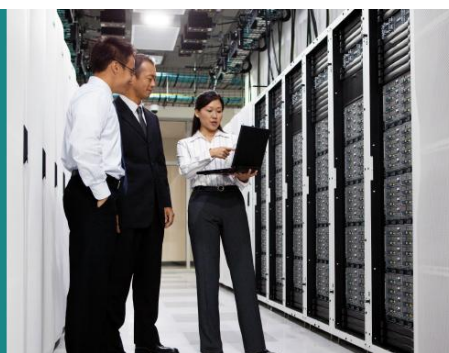Cisco
Advanced Services
Data Center and Virtualization Practice

Migration from Virtual PortChannel to Cisco FabricPath

White Paper

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Introduction

The demand for high efficiency in today's data centers is stimulating the growth of new technologies and consumption models. As IT infrastructures are consolidated, technologies such as server and network virtualization provide efficiency while introducing new scalability challenges. The large consolidated and virtualized infrastructures need to be flexible and scalable to meet dynamic demands.

In the past, the size and flexibility of Layer 2 domains in the data center and the separation of the Layer 2 domains were dictated by the Spanning Tree Protocol, but this approach does not meet today's requirements. New technologies, such as the virtual PortChannel (vPC), help overcome some of the limitations of spanning tree, but they do not address the stability and scalability challenges. Cisco® FabricPath helps enable the building of scalable Layer 2 domains, without the limitations of spanning tree or restrictions related to the vPC solution.

The information in this document assumes that readers have a basic understanding of Cisco FabricPath, spanning tree, and Layer 2 networking technologies and are interested in the process of migrating from vPC to Cisco FabricPath.

Document Scope

This document provides a brief overview of the Cisco FabricPath technology and walks the reader through the steps for migrating to Cisco FabricPath from vPC. The document also demonstrates how to configure a Cisco FabricPath deployment and how to scale a network enabled for Cisco FabricPath by adding new devices in the future by presenting selected use cases.

This document highlights the following:

- Configuration simplicity is built into Cisco FabricPath.
- A Cisco FabricPath domain does not run the Spanning Tree Protocol, although spanning tree still exists at the edge of the Cisco FabricPath domain but in considerably smaller domain sizes.
- Adding new devices to the Cisco FabricPath domain is easy and does not affect the domain in the same way that it would a spanning tree domain.

Business Requirements

Although technologies such as vPC complement Spanning Tree Protocol, they do not provide independence from the inherent challenges of Spanning Tree Protocol, including looping. Cisco FabricPath technology allows easy reconfiguration of a network with little disruption and is safe for use to extend the network within and across data centers without the risk of looping.

The sections that follow in this document discuss the Layer 2 design needs and challenges involving both the Spanning Tree Protocol and Cisco FabricPath in the data center environment.

Current Layer 2 Domain Designs

Most existing Layer 2 domains use the traditional Spanning Tree Protocol. However, spanning tree is inefficient in its use of the bandwidth of redundant links. Spanning Tree Protocol deployments usually have at least half the links blocked and do not participate in traffic forwarding. Another disadvantage is convergence. Each time a network changes, the spanning tree has to be recalculated. This disadvantage especially applies to Layer 2 domains.

Layer 2 domains designed with vPC technology make better use of the redundant links but still use Spanning Tree Protocol as a backup mechanism. As a result, a user must still follow spanning tree best practices.

Layer 2 Designs with Cisco FabricPath

By introducing a new control protocol (based on the Intermediate System to Intermediate System [IS-IS] Protocol) and a new data plane, Cisco FabricPath can work around most of the limitations that affect a traditional Ethernet network. In fact, Cisco FabricPath offers benefits of both Layer 2 and Layer 3 technologies. Equal Cost Multipathing (ECMP) allows Cisco FabricPath to use the total bandwidth of multiple parallel links.

Cisco FabricPath frames, including time-to-live (TTL) and reverse-path forwarding check (RPFC) frames, are applied to multidestination traffic. Also, unlike vPC, Cisco FabricPath can handle an arbitrary network topology.

All the elements borrowed from Layer 3 technologies make Cisco FabricPath safe for extension to an entire data center without the risk of looping and allow easy reconfiguration of a network with little disruption.

Cisco FabricPath Design Considerations

A typical Cisco FabricPath network topology is the Clos fabric, shown in Figure 1. A Clos fabric consists of two kinds of node: leaf switches and spine switches. A particular leaf switch is connected to all the spine switches, and a particular spine switch is connected to all the leaf switches.

The goal for the network is to provide optimal connectivity between the leaf switches, with the hosts attached using Classical Ethernet (edge) ports.

Figure 1.   Cisco FabricPath Components and Concepts
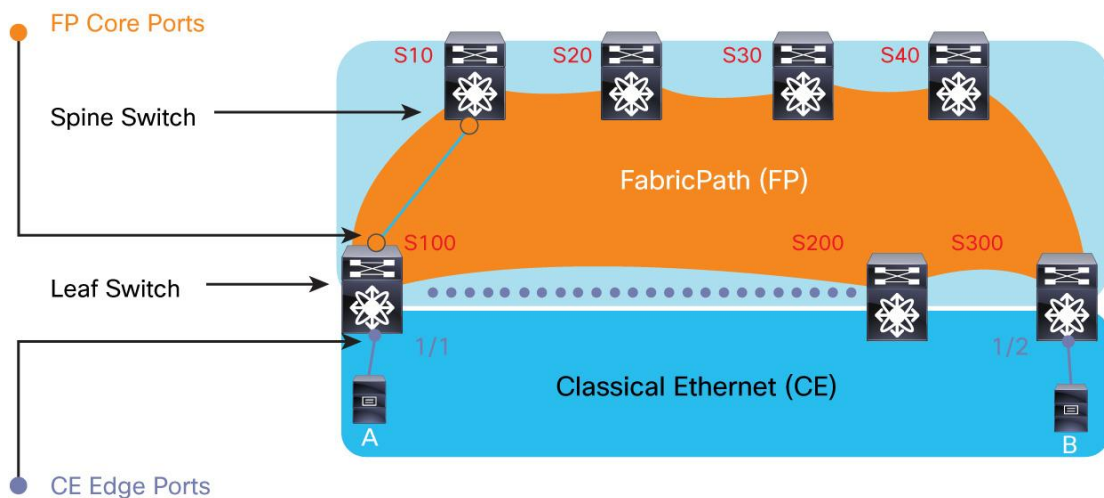
Cisco FabricPath Terminology

Table 1 defines important Cisco FabricPath terms. These terms are used throughout this document.

Table 1.   Cisco FabricPath Terminology

Cisco FabricPath Terminology	
Term	**Definition**
Cisco FabricPath domain	Layer 2 domain formed by interconnected Cisco FabricPath core interfaces and carrying Cisco FabricPath VLAN traffic: All traffic in the Cisco FabricPath domain is Cisco FabricPath encapsulated.
Cisco FabricPath core port	Interface connected to the Cisco FabricPath domain: The Cisco FabricPath core interface carries traffic encapsulated in Cisco FabricPath frames and can also be referred to as a FabricPath (FP) port. A Cisco FabricPath core port must be connected to another Cisco FabricPath core port. The Cisco FabricPath core port carries all Cisco FabricPath VLANs and, therefore, can be conceptually considered as a trunk port.
Cisco FabricPath edge port	Interface at the edge of the Cisco FabricPath domain: Cisco FabricPath edge interfaces carry traffic

Cisco FabricPath Terminology	
	encapsulated in regular Ethernet frames and also can be referred as Classical Ethernet (CE) ports. Cisco FabricPath edge ports can be connected to any standard Ethernet port. Cisco FabricPath edge ports are used to attach any regular Ethernet device to the Cisco FabricPath domain.
Cisco FabricPath VLAN	VLAN allowed to cross a Cisco FabricPath domain.
Classical Ethernet (CE) VLAN	VLAN not allowed to cross a Cisco FabricPath domain, but allowed to exist on the edge interfaces of the Cisco FabricPath attached device.

Port Selection and Connectivity Design Considerations

To make the right design decisions about physical connectivity, you need to know about the interface capabilities for Cisco FabricPath. Any Cisco Nexus® 5500 platform switch interface can be configured as a core port (FabricPath mode) or edge port (CE mode). For the Cisco Nexus 7000 Series Switches, configuration of an interface as a core port (FabricPath mode) or an edge port (CE mode) depends on the line-card model. Table 2 lists the available interface mode capabilities for various line cards.

Table 2.   Interface Mode Capabilities

Line card model	Interface mode	
	Classical Ethernet	FabricPath
N7K-M108XP	YES	NO
N7K-M132XP	YES	NO
N7K-M148XP	YES	NO
N7K-F132XP-15	YES	YES
N7K-F248XP-25	YES	YES
N5K-C5548P-FA	YES	YES
N5K-C5548UP-FA	YES	YES
N5K-C5596UP-FA	YES	YES

Basically, in a Cisco FabricPath network all ports (that is, core or edge ports) must be capable of supporting Cisco FabricPath. To enforce this restriction, a new Cisco FabricPath VLAN type has been created. Cisco FabricPath VLANs do not become active on ports that do not support Cisco FabricPath. Figure 2 shows that only the Cisco Nexus 7000 F-Series I/O modules support Cisco FabricPath on the Cisco Nexus 7000 Series Switches. Note that although no Cisco FabricPath VLAN can be configured on Cisco Nexus 7000 M-Series I/O module ports, those modules can still be used to create switched virtual interfaces (SVIs) for routing traffic between Cisco FabricPath VLANs handled by Cisco Nexus 7000 F1-Series I/O modules. The ports on Cisco Nexus 5500 platform switches also are all capable of supporting Cisco FabricPath.

Figure 2.   VLAN Mode Capabilities by Port Type
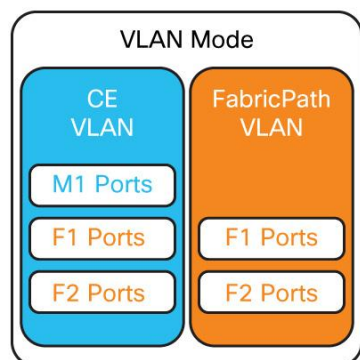
Cisco FabricPath Domain Expansion

Figure 3 illustrates the available connectivity options for the Cisco FabricPath domain.

- The first two options are examples of a case in which you cannot extend the Cisco FabricPath domain because the Cisco Nexus 7000 M1-Series interface cannot be configured in FabricPath mode.
- The third option prohibits the Cisco FabricPath domain extension because the Cisco Nexus 7000 M1-Series interface cannot carry the Cisco FabricPath VLAN.

The connectivity options shown in **Error! Reference source not found.** represent Cisco FabricPath extendable options. You do not have any interface limitations for expansion of Cisco FabricPath with the presented selection of the interfaces. The first case shows the option for the Cisco Nexus 7000 Series, and the second example presents the same option for the Cisco Nexus 5500 platform.

Figure 3.   Connecting to Cisco FabricPath Without Expanding Cisco FabricPath Domain
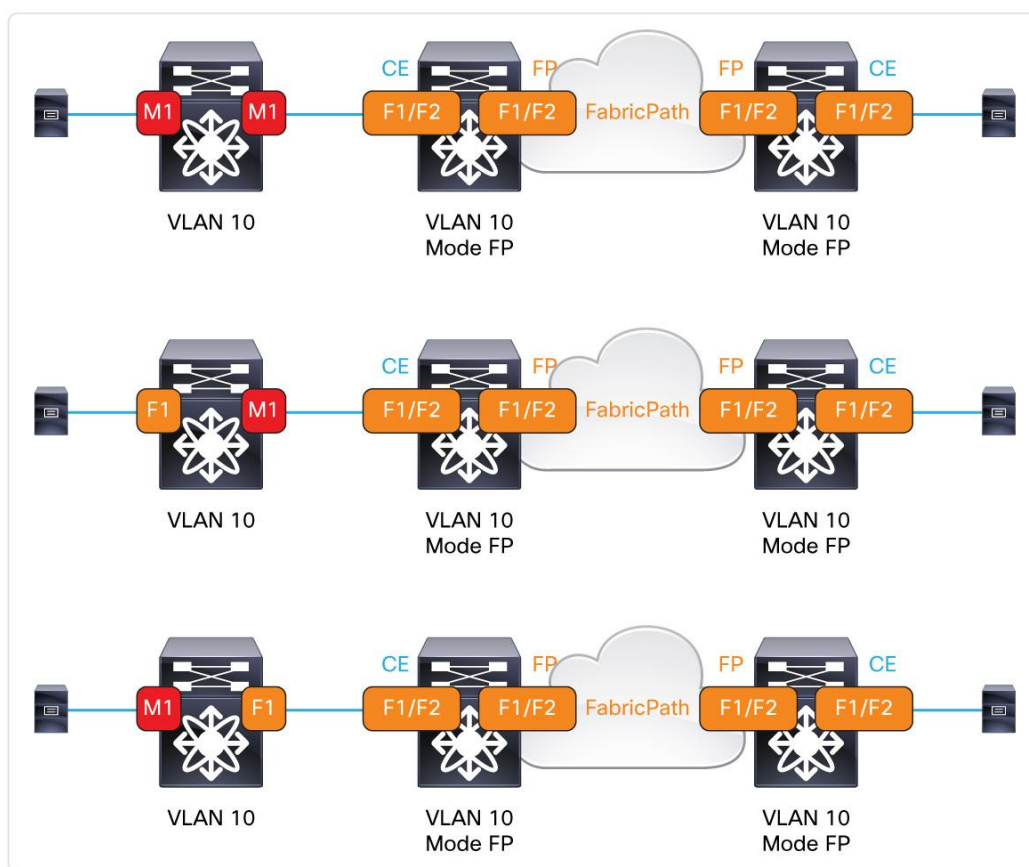
Figure 4.   Extending Cisco FabricPath Domain
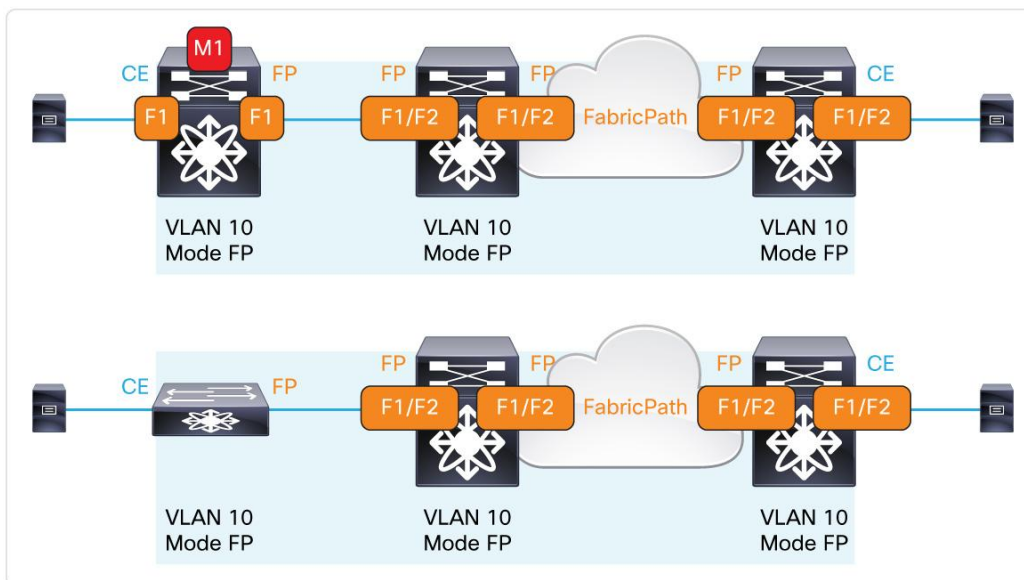
Cisco Nexus 7000 F2-Series Line-Card Design Considerations

Ports from the Cisco Nexus 7000 F2-Series line card must be placed in separate virtual device contexts (VDCs). Cisco Nexus 7000 F2-Series line cards support Layer 3, so you can now build routing on Cisco Nexus 7000 M1-Series or F2-Series line cards.

vPC+ Design Considerations

Cisco FabricPath supports ECMP, which eliminates the need in vPC for the Cisco FabricPath domain. Outside the Cisco FabricPath domain, you still have to use vPC to provide active-active connectivity. In the context of Cisco FabricPath, the vPC feature has been renamed vPC+. The only significant differences between vPC and vPC+ are that the latter requires the configuration of a virtual switch ID and the peer link now consists of Cisco FabricPath core ports.

Software Requirements as Design Considerations

Be sure to keep in mind the minimum software requirements for each piece of hardware used in your Cisco FabricPath design (Table 3).

Table 3.   Cisco FabricPath Minimum Software Requirements

Cisco FabricPath Minimum Software Requirements		
Hardware Model	Minimum Cisco NX-OS Software Release	Recommended Cisco NX-OS Release
N7K-F132XP-15	Release 5.1	Release 5.2(4)[*]
N7K-F248XP-25	Release 6.0	Release 6.0(3)[*]
N5K-C5548P-FA	Release 5.1.3	Release 5.1.3N2(1)[*]
N5K-C5548UP-FA	Release 5.1.3	Release 5.1.3N2(1)[*]
N5K-C5596UP-FA	Release 5.1.3	Release 5.1.3N2(1)[*]

[*] These requirements may change, so please consult your Cisco representative.

Design Considerations Summary

The following is a summary of the specific design details:

- Cisco FabricPath traffic is forwarded only on Cisco FabricPath VLANs.
- Only ports on Cisco Nexus 7000 F1-Series and F2-Series I/O modules and on Cisco Nexus 5500 platform switches can be used as Cisco FabricPath core and edge ports. In particular, Cisco FabricPath VLANs will not be activated on Cisco Nexus 7000 M-Series I/O modules on Cisco Nexus 7000 Series Switches.
- vPC is called vPC+ in the context of Cisco FabricPath.
- vPC+ is basically equivalent to vPC but uses Cisco FabricPath on the peer link.
- Cisco Nexus 7000 F2-Series ports must be placed in separate VDCs.
- Cisco Nexus 7000 F2-Series line cards are Layer 3 capable, so you can now build routing on Cisco Nexus 7000 M1-Series or F2-Series line cards.

Cisco FabricPath Migration Use Cases

The migration to Cisco FabricPath can begin from different starting points and have few different steps to complete the process. This section presents a review of selected cases and details the migration steps.

The starting point for the most common migration case may be the one depicted in Figure 5.

Figure 5.   Common Migration Starting Point
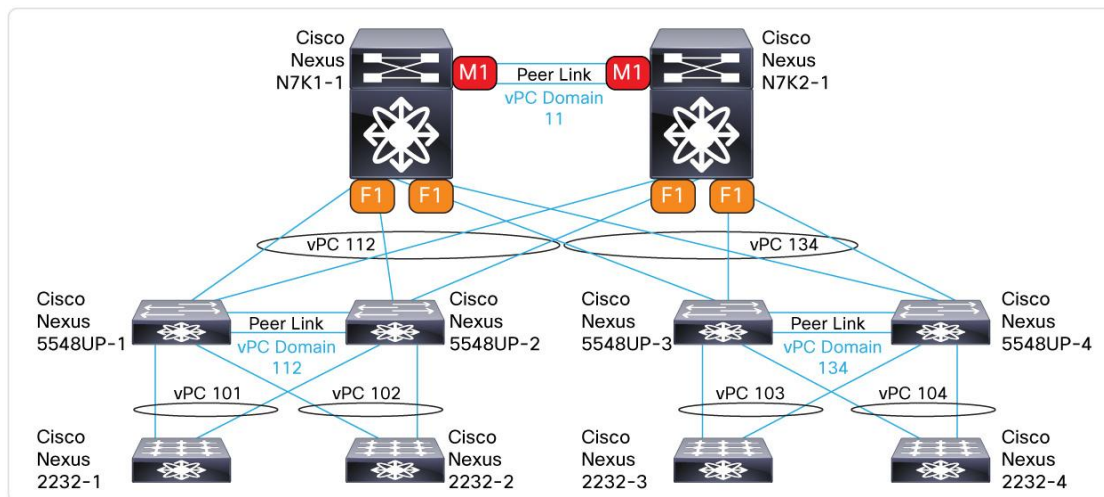
To initiate the migration, two scenarios can be considered.

- Scenario 1 represents a migration to Cisco FabricPath on the Cisco Nexus 7000 M1-Series or F1-Series chassis. This scenario also covers the case in which a Cisco Nexus 7000 F1-Series line card is added to the Cisco Nexus 7000 M1-Series chassis with only one difference requiring changes in cabling.
- Scenario 2 represents a migration to Cisco FabricPath with the addition of a Cisco Nexus 7000 F2-Series line card to a Cisco Nexus 7000 M1-Series or F1-Series chassis. In this scenario, you have two spine layers. One layer is built from Cisco Nexus 7000 F1-Series ports, and the second layer is built from Cisco Nexus 7000 F2-Series ports.

In both cases, you will have aggregation layer switches built from a Cisco Nexus 7000 M1-Series or F1-Series chassis and connected to the access layer switches built with Cisco Nexus 5500 platform switches. Aggregation-to-access layer connection will use double-sided vPC.

For migration planning in both scenarios, the way in which the Cisco Nexus 2000 Series Fabric Extender is connected to the parent switch. A single-connected fabric extender will not be affected by the Cisco FabricPath migration. However, a dual-connected fabric extender will be affected by the migration, because the migration from vPC to vPC+ requires a vPC flap, causing the fabric extender to be unregistered and registered again. For the testing, dual-connected fabric extenders were used because these would provide the most valuable information for migration planning.

Both scenarios require the building of a spine or core and a leaf or edge. A Cisco FabricPath domain spine must be built first, and then that is expanded to the leaf. In the test scenarios, the spine is built from Cisco Nexus 7000 Series Switches, and the leaf is built on the Cisco Nexus 5500 platform.

Migration Scenario 1: Cisco Nexus 7000 M1-Series and F1-Series Chassis Migration

In scenario 1 (Figure 6), the Cisco FabricPath spine is built on Cisco Nexus 7000 Series Switches with Cisco Nexus 7000 F1-Series line cards, and the leaf is built from the Cisco Nexus 5500 platform. Cisco Nexus 2000 Series Fabric Extenders will be dual-connected to the Cisco Nexus 5500 platform switches. Before migration starts, the Cisco Nexus 7000 Series Switches will have a vPC peer configured on Cisco Nexus 7000 M1-Series ports.

To simplify migration testing, Cisco Nexus 5500 is already connected to the Cisco Nexus 7000 F1-Series ports of the Cisco Nexus 7000 Series Switch. If a Cisco Nexus 5500 platform switch is connected to the Cisco Nexus 7000 M1-Series ports of the Cisco Nexus 7000 Series Switch, migration requires the additional step of moving connections from the Cisco Nexus 5500 platform switch from the Cisco Nexus 7000 M1-Series to the Cisco Nexus 7000 F1-Series ports on the Cisco Nexus 7000 Series Switch.

Figure 6. Migration Scenario 1
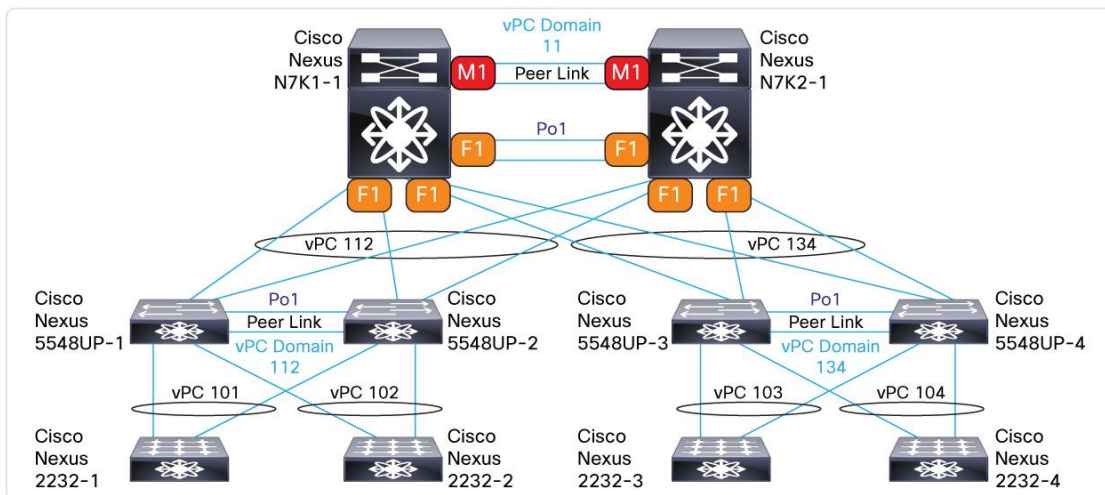
By the end of the migration, all peer links and links between the spine and leaf switches will be working in FabricPath mode. Green connection lines in Figure 7 show links configured in FabricPath mode.

Figure 7. Migration Scenario 1: Network Diagram After Migration Completion
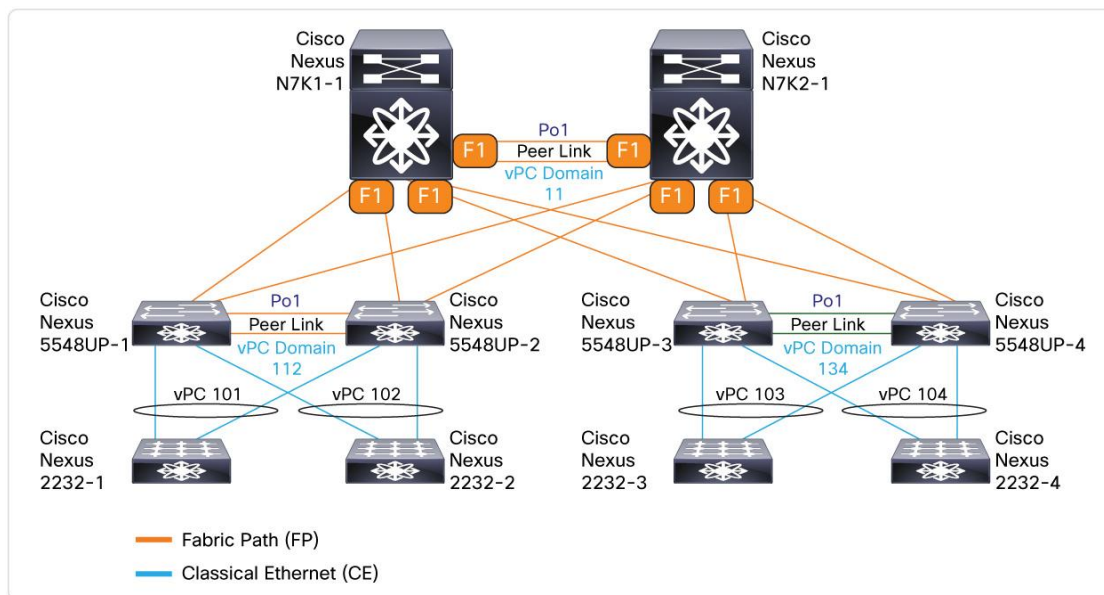
Migration Scenario 2: Cisco Nexus 7000 M1-Series, F1-Series, and F2-Series Chassis Migration

In scenario 2, the Cisco FabricPath spine is built on the Cisco Nexus 7000 Series with the Cisco Nexus 7000 F2-Series, and the leaf is built from the Cisco Nexus 7000 F1-Series and Cisco Nexus 5500 Series platform. This scenario has two leafs.

The Cisco Nexus 2000 Series Fabric Extenders will be dual-connected to the Cisco Nexus 5500 platform switches. Before migration starts, the Cisco Nexus 7000 Series Switches will have a vPC peer configured on the Cisco Nexus 7000 M1-Series ports. To simplify migration steps, the Cisco Nexus 5500 platform switch is already connected to the Cisco Nexus 7000 F1-Series ports of the Cisco Nexus 7000 Series Switch. If the Cisco Nexus 5500 platform switch were connected to the Cisco Nexus 7000 M1-Series ports of the Cisco Nexus 7000 Series Switch, migration would require the additional step of moving connections from the Cisco Nexus 5500 platform from the Cisco Nexus 7000 M1-Series to the Cisco Nexus 7000 F1-Series ports on the Cisco Nexus 7000 Series.

The network diagram for this scenario before migration is exactly the same as the one for scenario 1. By the end of the migration, all peer links and links between the spine and leaf switches will be working in FabricPath mode. The green connection lines in Figure 8 show links configured in FabricPath mode.

Figure 8. Migration Scenario 2: Network Diagram After Migration
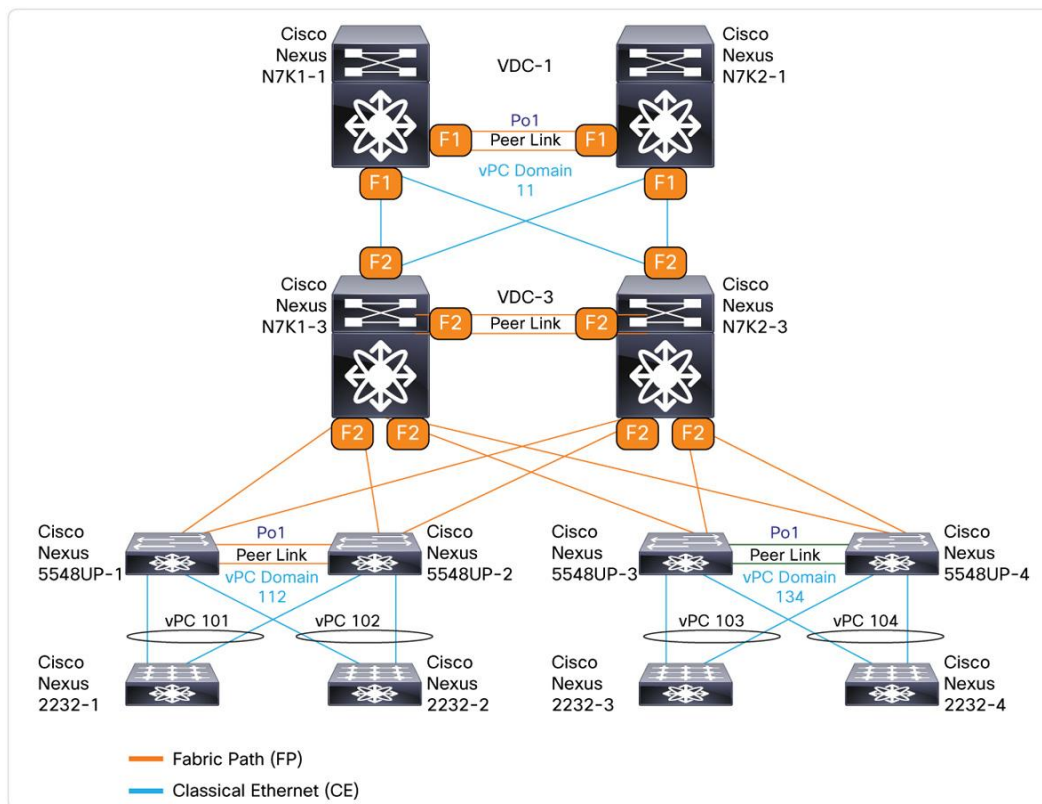
Cisco FabricPath Migration Overview

Taking into Consideration available hardware and existing deployments, these are the two main scenarios for migration to Cisco FabricPath:

- The first test case scenario is a design in which Cisco FabricPath is added to the network with few changes in the cabling and without any additional hardware, and with a Layer 2 domain buildout of the Cisco Nexus 7000 Series Switches with Cisco Nexus 7000 F1-Series line cards and Cisco Nexus 5500 platform switches with Cisco Nexus 2232 fabric extenders.
- The second test case scenario is a design in which Cisco FabricPath is added to the network using additional Cisco Nexus 7000 F2-Series line cards forming two Cisco FabricPath spines out of Cisco Nexus 7000 F1-Series and F2-Series ports. This case's starting point is exactly the same as in the first case, but it requires additional cabling.

Scenario 1: Cisco Nexus 7000 M1-Series and F1-Series Chassis Migration

Migration starts with movement of the peer link from the Cisco Nexus 7000 M1-Series port to the Cisco Nexus 7000 F1-Series port. A peer link cannot be built on Cisco Nexus 7000 M1-Series and F1-Series ports at the same time, so you need to remove the Cisco Nexus 7000 M1-Series ports first and then add the Cisco Nexus 7000 F1-Series ports to the peer link. This configuration will cause a peer-link failure. The primary vPC peer will stay operational when the peer link is down. The secondary vPC peer will shut down all vPC ports in the event of a peer link failure to avoid an active-active situation. It takes less than a minute for a peer link to come up after this step of migration.

Scenario 1: Configuration

Scenario 1: Enable Cisco FabricPath on the Switch

The next step is to implement a basic Cisco FabricPath configuration on all devices participating in the migration. Configuration starts with the activation of Cisco FabricPath (an enhanced Layer 2 license is required). The following commands provide an example of Cisco FabricPath activation.

```
conf t
  install feature-set fabricpath
  feature-set fabricpath
```

Scenario 1: Cisco FabricPath Basic Configuration

Each of the devices in the Cisco FabricPath domain must have a configured Cisco FabricPath switch ID. This step is optional, but you should configure a switch ID rather than allow a default configuration that may be hard to comprehend and troubleshoot at a later time. For the switch ID configuration, the recommended approach is to use single-digit numbers for the spine switches, double-digit numbers for the leaf switches, and four-digit numbers for the virtual switch ID on vPC+.

```
fabricpath switch-id 1
```

An additional item to configure is the Cisco FabricPath priority to assign the root for the multidestination tree. The recommended approach is to configure two spine switches as the primary and secondary roots for multidestination trees.

```
fabricpath domain default
  root-priority 255
```

Note: This entire basic configuration will not cause any downtime on the network.

Scenario 1: Configure Cisco FabricPath Spine

The next step in the migration involves building a Cisco FabricPath core on the peer link of the spine. That core will be the first small piece of the Cisco FabricPath domain you are building. You will need to change the peer-link interfaces to FabricPath mode.

After that, you need to change all VLANs that must be able to cross this Cisco FabricPath link to FabricPath mode. This mode will allow traffic for configured VLANs to cross the Cisco FabricPath domain. The last part of this step changes vPC to vPC+ by adding a Cisco FabricPath switch ID to the vPC domain configuration. That step creates a virtual entity for the vPC domain to be represented in the Cisco FabricPath domain.

```
/* Turn peer-link into fabricpath
interface port-channel 1
  switchport mode fabricpath
/* Change vPC to vPC+
vpc domain 11
  fabric switch-id 1011
/* Configure fabricpath VLANs
```

```
vlan 1,10-19,100,200,1010-1599
  mode fabricpath
```

At the same time, you need to configure spanning tree so that spine switches will be the spanning tree root for all connected Classical Ethernet segments. If you skip this step, all ports will be up, but traffic will be blocked by spanning tree.

```
/* Configure fabricpath edge as spanning tree root
spanning-tree vlan 1,10-19,100,200,1010-1599 priority 4096
```

At this point, the Cisco FabricPath domain is limited to the peer link on the spine switches. The Cisco Nexus 5500 platform switch would not see any difference. It will be a vPC connection to the Cisco Nexus 7000 Series Switch. But on the Cisco Nexus 7000 Series Switch, it will be vPC+, so you will have a vPC domain connected to the vPC+ domain.

Note: Changing vPC to vPC+ requires flapping all vPCs. This process is disruptive.

Scenario 1: Configure Cisco FabricPath Leaf

The next step needs to be repeated as many times as you have access-layer switch pairs (if you are dealing with access-layer vPC domains). In other words, you will start expanding the Cisco FabricPath domain from the spine to the leaf by adding one leaf at a time.

In this step, disruption or downtime will affect only pairs of access switches and all fabric extenders connected to the pairs. The migration itself will look like migration on the spine. You need to change the peer link to FabricPath mode, change VLAN mode to FabricPath mode, and change vPC to vPC+. On both a spine and leaf, you have to remove ports from vPC and configure ports in FabricPath mode. vPCs have to be deleted, but that can be done after migration is complete as part of configuration cleanup.

```
/* On the spine: change vPC connection to fabricpath
interface Ethernet 3/1-2
  no channel-group 112 mode active
  switchport mode fabricpath
no interface port-channel 112

/* On the leaf: Turn peer-link into fabricpath
interface port-channel 1
  switchport mode fabricpath
/* On the leaf: Change vPC to vPC+
vpc domain 112
  fabric switch-id 1112
/* On the leaf: Configure fabricpath VLANs
vlan 1,10-19,100,200,1010-1599
  mode fabricpath
/* Configure fabricpath edge as spanning tree root
spanning-tree vlan 1,10-19,100,200,1010-1599 priority 4096
  mode fabricpath
```

```
/* On the leaf: change vPC connection to fabricpath
interface Ethernet 1/1-2
  no channel-group 112 mode active
  switchport mode fabricpath
no interface port-channel 112
```

Scenario 1: Migration Validation

The following commands are used to validate a successful completion of the migration.

```
show vpc brief                    - brief display of vPC status
show interface brief              - verify interface status
show fabricpath switch-id         - show fabricpath switch-id
show fabricpath isis adjacency    - display IS-IS adjacency information
show fabricpath route             - show FabricPath route information
show spanning-tree                - verify spanning tree protocol status
show spanning-tree vlan 100       - verify spanning tree status for VLAN
```

You need to verify the vPC status at a few different points of the migration process. First, you should verify that the spine has vPC+ and that the leaf has vPC configured properly.

When you have the interfaces configured in FabricPath mode, you can validate the Cisco FabricPath configuration.

When the spine exists only on the peer link, you can validate the vPC-to-vPC+ configuration only. When you have expanded the Cisco FabricPath domain to the links between switches, you can start validating the Cisco FabricPath domain itself.

Scenario 1: Verify vPC and vPC+ Status After Configuring Cisco FabricPath Spine on Peer Link

When vPC is converted to vPC+ in the Cisco FabricPath domain, you need to verify that vPC+ is in the up state.

```
N7K1-1# show vpc brief
Legend:
                (*) - local vPC is down, forwarding via vPC peer-link

vPC domain id                 : 11
vPC+ switch id                : 1011
Peer status                   : peer adjacency formed ok
vPC keep-alive status         : peer is alive
vPC fabricpath status         : peer is reachable through fabricpath
Configuration consistency status : success
Per-vlan consistency status   : success
Type-2 consistency status     : success
vPC role                      : primary
Number of vPCs configured     : 2
Peer Gateway                  : Enabled
```

```
Peer gateway excluded VLANs       : -
Dual-active excluded VLANs        : -
Graceful Consistency Check        : Enabled
Auto-recovery status              : Enabled (timeout = 240 seconds)
Fabricpath load balancing         : Disabled


vPC Peer-link status
---------------------------------------------------------------------
id    Port    Status Active vlans
--    ----    ------ -----------------------------------------------
1     Po1     up     1,10-19,100,200,1010-1599


vPC status
-------------------------------------------------------------------------------
id    Port    Status Consistency Reason           Active vlans  vPC+ Attribute
--    ----    ------ ----------- ------           ------------  --------------
112   Po112   up     success     success          1,10-19,100,2 DF: Yes, FP
                                                   00,1010-1599  MAC:
                                                                 1011.11.4513
134   Po134   up     success     success          1,10-19,100,2 DF: Yes, FP
                                                   00,1010-1599  MAC:
                                                                 1011.12.4513
```

When the vPC is connected to the vPC+ on the leaf (FEX connections), we need to verify that vPC are in and **up** state.

```
N5548UP-2(config)# show vpc brief
Legend:
                (*) - local vPC is down, forwarding via vPC peer-link

vPC domain id                 : 112
Peer status                   : peer adjacency formed ok
vPC keep-alive status         : peer is alive
Configuration consistency status: success
Per-vlan consistency status   : success
Type-2 consistency status     : success
vPC role                      : secondary, operational primary
Number of vPCs configured     : 67
Peer Gateway                  : Enabled
Peer gateway excluded VLANs   : -
Dual-active excluded VLANs    : -
Graceful Consistency Check    : Enabled


vPC Peer-link status
```

```
        ----------------------------------------------------------------------
        id   Port    Status Active vlans
        --   ----    ------ ------------------------------------------------
        1    Po1     up     1,10-19,100,200,1010-1599


        vPC status

        -------------------------------------------------------------------------------
        id      Port        Status Consistency Reason                    Active vlans
        ------  ----------- ------ ----------- ------------------------- -----------
        101     Po101       up     success     success                   -
        102     Po102       up     success     success                   -
        112     Po112       up     success     success                   1,10-19,100
                                                                         ,200,1010-1
                                                                         599

        102400  Eth101/1/1  up     success     success                   1,10-19,100
                                                                         ,200,1010-1
                                                                         599
```

Scenario 1: Verify Cisco FabricPath Configuration on the Leaf

When all vPC links between the spine and leaf are converted to FabricPath mode, the only vPC+ you will see in the up state will be a peer link. You can verify the status of the link between switches using the command shown here.

```
N5548UP-2(config-if)# show interface brief


    --------------------------------------------------------------------------------
    Ethernet      VLAN    Type Mode    Status  Reason                   Speed    Port
    Interface                                                                    Ch #
    --------------------------------------------------------------------------------
    Eth1/1        1       eth  f-path  up      none                     10G(D)   112
    Eth1/2        1       eth  f-path  up      none                     10G(D)   112
    Eth1/3        1       eth  f-path  up      none                     10G(D)   1
    Eth1/4        1       eth  f-path  up      none                     10G(D)   1
    Eth1/5        1       eth  access  down    SFP not inserted         10G(D)   --
    Eth1/6        1       eth  access  down    SFP not inserted         10G(D)   --
    Eth1/7        1       eth  trunk   down    SFP not inserted         10G(D)   --
    Eth1/8        1       eth  trunk   down    SFP not inserted         10G(D)   --
    Eth1/9        1       eth  f-path  up      Administratively down    10G(D)   --
    Eth1/10       1       eth  f-path  up      Administratively down    10G(D)   --
    Eth1/11       1       eth  trunk   down    SFP not inserted         10G(D)   --
    Eth1/12       1       eth  trunk   down    SFP not inserted         10G(D)   --
    Eth1/13       1       eth  trunk   down    SFP not inserted         10G(D)   --
    Eth1/14       1       eth  trunk   down    SFP not inserted         10G(D)   --
    Eth1/15       1       eth  trunk   down    SFP not inserted         10G(D)   --
    Eth1/16       1       eth  trunk   down    SFP not inserted         10G(D)   --
    Eth1/17       1       eth  fabric  up      none                     10G(D)   101
```

```
 Eth1/18       1      eth  fabric up      none                       10G(D) 102
 Eth1/19       1      eth  trunk  down    SFP not inserted           10G(D) --
 …
```

Scenario 1: Verify Cisco FabricPath Configuration

When you have the Cisco FabricPath configuration expanded to the leaf switches, you can see a Cisco FabricPath switch ID forming the Cisco FabricPath domain. The **show fabricpath switch-id** command displays a list of the switches included in the Cisco FabricPath domain.

```
N7K1-1# show fabricpath switch-id
                    FABRICPATH SWITCH-ID TABLE
Legend: '*' - this system
=====================================================================
SWITCH-ID      SYSTEM-ID      FLAGS        STATE     STATIC  EMULATED
----------+----------------+-----------+-----------+--------------------
*1             001b.54c2.1cc1  Primary    Confirmed   Yes     No
 2             001b.54c2.1e41  Primary    Confirmed   Yes     No
 11            547f.ee52.87bc  Primary    Confirmed   Yes     No
 12            547f.ee29.4ec1  Primary    Confirmed   Yes     No
 13            547f.ee24.4381  Primary    Confirmed   Yes     No
 14            547f.ee04.023c  Primary    Confirmed   Yes     No
 1011          001b.54c2.1cc1  Primary    Confirmed   No      Yes
 1011          001b.54c2.1e41  Primary    Confirmed   No      Yes
 1112          547f.ee29.4ec1  Primary    Confirmed   No      Yes
 1112          547f.ee52.87bc  Primary    Confirmed   No      Yes
 1134          547f.ee04.023c  Primary    Confirmed   No      Yes
 1134          547f.ee24.4381  Primary    Confirmed   No      Yes
Total Switch-ids: 12
```

The **show fabricpath isis adjacency** command displays a list of the directly connected switches in the Cisco FabricPath domain.

```
N7K1-1# show fabricpath isis adjacency
Fabricpath IS-IS domain: default Fabricpath IS-IS adjacency database:
System ID      SNPA         Level  State  Hold Time   Interface
N7K2-1         N/A          1      UP     00:00:27    port-channel1
N5548UP-1      N/A          1      UP     00:00:32    Ethernet3/1
N5548UP-2      N/A          1      UP     00:00:25    Ethernet3/2
N5548UP-3      N/A          1      UP     00:00:23    Ethernet3/3
N5548UP-4      N/A          1      UP     00:00:31    Ethernet3/4
```

The Cisco FabricPath routing table shows Layer 2 routes to reach the Cisco FabricPath switch identified by the switch ID.

```
N7K2-1(config)# show fabricpath route
FabricPath Unicast Route Table
'a/b/c' denotes ftag/switch-id/subswitch-id
'[x/y]' denotes [admin distance/metric]
ftag 0 is local ftag
subswitch-id 0 is default subswitch-id


FabricPath Unicast Route Table for Topology-Default

0/2/0, number of next-hops: 0
        via ---- , [60/0], 8 day/s 03:21:19, local
0/1011/11, number of next-hops: 1
        via Po112, [80/0], 1 day/s 02:53:02, vpcm
0/1011/12, number of next-hops: 1
        via Po134, [80/0], 1 day/s 02:53:02, vpcm
1/1/0, number of next-hops: 1
        via Po1, [115/20], 1 day/s 02:53:01, isis_fabricpath-default
1/1011/0, number of next-hops: 0
        via ---- , [60/0], 1 day/s 02:53:02, local
2/1011/0, number of next-hops: 0
        via ---- , [60/0], 1 day/s 02:53:02, local
```

Verify the Spanning Tree Protocol status on the switch that does not have any spanning tree domains connected to the Cisco FabricPath domain.

```
N7K1-1# show spanning-tree
No spanning tree instance exists.
```

Verify the Spanning Tree Protocol status for a particular VLAN on the edge of the Cisco FabricPath domain. This VLAN must not be in the blocking (BLK) state.

```
N7K1-1# show spanning-tree vlan 100

VLAN0100
  Spanning tree enabled protocol rstp
  Root ID    Priority    4196
             Address     c84c.75fa.6000
             This bridge is the root
             Hello Time  2  sec  Max Age 20 sec  Forward Delay 15 sec


  Bridge ID  Priority    4196   (priority 4096 sys-id-ext 100)
             Address     c84c.75fa.6000
             Hello Time  2  sec  Max Age 20 sec  Forward Delay 15 sec
```

```
   Interface        Role Sts Cost      Prio.Nbr Type
   ---------------- ---- --- --------- -------- -------------------------------
   Po112            Desg FWD 1          128.4207 (vPC) P2p
```

The following listing shows the output when Cisco FabricPath is not the root and traffic is blocked for this VLAN.

```
   N7K2-1(config)# show spanning-tree vlan 100


   VLAN0100
     Spanning tree enabled protocol rstp
     Root ID    Priority    32868
                Address     c84c.75fa.6000
                This bridge is the root
                Hello Time  2  sec  Max Age 20 sec  Forward Delay 15 sec


     Bridge ID  Priority    32868  (priority 32768 sys-id-ext 100)
                Address     c84c.75fa.6000
                Hello Time  2  sec  Max Age 20 sec  Forward Delay 15 sec


   Interface        Role Sts Cost      Prio.Nbr Type
   ---------------- ---- --- --------- -------- -------------------------------
   Po112            Desg BKN*1          128.4207 (vPC) P2p *L2GW_Inc
```

Scenario 2: Cisco Nexus 7000 M1-Series, F1-Series, and F2 Chassis Migration

Migration starts with the movement of peer links from Cisco Nexus 7000 M1-Series ports to Cisco Nexus 7000 F1-Series ports. It is not possible to build a peer link on Cisco Nexus 7000 M1-Series and F1-Series ports at the same time, so you need to remove Cisco Nexus 7000 M1-Series ports first and then add Cisco Nexus 7000 F1-Series ports to the peer link. This configuration will cause a peer-link failure.

The primary vPC peer will stay operational when a peer link is down. The secondary vPC peer will shut down all vPC ports in the event of a peer-link failure to avoid an active-active situation. It takes less than a minute for a peer link to come up after this step of migration.

Note: Network diagrams prior to migration in this scenario are exactly the same as those for scenario 1.

Scenario 2: Configuration
Scenario 2: Enable Cisco FabricPath on the Switch

The next step is to implement a basic Cisco FabricPath configuration on all devices participating in the migration. The configuration starts with activation of Cisco FabricPath (an Enhanced Layer 2 license is required). The following commands provide an example of Cisco FabricPath activation.

```
conf t
  install feature-set fabricpath
  feature-set fabricpath
```

Scenario 2: Cisco FabricPath Basic Configuration

Each device in the Cisco FabricPath domain must have a configured Cisco FabricPath switch ID. This step is optional, but you should configure a switch ID rather than allow a default configuration, which can be hard to comprehend and troubleshoot later. The recommended approach for switch ID configuration is to use single-digit numbers for the spine switches, double-digit numbers for the leaf switches, and four-digit numbers for the virtual switch IDs on vPC+.

```
fabricpath switch-id 1
```

You also need to configure is the Cisco FabricPath priority for assigning the root for the multidestination tree. The recommended approach is to configure two spine switches as the primary and secondary roots for multidestination trees.

```
fabricpath domain default
  root-priority 255
```

Note: This entire basic configuration will not cause any downtime on the network.

Scenario 2: Configure Cisco FabricPath Spine

Cisco Nexus 7000 F2-Series line card ports must be placed in separate VDCs and configured in FabricPath mode. You do not need to use vPC+ on these switches because all connections will be configured for Cisco FabricPath.

The spine configuration for scenario 2 starts exactly the same way as it started in scenario 1. It will differ when you start expanding the Cisco FabricPath domain. The spine will be expanded with the Cisco Nexus 7000 F2-Series VDC used for spine switches.

As in scenario 1, you will be building a Cisco FabricPath core on the peer link of the spine. That core will be the first small part of the Cisco FabricPath domain you are building. You need to change the peer-link interfaces to FabricPath mode. Then you need to change all VLANs that must be able to cross this Cisco FabricPath link to FabricPath mode. This mode will allow traffic for configured VLANs to cross the Cisco FabricPath domain.

The last part of this step will change vPC to vPC+ by adding a Cisco FabricPath switch ID to the vPC domain configuration. That change will create a virtual entity for the vPC domain to be represented in the Cisco FabricPath domain.

```
/* Turn peer-link into fabricpath
interface port-channel 1
  switchport mode fabricpath
/* Change vPC to vPC+
vpc domain 11
  fabric switch-id 1011
/* Configure fabricpath VLANs
vlan 1,10-19,100,200,1010-1599
  mode fabricpath
```

At the same time, you need to configure spanning tree so that spine switches are at the spanning tree root. If you skip this step, all ports will come up, but traffic will be blocked by spanning tree.

```
/* Configure fabricpath edge as spanning tree root
spanning-tree vlan 1,10-19,100,200,1010-1599 priority 4096
```

At this point, the Cisco FabricPath domain is limited to the peer link on the spine switches. The Cisco Nexus 5500 platform switch will not see any difference. It will be a vPC connection to the Cisco Nexus 7000 Series Switch. On the Cisco Nexus 7000 Series Switch, it will be vPC+, so you have the vPC domain connected to the vPC+ domain.

Note: Changing vPC to vPC+ requires flapping all vPCs. This process is disruptive.

The next step is to expand the Cisco FabricPath domain and add spine switches built with Cisco Nexus 7000 F2-Series ports. This step does not require downtime because no production devices are connected to the new spine switches. In addition, new Cisco FabricPath devices in the Cisco FabricPath domain do not affect other devices in any way.

```
/* On M1/F1 VDC
/* Expand spine to F2  interfaces
interface Ethernet3/7-8
  switchport mode fabricpath

/* On the F2 VDC
/* Expand spine to F2  interfaces
interface Ethernet 8/1
  switchport mode fabricpath
```

Scenario 2: Configure Cisco FabricPath Leaf

The next steps will need to be repeated as many times as you have access layer switch pairs (if you are dealing with access-layer vPC domains). In other words, you will start expanding the Cisco FabricPath domain from the spine to the leaf by moving one leaf at a time from the Cisco Nexus 7000 M1-Series or F1-Series port connection to the Cisco Nexus 7000 F2-Series port connection.

In this step, disruption or downtime will affect only a pair of access switches and all fabric extenders connected to the pair. This migration will be the same as the migration on the Cisco Nexus 7000 F2-Series port spine with only one difference: that of changing physical connections from Cisco Nexus 7000 M1-Series or F1-Series to Cisco Nexus 7000 F2-Series ports.

Cisco Nexus 5548UP Switches need to connect to the spine: that is, to Cisco Nexus 7000 F2-Series ports. After that occurs, you need to change the peer link to FabricPath mode, change VLAN mode to FabricPath mode, and change vPC to vPC+, and the connection to Cisco Nexus 7000 F2-Series ports will be brought up.

On both the spine and leaf, you need to remove ports from the vPC and configure ports in FabricPath mode. The vPC must be deleted, but that can be done after migration is complete as part of configuration cleanup.

For scenario 2, you also need to move uplinks from Cisco Nexus 7000 F1-Series ports to Cisco Nexus 7000 F2-Series ports to make sure that you have enough links from the spine to the leaf.

```
/* On the F2 spine: configure ports in fabricpath mode
interface Ethernet 8/1-2
  switchport mode fabricpath


/* On the leaf: Turn peer-link into fabricpath
interface port-channel 1
  switchport mode fabricpath


/* On the leaf: Change vPC to vPC+
vpc domain 112
  fabric switch-id 1112


/* On the leaf: Configure fabricpath VLANs
vlan 1,10-19,100,200,1010-1599
  mode fabricpath
/* Configure fabricpath edge as spanning tree root
spanning-tree vlan 1,10-19,100,200,1010-1599 priority 4096
  mode fabricpath


/* On the leaf: change vPC connection to fabricpath
interface Ethernet 1/9-10
  switchport mode fabricpath


/* Cleanup configuration after successful validation
/* On the F1 leaf: remove vPC configuration to access pair
interface Ethernet 3/1-2
  no channel-group 112 mode active
no interface port-channel 112


/* On the leaf: remove vPC configuration for uplinks to F1 ports
interface Ethernet 1/1-2
  no channel-group 112 mode active
no interface port-channel 112
```

Scenario 2: Migration Validation

The commands shown here are used to validate successful completion of migration.

```
show vpc brief                  - brief display of vPC status
show interface brief            - verify interface status
show fabricpath switch-id       - show fabricpath switch-id
show fabricpath isis adjacency  - display IS-IS adjacency information
show fabricpath route           - show FabricPath route information
show spanning-tree              - verify spanning tree protocol status
show spanning-tree vlan 100     - verify spanning tree status for VLAN
```

Scenario 2: Verify vPC and vPC+ Status After Configuring Cisco FabricPath Spine on Peer Link

You need to verify the vPC status at a few different points of the migration process. First, you need to verify that the spine has vPC+ and that the leaf has vPC configured properly.

When vPC is converted to vPC+ in the Cisco FabricPath domain, you need to verify that vPC+ is in the up state.

```
N7K1-1# show vpc brief
Legend:
                (*) - LOCAL vPC is down, forwarding via vPC peer-link

vPC domain id                    : 11
vPC+ switch id                   : 1011
Peer status                      : peer adjacency formed ok
vPC keep-alive status            : peer is alive
vPC fabricpath status            : peer is reachable through fabricpath
Configuration consistency status : success
Per-vlan consistency status      : success
Type-2 consistency status        : success
vPC role                         : primary
Number of vPCs configured        : 2
Peer Gateway                     : Enabled
Peer gateway excluded VLANs      : -
Dual-active excluded VLANs       : -
Graceful Consistency Check       : Enabled
Auto-recovery status             : Enabled (timeout = 240 seconds)
Fabricpath load balancing        : Disabled


vPC Peer-link status
---------------------------------------------------------------------
id   Port   Status Active vlans
--   ----   ------ ---------------------------------------------------
1    Po1    up     1,10-19,100,200,1010-1599


vPC status
----------------------------------------------------------------------------
id   Port   Status Consistency Reason          Active vlans  vPC+ Attribute
--   ----   ------ ----------- ------          ------------  --------------
112  Po112  up     success     success         1,10-19,100,2 DF: Yes, FP
                                               00,1010-1599  MAC:
                                                             1011.11.4513
134  Po134  up     success     success         1,10-19,100,2 DF: Yes, FP
                                               00,1010-1599  MAC:
                                                             1011.12.4513
```

When vPC is connected to vPC+ on the leaf (fabric extender connections), you need to verify that vPC is in the up state.

```
N5548UP-2(config)# show vpc brief
Legend:
                (*) - local vPC is down, forwarding via vPC peer-link

vPC domain id                    : 112
Peer status                      : peer adjacency formed ok
vPC keep-alive status            : peer is alive
Configuration consistency status: success
Per-vlan consistency status      : success
Type-2 consistency status        : success
vPC role                         : secondary, operational primary
Number of vPCs configured        : 67
Peer Gateway                     : Enabled
Peer gateway excluded VLANs      : -
Dual-active excluded VLANs       : -
Graceful Consistency Check       : Enabled


vPC Peer-link status
---------------------------------------------------------------------
id   Port   Status Active vlans
--   ----   ------ --------------------------------------------------
1    Po1    up     1,10-19,100,200,1010-1599


vPC status
----------------------------------------------------------------------------
id      Port        Status Consistency Reason                    Active vlans
------  ----------- ------ ----------- ------------------------- -----------
101     Po101       up     success     success                   -
102     Po102       up     success     success                   -
112     Po112       up     success     success                   1,10-19,100
                                                                 ,200,1010-1
                                                                 599
102400  Eth101/1/1  up     success     success                   1,10-19,100
                                                                 ,200,1010-1
                                                                 599
```

Scenario 2: Verify Cisco FabricPath Configuration on the Leaf

When all vPC links between the spine and the leaf are converted to FabricPath mode, the only vPC+ you will see in the up state will be the peer link. You can verify the status of the link between switches using the command shown here.

```
N5548UP-2(config-if)# show interface brief

--------------------------------------------------------------------------------
Ethernet      VLAN   Type Mode   Status  Reason                    Speed    Port
Interface                                                                   Ch #
--------------------------------------------------------------------------------
Eth1/1        1      eth  trunk  down    Administratively down     10G(D) 112
Eth1/2        1      eth  trunk  down    Administratively down     10G(D) 112
Eth1/3        1      eth  f-path up      none                      10G(D) 1
Eth1/4        1      eth  f-path up      none                      10G(D) 1
Eth1/5        1      eth  access down    SFP not inserted          10G(D) --
Eth1/6        1      eth  access down    SFP not inserted          10G(D) --
Eth1/7        1      eth  trunk  down    SFP not inserted          10G(D) --
Eth1/8        1      eth  trunk  down    SFP not inserted          10G(D) --
Eth1/9        1      eth  f-path up      none                      10G(D) --
Eth1/10       1      eth  f-path up      none                      10G(D) --
Eth1/11       1      eth  trunk  down    SFP not inserted          10G(D) --
Eth1/12       1      eth  trunk  down    SFP not inserted          10G(D) --
Eth1/13       1      eth  trunk  down    SFP not inserted          10G(D) --
Eth1/14       1      eth  trunk  down    SFP not inserted          10G(D) --
Eth1/15       1      eth  trunk  down    SFP not inserted          10G(D) --
Eth1/16       1      eth  trunk  down    SFP not inserted          10G(D) --
Eth1/17       1      eth  fabric up      none                      10G(D) 101
Eth1/18       1      eth  fabric up      none                      10G(D) 102
Eth1/19       1      eth  trunk  down    SFP not inserted          10G(D) --
Eth1/20       1      eth  trunk  down    SFP not inserted          10G(D) --
```

Scenario 2: Verify Cisco FabricPath Configuration

The **show fabricpath switch-id** command displays a list of the switches included in the Cisco FabricPath domain.

```
N7K1-1# show fabricpath switch-id
                     FABRICPATH SWITCH-ID TABLE
Legend: '*' - this system
=========================================================================
SWITCH-ID     SYSTEM-ID       FLAGS       STATE       STATIC   EMULATED
----------+----------------+-----------+-----------+--------------------
*1         001b.54c2.1cc1   Primary     Confirmed   Yes      No
 2         001b.54c2.1e41   Primary     Confirmed   Yes      No
 11        547f.ee52.87bc   Primary     Confirmed   Yes      No
 12        547f.ee29.4ec1   Primary     Confirmed   Yes      No
 13        547f.ee24.4381   Primary     Confirmed   Yes      No
 14        547f.ee04.023c   Primary     Confirmed   Yes      No
 21        001b.54c2.1cc3   Primary     Confirmed   Yes      No
 22        001b.54c2.1e43   Primary     Confirmed   Yes      No
```

```
1011         001b.54c2.1cc1    Primary    Confirmed    No    Yes
1011         001b.54c2.1e41    Primary    Confirmed    No    Yes
1112         547f.ee29.4ec1    Primary    Confirmed    No    Yes
1112         547f.ee52.87bc    Primary    Confirmed    No    Yes
1134         547f.ee04.023c    Primary    Confirmed    No    Yes
1134         547f.ee24.4381    Primary    Confirmed    No    Yes
Total Switch-ids: 14
```

The **show fabricpath isis adjacency** command displays a list of the directly connected switches in the Cisco FabricPath domain.

```
N7K1-1# show fabricpath isis adjacency
Fabricpath IS-IS domain: default Fabricpath IS-IS adjacency database:
System ID       SNPA          Level  State  Hold Time  Interface
N7K2-1          N/A           1      UP     00:00:27   port-channel1
N7K1-3          N/A           1      UP     00:00:28   Ethernet3/7
N7K2-3          N/A           1      UP     00:00:28   Ethernet3/8
```

The Cisco FabricPath routing table shows Layer 2 routes to reach Cisco FabricPath switch identified by the switch ID.

```
N7K1-1# show fabricpath route
FabricPath Unicast Route Table
'a/b/c' denotes ftag/switch-id/subswitch-id
'[x/y]' denotes [admin distance/metric]
ftag 0 is local ftag
subswitch-id 0 is default subswitch-id


FabricPath Unicast Route Table for Topology-Default

0/1/0, number of next-hops: 0
        via ---- , [60/0], 21 day/s 13:13:41, local
0/1011/11, number of next-hops: 1
        via Po112, [80/0], 12 day/s 15:47:30, vpcm
1/2/0, number of next-hops: 1
        via Po1, [115/20], 13 day/s 06:07:14, isis_fabricpath-default
1/11/0, number of next-hops: 2
        via Eth3/7, [115/80], 2 day/s 14:53:05, isis_fabricpath-default
        via Eth3/8, [115/80], 2 day/s 14:53:05, isis_fabricpath-default
1/12/0, number of next-hops: 2
        via Eth3/7, [115/80], 2 day/s 14:53:05, isis_fabricpath-default
        via Eth3/8, [115/80], 2 day/s 14:52:51, isis_fabricpath-default
1/13/0, number of next-hops: 2
        via Eth3/7, [115/80], 2 day/s 14:54:08, isis_fabricpath-default
        via Eth3/8, [115/80], 2 day/s 14:54:08, isis_fabricpath-default
1/14/0, number of next-hops: 2
```

```
         via Eth3/7, [115/80], 2 day/s 14:54:08, isis_fabricpath-default
         via Eth3/8, [115/80], 2 day/s 14:53:51, isis_fabricpath-default
1/21/0, number of next-hops: 1
         via Eth3/7, [115/40], 2 day/s 15:39:00, isis_fabricpath-default
1/22/0, number of next-hops: 1
         via Eth3/8, [115/40], 2 day/s 15:38:36, isis_fabricpath-default
1/1011/0, number of next-hops: 0
         via ---- , [60/0], 13 day/s 06:57:42, local
1/1112/0, number of next-hops: 2
         via Eth3/7, [115/80], 2 day/s 14:53:05, isis_fabricpath-default
         via Eth3/8, [115/80], 2 day/s 14:53:05, isis_fabricpath-default
1/1134/0, number of next-hops: 2
         via Eth3/7, [115/80], 2 day/s 14:54:08, isis_fabricpath-default
         via Eth3/8, [115/80], 2 day/s 14:54:08, isis_fabricpath-default
2/1011/0, number of next-hops: 0
         via ---- , [60/0], 13 day/s 06:57:42, local
```

Verify the Spanning Tree Protocol status on the switch that does not have any spanning tree domains connected to the Cisco FabricPath domain.

```
N7K1-1# show spanning-tree
No spanning tree instance exists.
```

Verify the Spanning Tree Protocol status for the particular VLAN on the edge of the Cisco FabricPath domain. This VLAN must not be in the blocking (BLK) state.

```
N7K1-1# show spanning-tree vlan 100


VLAN0100
  Spanning tree enabled protocol rstp
  Root ID    Priority    4196
             Address     c84c.75fa.6000
             This bridge is the root
             Hello Time  2  sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    4196   (priority 4096 sys-id-ext 100)
             Address     c84c.75fa.6000
             Hello Time  2  sec  Max Age 20 sec  Forward Delay 15 sec


Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Po112            Desg FWD 1         128.4207 (vPC) P2p
```

The following listing shows output when Cisco FabricPath is not the root and traffic is blocked for this VLAN.

```
N7K2-1(config)# show spanning-tree vlan 100


VLAN0100
  Spanning tree enabled protocol rstp
  Root ID    Priority    32868
             Address     c84c.75fa.6000
             This bridge is the root
             Hello Time  2  sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32868  (priority 32768 sys-id-ext 100)
             Address     c84c.75fa.6000
             Hello Time  2  sec  Max Age 20 sec  Forward Delay 15 sec


Interface         Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- -------------------------------
Po112            Desg BKN*1         128.4207 (vPC) P2p *L2GW_Inc
```

Troubleshooting

Troubleshooting Cisco FabricPath is a straightforward process. You need to verify that each switch can see other switches as adjacent switches, and that each switch is unique in the Cisco FabricPath domain. You also need to verify that Cisco FabricPath routes are in place. You may need to verify the topology for the Cisco FabricPath domain.

Table 4 describes the main troubleshooting commands.

Table 4.   Troubleshooting Commands and Descriptions

Troubleshooting Commands and Descriptions	
Troubleshooting Command	**Description**
show license usage	Verify that the correct license is installed
show feature-set	Verify that Cisco FabricPath is enabled
show vlan	Verify that FabricPath mode is enabled
show run fabricpath	Check the Cisco FabricPath configuration
Show vpc	Verify the peer-link mode and vPC status
show fabricpath switch-id	Display a list of switches in the Cisco FabricPath domain
show fabricpath isis interface [brief]	Verify that interfaces are up and forwarding
show fabricpath isis adjacency	Display a list of adjacent Cisco FabricPath devices
show fabricpath route	Display a list of Layer 2 Cisco FabricPath routes
show tech fabricpath	Get information for opening a case with the Cisco Technical Assistance Center (TAC)
show interface ethernet x/y capabilities	Check port information
pong dest <sw#> dest <mac-address> vlan <vlan> count <#> … [detail]	Get hop-by-hop latency measurements

Sample troubleshooting command output from actual completed testing is shown here.

```
N7K1-1# show feature-set
Feature Set Name       ID        State
-------------------    --------  --------
fcoe                   1         uninstalled
fabricpath             2         enabled
fex                    3         uninstalled
mpls                   4         uninstalled
```

```
N7K1-1# show fabricpath isis adjacency
Fabricpath IS-IS domain: default Fabricpath IS-IS adjacency database:
System ID       SNPA          Level   State  Hold Time  Interface
N7K2-1          N/A           1       UP     00:00:27   port-channel1
N7K1-3          N/A           1       UP     00:00:28   Ethernet3/7
N7K2-3          N/A           1       UP     00:00:28   Ethernet3/8
```

```
N7K1-1# show fabricpath switch-id
                      FABRICPATH SWITCH-ID TABLE
Legend: '*' - this system
=======================================================================
SWITCH-ID      SYSTEM-ID        FLAGS         STATE      STATIC  EMULATED
----------+----------------+-----------+----------+--------------------
*1             001b.54c2.1cc1   Primary    Confirmed    Yes     No
 2             001b.54c2.1e41   Primary    Confirmed    Yes     No
 11            547f.ee52.87bc   Primary    Confirmed    Yes     No
 12            547f.ee29.4ec1   Primary    Confirmed    Yes     No
 13            547f.ee24.4381   Primary    Confirmed    Yes     No
 14            547f.ee04.023c   Primary    Confirmed    Yes     No
 21            001b.54c2.1cc3   Primary    Confirmed    Yes     No
 22            001b.54c2.1e43   Primary    Confirmed    Yes     No
 1011          001b.54c2.1cc1   Primary    Confirmed    No      Yes
 1011          001b.54c2.1e41   Primary    Confirmed    No      Yes
 1112          547f.ee29.4ec1   Primary    Confirmed    No      Yes
 1112          547f.ee52.87bc   Primary    Confirmed    No      Yes
 1134          547f.ee04.023c   Primary    Confirmed    No      Yes
 1134          547f.ee24.4381   Primary    Confirmed    No      Yes
Total Switch-ids: 14
```

References

Cisco FabricPath for Cisco Nexus 7000 Series Switches

http://www.cisco.com/en/US/prod/collateral/switches/ps9441/ps9402/white_paper_c11-687554.html

Scale Data Centers with Cisco FabricPath

http://www.cisco.com/en/US/prod/collateral/switches/ps9441/ps9402/white_paper_c11-605488.html

Cisco FabricPath Design Guide: Using Cisco FabricPath with an Aggregation and Access Topology

http://www.cisco.com/en/US/prod/collateral/switches/ps9441/ps9670/guide_c07-690079.html

Appendix A: Configuration Before Migration

To keep the configurations shown here to manageable sizes, the listings do not include the full SVI configuration. There were a total of 600 VLANs, and 20 were created for testing. The configuration shown here demonstrates the configuration for two SVIs only.

```
N7K1-1#                               N7K2-1#
feature lacp                          feature lacp
feature vpc                           feature vpc
feature interface-vlan                feature interface-vlan

hostname N7K1-1                       hostname N7K1-1

interface mgmt0                       interface mgmt0
  ip address 172.21.55.179/24           ip address 172.21.55.183/24

vrf context management                vrf context management
  ip route 0.0.0.0/0 172.21.55.254      ip route 0.0.0.0/0 172.21.55.254

vlan 1,10-19,100,200,1010-1599       vlan 1,10-19,100,200,1010-1599

vpc domain 11                         vpc domain 11
  peer-switch                           peer-switch
  role priority 1024                    role priority 2048
  system-priority 1024                  system-priority 1024
  peer-keepalive destination            peer-keepalive destination
172.21.55.183 source 172.21.55.179   172.21.55.179 source 172.21.55.183
  peer-gateway                          peer-gateway
  auto-recovery                         auto-recovery
  ip arp synchronize                    ip arp synchronize

interface Vlan1                       interface Vlan1
  ip address 10.1.1.2/24                ip address 10.1.1.3/24
  hsrp version 2                        hsrp version 2
  hsrp 1                                hsrp 1
    preempt                               preempt
```

```
      priority 150                           ip 10.1.1.1
      ip 10.1.1.1                            no shutdown
      no shutdown


 interface Vlan11                        interface Vlan11
   ip address 10.1.11.2/24                 ip address 10.1.11.3/24
   hsrp version 2                          hsrp version 2
   hsrp 11                                 hsrp 11
     preempt                                 preempt
     priority 150
     ip 10.1.11.1                            ip 10.1.11.1
     no shutdown                             no shutdown
```

interface port-channel 1   interface port-channel 1

```
   description VPC Peer-Link               description VPC Peer-Link
   switchport                              switchport
   switchport mode trunk                   switchport mode trunk
   vpc peer-link                           vpc peer-link
   spanning-tree port type network         spanning-tree port type network


 interface Ethernet1/1                   interface Ethernet1/1
   description : M1 port - peer-link        description : M1 port - peer-link
 member                                  member
   switchport                              switchport
   switchport mode trunk                   switchport mode trunk
   channel-group 1 mode active             channel-group 1 mode active
   no shutdown                             no shutdown


 interface Ethernet1/2                   interface Ethernet1/2
   description : M1 port - peer-link        description : M1 port - peer-link
 member                                  member
   switchport                              switchport
   switchport mode trunk                   switchport mode trunk
   channel-group 1 mode active             channel-group 1 mode active
   no shutdown                             no shutdown
```

interface port-channel 112   interface port-channel 112

```
   description : link to N5548UP-1 and     description : link to N5548UP-1 and
 N5548UP-2                               N5548UP-2
   switchport                              switchport
   switchport mode trunk                   switchport mode trunk
   vpc 112                                 vpc 112
```

```
interface Ethernet3/1                          interface Ethernet3/1
  description : link  to N5548UP-1               description : link  to N5548UP-1
  switchport                                     switchport
  switchport mode trunk                          switchport mode trunk
  channel-group 112 mode active                  channel-group 112 mode active
  no shutdown                                    no shutdown

interface Ethernet3/2                           interface Ethernet3/2
  description : link to N5548UP-2                 description : link to N5548UP-2
  switchport                                     switchport
  switchport mode trunk                          switchport mode trunk
  channel-group 112 mode active                  channel-group 112 mode active
  no shutdown                                    no shutdown

interface port-channel 134                      interface port-channel 134
  description : link to N5548UP-3 and            description : link to N5548UP-3 and
N5548UP-4                                       N5548UP-4
  switchport                                     switchport
  switchport mode trunk                          switchport mode trunk
  vpc 134                                        vpc 134

interface Ethernet3/3                           interface Ethernet3/3
  description : link  to N5548UP-3               description : link  to N5548UP-3
  switchport                                     switchport
  switchport mode trunk                          switchport mode trunk
  channel-group 134 mode active                  channel-group 134 mode active
  no shutdown                                    no shutdown

interface Ethernet3/4                           interface Ethernet3/4
  description : link to N5548UP-4                 description : link to N5548UP-4
  switchport                                     switchport
  switchport mode trunk                          switchport mode trunk
  channel-group 134 mode active                  channel-group 134 mode active
  no shutdown                                    no shutdown


N5548UP-1#                                      N5548UP-2#
feature vpc                                     feature vpc
feature lacp                                    feature lacp
feature fex                                     feature fex

interface mgmt0                                 interface mgmt0
  ip address 172.21.55.171/24                    ip address 172.21.55.172/24
vrf context management                          vrf context management
```

```
   ip route 0.0.0.0/0 172.21.55.254            ip route 0.0.0.0/0 172.21.55.254
vlan 1,10-19,100,200,1010-1599             vlan 1,10-19,100,200,1010-1599


vpc domain  112                            vpc domain  112
peer-keepalive destination                 peer-keepalive destination
172.21.55.172  source 172.21.55.171 vrf    172.21.55.171  source 172.21.55.172 vrf
management                                 management
reload restore                             reload restore
role priority 1024                         role priority 2048


interface port-channel 1                   interface port-channel 1
  description VPC Peer-Link                   description VPC Peer-Link
  switchport                                  switchport
  switchport mode trunk                       switchport mode trunk
  vpc peer-link                               vpc peer-link
  spanning-tree port type network             spanning-tree port type network


interface Ethernet1/3                       interface Ethernet1/3
  description  peer-link member               description  peer-link member
  switchport                                  switchport
  switchport mode trunk                       switchport mode trunk
  channel-group 1 mode active                 channel-group 1 mode active
  no shutdown                                 no shutdown


interface Ethernet1/4                       interface Ethernet1/4
  description  peer-link member               description  peer-link member
  switchport                                  switchport
  switchport mode trunk                       switchport mode trunk
  channel-group 1 mode active                 channel-group 1 mode active
  no shutdown                                 no shutdown




interface port-channel 112                  interface port-channel 112
  description : uplink to N7K1-1 and          description : uplink to N7K1-1 and
N7K2-1                                     N7K2-1
  switchport                                  switchport
  switchport mode trunk                       switchport mode trunk
  vpc 112                                     vpc 112


interface Ethernet1/1                       interface Ethernet1/1
  description : uplink  to N7K1-1             description : uplink  to N7K1-1
  switchport                                  switchport
  switchport mode trunk                       switchport mode trunk
  channel-group 112 mode active               channel-group 112 mode active
```

```
  no shutdown                                no shutdown

interface Ethernet1/2                      interface Ethernet1/2
  description : uplink to N7K2-1             description : uplink to N7K2-1
  switchport                                 switchport
  switchport mode trunk                      switchport mode trunk
  channel-group 112 mode active             channel-group 112 mode active
  no shutdown                                no shutdown

fex 101                                    fex 101
  pinning max-links 1                        pinning max-links 1
  description "FEX-101"                      description "FEX-101"

interface port-channel101                  interface port-channel101
  description FEX-101                         description FEX-101
  vpc 101                                    vpc 101
  switchport mode fex-fabric                 switchport mode fex-fabric
  fex associate 101                          fex associate 101

interface Ethernet1/17                      interface Ethernet1/17
  description FEX-101                         description FEX-101
  switchport mode fex-fabric                 switchport mode fex-fabric
  fex associate 101                          fex associate 101
  channel-group 101                          channel-group 101


fex 102                                    fex 102
  pinning max-links 1                        pinning max-links 1
  description "FEX-102"                      description "FEX-102"

interface port-channel102                  interface port-channel102
  description FEX-102                         description FEX-102
  vpc 102                                    vpc 102
  switchport mode fex-fabric                 switchport mode fex-fabric
  fex associate 102                          fex associate 102

interface Ethernet1/18                      interface Ethernet1/18
  description FEX-102                         description FEX-102
  switchport mode fex-fabric                 switchport mode fex-fabric
  fex associate 102                          fex associate 102
  channel-group 102                          channel-group 102

interface Ethernet101/1/1                   interface Ethernet101/1/1
  description : Test traffic generator       description : Test traffic generator
```

```
        switchport mode trunk                      switchport mode trunk




N5548UP-3#                                  N5548UP-4#
feature vpc                                 feature vpc
feature lacp                                feature lacp
feature fex                                 feature fex

interface mgmt0                             interface mgmt0
   ip address 172.21.55.173/24                 ip address 172.21.55.174/24


vrf context management                      vrf context management
   ip route 0.0.0.0/0 172.21.55.254            ip route 0.0.0.0/0 172.21.55.254


vlan 1,10-19,100,200,1010-1599              vlan 1,10-19,100,200,1010-1599


vpc domain  134                             vpc domain  134
peer-keepalive destination                  peer-keepalive destination
172.21.55.174  source 172.21.55.173 vrf     172.21.55.173  source 172.21.55.174 vrf
management                                  management
reload restore                              reload restore
role priority 1024                          role priority 2048


interface port-channel 1                    interface port-channel 1
   description VPC Peer-Link                    description VPC Peer-Link
   switchport                                   switchport
   switchport mode trunk                        switchport mode trunk
   vpc peer-link                                vpc peer-link
   spanning-tree port type network              spanning-tree port type network


interface Ethernet1/3                       interface Ethernet1/3
   description  peer-link member                description  peer-link member
   switchport                                   switchport
   switchport mode trunk                        switchport mode trunk
   channel-group 1 mode active                  channel-group 1 mode active
   no shutdown                                  no shutdown


interface Ethernet1/4                       interface Ethernet1/4
   description  peer-link member                description  peer-link member
   switchport                                   switchport
   switchport mode trunk                        switchport mode trunk
   channel-group 1 mode active                  channel-group 1 mode active
   no shutdown                                  no shutdown
```

```
interface port-channel 134
  description : uplink to N7K1-1 and
N7K2-1
  switchport
  switchport mode trunk
  vpc 134

interface Ethernet1/1
  description : uplink  to N7K1-1
  switchport
  switchport mode trunk
  channel-group 134 mode active
  no shutdown

interface Ethernet1/2
  description : uplink to N7K2-1
  switchport
  switchport mode trunk
  channel-group 134 mode active
  no shutdown

fex 103
  pinning max-links 1
  description "FEX-103"

interface port-channel103
  description FEX-103
  vpc 103
  switchport mode fex-fabric
  fex associate 103

interface Ethernet 1/17
  description FEX-103
    fex associate 103
  switchport mode fex-fabric
  channel-group 103


fex 104
  pinning max-links 1
  description "FEX-104"

interface port-channel104
```

```
interface port-channel 134
  description : uplink to N7K1-1 and
N7K2-1
  switchport
  switchport mode trunk
  vpc 134

interface Ethernet1/1
  description : uplink  to N7K1-1
  switchport
  switchport mode trunk
  channel-group 134 mode active
  no shutdown

interface Ethernet1/2
  description : uplink to N7K2-1
  switchport
  switchport mode trunk
  channel-group 134 mode active
  no shutdown

fex 103
  pinning max-links 1
  description "FEX-103"

interface port-channel103
  description FEX-103
  vpc 103
  switchport mode fex-fabric
  fex associate 103

interface Ethernet 1/17
  description FEX-103
    fex associate 103
  switchport mode fex-fabric
  channel-group 103


fex 104
  pinning max-links 1
  description "FEX-104"

interface port-channel104
```

```
  description FEX-104                      description FEX-104
  vpc 104                                  vpc 104
  switchport mode fex-fabric               switchport mode fex-fabric
  fex associate 104                        fex associate 104

interface Ethernet 1/18                  interface Ethernet 1/18
  description FEX-104                       description FEX-104
  fex associate 104                          fex associate 104
  switchport mode fex-fabric                switchport mode fex-fabric
  channel-group 104                        channel-group 104

interface Ethernet104/1/1                interface Ethernet104/1/1
  description : Test traffic generator      description : Test traffic generator
  switchport mode trunk                    switchport mode trunk
```

Appendix B: Configuration after Migration for Case 1.

```
N7K1-1#                                  N7K2-1#
feature lacp                             feature lacp
feature vpc                              feature vpc
feature interface-vlan                   feature interface-vlan
install feature-set fabricpath           install feature-set fabricpath
feature-set fabricpath                   feature-set fabricpath

hostname N7K1-1                          hostname N7K1-1

interface mgmt0                          interface mgmt0
  ip address 172.21.55.179/24             ip address 172.21.55.183/24

vrf context management                   vrf context management
  ip route 0.0.0.0/0 172.21.55.254        ip route 0.0.0.0/0 172.21.55.254

vlan 1,10-19,100,200,1010-1599          vlan 1,10-19,100,200,1010-1599
  mode fabricpath                          mode fabricpath

spanning-tree vlan 1,10-                 spanning-tree vlan 1,10-
19,100,200,1010-1599 priority 4096       19,100,200,1010-1599 priority 4096

vpc domain 11                           vpc domain 11
  peer-switch                             peer-switch
  role priority 1024                      role priority 2048
  system-priority 1024                    system-priority 1024
```

```
  peer-keepalive destination                      peer-keepalive destination
172.21.55.183 source 172.21.55.179             172.21.55.179 source 172.21.55.183
  peer-gateway                                     peer-gateway
  auto-recovery                                    auto-recovery
  fabric switch-id 1011                            fabric switch-id 1011
  ip arp synchronize                               ip arp synchronize

interface Vlan1                                  interface Vlan1
  ip address 10.1.1.2/24                           ip address 10.1.1.3/24
  hsrp version 2                                   hsrp version 2
  hsrp 1                                           hsrp 1
    preempt                                          preempt
    priority 150
    ip 10.1.1.1                                      ip 10.1.1.1
  no shutdown                                      no shutdown


interface Vlan11                                 interface Vlan11
  ip address 10.1.11.2/24                          ip address 10.1.11.3/24
  ip proxy-arp                                     ip proxy-arp
  hsrp version 2                                   hsrp version 2
  hsrp 11                                          hsrp 11
    preempt                                          preempt
    priority 150
    ip 10.1.11.1                                     ip 10.1.11.1
    no shutdown                                      no shutdown

interface port-channel 1                        interface port-channel 1
  description VPC Peer-Link                        description VPC Peer-Link
  switchport                                       switchport
  switchport mode fabricpath                       switchport mode fabricpath
  vpc peer-link                                    vpc peer-link
  spanning-tree port type network                 spanning-tree port type network

interface Ethernet3/5                           interface Ethernet3/5
  description : F1 port - peer-link                description : F1 port - peer-link
member                                          member
  switchport                                       switchport
  switchport mode fabricpath                       switchport mode fabricpath
  channel-group 1 mode active                     channel-group 1 mode active
  no shutdown                                      shutdown

interface Ethernet3/6                           interface Ethernet3/6
  description : F1 port - peer-link                description : F1 port - peer-link
member                                          member
```

```
    switchport                                      switchport
    switchport mode fabricpath                      switchport mode fabricpath
    channel-group 1 mode active                     channel-group 1 mode active
    no shutdown                                     shutdown

interface Ethernet3/1                           interface Ethernet3/1
    description : link  to N5548UP-1                description : link  to N5548UP-1
    switchport                                      switchport
    switchport mode fabricpath                      switchport mode fabricpath
    no shutdown                                     no shutdown

interface Ethernet3/2                           interface Ethernet3/2
    description : link to N5548UP-2                 description : link to N5548UP-2
    switchport                                      switchport
    switchport mode fabricpath                      switchport mode fabricpath
    no shutdown                                     no shutdown

interface Ethernet3/3                           interface Ethernet3/3
    description : link  to N5548UP-3                description : link  to N5548UP-3
    switchport                                      switchport
    switchport mode fabricpath                      switchport mode fabricpath
    no shutdown                                     no shutdown

interface Ethernet3/4                           interface Ethernet3/4
    description : link to N5548UP-4                 description : link to N5548UP-4
    switchport                                      switchport
    switchport mode fabricpath                      switchport mode fabricpath
    no shutdown                                     no shutdown


fabricpath switch-id 1                          fabricpath switch-id 2
fabricpath domain default                       fabricpath domain default
  root-priority 255                               root-priority 254


N5548UP-1#                                      N5548UP-2#
feature vpc                                     feature vpc
feature lacp                                    feature lacp
feature fex                                     feature fex
install feature-set fabricpath                  install feature-set fabricpath
feature-set fabricpath                          feature-set fabricpath

interface mgmt0                                 interface mgmt0
    ip address 172.21.55.171/24                    ip address 172.21.55.172/24
```

```
vrf context management                          vrf context management
  ip route 0.0.0.0/0 172.21.55.254               ip route 0.0.0.0/0 172.21.55.254
vlan 1,10-19,100,200,1010-1599                  vlan 1,10-19,100,200,1010-1599
spanning-tree vlan 1,10-                         spanning-tree vlan 1,10-
19,100,200,1010-1599 priority 8192              19,100,200,1010-1599 priority 8192


vpc domain  112                                 vpc domain  112
peer-keepalive destination                      peer-keepalive destination
172.21.55.172  source 172.21.55.171 vrf         172.21.55.171  source 172.21.55.172 vrf
management                                      management
reload restore                                  reload restore
role priority 1024                              role priority 2048
fabric switch-id 1112                           fabric switch-id 1112


interface port-channel 1                        interface port-channel 1
  description VPC Peer-Link                       description VPC Peer-Link
  switchport                                      switchport
  switchport mode fabricpath                      switchport mode fabricpath
  vpc peer-link                                   vpc peer-link
  spanning-tree port type network                 spanning-tree port type network


interface Ethernet1/3                           interface Ethernet1/3
  description  peer-link member                   description  peer-link member
  switchport                                      switchport
  switchport mode fabricpath                      switchport mode fabricpath
  channel-group 1 mode active                     channel-group 1 mode active
  no shutdown                                     no shutdown


interface Ethernet1/4                           interface Ethernet1/4
  description  peer-link member                   description  peer-link member
  switchport                                      switchport
  switchport mode fabricpath                      switchport mode fabricpath
  channel-group 1 mode active                     channel-group 1 mode active
  no shutdown                                     no shutdown


interface Ethernet1/1                           interface Ethernet1/1
  description : uplink  to N7K1-1                  description : uplink  to N7K1-1
  switchport                                      switchport
  switchport mode fabricpath                      switchport mode fabricpath
  no shutdown                                     no shutdown


interface Ethernet1/2                           interface Ethernet1/2
  description : uplink to N7K2-1                   description : uplink to N7K2-1
  switchport                                      switchport
```

```
  switchport mode fabricpath              switchport mode fabricpath
  no shutdown                             no shutdown

fex 101                                 fex 101
  pinning max-links 1                     pinning max-links 1
  description "FEX-101"                   description "FEX-101"

interface port-channel101               interface port-channel101
  description FEX-101                      description FEX-101
  vpc 101                                 vpc 101
  switchport mode fex-fabric              switchport mode fex-fabric
  fex associate 101                       fex associate 101

interface Ethernet1/17                  interface Ethernet1/17
  description FEX-101                      description FEX-101
  switchport mode fex-fabric              switchport mode fex-fabric
  fex associate 101                       fex associate 101
  channel-group 101                       channel-group 101


fex 102                                 fex 102
  pinning max-links 1                     pinning max-links 1
  description "FEX-102"                   description "FEX-102"

interface port-channel102               interface port-channel102
  description FEX-102                      description FEX-102
  vpc 102                                 vpc 102
  switchport mode fex-fabric              switchport mode fex-fabric
  fex associate 102                       fex associate 102

interface Ethernet1/18                  interface Ethernet1/18
  description FEX-102                      description FEX-102
  switchport mode fex-fabric              switchport mode fex-fabric
  fex associate 102                       fex associate 102
  channel-group 102                       channel-group 102

interface Ethernet101/1/1               interface Ethernet101/1/1
  switchport mode trunk                   switchport mode trunk

fabricpath switch-id 11                 fabricpath switch-id 12



N5548UP-3#                              N5548UP-4#
```

```
feature vpc                              feature vpc
feature lacp                             feature lacp
feature fex                              feature fex
install feature-set fabricpath           install feature-set fabricpath
feature-set fabricpath                   feature-set fabricpath

interface mgmt0                          interface mgmt0
  ip address 172.21.55.173/24              ip address 172.21.55.174/24

vrf context management                   vrf context management
  ip route 0.0.0.0/0 172.21.55.254         ip route 0.0.0.0/0 172.21.55.254

vlan 1,10-19,100,200,1010-1599           vlan 1,10-19,100,200,1010-1599
 mode fabricpath                         mode fabricpath

spanning-tree vlan 1,10-                 spanning-tree vlan 1,10-
19,100,200,1010-1599 priority 8192       19,100,200,1010-1599 priority 8192

vpc domain  134                          vpc domain  134
peer-keepalive destination               peer-keepalive destination
172.21.55.174  source 172.21.55.173 vrf  172.21.55.173  source 172.21.55.174 vrf
management                               management
reload restore                           reload restore
role priority 1024                       role priority 2048
fabric switch-id 1134                    fabric switch-id 1134

interface port-channel 1                 interface port-channel 1
  description VPC Peer-Link                description VPC Peer-Link
  switchport                               switchport
  switchport mode fabricpath               switchport mode fabricpath
  vpc peer-link                            vpc peer-link
  spanning-tree port type network          spanning-tree port type network

interface Ethernet1/3                    interface Ethernet1/3
  description  peer-link member            description  peer-link member
  switchport                               switchport
  switchport mode fabricpath               switchport mode fabricpath
  channel-group 1 mode active              channel-group 1 mode active
  no shutdown                              no shutdown

interface Ethernet1/4                    interface Ethernet1/4
  description  peer-link member            description  peer-link member
  switchport                               switchport
  switchport mode fabricpath               switchport mode fabricpath
  channel-group 1 mode active              channel-group 1 mode active
```

```
  no shutdown                                    no shutdown

interface Ethernet1/1                        interface Ethernet1/1
  description : uplink  to N7K1-1              description : uplink  to N7K1-1
  switchport                                   switchport
  switchport mode fabricpath                   switchport mode fabricpath
  no shutdown                                   no shutdown

interface Ethernet1/2                        interface Ethernet1/2
  description : uplink to N7K2-1               description : uplink to N7K2-1
  switchport                                   switchport
  switchport mode fabricpath                   switchport mode fabricpath
  no shutdown                                   no shutdown

fex 103                                      fex 103
  pinning max-links 1                          pinning max-links 1
  description "FEX-103"                         description "FEX-103"

interface port-channel103                    interface port-channel103
  description FEX-103                           description FEX-103
  vpc 103                                       vpc 103
  switchport mode fex-fabric                    switchport mode fex-fabric
  fex associate 103                            fex associate 103

interface Ethernet 1/17                      interface Ethernet 1/17
  description FEX-103                           description FEX-103
    fex associate 103                            fex associate 103
  switchport mode fex-fabric                    switchport mode fex-fabric
  channel-group 103                            channel-group 103

fex 104                                      fex 104
  pinning max-links 1                          pinning max-links 1
  description "FEX-104"                         description "FEX-104"

interface port-channel104                    interface port-channel104
  description FEX-104                           description FEX-104
  vpc 104                                       vpc 104
  switchport mode fex-fabric                    switchport mode fex-fabric
  fex associate 104                            fex associate 104

interface Ethernet 1/18                      interface Ethernet 1/18
  description FEX-104                           description FEX-104
  fex associate 104                            fex associate 104
  switchport mode fex-fabric                    switchport mode fex-fabric
```

```
    channel-group 104                         channel-group 104

interface Ethernet104/1/1                 interface Ethernet104/1/1
  switchport mode trunk                     switchport mode trunk

fabricpath switch-id 13                   fabricpath switch-id 14
```

Appendix C: Configuration after Migration for Scenario 2

```
N7K1-1#                                   N7K2-1#
feature lacp                              feature lacp
feature vpc                               feature vpc
feature interface-vlan                    feature interface-vlan
install feature-set fabricpath            install feature-set fabricpath
feature-set fabricpath                    feature-set fabricpath


hostname N7K1-1                           hostname N7K1-1

interface mgmt0                           interface mgmt0
  ip address 172.21.55.179/24               ip address 172.21.55.183/24

vrf context management                    vrf context management
  ip route 0.0.0.0/0 172.21.55.254         ip route 0.0.0.0/0 172.21.55.254

vlan 1,10-19,100,200,1010-1599           vlan 1,10-19,100,200,1010-1599
  mode fabricpath                           mode fabricpath

spanning-tree vlan 1,10-                  spanning-tree vlan 1,10-
19,100,200,1010-1599 priority 4096       19,100,200,1010-1599 priority 4096

vpc domain 11                             vpc domain 11
  peer-switch                               peer-switch
  role priority 1024                        role priority 2048
  system-priority 1024                      system-priority 1024
  peer-keepalive destination                peer-keepalive destination
172.21.55.183 source 172.21.55.179       172.21.55.179 source 172.21.55.183
  peer-gateway                              peer-gateway
  auto-recovery                             auto-recovery
  fabric switch-id 1011                     fabric switch-id 1011
  ip arp synchronize                        ip arp synchronize


interface Vlan1                           interface Vlan1
```

```
   ip address 10.1.1.2/24                       ip address 10.1.1.3/24
   hsrp version 2                               hsrp version 2
   hsrp 1                                       hsrp 1
     preempt                                      preempt
     priority 150
     ip 10.1.1.1                                  ip 10.1.1.1
     no shutdown                                no shutdown


interface Vlan11                             interface Vlan11
   ip address 10.1.11.2/24                      ip address 10.1.11.3/24
   ip proxy-arp                                 ip proxy-arp
   hsrp version 2                               hsrp version 2
   hsrp 11                                      hsrp 11
     preempt                                      preempt
     priority 150
     ip 10.1.11.1                                 ip 10.1.11.1
     no shutdown                                  no shutdown

interface port-channel 1                     interface port-channel 1
   description VPC Peer-Link                    description VPC Peer-Link
   switchport                                   switchport
   switchport mode fabricpath                   switchport mode fabricpath
   vpc peer-link                                vpc peer-link
   spanning-tree port type network             spanning-tree port type network

interface Ethernet3/5                        interface Ethernet3/5
   description : F1 port - peer-link            description : F1 port - peer-link
member                                       member
   switchport                                   switchport
   switchport mode fabricpath                   switchport mode fabricpath
   channel-group 1 mode active                 channel-group 1 mode active
   no shutdown                                  shutdown

interface Ethernet3/6                        interface Ethernet3/6
   description : F1 port - peer-link            description : F1 port - peer-link
member                                       member
   switchport                                   switchport
   switchport mode fabricpath                   switchport mode fabricpath
   channel-group 1 mode active                 channel-group 1 mode active
   no shutdown                                  shutdown

interface Ethernet3/1                        interface Ethernet3/1
   description : link  to N5548UP-1            description : link  to N5548UP-1
   switchport                                   switchport
```

```
  switchport mode fabricpath                    switchport mode fabricpath
  no shutdown                                    no shutdown

interface Ethernet3/2                          interface Ethernet3/2
  description : link to N5548UP-2                description : link to N5548UP-2
  switchport                                     switchport
  switchport mode fabricpath                    switchport mode fabricpath
  no shutdown                                    no shutdown

interface Ethernet3/3                          interface Ethernet3/3
  description : link  to N5548UP-3              description : link  to N5548UP-3
  switchport                                     switchport
  switchport mode fabricpath                    switchport mode fabricpath
  no shutdown                                    no shutdown

interface Ethernet3/4                          interface Ethernet3/4
  description : link to N5548UP-4               description : link to N5548UP-4
  switchport                                     switchport
  switchport mode fabricpath                    switchport mode fabricpath
  no shutdown                                    no shutdown


fabricpath switch-id 1                         fabricpath switch-id 2
fabricpath domain default                      fabricpath domain default
  root-priority 255                              root-priority 254


N7K1-3#                                        N7K2-3#
feature lacp                                   feature lacp
feature vpc                                    feature vpc
install feature-set fabricpath                 install feature-set fabricpath
feature-set fabricpath                         feature-set fabricpath

hostname N7K1-3                                hostname N7K2-3

interface mgmt0                                interface mgmt0
  ip address 172.21.55.181/24                   ip address 172.21.55.185/24

vrf context management                         vrf context management
  ip route 0.0.0.0/0 172.21.55.254              ip route 0.0.0.0/0 172.21.55.254

vlan 1,10-19,100,200,1010-1599                 vlan 1,10-19,100,200,1010-1599
  mode fabricpath                                mode fabricpath
```

```
interface Ethernet8/1                          interface Ethernet8/1
  description To 5548-1                           description To 5548-1
  switchport                                      switchport
  switchport mode fabricpath                      switchport mode fabricpath
  no shutdown                                     no shutdown

interface Ethernet8/2                          interface Ethernet8/2
  description To 5548-2                           description To 5548-2
  switchport                                      switchport
  switchport mode fabricpath                      switchport mode fabricpath
  no shutdown                                     no shutdown

interface Ethernet8/3                          interface Ethernet8/3
  description To 5548-3                           description To 5548-3
  switchport                                      switchport
  switchport mode fabricpath                      switchport mode fabricpath
  no shutdown                                     no shutdown

interface Ethernet8/4                          interface Ethernet8/4
  description To 5548-4                           description To 5548-4
  switchport                                      switchport
  switchport mode fabricpath                      switchport mode fabricpath
  no shutdown                                     no shutdown




interface Ethernet8/5                          interface Ethernet8/5
  description To N7K1-1                           description To N7K1-1
  switchport                                      switchport
  switchport mode fabricpath                      switchport mode fabricpath
  no shutdown                                     no shutdown

interface Ethernet8/6                          interface Ethernet8/6
  description To N7K2-1                           description To N7K2-1
  switchport                                      switchport
  switchport mode fabricpath                      switchport mode fabricpath
  no shutdown                                     no shutdown

interface Ethernet8/7                          interface Ethernet8/7
  description To N7K2-3                           description To N7K1-3
  switchport                                      switchport
  switchport mode fabricpath                      switchport mode fabricpath
  no shutdown                                     no shutdown
```

```
interface Ethernet8/8                        interface Ethernet8/8
  description To N7K2-3                         description To N7K1-3
  switchport                                    switchport
  switchport mode fabricpath                    switchport mode fabricpath
  no shutdown                                   no shutdown

fabricpath domain default                    fabricpath domain default
fabricpath switch-id 21                      fabricpath switch-id 22


N5548UP-1#                                   N5548UP-2#
feature vpc                                  feature vpc
feature lacp                                 feature lacp
feature fex                                  feature fex
install feature-set fabricpath              install feature-set fabricpath
feature-set fabricpath                       feature-set fabricpath

interface mgmt0                              interface mgmt0
  ip address 172.21.55.171/24                  ip address 172.21.55.172/24
vrf context management                       vrf context management
  ip route 0.0.0.0/0 172.21.55.254             ip route 0.0.0.0/0 172.21.55.254
vlan 1,10-19,100,200,1010-1599              vlan 1,10-19,100,200,1010-1599
spanning-tree vlan 1,10-                     spanning-tree vlan 1,10-
19,100,200,1010-1599 priority 8192          19,100,200,1010-1599 priority 8192


vpc domain  112                             vpc domain  112
peer-keepalive destination                   peer-keepalive destination
172.21.55.172  source 172.21.55.171 vrf     172.21.55.171  source 172.21.55.172 vrf
management                                   management
reload restore                               reload restore
role priority 1024                           role priority 2048
fabric switch-id 1112                        fabric switch-id 1112

interface port-channel 1                     interface port-channel 1
  description VPC Peer-Link                     description VPC Peer-Link
  switchport                                    switchport
  switchport mode fabricpath                    switchport mode fabricpath
  vpc peer-link                                 vpc peer-link
  spanning-tree port type network              spanning-tree port type network


interface Ethernet1/3                         interface Ethernet1/3
  description  peer-link member                 description  peer-link member
  switchport                                    switchport
  switchport mode fabricpath                    switchport mode fabricpath
```

```
  channel-group 1 mode active                 channel-group 1 mode active
  no shutdown                                 no shutdown

interface Ethernet1/4                       interface Ethernet1/4
  description  peer-link member               description  peer-link member
  switchport                                  switchport
  switchport mode fabricpath                  switchport mode fabricpath
  channel-group 1 mode active                 channel-group 1 mode active
  no shutdown                                 no shutdown


interface Ethernet1/9                       interface Ethernet1/9
  description : uplink  to N7K1-3             description : uplink  to N7K1-3
  switchport                                  switchport
  switchport mode fabricpath                  switchport mode fabricpath
  no shutdown                                 no shutdown

interface Ethernet1/10                      interface Ethernet1/10
  description : uplink to N7K2-3              description : uplink to N7K2-3
  switchport                                  switchport
  switchport mode fabricpath                  switchport mode fabricpath
  no shutdown                                 no shutdown

fex 101                                     fex 101
  pinning max-links 1                         pinning max-links 1
  description "FEX-101"                       description "FEX-101"

interface port-channel101                   interface port-channel101
  description FEX-101                          description FEX-101
  vpc 101                                     vpc 101
  switchport mode fex-fabric                  switchport mode fex-fabric
  fex associate 101                           fex associate 101

interface Ethernet1/17                      interface Ethernet1/17
  description FEX-101                          description FEX-101
  switchport mode fex-fabric                  switchport mode fex-fabric
  fex associate 101                           fex associate 101
  channel-group 101                           channel-group 101


fex 102                                     fex 102
  pinning max-links 1                         pinning max-links 1
  description "FEX-102"                       description "FEX-102"
```

```
interface port-channel102                    interface port-channel102
  description FEX-102                           description FEX-102
  vpc 102                                        vpc 102
  switchport mode fex-fabric                     switchport mode fex-fabric
  fex associate 102                              fex associate 102

interface Ethernet1/18                        interface Ethernet1/18
  description FEX-102                             description FEX-102
  switchport mode fex-fabric                      switchport mode fex-fabric
  fex associate 102                              fex associate 102
  channel-group 102                              channel-group 102

interface Ethernet101/1/1                     interface Ethernet101/1/1
  switchport mode trunk                          switchport mode trunk

fabricpath switch-id 11                       fabricpath switch-id 12


N5548UP-3#                                    N5548UP-4#
feature vpc                                    feature vpc
feature lacp                                   feature lacp
feature fex                                    feature fex
install feature-set fabricpath                install feature-set fabricpath
feature-set fabricpath                        feature-set fabricpath

interface mgmt0                               interface mgmt0
  ip address 172.21.55.173/24                   ip address 172.21.55.174/24

vrf context management                        vrf context management
  ip route 0.0.0.0/0 172.21.55.254              ip route 0.0.0.0/0 172.21.55.254

vlan 1,10-19,100,200,1010-1599               vlan 1,10-19,100,200,1010-1599
 mode fabricpath                              mode fabricpath

spanning-tree vlan 1,10-                      spanning-tree vlan 1,10-
19,100,200,1010-1599 priority 8192           19,100,200,1010-1599 priority 8192

vpc domain  134                              vpc domain  134
peer-keepalive destination                    peer-keepalive destination
172.21.55.174  source 172.21.55.173 vrf       172.21.55.173  source 172.21.55.174 vrf
management                                    management
reload restore                                reload restore
role priority 1024                            role priority 2048
fabric switch-id 1134                         fabric switch-id 1134
```

```
interface port-channel 1                          interface port-channel 1
  description VPC Peer-Link                          description VPC Peer-Link
  switchport                                         switchport
  switchport mode fabricpath                         switchport mode fabricpath
  vpc peer-link                                      vpc peer-link
  spanning-tree port type network                    spanning-tree port type network

interface Ethernet1/3                              interface Ethernet1/3
  description  peer-link member                      description  peer-link member
  switchport                                         switchport
  switchport mode fabricpath                         switchport mode fabricpath
  channel-group 1 mode active                        channel-group 1 mode active
  no shutdown                                        no shutdown

interface Ethernet1/4                              interface Ethernet1/4
  description  peer-link member                      description  peer-link member
  switchport                                         switchport
  switchport mode fabricpath                         switchport mode fabricpath
  channel-group 1 mode active                        channel-group 1 mode active
  no shutdown                                        no shutdown

interface Ethernet1/9                              interface Ethernet1/9
  description : uplink  to N7K1-3                     description : uplink  to N7K1-1
  switchport                                         switchport
  switchport mode fabricpath                         switchport mode fabricpath
  no shutdown                                        no shutdown

interface Ethernet1/10                             interface Ethernet1/10
  description : uplink to N7K2-3                      description : uplink to N7K2-1
  switchport                                         switchport
  switchport mode fabricpath                         switchport mode fabricpath
  no shutdown                                        no shutdown

fex 103                                           fex 103
  pinning max-links 1                                pinning max-links 1
  description "FEX-103"                               description "FEX-103"

interface port-channel103                         interface port-channel103
  description FEX-103                                 description FEX-103
  vpc 103                                            vpc 103
  switchport mode fex-fabric                          switchport mode fex-fabric
  fex associate 103                                  fex associate 103

interface Ethernet 1/17                           interface Ethernet 1/17
```

```
      description FEX-103                    description FEX-103
        fex associate 103                      fex associate 103
      switchport mode fex-fabric             switchport mode fex-fabric
      channel-group 103                      channel-group 103

    fex 104                                fex 104
      pinning max-links 1                    pinning max-links 1
      description "FEX-104"                  description "FEX-104"

    interface port-channel104              interface port-channel104
      description FEX-104                     description FEX-104
      vpc 104                                vpc 104
      switchport mode fex-fabric             switchport mode fex-fabric
      fex associate 104                      fex associate 104

    interface Ethernet 1/18                interface Ethernet 1/18
      description FEX-104                     description FEX-104
      fex associate 104                        fex associate 104
      switchport mode fex-fabric             switchport mode fex-fabric
      channel-group 104                      channel-group 104

    interface Ethernet104/1/1              interface Ethernet104/1/1
      switchport mode trunk                  switchport mode trunk

    fabricpath switch-id 13                fabricpath switch-id 14
```

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