



HP Moonshot with 45XGc Deployment Guide for Cisco Nexus Switches

Last Updated: 7/16/2015

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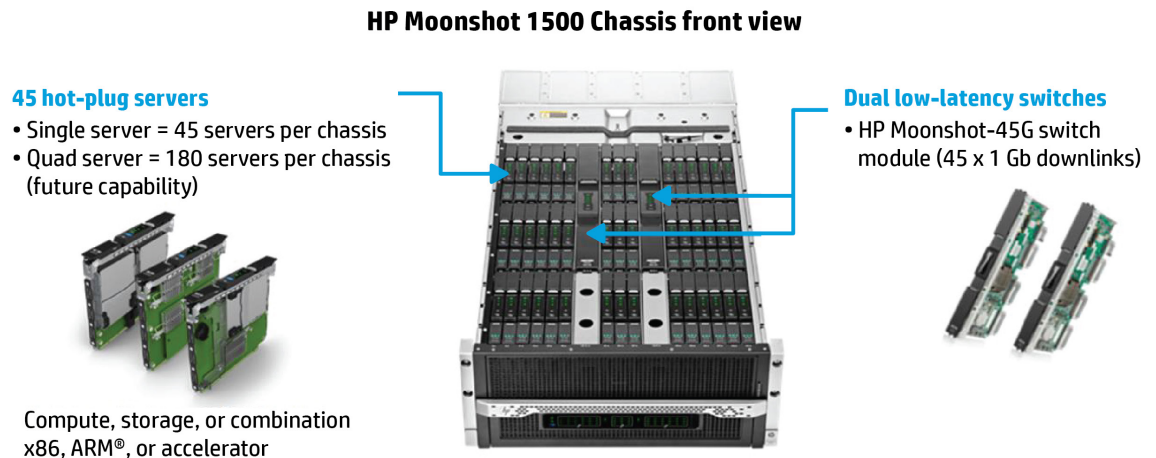
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Introduction

The basis for this paper is to document the configuration parameters need to connect an HP Moonshot 1500 chassis with HP Comwolff-1X network switches (Comware OS 7.x) to a redundant pair of Nexus 5K switches, essentially providing the steps necessary for integrating an HP Networking solution into a Cisco network topology.

Solution Overview

Moonshot 1500 chassis



The HP Moonshot System is the world's first software-defined server platform to deliver breakthrough efficiency and scale by aligning just the right amount of compute, memory and storage to get the work done, thereby enabling you to capitalize on the major growth trend of the Internet of Things. The HP Moonshot System adopts a federated approach to server design that saves energy, cost, and enables extreme scale-out without a corresponding increase in complexity and management overhead. HP Moonshot 1500 Chassis incorporates common components that include management, fabric, storage, cooling, and power elements and accommodates up to 45 individually serviceable hot-plug server Cartridges. The innovative software-defined cartridges can include one or more servers and are designed for specific Internet of Things solutions providing optimal results for a given workload. The workload range extends from dedicated hosting, data analytics, web front end to more advanced functions such as graphics processing units, digital signal processors, and field-programmable gate arrays. HP Moonshot enables enterprises to maximize their ability to innovate and speed their time to market with new services while reducing costs and energy use.

Specifics for this paper

Network connectivity from the Moonshot 1500 chassis and external to the Nexus 5K is facilitated by a pair of switches and uplink modules. The internal pair of switches are connected via a single 40GB IRF interconnect creating a single IRF domain. The uplinks are connected to the Nexus 5K via 2 x 10GB links with LACP. (Figure 1)

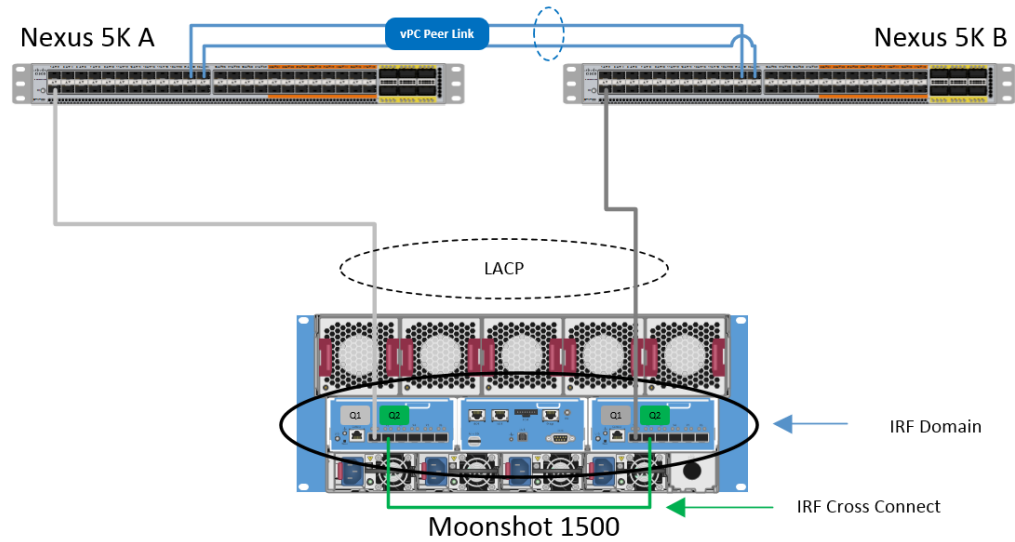
Note that the Moonshot should never be connected to a Cisco FEX module, which is not designed to be attached to switches on its downlink ports. Disabling spanning tree on the Moonshot switches to enable connection to a Cisco FEX module (or any other switch) may result in a network loop, which can lead to packet storms and network outage.

The Moonshot configuration tested is of an m710 cartridge, 45XGc switches and 4 port uplink modules. This config is not on the HP compatibility matrix as this was done as a proof of concept. However, the paper does prove that as tested, the configuration operated as expected.

Testing Topology—Single Moonshot 1500 chassis

The following testing topology was set up to validate the Moonshot 1500 connectivity to a pair of Nexus 5K switches.

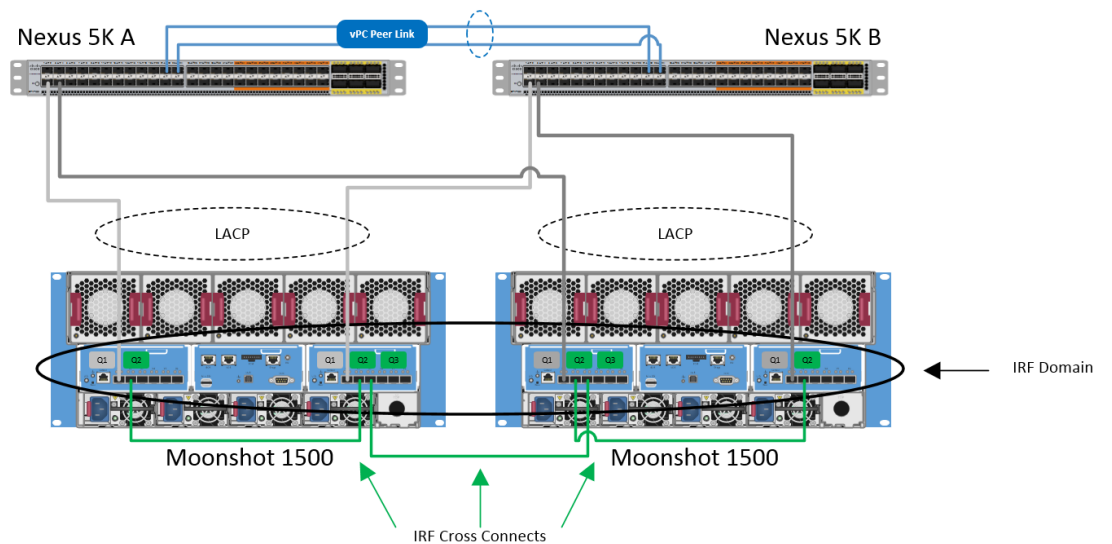
Figure 1. Single Moonshot 1500 chassis with Cisco Nexus 5K (the image above show a 6 port uplink module instead of 4 port 40Gb Rook-40 module)



Testing Topology—Dual Moonshot 1500 chassis

The following testing topology was set up to validate Dual Moonshot 1500 connectivity to a pair of Nexus 5K switches.

Figure 2. Dual Single Moonshot 1500 chassis' with Cisco Nexus 5K (rook 40 module?)



Configuration Guidelines

Users should note the following when analyzing the cabling and configuration of the testing topology

1. This configuration will work with most Nexus platforms. The Nexus platforms must also support vPC.
2. The Nexus switches are configured with LACP and vPC.
3. When connecting a second Moonshot 1500 chassis, all four internal switches would be configured as a single IRF domain leveraging 40GB interconnects. (Figure 2)
4. Port Q1 from the Moonshot 45XGc switches A and B will be used to connect to the Cisco Nexus 5K switches.
5. Port Q1 from the Moonshot 45XGc switches A and B have a 40Gb to 10Gb QSFP to SFP+ converter transceiver installed. [Do you want to add steps to reconfigure port Q1 to operate at 10Gb to this doc in the configuration procedures section?]
6. Port Q2 from the Moonshot 45XGc switches A & B will be used to create the IRF Domain
7. Port Q3 from the Moonshot chassis 1, 45XGc switch B and Moonshot chassis 2, 45XGc switch A will be used to extend the IRF domain across two Moonshot chassis.
8. The server cartridges are networked in an Active/Active configuration.
9. LACP Active Mode

Configuration Procedures

Shutdown unused ports (optional)

[HP] display interface FortyGigE 1/1/2 brief	Displays the current switch port status (40GB ports in this example)
[HP] interface FortyGigE 1/1/2	Changes to the second uplink port (Q2)
[HP FortyGigE 1/1/2] shutdown	Shuts down the port
[HP FortyGigE 1/1/2] display interface FortyGigE brief	Checks the uplink status again. Port 1/1/2 should show a link status as "ADM"

Moonshot 1500 switch IRF configuration

In this example, we will connect the 40GB uplink port Q2 from Switch A to the 40GB uplink port Q2 of Switch B in the same Moonshot 1500 chassis and create an IRF pair between Switches A and B.

Note

Follow the steps in the section "Shutdown Unused Ports" to shutdown port Q2 on both switches A and B before executing the commands listed below.

All commands are executed in the "system-view" of the switch.

Configure 45XGc switch A as an IRF Master

[HP] display irf	Checks the current IRF status
[HP] irf member 1 priority 32	Assigns member ID 1, since this is the first IRF switch
[HP] irf-port 1/1	Defines a logical IRF port
[HP irf-port1/1] port group interface FortyGigE 1/1/2	Add the physical port (Q2) to the logical IRF port
[HP] irf-port	Quits the interface
[HP] interface FortyGigE 1/1/2	Changes to port Q2
[HP interface FortyGigE 1/1/2] undo shutdown	Turns on port Q2
[HP interface FortyGigE 1/1/2] save	Saves the configuration
[HP interface FortyGigE 1/1/2] irf-port configuration active	Activates the IRF configuration
[HP] display irf configuration	Displays the IRF configuration
[HP] save	Saves the configuration after activating the IRF port

Configure 45XGc switch B as an IRF Slave

[HP] display irf	Checks the current IRF status
[HP] irf member 1 renumber 2	Assign member ID of 2, to make this a slave switch in the IRF pair
[HP] save	Saves the configuration
[HP] quit	
[HP] reboot	Reboots the switch

Note

Once the switch comes back online, it should have a member ID of 2 and all the ports will be numbered with 2/x/x convention. The 40GB Interface 2/1/2, which was shutdown prior to execution of the above steps, would have automatically been turned back on. This interface will have to be shut down again in order to continue the configuration.

[HP interface FortyGigE 2/1/2] shutdown	Shutdown port Q2
[HP] irf member 2 priority 16	Configures the IRF member priority on switch B. Sets the number to a value lower than Switch A (Master). In this case it is set to 16.
[HP] irf-port 2/2	Defines the logical IRF port
[HP-irf-port2/2] port group interface FortyGigE 2/1/2	Adds port Q2 to the IRF
[HP interface FortyGigE 2/1/2] undo shutdown	Enables port Q2
[HP interface FortyGigE 2/1/2] save	Saves the configuration
[HP interface FortyGigE 2/1/2] quit	Quits
[HP] irf-port-configuration active	Activates the IRF configuration. Note: Switch B will automatically reboot at this time and become the slave member of the IRF.

Note

After Switch B comes back online, log into it via serial console and you will notice that the switch name is the same as Switch A, and issuing a 'display interface brief' should show twice the number of ports. The 'display IRF' command should show you the overall IRF status and 'display IRF configuration' would display the details of the IRF configuration.

LACP Configuration

The commands below assumes that ports Q1 of Switch A and Q1 of Switch B need to be combined as an LACP pair.

Note

Since Switch A and B are an IRF pair, 40 GigE port Q1 of Switch B is referred to as 2/1/1

[HP] interface Bridge-Aggregation 1	Switch to the Bridge-aggregation interface 1
[HP-Bridge-Aggregation1]description uplink SA Q1 and SB Q1	Provides a descriptive text for the aggregate
[HP-Bridge-Aggregation1]link-aggregation mode dynamic	Sets the aggregation mode to dynamic (LACP)
[HP-Bridge-Aggregation1]quit	Quit
[HP]interface FortyGigE 1/1/1	Connects to Switch A Q1 port interface
[HP-FortyGigE1/1/1] port link-aggregation group 1	Adds Switch A Q1 port to the aggregate
[HP-FortyGigE1/1/1]quit	Quit
[HP]interface FortyGigE 2/1/1	Connects to Switch B Q1 port interface
[HP-FortyGigE 2/1/1] port link-aggregation group 1	Adds this port to the link aggregate
[HP-FortyGigE 2/1/1] quit	quit
[HP] interface Bridge-Aggregation 1	
[HP-Bridge-Aggregation1]port link-type trunk	Sets ports in Link Aggregation to type trunk
[HP-Bridge-Aggregation1] port trunk permit vlan all	Sets ports in Link Aggregation to accept all VLAN traffic on these ports. You can mention specific VLAN IDs if need be.
[HP] display link-aggregation summary	Displays the link aggregation config on the switch

Cartridge NIC teaming configuration

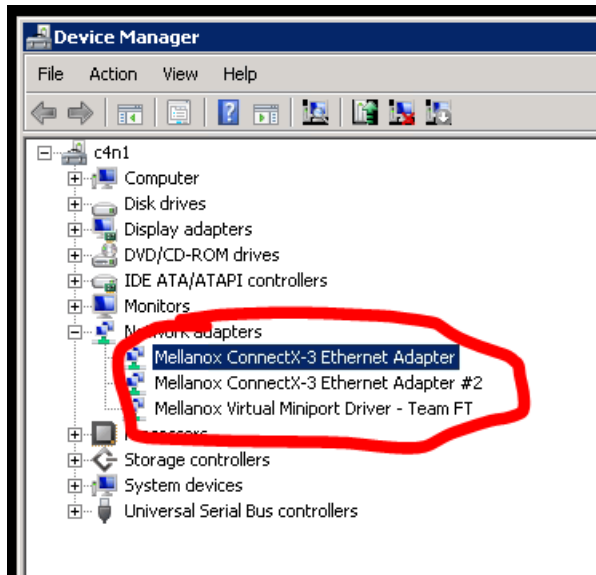
Now that the internal Moonshot 45XGc switches have been configured, configure the NIC teaming driver on the server cartridge or cartridges. We will use these later to test the High Availability of our IRF Domain. Load your operating system of choice, configure and test connectivity on the server cartridge or cartridges. Once that is complete, you will configure the NIC Teaming driver. The examples below are for a Windows® 2008, R2 OS load. These steps and or screens may be different based on what version of an operating system is loaded.

Note

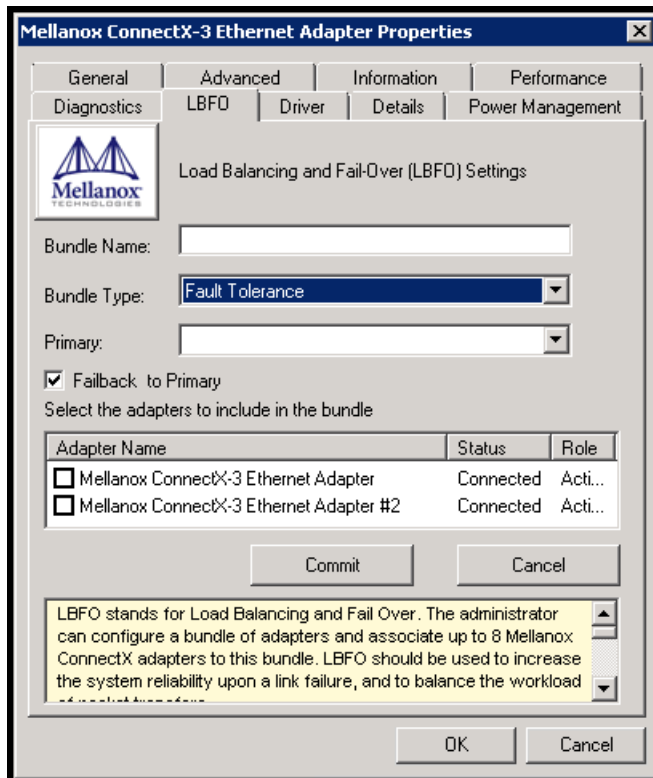
The cartridge used in this example is the m710 that leverages a Mellanox NIC chipset and driver. It is also running Windows 2008 R2. The exact steps may be different for cartridges that leverage other NIC manufacturers as well as for other operating systems. Also note that the corresponding switch ports must be configured into a dynamic Link Aggregation group (ports 1/0/5 and 2/0/5 in the example switch configuration in this paper).

Mellanox Driver Configuration

1. Install the Mellanox driver for the m710 cartridge. The driver is available from the link below.
mellanox.com/downloads/WinOF/MLNX_VPI_WinOF-4_80_All_win2008R2_x64.exe
2. Open Device Manager and find the Mellanox network adapters from the list of available drivers.

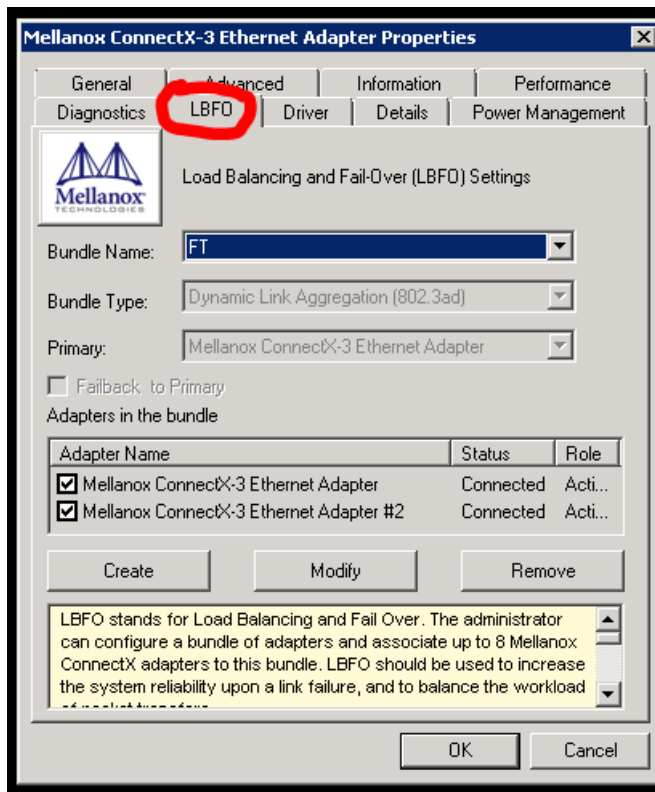


3. Right Click on the Mellanox adapter and select "Properties". Then click on the "LBFO" tab in the resulting property dialog box.

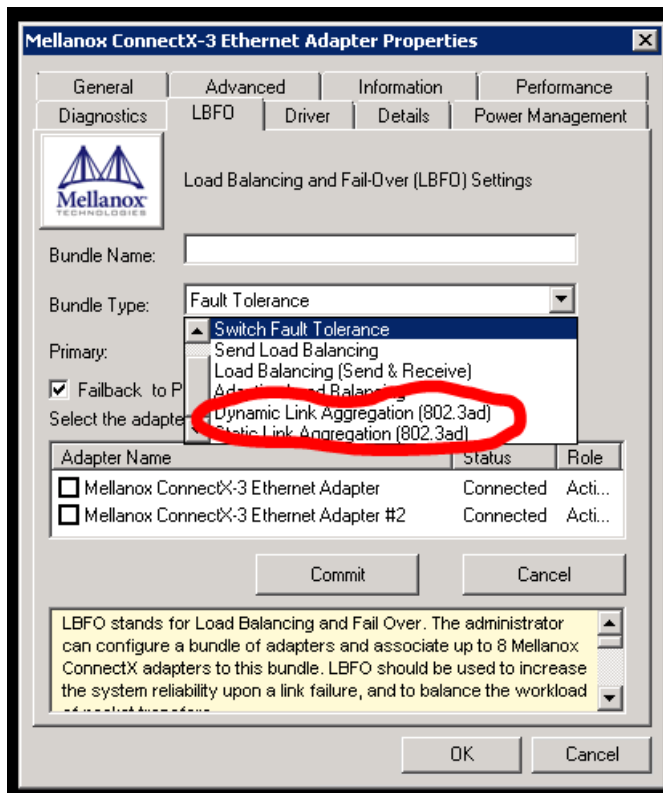


Note

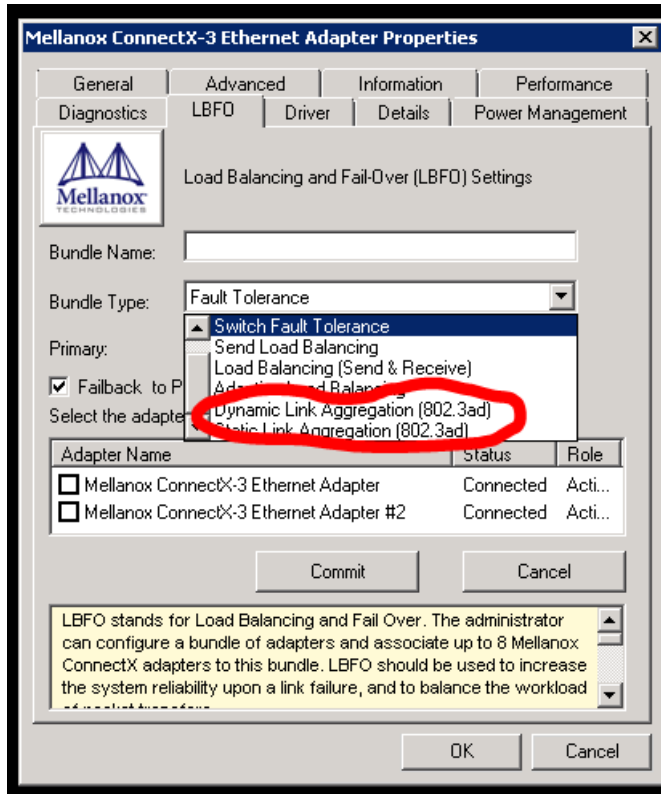
If you are opening the properties screen for the first time, click on the “Create” button to create a new bundle (your screen will look like the screenshot below).



4. Select “Dynamic Link Aggregation” as the Bundle Type.



- Select both available network adapters in the “Adapter Name” box. Then choose one adapter as the primary in the “Primary” box and click “Commit”. This will create the Mellanox virtual miniport adapter.



MAD—Multi Active Detection configuration

MAD will be configured on the IRF interfaces to avoid multi-active collisions in the event of an IRF link failure.

In this configuration 2 x 40Gbs links are used one for IRF interconnect and one for the MAD connection but if you want you can also have two connections for MAD and two for IRF which would provide for high resiliency.

Below is the procedure for configuration MAD:

```
interface Vlan-interface2 (Separate VLAN for MAD between members)
```

```
description BFD MAD
```

```
mad bfd enable
```

```
mad ip address 2.2.2.1 255.255.255.240 member 1 (isolated IPseg)
```

```
mad ip address 2.2.2.2 255.255.255.240 member 2 (isolated IP seg)
```

Configure that 40Gbs interface from both switches into VLAN 2.

```
interface FortyGigE1/1/4
```

```
port link-mode bridge
```

```
description MAD link to SB
```

```
port access vlan 2
```

```
interface FortyGigE2/1/4
```

```
port link-mode bridge
```

```
description MAD link to SA
```

```
port access vlan 2
```

An alternative option for MAD and more cost effective would be to leverage 1Gbs interfaces and that configuration is also shown below.

```
interface GigabitEthernet1/4/0/25
```

```
port link-mode bridge
```

```
description MAD link to SB
```

```
port access vlan 2
```

```
interface GigabitEthernet2/4/0/25
```

```
port link-mode bridge
```

```
description MAD link to SA
```

```
port access vlan 2
```

Testing MAD is simple as you can issue a client server continuous ping test and break the IRF interconnect link by shutting down one interface that is part of the IRF configuration. When you shut this interface down you will want to review the following commands.

```
Display IRF
```

```
Display irf topo
```

```
Display irf conf
```

```
Display interface brief
```

You will notice on the slave switch all ports except IRF and MAD ports will be administratively down state and on Master side all will be up.

IRF High Availability testing

Now that the internal Moonshot 45XGc switches have been configured for IRF and LACP, and the server cartridge or cartridges have been loaded and configured, we will test High Availability for our IRF Domain. For this test, you will need a client external to the Moonshot 1500 chassis.

1. Uplink failure and resiliency test 1 (between the 45XGc uplink & Nexus 5K)
 - From a client external to the Nexus 5K, ping the server IP address running on one of the cartridge servers.
 - Shutdown one of the uplinks between one of the Moonshot 45XGc switches and the Nexus 5K tier.
 - Stop the ping command and take note of the sent and received packets. There should be a minimum of 1 packet loss or no packet loss.
 - In the command window, ping the server again.
 - Restore the previously shutdown uplink before proceeding to the next step.
 - There should be no packet loss during the restoration of the links as observed in the ping test.
 - Repeat the same exercise with other uplink and observe the results
2. Link Failure & Resiliency Test 2 (between 45XGc downlinks & Cartridges)
 - From a client external to the Nexus 5K, ping the server IP address running on one of the cartridge servers.
 - Shutdown one of the downlinks between the 45XGc switch and the server cartridge. This can be accomplished from either NIC side or the switch interface side.
 - Stop the ping command and take note of the sent and received packets. There should be a minimum of 1 packet loss or no packet loss.
 - In the command window, ping the server again.

- Restore the downlink before proceeding to the next step.
 - There should be no packet loss during the restoration of the links as observed in the ping test.
 - Repeat the same exercise with other uplink and observe the results
3. 45XGc Switch Failure Test
- From a client external to the Nexus 5K, ping the server IP address running on one of the cartridge servers.
 - Shutdown/reboot one of the 45XGc switches in the chassis by press Ctrl-B and enter into the boot menu. This will simulate a device. Stay within the boot menu until the testing is complete.
 - Stop the ping command and take note of the sent and received packets. There should be a minimum of 1 packet loss or no packet loss.
 - In the command window, ping the server again.
 - Logout of the boot menu and reboot the switch. Once the switch comes on line it will join the IRF once again.
 - There should be no packet loss during the restoration of the links as observed in the ping test.
 - Repeat the same exercise with other switch and observe the results
4. IRF Link Failure (MAD-Multi Active Detection) Test
- From a client external to the Nexus 5K, ping the server IP address running on one of the cartridge servers.
 - Shutdown the IRF links between both 45XGc switches.
 - The Switch with the higher priority will become the master and the slave switch will shut down all its interfaces to avoid creating a loop.
 - Verify the interface status on both switches and see whether other switch ports are accessible. Otherwise login to each switch individually using the management port on the uplink module and verify that all the ports on the slave switch are shutdown during the failure.
 - Stop the ping command and take note of the sent and received packets. There should be a minimum of 1 packet loss or no packet loss.
 - In the command window, ping the server again.
 - Restore the IRF links between both 45XGc switches. Restoring the IRF links will result in the reboot of the slave switch. Once the slave switch comes up it will join the IRF stack again.
 - Verify the interface status on both switches and see whether the other switch ports are accessible. Otherwise login to each individually using the management port on uplink module and verify that all the ports on slave switch are shut during the failure.
 - Stop the ping command and take note of the sent and received packets. There should be a minimum of 1 packet loss or no packet loss.

Conclusion

The HP Moonshot 1500 chassis with the 45XGc allows for a high performing and scalable solution that can integrate with third party solutions to provide an active/active fabric down to the highly scalable compute nodes in Moonshot.

Appendix

Hardware specification

Moonshot firmware	<p>Chassis</p> <p>-----</p> <p>iLO CM Chassis Firmware iLO CM CPLD Chassis CPLD Front CPLD</p> <p>-----</p> <p>-----</p> <p>1.30 Aug 19 2014 4.4.0 07 0B 05</p> <p>Switches</p> <p>-----</p> <table border="0"> <thead> <tr> <th>ID</th> <th>Product Name</th> <th>Switch</th> <th>Satellite Data</th> </tr> </thead> <tbody> <tr> <td colspan="4">-----</td> </tr> <tr> <td></td> <td>SA HP Moonshot-45XGc Switch Module</td> <td></td> <td>7.1.045, ESS 2406P01 06/04/2014 11/21/2013</td> </tr> <tr> <td></td> <td>SB HP Moonshot-45XGc Switch Module</td> <td></td> <td>7.1.045, ESS 2406P01 11/11/2013 11/21/2013</td> </tr> </tbody> </table> <p>Cartridges</p> <p>-----</p> <table border="0"> <thead> <tr> <th>ID</th> <th>Product Name</th> <th>System ROM</th> <th>Satellite Data</th> <th>CPLD Other Firmware</th> </tr> </thead> <tbody> <tr> <td colspan="5">-----</td> </tr> <tr> <td></td> <td>c5 ProLiant m710 Server Cartridge</td> <td>H03 08/14/2014</td> <td>07/18/2014</td> <td>08/13/2014 08</td> </tr> <tr> <td></td> <td colspan="4">Cartridge Mellanox ConnectX3Pro Firmware: 2.32.1092</td> </tr> </tbody> </table>	ID	Product Name	Switch	Satellite Data	-----					SA HP Moonshot-45XGc Switch Module		7.1.045, ESS 2406P01 06/04/2014 11/21/2013		SB HP Moonshot-45XGc Switch Module		7.1.045, ESS 2406P01 11/11/2013 11/21/2013	ID	Product Name	System ROM	Satellite Data	CPLD Other Firmware	-----						c5 ProLiant m710 Server Cartridge	H03 08/14/2014	07/18/2014	08/13/2014 08		Cartridge Mellanox ConnectX3Pro Firmware: 2.32.1092			
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Switch Firmware	<p>HP Comware Software, Version 7.1.045, ESS 2406P01</p> <p>Copyright (c) 2010-2014 Hewlett-Packard Development Company, L.P.</p> <p>HP Moonshot-45XGc Switch uptime is 0 weeks, 0 days, 1 hour, 21 minutes</p> <p>Last reboot reason : Cold reboot</p> <p>Boot image: flash:/moonshot-45xgc-cmw710-boot-e2406p01.bin</p> <p>Boot image version: 7.1.045P11, ESS 2406P01</p> <p>Compiled Jul 18 2014 16:19:11</p> <p>System image: flash:/moonshot-45xgc-cmw710-system-e2406p01.bin</p> <p>System image version: 7.1.045, ESS 2406P01</p> <p>Compiled Jul 18 2014 16:19:11</p> <p>Slot 1:</p> <p>Uptime is 0 weeks,0 days,1 hour,21 minutes</p> <p>Moonshot-45XGc Switch with 2 Processors</p> <p>BOARD TYPE: Moonshot-45XGc Switch</p> <p>DRAM: 2048M bytes</p> <p>FLASH: 512M bytes</p> <p>PCB 1 Version: VER.C</p> <p>Bootrom Version: 106</p> <p>CPLD 1 Version: 0x21</p>																																				

	CPLD 2 Version: 0x0e CPLD 3 Version: 0x02 Release Version: HP Moonshot-45XGc Switch-2406P01 Patch Version: None
OS configuration	Windows Server 2008 R2 Data center edition (service pack 1)
M710 network driver	Mellanox WinOF v4.80 mellanox.com/downloads/WinOF/MLNX_VPI_WinOF-4_80_All_win2008R2_x64.exe mellanox.com/related-docs/prod_software/MLNX_VPI_Windows_user_manual.pdf

45XGc switch configuration files

```

#
version 7.1.045, ESS 2406P01
#
sysname SA
#
irf mac-address persistent timer
irf auto-update enable
undo irf link-delay
irf member 1 priority 10
irf member 2 priority 1
#
lldp global enable
#
system-working-mode advance
password-recovery enable
#
vlan 1
#
vlan 2
#
vlan 40
name 10.16.40.0/22
#
irf-port 1/1
port group interface FortyGigE1/1/3
#
irf-port 2/2
port group interface FortyGigE2/1/3
#
stp global enable
#
interface Bridge-Aggregation1
description uplink trunk from SA and SB Q1 to NX5K VPC
port link-type trunk
undo port trunk permit vlan 1
port trunk permit vlan 40
link-aggregation mode dynamic
#
interface Bridge-Aggregation105
port link-type trunk
undo port trunk permit vlan 1
port trunk permit vlan 40
port trunk pvid vlan 40
link-aggregation mode dynamic
stp edged-port
#
interface NULL0
    
```

```

#
interface Vlan-interface2 mad bfd enable
  mad ip address 2.2.2.1 255.255.255.240 member 1
  mad ip address 2.2.2.2 255.255.255.240 member 2
#
interface FortyGigE1/1/2
  port link-mode bridge
  shutdown
#
interface FortyGigE1/1/4
  port link-mode bridge
  description MAD link to SB
  port access vlan 2
#
interface FortyGigE2/1/2
  port link-mode bridge
  shutdown
#
interface FortyGigE2/1/4
  port link-mode bridge
  description MAD link to SA
  port access vlan 2
#
interface FortyGigE1/1/3
  description IRF-ports
#
interface FortyGigE2/1/3
  description IRF-Ports
#
interface M-GigabitEthernet0/0/0
  ip address dhcp-alloc
#
interface Ten-GigabitEthernet1/0/1
  port link-mode bridge
  port access vlan 40
#
interface Ten-GigabitEthernet1/0/2
  port link-mode bridge shutdown
#
interface Ten-GigabitEthernet1/0/3
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/4
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/5
  port link-mode bridge
  port link-type trunk
  undo port trunk permit vlan 1
  port trunk permit vlan 40
  port trunk pvid vlan 40
  port link-aggregation group 105
#
interface Ten-GigabitEthernet1/0/6
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/7
  port link-mode bridge
  shutdown

```

```

#
interface Ten-GigabitEthernet1/0/8
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/9
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/10
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/11
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/12
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/13
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/14
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/15
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/16
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/17
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/18
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/19
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/20
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/21
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/22
  port link-mode bridge
  shutdown
#

```

```

interface Ten-GigabitEthernet1/0/23
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/24
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/25
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/26
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/27
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/28
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/29
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/30
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/31
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/32
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/33
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/34
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/35
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/36
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/37
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/38
  port link-mode bridge

```



```

shutdown
#
interface Ten-GigabitEthernet1/0/39
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/40
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/41
  port link-mode bridge
shutdown
#
interface Ten-GigabitEthernet1/0/42
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/43
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/44
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/0/45
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/1/1:1
  port link-mode bridge
  port link-type trunk
  undo port trunk permit vlan 1
  port trunk permit vlan 40
  port link-aggregation group 1
#
interface Ten-GigabitEthernet1/1/1:2
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/1/1:3
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet1/1/1:4
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet2/0/1
  port link-mode bridge
  port access vlan 40
#
interface Ten-GigabitEthernet2/0/2
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet2/0/3
  port link-mode bridge
  shutdown

```

```

#
interface Ten-GigabitEthernet2/0/4
 port link-mode bridge
 shutdown
#
interface Ten-GigabitEthernet2/0/5
 port link-mode bridge
 port link-type trunk
 undo port trunk permit vlan 1
 port trunk permit vlan 40
 port trunk pvid vlan 40
 port link-aggregation group 105
#
interface Ten-GigabitEthernet2/0/6
 port link-mode bridge
 shutdown
#
interface Ten-GigabitEthernet2/0/7
 port link-mode bridge
 shutdown
#
interface Ten-GigabitEthernet2/0/8
 port link-mode bridge
 shutdown
#
interface Ten-GigabitEthernet2/0/9
 port link-mode bridge
 shutdown
#
interface Ten-GigabitEthernet2/0/10
 port link-mode bridge
 shutdown
#
interface Ten-GigabitEthernet2/0/11
 port link-mode bridge
 shutdown
#
interface Ten-GigabitEthernet2/0/12
 port link-mode bridge shutdown
#
interface Ten-GigabitEthernet2/0/13
 port link-mode bridge
 shutdown
#
interface Ten-GigabitEthernet2/0/14
 port link-mode bridge
 shutdown
#
interface Ten-GigabitEthernet2/0/15
 port link-mode bridge
 shutdown
#
interface Ten-GigabitEthernet2/0/16
 port link-mode bridge
 shutdown
#
interface Ten-GigabitEthernet2/0/17
 port link-mode bridge
 shutdown
#
interface Ten-GigabitEthernet2/0/18
 port link-mode bridge

```

```

shutdown
#
interface Ten-GigabitEthernet2/0/19
port link-mode bridge
shutdown
#
interface Ten-GigabitEthernet2/0/20
port link-mode bridge
shutdown
#
interface Ten-GigabitEthernet2/0/21
port link-mode bridge
shutdown
#
interface Ten-GigabitEthernet2/0/22
port link-mode bridge
shutdown
#
interface Ten-GigabitEthernet2/0/23
port link-mode bridge
shutdown
#
interface Ten-GigabitEthernet2/0/24
port link-mode bridge
shutdown
#
interface Ten-GigabitEthernet2/0/25
port link-mode bridge
shutdown
#
interface Ten-GigabitEthernet2/0/26
port link-mode bridge
shutdown
#
interface Ten-GigabitEthernet2/0/27
port link-mode bridge
shutdown
#
interface Ten-GigabitEthernet2/0/28
port link-mode bridge
shutdown
#
interface Ten-GigabitEthernet2/0/29
port link-mode bridge
shutdown
#
interface Ten-GigabitEthernet2/0/30
port link-mode bridge
shutdown
#
interface Ten-GigabitEthernet2/0/31
port link-mode bridge
shutdown
#
interface Ten-GigabitEthernet2/0/32
port link-mode bridge
shutdown
#
interface Ten-GigabitEthernet2/0/33
port link-mode bridge
shutdown

```

```

#
interface Ten-GigabitEthernet2/0/34
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet2/0/35
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet2/0/36
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet2/0/37
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet2/0/38
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet2/0/39
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet2/0/40
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet2/0/41
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet2/0/42
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet2/0/43
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet2/0/44
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet2/0/45
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet2/1/1:1
  port link-mode bridge
  port link-type trunk
  undo port trunk permit vlan 1
  port trunk permit vlan 40
  port link-aggregation group 1
#
interface Ten-GigabitEthernet2/1/1:2
  port link-mode bridge
  shutdown
#
interface Ten-GigabitEthernet2/1/1:3
  port link-mode bridge

```

```

shutdown
#
interface Ten-GigabitEthernet2/1/1:4
port link-mode bridge
shutdown
#
scheduler logfile size 16
#
line class aux
user-role network-admin
#
line class console
user-role network-admin
#
line class vty
user-role network-operator
#
line aux 0
user-role network-admin
#
line con 0
user-role network-admin
#
line vty 0 15
authentication-mode scheme
user-role network-operator
protocol inbound ssh
#
line vty 16 63
authentication-mode password
user-role network-operator
#
ssh server enable
#
radius scheme system
user-name-format without-domain
#
domain system
#
domain default enable system
#
role name level-0
description Predefined level-0 role
#
role name level-1
description Predefined level-1 role
#
role name level-2
description Predefined level-2 role
#
role name level-3
description Predefined level-3 role
#
role name level-4
description Predefined level-4 role
#
role name level-5
description Predefined level-5 role
#
role name level-6
description Predefined level-6 role

```

```

#
role name level-7
  description Predefined level-7 role
#
role name level-8
  description Predefined level-8 role
#
role name level-9
  description Predefined level-9 role
#
role name level-10
  description Predefined level-10 role
#
role name level-11
  description Predefined level-11 role
#
role name level-12
  description Predefined level-12 role
#
role name level-13
  description Predefined level-13 role
#
role name level-14
  description Predefined level-14 role
#
user-group system
#
local-user ad class manage
  authorization-attribute user-role network-operator
#
local-user admin class manage
  password hash
  $h$6$QrRsC7My/NzES1yy$9cy2Zw6xsIXGOjC2a/V/JBFZ2GJ3fv/KsjszXqRU
  VjP0ghP7nxjet0vu2mCAde51T7QIg47WJ1DYlM7sJlq9vg==
  service-type ssh
  authorization-attribute user-role network-admin
  authorization-attribute user-role network-operator
#
  ftp server enable
#
return

```

Nexus 5672 switch configuration files

Switch 5672-01

```

!Command: show startup-config
!Time: Fri Mar  2 03:57:02 2001
!Startup config saved at: Fri Mar  2 03:49:48 2001

version 7.0(1)N1(1)
hostname DIA-5672-01

feature telnet
cfs eth distribute
feature lacp
feature vpc
feature lldp

logging level xmlma 7
username admin password 5 $1$x.m7PAnl$U/3wha/v2/sT37A.3H7Ic.
role network-admin

```

```

no password strength-check

banner motd #Nexus 5672 Switch
#

ip domain-lookup
logging event link-status default
snmp-server user admin network-admin auth md5
0xale988b8254269a7c5de1a8a92d74c3c priv
0xale988b8254269a7c5de1a8a92d74c3c localizedkey
snmp-server community public group network-operator
snmp-server community private group network-admin

vlan 1
vlan 40
    name 10.16.40.0/22
spanning-tree vlan 1-3967 priority 61440
vrf context management
    ip route 0.0.0.0/0 10.16.40.3
vpc domain 1
    role priority 1
    system-priority 1
    peer-keepalive destination 10.16.40.36
    delay restore 150
    auto-recovery

interface port-channel1
    switchport mode trunk
    spanning-tree port type
    network vpc peer-link

interface port-channel30

interface port-channel40
    switchport mode trunk
    switchport trunk allowed vlan 40
    vpc 40

interface Ethernet1/1
    switchport mode trunk
    switchport trunk allowed vlan 40
    channel-group 40 mode active

interface Ethernet1/2
    switchport mode trunk
    switchport trunk allowed vlan 40
    spanning-tree port type network

interface Ethernet1/3

interface Ethernet1/4

interface Ethernet1/5

interface Ethernet1/6
    switchport mode trunk
    channel-group 1 mode active

interface Ethernet1/7

```

```
interface Ethernet1/8
  switchport mode trunk
  channel-group 1 mode active

interface Ethernet1/9

interface Ethernet1/10

interface Ethernet1/11

interface Ethernet1/12

interface Ethernet1/13

interface Ethernet1/14

interface Ethernet1/15

interface Ethernet1/16

interface Ethernet1/17

interface Ethernet1/18

interface Ethernet1/19

interface Ethernet1/20

interface Ethernet1/21

interface Ethernet1/22

interface Ethernet1/23

interface Ethernet1/24

interface Ethernet1/25

interface Ethernet1/26

interface Ethernet1/27

interface Ethernet1/28

interface Ethernet1/29

interface Ethernet1/30

interface Ethernet1/31

interface Ethernet1/32

interface Ethernet1/33

interface Ethernet1/34

interface Ethernet1/35

interface Ethernet1/36

interface Ethernet1/37
```



```
interface Ethernet1/38
interface Ethernet1/39
interface Ethernet1/40
interface Ethernet1/41
interface Ethernet1/42
interface Ethernet1/43
interface Ethernet1/44
interface Ethernet1/45
interface Ethernet1/46
interface Ethernet1/47
interface Ethernet1/48
interface Ethernet2/1
interface Ethernet2/2
interface Ethernet2/3
interface Ethernet2/4
interface Ethernet2/5
interface Ethernet2/6

interface mgmt0
  vrf member management
  ip address 10.16.40.35/24
line console
line vty
boot kickstart bootflash:/n6000-uk9-kickstart.7.0.1.N1.1.bin
boot system bootflash:/n6000-uk9.7.0.1.N1.1.bin
poap transit
```

Switch 5672-02

```
!Command: show startup-config
!Time: Fri Mar 2 03:58:32 2001
!Startup config saved at: Fri Mar 2 00:14:56 2001

version 7.0(1)N1(1)
hostname DIA-5672-02

feature telnet
cfs eth distribute
feature lacp
feature vpc
feature lldp

username admin password 5 $1$YoTk1xds$m0XwkpkVzOZSMYbV1evQW1
role network-admin
no password strength-check
```

```

banner motd #Nexus 5672 Switch
#

ip domain-lookup
logging event link-status default
snmp-server user admin network-admin auth md5
0x10d1b16714141f3d616f469adebb5f6a priv
0x10d1b16714141f3d616f469adebb5f6a localizedkey
snmp-server community private group network-admin
snmp-server community public group network-operator

vlan 1
vlan 40
    name 10.16.40.0/22
spanning-tree vlan 1-3967 priority 61440
vrf context management
    ip route 0.0.0.0/0 10.16.40.1
vpc domain 1
    role priority 2
    system-priority 1
    peer-keepalive destination 10.16.40.35
    delay restore 150
    auto-recovery

interface port-channel1
    switchport mode trunk
    spanning-tree port type network
    vpc peer-link

interface port-channel40
    switchport mode trunk
    switchport trunk allowed vlan 40
    vpc 40

interface Ethernet1/1
    switchport mode trunk
    switchport trunk allowed vlan 40
    channel-group 40 mode active

interface Ethernet1/2

interface Ethernet1/3

interface Ethernet1/4

interface Ethernet1/5

interface Ethernet1/6
    switchport mode trunk
    channel-group 1 mode active

interface Ethernet1/7

interface Ethernet1/8
    switchport mode trunk
    channel-group 1 mode active

interface Ethernet1/9

interface Ethernet1/10

interface Ethernet1/11

```

```
interface Ethernet1/12
interface Ethernet1/13
interface Ethernet1/14
interface Ethernet1/15
interface Ethernet1/16
interface Ethernet1/17
interface Ethernet1/18
interface Ethernet1/19
interface Ethernet1/20
interface Ethernet1/21
interface Ethernet1/22
interface Ethernet1/23
interface Ethernet1/24
interface Ethernet1/25
interface Ethernet1/26
interface Ethernet1/27
interface Ethernet1/28
interface Ethernet1/29
interface Ethernet1/30
interface Ethernet1/31
interface Ethernet1/32
interface Ethernet1/33
interface Ethernet1/34
interface Ethernet1/35
interface Ethernet1/36
interface Ethernet1/37
interface Ethernet1/38
interface Ethernet1/39
interface Ethernet1/40
interface Ethernet1/41
```

```
interface Ethernet1/42

interface Ethernet1/43

interface Ethernet1/44

interface Ethernet1/45

interface Ethernet1/46

interface Ethernet1/47

interface Ethernet1/48

interface Ethernet2/1

interface Ethernet2/2

interface Ethernet2/3

interface Ethernet2/4

interface Ethernet2/5

interface Ethernet2/6

interface mgmt0
  vrf member management
  ip address 10.16.40.36/24
line console
line vty
boot kickstart bootflash:/n6000-uk9-kickstart.7.0.1.N1.1.bin
boot system bootflash:/n6000-uk9.7.0.1.N1.1.bin
poap transit
```

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