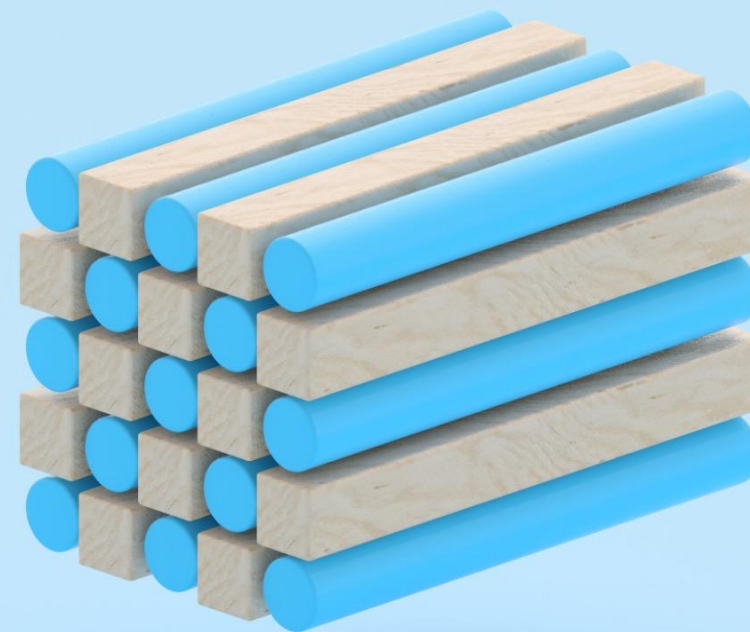


# NS224 NVMe Drive Shelf Cabling Guide

Version 1.3.1

[ng-doccomments@netapp.com](mailto:ng-doccomments@netapp.com)

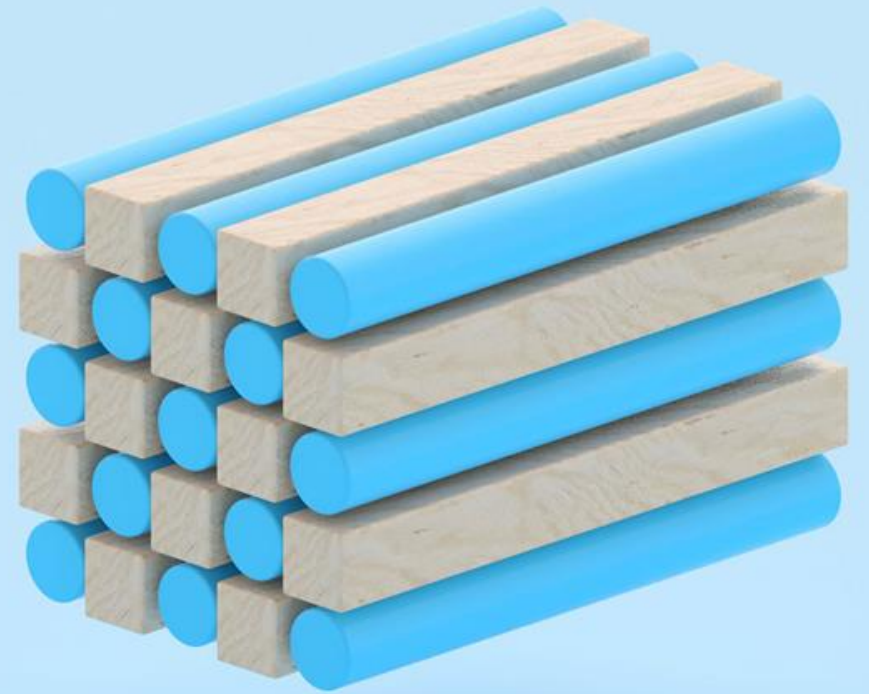
December 2021



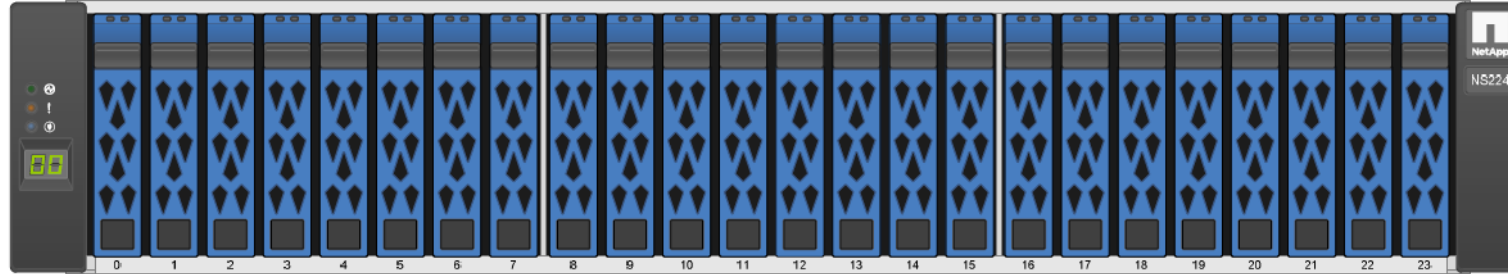
# Table of Contents

- NS224 Overview – slide 4
- NS224 using direct connections to the controllers – slide 11
- NS224 using switched connections to the controllers – slide 34
- NDO conversion from direct connections on NS224 to switched connections - slide 45
- Revision history – slide 71

# NS224 Overview



# NS224 Introduction: NVMe SSD Drive Shelf



- 2U chassis with 24 internal NVMe SSDs
- NS224 capable of 400Gb/sec bandwidth – 200Gb/sec per shelf module
- Ethernet connectivity using remote direct memory access (RDMA) over converged Ethernet (RoCE)
- Supported with direct connections on
  - AFF A320 in ONTAP 9.6 and later
  - AFF A400 and AFF A800 in ONTAP 9.7 and later
  - FAS500f, AFF A250 and AFF A700 in ONTAP 9.8 and later
- Switched support on AFF A320, AFF A400, AFF A700, and AFF A800 in ONTAP 9.8

# NS224 Additional Features

- Available starting in ONTAP 9.6
- New network topology eliminates concept of stack depth
  - NS224 shelf depth is one – no shelf-to-shelf connections
- Uses 100Gb Ethernet connections
- Populate NVMe SSDs from outside in with partial shelves
- Original NVMe SSDs from AFF A800 not supported on NS224
  - AFF A800 NVMe SSDs supported with NS224 released in March 2019
- 110V and 220V supported
- Follows standard ONTAP RAID policies

# Changing 100GbE Ports To Storage Settings

- Supported controller ports for NS224 connections are shown in later diagrams
- To set ports to use with NS224 in ONTAP 9.8 and later:
  - `storage port modify -node [node name] -port [port name] -mode storage`
- To set ports to use with NS224 in ONTAP 9.6 and 9.7 :
  - `storage port enable -node [node name] -port [port name]`
  - In ONTAP 9.6 reboot the node for this change to take effect
- Note: Factory-configured systems with NS224 ship with ports already set to storage mode

# Changing 100GbE Ports To Network Settings

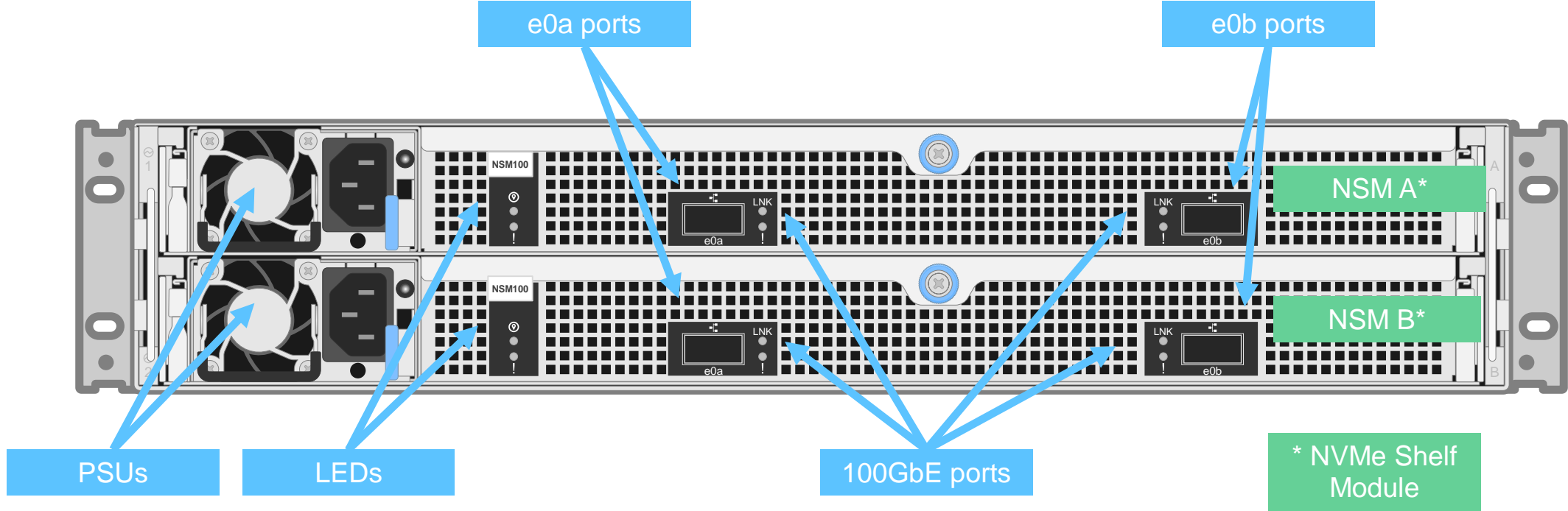
- To set ports to use with Ethernet host connections in ONTAP 9.8 and later:
  - `storage port modify -node [node name] -port [port name] -mode network`
- To set ports to use with Ethernet host connections in ONTAP 9.6 and 9.7:
  - `storage port disable -node [node name] -port [port name]`
  - In ONTAP 9.6 reboot the node for this change to take effect
  - Put storage ports into a broadcast domain:
    - `network port broadcast-domain create` (to create a new domain if needed)
    - `network port broadcast-domain add-ports` (to add ports to an existing domain)

# NS224 Chassis – Front View

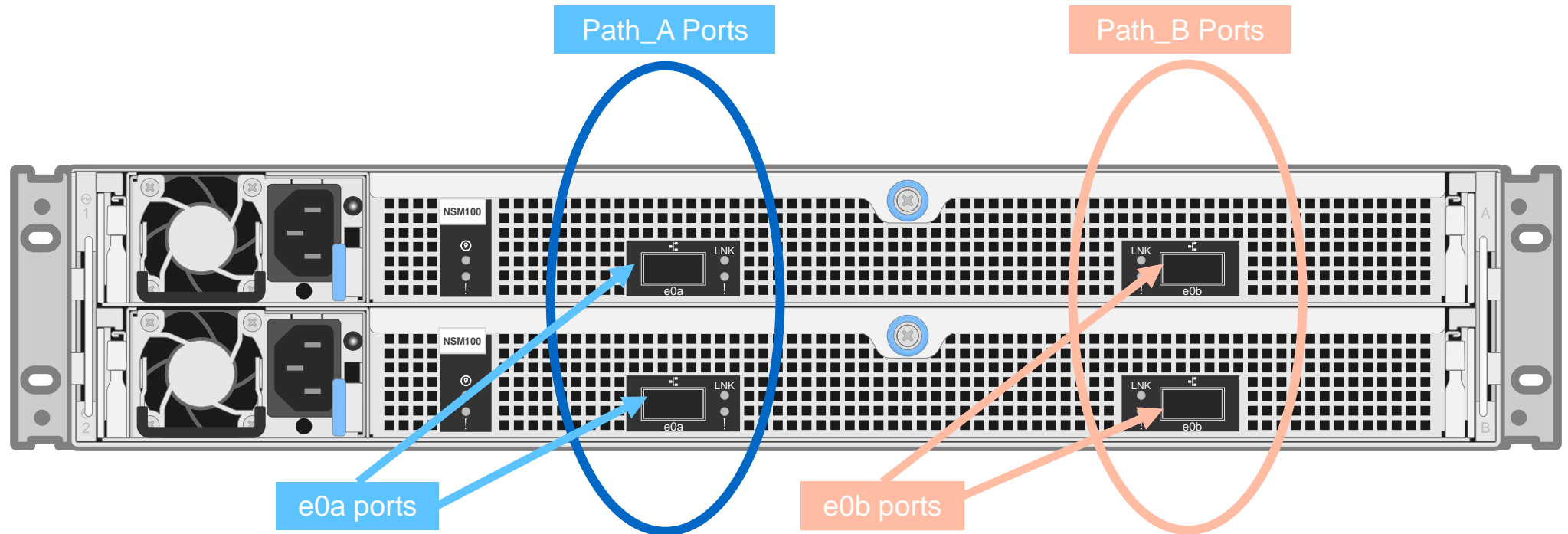




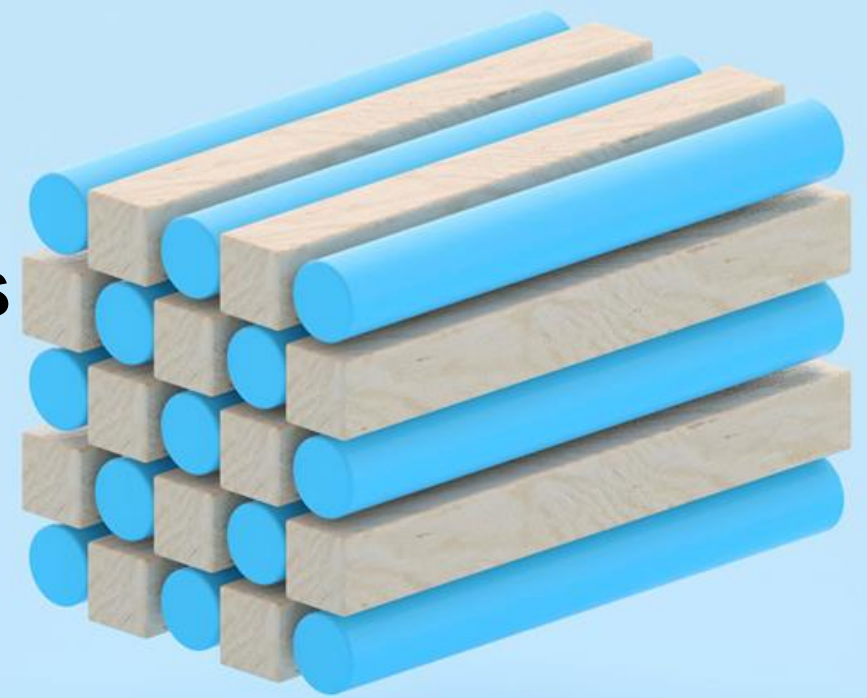
# NS224 Chassis – Rear View



# NS224 Chassis – Path Assignments for 100GbE Ports

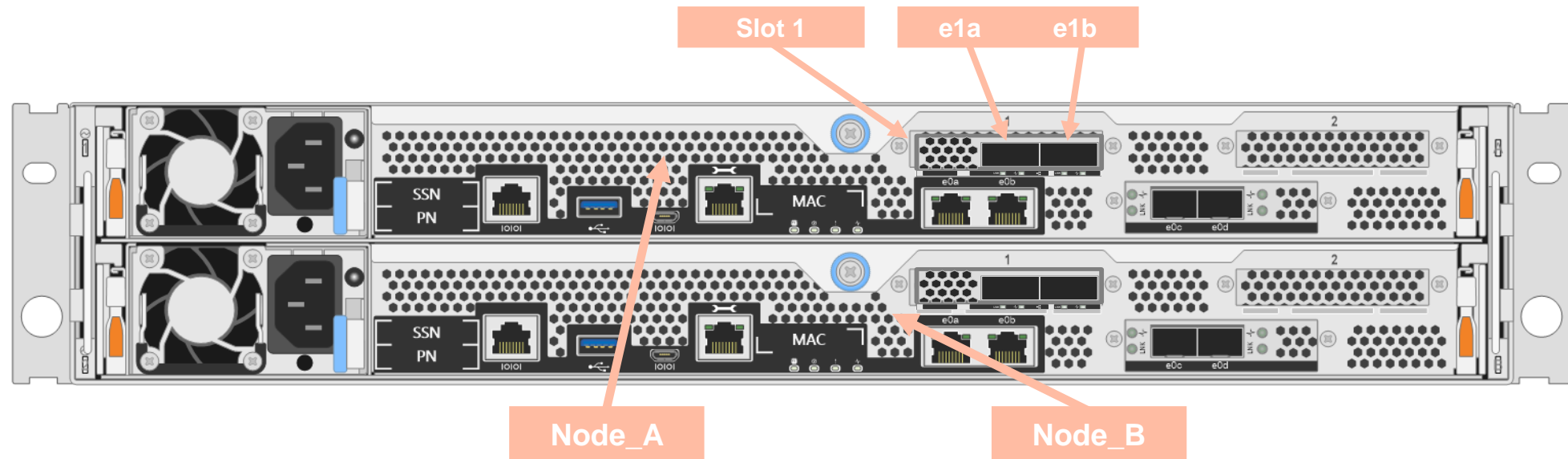


## NS224 With Direct Connections



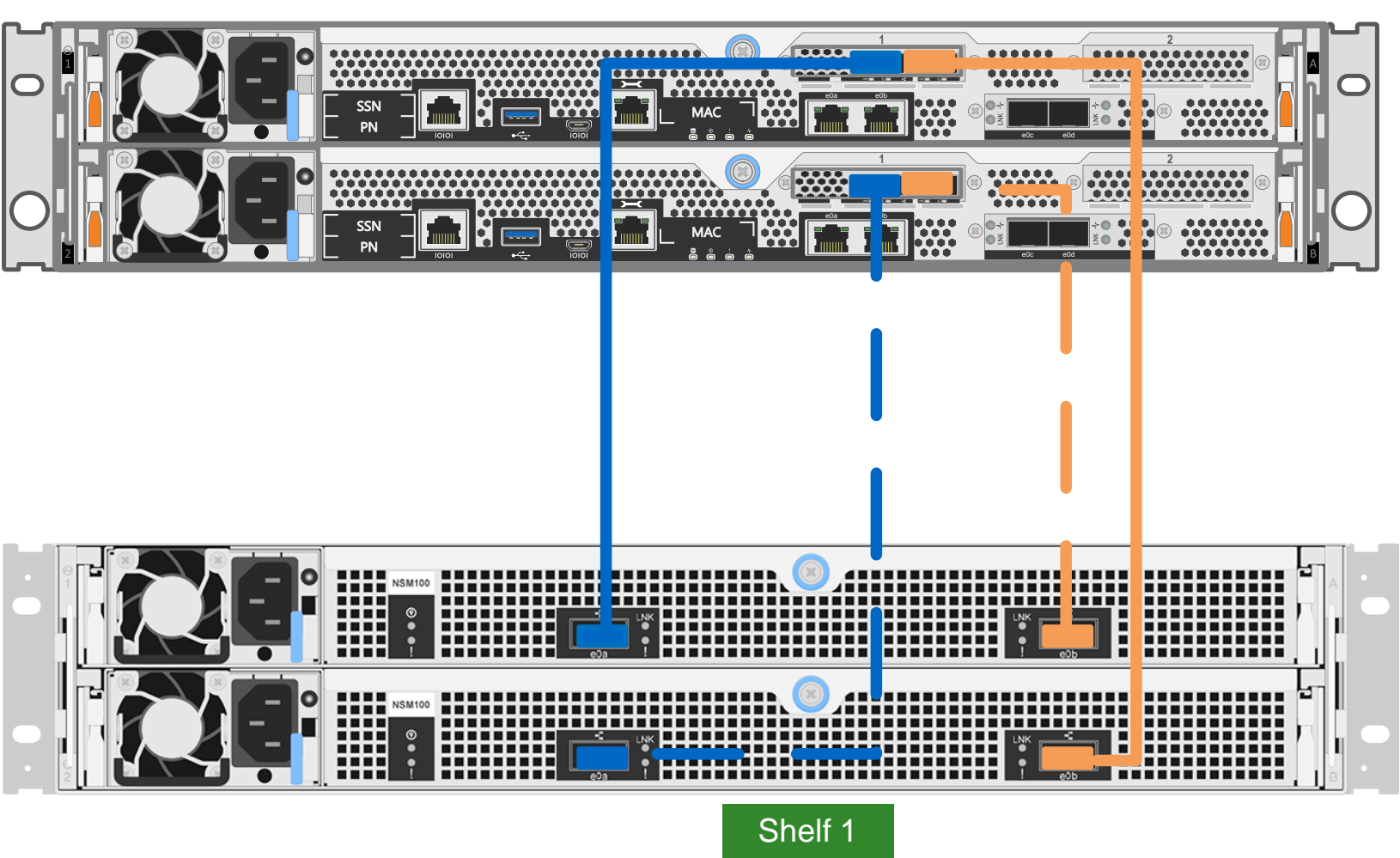
# AFF / ASA A250, FAS500f Rear View – Adapter-Based 100GbE Ports

100GbE ports e1a and e1b can only be used with NS224 storage.  
Host connections are not supported and are blocked by ONTAP.



# AFF / ASA A250, FAS500f with One NS224 Shelf – ONTAP 9.8+

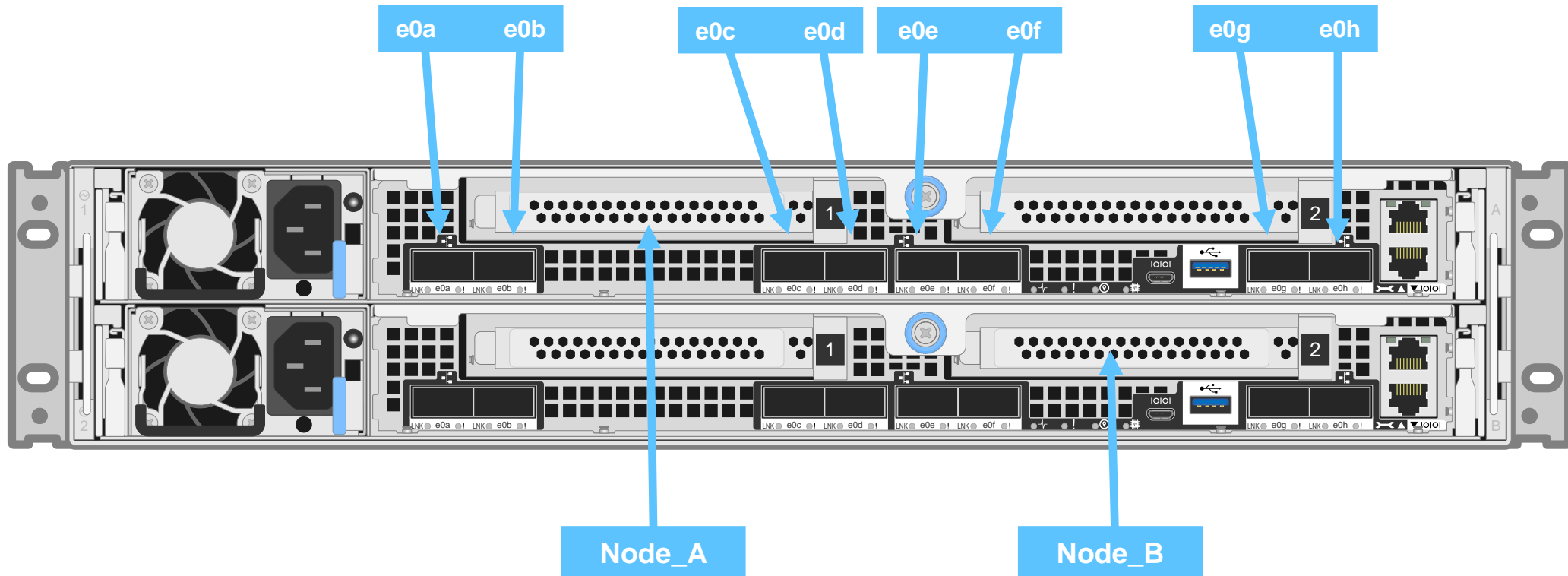
Using 100GbE ports on X1153A in slot 1 to connect to single NS224 shelf



Maximum NS224			
1 shelf / 24 SSDs			

	Port	Node	Line
Path_A	e1a	Node_A	—————
		Node_B	- - - - -
Path_B	e1b	Node_A	—————
		Node_B	- - - - -

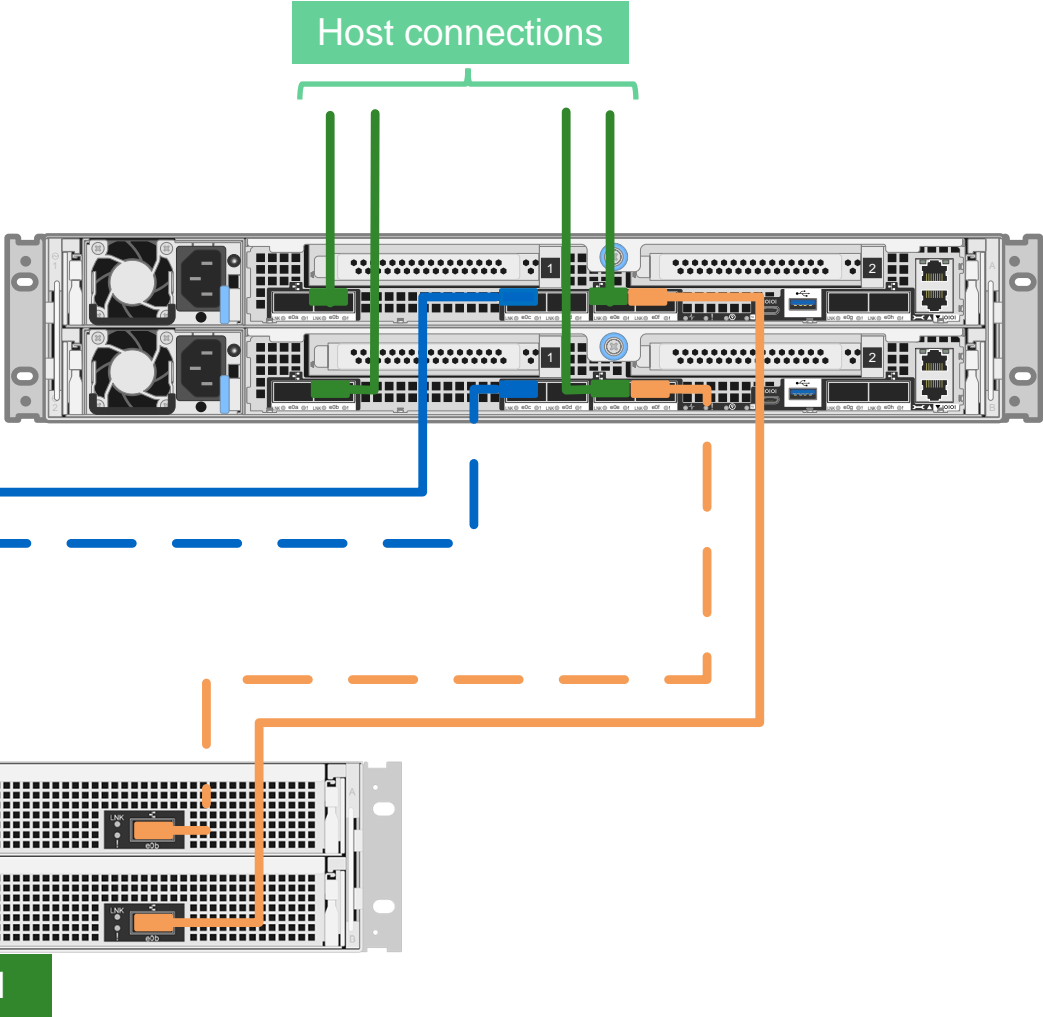
# AFF A320 Rear View – Onboard 100GbE Ports



# AFF A320 with One NS224 Shelf – ONTAP 9.6+

Using onboard 100GbE ports to connect to single NS224 shelf

Ports e0b and e0e are configured for NS224 storage. To use for host connections, follow the steps on slide 8.



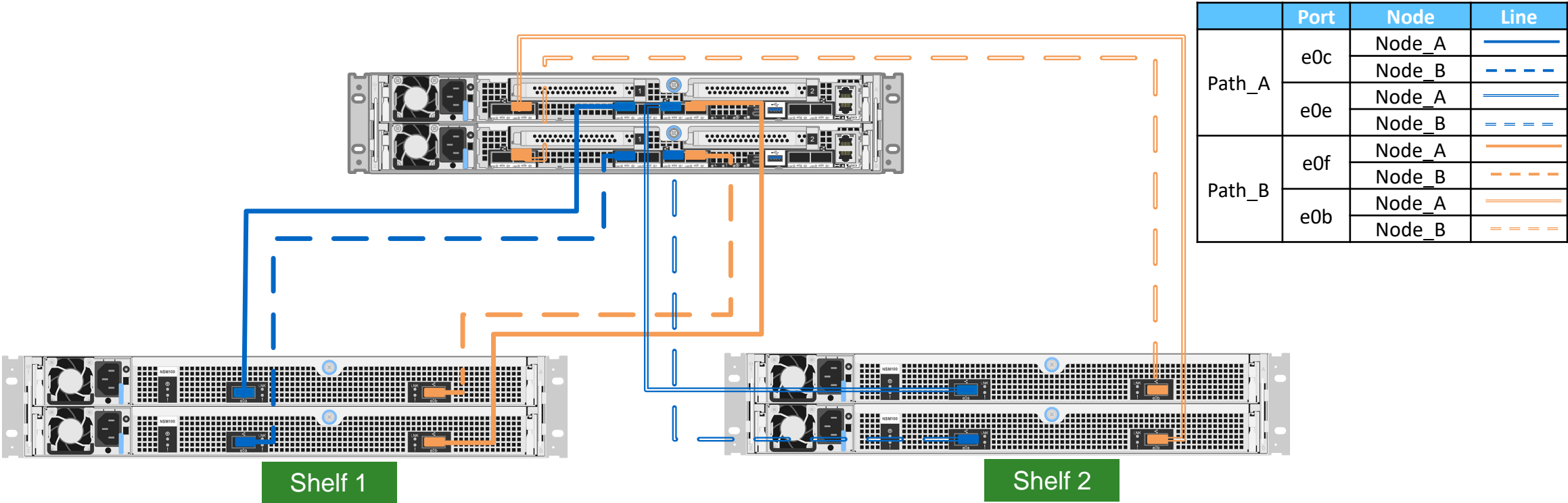
Maximum NS224	
2 shelves / 48 SSDs	

	Port	Node	Line
Path_A	e0c	Node_A	—————
		Node_B	- - - - -
Path_B	e0f	Node_A	—————
		Node_B	- - - - -

# AFF A320 with Two NS224 Shelves – ONTAP 9.6+

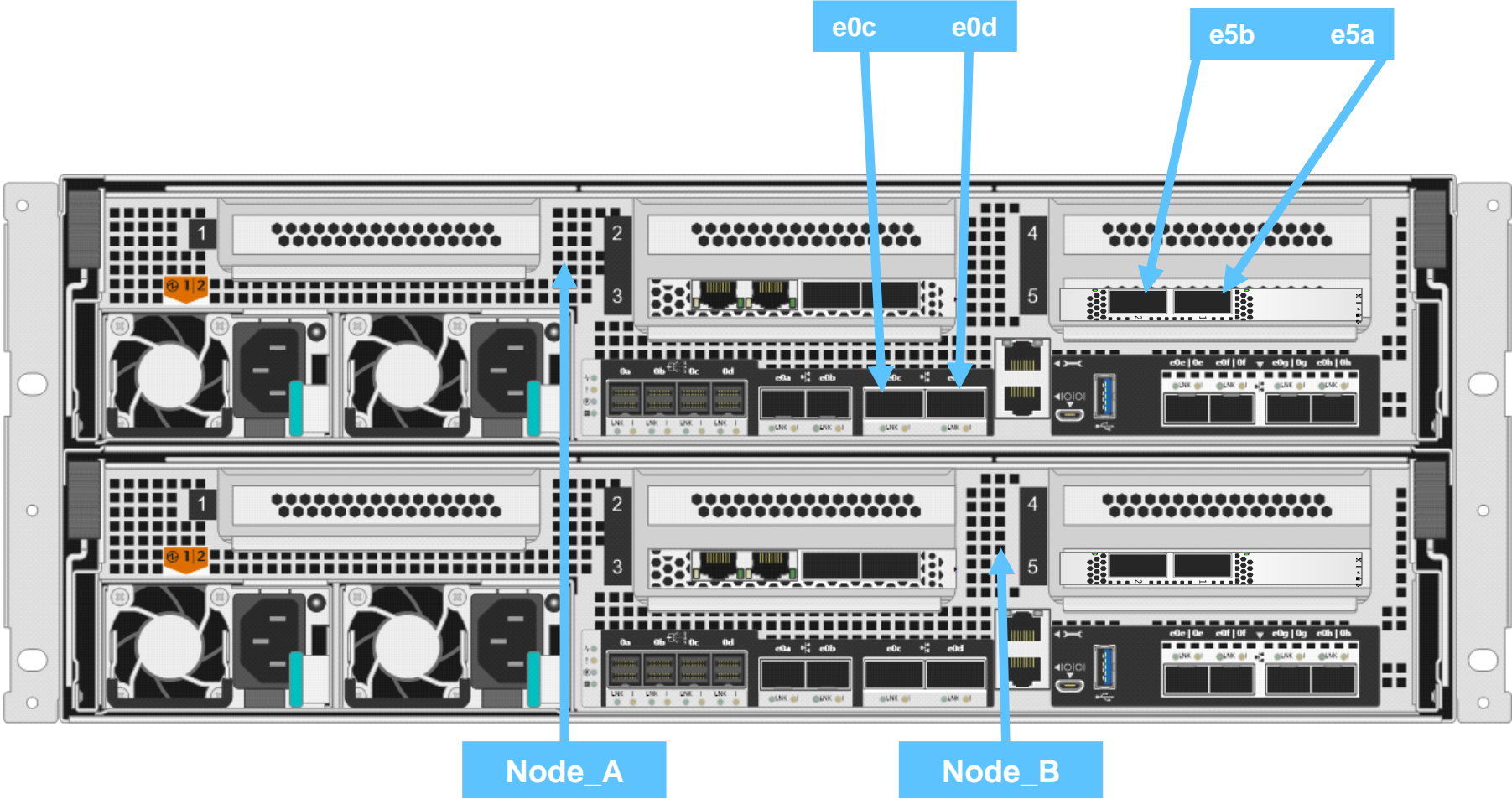
Using onboard 100GbE ports to connect to two NS224 shelves

Maximum NS224
2 shelves / 48 SSDs



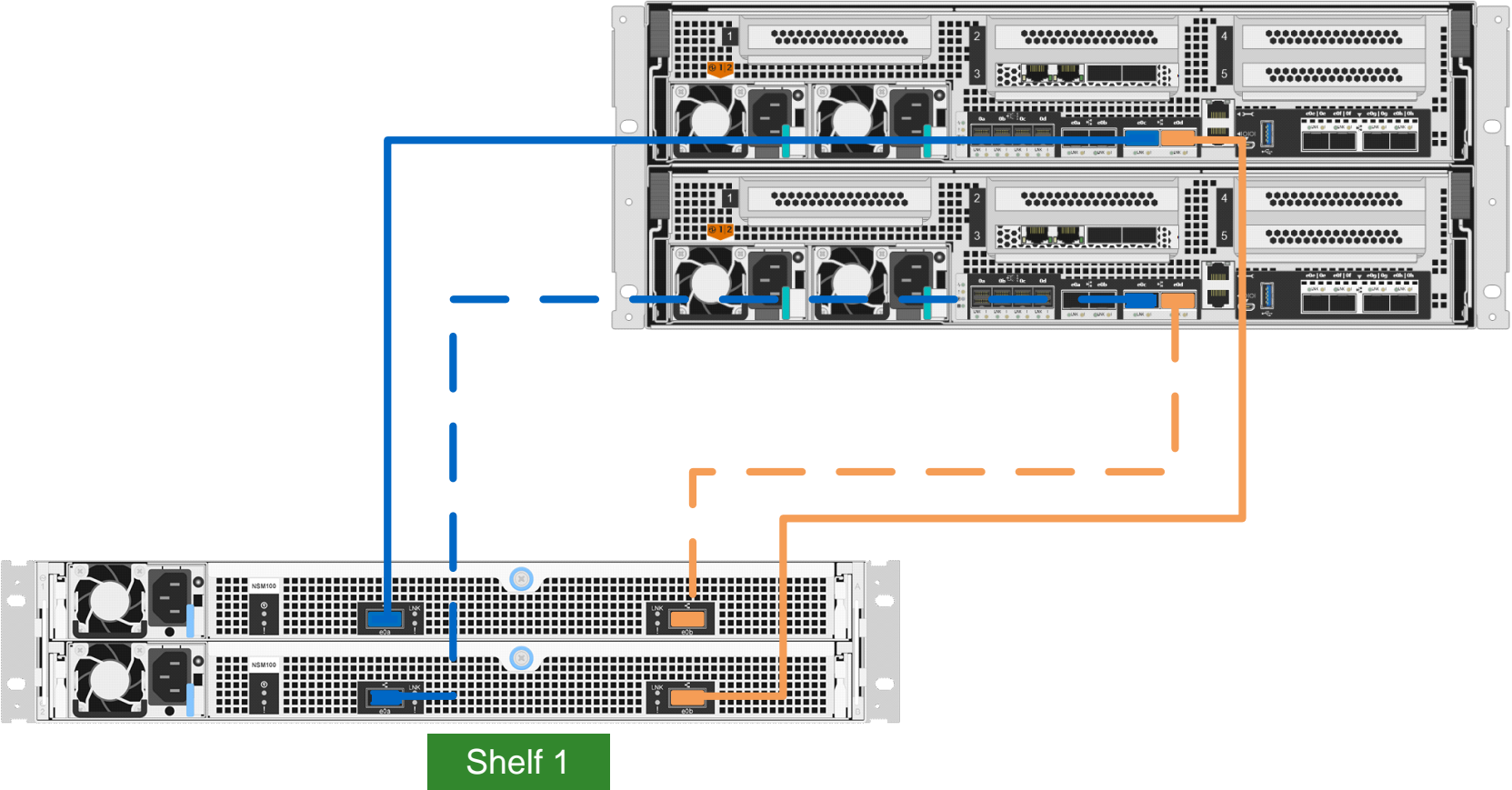


# AFF / ASA A400 Rear View – Onboard and Adapter-Based 100GbE Ports



# AFF / ASA A400 with One NS224 Shelf - Option One – ONTAP 9.7+

Using onboard 100GbE ports to connect to single NS224 shelf

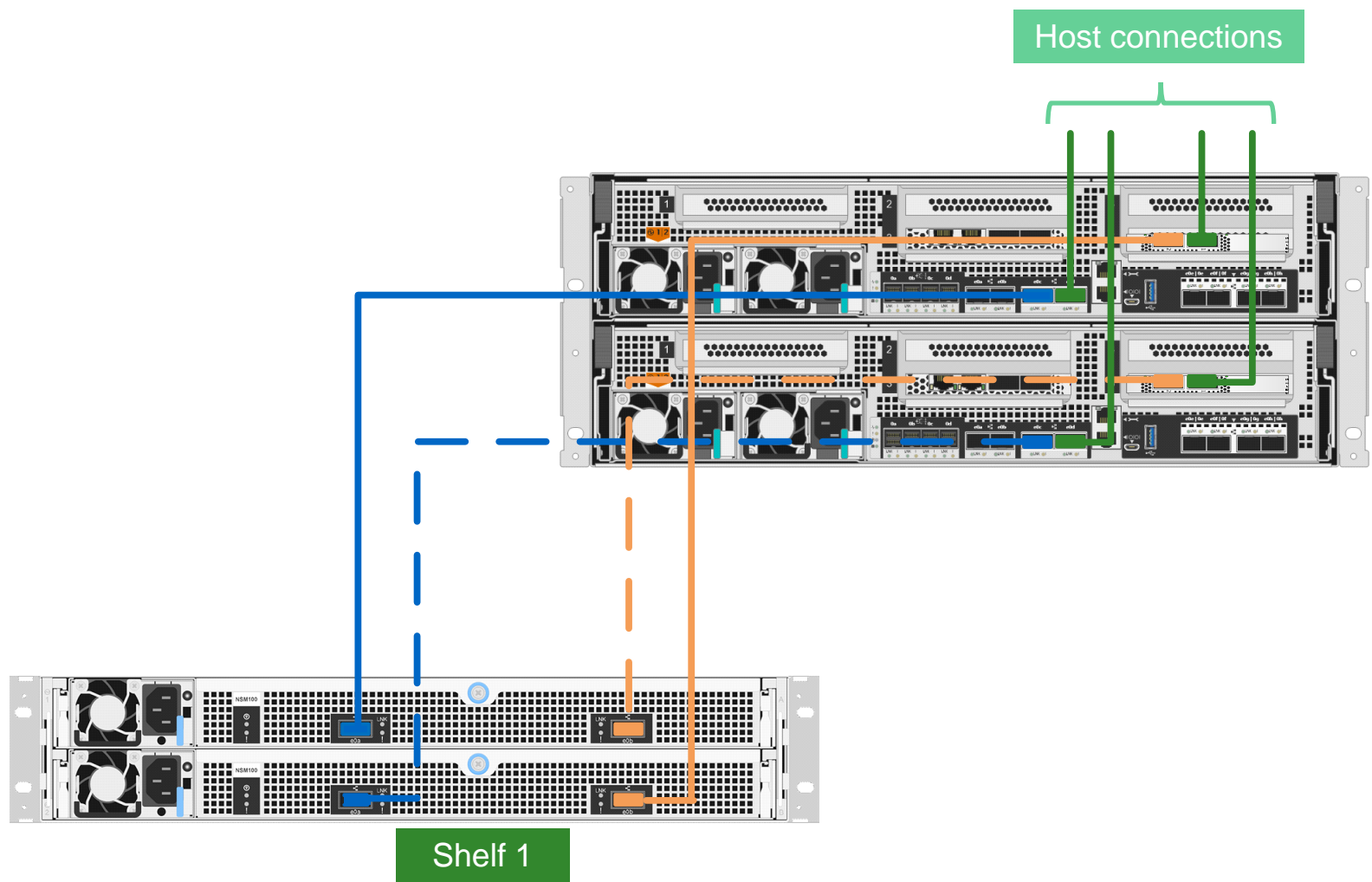


Maximum NS224			
2 shelves / 48 SSDs			

	Port	Node	Line
Path_A	e0c	Node_A	—————
		Node_B	- - - - -
Path_B	e0d	Node_A	—————
		Node_B	- - - - -

# AFF / ASA A400 with One NS224 Shelf – Option Two – ONTAP 9.7+

Using one onboard 100GbE port and one 100GbE port from the X1148A in slot 5



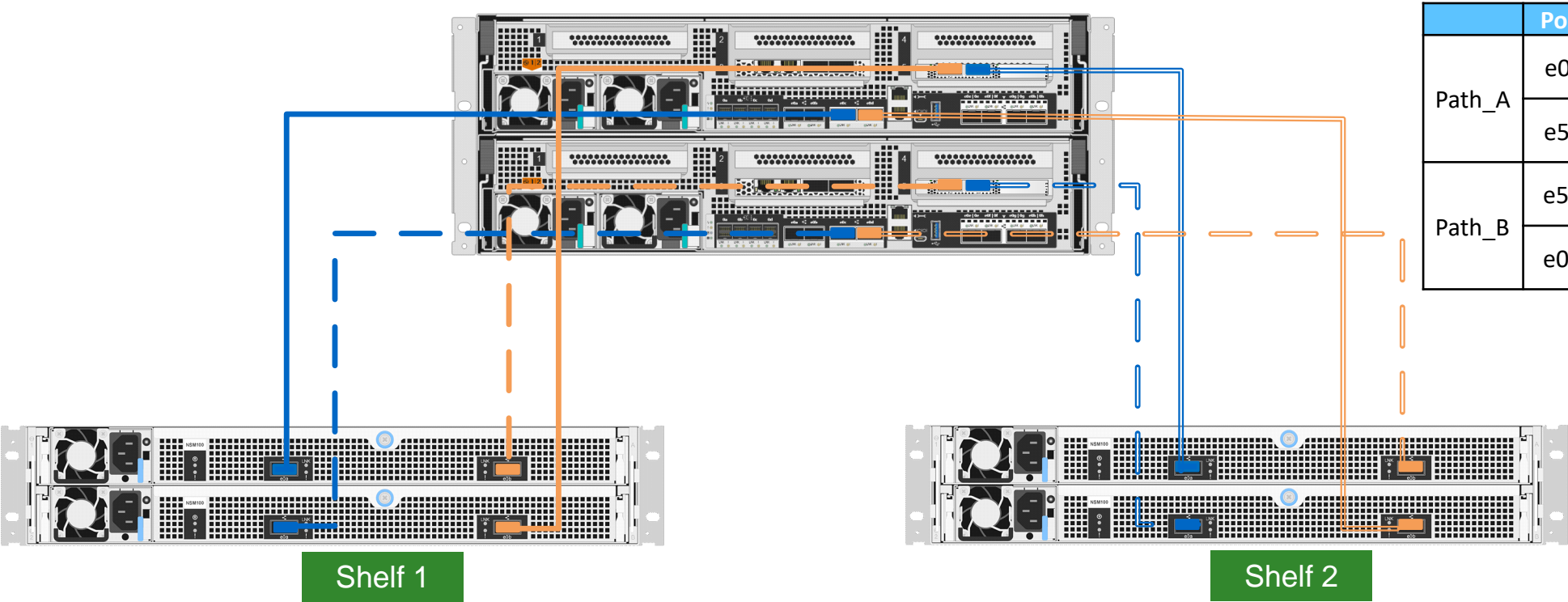
Maximum NS224			
2 shelves / 48 SSDs			

	Port	Node	Line
Path_A	e0c	Node_A	—————
	e0c	Node_B	- - - - -
Path_B	e5b	Node_A	—————
	e5b	Node_B	- - - - -

# AFF / ASA A400 with Two NS224 Shelves – ONTAP 9.7+

Using two onboard 100GbE ports and two from the X1148A in slot 5

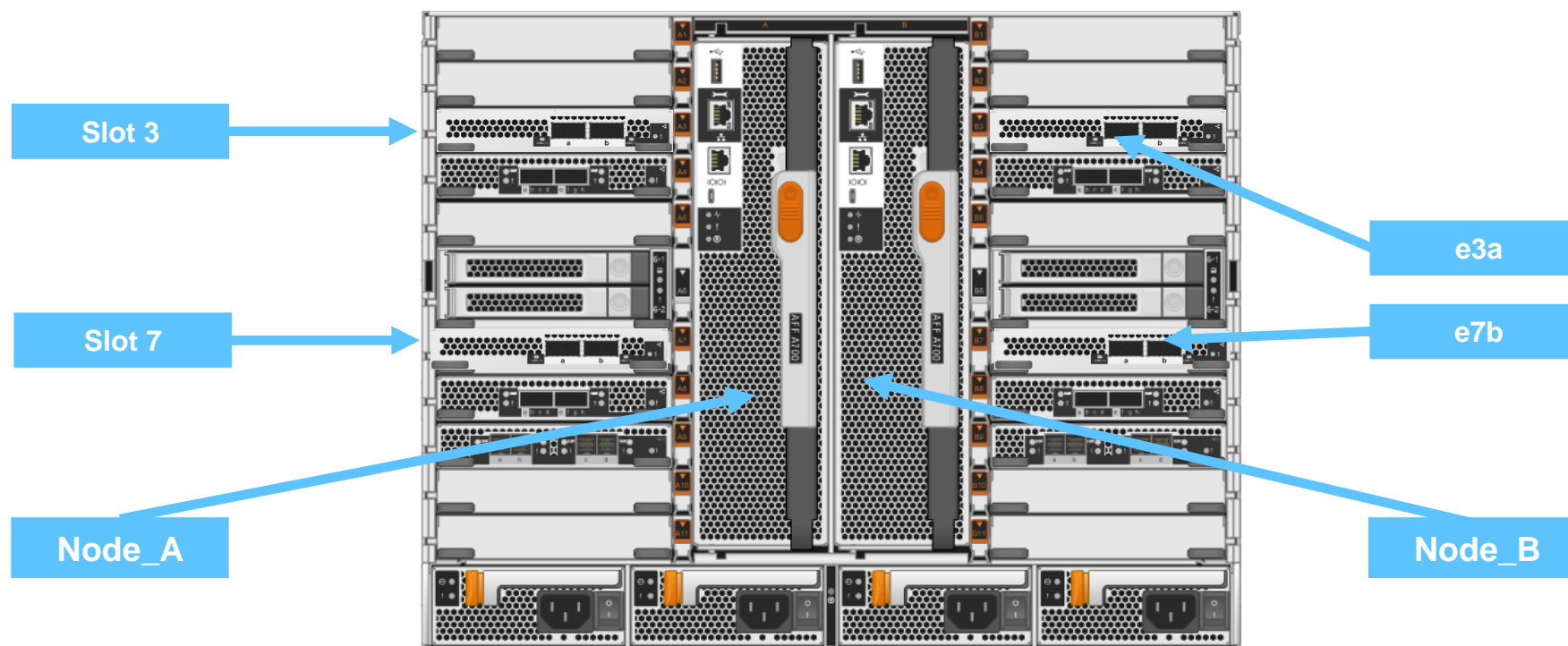
Maximum NS224
2 shelves / 48 SSDs



	Port	Node	Line
Path_A	e0c	Node_A	—————
		Node_B	- - - - -
	e5a	Node_A	—————
		Node_B	- - - - -
Path_B	e5b	Node_A	—————
		Node_B	- - - - -
	e0d	Node_A	—————
		Node_B	- - - - -

# AFF / ASA A700 Rear View – Adapter-Based 100GbE Ports

AFF / ASA A700 requires X9170A NVMe dump device installed in slot 6-1 of the NVRAM module in slot 6 to use with NS224



# AFF A900 Rear View After an A700 Upgrade – Adapter-Based 100GbE Ports

NS224 connections remain the same as the original A700 on slides 23-25

NVRAM11 module on A900 does not use the A700 X9170A NVMe dump device

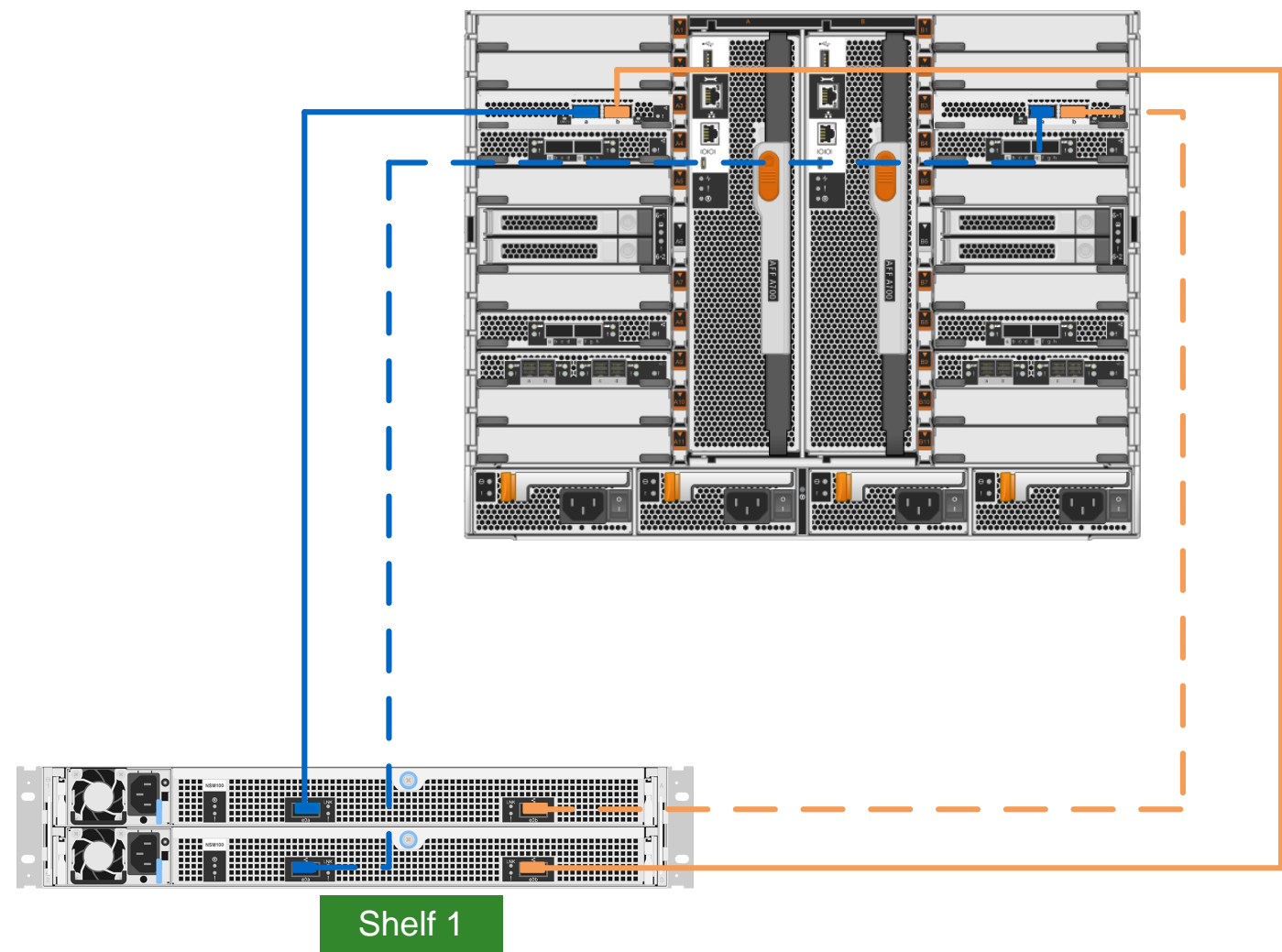


For A700 MCC upgraded to A900 storage adapters in slots 3 and 7 must be moved to slots 2 and 10 or 1 and 11



# AFF / ASA A700 with One NS224 Shelf – Option One – ONTAP 9.8+

Using two 100GbE ports on the X91148A adapter in slot 3

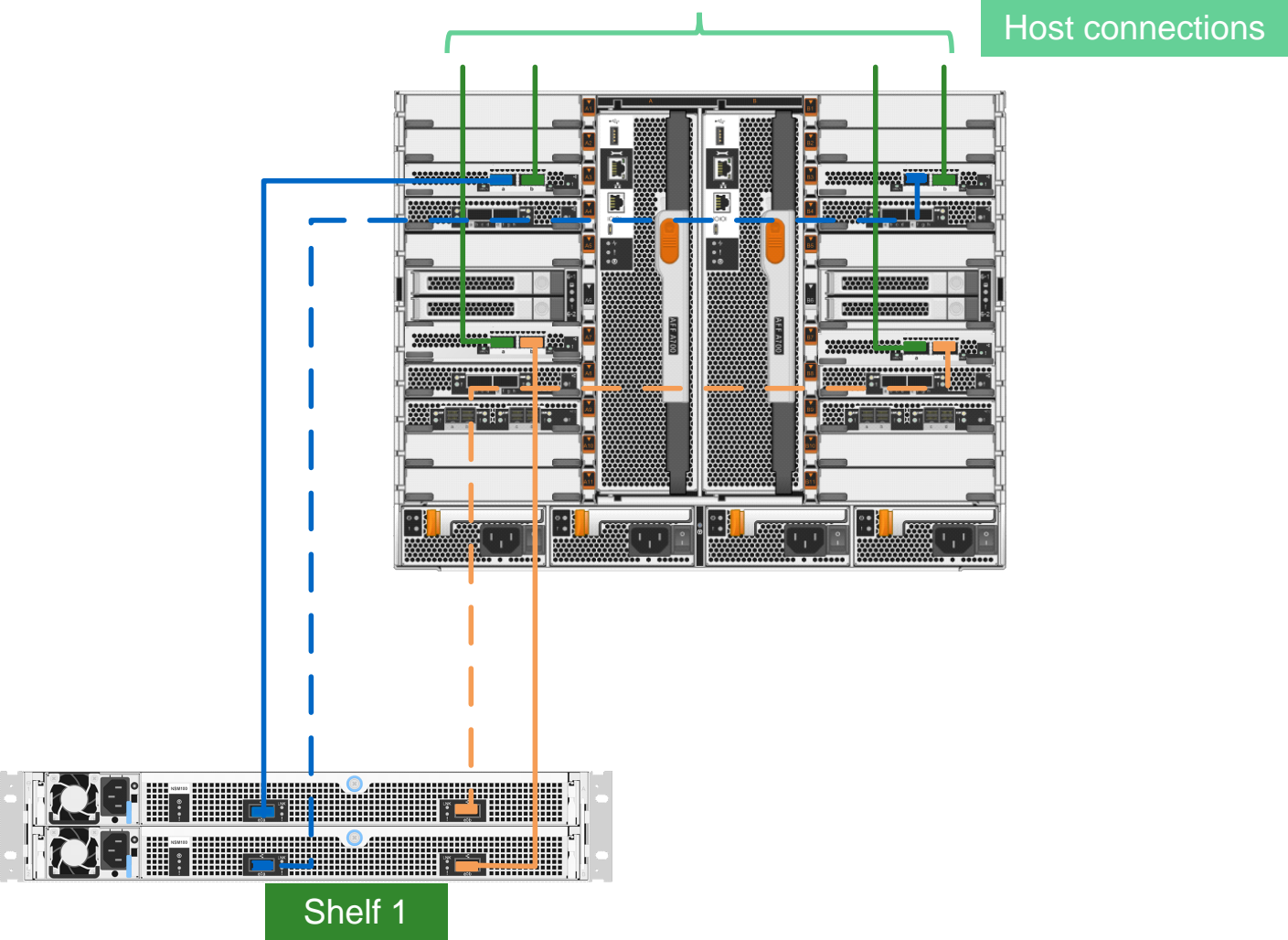


Maximum NS224	
2 shelves / 48 SSDs	

	Port	Node	Line
Path_A	e3a	Node_A	—————
		Node_B	- - - - -
Path_B	e3b	Node_A	—————
		Node_B	- - - - -

# AFF / ASA A700 with One NS224 Shelf – Option Two – ONTAP 9.8+

Using two 100GbE X91148A adapters in slot 3 and slot 7 plus host-side connections



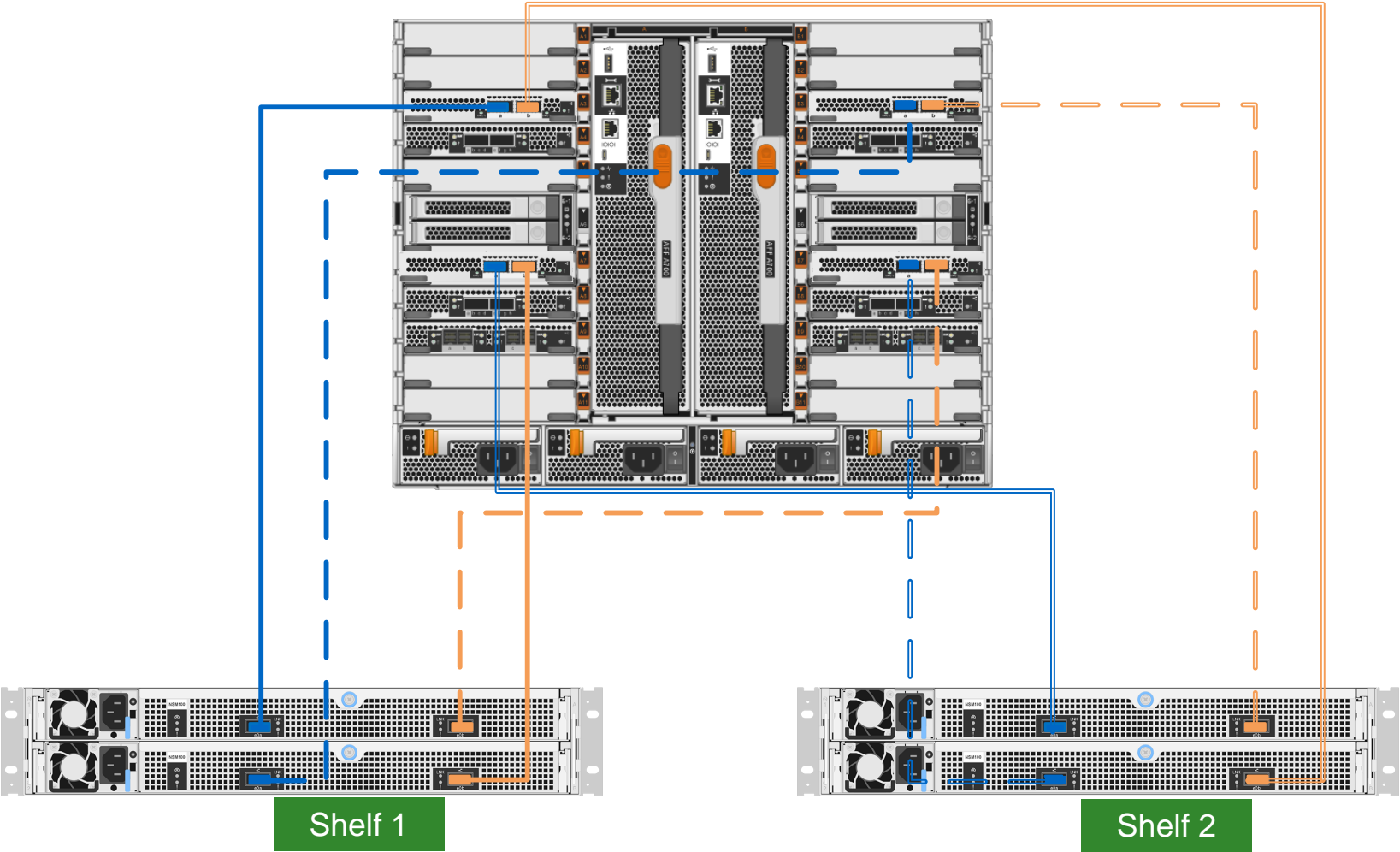
Maximum NS224	
2 shelves / 48 SSDs	

	Port	Node	Line
Path_A	e3a	Node_A	—————
		Node_B	- - - - -
Path_B	e7b	Node_A	—————
		Node_B	- - - - -



# AFF / ASA A700 with Two NS224 Shelves – ONTAP 9.8+

Using two 100GbE X91148A adapters in slot 3 and slot 7

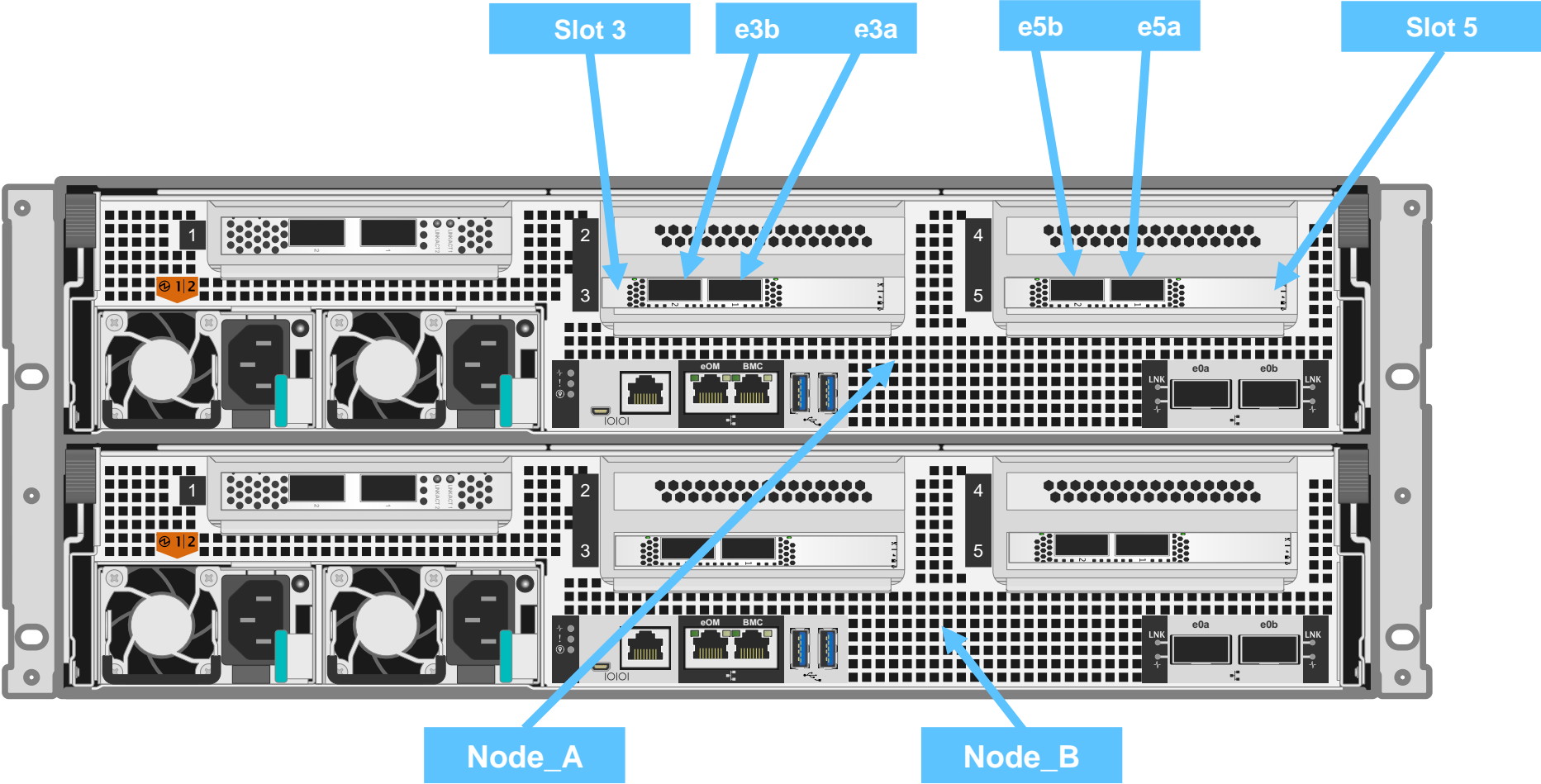


Maximum NS224	
2 shelves / 48 SSDs	

	Port	Node	Line
Path_A	e3a	Node_A	—————
		Node_B	- - - - -
	e7a	Node_A	—————
		Node_B	- - - - -
Path_B	e7b	Node_A	—————
		Node_B	- - - - -
	e3b	Node_A	—————
		Node_B	- - - - -

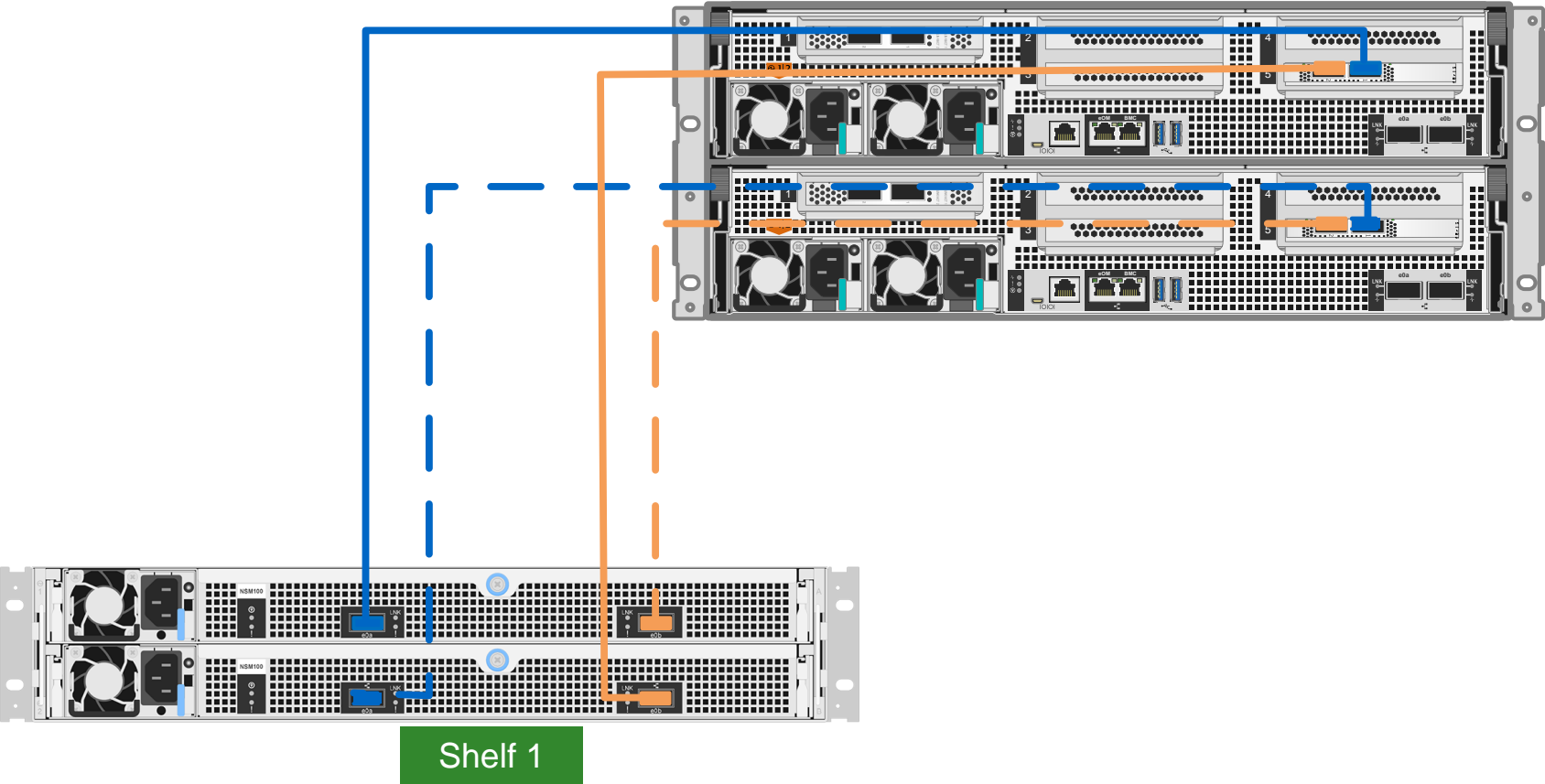
# AFF / ASA A800 Rear View – Adapter-Based 100GbE Ports

ASA A800 supported in ONTAP 9.8 and later



# AFF / ASA A800 with One NS224 Shelf – Option One – ONTAP 9.7+

Using two 100GbE ports on the X1148A adapter in slot 5

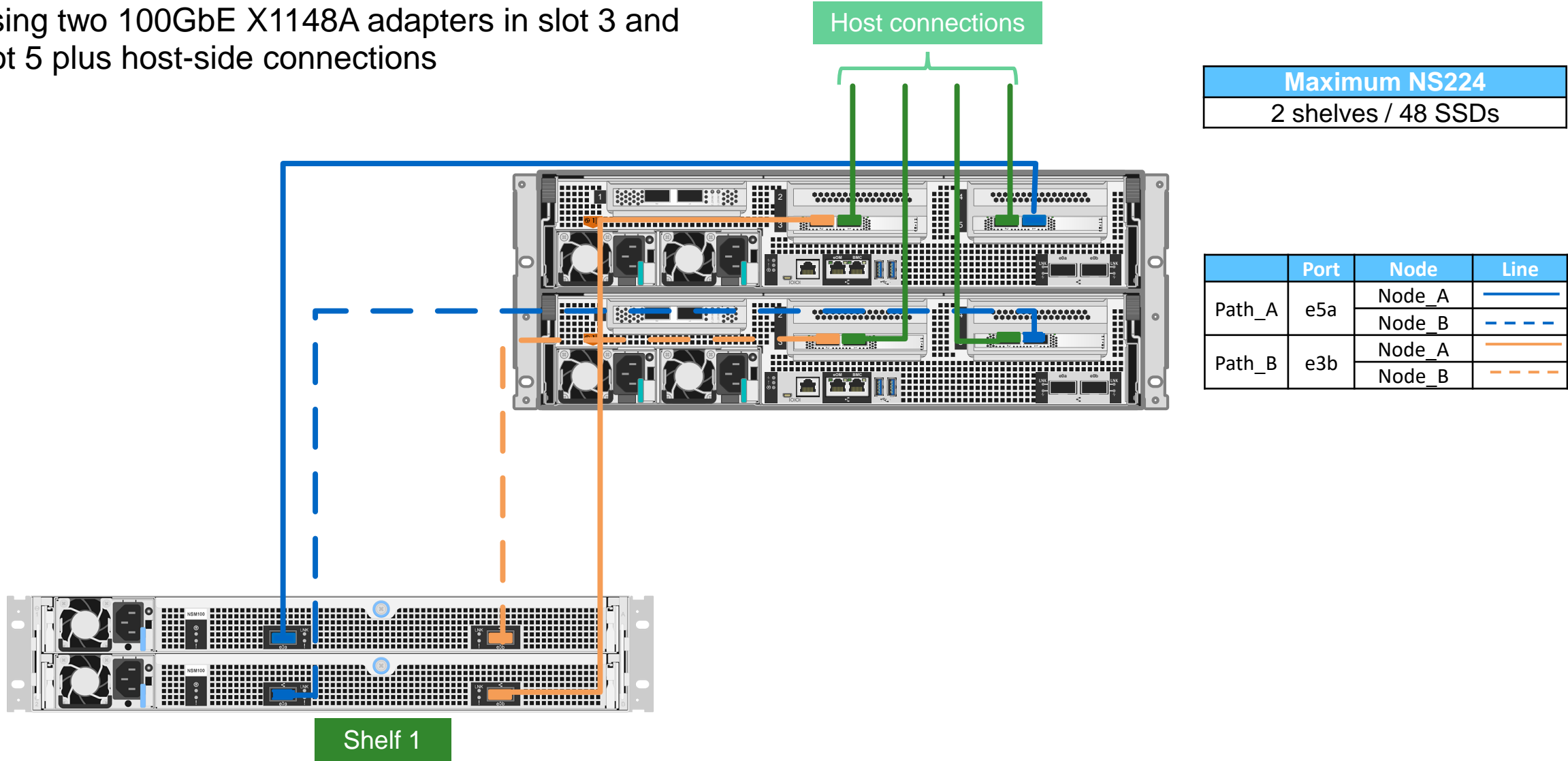


Maximum NS224			
2 shelves / 48 SSDs			

	Port	Node	Line
Path_A	e5a	Node_A	—————
		Node_B	- - - - -
Path_B	e5b	Node_A	—————
		Node_B	- - - - -

# AFF / ASA A800 with One NS224 Shelf – Option Two – ONTAP 9.7+

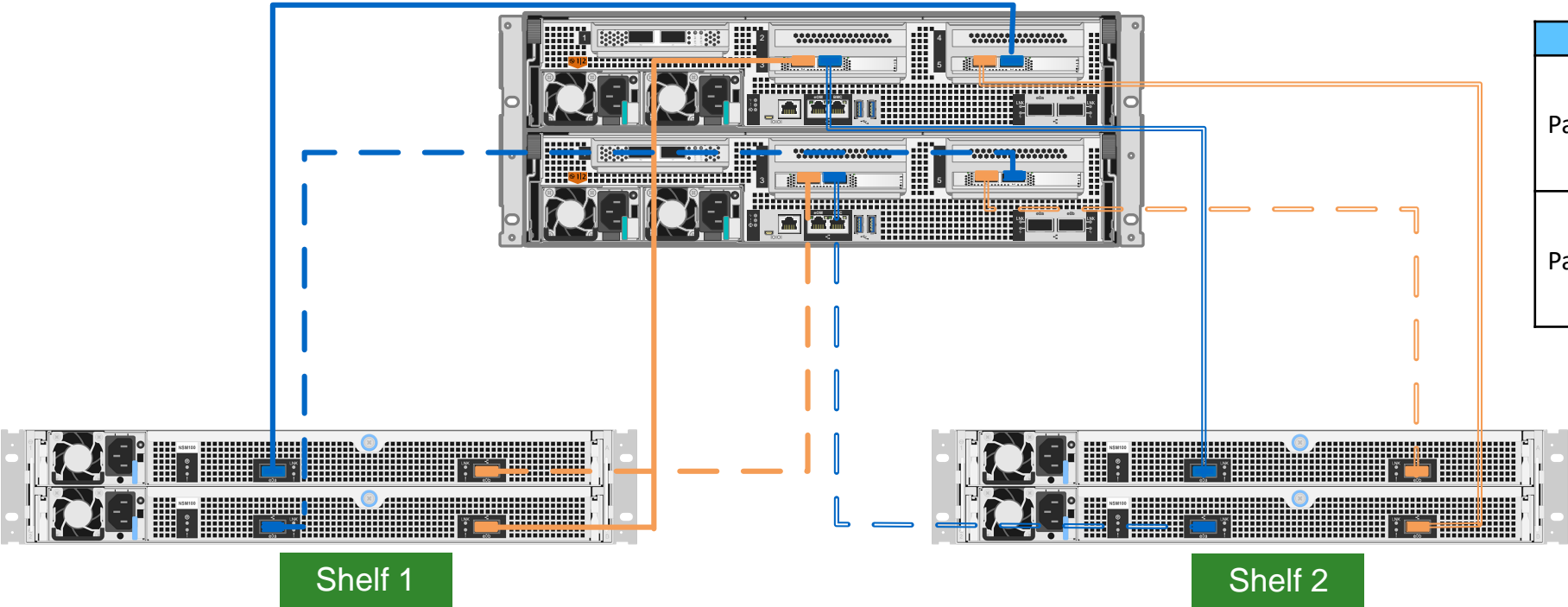
Using two 100GbE X1148A adapters in slot 3 and slot 5 plus host-side connections



# AFF / ASA A800 with Two NS224 Shelves – ONTAP 9.7+

Using two 100GbE X1148A adapters in slot 3 and slot 5

Maximum NS224
2 shelves / 48 SSDs



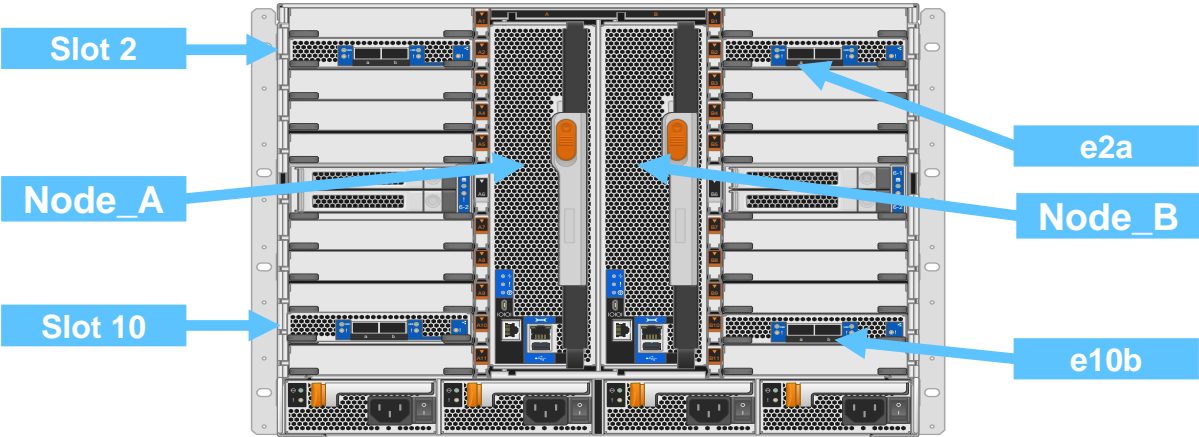
	Port	Node	Line
Path_A	e5a	Node_A	—————
		Node_B	- - - - -
	e3a	Node_A	= = = = =
		Node_B	—————
Path_B	e3b	Node_A	—————
		Node_B	- - - - -
	e5b	Node_A	—————
		Node_B	= = = = =

# AFF A900 Rear View for New Factory Orders – Adapter-Based 100GbE Ports

Supports up to 4 directly connected NS224 shelves

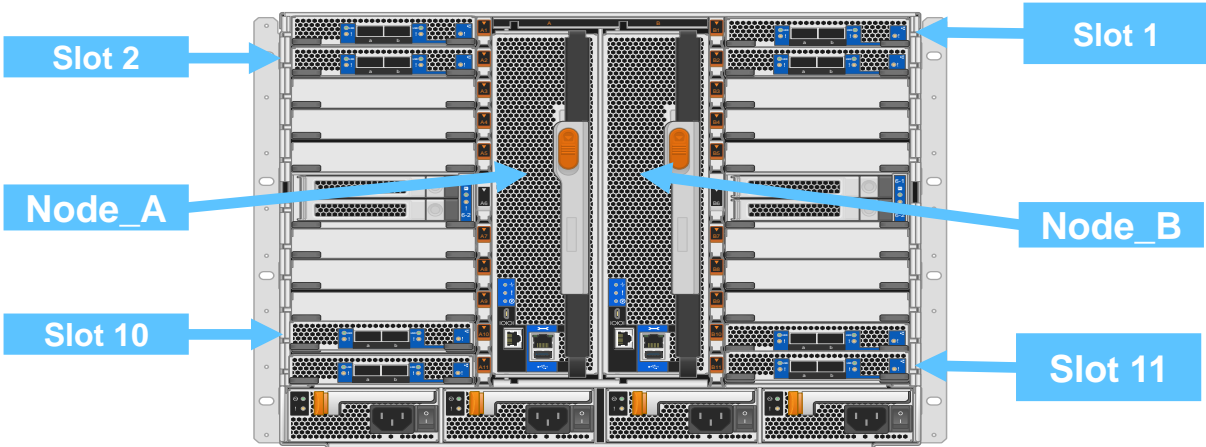
NVRAM11 module on A900 **does not** use the A700 X9170A NVMe dump device

Slots for direct connections to 2 NS224 shelves



Supports 1 to 2 NS224 direct connections

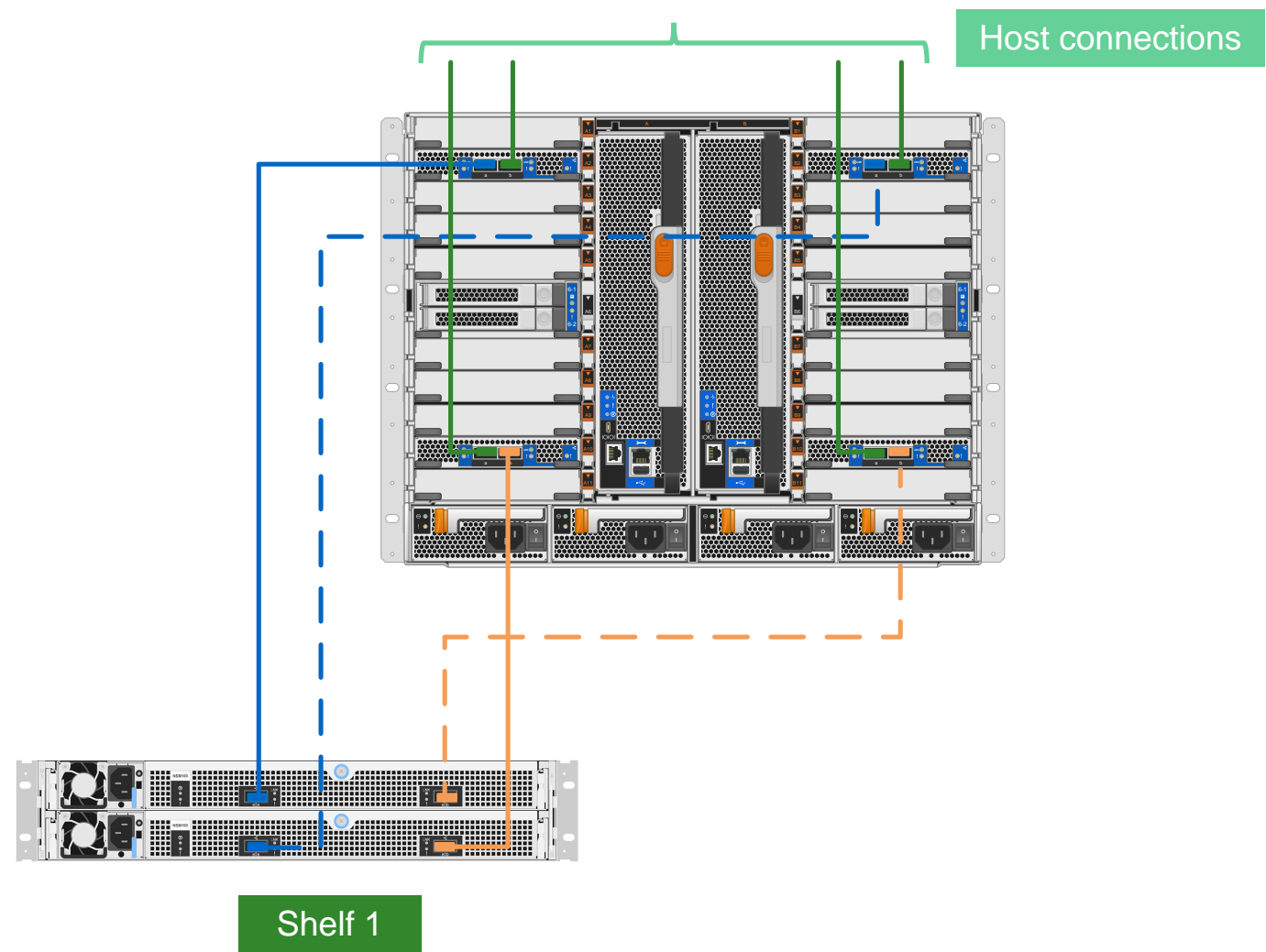
Slots for direct connections to 4 NS224 shelves



Supports up to 4 NS224 direction connections

# New AFF A900 with One NS224 Shelf

Using two 100GbE X91153A adapters in slot 2 and slot 10 plus host-side connections

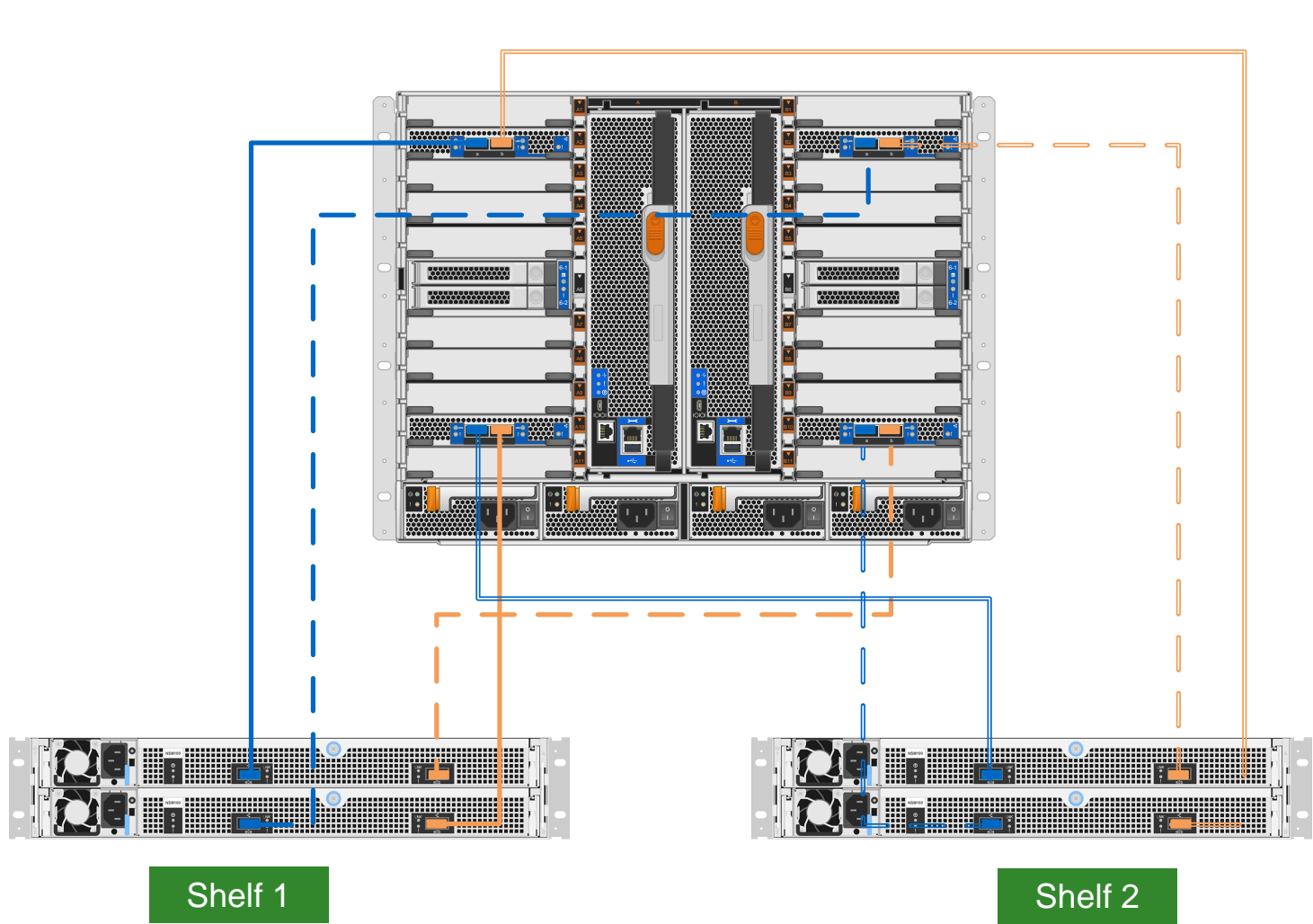


Maximum NS224	
4 shelves / 96 SSDs	

	Port	Node	Line
Path_A	e2a	Node_A	————
		Node_B	- - - -
Path_B	e10b	Node_A	————
		Node_B	- - - -

# New AFF A900 with Two NS224 Shelves

Using two 100GbE X91153A adapters in slots 2 and slot 10



Maximum NS224	
4 shelves / 96 SSDs	

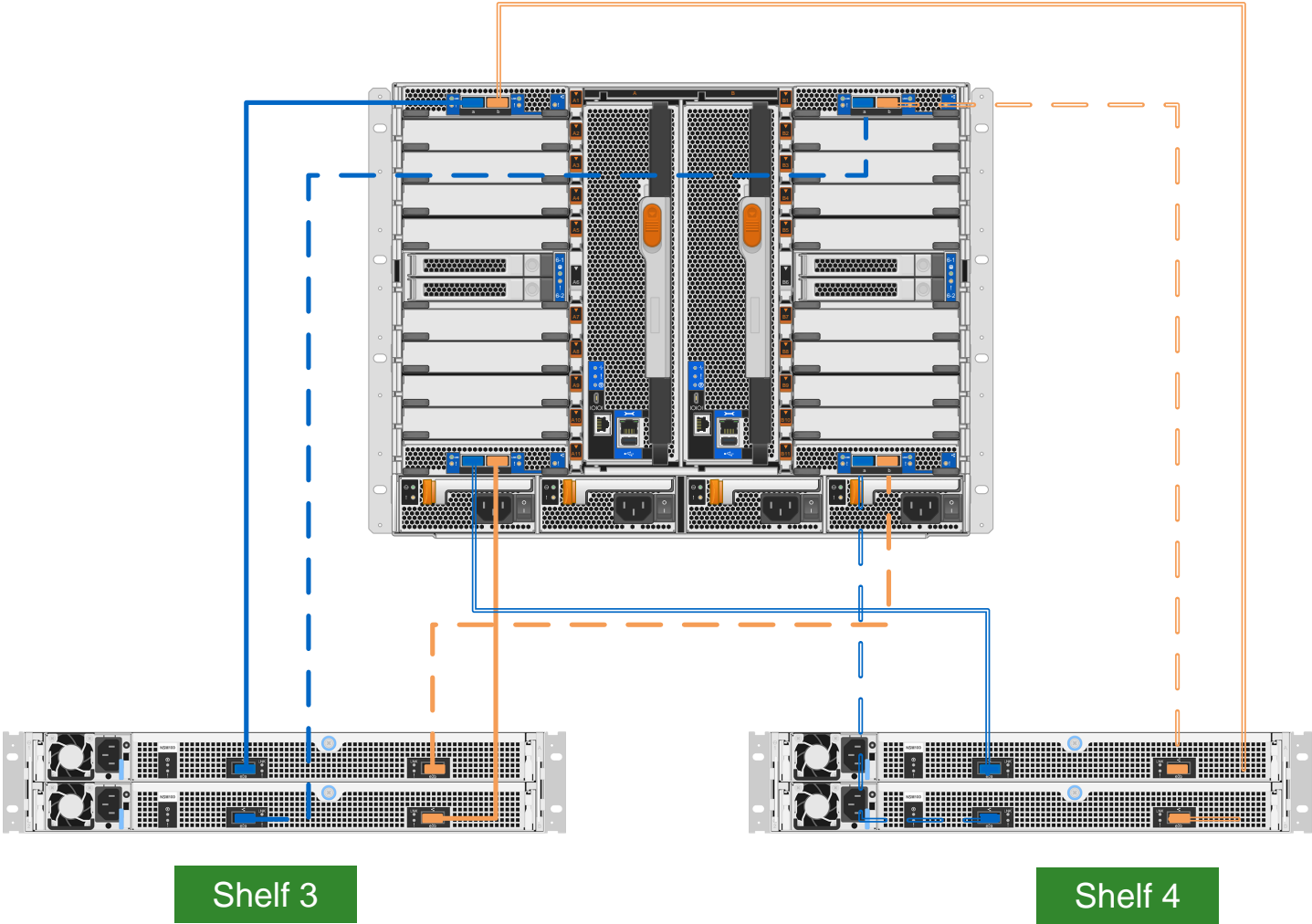
	Port	Node	Line
Path_A	e2a	Node_A	—————
		Node_B	- - - - -
	e10a	Node_A	—————
		Node_B	- - - - -
Path_B	e10b	Node_A	—————
		Node_B	- - - - -
	e2b	Node_A	—————
		Node_B	- - - - -



# New AFF A900 with Four NS224 Shelves

(reference slide 32 for first two NS224 shelves)

Using two 100GbE X91153A adapters in slots 1 and slot 11

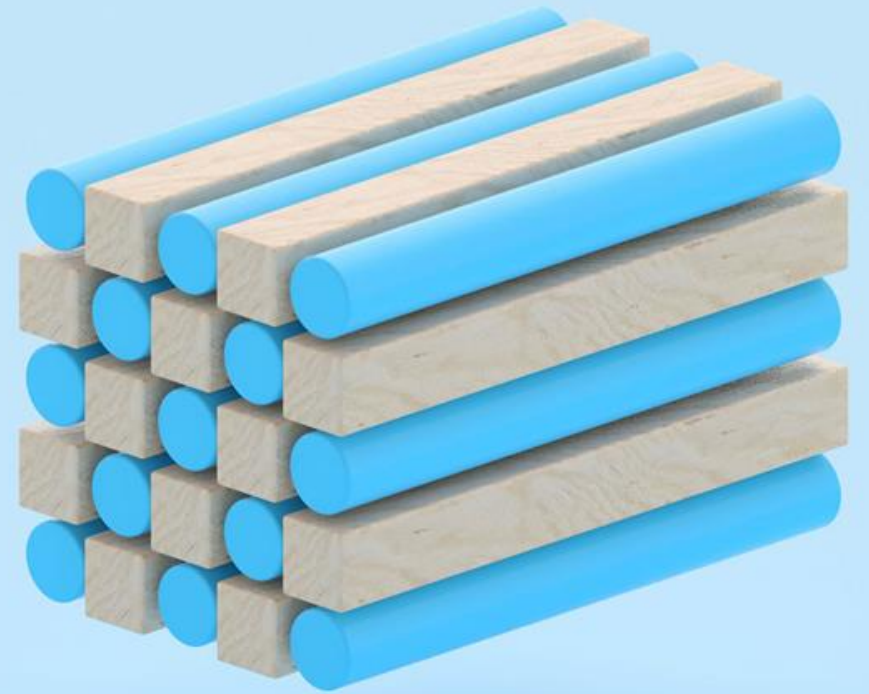


Maximum NS224	
4 shelves / 96 SSDs	

	Port	Node	Line
Path_A	e1a	Node_A	—————
		Node_B	- - - - -
	e11a	Node_A	—————
		Node_B	- - - - -
Path_B	e11b	Node_A	—————
		Node_B	- - - - -
	e1b	Node_A	—————
		Node_B	- - - - -

# **NS224 With Switched Connections**

**ONTAP 9.8 and Later**



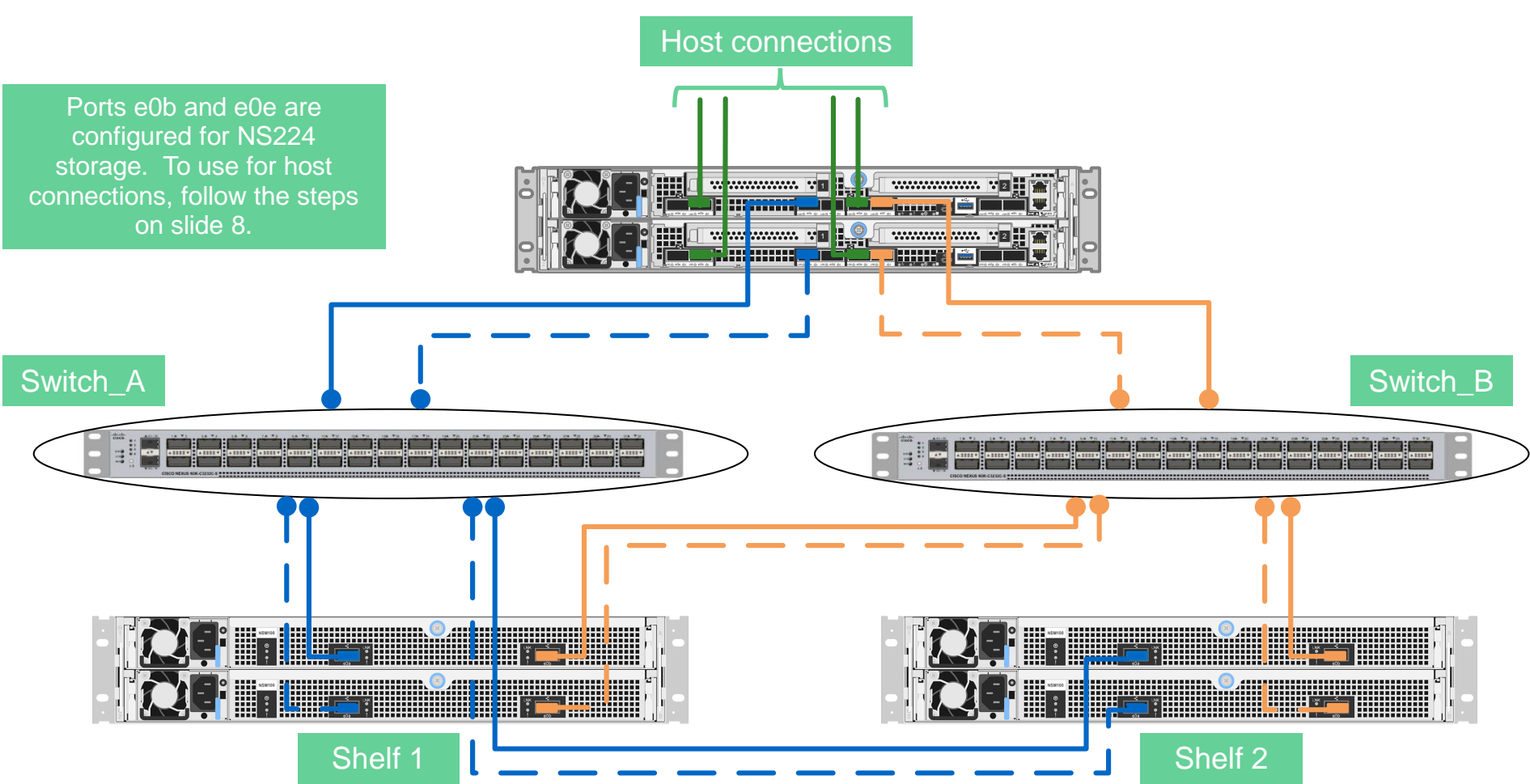
# Switched NS224 Shelves

## Background

- Prior to ONTAP 9.9.1
  - Two dedicated storage switches for NS224 storage – separate from cluster interconnect switches
    - Storage and cluster connections cannot share the same two switches
  - Install latest switched storage reference configuration file (RCF) from NetApp support site [Cisco Cluster and Storage Switch RCF Downloads](#)
    - Cisco Nexus 9336C-FX2: Nexus\_9336C\_RCF\_v1.6-Storage.txt
    - Cisco Nexus 3232C: Nexus\_3232C\_RCF\_v1.6-Storage.txt
- ONTAP 9.9.1 and later
  - Shared cluster interconnect and storage supported on Cisco Nexus 9336C-FX2 switches
  - Review [Cisco Nexus 9336C-FX2 Cluster Interconnect Configurations](#) for more details

# AFF A320 with Two Switched NS224 Shelves – ONTAP 9.8+

Using onboard 100GbE ports to connect to two switched NS224 shelves



Maximum NS224			
4 shelves / 96 SSDs			

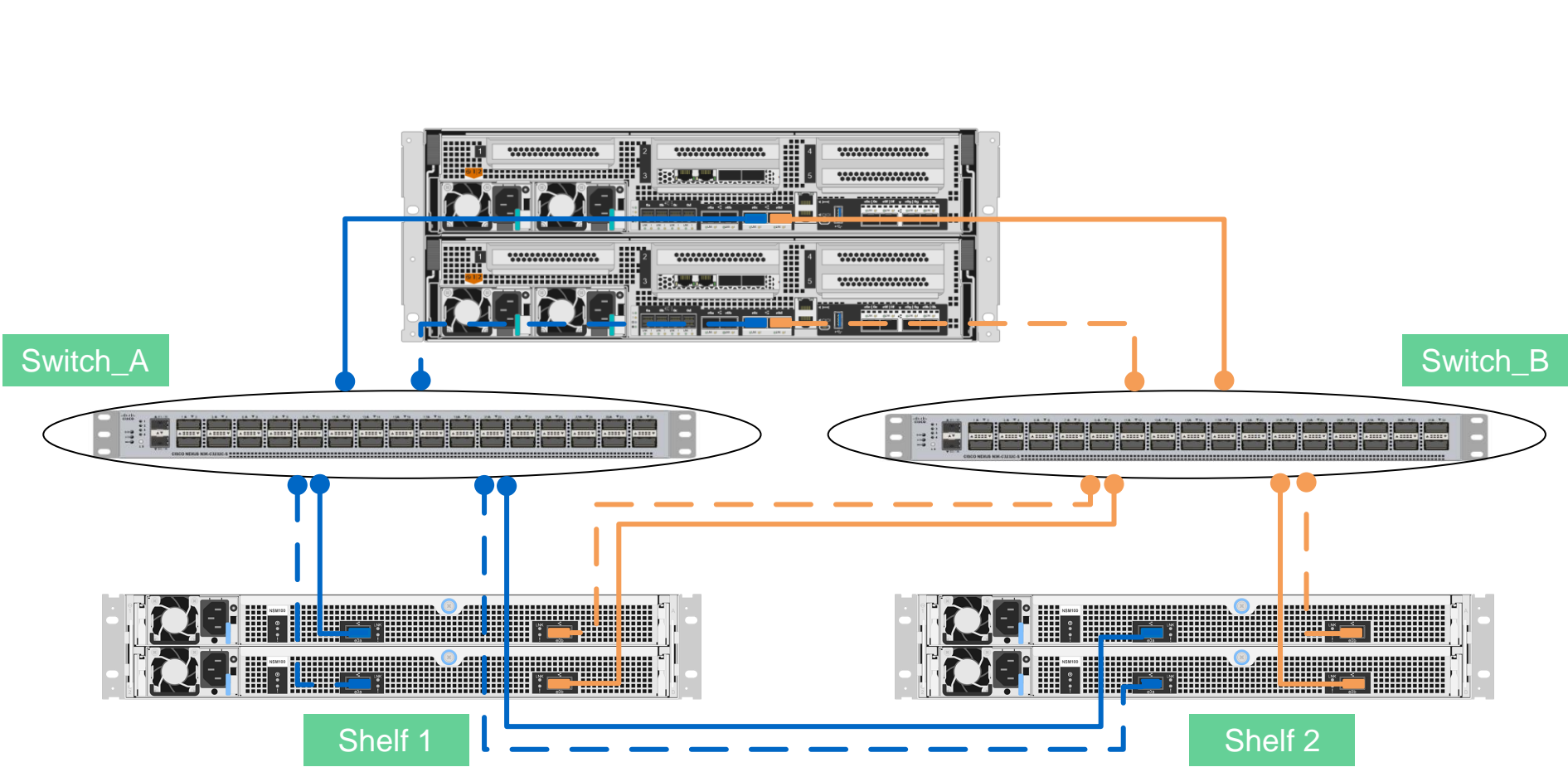
	Port	Node	Line
Path_A	e0c	Node_A	—————
		Node_B	- - - - -
Path_B	e0f	Node_A	—————
		Node_B	- - - - -

	Ports
Switch A	Any port
Switch B	Any port

For additional NS224 shelves, continue connecting as shown

# AFF / ASA A400 with Two Switched NS224 Shelves – ONTAP 9.8+

Using onboard 100GbE ports to connect to two switched NS224 shelves



Maximum NS224	
4 shelves / 96 SSDs	

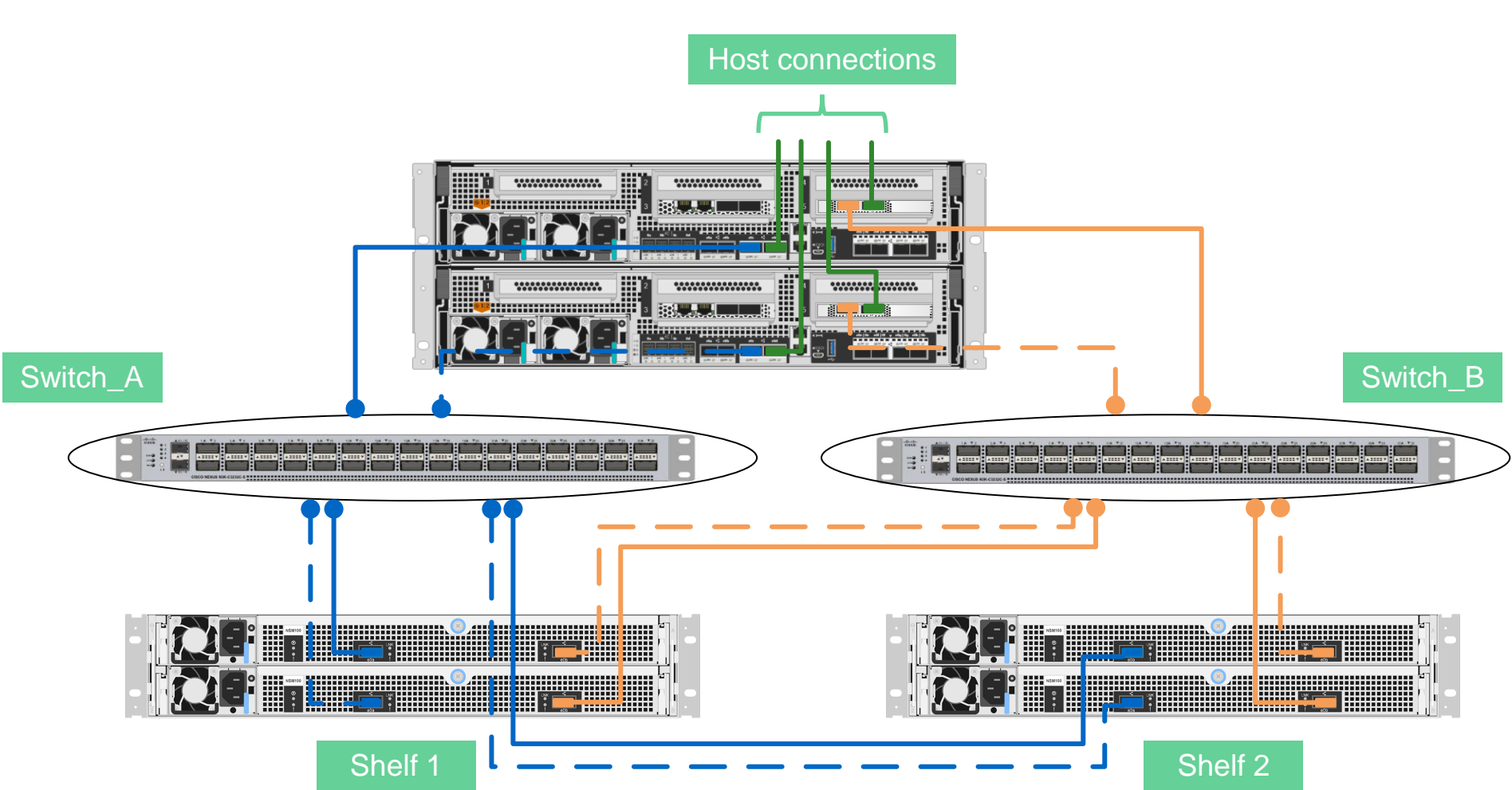
	Port	Node	Line
Path_A	e0c	Node_A	—————
		Node_B	- - - - -
Path_B	e0d	Node_A	—————
		Node_B	- - - - -

	Ports
Switch A	Any port
Switch B	Any port

For additional NS224 shelves, continue connecting as shown

# AFF / ASA A400 with Two Switched NS224 Shelves – Option Two

Using one onboard 100GbE port and one 100GbE port from the X1148A in slot 5



Maximum NS224	
4 shelves / 96 SSDs	

	Port	Node	Line
Path_A	e0c	Node_A	————
	e0c	Node_B	- - - -
Path_B	e5b	Node_A	————
	e5b	Node_B	- - - -

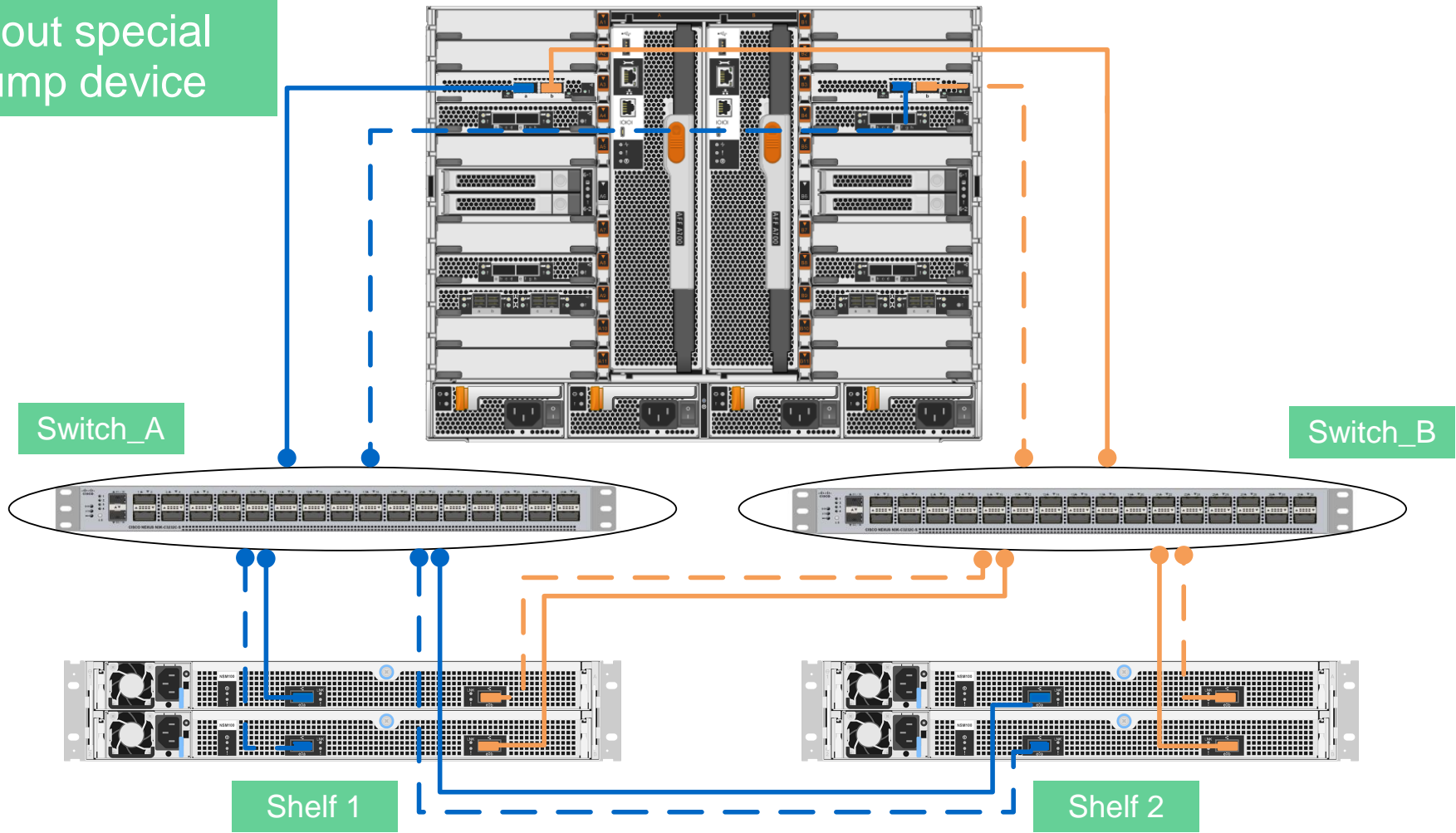
	Ports
Switch A	Any port
Switch B	Any port

For additional NS224 shelves, continue connecting as shown

# AFF / ASA A700 with Two Switched NS224 Shelves – ONTAP 9.8+

Using two 100GbE ports from the X91148A in slot 3

See slide 21  
about special  
dump device



Maximum NS224	
10 shelves / 240 SSDs	

	Port	Node	Line
Path_A	e3a	Node_A	—
		Node_B	- - -
Path_B	e3b	Node_A	—
		Node_B	- - -

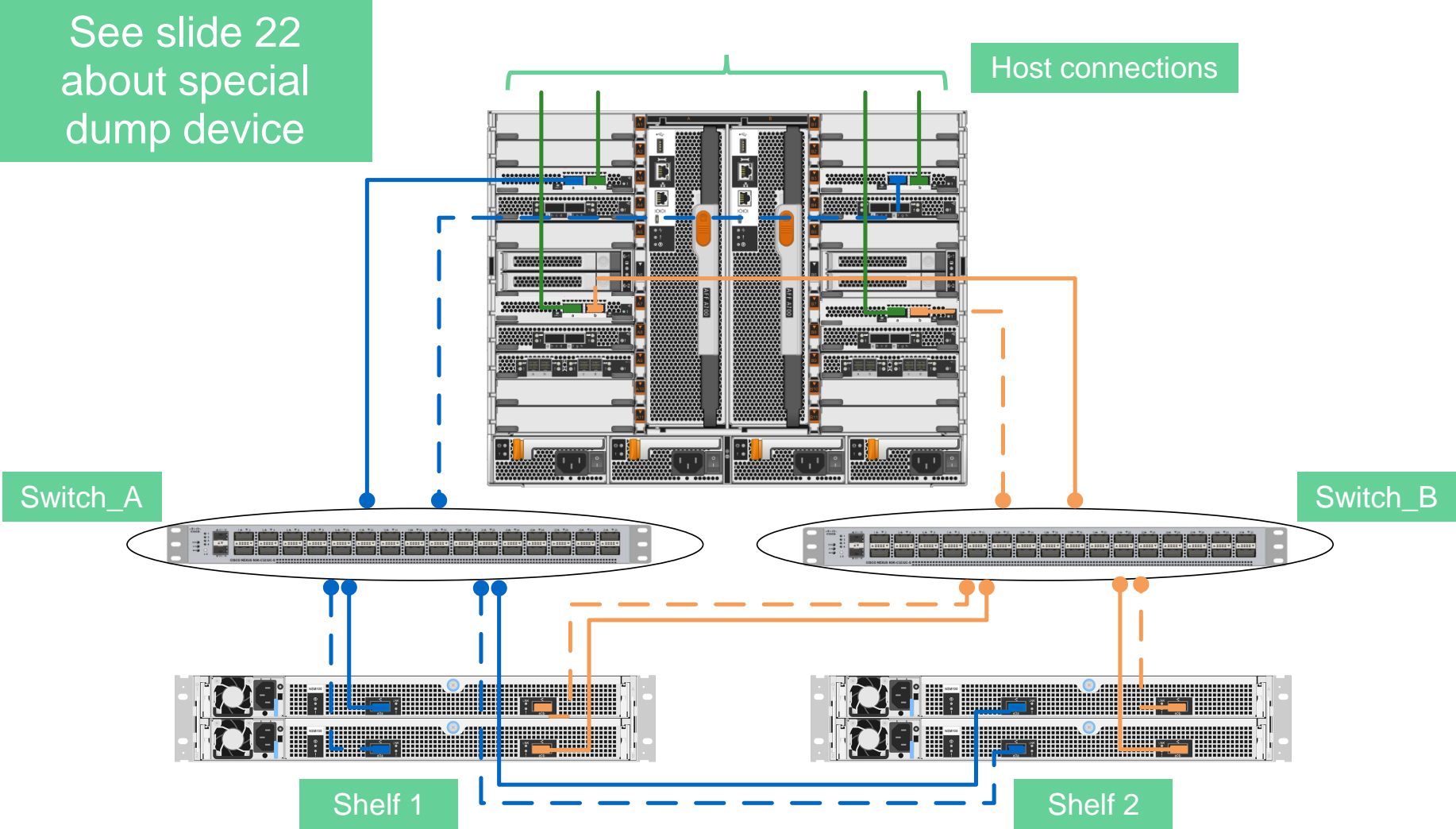
	Ports
Switch A	Any port
Switch B	Any port

For additional NS224 shelves,  
continue connecting as shown



# AFF / ASA A700 with Two Switched NS224 Shelves – Option Two

Using one 100GbE port from the X91148A in slot 3 and one 100GbE port from the X91148A in slot 7



Maximum NS224	
10 shelves / 240 SSDs	

	Port	Node	Line
Path_A	e3a	Node_A	—————
		Node_B	- - - - -
Path_B	e7b	Node_A	—————
		Node_B	- - - - -

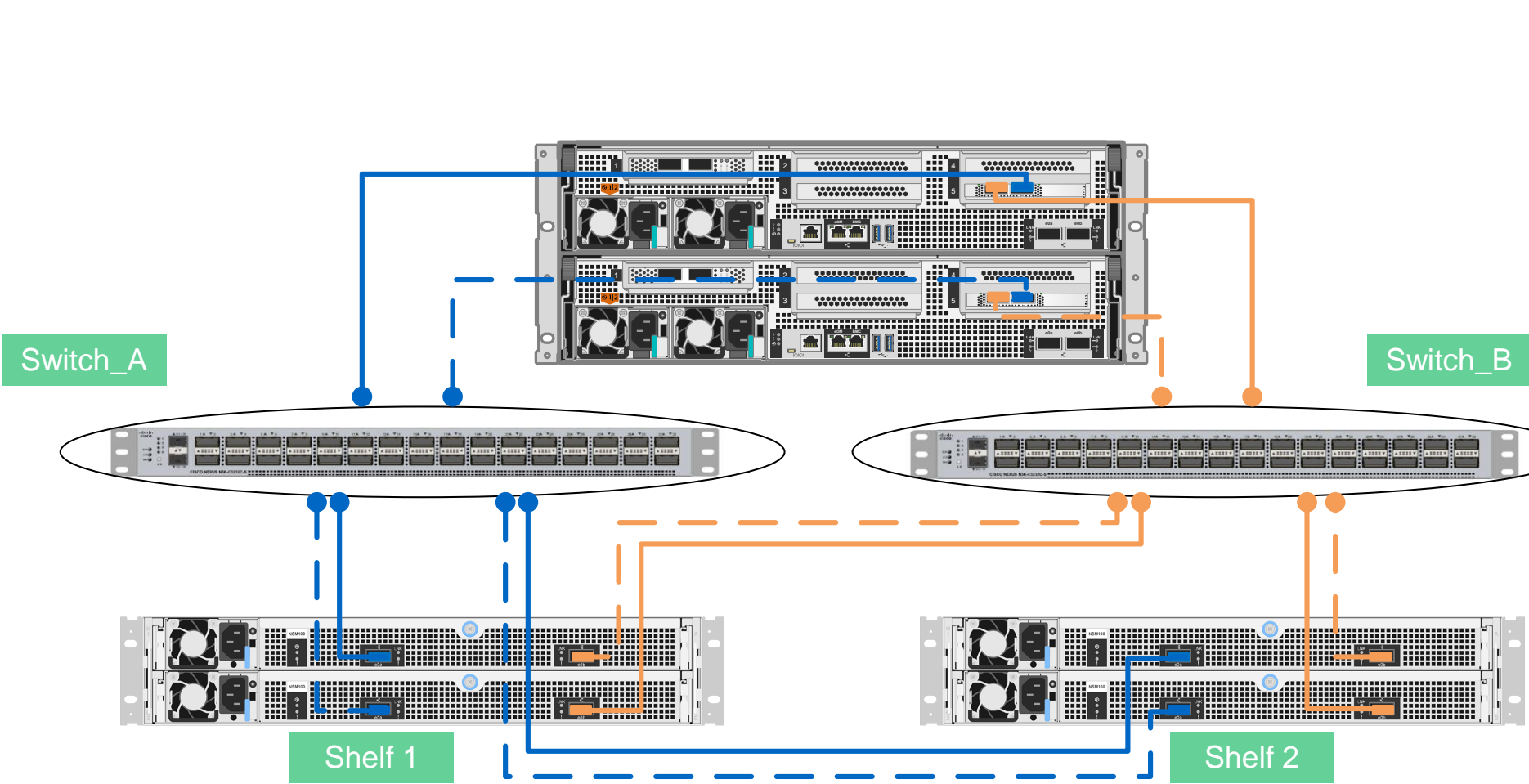
	Ports
Switch A	Any port
Switch B	Any port

For additional NS224 shelves, continue connecting as shown



# AFF / ASA A800 with Two Switched NS224 Shelves – ONTAP 9.8+

Using two 100GbE ports on X1148A in slot 5 to connect to two switched NS224 shelves



Maximum NS224	
8 shelves / 192 SSDs	
240 Max NVMe SSDs	
with 48 internal SSDs	

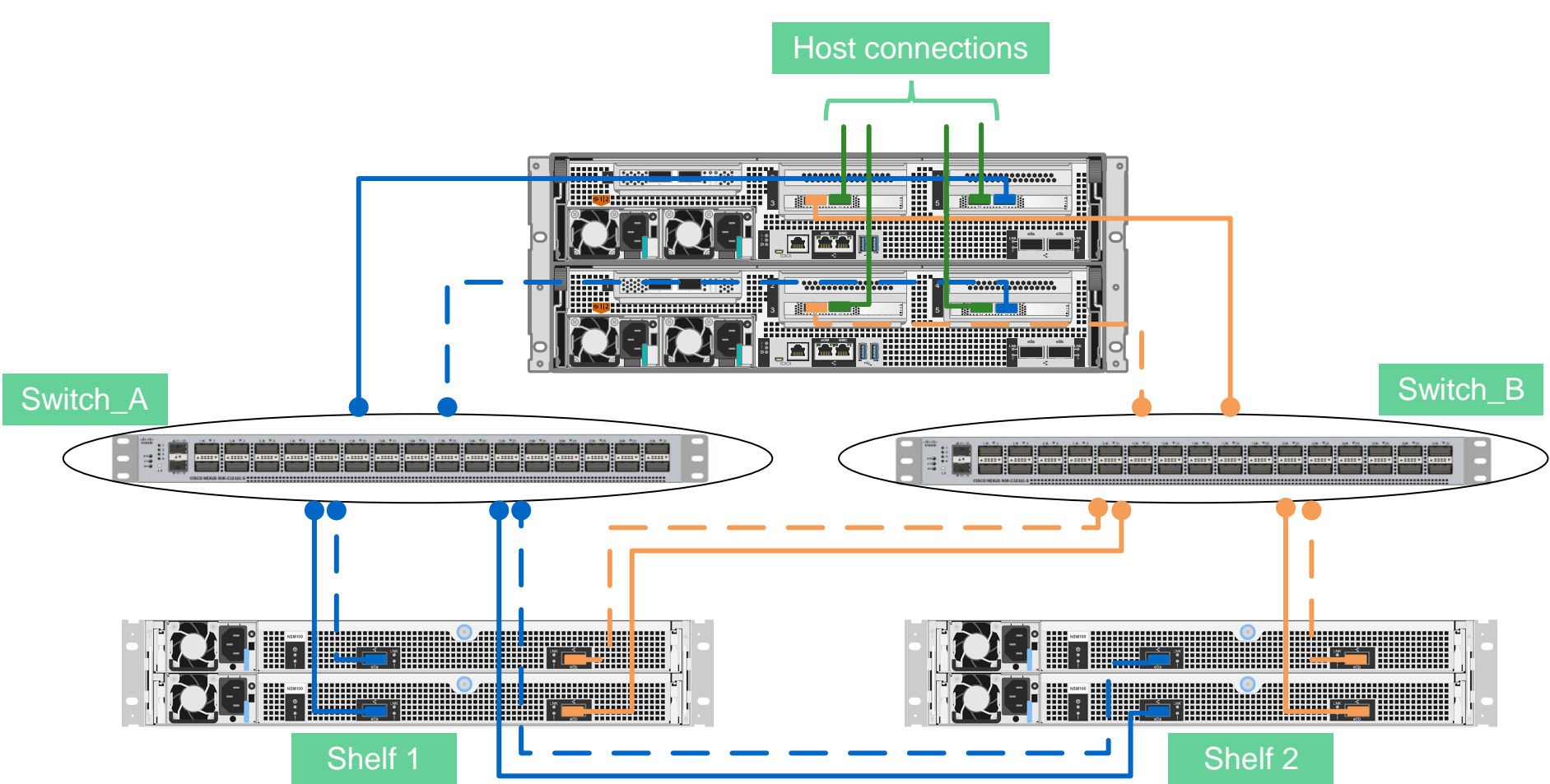
	Port	Node	Line
Path_A	e5a	Node_A	---
		Node_B	---
Path_B	e5b	Node_A	---
		Node_B	---

	Ports
Switch A	Any port
Switch B	Any port

For additional NS224 shelves, continue connecting as shown

# AFF / ASA A800 with Two Switched NS224 Shelves – Option Two

Using one 100GbE port from the X1148A in slot 3 and one 100GbE port from the X1148A in slot 5



Maximum NS224			
8 shelves / 192 SSDs			
240 Max NVMe SSDs			
with 48 internal SSDs			

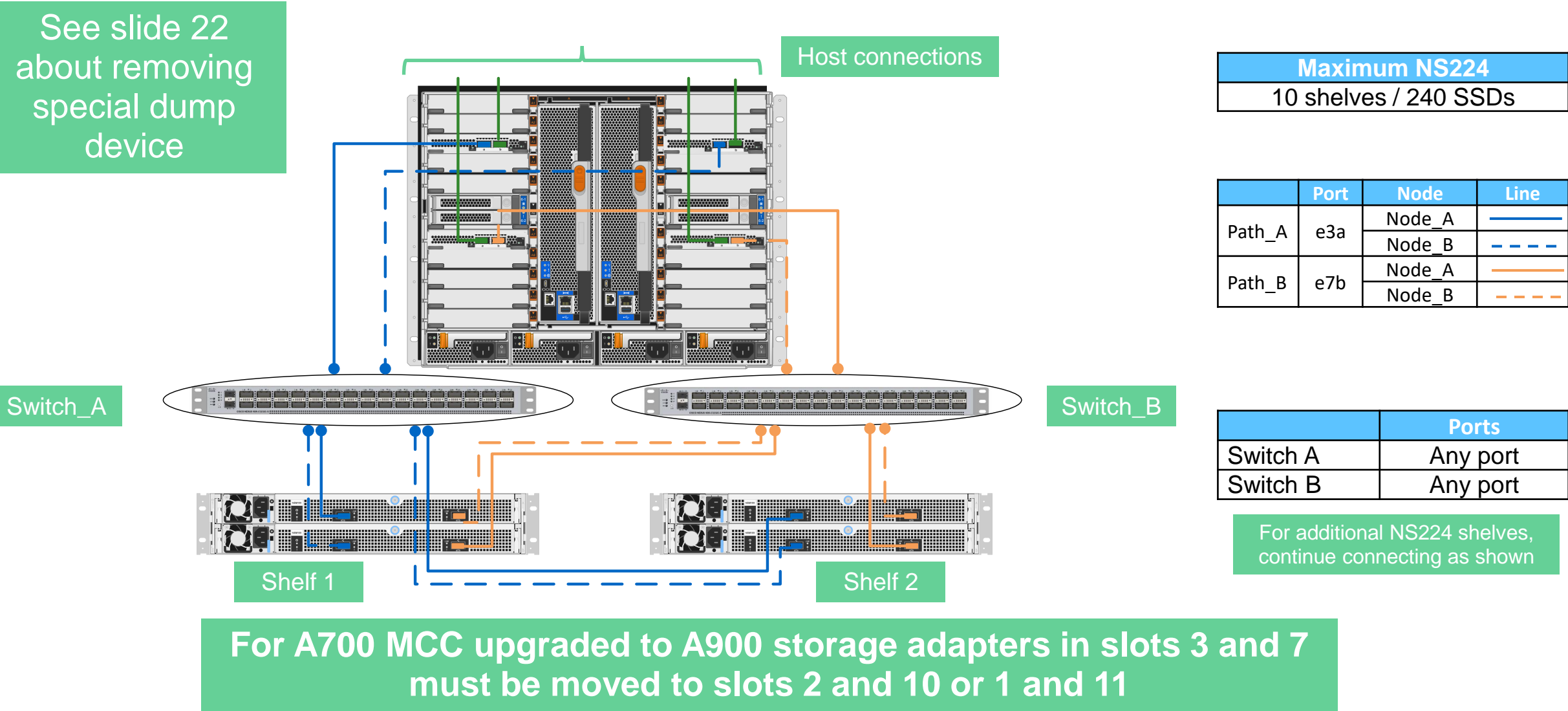
	Port	Node	Line
Path_A	e5a	Node_A	—————
	e5a	Node_B	- - - - -
Path_B	e3b	Node_A	—————
	e3b	Node_B	- - - - -

	Ports
Switch A	Any port
Switch B	Any port

For additional NS224 shelves, continue connecting as shown

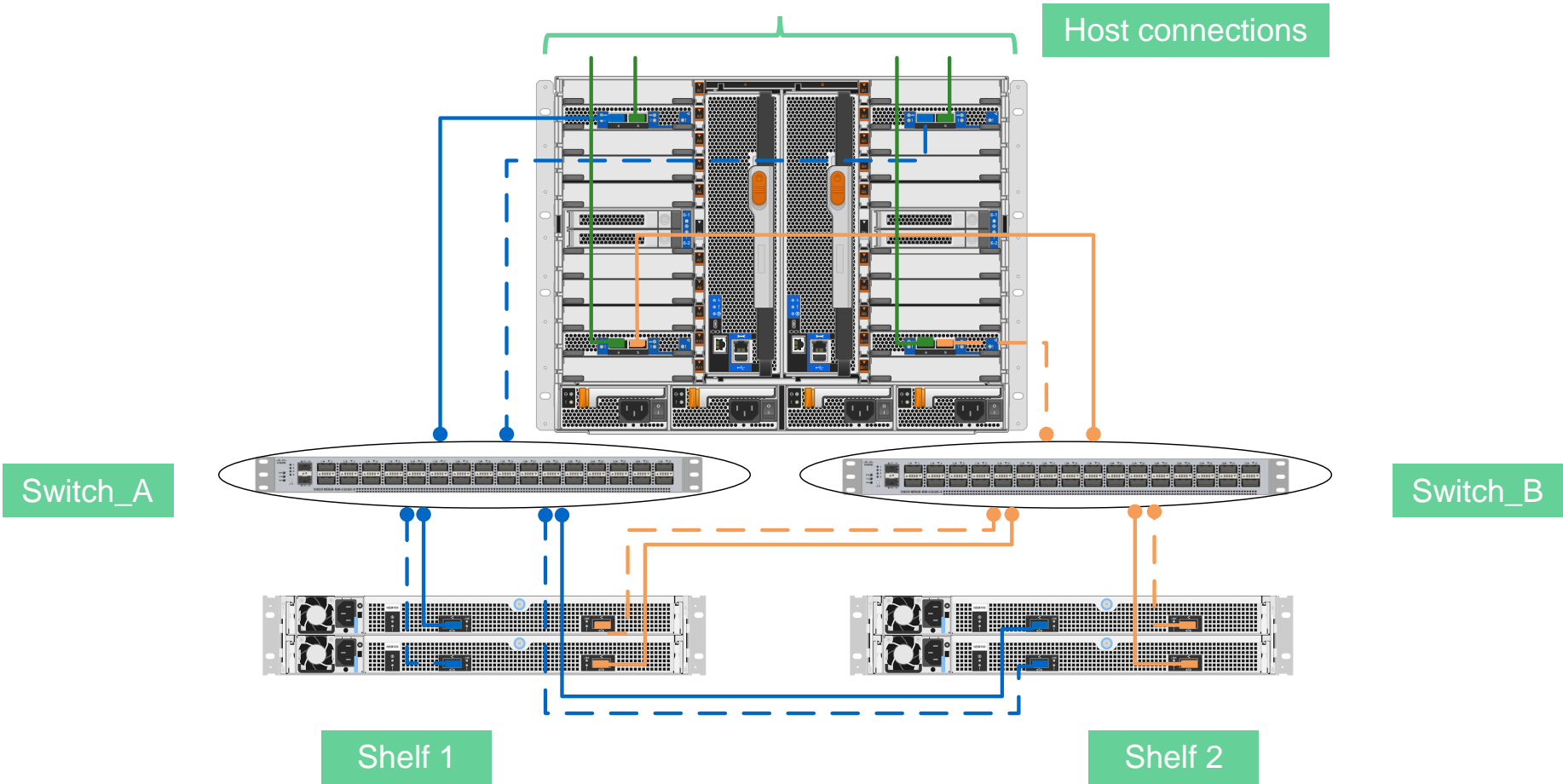
# AFF A900 with Two Switched NS224 Shelves After A700 Upgrade

NS224 connections remain the same as the original A700



# New AFF A900 with Two Switched NS224 Shelves – Option Two

NS224 connections remain the same as the original A700



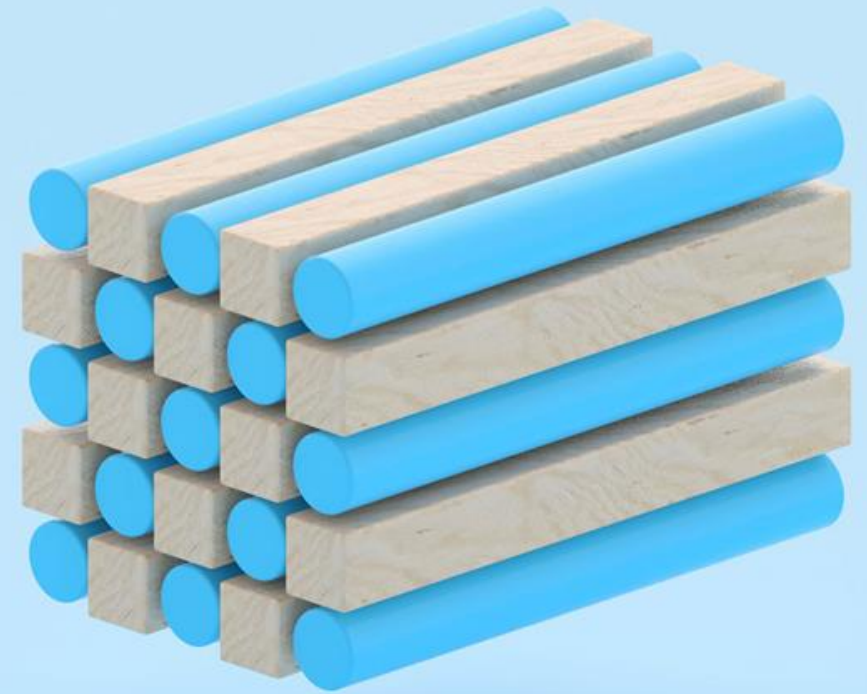
Maximum NS224	
10 shelves / 240 SSDs	

	Port	Node	Line
Path_A	e2a	Node_A	—
		Node_B	- - -
Path_B	e10b	Node_A	—
		Node_B	- - -

	Ports
Switch A	Any port
Switch B	Any port

For additional NS224 shelves, continue connecting as shown

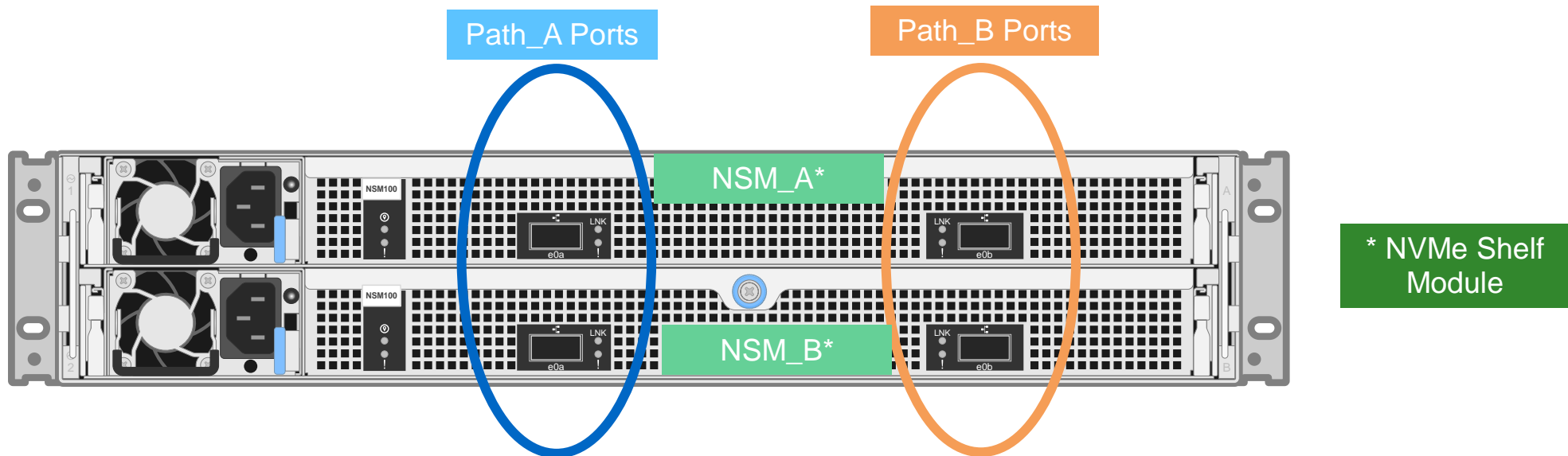
# Converting From Direct-Attached NS224 to Switch-Attached



# Process to Convert from Direct to Switch-Attached NS224 Shelves

## Process overview

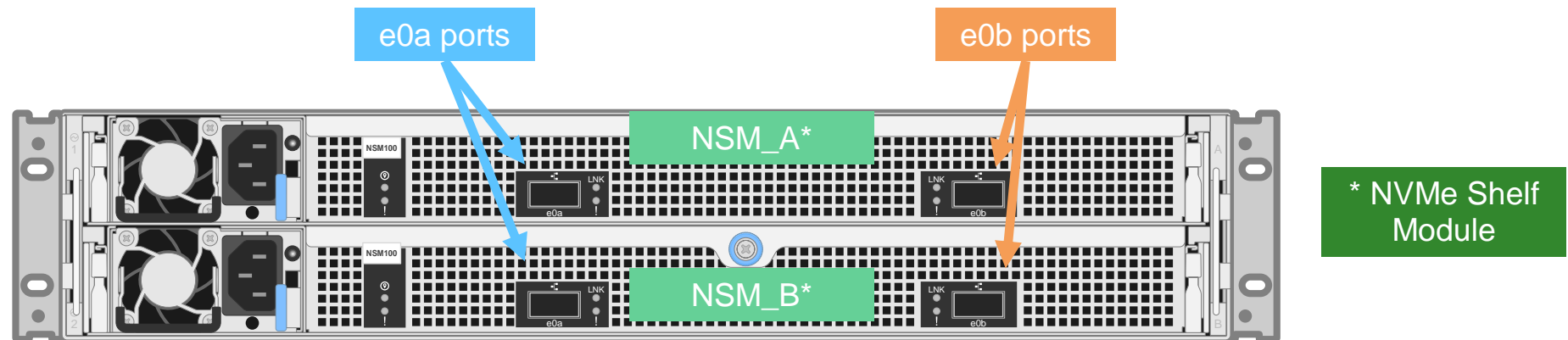
- The conversion process is NDO, but it needs to follow a certain cabling sequence
- First phase is moving all Path\_A “blue” direct connections one-by-one to switch\_A
- Second phase is moving all Path\_B “orange” direct connections one-by-one to switch\_B
- There is no minimum time to wait after disconnecting from NS224 and connecting to switch



# Process to Convert from Direct to Switch-Attached NS224 Shelves

## Process overview - phase one sequence for Path\_A connections

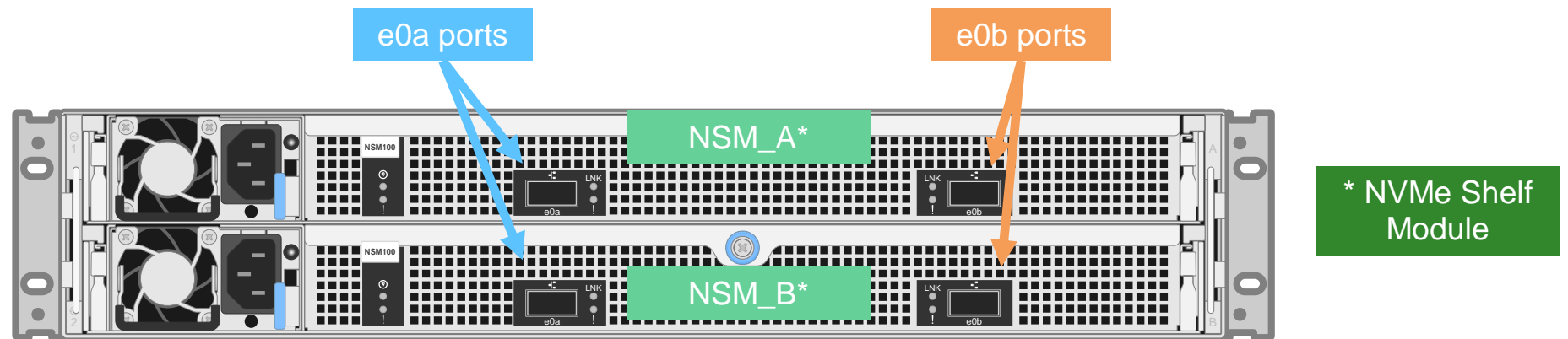
- Any switch port can be used for either the nodes or the shelves
- Phase one conversion flow starts with the e0a connections on the first NS224 shelf
  - Move top node\_A port cable to switch\_A followed by the top e0a port cable to switch\_A
  - Then move bottom node\_B port cable to switch\_A followed by the bottom e0a port cable to switch\_A
- If a second NS224 is present, repeat the above sequence so all Path\_A ports are connected to switch\_A



# Process to Convert from Direct to Switch-Attached NS224 Shelves

## Process overview - phase one sequence for Path\_B connections

- Any switch port can be used for either the nodes or the shelves
- Phase two conversion flow starts with the e0b connections on the first NS224 shelf
  - Move top node\_A port cable to switch\_B followed by the top e0b port cable to switch\_B
  - Then move bottom node\_B port cable to switch\_B followed by the bottom e0b port cable to switch\_B
- If a second NS224 is present, repeat the above sequence so all Path\_B ports are connected to switch\_B





# Process to Convert from Direct to Switch-Attached NS224 Shelves

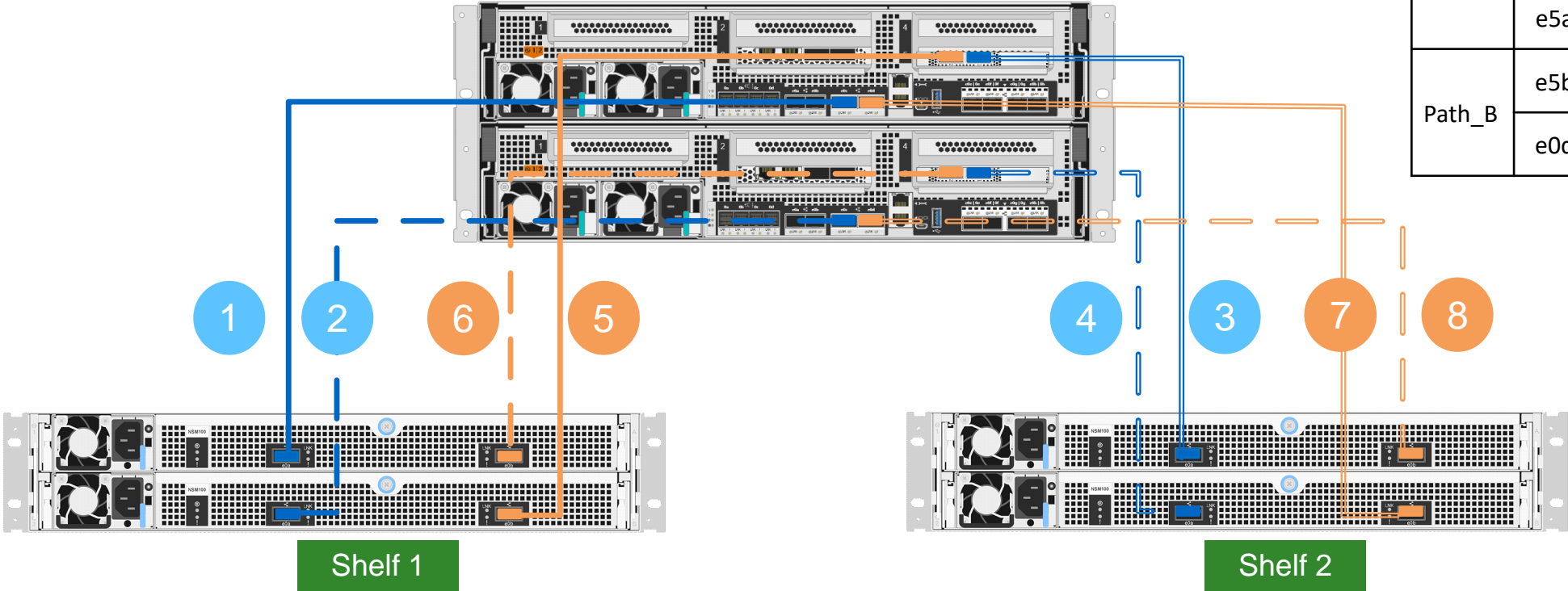
## Process overview

- Slides 43-54 show the step-by-step cabling to convert from direct-attached to switch-attached on an AFF A400
- The flow for other AFF systems is similar, but has different node connections depending on the platform
  - Guidance on the A320, A700, and A800 follow A400 conversion starting on slide 55
- Note – the process as shown reuses cables as possible when connecting to switches
  - Determine if longer cabling is needed when planning, especially if hardware spans cabinets
- When a new cable is needed to connect the NS224 shelf to the switch, this is called out on the appropriate slide

# Direct to Switched-Attached NS224 on an AFF / ASA A400

Sequence of cable connections to move from direct to switched NS224

- Move cables from direct to switched according to the following sequence
- Connecting NS224 ports to switch requires another network cable



	Port	Node	Line
Path_A	e0c	Node_A	—————
		Node_B	- - - - -
	e5a	Node_A	—————
		Node_B	- - - - -
Path_B	e5b	Node_A	—————
		Node_B	- - - - -
	e0d	Node_A	—————
		Node_B	- - - - -

# A400 Port Mapping Guide for Nodes, NS224 Shelves, and Switches

Cable connections before starting conversion from direct to switch-attached

- Port examples shown but any switch port can be used for either the nodes or the shelves
- Install storage switch RCF version 1.6 to use with switched storage

A400 Node	Cabling Order	Node Port	Node Switch Port	NS224 Port	NS224 Switch Port
Node_A	1	e0c		Shelf_1 / NSM_A - e0a	
	7	e0d		Shelf_2 / NSM_B - e0b	
	3	e5a		Shelf_2 / NSM_A - e0a	
	5	e5b		Shelf_1 / NSM_B - e0b	
Node_B	2	e0c		Shelf_1 / NSM_B - e0a	
	8	e0d		Shelf_2 / NSM_A - e0b	
	4	e5a		Shelf_2 / NSM_B - e0a	
	6	e5b		Shelf_1 / NSM_A - e0b	

# A400 Port Mapping Guide for Nodes, NS224 Shelves, and Switches

Cable connections after converting from direct to switch-attached

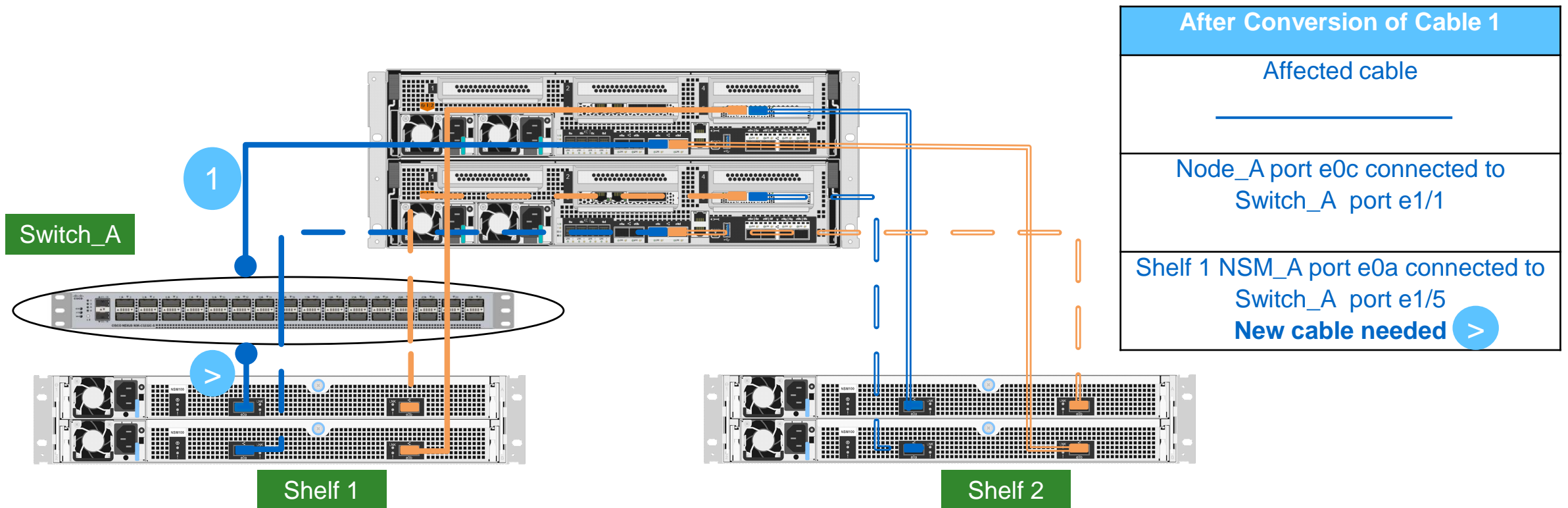
- Port examples shown but any switch port can be used for either the nodes or the shelves
- Install storage switch RCF version 1.6 to use with switched storage

A400 Node	Cabling Order	Node Port	Node Switch Port	NS224 Port	NS224 Switch Port
Node_A	1	e0c	Switch_A e1/1	Shelf_1 / NSM_A - e0a	Switch_A e1/5
	7			Shelf_2 / NSM_B - e0b	Switch_B e1/8
	3			Shelf_2 / NSM_A - e0a	Switch_A e1/7
	5	e5b	Switch_B e1/1	Shelf_1 / NSM_B - e0b	Switch_B e1/6
Node_B	2	e0c	Switch_A e1/2	Shelf_1 / NSM_B - e0a	Switch_A e1/6
	8			Shelf_2 / NSM_A - e0b	Switch_B e1/7
	4			Shelf_2 / NSM_B - e0a	Switch_A e1/8
	6	e5b	Switch_B e1/2	Shelf_1 / NSM_A - e0b	Switch_B e1/5

# Direct to Switched-Attached NS224 on an AFF / ASA A400

Cabling examples moving from direct to switched NS224

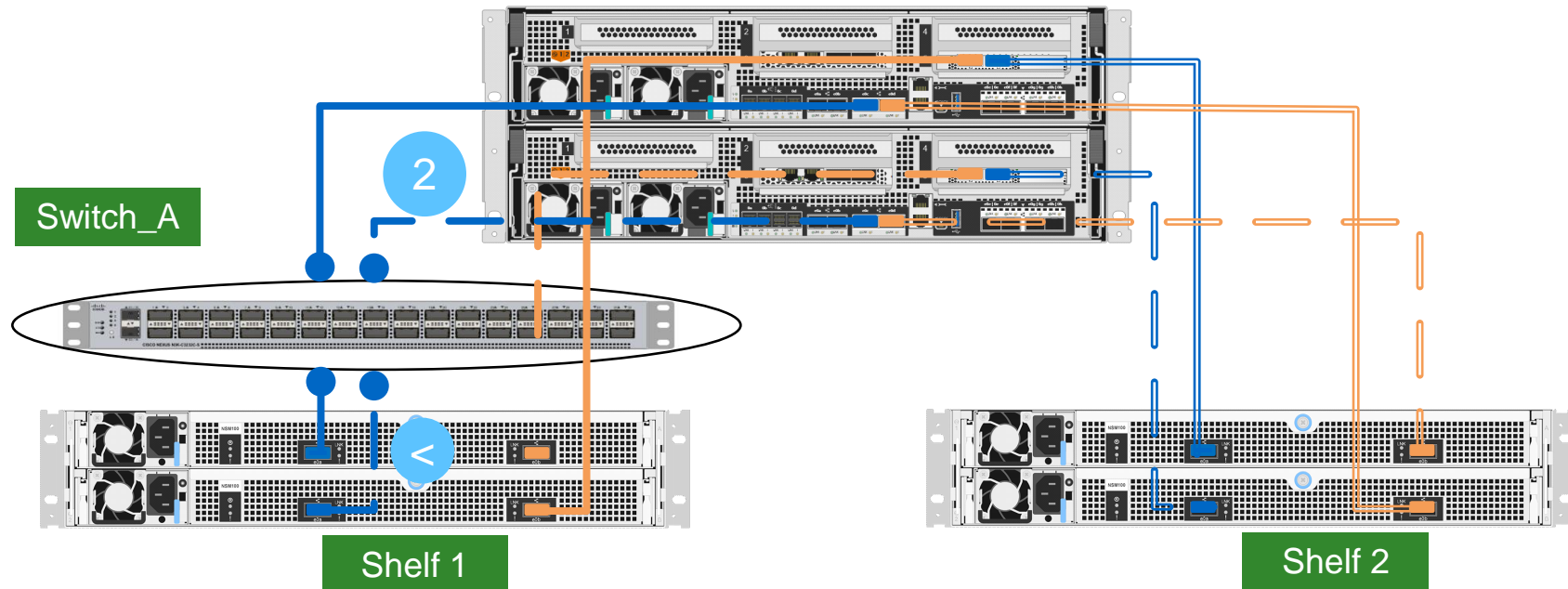
- Disconnect cable 1 from top e0a port on Shelf 1 and connect to Switch\_A port 1/1
- Using a new cable connect top e0a port on Shelf 1 to Switch\_A port 1/5



# Direct to Switched-Attached NS224 on an AFF / ASA A400

Cabling examples moving from direct to switched NS224

- Disconnect cable 2 from bottom e0a port on Shelf 1 and connect to Switch\_A e1/2
- Using a new cable connect bottom e0a port on Shelf 1 to Switch\_A e1/6

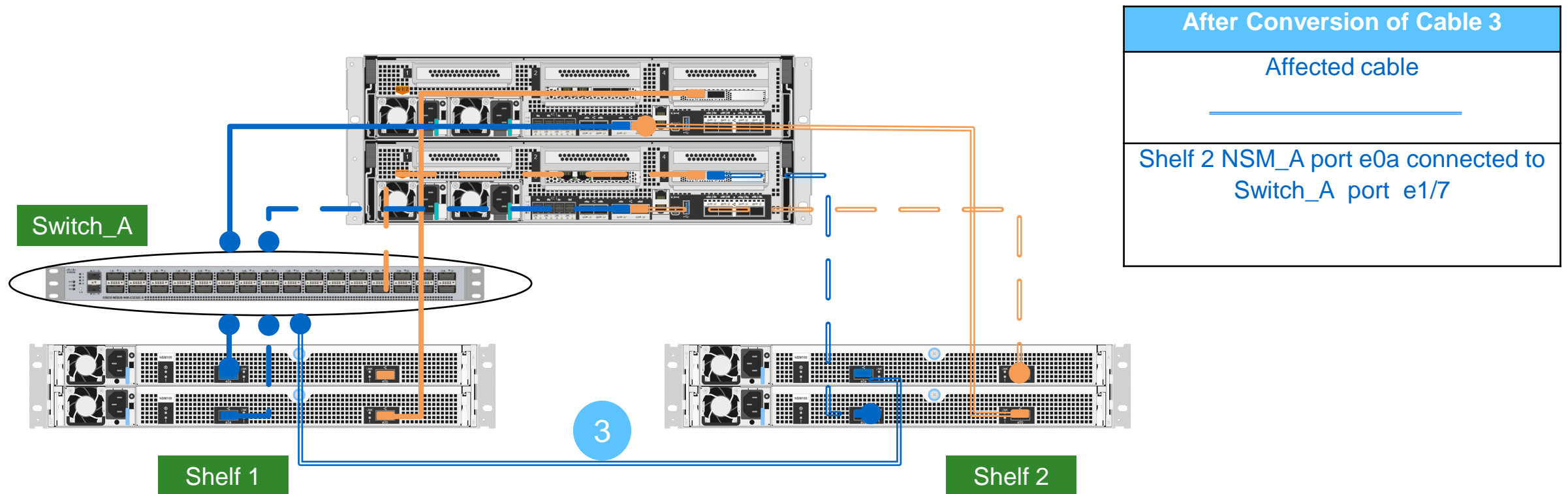


After Conversion of Cable 2
Affected cable -----
Node_B port e0c connected to Switch_A port e1/2
Shelf 1 NSM_B port e0a connected to Switch_A port e1/6 <b>New cable needed</b> <

# Direct to Switched-Attached NS224 on an AFF / ASA A400

Cabling examples moving from direct to switched NS224

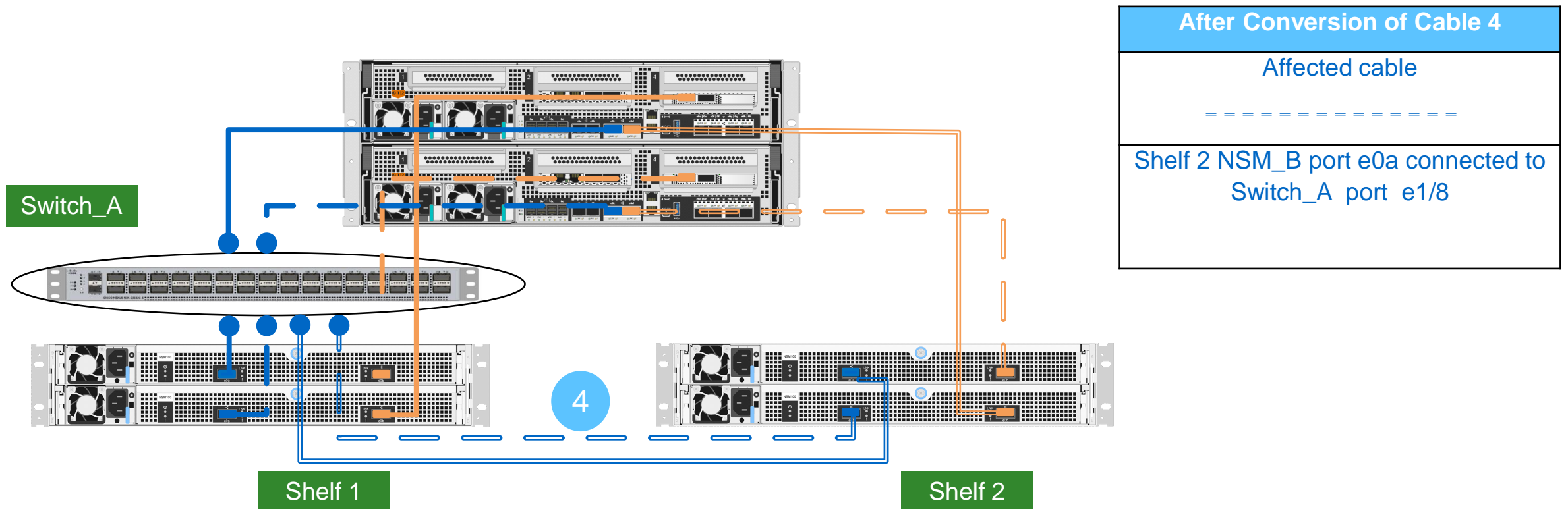
- Disconnect cable 3 from port e5a on Node\_A and connect to Switch\_A port e1/7



# Direct to Switched-Attached NS224 on an AFF / ASA A400

Cabling examples moving from direct to switched NS224

- Disconnect cable 4 from port e5a on Node\_B and connect to Switch\_A e1/8

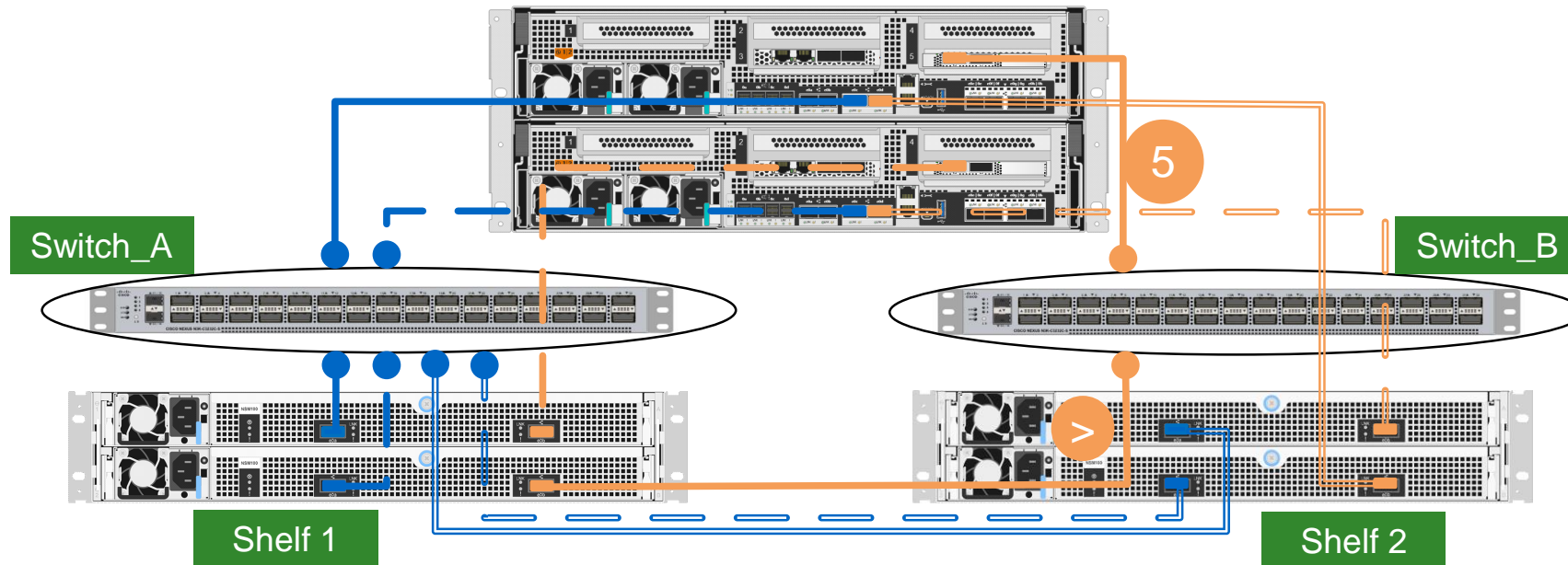




# Direct to Switched-Attached NS224 on an AFF / ASA A400

Cabling examples moving from direct to switched NS224

- Disconnect cable 5 from bottom e0b port on Shelf 1 and connect to Switch\_B port e1/1
- Using a new cable connect bottom e0b port on Shelf 1 to Switch\_B port e1/6



## After Conversion of Cable 5

Affected cable

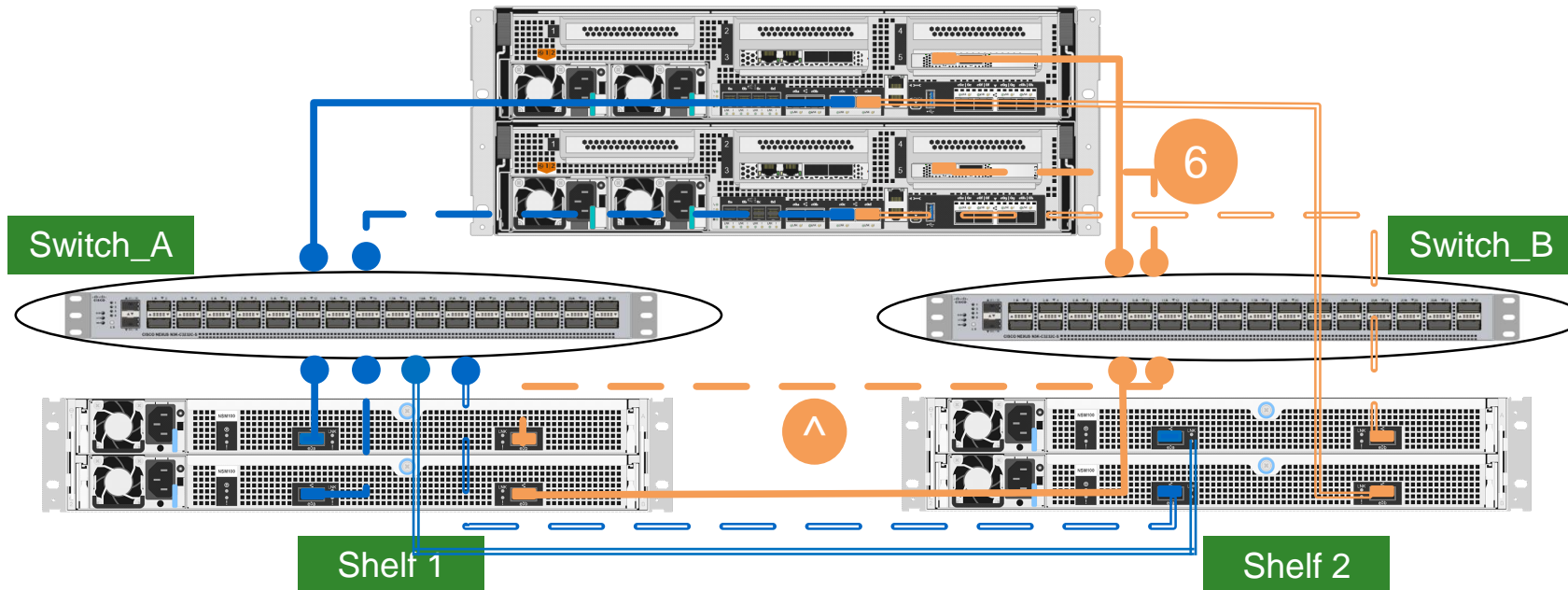
Node\_A port e5b connected to  
Switch\_B port e1/1

Shelf 1 NSM\_B port e0b connected to  
Switch\_B port e1/6  
New cable needed >

# Direct to Switched-Attached NS224 on an AFF / ASA A400

Cabling examples moving from direct to switched NS224

- Disconnect cable 6 from top e0b port on Shelf 1 and connect to Switch\_B port e1/2
- Using a new cable connect top e0b port on Shelf 1 to Switch\_B port e1/5

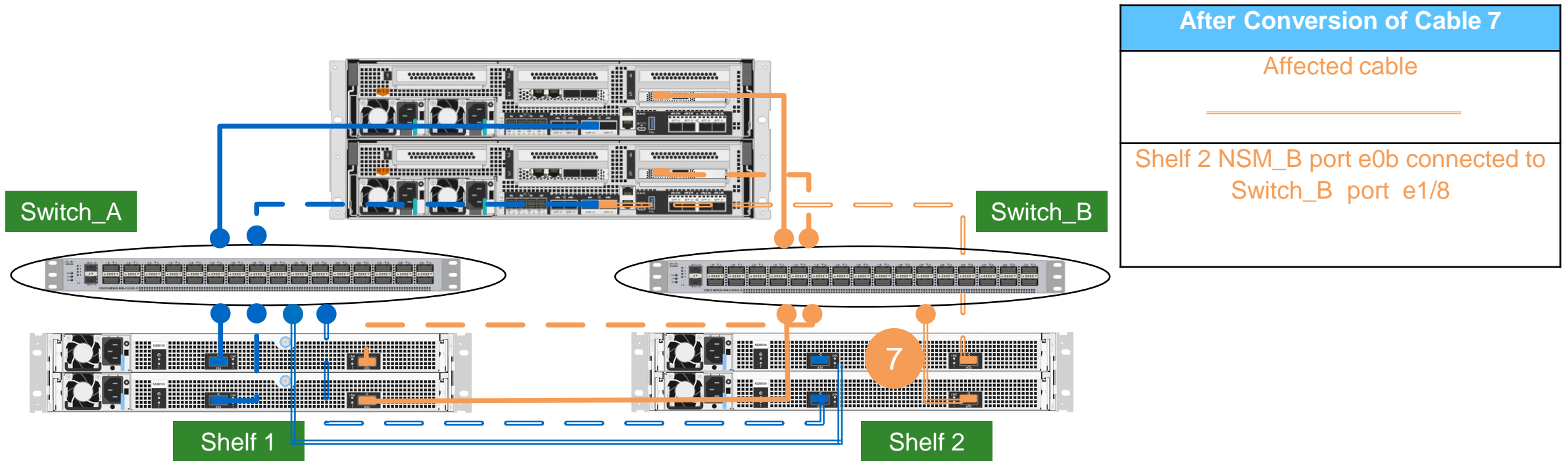


After Conversion of Cable 6
Affected cable -----
Node_B port e5b connected to Switch_B port e1/2
Shelf 1 NSM_A port e0b connected to Switch_B port e1/5 New cable needed ^

# Direct to Switched-Attached NS224 on an AFF / ASA A400

Cabling examples moving from direct to switched NS224

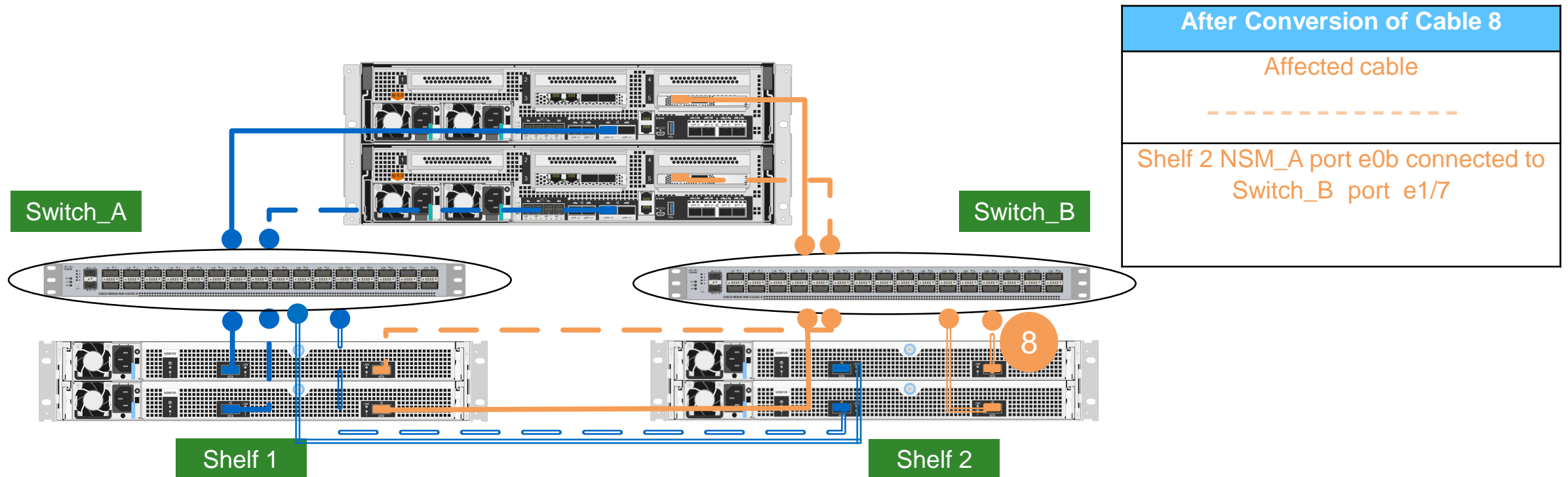
- Disconnect cable 7 from port e0d on Node\_A and connect to Switch\_B port e1/8



# Direct to Switched-Attached NS224 on an AFF / ASA A400

Cabling examples moving from direct to switched NS224

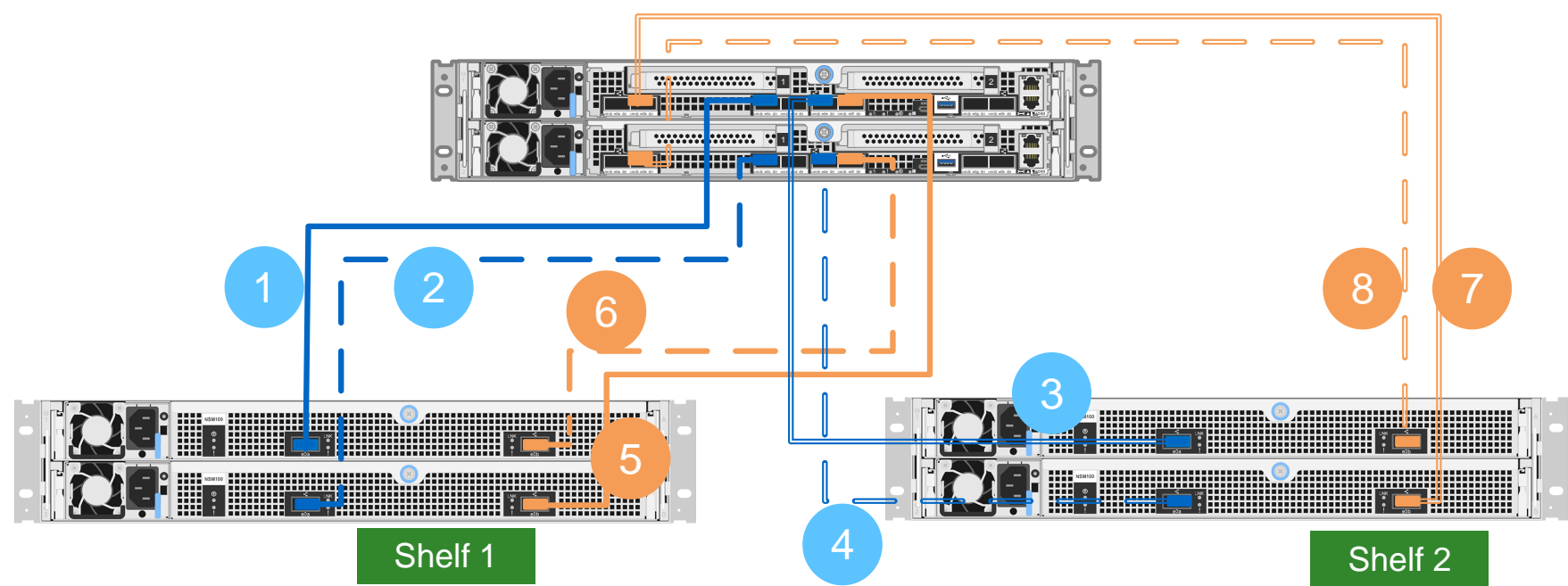
- Disconnect cable 8 from port e0d on Node\_B and connect to Switch\_B port e1/7



# Direct to Switched-Attached NS224 on an AFF / ASA A320

Cabling examples moving from direct to switched NS224

- Move cables from direct to switched according to the following sequence
  - Move one cable at a time to switched connectivity



	Port	Node	Line
Path_A	e0c	Node_A	—————
		Node_B	- - - - -
	e0e	Node_A	—————
		Node_B	- - - - -
Path_B	e0f	Node_A	—————
		Node_B	- - - - -
	e0b	Node_A	—————
		Node_B	- - - - -

# A320 Port Mapping Guide for Nodes, NS224 Shelves, and Switches

Cable connections before starting conversion from direct to switch-attached

- Port examples shown but any switch port can be used for either the nodes or the shelves
- Install storage switch RCF version 1.6 to use with switched storage

A320 Node	Cabling Order	Node Port	Node Switch Port	NS224 Port	NS224 Switch Port
Node_A	1	e0c		Shelf_1 / NSM_A - e0a	
	7	e0b		Shelf_2 / NSM_B - e0b	
	3	e0e		Shelf_2 / NSM_A - e0a	
	5	e0f		Shelf_1 / NSM_B - e0b	
Node_B	2	e0c		Shelf_1 / NSM_B - e0a	
	8	e0b		Shelf_2 / NSM_A - e0b	
	4	e0e		Shelf_2 / NSM_B - e0a	
	6	e0f		Shelf_1 / NSM_A - e0b	

# A320 Port Mapping Guide for Nodes, NS224 Shelves, and Switches

Cable connections after converting from direct to switch-attached

- Port examples shown but any switch port can be used for either the nodes or the shelves
- Install storage switch RCF version 1.6 to use with switched storage

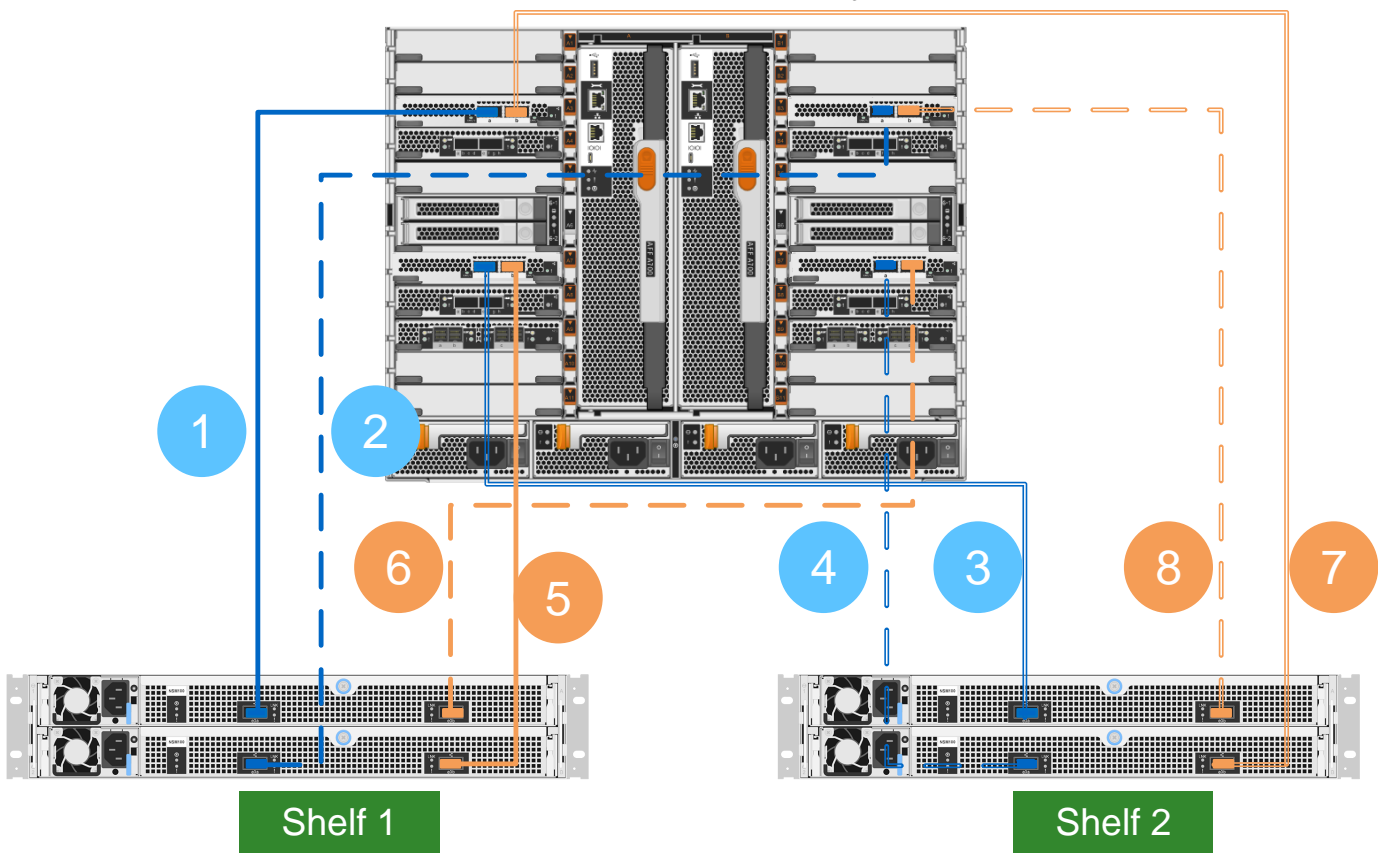
A320 Node	Cabling Order	Node Port	Node Switch Port	NS224 Port	NS224 Switch Port
Node_A	1	e0c	Switch_A e1/1	Shelf_1 / NSM_A - e0a	Switch_A e1/5
	7			Shelf_2 / NSM_B - e0b	Switch_B e1/8
	3			Shelf_2 / NSM_A - e0a	Switch_A e1/7
	5	e0f	Switch_B e1/1	Shelf_1 / NSM_B - e0b	Switch_B e1/6
Node_B	2	e0c	Switch_A e1/2	Shelf_1 / NSM_B - e0a	Switch_A e1/6
	8			Shelf_2 / NSM_A - e0b	Switch_B e1/7
	4			Shelf_2 / NSM_B - e0a	Switch_A e1/8
	6	e0f	Switch_B e1/2	Shelf_1 / NSM_A - e0b	Switch_B e1/5



# Direct to Switched-Attached NS224 on an AFF A700

Cabling examples moving from direct to switched NS224

- Move cables from direct to switched according to the following sequence
  - Move one cable at a time to switched connectivity



	Port	Node	Line
Path_A	e3a	Node_A	—————
		Node_B	- - - - -
	e7a	Node_A	- - - - -
		Node_B	—————
Path_B	e7b	Node_A	—————
		Node_B	- - - - -
	e3b	Node_A	—————
		Node_B	- - - - -



# A700 Port Mapping Guide for Nodes, NS224 Shelves, and Switches

Cable connections before starting conversion from direct to switch-attached

- Port examples shown but any switch port can be used for either the nodes or the shelves
- Install storage switch RCF version 1.6 to use with switched storage

A700 Node	Cabling Order	Node Port	Node Switch Port	NS224 Port	NS224 Switch Port
Node_A	1	e3a		Shelf_1 / NSM_A - e0a	
	7	e3b		Shelf_2 / NSM_B - e0b	
	3	e7a		Shelf_2 / NSM_A - e0a	
	5	e7b		Shelf_1 / NSM_B - e0b	
Node_B	2	e3a		Shelf_1 / NSM_B - e0a	
	8	e3b		Shelf_2 / NSM_A - e0b	
	4	e7a		Shelf_2 / NSM_B - e0a	
	6	e7b		Shelf_1 / NSM_A - e0b	

# A700 Port Mapping Guide for Nodes, NS224 Shelves, and Switches

Cable connections after converting from direct to switch-attached

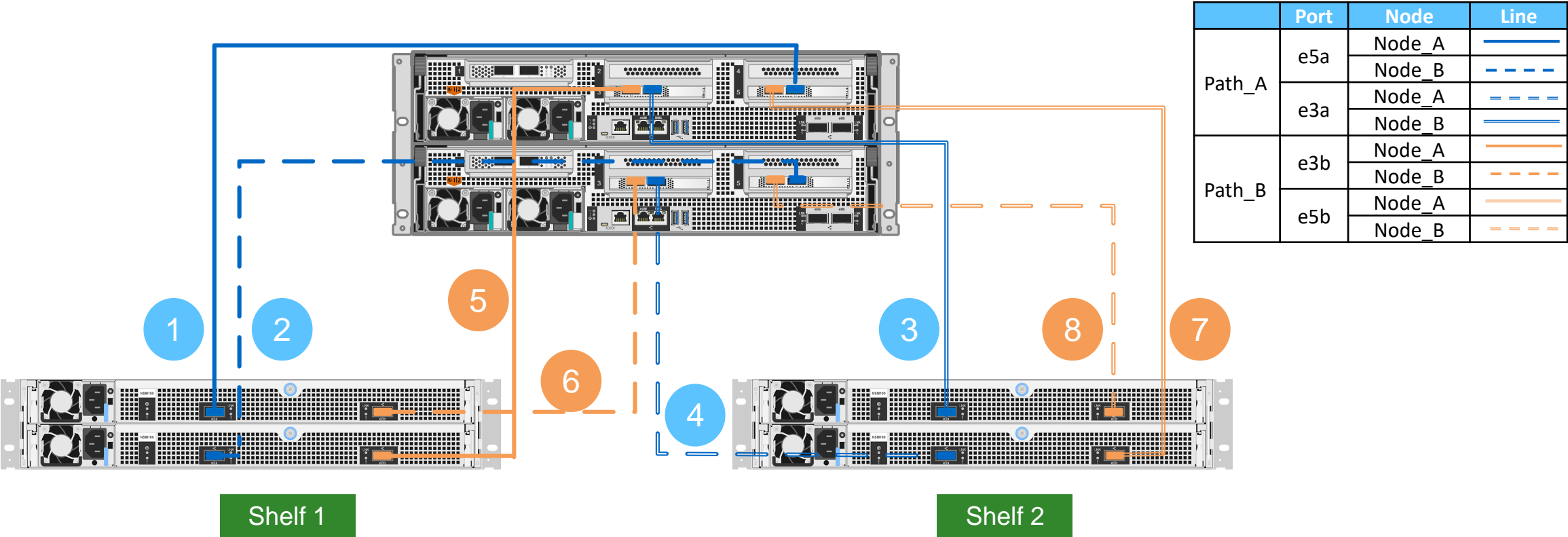
- Port examples shown but any switch port can be used for either the nodes or the shelves
- Install storage switch RCF version 1.6 to use with switched storage

A700 Node	Cabling Order	Node Port	Node Switch Port	NS224 Port	NS224 Switch Port
Node_A	1	e3a	Switch_A e1/1	Shelf_1 / NSM_A - e0a	Switch_A e1/5
	7			Shelf_2 / NSM_B - e0b	Switch_B e1/8
	3			Shelf_2 / NSM_A - e0a	Switch_A e1/7
	5	e7b	Switch_B e1/1	Shelf_1 / NSM_B - e0b	Switch_B e1/6
Node_B	2	e3a	Switch_A e1/2	Shelf_1 / NSM_B - e0a	Switch_A e1/6
	8			Shelf_2 / NSM_A - e0b	Switch_B e1/7
	4			Shelf_2 / NSM_B - e0a	Switch_A e1/8
	6	e7b	Switch_B e1/2	Shelf_1 / NSM_A - e0b	Switch_B e1/5

# Direct to Switched-Attached NS224 on an AFF / ASA A800

Cabling examples moving from direct to switched NS224

- Move cables from direct to switched according to the following sequence
  - Move one cable at a time to switched connectivity



# A800 Port Mapping Guide for Nodes, NS224 Shelves, and Switches

Cable connections before starting conversion from direct to switch-attached

- Port examples shown but any switch port can be used for either the nodes or the shelves
- Install storage switch RCF version 1.6 to use with switched storage

A800 Node	Cabling Order	Node Port	Node Switch Port	NS224 Port	NS224 Switch Port
Node_A	1	e5a		Shelf_1 / NSM_A - e0a	
	7	e5b		Shelf_2 / NSM_B - e0b	
	3	e3a		Shelf_2 / NSM_A - e0a	
	5	e3b		Shelf_1 / NSM_B - e0b	
Node_B	2	e5a		Shelf_1 / NSM_B - e0a	
	8	e5b		Shelf_2 / NSM_A - e0b	
	4	e3a		Shelf_2 / NSM_B - e0a	
	6	e3b		Shelf_1 / NSM_A - e0b	

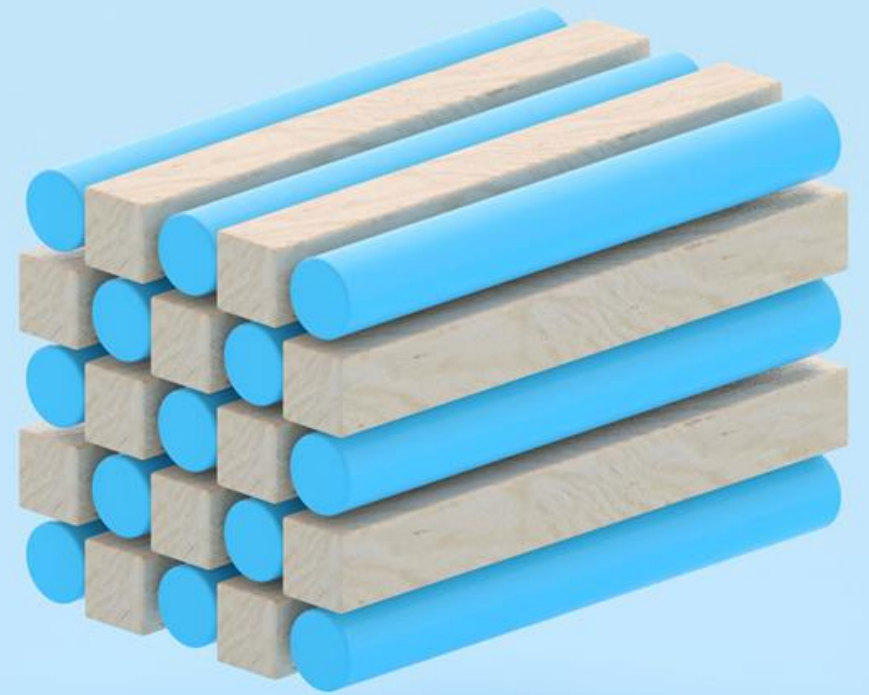
# A800 Port Mapping Guide for Nodes, NS224 Shelves, and Switches

Cable connections after converting from direct to switch-attached

- Port examples shown but any switch port can be used for either the nodes or the shelves
- Install storage switch RCF version 1.6 to use with switched storage

A800 Node	Cabling Order	Node Port	Node Switch Port	NS224 Port	NS224 Switch Port
Node_A	1	e5a	Switch_A e1/1	Shelf_1 / NSM_A - e0a	Switch_A e1/5
	7			Shelf_2 / NSM_B - e0b	Switch_B e1/8
	3			Shelf_2 / NSM_A - e0a	Switch_A e1/7
	5	e3b	Switch_B e1/1	Shelf_1 / NSM_B - e0b	Switch_B e1/6
Node_B	2	e5a	Switch_A e1/2	Shelf_1 / NSM_B - e0a	Switch_A e1/6
	8			Shelf_2 / NSM_A - e0b	Switch_B e1/7
	4			Shelf_2 / NSM_B - e0a	Switch_A e1/8
	6	e3b	Switch_B e1/2	Shelf_1 / NSM_A - e0b	Switch_B e1/5

# Revisions



# Revisions

Version	Date	Comments
1.0	10/2020	Initial release
1.1	12/2020	Added slide 31 with switch background information. Fixed cabling on slides 52, 53, and 54. Updated RCF version to 1.6.
1.2	4/2021	Added information about FAS500f cabling on slides 12 and 13. Changed footer to show general public availability.
1.3	12/2021	Added A900 cabling slides, tagged A700 slides to show connectivity after A900 upgrades
1.3.1	12/2021	Slide 33: Updated shelf numbers to indicate how shelves 3 and 4 are directly connected to A900

# Thank you

