.0
        Gateway:           172.16.52.1
    IPv6 configuration:        Disabled
    [Service Processor cached network information determined at Thu Aug 11 00:36:10 UTC 2016]
    slot 0: Internal 10/100/1000 Ethernet Switch
        Firmware Version:   Version3  SB_XXI Switch0
        Wrench:            auto-1000t-fd-up
        Device Type:       88E6176
    slot 0: Gigabit Ethernet I210
        e0M MAC Address:    00:a0:98:8d:71:9f (auto-1000t-fd-up)
        Device Type:       1533
        Firmware Version:   3.25-0.0 0x80000616
    slot 0: Intel WBG SATA Controller u0a (0x6ec11000)
        boot0 Micron M600 MTFDDAT128MBF       MU05 122104MB  512B/sect       (1439100AF72A)
    slot 0: Intel USB EHCI Adapter u0b (0x6ec12000)
    slot 2: 1/10 Gigabit Ethernet Controller IX4-T
        e2a MAC Address:    00:a0:98:8d:e8:29 (auto-unknown-down)
        e2b MAC Address:    00:a0:98:8d:e8:2a (auto-1000t-fd-up)
        e2c MAC Address:    00:a0:98:8d:e8:2b (auto-1000t-fd-up)
        e2d MAC Address:    00:a0:98:8d:e8:2c (auto-unknown-down)
        Device Type:       X550
```

```
        Firmware Version:   0.87-6.7
        Part Number:       111-02399
        Hardware Revision:  50
        Serial Number:     031545000205
slot 4: 40 Gigabit Ethernet Controller XL710 QSFP+
        e4a MAC Address:   00:a0:98:8e:6a:4e (auto-40g_cr4-fd-up)
          QSFP Vendor:       CISCO
          QSFP Part Number:   L45593-D118-B50
          QSFP Serial Number:  LCC1926G08P-A
        e4e MAC Address:   00:a0:98:8e:6a:52 (auto-40g_cr4-fd-up)
          QSFP Vendor:       CISCO
          QSFP Part Number:   L45593-D118-B50
          QSFP Serial Number:  LCC1926G0AK-A
        Device Type:       XL710 B1
        Firmware Version:   nvm 5.04 etid 8000250c
        Part Number:       111-02590
        Hardware Revision:  40
        Serial Number:     031548000505
slot 6: NVRAM (NVRAM 10)
        Revision:          51
        Serial Number:     031543003351
        DIMM Size:         16384 MB
        Memory Size:       32768 MB
        Battery Status:    Battery sufficiently charged
        Running Firmware:   0.5.42
slot 6: Interconnect HBA: Generic OFED Provider
        Port Name:         ib6a
        GID:               fe80:0000:0000:0000:0000:0000:0000:0105
        Base LID:          0x105
        Active MTU:        8192
slot 8: 40 Gigabit Ethernet Controller XL710 QSFP+
        e8a MAC Address:   00:a0:98:8e:35:0b (auto-40g_cr4-fd-up)
          QSFP Vendor:       CISCO
          QSFP Part Number:   2231254-3
          QSFP Serial Number:  TED1932E0HA-A
        e8e MAC Address:   00:a0:98:8e:35:0f (auto-40g_cr4-fd-up)
          QSFP Vendor:       CISCO
          QSFP Part Number:   2231254-3
          QSFP Serial Number:  TED1932E0PT-A
        Device Type:       XL710 B1
        Firmware Version:   nvm 5.04 etid 8000250c
        Part Number:       111-02590
        Hardware Revision:  40
        Serial Number:     031546000347
slot 9: SAS Host Adapter 9a (PMC-Sierra PM8072 rev. C, SAS, <OFFLINE (hard)>)
        MFG Part Number:   NetApp, Inc. 111-02396 rev. 50
        Part number:       111-02396+50
        Serial number:     031543001644
        Date Code:         20151113
        Firmware rev:      03.08.09.00
        Base WWN:          5:00a098:0066f65:50
        Phy State:         [12] Enabled, Rate unknown
                           [13] Enabled, Rate unknown
                           [14] Enabled, Rate unknown
                           [15] Enabled, Rate unknown
        Mini-SAS HD Vendor:       Amphenol
        Mini-SAS HD Part Number:   112-00429+10
        Mini-SAS HD Type:         Passive Copper (unequalized) 0.5m ID:00
        Mini-SAS HD Serial Number: APF14510026536
slot 9: SAS Host Adapter 9b (PMC-Sierra PM8072 rev. C, SAS, <UP>)
        MFG Part Number:   NetApp, Inc. 111-02396 rev. 50
        Part number:       111-02396+50
        Serial number:     031543001644
        Date Code:         20151113
        Firmware rev:      03.08.09.00
        Base WWN:          5:00a098:0066f65:54
```

```
        Phy State:        [8] Enabled, 6.0 Gb/s
                          [9] Enabled, 6.0 Gb/s
                          [10] Enabled, 6.0 Gb/s
                          [11] Enabled, 6.0 Gb/s
        Mini-SAS HD Vendor:       Amphenol
        Mini-SAS HD Part Number:   112-00429+10
        Mini-SAS HD Type:        Passive Copper (unequalized) 0.5m ID:00
        Mini-SAS HD Serial Number: APF14510026532
```

(Note - disk information removed to save space)

```
        Shelf 3: DS2246  Firmware rev. IOM6 A: 0190  IOM6 B: 0190
        Shelf 4: DS2246  Firmware rev. IOM6 A: 0190  IOM6 B: 0190
        Shelf 5: DS2246  Firmware rev. IOM6 A: 0190  IOM6 B: 0190
    slot 9: SAS Host Adapter 9c (PMC-Sierra PM8072 rev. C, SAS, <UP>)
        MFG Part Number:    NetApp, Inc. 111-02396 rev. 50
        Part number:       111-02396+50
        Serial number:     031543001644
        Date Code:        20151113
        Firmware rev:      03.08.09.00
        Base WWN:          5:00a098:0066f65:58
        Phy State:        [0] Enabled, 6.0 Gb/s
                          [1] Enabled, 6.0 Gb/s
                          [2] Enabled, 6.0 Gb/s
                          [3] Enabled, 6.0 Gb/s
        Mini-SAS HD Vendor:       Amphenol
        Mini-SAS HD Part Number:   112-00430+10
        Mini-SAS HD Type:        Passive Copper (unequalized) 2m ID:00
        Mini-SAS HD Serial Number: APF14520026852
```

(Note - disk information removed to save space)

```
        Shelf 3: DS2246  Firmware rev. IOM6 A: 0190  IOM6 B: 0190
        Shelf 4: DS2246  Firmware rev. IOM6 A: 0190  IOM6 B: 0190
        Shelf 5: DS2246  Firmware rev. IOM6 A: 0190  IOM6 B: 0190
    slot 9: SAS Host Adapter 9d (PMC-Sierra PM8072 rev. C, SAS, <UP>)
        MFG Part Number:    NetApp, Inc. 111-02396 rev. 50
        Part number:       111-02396+50
        Serial number:     031543001644
        Date Code:        20151113
        Firmware rev:      03.08.09.00
        Base WWN:          5:00a098:0066f65:5c
        Phy State:        [4] Enabled, 6.0 Gb/s
                          [5] Enabled, 6.0 Gb/s
                          [6] Enabled, 6.0 Gb/s
                          [7] Enabled, 6.0 Gb/s
        Mini-SAS HD Vendor:       Amphenol
        Mini-SAS HD Part Number:   112-00429+10
        Mini-SAS HD Type:        Passive Copper (unequalized) 0.5m ID:00
        Mini-SAS HD Serial Number: APF14520027339
```

(Note - disk information removed to save space)

```
        Shelf 0: DS2246  Firmware rev. IOM6 A: 0190  IOM6 B: 0190
```

11 Revision History

Revision	Date	Comment
1.0	September 2016	Initial release
1.1	September 2016	Added information about NVE to section 4 Corrected minimum root volume size in table 14 Corrected answer on page 14 about port names when fanning out to 10GbE ports Added more details about how the four PSUs are assigned on page 20
1.2	December 2016	Added super rail to the FRU list and recommendation in section 7 Added quotable options for shelves in table 15 Added FlexGroups support and TPM information in section 4
1.3	February 2017	Added links to the NVRAM battery MSDS Added link to RAID-TEC demo video Added question on fanning in 4 x 10GbE cluster interconnect ports into a single 40GbE port on the switch Added SFP+ part number for X91143A ASIC set to Ethernet Added information about the de-pop tray with part number X90102A Added DS460C support Added more details about OKM not using TPM at this time Fixed the number of CPUs on an HA pair Added link to the Controller Upgrade Express Guide Added 32Gb FC autorange speeds of 8Gb and 16Gb Added a link to the setup guide for Cisco cluster interconnect switches Added design considerations for lithium-ion batteries to prevent potential fire issues

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