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## Scope

This document briefly describes Data Center technology and provides a straight-forward, simple configuration to 2 N5Ks, connected and running layer 2 protocols. This Design assumes 2 Nexus 5020 units, with 12 FEX 2000 single homed to each of the Nexus 5000.

## Technology Overview

### Data Center Switching:

The Cisco Nexus family of switches is a primary part of the unified fabric pillar of the Cisco Data Center Business Advantage architectural framework. These switches are designed to meet the stringent requirements of the next-generation data center. Not simply bigger or faster, these switches offer the following advantages:

- Infrastructure that can be scaled cost-effectively and that helps you increase energy, budget, and resource efficiency
- Transport 10 Gigabit Ethernet and unified fabric and can handle virtualization, Web 2.0 applications, and cloud computing
- Operational continuity where system availability is assumed and maintenance windows are rare or nonexistent

The Cisco Nexus 5000 Series Switches help you transform the data center with innovative, standards-based, multilayer, multiprotocol, and multipurpose Ethernet-based fabric. Now you can help enable any transport over Ethernet, including Layer 2 and Layer 3 traffic, and storage traffic, all on one common data center-class platform.

## Best Practice Design Objectives

The Goal of this document is to connect 2 Nexus 5020 devices and have them configured to do Layer 2 switching while layer 3 is handled on the core level. Layer 3 configs are out of the scope of this document.

## Best Practice Design Technology Considerations

This design uses 2 Nexus 5020 with 24 Fabric extender 2248G attached single homed (12 FEX attached on to each of the 5020). Layer 3 routing is done on a core switch Cisco 6513 (not covered in this document)

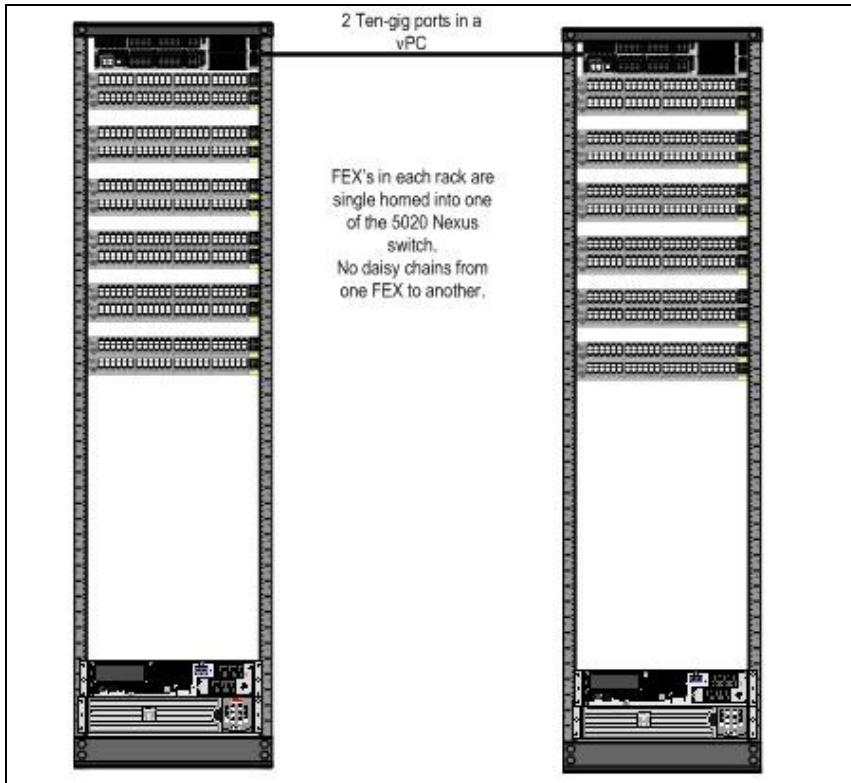
The following steps need to be taken:

1. upgrade the switch NX-OS
2. enable features

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3. connect and configure the fabric extenders; which includes creating port channel interfaces and associating the Ethernet interfaces with a FEX ID and PO number.
4. configure vPC between N5K
5. General and layer 2 configurations
6. TACACS+ configs

### Reference Design Example



### Configuration Example(s)

#### Upgrading the Nexus parent Switch:

Upgrading Cisco Nexus switch:

- Select and download the kickstart and system software files to a server.
- Ensure that the required space is available in the bootflash: directory for the image file(s) to be copied --dir bootflash:
- Copy the kickstart and system images to the supervisor module bootflash using a transfer protocol.

```
copy tftp bootflash:kick start n5000-uk9-kickstart.5.0.2.N1.1.bin
copy tftp bootflash:system files n5000-uk9.5.0.2.N1.1.bin
```

I used ftp as the files were too large for tftp.

- Install the new images, specifying the new image names that you downloaded

```
install all kickstart bootflash:n5000-uk9-kickstart.5.0.2.N1.1.bin system bootflash:n5000-uk9.5.0.
```

- After the switch completes the installation, log in and verify that the switch is running the required

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software version. -- sh ver

- Make sure; you set the boot variables for kickstart and system image to point to the proper BIN files.

### Enabling features:

Nexus needs to have its features enabled to do a lot of the configurations. Available features are listed below:

```
fcoe          Enable/Disable FCoE/FC feature
fex           Enable/Disable FEX
http-server   Enable/Disable http-server
interface-vlan Enable/Disable interface vlan
lACP         Enable/Disable LACP
private-vlan  Enable/Disable private-vlan
privilege     Enable/Disable IOS type privilege level support
ssh          Enable/Disable ssh
tacacs+      Enable/Disable tacacs+
telnet       Enable/Disable telnet
udld         Enable/Disable UDLD
vpc          Enable/Disable VPC (Virtual Port Channel)
vtp          Enable/Disable Vlan Trunking Protocol (VTP)
```

### Connecting the Fabric extenders:

*Note:* lacp feature and FEX feature needs to be enabled *Note:* all configurations are done on the parent switch (Nexus 5020). When connecting a fabric extender to its parent switch (5020), it will not come up online; unless it has a chassis ID configured and the chassis ID is associated with the interface where the fabric extender is plugged into. Configure the Fabric extender (FEX):

```
fex 101
  pinning max-links 1
  description "FEX0101"
fex 102
  pinning max-links 1
  description "FEX0102"
fex 103
  pinning max-links 1
  description "FEX0103"
fex 104
  pinning max-links 1
  description "FEX0104"
fex 105
  pinning max-links 1
  description "FEX0105"
fex 106
  pinning max-links 1
  description "FEX0106"
fex 107
  pinning max-links 1
  description "FEX0107"
fex 108
  pinning max-links 1
  description "FEX0108"
fex 109
  pinning max-links 1
  description "FEX0109"
fex 110
  pinning max-links 1
  description "FEX0110"
fex 111
  pinning max-links 1
```

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```
description "FEX0111"  
fex 112  
pinning max-links 1  
description "FEX0112"
```

### **Configure the Port Channels:**

```
interface port-channel101  
switchport mode fex-fabric  
fex associate 101
```

```
interface port-channel102  
switchport mode fex-fabric  
fex associate 102
```

```
interface port-channel103  
switchport mode fex-fabric  
fex associate 103
```

```
interface port-channel104  
switchport mode fex-fabric  
fex associate 104
```

```
interface port-channel105  
switchport mode fex-fabric  
fex associate 105
```

```
interface port-channel106  
switchport mode fex-fabric  
fex associate 106
```

```
interface port-channel107  
switchport mode fex-fabric  
fex associate 107
```

```
interface port-channel108  
switchport mode fex-fabric  
fex associate 108
```

```
interface port-channel109  
switchport mode fex-fabric  
fex associate 109
```

```
interface port-channel110  
switchport mode fex-fabric  
fex associate 110
```

```
interface port-channel111  
switchport mode fex-fabric  
fex associate 111
```

```
interface port-channel112  
switchport mode fex-fabric  
fex associate 112
```

### **Configure the Ethernet port interfaces and associate them with the FEX chassis and port-channel:**

```
interface Ethernet1/1  
fex associate 101  
switchport mode fex-fabric  
channel-group 101
```

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```
interface Ethernet1/2
  fex associate 101
  switchport mode fex-fabric
  channel-group 101

interface Ethernet1/3
  fex associate 102
  switchport mode fex-fabric
  channel-group 102

interface Ethernet1/4
  fex associate 102
  switchport mode fex-fabric
  channel-group 102

interface Ethernet1/5
  fex associate 103
  switchport mode fex-fabric
  channel-group 103

interface Ethernet1/6
  fex associate 103
  switchport mode fex-fabric
  channel-group 103

interface Ethernet1/7
  fex associate 104
  switchport mode fex-fabric
  channel-group 104

interface Ethernet1/8
  fex associate 104
  switchport mode fex-fabric
  channel-group 104

interface Ethernet1/9
  fex associate 105
  switchport mode fex-fabric
  channel-group 105

interface Ethernet1/10
  fex associate 105
  switchport mode fex-fabric
  channel-group 105

interface Ethernet1/11
  fex associate 106
  switchport mode fex-fabric
  channel-group 106

interface Ethernet1/12
  fex associate 106
  switchport mode fex-fabric
  channel-group 106

interface Ethernet1/13
  fex associate 107
  switchport mode fex-fabric
  channel-group 107

interface Ethernet1/14
  fex associate 107
  switchport mode fex-fabric
```

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```
channel-group 107

interface Ethernet1/15
  fex associate 108
  switchport mode fex-fabric
  channel-group 108

interface Ethernet1/16
  fex associate 108
  switchport mode fex-fabric
  channel-group 108

interface Ethernet1/17
  fex associate 109
  switchport mode fex-fabric
  channel-group 109

interface Ethernet1/18
  fex associate 109
  switchport mode fex-fabric
  channel-group 109

interface Ethernet1/19
  fex associate 110
  switchport mode fex-fabric
  channel-group 110

interface Ethernet1/20
  fex associate 110
  switchport mode fex-fabric
  channel-group 110

interface Ethernet1/21
  fex associate 111
  switchport mode fex-fabric
  channel-group 111

interface Ethernet1/22
  fex associate 111
  switchport mode fex-fabric
  channel-group 111

interface Ethernet1/23
  fex associate 112
  switchport mode fex-fabric
  channel-group 112

interface Ethernet1/24
  fex associate 112
  switchport mode fex-fabric
  channel-group 112
```

### **Configuring a vPC between the 2 N5K chassis:**

Need to configure the port channel and make sure the switchport mode of the channel matches that of the Ethernet interface that will associate with the channel:

```
interface port-channel100
  switchport mode trunk
  vpc peer-link
  spanning-tree port type network
```

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Make sure vPC feature is enabled:

```
feature vpc
```

Create the vpc domain and specify the peer keep alive destination:

```
vpc domain "domain ID #"  
  peer-keepalive destination ?mgmt0 address?
```

**Configure the Ethernet ports in trunk mode and add them to the channel group of the peer link port channel interface (port channel mode must match ethernet port mode):**

```
interface Ethernet1/35  
  switchport mode trunk  
  channel-group 100 mode active  
!  
interface Ethernet1/36  
  switchport mode trunk  
  channel-group 100 mode active
```

### General configs

```
ip domain-lookup  
ip domain-name mydomain.ca  
hostname NX1  
username myuser password 5 xyz. role priv-15  
username myotheruser password 5 abc. role priv-15
```

### Configs to get Layer 2 connectivity with CTD Core:

```
vlan 75  
  name mgmt  
!  
interface Vlan75  
  no shutdown  
  description MGMT  
  ip address 10.16.75.X/24  
!  
interface Ethernet1/39  
  switchport mode trunk  
  switchport trunk allowed vlan 75  
!  
vrf context management  
  ip route 0.0.0.0/0 10.60.75.Y (10.160.175.Y is the address of the vlan interface on the Layer 3
```

### TACACS+ configurations:

```
ip tacacs source-interface Vlan75  
tacacs-server timeout 10  
tacacs-server host X.X.X.X key 7 "layer2keys"  
tacacs-server host Y.Y.Y.Y key 7 "layer2keys"  
aaa group server tacacs+ tac-servers  
  server X.X.X.X  
  server Y.Y.Y.Y  
  use-vrf management  
  source-interface Vlan75  
aaa authentication login default group tac-servers local
```

### Configuration Example(s)

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```
aaa authentication login console group tac-servers local
aaa accounting default group tac-servers
aaa authentication login error-enable
tacacs-server directed-request
```

## References

[Technical Support & Documentation - Cisco Systems](#)

[http://www.cisco.com/en/US/prod/collateral/switches/ps9441/ps9402/white\\_paper\\_c11-516396.html](http://www.cisco.com/en/US/prod/collateral/switches/ps9441/ps9402/white_paper_c11-516396.html)

<http://www.cisco.com/en/US/products/ps9670/index.html>

[http://www.cisco.com/en/US/prod/collateral/switches/ps9441/ps9670/configuration\\_guide\\_c07-543563.html](http://www.cisco.com/en/US/prod/collateral/switches/ps9441/ps9670/configuration_guide_c07-543563.html)

<http://www.cisco.com/en/US/products/ps10110/index.html>

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