

# HP Virtual Connect FlexFabric Cookbook – With HP Virtual Connect Flex-10/10D

(Version 3.70 through 4.01 Firmware Enhancements)

Purpose	4
Documentation feedback	4
Introduction to Virtual Connect Flex-10 and FlexFabric	5
New Features:	5
The Virtual Connect Cookbook Series:	8
Virtual Connect Ethernet Modules	9
Connecting VC Flex-10/10D or VC FlexFabric to the CORE	21
Choosing VC Flex-10/10D or VC FlexFabric	22
Choosing an Adapter for VC Flex-10/10D or VC	
FlexFabric	23
Determining Network Traffic Patterns and Virtual	
Connect network design (Active/Standby vs.	
Active/Active)	23
VMware ESXi 5.0/5.1	26
Single Domain/Enclosure Scenarios	28
Overview	28
Requirements	28
Scenario 1 – Simple vNet with Active/Standby Uplinks –	
Ethernet and FCoE – Windows 2008 R2	30
Overview	30
Requirements	30
Installation and configuration	32
Review	40
Results – Windows 2008 R2 Networking Examples	40
Results – Windows 2008 R2 SAN Connectivity	45
Summary	46
Scenario 2 –Shared Uplink Sets with Active/Active	
uplinks and 802.3ad (LACP) - Ethernet and FCoE –	
Windows 2008 R2	47
Overview	47
Requirements	47
Installation and configuration	49
Review	58
Results – Windows 2008 R2 Networking Examples	59
Results – Windows 2008 R2 SAN Connectivity	63
Summary	64

Scenario 3 – Shared Uplink Set with Active/Active Uplinks and 802.3ad (LACP) - Ethernet and FCoE Boot	
from SAN – Windows 2008 R2	65
Overview	65
Requirements	65
Installation and configuration	/ ۲ حح
Review Bosults Windows 2008 B2 Notworking Examples	// 77
Results – Windows 2000 R2 Networking Examples	<i>۱۱</i> دە
Summary	83
Scenario 4 – Shared Uplink Set with Active/Active	
Uplinks and 802.3ad (LACP) – Ethernet, FCoE SAN -	
Windows 2008 R2 Hyper-V	84
Overview	84
Requirements	84
Installation and configuration	80
Review Posults - Windows 2008 P2 Notworking Examples	97
Results - Windows 2008 R2 SAN Connectivity	108
Summary	100
Scenario 5 – Shared Uplink Set with Active/Standby Uplinks and 802.3ad (LACP) - Ethernet and FCoE SAN -	
vSphere	110
Overview	110
Requirements	110
Installation and configuration	112
Review Recults - uCabora Natworking Examples	123
Results – vSphere Networking Examples	125
Summary	130
Scenario 6 – Shared Uplink Set with Active/Active	151
Uplinks, 802.3ad (LACP) - Ethernet and FCoE SAN –	
vSphere	132
Overview	132
Requirements	132
Installation and configuration	134
Review	144
καςτιπς – υδηρατα Νατωργμητί Ενρηπίας	1/16
Results VSphere Retworking Examples	140

Scenario 7 – Tunneled VLANs <i>and</i> Shared Uplink Set with Active/Active Uplinks and 802.3ad (LACP) - Ethernet and	
FCoE SAN - vSphere	153
Overview	153
Requirements	153
Installation and configuration	155
Review	167
Results – vSphere Networking Examples	168
Results – vSphere SAN Connectivity	173
Summary	174
Scenario 8 – Network Access Groups in a Shared Uplink	
Set - Ethernet and FCoE SAN – Windows 2008R2	175
Overview	175
Requirements	175
Installation and configuration	178
Review	187
Results – Windows 2008 R2 Networking Examples	187
Summary	192
Scenario 9 - Shared Uplink Set with Active/Active	
Inlinks 802 3ad (I $\Delta$ CP) - Fley-10 and VC-Fibre Channel	
SAN = vSnhere	193
Overview	193
Requirements	193
Installation and configuration	195
Review	205
Results – vSphere Networking Examples	207
Results – vSphere SAN Connectivity	212
Summary	213
Annual y	
Appendix A I – Scenario-Dased CISCO IOS Command Line	714
Reference	214
Appendix A2 – Scenario-based CISCO NX-OS Command	
Line Reference	219
Appendix B1 – Scenario-based ProCurve Command Line	
Reference	224
Appendix R2 - Scenario-based Comware Command Line	
Reference	228
Appendix C - Acronyme and abbreviations	224
Appendix C – Actoliyilis and abbieviacions	234
Appendix D – Useful VC CLI Command sets	235
VC Domain Configuration	235
FlexFabric Scripting Additions	238
Release 3.30 Scripting Additions	238
Appendix E – Configuring QoS	240

# Purpose

The purpose of this Virtual Connect Cookbook is to provide users of Virtual Connect with a better understanding of the concepts and steps required when integrating HP BladeSystem and Virtual Connect Flex-10 or FlexFabric components into an existing network.

The scenarios in this Cookbook vary from simplistic to more complex while covering a range of typical building blocks to use when designing Virtual Connect Flex-10 or FlexFabric solutions. Although these scenarios are shown individually, some scenarios could be combined to create a more complex and versatile Virtual Connect environment, such as the combined use of Shares Uplink Sets (SUS) and vNet Tunnels. Or Active/Active networks for North/South traffic flows, such as iSCSI or VDI, while also having the primary network traffic configured in a separate Shared Uplink Set with Active/Standby uplinks.

Existing users of Virtual Connect will quickly realize that as of VC firmware release 3.30 that the selection between "Mapped" and "Tunneled" modes are no longer of concern. The capabilities provided in those modes are now available in the default installation of VC firmware 3.30 and beyond. These capabilities and changes will be discussed in further detail later in this paper.

In addition to the features added in release 3.30, 4.01 is a major release containing several new features, including QoS and Min/Max downlink speed settings among others. This Cookbook will highlight and discuss some of these added features.

The scenarios as written are meant to be self-contained configurations and do not build on earlier scenarios, with this you may find some repetition or duplication of configuration across scenarios.

This paper is not meant to be a complete or detailed guide to Virtual Connect Flex-10 or FlexFabric, but is intended to provide the reader with some valid examples of how Virtual Connect Flex-10 or FlexFabric could be deployed within their environments. Many additional configurations or scenarios could also be implemented. Please refer to the following section for additional reference material on Virtual Connect, Flex-10 and FlexFabric.

## **Documentation feedback**

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# Introduction to Virtual Connect Flex-10 and FlexFabric

Virtual Connect is an industry standards-based implementation of server-edge virtualization. It puts an abstraction layer between the servers and the external networks so the LAN and SAN see a pool of servers rather than individual servers. Once the LAN and SAN connections are physically made to the pool of servers, the server administrator uses Virtual Connect management tools (Virtual Connect Manager (VCM) or Virtual Connect Enterprise Manager (VCEM)) to create a profile for each server.

Virtual Connect FlexFabric is an extension to Virtual Connect Flex-10 which leverages Fibre Channel over Ethernet (FCoE) protocols. By leveraging FCoE for connectivity to existing Fibre Channel SAN networks, we can reduce the number of switch modules and HBAs required within the server blade and enclosure. This in turn further reduces cost, complexity, power and administrative overhead.

This paper will discuss the differences between Flex-10 and FlexFabric and provide information and suggestions to assist the reader in determining the best option for their implementation of BladeSystem and Virtual Connect. For additional information on Virtual Connect, Flex-10 and/or FlexFabric, please review the documents below.

# **New Features:**

#### Version 3.70 of Virtual Connect contains support for the following enhancements:

The user guide contains information about the following changes in VC 3.70:

- Discontinued support for old hardware:
  - HP 1/10Gb Virtual Connect Ethernet Module
  - HP 1/10Gb-F Virtual Connect Ethernet Module
- Support for new hardware:
  - HP Virtual Connect Flex-10/10D Module
  - HP ProLiant BL660c Gen8 Server series
  - HP ProLiant WS460c Gen8 Workstation series
  - HP Integrity BL860c i4 Server Blades
  - HP Integrity BL870c i4 Server Blades
  - HP Integrity BL890c i4 Server Blades
  - HP 7m C-series Active Copper SFP+ cables (QK701A)
  - HP 10m C-series Active Copper SFP+ cables (QK702A)
  - Cisco 7m copper active Twinax cables (SFP-H10GB-ACU7M)
  - Cisco 10m copper active Twinax cables (SFP-H10GB-ACU10M)
  - Virtual Connect Direct-Attach Fibre Channel for HP 3PAR Storage Systems
- Manageability enhancements:
  - VCM GUI access to telemetry information
  - Advanced telemetry and statistics for Link Aggregation Groups and FlexNICs
  - GUI access to the FC Port Statistics for HP FlexFabric 10Gb/24-port Modules
  - o Improvements to the Statistics Throughout display and data collection
  - Display of factory default MACs and WWNs in server profiles
  - Added an FC/FCoE "Connect To" field to help identify how server ports are connected to the uplink ports
  - LLDP enhancements to more easily identify VC Ethernet modules on the network
  - Improvements to the display of the MAC Address table to show the network name and VLAN ID where the MAC address was learned, as well as display of the LAG membership table
- VCM GUI/CLI task progress activity indicator for predefined VCM operations
- Security enhancements:
  - o Support for 2048 bit SSL certificates and configurable SSL-CSR

- Activity logging improvements for TACACS+ accounting
- Option to disable local account access when LDAP, RADIUS, or TACACS+ authentication is enabled
- o Increased the default VCM local user account minimum required password length
- SNMP access security to prevent access from unauthorized management stations
- SmartLink failover improvements
- IGMP "NoFlood" option when IGMP snooping is enabled
- Browser support:
  - Internet Explorer 8 and 9
  - o Firefox 10 and 11
- Firmware upgrade rollback from a previous firmware upgrade without domain deletion
- Please refer to the VC 3.70 User Guide for additional VCEM feature enhancements

#### Please refer to the VC 3.70 Release notes and User Guides for further information

#### **3.70 Release Notes**

http://bizsupport2.austin.hp.com/bc/docs/support/SupportManual/c03478436/c03478436.pdf

#### 3.70 CLI User Guide

http://bizsupport2.austin.hp.com/bc/docs/support/SupportManual/c03478433/c03478433.pdf

#### 3.70 User Guide

http://h20628.www2.hp.com/km-ext/kmcsdirect/emr\_na-c03478464-3.pdf

#### Virtual Connect Firmware 4.01 includes the following new features:

Version 4.01 of Virtual Connect contains support for the following enhancements:

- Manageability enhancements:
  - Extended support for FCoE protocol on Flex-10/10D and FlexFabric modules, which includes FIP snooping support but is limited to dual-hop configurations. FlexFabric module dual-hop FCoE support is restricted to uplink ports X1-X4
     IMPORTANT: For more information about the installation and limitations for Virtual Connect dual-hop FCoE support, see the HP Virtual Connect Dual-Hop FCoE Cookbook, which can be found on the Installing tab of the HP BladeSystem Technical Resources website (http://www.hp.com/go/bladesystem/documentation)
  - Prioritization of critical application traffic with QoS
  - Minimum and maximum bandwidth optimization for efficient allocation of bandwidth in virtualized environments with Flex-10 and FlexFabric adapters. Flex-10 and FlexFabric adapter firmware and drivers must be updated to SPP version 2013.02.00, or the latest hotfix thereafter, to take advantage of this enhancement Note: This feature excludes support for the following adapters:
    - HP NC551i Dual Port FlexFabric 10Gb Converged Network Adapter
    - HP NC551m Dual Port FlexFabric 10Gb Converged Network Adapter
    - HP NC550m 10Gb 2-port PCIe x8 Flex-10 Ethernet Adapter
  - VC SNMP MIB enhancements for improved troubleshooting and failure analysis Virtual Connect SNMP Domain MIB (vc-domain-mib.mib) traps now contain detailed information
  - with the root cause of each event. Update SNMP management stations with the HP MIB Kit version 9.30 prior to installing Virtual Connect version 4.01 to take advantage of this enhancement. Download the update from the HP website (http://h18006.www1.hp.com/products/servers/management/hpsim/mibkit.html).
  - Enhanced support for LLDP MIB, Bridge MIB, Interface MIB, and Link aggregation MIB
  - The domain status alerts screen includes cause and root cause for each alert
  - Customization of VC user roles and privileges
  - The VCM GUI now allows searching for Network Access Groups, modules, interconnect bays, and device bay items from the left navigation tree
  - Configurable long or short LACP timer
  - VCM CLI TAB key auto-completion
  - The Network, SUS, and hardware pages now display the remote system name instead

of the MAC address.

- Security enhancements:
  - o IGMP Snooping enhancements with multicast group host membership filtering
  - Ability to set session timeout for idle VCM CLI or VCM GUI management sessions
  - Protection of VC Ethernet modules from buffer exhaustion due to flooding of Pause packets from servers
- VCEM compatibility:

If you are running VCEM 6.3.1 or later to manage a VC 4.01 domain, the 4.01 domain can be in a VCDG in 3.30 firmware mode or later. To enable new features in VC 4.01, you must upgrade to VCEM 7.2 or later. VCEM 7.2 does not support VC versions prior to 3.30

- Configurable role operations must be delegated to one of the following roles if they are to be performed while the domain is in Maintenance Mode: Network, Storage or Domain. Administrators logging into VCM with a Server role account while the domain is in Maintenance mode will be denied access to perform delegated operations such as exporting support files, updating firmware, configuring port monitoring or saving or restoring domain configuration
- In VC 4.01, the telemetry port throughput is Enabled by default. You must do the following to add a fresh VC 4.01 installation to your existing VCDG:
  - 3.30-3.70 VCDG with statistics throughput disabled—Clear the Enable Throughput Statistics checkbox on the Ethernet Settings (Advanced Settings) screen, or run the following VCM CLI command:
    - set statistics-throughput Enabled=false
  - 3.30-3.70 VCDG with statistics throughput enabled—Add the domain as is. No change is required
- In VC 4.01, the VLAN Capacity is set to Expanded by default. You must do the following to add a fresh VC 4.01 installation to your existing VCDG:
  - 3.30-3.70 with Legacy VLAN VCDG—You cannot add the domain. Select a different VCDG
  - 3.30-3.70 with Enhanced VLAN VCDG—Add the domain as is. No change is required

#### Please refer to the VC 4.01 Release notes for further information

#### 4.01 Release Notes

http://bizsupport2.austin.hp.com/bc/docs/support/SupportManual/c03801912/c03801912.pdf

#### 4.01 CLI User Guide

http://bizsupport2.austin.hp.com/bc/docs/support/SupportManual/c03790895/c03790895.pdf

#### 4.01 User Guide

http://bizsupport2.austin.hp.com/bc/docs/support/SupportManual/c03791917/c03791917.pdf

#### Additional Virtual Connect Reference Material

*Links to* HP Virtual Connect technology site, provides a great deal of reference information on **HP Virtual Connect Flex-10 and FlexFabric.** http://h18000.www1.hp.com/products/blades/virtualconnect/

http://iii8000.wwwi.hp.com/products/blades/virtualconnect/

**Overview of HP Virtual Connect Technologies** http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00814156/c00814156.pdf

#### **HP Virtual Connect Traffic Flow**

http://h20000.www2.hp.com/bc/docs/support/SupportManual/c03154250/c03154250.pdf

HP Virtual Connect for c-Class BladeSystem Setup and Installation Guide http://bizsupport1.austin.hp.com/bc/docs/support/SupportManual/c01732252/c01732252.pdf

#### Efficiently managing Virtual Connect environments

http://h20000.www2.hp.com/bc/docs/support/SupportManual/c03028646/c03028646.pdf

HP Virtual Connect Direct-Attach Fibre Channel for HP 3PAR (FlatSAN) Solution brief http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA4-1557ENW.pdf

#### HP BladeSystem Network Reference Architecture - FlexFabric and VMware vSphere 5

http://h20000.www2.hp.com/bc/docs/support/SupportManual/c03278211/c03278211.pdf

#### Virtual Connect User, Setup and CLI Guides

http://h20000.www2.hp.com/bizsupport/TechSupport/DocumentIndex.jsp?contentType=SupportManual&lan g=en&cc=us&docIndexId=64180&taskId=101&prodTypeId=3709945&prodSeriesId=3794423

#### **HP Virtual Connect FlexFabric Solutions Recipe**

http://vibsdepot.hp.com/hpq/recipes/

#### Virtual Connect Multi-Enclosure Stacking Reference Guide

http://h20000.www2.hp.com/bc/docs/support/SupportManual/c02102153/c02102153.pdf

Virtual Connect for the CISCO Administrator http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01386629/c01386629.pdf (www.hp.com/go/blades)

### **The Virtual Connect Cookbook Series:**

#### Virtual Connect 1Gb Ethernet Cookbook

Virtual Connect can be used to support both Ethernet and Fibre Channel connections. The Virtual Connect 1Gb Ethernet Cookbook is provided with basic Virtual Connect configurations in a 1Gb environment. Earlier releases of the Virtual Connect Ethernet Cookbook cover both 1Gb and 10Gb solutions; however, the most recent release of the Virtual Connect 1Gb Cookbook cover only 1Gb Ethernet Solutions up to Virtual Connect firmware release 3.6x.

http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01990371/c01990371.pdf (www.hp.com/go/blades)

#### Virtual Connect Dual-Hop FCoE Cookbook

Virtual Connect 4.01 now provides the ability to pass FCoE (Dual Hop) to an external FCoE capable network switch. This guide is focused on both the Virtual Connect and Network switch configurations needed to support this connectivity.

For Dual Hop FCoE connectivity, please refer to the *Dual-Hop FCoE with HP Virtual Connect modules Cookbook* 

http://bizsupport1.austin.hp.com/bc/docs/support/SupportManual/c03808925/c03808925.pdf (www.hp.com/go/blades)

#### Virtual Connect Fibre Channel Cookbook

Virtual Connect can be used to support both Ethernet and Fibre Channel connections; however, this guide is focused completely on the Ethernet configuration.

For Fibre Channel connectivity, please refer to the *Virtual Connect Fibre Channel Cookbook* http://bizsupport1.austin.hp.com/bc/docs/support/SupportManual/c01702940/c01702940.pdf (www.hp.com/go/blades)

#### Virtual Connect iSCSI Cookbook

Virtual Connect can be used to support iSCSI accelerated connections, including iSCSI boot, however, this guide is focused completely on the Ethernet and iSCSI configuration.

For iSCSI connectivity, please refer to the *Virtual Connect iSCSI Cookbook* http://h20000.www2.hp.com/bc/docs/support/SupportManual/c02533991/c02533991.pdf (www.hp.com/go/blades)

# **Virtual Connect Ethernet Modules**

#### Virtual Connect Flex-10 Module Uplink Port Mappings

It is important to note how the external uplink ports on the Flex-10 module are configured. The graphic below outlines the type and speed each port can be configured as.

- Ports X1 X8; Can be configured as 1Gb or 10Gb Ethernet
- Ports X7 X8; Are also shared as internal cross connect and should not be used for external connections, at the very least one horizontal stacking link is required.
- Uplink Ports X1-X8 support 0.5–7m length DAC as stacking or uplink
- The CX-4 port is shared with port X1, only one of these connections can be used at a time.

#### Figure 1 – Virtual Connect Flex-10 Module port configuration, speeds and types

Midplane	<ul> <li>16 individually configurable downlin</li> <li>10Gb Ethernet, Flex 10 and Flex 10/rit</li> <li>2 x 10Gb cross-links between adjacer</li> <li>M anagement interfaces to Onboard A</li> </ul>	<b>nk ports</b> SCSI nt Flex-10 modules cdministrator (Enet, RS232, and I <sup>2</sup> C)
UD U		
1x 10GBASE-CX4 Ethernet 1x SEP+ module (X1)	or 5x SFP+ modules (X2-6) (10bE or 100bE)	Recessed module
Port Number & Statu Indicates whether a data ce stacking link (amber), or hig	s Indicators http://www.commons.com/second	2x Crosslinks (midplane) <u>or</u> 2x SFP+ module (X7-8)

**Note:** The Virtual Connect Flex-10 module shown above was introduced in in Late 2008 and is replaced by the Flex-10/10D module, shown next and was released in August of 2012. The Flex-10 module above will go end of sales life in late 2013.

**Figure 2 -** FlexNIC Connections – It is important to note that Physical Function two (pf2) can be configured as Ethernet or iSCSI (iSCSI is supported with Flex-10 and G7 and Gen 8 blades using the Emulex based BE2 and BE3 chipsets). Physical Functions 1, 3 and 4 would be assigned as Ethernet only connections



#### Virtual Connect Flex-10/10D Module Uplink Port Mappings

It is important to note how the external uplink ports on the Flex-10 module are configured. The graphic below outlines the type and speed each port can be configured as.

- Ports X1 X10; Can be configured as 1Gb or 10Gb Ethernet or FCoE (ALL external ports can be used, no sharing of these ports with internal stacking, as with previous modules)
- Ports X11-X14; Internal cross connections for horizontal stacking and are NOT shared with any external connections
- Uplink Ports X1-X10 support 0.5–15m length DAC as stacking or uplink. If greater lengths are required, fibre optic cables would be required



**Figure 4 -** FlexNIC Connections – It is important to note that Physical Function two (pf2) can be configured as Ethernet, iSCSI (iSCSI and Dual Hop FCoE are supported with Flex-10/10D and G7 blades using the Emulex based BE2 and BE3 chipsets). Physical Functions 1, 3 and 4 would be assigned as Ethernet only connections. Dual Hop FCoE connections are supported on all external uplink ports



#### Virtual Connect FlexFabric Module Uplink Port Mappings

It is important to note how the external uplink ports on the FlexFabric module are configured. The graphic below outlines the type and speed each port can be configured as.

- Ports X1 X4; Can be configured as 10Gb Ethernet or Fibre Channel, FC speeds supported = 2Gb, 4Gb or 8Gb using 4Gb or 8Gb FC SFP modules, please refer to the FlexFabric Quick Spec for a list of supported SFP modules
- Ports X5 X8: Can be configured as 1Gb or 10Gb Ethernet
- Ports X7 X8; Are also shared as internal stacking links and should not be used for external connections, at the very least one horizontal stacking link is required, if modules are in adjacent bays. Note: Within FlexFabric Stacking only applies to Ethernet traffic.
- Uplink ports X1-X4 support 0.5–5m length DAC as stacking or uplink
- Uplink Ports X5-X8 support 0.5–7m length DAC as stacking or uplink Note: 5m DAC cables are supported on all ports with FlexFabric, in addition, 7-15m DAC cables are also supported on ports X5 through X8. Flex-10 supports 15m DAC cables on ALL ports.

Figure 5 – Virtual Connect FlexFabric Module port configuration, speeds and types



**Figure 6 -** FlexNIC Connections – It is important to note that Physical Function two (pf2) can be configured as Ethernet, iSCSI or FCoE (iSCSI and FCoE are supported with VC FlexFabric and G7 blades using the Emulex based BE2 and BE3 chipsets). Physical Functions 1, 3 and 4 would be assigned as Ethernet only connections. Dual Hop FCoE connections are supported on external ports X1 through X4



#### Virtual Connect 8Gb 20-Port Fibre Channel Module Uplink Port Mappings

It is important to note how the external uplink ports on the VC-FC module are configured. The graphic below outlines the type and speed each port can be configured as.

- Ports 1 4; Can be operate at Fibre Channel speeds of 2Gb, 4Gb or 8Gb using 4Gb or 8Gb FC SFP modules,
- The VC 8Gb 2o Port module ships with NO SFP modules
- Refer to the VC 8Gb 20 Port module Quick Spec for a list of supported SFP modules

#### Figure 7 - Virtual Connect 8Gb 20 Port Module port configuration and speed types



#### Virtual Connect 8Gb 24-Port Fibre Channel Module Uplink Port Mappings

It is important to note how the external uplink ports on the VC-FC module are configured. The graphic below outlines the type and speed each port can be configured as.

- Ports 1 8; Can be operate at Fibre Channel speeds of 2Gb, 4Gb or 8Gb using 4Gb or 8Gb FC SFP modules
- The VC 8Gb 24 Port module ships with TWO 8Gb FC SFP modules installed
- Refer to the VC 8Gb 20 Port module Quick Spec for a list of supported SFP modules

#### Figure 8 - Virtual Connect 8Gb 20 Port Module port configuration and speed types Midplane 16 individually configurable downlink ports



#### **Connecting to Brocade Fibre Channel Fabric at 8Gb**

**NOTE:** When VC 8Gb 20-port FC or VC FlexFabric 10Gb/24-port module Fibre Channel uplink ports are configured to operate at 8Gb speed and connecting to HP B-series (Brocade) Fibre Channel SAN switches, the minimum supported version of the Brocade Fabric OS (FOS) is v6.3.1 and v6.4.x. In addition, a fill word on those switch ports must be configured with option "Mode 3" to prevent connectivity issues at 8Gb speed.

On HP B-series (Brocade) FC switches use the command;

portCfgFillWord (portCfgFillWord <Port#> <Mode>) to configure this setting:

Mode	Link Init/Fill Word
Mode 0	IDLE/IDLE
Mode 1	ARBF/ARBF
Mode 2	IDLE/ARBF
Mode 3	If ARBF/ARBF fails use IDLE/ARBF

Although this setting only affects devices logged in at 8G, changing the mode is disruptive regardless of the speed the port is operating at. The setting is retained and applied any time an 8G device logs in. Upgrades to FOS v6.3.1 or v6.4 from prior releases supporting only modes 0 and 1 will not change the existing setting, but a switch or port reset to factory defaults with FOS v6.3.1 or v6.4 will be configured to Mode 0 by default. The default setting on new units may vary by vendor. Please use portcfgshow CLI to view the current portcfgfillword status for that port.

Modes 2 and 3 are compliant with FC-FS-3 specifications (standards specify the IDLE/ARBF behavior of Mode 2 which is used by Mode 3 if ARBF/ARBF fails after 3 attempts). For most environments, Brocade recommends using Mode 3, as it provides more flexibility and compatibility with a wide range of devices. In the event that the default setting or Mode 3 does not work with a particular device, contact your switch vendor for further assistance. When connecting to Brocade SAN Switches at 8Gb, "portCfgFillWord" must be set to Mode 3 – If ARBF/ARBF fails use IDLE/ARBF. In order to use Mode 3, FOS v6.3.1 or v6.4.x or better is required.

#### **Tunneled VLAN and Mapped VLANS**

Readers that are familiar with earlier releases of Virtual Connect firmware features will realize that Virtual Connect 3.30 firmware removed the need to configure Virtual Connect in Mapped vs. Tunneled mode. As of Virtual Connect 3.30 firmware release, Virtual Connect now provides the ability to simultaneously take advantage of the features and capabilities that were provided in either mapped or tunneled modes, there is no need to choose the domain's mode of operation. The key feature gained here is the ability to now use Mapped VLANs (multiple networks) and Tunneled networks within the same profile.

#### Virtual Connect VLAN Support – Shared Uplink Set

Shared Uplink Sets provide administrators with the ability to distribute VLANs into discrete and defined Ethernet Networks (vNet.) These vNets can then be mapped logically to a Server Profile Network Connection allowing only the required VLANs to be associated with the specific server NIC port. This also allows the flexibility to have various network connections for different physical Operating System instances (i.e. VMware ESX host and physical Windows host.)

#### **Legacy VLAN Capacity**

Legacy VLAN capacity mode allows up to 320 VLANs per Ethernet module, 128 VLANs per Shared Uplink Set and, up to 28 VLANs are allowed per FlexNIC port. Care must be taken not to exceed the limit per physical server port.

The following Shared Uplink Set rules apply to legacy capacity mode:

- 320 VLANs per Virtual Connect Ethernet Module
- 128 VLANs per Shared Uplink Set (single uplink port)
- 28 unique server mapped VLANs per server profile network connection

The above configuration rules apply only to a Shared Uplink set. If support for a larger numbers of VLANs is required, a VLAN Tunnel can be configured to support a large number of VLANs. Please see the Virtual Connect Release Notes for future details.

#### Expanded VLAN Capacity – Added in Virtual Connect 3.30 Release

This mode allows up to 1000 VLANs per domain when implementing a Share Uplink Set (SUS). The number of VLANs per shared uplink set is restricted to 1000. In addition, up to 162 VLANs are allowed per physical server port, with no restriction on how those VLANs are distributed among the server connections mapped to the same physical server port. Care must be taken not to exceed the limit per physical server port. For example, if you configure 150 VLAN mappings for a server connection (FlexNIC:a) of a FlexFabric physical server port, then you can only map 12 VLANs to the remaining three server connections (FlexNIC:b, FlexNIC:c, and FlexNIC:d) of the same physical server port. If you exceed the 162 VLAN limit, the physical server port is disabled and the four server connections are marked as Failed. Also, keep in mind that the FCOE SAN or iSCSI connection is also counted as a network mapping. In the event that greater numbers of VLANs are needed a vNet Tunnel can be used simultaneously with VLAN mapping.

The following Shared Uplink Set rules apply:

- 1000 VLANs per Virtual Connect Ethernet domain,
- 162 VLANs per Ethernet server port
- The above configuration rules apply only to a Shared Uplink set. If support for a greater numbers of VLANs is required, a VLAN Tunnel can be configured to support a large number of VLANs. Please see the Virtual Connect Release Notes for further details.

When creating the Virtual Connect Domain, the default configuration in 3.30 is Legacy VLAN Capacity Mode (in Virtual Connect 4.01, the default mode is now Expanded VLAN Capacity), however, Multiple Networks and Tunnel mode can be used simultaneously. After Expanded VLAN Capacity mode is configured, in order to revert back to Legacy VLAN capacity mode, you must delete and recreate the Virtual Connect Domain.

**Note:** Expanded VLAN Capacity mode is not supported on the following 1Gb based Virtual Connect Ethernet modules, such as:

- HP 1/10Gb VC Ethernet Module
- HP 1/10Gb-F VC Ethernet Module

If these modules are inserted into an enclosure that is in Expanded VLAN Capacity mode, they are marked as incompatible. If these modules are installed in an enclosure, converting to Expanded VLAN Capacity mode will not be permitted.

Figure 9 - Configuring Expanded VLAN Capacity support

thern	let Settings	
MAC Ad	Idresses Port Monitoring Advanced Settings	
VLAN		
erver \	/LAN Tagging Support	
🗌 Fo	rce server connections to use the same VLAN mappings as shared uplink sets	?
1 AN C2	marity	
	<b>ipacity</b> enacy VI AN canacity (1 In to 320 VI ANs per module and 28 VI ANs per server connection)	2
/LAN Ca O La	apacity egacy VLAN capacity (Up to 320 VLANs per module and 28 VLANs per server connection). «panded VLAN capacity (Up to 1000 VLANs per domain and 162 VLANs per physical server po	? ort).
(LAN Ca 0 La 0 E	npacity egacy VLAN capacity (Up to 320 VLANs per module and 28 VLANs per server connection). xpanded VLAN capacity (Up to 1000 VLANs per domain and 162 VLANs per physical server po	? ort).
ALAN Ca O La O Es Aultiple	ppacity egacy VLAN capacity (Up to 320 VLANs per module and 28 VLANs per server connection). «panded VLAN capacity (Up to 1000 VLANs per domain and 162 VLANs per physical server po Networks Link Speed Settings	? ort).
LAN Ca La E E fultiple vVher settin	apacity egacy VLAN capacity (Up to 320 VLANs per module and 28 VLANs per server connection). xpanded VLAN capacity (Up to 1000 VLANs per domain and 162 VLANs per physical server po Networks Link Speed Settings n using mapped VLAN tags (multiple networks over a single link), these gs will be used for the overall Link speed control.	? ort).
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#### **Bulk VLAN Creation**

In addition to providing support for a greater number of VLANs, Virtual Connect now provides the ability to create several VLANs, within a Shared Uplink Set (SUS), in a single operation. Using the Bulk VLAN creation feature in the GUI or the add network-range command in the CLI many VLANs can be added to a SUS. In addition, copying an existing SUS is also now possible. When creating an Active/Active SUS configuration, you can create the first SUS, and then copy it.

Figure 10 - Example of adding multiple VLANs to a SUS through the GUI

/ a single Associate	letwork 💿 multiple Associated Net	works
Network Name	VLAN- + VLAN	ND+ _1
Sample network name:	VLAN-2400-1	
VLAN ID(s)	101-105,2100-2400	?
	Type to add Network Labe	8
<ol> <li>Setting Native VI</li> </ol>	N is supported only when adding or e	diting a single Associated Network
<ul> <li>Setting Native VI</li> <li>The 306 network reaching the limit</li> </ul>	N is supported only when adding or e being created cannot all be marked F If 128.	diting a single Associated Network Yrivate. The domain can only support 128 more private network(s) before
<ul> <li>Setting Native VI</li> <li>The 306 network reaching the lim</li> <li>Smart Link Priv</li> </ul>	N is supported only when adding or a being created cannot all be marked F if 128. s Network	diting a single Associated Network ?rivate. The domain can only support 128 more private network(s) before

Here is an example of creating a shared Uplink Set using the CLI command "add network-range" to create the more than 400 VLANs shown above.

add uplinkset VLAN-Trunk-1 add uplinkport enc0:1:X5 Uplinkset=VLAN-Trunk-1 speed=auto add uplinkport enc0:1:X6 Uplinkset=VLAN-Trunk-1 speed=auto add network-range -quiet UplinkSet=VLAN-Trunk-1 NamePrefix=VLAN- NameSuffix=-1 VLANIds=101-105,2100-2400 State=enabled PrefSpeedType=auto SmartLink=enabled

**Note:** Earlier release of Virtual Connect firmware supported only 320 VLANs, in addition, to create each VLAN with SmartLink enabled required two lines of script. In the example above, over 300 VLANs are created in a single statement.

#### **Copying a Shared Uplink Sets**

Virtual Connect provides the ability to copy a Shared Uplink Set. This can be very handy when defining an Active/Active Shared Uplink Set design. You simply create the first SUS, and then copy it.

For example, after creating Shared Uplink Set VLAN-Trunk-1 you can copy it to VLAN-Trunk-2. You will then need to add uplinks to the new SUS and ensure all networks have SmartLink enabled. This can be accomplished as follows;

copy uplinkset VLAN-Trunk-1 VLAN-Trunk-2 fromVlanStr=1 toVlanStr=2 replace=last add uplinkport enc0:2:X5 Uplinkset=VLAN-Trunk-2 speed=auto add uplinkport enc0:2:X6 Uplinkset=VLAN-Trunk-2 speed=auto set network-range -quiet UplinkSet=VLAN-Trunk-1 VLANIds=101-105,2100-2400 SmartLink=enabled

#### vNets, Tunnels and Shared Uplink Sets

There are two types of vNets. The first is a simple vNet that will pass only untagged frames. The second is a vNet tunnel which will pass tagged frames for one or many VLANs.

#### vNet

The vNet is a simple network connection between one or many server NICs to one or many uplink ports.

A vNet could be used to connect a single VLAN, without tagging, to one or many server NICs. If this network is configured as a VLAN, by configuring the upstream switch port as an access or untagged port, by extension, any server connected to this vNet would reside in that VLAN, but would not need to be configured to interpret the VLAN tags.

#### Benefits of a vNet

A vNet can be utilized in one of two ways, a simple vNet, used to pass untagged frames and a tunneled vNet. A tunneled vNet can be used to pass many VLANs without modifying the VLAN tags, functioning as a transparent VLAN Pass-Thru module.

#### vNet Tunnel

A tunneled vNet will pass VLAN tagged frames, without the need to interpret or forward those frames based on the VLAN tag. Within a tunneled vNet the VLAN tag is completely ignored by Virtual Connect and the frame is forwarded to the appropriate connection (server NIC[s] or uplinks) depending on frame direction flow. In this case, the end server would need to be configured to interpret the VLAN tags. This could be a server with a local operating system, in which the network stack would need to be configured to understand which VLAN the server was in, or a virtualization host with a vSwitch supporting multiple VLANs.

The tunneled vNet can support up to 4096 VLANs.

#### **Benefits of a vNet Tunnel**

A vNet Tunnel can present one or many VLANs to a server NIC. When additional VLANs are added to the upstream switch port, they are made available to server with no changes required within Virtual Connect. All presented VLANs are pass through the tunnel, unchanged.

#### **Shared Uplink Set (SUS)**

The SUS provides the ability to support VLAN tagging and forward frames based on the VLAN tags of those frames. The SUS connects one or many server NICs to one or many uplink ports. A SUS would be configured for the specific VLANs it will support. If support for additional VLANs is required, those VLANs need to be configured within the SUS.

When connecting a server NIC to a network within a SUS, there are two choices provided. The key difference between these two options is the state in which the frame is passed to the server NIC. When configuring a server NIC for network connection;

- Selecting a single network which would be mapped to a specific VLAN. If a single network is selected, the frames will be presented to the server NIC WITHOUT a VLAN tag. In this case the host operating system does not need to understand which VLAN it resides in. When the server transmits frames back to Virtual Connect, those frames will not be tagged, however; Virtual Connect will add the VLAN tag and forward the frame onto the correct VLAN.
- 2. Selecting multiple networks which would provide connectivity to several VLANs. The Map VLAN Tags feature provides the ability to use a Shared Uplink Set to present multiple networks to a single NIC. If you select Multiple Networks when assigning a Network to a server NIC, you will have the ability to configure multiple Networks (VLANS) on that server NIC. At this point Virtual Connect tags ALL the packets presented to the NIC unless the Native check box is selected for one of the networks, in which case packets from this network (VLAN) will be untagged, and any untagged packets leaving the server will be placed on this Network (VLAN).

With Mapped VLAN Tags, you can create a Shared Uplink Set that contains ALL the VLANs you want to present to your servers, then present only ONE network (the one associated with the VLAN we want the server NIC in) to the Windows, LINUX or the ESX Console NIC, then select Multiple Networks for the NIC connected to the ESX vSwitch and select ALL the networks that we want presented to the ESX host vSwitch. The vSwitch will then break out the VLANs into port groups and present them to the guests. Using Mapped VLAN Tags minimizes the number of uplinks required.

#### **Benefits of a SUS**

A Shared Uplink Set can be configure to support both tagged and un-tagged network traffic to a server NIC, which simplifies the overall configuration and minimizes the number of uplink cables required to support the network connections.

#### **MAC Cache Failover**

When a Virtual Connect Ethernet uplink that was previously in standby mode becomes active, it can take several minutes for external Ethernet switches to recognize that the c-Class server blades can now be reached on this newly-active connection. Enabling Fast MAC Cache Failover causes Virtual Connect to transmit Ethernet packets on newly-active links, which enables the external Ethernet switches to identify the new connection more quickly (and update their MAC caches appropriately). This transmission sequence repeats a few times at the MAC refresh interval (5 seconds recommended) and completes in about 1 minute.

When implementing Virtual Connect in an Active/Standby configuration, where some of the links connected to a Virtual connect Network (whether a SUS or vNet) are in standby, MAC Cache Fail-over would be employed to notify the switch as a link transitions from Standby to Active within Virtual Connect.

**Note:** Be sure to set switches to allow MAC addresses to move from one port to another without waiting for an expiration period or causing a lock out.

#### **Role Management**

New to Virtual Connect 4.01 is the ability to provide a more granular control of each of the operational user roles provided. In prior releases, each role had a set level of access.

**Figure 11 –** Role Operations provides the ability to set the level of access a specific operational role is provided

Define 👻 Configure 👻 Tools 👻	Help 🔻				
Role Management					
Role Authentication Order	Role	e Operation	IS		
Configure Role Operations					
Role Operations		Network	Server	Storage	Domain
Export Support Files					<ul><li>✓</li></ul>
Firmware Update (VCSU) 🛛 🔋					$\checkmark$
Port Monitoring		$\checkmark$	$\checkmark$		
Restore Domain Configuration					<ul> <li>✓</li> </ul>
Save Domain Configuration					

#### Virtual Connect DirectAttach Virtual Connect SAN fabrics (FlatSAN with 3PAR)

Virtual Connect Direct Attached SAN fabrics, provides the ability to directly connect HP FlexFabric to an HP 3PAR storage array and completely eliminate the need for a traditional SAN fabric and the administrative overhead associated with maintaining the fabric. FlatSAN is supported on FlexFabric modules through Ports X1-X4, simply connect the FlexFabric modules to available ports on the 3PAR array and configure the Virtual Connect fabrics for "DirectAttach".

Figure 12 - When configuring FlatSAN, chose the Fabric Type of "DirectAttach"

Define 👻	Configure 👻	Tools 👻	Help 👻			
Define	SAN Fab	ric				
Fabric	:					
Fabric Na	me	ſ	Fabric Type	Login Re-Distribution	Configured Speed	Show Advanced Settings
FCoE_Flat	ISAN_A	L C	DirectAttach	<b>V</b> NA	Auto	

**Note:** See Scenario 6 in the Virtual Connect Fibre Channel Cookbook for a details on implementation of FlatSAN.

http://bizsupport1.austin.hp.com/bc/docs/support/SupportManual/c01702940/c01702940.pdf

#### Virtual Connect QoS

QoS is used to provide different priorities for designated networking traffic flows and guarantee a certain level of performance through resource reservation. QoS is important for reasons such as:

- Providing Service Level Agreements for network traffic and to optimize network utilization
- Different traffic types such as management, back up, and voice having different requirements for throughput, jitter, delays and packet loss
- IP-TV, VOIP and expansion of internet is creating additional traffic and latency requirements

• In some cases, capacity cannot be increased. Even when possible, increasing capacity may still encounter issues if traffic needs to be re-routed due to a failure

Traffic must be categorized and then classified. Once classified, traffic is given priorities and scheduled for transmission. For end to end QoS, all hops along the way must be configured with similar QoS policies of classification and traffic management. Virtual Connect manages and guarantees its own QoS settings as one of the hops within the networking infrastructure.

#### **Network Access Groups (NAG)**

Before Virtual connect 3.30, any server profile could be assigned any set of networks. If policy dictated that some networks should not be accessed by a system that accessed other networks (for example, the Intranet and the Extranet or DMZ networks) there was no way to enforce that policy automatically.

With Virtual Connect 3.30 and later, network access groups are defined by the network administrator and associated with a set of networks that can be shared by a single server. Each server profile is associated with one network access group. A network cannot be assigned to the server profile unless the profile is a member of the network access group associated with that network. A network access group can contain multiple networks. A network can reside in more than one network access group, such as a management or VMotion VLAN.

Up to 128 network access groups are supported in the domain. Ethernet networks and server profiles that are not assigned to a specific network access group are added to the domain Default network access group automatically. The Default network access group is predefined by VCM and cannot be removed or renamed.

If you are updating to Virtual Connect 3.30, all current networks are added to the Default network access group and all server profiles are set to use the Default network access group. Network communication within the network access group behaves similarly to earlier versions of Virtual Connect firmware, because all profiles can reach all networks.

If you create a new network access group, NetGroup1, and copy or move existing networks from the Default network access group to NetGroup1, then a profile that uses NetGroup1 cannot use networks included in the Default network access group. Similarly, if you create a new network and assign it to NetGroup1 but not to the Default network access group, then a profile that uses the Default network access group cannot use the new network. Therefore, an administrator cannot inadvertently, or intentionally, place a server on networks that reside in different Network Access Groups.

#### Virtual Connect LACP Timers

Virtual Connect provides two options for configuring uplink redundancy (Auto and Failover). When the connection mode is set to "Auto", Virtual Connect uses Link Aggregation Control Protocol to aggregate uplink ports from a Network or Shared Uplink Set into Link Aggregation Groups. As part of the LACP negotiation to form a LAG, the remote switch sends a request for the frequency of the control packets (LACPDU). This frequency can be "short" or "long." Short is every 1 second with a 3 second timeout. Long is every 30 seconds with a 90 second timeout.

Prior to Virtual Connect 4.01 this setting defaulted to short. Starting with Virtual Connect 4.01 this setting can be set to short or long. The domain-wide setting can be changed on the Ethernet Settings (Advanced Settings) screen. Additionally, each Network or Shared Uplink Set also has a LACP timer setting. There are three possible values: Domain-Default, Short, or Long. The domain default option sets the LACP timer to the domain-wide default value that is specified on the Advanced Ethernet Settings screen.

This setting specifies the domain-wide default LACP timer. VCM uses this value to set the duration of the LACP timeout and to request the rate at which LACP control packets are to be received on LACP-supported interfaces. Changes to the domain-wide setting are immediately applied to all existing networks and shared uplink sets.

Using the "long" setting can help prevent loss of LAGs while performing in-service upgrades on upstream switch firmware.

#### Multiple Networks Link Speed Settings (Min/Max Bandwidth Control)

A new feature to Virtual Connect 4.01 provides the ability to configure a minimum and maximum preferred NIC link speed for server downlinks. This setting can be configured as a global default for NICs configured with multiple networks, but can also be fine-tuned at the individual NIC level. The default global Preferred Speed is set to 10Gb. The new "Maximum Link Connection Speed" setting can be configured to enable a NIC to transmit at a speed greater that it's configured speed. The default Maximum speed is set to 10Gb. If these settings are remain as default, each NIC, although configured for a set speed (minimum guaranteed speed), will be able to transmit at a rate as high as 10Gb. This feature is also known as "Min/Max".

#### Configuring Multiple Networks Link Speed Settings (Min/Max)

Configure the global default setting for Preferred Link Speed to 2Gb and the Maximum Speed to 8Gb. This global setting applies to connections configured for Multiple Networks only.

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
  - Select Set a Customer value for Preferred Link Connection Speed • Set for 2Gb
- Select Set a Customer value for Maximum Link Connection Speed

   Set for 8Gb
- Select Apply

•

#### Figure 13 - Set Custom Link Speeds

ther	net Settings
MAC A	ddresses Port Monitoring Advanced Settings
VLAN	
Server	VLAN Tagging Support
F	orce server connections to use the same VLAN mappings as shared uplink sets
VLAN C	apacity
OL	egacy VLAN capacity (Up to 320 VLANs per module and 28 VLANs per server connection).
• E	expanded VLAN capacity (Up to 1000 VLANs per domain and 162 VLANs per physical server port).
settir	o ligiod manned VI AN 1902 I multiple networks over a sindle link I these
Selei	et a Custom value for Preferred Link Connection Speed    ted Speed
Selei 0.1 (	et a Custom value for Preferred Link Connection Speed       2     Gb       3b     10 Gb
Selection	In casing imposed vicinity in tags (initialize in the overall Link speed control.       let a Custom value for Preferred Link Connection Speed       cted Speed:       2       Gb
Selection Select	et a Custom value for Maximum Link Connection Speed 22 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
Selection Select	et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum
<ul> <li>✓ S</li> <li>Selei</li> <li>0.1 (</li> <li>✓ S</li> <li>Selei</li> <li>0.1 (</li> </ul>	et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value for Maximum Link Connection Speed et a Custom value

The following command can be copied and pasted into an SSH based CLI session with Virtual Connect;

# Set Preferred and Maximum Connection Speeds set enet-vlan PrefSpeedType=Custom PrefSpeed=2000 set enet-vlan MaxSpeedType=Custom MaxSpeed=8000

#### **Configuring Throughput Statistics**

Telemetry support for network devices caters to seamless operations and interoperability by providing visibility into what is happening on the network at any given time. It offers extensive and useful detection capabilities which can be coupled with upstream systems for analysis and trending of observed activity.

The Throughput Statistics configuration determines how often the Throughput Statistics are collected and the supported time frame for sample collection before overwriting existing samples. When the time frame for sample collection is reached, the oldest sample is removed to allocate room for the new sample. Configuration changes can be made without having to enable Throughput Statistics. Applying configuration changes when Throughput statistics is enabled clears all existing samples.

Some conditions can clear existing Throughput Statistics:

- Disabling the collection of Throughput Statistics clears all existing samples.
- Changing the sampling rate clears all existing samples.
- Power cycling a Virtual connect Ethernet module clears all Throughput Statistics samples for that module.

Collected samples are available for analysis on the Throughput Statistics screen (on page 226 of the Virtual Connect 4.01 User Guide), accessible by selecting Throughput Statistics from the Tools pull-down menu.

The following table describes the available actions for changing Throughput Statistics settings.

Task	Action		
Enable/disable	Select (enable) or clear (disable) the Enable Throughput Statistics checkbox		
Change sampling rate	<ul> <li>Select a sampling rate from the Configuration list. Supported sampling rates include:</li> <li>Sample rate of 1 minute, collecting up to 5 hours of samples.</li> <li>Sample rate of 2 minutes, collecting up to 10 hours of samples.</li> <li>Sample rate of 3 minutes, collecting up to 15 hours of samples.</li> <li>Sample rate of 4 minutes, collecting up to 20 hours of samples.</li> <li>Sample rate of 5 minutes, collecting up to 25 hours of samples.</li> <li>Sample rate of 1 hour, collecting up to 12.5 days of samples.</li> </ul>		

# Connecting VC Flex-10/10D or VC FlexFabric to the CORE

The baseline Virtual Connect technology adds a virtualization layer between the edge of the server and the edge of the existing LAN and SAN. As a result, the external networks connect to a shared resource pool of MAC addresses and WWNs rather than to MACs/WWNs of individual servers.

#### LAN-Safe

From the external networking view, Virtual Connect FlexFabric, Flex-10, or Ethernet uplinks appear to be multiple NICs on a large server. Virtual Connect ports at the enclosure edge look like server connections. This is analogous to a VMware environment that provides multiple MAC addresses to the network through a single NIC port on a server.

Virtual Connect works seamlessly with your external network:

• Does not participate in Spanning Tree Protocol (STP) on the network uplinks to the data center. This avoids potential STP configuration errors that can negatively affect switches in the network and the servers connected to those switches

- Uses an internal loop prevention algorithm to automatically detect and prevent loops inside a Virtual Connect domain. Virtual Connect ensures that there is only one active uplink for any single network at one time
- Allows aggregation of uplinks to data center networks (using LACP and fail-over)
- Supports VLAN tagging on egress or pass-thru of VLAN tags in tunneled mode
- Supports Link Layer Discovery Protocol (LLDP) and Jumbo Frames

Virtual Connect was designed to connect to the network as an endpoint device, as such, it is capable of connecting to any network switch, at any layer, including directly to the core switch, providing the ability to flatten the network as required.

## Choosing VC Flex-10/10D or VC FlexFabric

When choosing between Flex-10/10D and FlexFabric, the first question to ask is whether a direct connection to a Fibre Channel SAN fabric will be required, today or in the future. The key difference between Flex-10 and FlexFabric is that FlexFabric modules leverage the built in Converged Network Adapter (CNA) provided in the G7 and Gen 8 BladeSystem servers to provide FCoE (Fibre Channel) connectivity. FCoE connectivity is provided through the integrated Converged Network Adapter (CNA) and the FlexFabric modules, the FlexFabric modules connect directly to the existing Fibre Channel switch fabrics, no additional components would be required, such as a traditional HBA.

With the release of Virtual connect firmware 4.01, the Flex-10/10D and FlexFabric modules can also be utilized to provide dual hop FCoE connectivity to a switch that supports FCoE connections, in which case the FCoE traffic would traverse the Ethernet uplinks and connect to the SAN through the ToR or Core switch.

Virtual Connect 3.70 provided a new capability when connecting to HP's 3PAR storage arrays using Fibre Channel, allowing the 3PAR array to be directly connected to the FlexFabric modules. This feature is call "FlatSAN" and provides the ability to completely eliminate the need for a fibre channel SAN fabric, further reducing the cost of implementation and management of a blade server environment.

If direct connection to a Fibre Channel SAN fabric is not required, then all the capabilities of the CNA in the G7 and Gen 8 Blade and Virtual Connect can be obtained through the use of the Flex-10/10D modules, the only feature not available would be direct connection to a fibre channel SAN fabric. Fibre Channel connectivity could be later added through the use of traditional Virtual Connect Fibre Channel modules, and FC HBAs. iSCSI support is provided through either FlexFabric or Flex-10 modules.

If Fibre Channel is not used, then the second Physical Function (pf) on each port would be used for Ethernet. If Flex-10 modules are used with Virtual connect Fibre Channel modules, ensure an HBA is installed in the appropriate MEZZ slot in the blade and simply configure a "FC HBA" within the server profile and map it to the appropriate FC SAN Fabrics. In this case, FCoE SAN Fabrics and FCoE CNAs would not be utilized. An example of this configuration is provided in Scenario 9.

The Scenarios provided in this document could be implemented on either; Flex-10, Flex-10/10D (with VC-FC Modules for FC connections) or FlexFabric modules, with the exception of the dual hop FCoE, which would not be supported on Flex-10 modules.

FlexFabric also provides the ability to support "Direct Attached" SAN fabrics to an HP 3PAR SAN, which provides the ability to eliminate the SAN fabric.

**Note:** Dual hop FCoE connectivity is provided through Flex-10/10D and FlexFabric modules only. The original Flex-10 module does not support dual hop FCoE.

# Choosing an Adapter for VC Flex-10/10D or VC FlexFabric

The following adapters are supported with Virtual Connect Flex-10, Flex-10/10D and FlexFabric;

Gen 8 Blades – FlexFabric FCoE/iSCSI support

- HP FlexFabric 10Gb 2-port 554FLB Adapter
- HP FlexFabric 10Gb 2-port 554M Adapter

Gen 8 Blades – Flex-10 Ethernet only

- HP Flex-10 10Gb 2-port 530FLB Adapter
- HP Flex-10 10Gb 2-port 530M Adapter
- HP Flex-10 10Gb 2-port 552M Adapter

Gen 7 and older Blades – FlexFabric FCoE/iSCSI support

- HP NC553i 10Gb FlexFabric adapter
- HP NC553m 10Gb 2-port FlexFabric Adapter

Gen 7 and older Blades – Flex-10 Ethernet Only

- HP NC552m 10Gb Dual Port Flex-10 Ethernet Adapter
- HP NC532m 10Gb Dual Port Flex-10 Ethernet Adapter
- HP NC542m 10Gb Dual Port Flex-10 Ethernet Adapter
- HP NC550m 10Gb Dual Port Flex-10 Ethernet Adapter

The Min/Max bandwidth optimization feature released in Virtual Connect 4.01 excludes support for the following adapters:

- HP NC551i Dual Port FlexFabric 10Gb Converged Network Adapter
- HP NC551m Dual Port FlexFabric 10Gb Converged Network Adapter
- HP NC550m 10Gb 2-port PCIe x8 Flex-10 Ethernet Adapter

The following adapters are NOT supported with Flex-10, Flex-10/10D or FlexFabric:

- HP Ethernet 10Gb 2-port 560FLB FIO Adapter
- HP Ethernet 10Gb 2-port 560M Adapter

**Note:** All 1Gb Blade LAN adapters will function with any of the Virtual Connect 10Gb Ethernet modules, however, will operate at 1Gb.

# Determining Network Traffic Patterns and Virtual Connect network design (Active/Standby vs. Active/Active)

When choosing which Virtual Connect network design to use (Active/Active (A/A) vs. Active/Standby (A/S) uplinks), consider the type of network traffic this enclosure will need to support. For example, will there be much server to server traffic needed within the enclosure, or is the traffic flow mainly in/out bound of the enclosure.

Network traffic patterns, North/South (N/S) vs. East/West (E/W), should be considered when designing a Virtual Connect solution as network connectivity can be implemented in a way to maximize the connected bandwidth and/or minimize the need for server to server traffic to leave the enclosure when communicating on the same VLAN with other servers within the same enclosure.

For example; if the solution being implemented will have a high level of in/out or North/South traffic flow, an A/A network design would likely be the better solution as it would enable all connected uplinks. However, if a greater level of network traffic is between systems within the same enclosure/VLAN, such as a multi-tiered application, then a better design may be A/S, as this would minimize or eliminate any server to server communications from leaving the enclosure.

Determining whether network connectivity is A/A vs. A/S is not a domain configuration issue or concern. Networks are independent of one another and both A/A and A/S networks could be implemented in the same Virtual Connect domains. As an example, an iSCSI connection could be configured as A/A to support a high rate of N/S traffic between targets and initiators. Whereas the LAN connectivity for the users and applications could be more E/W where an A/S network design could be implemented.

In an active/standby network design, all servers would have both NICs connected to the same Virtual Connect network. All communications between servers within the Virtual Connect Domain would occur through this network, no matter which network adapter is active. In the example below, if Windows Host 1 is active on NIC 1 and Windows Host 2 is active on NIC 2, the communications between servers will cross the internal stacking links. For external communications, all servers in the enclosure will use the Active uplink (currently) connected to Bay 1, no matter which NIC they are active on.

**Figure 14 -** This is an example of an Active/Standby network configuration. One uplink is active, while the other is in standby, and available in the event of a network or module failure



In an A/A network design, all servers would have their NICs connected to opposite Virtual Connect networks. Communications between servers within the Virtual Connect Domain would depend on which NIC each server was active on. In the following example, if Windows Host 1 is active on NIC 1 and Windows Host 2 is active on NIC 2, the communications between servers will NOT cross the internal stacking links and would need to leave the enclosure and re-enter via the opposite module; however, if a higher rate of external communications is require, vs. peer to peer, then an active/active configuration may be preferred as both uplinks would be actively forwarding traffic. Also, if both servers were active on the same NIC, then communications between servers would remain within the module/enclosure.

**Figure 15 -** This is an example of an Active/Active network configuration. Both uplinks are actively forwarding traffic.



**Figure 16 -** Both A/A (iSCSI\_x) and A/S (vNet\_PROD) networks are used in this example.



**Note:** Alternatively, if Fibre Channel will not be required, the iSCSI networks could be connected as iSCSI hardware accelerated and would be connected to the FlexHBA.

# VMware ESXi 5.0/5.1

VMware ESX 5.0 is fully supported with BladeSystem and Virtual Connect. However, it is important to ensure that the proper Network Adapter and HBA drivers and firmware are properly installed. As of this writing, the following drivers and firmware should be used.

CNA driver and Firmware recommendations:

Emulex NC55x CNA Firmware	4.2.401.2155
VMware ESXi 5.0/5.1 Driver CD for Emulex be2net	4.2.327.0
VMware ESXi50 Driver for Emulex iSCSI Driver	4.2.324.12
VMware ESX/ESXi Driver CD for Emulex FCoE/FC adapters	8.2.4.141.55

**Note:** As noted in the "February 2013 VMware FW and Software Recipe" http://vibsdepot.hp.com/hpq/recipes/February2013VMwareRecipe5.0.pdf. **Note:** For the most up to date recipe document please visit "vibsdepot" at http://vibsdepot.hp.com

Figure 17 - Note the Emulex BIOS version as 4.2.401.2155



**Figure 18 -** Note the be2net driver and firmware level as displayed in vCenter, under the Hardware Status tab

192.168.101.170 VMware E5Xi, 5.1.0, 1117900						
Getting Started Summary Virtual Machines Performance Configuration Tasks & Events Alarms Permissions Maps Storage Views Network Views Hardware Status						
Updated: 07/14/2013 6:26:53 PM (View is refreshed every 5 mins)						
System summary: BIOS Manufacturer: HP, BIOS Version: I31 Model: ProLiant BL460c Gen8, Serial Number: VCX0000V00, Tag: 23.0, Asset Tag: unknown No alerts or warrings out of 240 sensors						
View: Sensors Show all sensors Show all details	s Hide all					
Sensor	Status	Details				
🕀 🛄 Processor	🤣 Normal					
🗄 🌉 Memory	🦁 Normal					
🕀 📜 PCI						
🗄 🎭 Fan	📀 Normal					
🗉 🕖 Voltage	📀 Normal					
	Normal					
🗉 👳 Network						
Battery	📀 Normal					
E Storage	📀 Normal					
🖃 🕋 Software Components						
🗉 🝙 Alt Boot Bank: VMware ESXi 5.1.0 build-1065491						
⊞      Ga BMC Firmware (node 0) 46:10000						
🗉 🚯 Smart Array Controller HPSA1						
🗉 🚯 System BIOS						
🗉 🝙 VMware ESXi 5.1.0 build-1117900						
🗉 🚯 ata-pata-amd						
🗉 🚯 ata-pata-atiixp						
🗉 🚯 ata-pata-cmd64x						
🗉 🚯 ata-pata-hpt3x2n						
🗉 👔 ata-pata-pdc2027x						
🗉 🚯 ata-pata-serverworks						
🗉 🚯 ata-pata-sil680						
🗉 🚯 ata-pata-via						
💿 be2net device firmware		Version: be2net device firmware 4.2.401.2215				
o be2net device firmware		Version: be2net device firmware 4.2.401.2215				
🔞 be2net device firmware		Version: be2net device firmware 4.2.401.2215				
🔞 be2net device firmware		Version: be2net device firmware 4.2.401.2215				
🔞 be2net device firmware		Version: be2net device firmware 4.2.401.2215				
🔞 be2net device firmware		Version: be2net device firmware 4.2.401.2215				
👔 be2net driver		Version: be2net driver 4.2.327.0				
🔞 be2net driver		Version: be2net driver 4.2.327.0				
🚳 be2net driver		Version: be2net driver 4.2.327.0				
🚯 be2net driver		Version: be2net driver 4.2.327.0				
🚯 be2net driver		Version: be2net driver 4.2.327.0				
🚯 be2net driver		Version: be2net driver 4.2.327.0				
I						

# **Single Domain/Enclosure Scenarios**

## **Overview**

This Cookbook will provide several configuration scenarios of Virtual Connect Flex-10/10D and FlexFabric, using an HP BladeSystem c7000 enclosure. Virtual Connect also supports Multi-Enclosure stacking, for up to 4 enclosures, which provides a single point of management and can further reduce cable connectivity requirements. For Virtual connect stacked configurations, see the Virtual Connect Multi-Enclosure Stacking Reference Guide. Each scenario will provide an overview of the configuration, show how to complete that configuration and include both GUI and CLI (scripted) methods. Where possible, examples for Windows and/or VMware vSphere will also be provided.

#### Requirements

This Cookbook will utilize a single HP BladeSystem c7000 enclosure with TWO Virtual Connect FlexFabric or Flex-10/10D modules installed in I/O Bays 1 and 2 and a BL460c Gen 8 half height BladeSystem Servers in server Bay 1. Some of the scenarios will provide Ethernet only connections, in which case Flex-10/10D modules may be used. In the scenarios where Fibre Channel connectivity is required, FlexFabric modules will be used, with the exception of Scenario 9 which uses Flex-10/10D and Virtual Connect Fibre Channel modules.

The server's integrated converged network adapters (CNA) will connect to Bays 1 and 2, with two 10Gb FlexFabric adapter ports. Each FlexFabric Adapter port supports Ethernet and iSCSI or Fibre Channel over Ethernet (FCoE) when connected to FlexFabric modules. Port 1 will connect to the FlexFabric module in Bay 1 and Port 2 will connect to the FlexFabric module in Bay 2.

The Flex-10/10D modules are connected to a pair of 10Gb Ethernet switches for standard LAN connectivity.

The FlexFabric modules and VC-FC modules are linked to a pair of 8Gb Brocade fibre channel switches for SAN connectivity.

In each scenario, it's assumed that a Virtual Connect Domain has been created either through the GUI or a CLI script and no Virtual Connect Networks, uplink sets or Server Profiles have been created. Virtual Connect scripting examples are provided within each scenario as well as additional examples in Appendix C.

Figure 19- c7000 enclosure front view with Half Height Gen 8 BladeSystem servers installed



BL460c Gen 8 Blade servers

C7000 Front View

**Figure 20 -** c7000 enclosure rear view with Virtual Connect FlexFabric Modules installed in Interconnect bays 1& 2



Bay 1:X1 - To SAN Fabric A – Port x (Port #-x)

**Figure 21 -** c7000 enclosure rear view with Virtual Connect Flex-10/10D modules in Bays 1 & 2 and Virtual Connect 20 Port 8Gb Fibre Channel Modules installed in Interconnect bays 3 & 4. If Fibre Channel connectivity is not required, the Fibre Channel modules would not be required



# Scenario 1 – Simple vNet with Active/Standby Uplinks – Ethernet and FCoE – Windows 2008 R2

### **Overview**

This simple configuration uses the Virtual Connect vNet along with FCoE for SAN connectivity. When VLAN mapping is not required, the vNet is the simplest way to connect Virtual Connect to a network and server. In this scenario, the upstream network switch connects a network to a single port on each FlexFabric module. In addition, Fibre Channel uplinks will also be connected to the FlexFabric modules to connect to the existing Fibre Channel infrastructure.

No special upstream switch configuration is required as the switch is in the factory default configuration, typically configured as an Access or untagged port on either the default VLAN or a specific VLAN. In this scenario, Virtual Connect does not receive VLAN tags.

When configuring Virtual Connect, we can provide several ways to implement network fail-over or redundancy. One option would be to connect TWO uplinks to a single vNet; those two uplinks would connect from different Virtual Connect modules within the enclosure and could then connect to the same or two different upstream switches, depending on your redundancy needs. An alternative would be to configure TWO separate vNets, each with a single or multiple uplinks configured. Each option has its advantages and disadvantages. For example; an Active/Standby configuration places the redundancy at the VC level, where Active/Active places it at the OS NIC teaming or bonding level. We will review the first option in this scenario.

In addition, several vNets can be configured to support the required networks to the servers within the BladeSystem enclosure. These networks could be used to separate the various network traffic types, such as iSCSI, backup and VMotion from production network traffic.

This scenario will also leverage the Fibre Channel over Ethernet (FCoE) capabilities of the FlexFabric modules. Each Fibre channel fabric will have one uplink connected to each of the FlexFabric modules.

#### **Requirements**

This scenario will support both Ethernet and fibre channel connectivity. In order to implement this scenario, an HP BladeSystem c7000 enclosure with one or more server blades and TWO Virtual Connect FlexFabric modules, installed in I/O Bays 1& 2 are required. In addition, we will require ONE or TWO external Network switches. As Virtual Connect does not appear to the network as a switch and is transparent to the network, any standard managed switch will work with Virtual Connect. The Fibre Channel uplinks will connect to the existing FC SAN fabrics. The SAN switch ports will need to be configured to support NPIV logins. One uplink from each FlexFabric module will be connected the existing SAN fabrics.

**Figure 22 - Physical View;** Shows one Ethernet uplink from Ports X5 on Module 1 and 2 to Port 1 on each network switch. The SAN fabrics are also connected redundantly, with TWO uplinks per fabric, from ports X1 and X2 on module 1 to Fabric A and ports X1 and X2 to Fabric B.



**Figure 23 - Logical View;** Shows a single Ethernet uplink from Port X5 on Module 1 on the first network switch and a single uplink from Port X5 on Module 2 to the second network switch. Both Ethernet uplinks are connected to the same vNet, vNet-PROD. In addition, SAN Fabric FCoE\_A connects to the existing SAN Fabric A through port X1 on Module 1 (Bay 1) and FCoE\_B connects to the existing SAN Fabric B through port X1 on Module 2 (Bay 2)



# Installation and configuration

#### **Switch configuration**

As the Virtual Connect module acts as an edge switch, Virtual Connect can connect to the network at either the distribution level or directly to the core switch.

The appendices provide a summary of the cli commands required to configure various switches for connection to Virtual Connect. The configuration information provided in the appendices for this scenario assumes the following information:

- The switch ports are configured as ACCESS or untagged ports, either presenting the Default VLAN or a specific VLAN and will be forwarding untagged frames
- As an alternative, if the switch ports were configured as TRUNK ports and forwarding multiple VLANS, Virtual Connect would forward those tagged frames to the host NICs configured for this network, however; the Virtual Connect network would need to be configured for VLAN Tunneling. The connected host would then need to be configured to interpret those VLAN tags.

The network switch port should be configured for Spanning Tree Edge as Virtual Connect appears to the switch as an access device and not another switch. By configuring the port as Spanning Tree Edge, it allows the switch to place the port into a forwarding state much quicker than otherwise, this allows a newly connected port to come online and begin forwarding much quicker.

The SAN switch ports connecting to the FlexFabric module must be configured to accept NPIV logins.

#### **Configuring the VC module**

- Physically connect Port 1 of network switch 1 to Port X15 of the VC module in Bay 1
- Physically connect Port 1 of network switch 2 to Port X5 of the VC module in Bay 2

**Note:** if you have only one network switch, connect VC port X5 (Bay 2) to an alternate port on the same switch. This will NOT create a network loop and Spanning Tree is not required.

- Physically connect Port X1 on the FlexFabric in module Bay 1 to a switch port in SAN Fabric A
- Physically connect Port X1 on the FlexFabric in module Bay 2 to a switch port in SAN Fabric B

#### **VC CLI commands**

In addition to the GUI many of the configuration settings within VC can also be accomplished via a CLI command set. In order to connect to VC via a CLI, open an SSH connection to the IP address of the active VCM. Once logged in, VC provides a CLI with help menus. The Virtual Connect CLI guide also provides many useful examples. Throughout this scenario the CLI commands to configure VC for each setting are provided.

#### **Configuring Expanded VLAN Capacity via GUI**

Virtual Connect release 3.30 provided an expanded VLAN capacity mode when using Shared Uplink Sets, this mode can be enabled through the Ethernet Settings tab or the VC CLI. The default configuration for a new Domain install is "Expanded VLAN Capacity" mode, Legacy mode is no longer available and the Domain cannot be downgraded.

#### To verify the VLAN Capacity mode

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Expanded VLAN capacity
- Verify Expanded VLAN Capacity is configured and Legacy VLAN Capacity is greyed out.

**Note:** Legacy VLAN mode will only be presented if 1Gb Virtual Connect Modules are present, in which case the domain would be limited to Firmware version 3.6x.

#### **Configuring Expanded VLAN Capacity via CLI**

The following command can be copied and pasted into an SSH based CLI session with Virtual Connect;

# Set Expanded VLAN Capacity set enet-vlan -quiet VlanCapacity=Expanded

#### Figure 24 - Enabling Expanded VLAN Capacity

Define ▼ Configure ▼ 100is ▼ Help ▼				
Ethernet Settings				
MAC Addresses Port Monitoring Advanced Settings				
VLAN				
Server VLAN Tagging Support				
Force server connections to use the same VLAN mappings as shared uplink sets				
VLAN Capacity				
O Legacy VLAN capacity (Up to 320 VLANs per module and 28 VLANs per server connection).				
Expanded VLAN capacity (Up to 1000 VLANs per domain and 162 VLANs per physical server port).				
Multiple Networks Link Speed Settings				
When using mapped VLAN tags (multiple networks over a single link), these settings will be used for the overall Link speed control.				
Set a Custom value for Preferred Link Connection Speed				
Set a Custom value for Maximum Link Connection Speed				

**Note:** If a 1Gb VC Ethernet module is present in the Domain, Expanded VLAN capacity will be greyed out, this is only supported with 10Gb based VC modules. Also, once Expanded VLAN capacity is selected, moving back to Legacy VLAN capacity mode will require a domain deletion and rebuild.

#### **Configuring Fast MAC Cache Failover**

When an uplink on a VC Ethernet Module that was previously in standby mode becomes active, it can take several minutes for external Ethernet switches to recognize that the c-Class server blades must now be reached on this newly active connection.

Enabling Fast MAC Cache Failover forces Virtual Connect to transmit Ethernet packets on newly active links, which enables the external Ethernet switches to identify the new connection more quickly (and update their MAC caches appropriately). This transmission sequence repeats a few times at the MAC refresh interval (five seconds is the recommended interval) and completes in about one minute.

#### Configuring the VC Module for Fast Mac Cache Fail-over via GUI (Ethernet settings)

Set Fast MAC Cache Fail-over to 5 Seconds

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Click the "Other" tab
- Select Fast MAC Cache Fail-over with a refresh of 5
- Select Apply

#### Configuring the VC Module for Fast Mac Cache Fail-over via CLI (Ethernet settings)

The following command can be copied and pasted into an SSH based CLI session with Virtual Connect;

# Set Advanced Ethernet Settings to Enable Fast MAC cache fail-over set mac-cache Enabled=True Refresh=5

#### Figure 25 - Set Fast MAC Cache, under Ethernet Settings "Advanced Settings")

MAC Addresses	For monitoring Advanced settings	
VLAN		
Server VLAN Tagg	ing Support connections to use the same VLAN mappings as shared uplink sets	
VLAN Capacity		
<ul> <li>Legacy VLAP</li> <li>Expanded VL</li> </ul>	I capacity (Up to 320 VLANs per module and 28 VLANs per server connection). AN capacity (Up to 1000 VLANs per domain and 162 VLANs per physical server por	t).
Multiple Networks	Link Speed Settings	
When using map	oed VLAN tags (multiple networks over a single link), these sed for the overall Link speed control	
settings will be u		
settings will be u	value for Preferred Link Connection Speed	ſ
settings will be u	value for Preferred Link Connection Speed value for Maximum Link Connection Speed	
Settings will be u	value for Preferred Link Connection Speed value for Maximum Link Connection Speed	
Settings will be u Set a Custom Set a Custom Other MAC Cache Fail-on	value for Preferred Link Connection Speed value for Maximum Link Connection Speed rer	
Settings will be u Set a Custom Set a Custom Other MAC Cache Fail-ox V Enable Fast M	value for Preferred Link Connection Speed value for Maximum Link Connection Speed ref ref ref	5
Settings will be u Set a Custom Set a Custom Set a Custom Other MAC Cache Fail-ov MAC Refresh Inte	value for Preferred Link Connection Speed value for Maximum Link Connection Speed  rer IAC Cache Fail-over erval 5 3 seconds	
Settings will be u Set a Custom Set a Custom Set a Custom Other MAC Cache Fail-ov MAC Refresh Inte	value for Preferred Link Connection Speed value for Maximum Link Connection Speed  rer IAC Cache Fail-over arval 5  seconds	
Set a Custom Set a Custom Set a Custom Set a Custom Other MAC Cache Fail-on MAC Refresh Inte Port Protection	value for Preferred Link Connection Speed value for Maximum Link Connection Speed  rer IAC Cache Fail-over erval 5	
Settings will be u Set a Custom Set a Custom Set a Custom Cother WAC Cache Fail-ov WEnable Fast M MAC Refresh Inte Port Protection ✓ Enable Loop F ✓ Enable Loop F ✓ Enable Loop F	value for Preferred Link Connection Speed value for Maximum Link Connection Speed  rer Per Parval 5 seconds  Protection Flood Protection	
Settings will be u Set a Custom Set a Custom Set a Custom Other MAC Cache Fail-ov MAC Cache Fail-ov MAC Refresh Inte Port Protection Set a Custom Finable Loop F Finable Pause	value for Preferred Link Connection Speed value for Maximum Link Connection Speed  rer Per Parval S S Seconds  Protection Flood Protection	
Settings will be u Set a Custom Set a Custom Set a Custom Cther MAC Cache Fail-on Finable Fast M MAC Refresh Inte Port Protection Finable Loop F Finable Loop F Finable Pause Throughput Statis	value for Preferred Link Connection Speed value for Maximum Link Connection Speed  rer AC Cache Fail-over erval 5  seconds  rotection Flood Protection  tics	
Settings will be u Set a Custom Set a Custom Set a Custom Other MAC Cache Fail-ov MAC Cache Fail-ov MAC Refresh Inte Port Protection Chroughput Statis Shable Throug Data	value for Preferred Link Connection Speed value for Maximum Link Connection Speed  rer Prer Protection Flood Protection  tics phput Statistics	

#### Defining a new vNet via GUI

Create a vNet and name it "vNet-PROD"

- Login to Virtual Connect, if a Domain has not been created, create it now, but cancel out of the configuration wizards after the domain has been created.
- On the Virtual Connect Manager screen, click Define, Ethernet Network to create a vNet
- Enter the Network Name of "vNet-PROD"
  - Note; Do NOT select the options (ie; SmartLink, Private Networks or Enable VLAN Tunnel)
- Select Add Port, then add the following ports;
  - Enclosure 1 (enc0), Bay 1, Port X5
    - Enclosure 1 (enc0), Bay 2, Port X5
- Leave Connection Mode as Auto
- Optionally, Select Advanced Network Settings and set the Preferred speed to 4Gb and the Maximum speed to 6Gb.
- Select Apply

**Note:** By connecting TWO Uplinks from this vNet we have provided a redundant path to the network. As each uplink originates from a different VC module, one uplink will be Active and the second will be in Standby. This configuration provides the ability to lose an uplink cable, network switch or depending on how the NICs are configured at the server (teamed or un-teamed), even a VC module. An Active/Standby configuration also provides better East/West connectivity.

**Note:** SmartLink – In this configuration SmartLink should NOT be enabled. SmartLink is used to turn off downlink ports within Virtual Connect, if ALL available uplinks to a vNet are down. We will use SmartLink in a later scenario.

**Figure 26 -** Define Ethernet Network (vNet-PROD). Note: The Port Status and Connected to information. If the connected switch has LLDP enabled, the connected to information should be displayed as below

Denne + Conngure		сир ▼				
Edit Ethernet	Network: v	Net-PROD				
Network						
Network Name		Enabled Status PID				
vNet-PROD		<ul> <li>Image: Second sec</li></ul>				
Color none	Labels Ty	<i>Type to add Network Labels</i> rpe to add Network Labels				
Smart Link Pri Advanced Network	vate Network 🔲 E	nable VLAN Tunneling				
External Uplink	Ports					
Port	Port Role	Port Status	Connector	Type Connected To	PID Speed/Duplex Act	tion
C7K-Bottom Bay 1: Port X5	NA	C Linked-Active	10 Gb SFP-DAC	HP (Ten-GigabitEthernet1/0/5)	Auto Del	<u>lete</u>
C7K-Bottom Bay 2: Port X5	NA	Linked-Standby	10 Gb SFP-DAC	HP (Ten-GigabitEthernet2/0/5)	Auto Del	<u>lete</u>
Connection Mode:	<ul> <li>Auto</li> </ul>	LACP Timer: 💿 Domain Default, S	Short (1 sec)			
	○ Failover	O Short (1 sec)				
		🔵 Long (30 sec)				
Add Port						
C7K-Bottom	*					

**Figure 27 -** Configuring the Advanced network setting for Min/Max Network Speed. We will see how this configuration is utilized when we create the server profile

Define + Configure + Tools + Help +	
Edit Ethernet Network: vNet-PROD	
Network	
Network Name	
vNet-PROD	
Colornone Labels	
Smart Link Private Network Chable VLAN Tunneling Advanced Network Settings	
Set preferred connection speed     2       Selected Speed:     4 🜍 Gb	
0.1 0b 6 0b	
Selected Speed:     6	
0.1 Gb 10 Gb	
	Apply Cancel

#### Defining a new vNet via CLI

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

# Create the vNet "vNet-PROD" and configure uplinks as discussed above add Network vNet-PROD add uplinkport enc0:1:X5 Network=vNet-PROD speed=auto add uplinkport enc0:2:X5 Network=vNet-PROD speed=auto set network vNet-PROD SmartLink=Disabled

**Note:** Optionally, if you wish to utilize the new Min/Max NIC speed setting provided within Virtual Connect, you can set this Network to a "Preferred" Speed and a "Maximum Speed". This provides the ability to quickly create server profiles, using the NIC speed setting of "Preferred", then allowing Virtual Connect to configure the NIC speeds for both the minimum speed as well as the maximum speed. Use the setting below to configure the Min. Max. NIC speeds for this network. It is also important to note, that this does NOT affect the network uplink speed, which will remain at 10Gb (or 1Gb if connected to a 1Gb switch port).

set network vNet-PROD SmartLink=Disabled PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=6000

#### Defining a new (FCoE) SAN Fabric via GUI

Create a Fabric and name it "FCoE\_A"

- On the Virtual Connect Manager screen, click Define, SAN Fabric to create the first Fabric
- Enter the Network Name of "FCoE\_A"
- Select Add Port, then add the following ports;
  - Enclosure 1, Bay 1, Port X1
- Ensure Fabric Type is set to "FabricAttach"
- Select Show Advanced Settings
  - Select Manual Login Re-Distribution (FlexFabric Only)
  - Select Set Preferred FCoE Connect Speed
    - Configure for 4Gb
  - Select Set Maximum FCoE Connect Speed
    - Configure for 8Gb
- Select Apply
Create a second Fabric and name it "FCoE\_B"

- On the Virtual Connect Manager screen, click Define, SAN Fabric to create the second Fabric
- Enter the Network Name of "FCoE\_B"
- Select Add Port, then add the following ports;
  - Enclosure 1, Bay 2, Port X1
- Ensure Fabric Type is set to "FabricAttach"
- Select Show Advanced Settings
  - Select Manual Login Re-Distribution (FlexFabric Only)
  - Select Set Preferred FCoE Connect Speed
    - Configure for 4Gb
  - Select Set Maximum FCoE Connect Speed

Configure for 8Gb

Select Apply

#### **Defining SAN Fabrics via CLI**

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

#Create the SAN Fabrics FCoE\_A and FCoE\_B and configure uplinks as discussed above add fabric FCoE\_A Type=FabricAttach Bay=1 Ports=1 Speed=Auto LinkDist=Manual PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000 add fabric FCoE\_B Type=FabricAttach Bay=2 Ports=1 Speed=Auto LinkDist=Manual PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000

#### Figure 28 - SAN Configuration and Advanced Settings

bonno · · · · · · · · · · · · · · · · · ·		- nonp									
Define SAN	Fabric										
Fabric											
Fabric Name		Fabric Ty	/pe	٦L	ogin Re-Distribution	Config	jured Speed	Show Adv	vanced Settings		
FCoE_A		FabricAtt	ach	- M.	ANUAL	Auto	-	💿 Manu	al Login Re-Distributi	on ?	
								O Autor	natic Login Re-Distrik	ution ?	
								🗹 Set F	referred FCoE Conn	ection Speed	3 ?
								Selected	l Speed: 4 🔷	Gb	
								0.1 Gb	8	Gb	
										-	
									favinum ECaE Canad	ation Course	2
								Selecter	i Speed:	Gh	f
								0.1.0h		Ch	
								0.100		•	
											_
Enclosure U	plink Ports										
Uplink Port				tatus							
Uplink Port X1	C7K-Bottom	1	0	8 Gb	10:00:00:27:f8:46:09:38	<u>Delete</u>					
Add Port											
Bay 1	>										
							Apply	Cancèl			

**Figure 29 -** FCoE SAN fabrics configured with two 8Gb uplinks per fabric. Note the bay and port numbers on the right

Define 👻	Configure 👻 🗋	Tools <del>v</del> Help <del>v</del>								
SAN F	abrics									?
Extern	al Connections	Server Connections								
Status	SAN Fabric	Fabric Type	Login Re-Distribution	Port Status	Connected To	Enclosure	Bay	Port	Action	
0	FCoE_A	FabricAttach	MANUAL	🧭 8 Gb	10:00:00:27:F8:84:7E:5	58 C7K-Bottom	1	X1	Edit 📼	
+ Add										

## Defining a Server Profile with NIC and FCoE Connections, via GUI

Each server NIC will connect to a specific network.

On the Virtual Connect Manager screen, click Define, Server Profile to create a Server Profile

- Create a server profile called "App-1"
- In the Network Port 1 drop down box, select "vNet-PROD"
- In the Network Port 2 drop down box, select "vNet-PROD"
- Expand the FCoE Connections box, for Bay 1, select FCoE\_A for Bay 2, select FCoE\_B
- Do not configure FC SAN or iSCSI Connection
- In the Assign the Profile to a Server Bay, select Bay 1 and apply

Prior to applying the profile, ensure that the server in Bay 1 is currently OFF

**Note:** you should now have a server profile assigned to Bay 1, with 2 Server NIC connections. NICs 1&2 should be connected to network vNet\_PROD and FCoE SAN fabrics FCoE\_A and FCoE\_B.

#### **Defining a Server Profile with NIC and FCoE Connections, via CLI**

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

# Create and Assign Server Profile App-1 to server bay 1 add profile App-1 -nodefaultfcconn -nodefaultfcoeconn set enet-connection App-1 1 pxe=Enabled Network=vNet-PROD set enet-connection App-1 2 pxe=Disabled Network=vNet-PROD add fcoe-connection App-1 Fabric=FCoE\_A SpeedType=4Gb add fcoe-connection App-1 Fabric=FCoE\_B SpeedType=4Gb assign profile App-1 enc0:1



Define 👻 Configure 👻 Tools 🗸	r Help <del>v</del>				
Edit Server Profile: A	pp-1				2
Profile					
Profile Name N	stwork Access Group Status	s Serial Number	Server UUD		
App-1	Default 👻 🙎 🔗	VCX0000V00	b23901d5-f882-4020-8c9f-8b28cd	140a40b	
Ethernet Adapter Connec	tions				-
Port Network Name	Statu Port Speed Type	Allocated Port PXE	Multicast Filter	MAC	Mapping Action
1 vNet-PROD	PREFERRED	4 Gb - 6 Gb ENABLED	) None	00-17-A4-77-7C-00	.OM1:1-a => Bay 1:d1:v1
2 vNet-PROD	PREFERRED	4 Gb - 6 Gb DISABL	None	00-17-A4-77-7C-02	.OM1:2-a => Bay 2:d1:v1
+ Add					
iSCSI HBA Connections					+
FCoE HBA Connections					•
Port Connect: FC SAN / FCoE N	letwic Type Status Po	ort Speed Allocated P	MAPN	MAC	Mapping Action
1 Bay 1 FCoE_A	SAN 🥝 4	4 Gb - 8 Gb	50:06:08:00:00:C2:DE:00	00-17-A4-77-7C-04	LOM1:1-b => Bay 1:d1:v2
2 Bay 2 FCoE_B	SAN 🛇 4	4 Gb - 8 Gb	50:06:08:00:00:C2:DE:02	00-17-A4-77-7C-05	LOM1:2-b => Bay 2:d1:v2 Delete
+ Add					
Fibre Channel Boot Parameters					
Assign Profile to Server	Bay				
Enclosure Server	Ma	odel SN	Status Power	up	
C7K-Bottom	Bay 1	ProLiant BL460c Gen8 MX	2303019P 🛇 🥌		
				Apply	Apply & Close Cancel

**Note:** Observe the speed settings for both NIC and SAN connections and the new "Max" parameter, as well as the MAC and WWN addresses. Also, note that the FCoE connections are assigned to the two SAN fabrics created earlier and use ports LOM:1-b and LOM:2-b.

## Figure 31 - Server Profile View Bay 1

C7K-Bottom: Bay 1 (ProLiant BL460c Gen8)								
Device Bay S	Status - Bay #	¥ 1						
Overall Status:			📀 ок					
Hardward	e Status:		📀 Normal					
VC Statu	s:		🕗 ок					
Assigned S	erver Profile	:	App-1					
Enclosure N	lame:		C7K-Bottor	n				
UID:			۲					
Power State	us/Control:		ott				Momentary P	ress
Blade Serve	r Informatio	n Rav # 1					_	
Serial Numb	ber:		MXQ30301	9P				
Serial Numb	per (Logical):		VCX0000V	00				
UUID:			31363636-	3136-584D-5133-3033303	313950			
UUID (Logica	ai):		b23901d5-f882-4020-8c9f-8b28cd40a40b					
Product Nar	ne:		ProLiant BL460c Gen8					
Server Nam	e:							
Part Numbe	r:		666161-B21					
Asset Tag:			[Unknow n]					
Server Ethe	rnet Adapter	r Informat	ion					
Ethernet Adapter	FlexNIC	Location	Module Port	Model	MAC Address	Network	WWN	SAN Fabric
Port 1								
	LOM1:1- a	FLB1	Bay 1:d1:v1	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-00	vNet- PROD		
	LOM1:1- b	FLB1	Bay 1:d1:v2	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-04		50:06:0B:00:00:C2:DE:00	FC0E_A
	LOM1:1- c	FLB1	Bay 1:d1:v3	HP FlexFabric 10Gb 2- port 554FLB Adapter	6C-3B-E5-A4- B0-6A			
	LOM1:1- d	FLB1	Bay 1:d1:v4	HP FlexFabric 10Gb 2- port 554FLB Adapter	6C-3B-E5-A4- B0-6B			
Port 2								
	LOM1:2- a	FLB1	Bay 2:d1:v1	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-02	vNet- PROD		
	LOM1:2- b	FLB1	Bay 2:d1:v2	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-05		50:06:0B:00:00:C2:DE:02	FCoE_B
	LOM1:2- c	FLB1	Bay 2:d1:v3	HP FlexFabric 10Gb 2- port 554FLB Adapter	6C-3B-E5-A4- B0-6E			
	LOM1:2- d	FLB1	Bay 2:d1:v4	HP FlexFabric 10Gb 2- port 554FLB Adapter	6C-3B-E5-A4- B0-6F			

# Review

In this scenario we have created a simple vNet utilizing uplinks originating from each FlexFabric Module, by doing so we provide redundant connections out of the Virtual Connect domain, where one uplink will be active and the alternate uplink will be in standby. We create two FCoE SAN Fabrics, utilizing a single uplink each.

We created a server profile, with two NICs connected to the same vNet, which provides the ability to sustain a link or module failure and not lose connection to the network, this configuration also guarantees that ALL server to server communications within the enclosure will remain inside the enclosure. Alternatively, we could have created two vNets and assigned uplinks from one module to each vNet, providing an Active/Active uplink scenario.

Additionally, FCoE port 1 is connected to SAN fabric FCoE\_A and FCoE SAN port 1 is connected to SAN Fabric FCoE\_B, providing a multi-pathed connected to the SAN.

Additional uplinks could be added to either the San fabrics or the Ethernet networks, which could increase performance and/or availability.

## **Results – Windows 2008 R2 Networking Examples**

We have successfully configured FlexFabric with a simple vNet and redundant SAN fabrics. We have created a server profile to connect to the vNet with TWO NICs and the SAN fabrics using the FCoE connections created within the profile.

Although both Ethernet and Fibre channel connectivity is provided by the CNA adapter used in the G7 and Gen 8 servers; each capability (LAN and SAN) is provided by a different component of the adapter, they appear in the server as individual network and SAN adapters.

**Figure 32** - Example of Emulex's OneCommand Manager Utility (formerly known as HBA Anywhere). Note that there are 3 Ethernet personalities and one FCoE personality per port, as configured in the server profile.



The following graphics show a Windows 2008 R2 server with TWO FlexNICs configured at 6Gb. You will also notice that Windows believes there are 6 NICs within this server. However, only TWO NICs are currently configured within the FlexFabric profile, the extra NICs are offline and could be disabled. If we did not require SAN connectivity on this server, the FCoE connections could be deleted and the server would then have 8 NIC ports available to the OS.

Note: the BL465c G7 and BL685c G7 utilize an NC551i chipset (BE2), whereas the BL460c G7, BL620c G7 and BL680c G7 utilize an NC553i chipset (BE3) and the Gen 8 blades typically have a NC554 adapter which also utilizes the BE3 chipset. Both the BE2 and BE3 chipsets share common drivers and firmware.

Figure 33 - Windows 2008 R2 Network Connections (2 Connections Active)

Network Connections		
🕤 💭 🖓 🔹 Network and Interne	et 🔹 Network Connections 👻 👻	Search Network Connections
Organize 🔻		III 🔹 🖬 🔞
Name	Status ^	Device Name
🚇 Local Area Connection	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter
Local Area Connection 2	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter #2
📮 Local Area Connection 3	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter #3
🚇 Local Area Connection 6	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter #6
Local Area Connection 4	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter #4
Local Area Connection 5	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter #5

Note: The NICs that are not configured within VC will appear with a red x as not connected. You can go into Network Connections for the Windows 2008 server and disable any NICs that are not currently in use. Windows assigns the NICs as NIC 1-6, whereas three of the NICs will reside on LOM:1 and three on LOM:2. You may need to refer to the FlexFabric server profile for the NIC MAC addresses to verify which NIC is which.

Figure 34 - Windows 2008 R2 Extra Network Connections – Disabled

Retwork Connections			×
😋 🕞 🖓 🔹 Network and Internet 🔹 Netwo	rk Connections 👻 👻 🛃	Search Network Connections	0
Organize 🔻		III 🕶 🗖 🔞	)
Name	Status ^	Device Name	
🔋 Local Area Connection	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter	
Local Area Connection 2	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #2	
Local Area Connection 3	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #3	
Local Area Connection 6	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #6	
Local Area Connection 4	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter #4	
Local Area Connection 5	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter #5	
			۲

Local Area Connect	tion 4 Statu	5		×
General				
				1
Connection				
IPv4 Connectivity:			Internet	
IPv6 Connectivity:		No Inter	net access	
Media State:			Enabled	
Duration:			00:01:02	
Speed:		[	6.0 Gbps	
Details				
Activity				
	Sent —	<b>N</b>	Received	
		100 M		
Bytes:	3,931		6,075	
😯 Properties 🛛 🤅	🔁 Disable	Diagnose	1	
			1	
			Close	

**Note:** In Windows 2008 and later the actual NIC speed is displayed as configured in server Profile. Also, note that the speed displayed is the maximum speed setting, not the minimum setting.

**Figure 36 -** Windows 2008 R2, Device Manager, SIX NICs are shown, however, we have only configured two of the NICs and two FCoE HBAs.



The following graphics provides an example of a Windows 2008 R2 server with TWO NICs connected to the network, initially each NIC has its own TCP/IP address, alternatively, both NICs could be teamed to provide NIC fail-over redundancy. If an active uplink or network switch were to fail, Virtual Connect would fail-over to the standby uplink. In the event of a Virtual Connect FlexFabric module failure, the server's NIC teaming software would see one of the NICs go offline, assuming it was the active NIC, NIC teaming would fail-over to the standby NIC.

Figure 37 - Both NICs for Profile App-1are connected to the network through vNet-PROD

```
C:\Users\Administrator>ipconfig

Windows IP Configuration

Ethernet adapter NIC 2:

Connection-specific DNS Suffix .: vaolab.net

Link-local IPv6 Address ... .: fe80::2cc2:2e68:2a17:4494%21

IPv4 Address ... .: 192.168.1.102

Subnet Mask ... .: .: 192.168.1.102

Default Gateway ... .: 192.168.1.254

Ethernet adapter NIC 1:

Connection-specific DNS Suffix .: vaolab.net

Link-local IPv6 Address ... .: fe80::5576:c578:f6e5:cc98%19

IPv4 Address ... .: 192.168.1.254
```

#### **NIC Teaming**

If higher availability is desired, NIC teaming in Virtual Connect works the same way as in standard network configurations. Simply, open the NIC teaming Utility and configure the available NICs for teaming. In this example, we have only TWO NICs available, so selecting NICs for teaming will be quite simple. However, if multiple NICs are available, ensure that the correct pair of NICs is teamed. You will note the BAY#-Port# indication within each NIC. Another way to confirm you have the correct NIC is to verify through the MAC address of the NIC. You would typically TEAM a NIC from Bay 1 to Bay 2 for example.

The following graphics provide an example of a Windows 2008 R2 server with TWO NICs teamed and connected to the network. In the event of an Uplink or switch failure, VC will fail-over to the standby uplinks, if a VC FlexFabric module were to fail, the NIC teaming software would fail-over to the standby NIC.

IP Network Configuration Utility Properties	? ×
HP Network Configuration Utility	
HP NICs: [5] HP FlexFabric 10Gb 2-port 554FLB Adapter #51/0 Bay 2 Port 1 / 1] [4] HP FlexFabric 10Gb 2-port 554FLB Adapter #41/0 Bay 1 Port 1 / 1	Teaming Setup Team Dissolve VLAN(802.1Q)
Make a selection. You may view properties of an item at any time by Double-Clicking on it or Selecting and, then, Clicking Properties.	Save Properties
Help License Manager Enable UID 🔽 Display Tray Icon	
	OK Cancel

Figure 38 - Team both NICs, using the HP Network Configuration Utility

**Figure 39 -** Both NICs for Profile App-1are teamed and connected to the network through vNet-PROD

Network Configuration Utility Properties	
P Network Configuration Utility	
IP NICs:	T : C.
HP Network Team #1	learning Setup
[5] HP FlexFabric 10Gb 2-port 554FLB Adapter #51/0 Bay 2 Port 1 / 1	Team
[4] HP FlexFabric 10Gb 2-port 554FLB Adapter #4 I/O Bay 1 Port 1 / 1	Dissolve
	VLAN(802.1Q)
	Save
lake a selection. You may view properties of an item at any time by Double-Clicking on it or	
rate a selector. The may new properties of an item at any time by broadle clicking on it of	Properties
electing and, then, Clicking Properties.	
electing and, then, Clicking Properties.	
Belecting and, then, Clicking Properties.	
Selecting and, then, Clicking Properties.           Help         License Manager         Enable UID         Image: Display Tray Icon	
Selecting and, then, Clicking Properties.	

Various modes can be configured for NIC Teaming, such as NFT, TLB etc. Once the Team is created, you can select the team and edit its properties. Typically, the default settings can be used.

Figure 40 - View – Network Connections – NIC Team #1 – Windows

Network Connections		
🜀 🕞 🖳 🔹 Network and Interne	t 🔹 Network Connections 👻	👻 🛃 Search Network Connections
Organize 🔻		1= 🕶 🗔 🔞
Name	Status ^	Device Name
Local Area Connection	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter
Local Area Connection 2	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #2
Local Area Connection 3	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #3
Local Area Connection 6	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #6
Local Area Connection 4	Enabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #4
Local Area Connection 5	Enabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #5
Local Area Connection 8	vaolab.net	HP Network Team #1
•		

Figure 41 - Both NICs are teamed and connect to the network with a common IP Address

en. Administrator: Command Prompt	
C:\Users\Administrator>ipconfig Windows IP Configuration	
Ethernet adapter Local Area Connection Connection-specific DNS Suffix . : Link-local IPv6 Address : IPv4 Address	5: vaolab.net fe80::9943:165b:ba23:75d2:27 192.168.1.102 255.255.255.0 192.168.1.254

# Results – Windows 2008 R2 SAN Connectivity

**Figure 42 -** By access the HBA BIOS during server boot, you can see that Port 1 of the FlexHBA is connected to an EVA SAN LUN

	Emu	lex OneConr	nect FCoE	BIOS Uti	lity,	XA4.03a5	
01: 554FL Mem Base: Port Name: Vlan ID:	B: FBE00000 50060B0 1001 DCF	) Firmware 0000C2DE00 3X mode: CF	Version: E mode	Bus#: 4.2.401 Node	04 De .2215 Name:	v#: 00 Func#: 02 BIOS: Disabled 50060B0000C2DE01	
		Devices	Present o	on This A	dapter		
01. DID:0 02. DID:0 03. DID:0	10000 WWF 10100 WWF 10200 WWF	PN:50001FE1 PN:50001FE1 PN:50001FE1	5005D468 5005D46C 5005D46A	LUN:01 LUN:01 LUN:01	HP HP HP	HSU210 HSU210 HSU210	5000 5000 5000
04. DID:0	10300 WWF	PN:50001FE1	5005D46B	LUN:01	HP	HSV210	5000
		Enter	(Esc) to	Preuious	Menu		
01an 1D: 01. DID:0 02. DID:0 03. DID:0 04. DID:0	1000 WWI 10100 WWI 10100 WWI 10200 WWI	X mode: Cf Devices 2N:50001FE1 2N:50001FE1 2N:50001FE1 2N:50001FE1 2N:50001FE1	E mode Present ( 5005D468 5005D468 5005D468 5005D468 	on This A LUN:01 LUN:01 LUN:01 LUN:01 Previous	dapter HP HP HP MP	: HSU210 HSU210 HSU210 HSU210 HSU210	5000 5000 5000

Figure 43 - Windows 2008 R2 Disk Administrator. Note; that D: is the SAN attached volume

En Server Manager							
File Action View Help							
🗢 🔿 🔰 📅 🛛 🗖	🛛 🔁 🖀 🕼	à 🛐					
Server Manager (WIN-BEF	Disk Management	Volume	e List +	Graphical Vie	w		
Roles	Volume	Layout	Туре	File System	Status	Capacity	Free Space
Diagnostics	🖙 (C:)	Simple	Basic	NTES	Healthy (Boot, Page File, Crash Dump, Pri	136.60 GB	104.72 GB
Configuration	SAN Volume (D:)	Simple	Basic	NTFS	Healthy (Primary Partition)	19.53 GB	19.44 GB
🖃 🚰 Storage	System Reserved	Simple	Basic	NTFS	Healthy (System, Active, Primary Partition)	100 MB	72 MB
Windows Server E							
📑 Disk Management							
	•						Þ
	Disk 0	C			(6)		
	136.70 GB	100 MB N	TFS RESER	ved	136.60 GB NTFS		
	Online	Healthy (	System	, Active, F	Healthy (Boot, Page File, Crash Dump, Primary	Partition)	
(	Disk 1						)
	Basic	SAN Vol	ume (	D:)			
	Online	19.53 GB Healthy (	NTFS /	Partition			
		/////	////	///////////////////////////////////////			
			_				
	Unallocated	Primary	partit	tion			

# Summary

We presented a Virtual Connect Network scenario by creating a simple vNet, we configured the new Min/Max Network speed setting for the vNet. A dual path SAN fabric for storage connectivity was also configured.

When VC profile App-1 is applied to the server in bay1 and the server is powered up, it has one NIC connected through each FlexFabric module connected to "vNet-PROD", which connects to the network infrastructure through the 10Gb uplinks. These NICs could now be configured as individual NICs with their own IP address or as a pair of TEAMED NICs. Either NIC could be active. As a result, this server could access the network through either NIC or either uplink cable, depending on which is active at the time. Each NIC is configured for a guaranteed minimum bandwidth of 4Gb, with a maximum of 6Gb of network bandwidth and each FCoE port is configured for 4Gb of SAN bandwidth with the ability to burst to a maximum of 8Gb.

Additional NICs could be added within FlexFabric, by simply powering the server off and adding up to a total of 6 NICs, the NIC speed can then be adjusted accordingly to suit the needs of each NIC. If additional or less SAN bandwidth is required, the speed of the SAN connection can also be adjusted.

As additional servers are added to the enclosure, simply create additional profiles, or copy existing profiles, configure the NICs for LAN and SAN fabrics as required and apply them to the appropriate server bays and power the server on.

# Scenario 2 – Shared Uplink Sets with Active/Active uplinks and 802.3ad (LACP) -Ethernet and FCoE – Windows 2008 R2

# **Overview**

This scenario will implement the Shared Uplink Set (SUS) to provide support for multiple VLANs. Virtual Connect 3.30 increased the number of VLANs supported on a Shared Uplink Set and provides some enhanced GUI and CLI features that reduce the effort required to create large number of VLANs. The upstream network switches connect to each FlexFabric module and two separate Shared Uplink Sets, providing an Active/Active configuration, LACP will be used to aggregate those links.

As multiple VLANs will be supported in this configuration, the upstream switch ports connecting to the FlexFabric modules will be configured to properly present those VLANs. In this scenario, the upstream switch ports will be configured for VLAN trunking/VLAN tagging.

When configuring Virtual Connect, we can provide several ways to implement network fail-over or redundancy. One option would be to connect TWO uplinks to a single Virtual Connect network; those two uplinks would connect from different Virtual Connect modules within the enclosure and could then connect to the same upstream switch or two different upstream switches, depending on your redundancy needs. An alternative would be to configure TWO separate Virtual Connect networks, each with a single, or multiple, uplinks configured. Each option has its advantages and disadvantages. For example; an Active/Standby configuration places the redundancy at the VC level, where Active/Active places it at the OS NIC teaming or bonding level. We will review the second option in this scenario.

In addition, several Virtual Connect Networks can be configured to support the required networks to the servers within the BladeSystem enclosure. These networks could be used to separate the various network traffic types, such as iSCSI, backup and VMotion from production network traffic.

This scenario will also leverage the Fibre Channel over Ethernet (FCoE) capabilities of the FlexFabric modules. Each fibre channel fabric will have two uplinks connected to each of the FlexFabric modules.

## Requirements

This scenario will support both Ethernet and fibre channel connectivity. In order to implement this scenario, an HP BladeSystem c7000 enclosure with one or more server blades and TWO Virtual Connect FlexFabric modules, installed in I/O Bays 1& 2 are required. In addition, we will require ONE or TWO external Network switches. As Virtual Connect does not appear to the network as a switch and is transparent to the network, any standard managed switch will work with Virtual Connect. The Fibre Channel uplinks will connect to the existing FC SAN fabrics. The SAN switch ports will need to be configured to support NPIV logins. Two uplinks from each FlexFabric module will be connected to the existing SAN fabrics.

**Figure 44 - Physical View;** Shows two Ethernet uplinks from Ports X5 and X6 on Module 1 and 2 to Ports 1 and 2 on each network switch. The SAN fabrics are also connected redundantly, with TWO uplinks per fabric, from ports X1 and X2 on module 1 to Fabric A and ports X1 and X2 to Fabric B.



**Figure 45 - Logical View;** the server blade profile is configured with TWO FlexNICs and 2 FlexHBAs. NICs 1 and 2 are connected to VLAN-101-x which are part of the Shared Uplink Sets, VLAN-Trunk-1 and VLAN-Trunk-2 respectively. The VLAN-Trunks are connected, at 10Gb, to a network switch, through Ports X5 and X6 on each FlexFabric Module in Bays 1 and 2. The FCoE SAN connections are connected through ports X1 and X2 on each FlexFabric module. In addition, SAN Fabric FCoE\_A connects to the existing SAN Fabric A through port X1 on Module 1 (Bay 1) and FCoE\_B connects to the existing SAN Fabric B through port X1 on Module 2 (Bay 2)



# **Installation and configuration**

## **Switch configuration**

As the Virtual Connect module acts as an edge switch, Virtual Connect can connect to the network at either the distribution level or directly to the core switch.

The appendices provide a summary of the cli commands required to configure various switches for connection to Virtual Connection. The configuration information provided in the appendices for this scenario assumes the following information:

 The switch ports are configured as VLAN TRUNK ports (tagging) to support several VLANs. All frames will be forwarded to Virtual Connect with VLAN tags. Optionally, one VLAN could be configured as (Default) untagged, if so, then a corresponding vNet within the Shared Uplink Set would be configured and set as "Default"

**Note:** when adding additional uplinks to the SUS, if the additional uplinks are connecting from the same FlexFabric module to the same switch, in order to ensure all the uplinks are active, the switch ports will need to be configured for LACP within the same Link Aggregation Group.

The network switch port should be configured for Spanning Tree Edge as Virtual Connect appears to the switch as an access device and not another switch. By configuring the port as Spanning Tree Edge, it allows the switch to place the port into a forwarding state much quicker than otherwise, this allows a newly connected port to come online and begin forwarding much quicker.

The SAN switch ports connecting to the FlexFabric module must be configured to accept NPIV logins.

#### **Configuring the VC module**

- Physically connect Port 1 of network switch 1 to Port X5 of the VC module in Bay 1
- Physically connect Port 2 of network switch 1 to Port X6 of the VC module in Bay 1
- Physically connect Port 1 of network switch 2 to Port X5 of the VC module in Bay 2
- Physically connect Port 2 of network switch 2 to Port X6 of the VC module in Bay 2

**Note:** if you have only one network switch, connect VC ports X5 and X6 (Bay 2) to an alternate ports on the same switch. This will NOT create a network loop and Spanning Tree is not required.

- Physically connect Ports X1/X2 on the FlexFabric in module Bay 1 to switch ports in SAN Fabric A
- Physically connect Ports X1/X2 on the FlexFabric in module Bay 2 to switch ports in SAN Fabric B

#### **VC CLI commands**

Many of the configuration settings within VC can also be accomplished via a CLI command set. In order to connect to VC via a CLI, open an SSH connection to the IP address of the active VCM. Once logged in, VC provides a CLI with help menus. Through this scenario the CLI commands to configure VC for each setting will also be provided.

### **Configuring Expanded VLAN Capacity via GUI**

Virtual Connect release 3.30 provided an expanded VLAN capacity mode when using Shared Uplink Sets, this mode can be enabled through the Ethernet Settings tab or the VC CLI. The default configuration for a new Domain install is "Expanded VLAN Capacity" mode, Legacy mode is no longer available and the Domain cannot be downgraded.

## To verify the VLAN Capacity mode

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Expanded VLAN capacity
- Verify Expanded VLAN Capacity is configured and Legacy VLAN Capacity is greyed out.

**Note:** Legacy VLAN mode will only be presented if 1Gb Virtual Connect Modules are present, in which case the domain would be limited to Firmware version 3.6x.

#### **Configuring Expanded VLAN Capacity via CLI**

The following command can be copied and pasted into an SSH based CLI session with Virtual Connect;

# Set Expanded VLAN Capacity set enet-vlan -quiet VlanCapacity=Expanded

#### Figure 46 - Enabling Expanded VLAN Capacity

Define 👻 Configure 👻 Tools 👻 Help 👻
Ethernet Settings
MAC Addresses Port Monitoring Advanced Settings
VLAN
Server VLAN Tagging Support
Force server connections to use the same VLAN mappings as shared uplink sets ?
VLAN Capacity
Legacy VLAN capacity (Up to 320 VLANs per module and 28 VLANs per server connection).      Expanded VLAN capacity (Up to 1000 VLANs per domain and 162 VLANs per physical server port)
Multiple Networks Link Speed Settings
When using mapped VLAN tags (multiple networks over a single link), these settings will be used for the overall Link speed control
settings will be used for the overall Link speed control.
Set a Custom value for Preferred Link Connection Speed ?
Set a Custom value for Mavimum Link Connection Second

**Note:** If a 1Gb VC Ethernet module is present in the Domain, Expanded VLAN capacity will be greyed out, this is only supported with 10Gb based VC modules. Also, once Expanded VLAN capacity is selected, moving back to Legacy VLAN capacity mode will require a domain deletion and rebuild.

#### Defining a new Shared Uplink Set (VLAN-Trunk-1)

Connect Ports X5 and X6 of FlexFabric module in Bay 1 to Ports 1 and 2 on switch 1 Create a SUS named VLAN-Trunk-1 and connect it to FlexFabric Ports X5 and X6 on Module 1

- On the Virtual Connect Home page, select Define, Shared Uplink Set
- Insert Uplink Set Name as VLAN-Trunk-1
- Select Add Port, then add the following port;
  - Enclosure 1, Bay 1, Port X5
  - Enclosure 1, Bay 1, Port X6

efine 🔻 Configu	ıre <del>v</del> Tools <del>v</del> H	lelp 🕶			-			
Edit Shared	Uplink Set: '	VLAN-Trunk-1						
Ethernet Sha	ured External Up	olink Set						
Uplink Set Name		Status PID						
VLAN-Trunk-1		<b>O</b>						
External Uplin	nk Ports							
Port	Port Role	Port Status		Connector	Type Connected To	PID	Speed/Duplex	Action
C7K-Bottom Bay 1: Port X5	NA	C Linked-Active	10 Gb	SFP-DAC	HP (Ten-GigabitEthernet1/0/5)		Auto	Delete
C7K-Bottom Bay 1: Port X6	NA	C Linked-Active	10 Gb	SFP-DAC	HP (Ten-GigabitEthernet1/0/6)		Auto	Delete
Connection Mode	Auto     Failover	LACP Timer:	Short (1 sec)					
Associated I	FCoE Network (\	/LAN tagged)				+ A	dd 🧪 Edit 🥤	) Delete
Associated I	Networks (VLAN	tagged)				[	+ Add 1	) Delete

Figure 47 - Shared Uplink Set (VLAN-Trunk-1) Uplinks Assigned

- Click Add Networks and select the Multiple Networks radio button and add the following VLANs;
  - o Enter Name as VLAN-
  - Enter Suffix as -1
  - Enter VLAN IDs as follows (and shown in the following graphic);
  - o **101-105,2100-2400**
- Enable SmartLink on ALL networks
- Click Advanced
  - Configure Preferred speed to 4Gb
  - Configure Maximum speed to 8Gb
- Click Apply

**Note:** You can optionally specify a network "color" or "Label" when creating a shared Uplinkset and its networks. In the example above we have not set either color or label. Also notice the new configurable LACP Timer setting.

<b>FIGURE 40 -</b> CLEALING VLANS IN A SHALEU UPUNK SEL
---------------------------------------------------------

Would you like to add	
a single Associated Network 💽 multiple Associated Networks	
Network Name         VLAN         VLAN ID +         1           Sample network name:         VLAN-2400-1         VLAN         VLAN	
VLAN D(s) * 101-105,2100-2400 2	
Colornone Labels Type to add Network Labels	
Type to add Network Labels	
<ul> <li>The Native VLAN setting supported only when adding or editing a single Associated Network</li> </ul>	
(1) The 306 networks being created cannot all be marked Private. The domain can only support 128 more private network(s) before reaching the limit of 128.	
Smart Link Private Network	
✓ Advanced Network Settings	
Set preferred connection speed	
Selected Speed: 4 🖨 Gb	
0.1 Gb 8 Gb	
Set maximum connection speed	
0.1 Gb 10 Gb	
ie network access group names	
Default ×	
a defense are ensemblerer (fel 191 tel hereit bleden/BD).	
e letters or numbers ("a', 'z', e', nag, detauit.)	
Apply Ca	ce

**Note:** If the VC domain is not in Expanded VLAN capacity mode, you will receive an error when attempting to create more that 128 VLANs in a SUS. If that occurs, go to Advanced Ethernet Settings and select Expanded VLAN capacity mode and apply.

After clicking apply, a list of VLANs will be presented as shown below. If one VLAN in the trunk is untagged/native, see note below.

• Click Apply at the bottom of the page to create the Shared Uplink Set

clated Networks (VLAN tagged)						- 5
					+ Add 1	) Delete
Network Name	VLAN ID 🚽	Native	Smart Link	Private Network	Action	
VLAN-101-1	101	false	true	false	Edit 💌	
VLAN-102-1	102	false	true	false	Edit 📼	
VLAN-103-1	103	false	true	false	Edit 📼	
VLAN-104-1	104	false	true	false	Edit 📼	
VLAN-105-1	105	false	true	false	Edit 📼	
VLAN-2100-1	2100	false	true	false	Edit 💌	
VLAN-2101-1	2101	false	true	false	Edit 💌	
VLAN-2102-1	2102	false	true	false	Edit 💌	
VLAN-2103-1	2103	false	true	false	Edit 📼	
VLAN-2104-1	2104	false	true	false	Edit 👻	
VLAN-2105-1	2105	false	true	false	Edit 📼	
VLAN-2106-1	2106	false	true	false	Edit 💌	
VLAN-2107-1	2107	false	true	false	Edit 📼	
VLAN-2108-1	2108	false	true	false	Edit 💌	
VLAN-2109-1	2109	false	true	false	Edit 💌	
VLAN-2110-1	2110	false	true	false	Edit 💌	
VLAN-2111-1	2111	false	true	false	Edit 📼	
VLAN-2112-1	2112	false	true	false	Edit 💌	
VLAN-2113-1	2113	false	true	false	Edit 📼	
VLAN-2114-1	2114	false	true	false	Edit 💌	
VLAN-2115-1	2115	false	true	false	Edit 📼	
VLAN-2116-1	2116	false	true	false	Edit 💌	
VLAN-2117-1	2117	false	true	false	Edit 💌	
VLAN-2118-1	2118	false	true	false	Edit 💌	

#### Figure 49 - Associated VLANs for Shared Uplink Set VLAN-Trunk-1

**Note:** Optionally, if one of the VLANs in the trunk to this shared uplink set were configured as Native or Untagged, you would be required to "edit" that VLAN in the screen above, and configure Native as TRUE. This would need to be set for BOTH VLAN-Trunk-1 and VLAN-Trunk-2.

Apply Cancel

### Defining a new Shared Uplink Set (VLAN-Trunk-2) (Copying a Shared Uplink Set)

The second Shared Uplink Set could be created in the same manner as VLAN-Trunk-1 however; VC now provides the ability to COPY a VC Network or Shared Uplink Set.

- Connect Ports X5 and X6 of FlexFabric module in bay 2 to Ports 1 and 2 on switch 2
- In the VC GUI screen, select Shared Uplink Sets in the left pane, in the right pane VLAN-Trunk-1 will be displayed, left click VLAN-Trunk-1, it will appear as blue, right click and select COPY
- Edit the Settings as shown in the following graphic, the new SUS name will be VLAN-Trunk-2 and ALL the associated VLANs with have a suffix of 2
- In step 3, ADD uplinks X5 and X6 from Bay 2
- Click OK
- The SUS and ALL VLANs will be created

Figure 50 - Copying a SUS and ALL VLANs

Shared Uplink Set Name	
Name VLAN-Trunk-2	
Associated Networks (VLANs	3)
Replace last 👻 instance(s) of	1 with 2
VLAN-Trunk-1 Original	VLAN-Trunk-2 Copy
VLAN-101- <u>1</u>	▲ VLAN-101- <u>2</u>
VLAN-102- <u>1</u>	VLAN-102-2
VLAN-103- <u>1</u>	VLAN-103-2
VLAN-104- <u>1</u>	VLAN-104- <u>2</u>
VLAN-105- <u>1</u>	VLAN-105- <u>2</u>
VLAN-2100- <b>1</b>	VLAN-2100-2

### **Defining a new Shared Uplink Set via CLI**

The following script can be used to create the first Shared Uplink Set (VLAN-Trunk-1) The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

# Create Shared Uplink Set VLAN-Trunk-1 and configure uplinks add uplinkset VLAN-Trunk-1 add uplinkport enc0:1:X5 Uplinkset=VLAN-Trunk-1 speed=auto add uplinkport enc0:1:X6 Uplinkset=VLAN-Trunk-1 speed=auto

# Create Networks VLAN-101-1 through VLAN-105-1 and 2100-2400 for Shared Uplink Set VLAN-Trunk-1

add network-range -quiet UplinkSet=VLAN-Trunk-1 NamePrefix=VLAN- NameSuffix=-1 VLANIds=101-105,2100-2400 State=enabled PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000 SmartLink=enabled

Note: Refer to Appendix D; "Scripting the Native VLAN" for scripting examples.

The following script can be used to create the Second Shared Uplink Set (VLAN-Trunk-2)

# Create Shared Uplink Set VLAN-Trunk-2 and configure uplinks add uplinkset VLAN-Trunk-2 add uplinkport enc0:2:X5 Uplinkset=VLAN-Trunk-2 speed=auto add uplinkport enc0:2:X6 Uplinkset=VLAN-Trunk-2 speed=auto

```
# Create Networks VLAN101-2 through VLAN105-2 and VLAN-2100-2 through VLAN-2400-
2 for Shared Uplink Set VLAN-Trunk-2
add network-range -quiet UplinkSet=VLAN-Trunk-2 NamePrefix=VLAN- NameSuffix=-2
VLANIds=101-105,2100-2400 State=enabled PrefSpeedType=Custom PrefSpeed=4000
MaxSpeedType=Custom MaxSpeed=8000 SmartLink=enabled
```

**Note:** In this scenario we have created two independent Share Uplink Sets (SUS), each originating from the opposite FlexFabric Modules, by doing so we provide the ability to create separate and redundant connections out of the Virtual Connect domain. When we create the server profiles, you will see how the NICs will connect to VLANs accessed through the opposite VC module, which provides the ability to create an Active / Active uplink scenario. Alternatively, we could have created a single SUS and assigned both sets of these uplink ports to the same SUS, however, this would have provided an Active/Standby uplink scenario, as shown in Scenario 5.

**Note:** As we did not configure the Min/Max network speed setting for any of these networks, you will notice in each profile that ALL configured NICs will have a configured speed of 10Gb. If you wish to limit the speed of specific networks, you could edit each network and configure a maximum speed.

## Defining a new (FCoE) SAN Fabric via GUI

Create a Fabric and name it "FCoE\_A"

- On the Virtual Connect Manager screen, click Define, SAN Fabric to create the first Fabric
- Enter the Network Name of "FCoE\_A"
- Select Add Port, then add the following ports;
  - o Enclosure 1, Bay 1, Port X1
  - Enclosure 1, Bay 1, Port X2
- Ensure Fabric Type is set to "FabricAttach"
- •
- Select Show Advanced Settings
  - Select Automatic Login Re-Distribution (FlexFabric Only)
  - Select Set Preferred FCoE Connect Speed
    - Configure for 4Gb
  - Select Set Maximum FCoE Connect Speed
    - Configure for 8Gb
- Select Apply

Create a second Fabric and name it "FCoE\_B"

- On the Virtual Connect Manager screen, click Define, SAN Fabric to create the second Fabric
  - Enter the Network Name of "FCoE\_B"
- Select Add Port, then add the following ports;
  - Enclosure 1, Bay 2, Port X1
  - Enclosure 1, Bay 2, Port X2
- Ensure Fabric Type is set to "FabricAttach"
- Select Show Advanced Settings
  - Select Automatic Login Re-Distribution (FlexFabric Only)
  - Select Set Preferred FCoE Connect Speed
    - Configure for 4Gb
  - Select Set Maximum FCoE Connect Speed
    - Configure for 8Gb
- Select Apply

### **Defining SAN Fabrics via CLI**

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

#Create the SAN Fabrics FCoE\_A and FCoE\_B and configure uplinks as discussed above add fabric FCoE\_A Type=FabricAttach Bay=1 Ports=1,2 Speed=Auto LinkDist=Auto PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000 add fabric FCoE\_B Type=FabricAttach Bay=2 Ports=1,2 Speed=Auto LinkDist=Auto PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000

efine 👻 Confi	igure - Tools	- H	elp 👻			Jetti	.95		
Define SAN	N Fabric								
Fabric									
Fabric Name FCoE_A		Fabr	ric Type	n	Login Re-Distribution		Configured Speed	Show Adve     Manual     Autom     Y Set Pr     Selected     0.1 Gb     V Set M     Selected     0.1 Gb	anced Settings I Login Re-Distribution 2 atic Login Re-Distribution 2 eferred FCcE Connection Speed 8 Gb 8 Gb 9 aximum FCcE Connection Speed 9 Gb 8 Gb 9
Enclosure	Uplink Ports								
Uplink Port	Enclosure	Bay	Port S	Status	Connected To	Action			
Uplink Port X1	C7K-Bottom	1	0	8 Gb	10:00:00:27:18:46:09:38	Delete			
Uplink Port X2	C7K-Bottom	1	0	8 Gb	10:00:00:27:f8:46:09:38	Delete			
Add Port									
Bay 1	*								
							Apply	Cancel	1

#### Figure 51 - SAN Configuration and Advanced Settings

**Figure 52 -** FCoE SAN fabrics configured with two 8Gb uplinks per fabric. Note the bay and port numbers on the right

Define -	Configure - I	ools ≠ Help ≠								
SAN F	abrics									
Extern	al Connections	Server Connections								
Status	SAN Fabric	Fabric Type	Login Re-Distribution	Port S	tatus	Connected To	Enclosure	Вау	Port	Action
0	FCoE_A	FabricAttach	AUTOMATIC	0	8 Gb	10:00:00:27:18:46:09:38	C7K-Bottom	1	X1	Edit 📼
				0	8 Gb	10:00:00:27:18:46:09:38	C7K-Bottom	1	X2	
0	FCoE_B	FabricAttach	AUTOMATIC	0	8 Gb	10:00:00:27:18:3a:5d:88	C7K-Bottom	2	X1	Edit 💌
				0	8 Gb	10:00:00:27:f8:3a:5d:88	C7K-Bottom	2	X2	
🕂 Add										

## **Defining a Server Profile**

We will create a server profile with two server NICs.

Although, we have created Shared Uplink Sets with several VLANs, each server NIC, for this scenario, will connect to VLAN 101, all other networks/VLANs will remain unused.

- On the main menu, select Define, then Server Profile
- Create a server profile called "App-1"
- In the Network Port 1 drop down box, select VLAN-101-1
- In the Network Port 2 drop down box, select VLAN-101-2
- Expand the FCoE Connections box, for Bay 1, select FCoE\_A for Bay 2, select FCoE\_B
- Do not configure FC SAN or iSCSI Connection
- In the Assign Profile to Server Bay box, locate the Select Location drop down and select Bay 1, then apply

Prior to applying the profile, ensure that the server in Bay 1 is currently OFF

**Note:** you should now have a server profile assigned to Bay 1, with 2 Server NIC connections. NICs 1&2 should be connected to networks VLAN-101-1 and VLAN-101-2 and FCoE SAN fabrics FCoE\_A and FCoE\_B.

#### **Defining a Server Profile via CLI**

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

# Create Server Profile App-1
add profile App-1 -nodefaultfcconn -nodefaultfcoeconn
set enet-connection App-1 1 pxe=Enabled Network=VLAN-101-1
set enet-connection App-1 2 pxe=Disabled Network=VLAN-101-2
Add fcoe-connection App-1 Fabric=FCoE\_A SpeedType=4Gb
Add fcoe-connection App-1 Fabric=FCoE\_B SpeedType=4Gb
poweroff server 1
assign profile App-1 enc0:1

**Note:** The speed of the NIC and SAN connections, as well as the MAC and WWN. Also, that the FCoE connections are assigned to the two SAN fabrics created earlier and use ports LOM:1-b and LOM:2-b.

Figure 53 - Define a Server Profile (App-1)

Define • Configure	e v lools v Help v							
Edit Server P	Profile: App-1							
Profile								
Profile Name	Network Access Group	p Status Serial Numi	ver	Server UUD				
App-1	Default 💌 🦻	VCX0000VC	0	7fa08c1f-7ea	3-4988-b07c-b4995ac0449e			
Ethernet Adapt	ter Connections							-
Port Network Nas	ne Statu Port	Speed Type	Allocated Port	Spee PXE	Multicast Filter	MAC	Mapping	Action
1 VLAN-101-1	🗢 PR	EFERRED	4 Gb - 8 Gb	ENABLE	D None	00-17-A4-77-7C-00	LOM1:1-a => Bay 1:d1:v1	
2 VLAN-101-2	2 🗢 PR	EFERRED	4 Gb - 8 Gb	DISABLE	D None	00-17-A4-77-7C-02	LOM1:2-a => Bay 2:d1:v1	J
+ Add								
ISCSI HBA Con	nections							
FC HBA Conne	ctions							÷
FCoE HBA Con	inections							
Por Con FC SAN /F	FCoE Network Narr Type	Stat Port Speed Type		Allocated Port	WARN	MAC	Mapping	Action
1 B. FCOE_A	SAN	4		4 Gb - 8 Gb	50:06:08:00:00:C2:DE:00	00-17-A4-77-7C-04	LOM1:1-b => Bay 1:d1.v2	)
2 B. FCOE_B	SAN	O 4		4 Gb - 8 Gb	50:06:08:00:00:C2:DE:02	00-17-A4-77-7C-05	LOM1:2-b => Bay 2:d1:v2	Delete
+ Add								
Fibre Channel Boo	ot Parameters							
Assign Profile	to Server Bay							
Enclosure	Server	Model	SN		Status Power UID			
C7K-Bottom	Bay 1	ProLiant BL460	Gen8 h	KQ32102HC	o 🤪 🔘			
							Asely	Apply & Close Cancel

Figure 54 - Server Profile View Bay 1

ierine 👻 C	onfigure 👻	10015 -	Help ▼			_	_					
Bay 1 (F	ProLiant	BL46	0c Ger	18)								
Device Bay S	Status - Bay a	#1										
Overall Stat	us:		Ø ok									
Hardwar	e Status:		O Normal									
VC Statu	s:		ОК									
Assigned S	erver Profile	::	App-1									
Enclosure K	lame:		C7K-Botton	n								
UID:												
Power State	us/Control:		© On									
						Momentary P	ress	Press and	Hold			
Blade Serve	r Informatio	n - Bay #1										
Serial Numb	ber:		MXQ30301	9P								
Serial Numb	per (Logical)	:	VCX0000V00									
UUID:			31363636-3136-584D-5133-303330313950									
UUID (Logic	al):		35999bc9-d2dd-41cb-bd11-a4087d6ae718									
Product Nar	ne:		ProLiant BL460c Gen8									
Server Nam	ie:		esx-173-1.vaolab.net									
Part Numbe	er:		666161-B2	1								
Asset Tag:			[Unknown]									
Server Ethe	rnet Adapte	r Informat	ion									
Ethernet Adapter	Flex NIC	Location	Module Port	Model	MAC Addres	s Network	WWN		SAN Fabri			
Port 1												
	LOM1:1- a	FLB1	Bay 1:d1:v1	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-00	VLAN- 101-1						
	LOM1:1- b	FLB1	Bay 1:d1:v2	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-04		50:06:0B:0	J0:00:C2:DE:00	FCoE			
	LOM1:1- c	FLB1	Bay 1:d1:v3	HP FlexFabric 10Gb 2- port 554FLB Adapter	6C-3B-E5-A4- B0-6A							
	LOM1:1- d	FLB1	Bay 1:d1:v4	HP FlexFabric 10Gb 2- port 554FLB Adapter	6C-3B-E5-A4- B0-6B							
Port 2												
	LOM1:2- a	FLB1	Bay 2:d1:v1	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-02	VLAN- 101-2						
	LOM1:2- b	FLB1	Bay 2:d1:v2	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-05		50:06:0B:0	J0:00:C2:DE:02	FCoE			
	LOM1:2- c	FLB1	Bay 2:d1:v3	HP FlexFabric 10Gb 2- port 554FLB Adapter	6C-3B-E5-A4- B0-6E							
	LOM1:2- d	FLB1	Bay 2:d1:v4	HP FlexFabric 10Gb 2- port 554FLB Adapter	6C-3B-E5-A4- B0-6F							

# Review

In this scenario we have created Two Shared Uplink Sets (SUS), providing support for many VLANs. Uplinks originating from each FlexFabric Module connect to each SUS, by doing so we provide redundant connections out of the Virtual Connect domain. As multiple uplinks are used for each SUS, we have also leveraged LACP to improve uplink performance. In this scenario, all uplinks will be active. We also created two FCoE SAN Fabrics.

We created a server profile, with two NICs connected to the same external VLAN (101) through VC networks VLAN-101-1 and VLAN-101-2, which provides the ability to sustain a link or module failure and not lose connection to the network. VLAN101-1 and VLAN101-2 are configured to support VLAN 101, frames will be presented to the NIC(s) without VLAN tags (untagged), these two NICs are connected to the same VLAN, but taking a different path out of the enclosure.

Additionally, FCoE port 1 is connected to SAN fabric FCoE\_A and FCoE SAN port 2 is connected to SAN Fabric FCoE\_B, providing a multi-pathed connected to the SAN.

Additional uplinks could be added to either the San fabrics or the Ethernet networks, which could increase performance and/or availability.

# Results – Windows 2008 R2 Networking Examples

We have successfully configured FlexFabric with a shared uplink set and redundant SAN fabrics. We have created a server profile to connect the TWO NICs to VLAN 101 and the SAN fabrics using the FCoE connections created within the profile.

Although both Ethernet and Fibre channel connectivity is provided by the CNA used in the G7 and Gen 8 servers; each capability (LAN and SAN) is provided by a different component of the adapter, they appear in the server as individual network and SAN adapters.

**Figure 55 -** Example of Emulex's OneCommand Manager Utility (formerly known as HBA Anywhere). Note that there are 3 Ethernet personalities and one FCoE personality per port, as configured in the server profile.



The following graphics show a Windows 2008 R2 server with TWO FlexNICs configured at 6Gb. You will also notice that Windows believes there are 6 NICs within this server. However, only TWO NICs are currently configured within the FlexFabric profile, the extra NICs are offline and could be disabled. If we did not require SAN connectivity on this server, the FCoE connections could be deleted and the server would then have 8 NIC ports available to the OS.

**Note:** the BL465c G7 and BL685c G7 utilize an NC551i chipset (BE2), whereas the BL460c G7, BL620c G7 and BL680c G7 utilize an NC553i chipset (BE3) and the Gen 8 blades typically have a NC554 adapter which also utilizes the BE3 chipset. Both the BE2 and BE3 chipsets share common drivers and firmware.

Network Connections		
🕞 🗇 🖉 🔹 Network and Internet	t ▼ Network Connections ▼	Search Network Connections
Organize 🔻		III 🕶 🖬 🔞
Name	Status ^	Device Name
🚇 Local Area Connection	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter
📮 Local Area Connection 2	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter #2
🚚 Local Area Connection 3	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter #3
🚚 Local Area Connection 6	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter #6
Local Area Connection 4	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter #4
Local Area Connection 5	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter #5
•		

Figure 56 - Windows 2008 R2 Network Connections (2 Connections Active)

**Note:** The NICs that are not configured within VC will appear with a red x as not connected. You can go into Network Connections for the Windows 2008 server and Disable any NICs that are not currently in use. Windows assigns the NICs as NIC 1-6, whereas three of the NICs will reside on LOM:1 and three on LOM:2. You may need to refer to the FlexFabric server profile for the NIC MAC addresses to verify which NIC is which.

Figure 57 - Windows 2008 R2 Extra Network Connections – Disabled

Organize 🔻		III 👻 🗖
Name	Status ~	Device Name
Local Area Connection	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter
Local Area Connection 2	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter
Local Area Connection 3	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter
Local Area Connection 6	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter
Local Area Connection 4	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter
Local Area Connection 5	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter

Figure 58 - Windows 2008 R2 Network Connection Status

General		
Connection		
IPv4 Connecti	vity:	No Internet access
IPv6 Connecti	vity:	No Internet access
Media State:		Enabled
Duration:		00:04:42
Speed:		8.0 Gbps
Details	1	
	-	
Activity		
	Sent — 💻	Received
	Sent —	Received
Bytes:	Sent — 1,642	
Bytes:	Sent — 1,642	Received
Bytes:	Sent — 1,642	Received     1,730 Diagnose
Bytes:	Sent — 4	Received     1,730 Diagnose
Bytes:	Sent 4	Received     1,730 Diagnose Close

**Note:** In Windows 2008 and later the actual NIC speed is displayed as configured in server Profile. Also, note that the speed displayed is the maximum speed setting, not the minimum setting.

**Figure 59 -** Windows 2008 R2, Device Manager, SIX NICs are shown, however, we have only configured two of the NICs and two FCoE HBAs.



The following graphics provides an example of a Windows 2008 R2 server with TWO NICs connected to the network, initially each NIC has its own TCP/IP address, alternatively, both NICs could be teamed to provide NIC fail-over redundancy. If an active uplink or network switch were to fail, Virtual Connect would fail-over to the standby uplink. In the event of a Virtual Connect FlexFabric module failure, the server's NIC teaming software would see one of the NICs go offline, assuming it was the active NIC, NIC teaming would fail-over to the standby NIC.

Figure 60 - Each NIC is connected to VLAN 101

#### **NIC Teaming**

If higher availability is desired, NIC teaming in Virtual Connect works the same way as in standard network configurations. Simply, open the NIC teaming Utility and configure the available NICs for teaming. In this example, we have only TWO NICs available, so selecting NICs for teaming will be quite simple. However, if multiple NICs are available, ensure that the correct pair of NICs is teamed. You will note the BAY#-Port# indication within each NIC. Another way to confirm you have the correct NIC is to verify through the MAC address of the NIC. You would typically TEAM a NIC from Bay 1 to Bay 2 for example.

The following graphics provide an example of a Windows 2008 R2 server with TWO NICs teamed and connected to the network. In the event of an Uplink or switch failure, VC will fail-over to the standby uplinks, if a VC FlexFabric module were to fail, the NIC teaming software would fail-over to the standby NIC.

P Network Configuration Utility Properties	? :
HP Network Configuration Utility	
HP NICs: [5] HP FlexFabric 10Gb 2-port 554FLB Adapter #5 I/O Bay 2 Port 1 / 1] [4] HP FlexFabric 10Gb 2-port 554FLB Adapter #4 I/O Bay 1 Port 1 / 1	Teaming Setup Team Dissolve VLAN(802.10)
Make a selection. You may view properties of an item at any time by Double-Clicking on it or Selecting and, then, Clicking Properties.	Save Properties
Help License Manager Enable UID 🔽 Display Tray Icon	
	OK Cancel

Figure 61 – Team both NICs, using the HP Network Configuration Utility

Figure 62 - Both NICs for Profile App-1 are teamed and connected to the network through vNet-PROD



Various modes can be configured for NIC Teaming, such as NFT, TLB etc. Once the Team is created, you can select the team and edit its properties. Typically, the default settings can be used.

🔯 Network Connections		
😋 🕞 🖳 🔹 Network and Internet	<ul> <li>Network Connections</li> </ul>	👻 🚱 Search Network Connections 😥
Organize 🔻		III 🕶 🗖 😨
Name	Status ^	Device Name
Local Area Connection	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter
Local Area Connection 2	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #2
Local Area Connection 3	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #3
Local Area Connection 6	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #6
Local Area Connection 4	Enabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #4
Local Area Connection 5	Enabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #5
Local Area Connection 8	vaolab.net	HP Network Team #1
•		

Figure 63 - View - Network Connections - NIC Team #1 - Windows



av Administrator: Command Prompt
C:\Users\Administrator>ipconfig
Windows IP Configuration
Ethernet adapter Local Area Connection 5:
Connection-specific DNS Suffix . : vaolab.net
Link-local IPv6 Address : fe80::9943:165b:ba23:75d2%27
IPv4 Address
Subnet Mask
Default Gateway : 192.168.1.254

# Results – Windows 2008 R2 SAN Connectivity

**Figure 65 -** By access the HBA BIOS during server boot, you can see that Port 1 of the FlexHBA is connected to an EVA SAN LUN

01: 554FLB: Mem Base: FBE00000 Firmware Version: 4.2.401.2215 BIOS: Disabled Port Name: 50060B0000C2DE00 Node Name: 50060B00000C2DE01 Vlan ID: 1001 DCBX mode: CEE mode								
			Devices	Present o	on This A	dapter:		
01.	DID:	010000	WWPN:50001FE1	5005D468	LUN:01	HP	HSV210	5000
02.	DID:	010100	WWPN:50001FE1	5005D46C	LUN:01	HP	HSU210	5000
04.	DID:	010300	WWPN:50001FE1	5005D46B	LUN:01	HP	HSV210	5000

Server manager							
Hie Action View Help							
🗢 🔿   📶   🚺   🗖	🛯 🖾 X 🖀 🖼 l	9 😼					
Server Manager (WIN-BE	F Disk Management	Volume	List +	Graphical Viev	N		
Roles     Features	Volume	Layout	Туре	File System	Status	Capacity	Free Spac
Diagnostics	(C:)	Simple	Basic	NTFS	Healthy (Boot, Page File, Crash Dump, Pri	136.60 GB	104.72 GB
Configuration	SAN Volume (D:)	Simple	Basic	NTFS	Healthy (Primary Partition)	19.53 GB	19.44 GB
🖃 🚰 Storage	System Reserved	Simple	Basic	NTFS	Healthy (System, Active, Primary Partition)	100 MB	72 MB
Windows Server I							
Disk Management							
	L						
	•						
	Cont o						
	Basic	System	Reser	ved	((;)		
	136.70 GB	100 MB N	TFS	veu	136.60 GB NTFS		
	Online	Healthy (S	System	, Active, P	Healthy (Boot, Page File, Crash Dump, Primary I	Partition)	
							·
í	Disk 1						1
	Basic 10.53 CB	SAN Volu	me (	D:)			
	Online	Healthy (F	Primar v	Partition)			
Į		/////	1111	///////	<u> </u>		
,	· · · · ·		_				
	_						
(	🛛 📕 Unallocated 📕	Primary	partit	tion			

Figure 66 - Windows 2008 R2 Disk Administrator. Note; that D: is the SAN attached volume

# Summary

We presented a Virtual Connect Network scenario by creating two shared uplink sets (SUS), each SUS is connected with TWO active uplinks, both SUS' can actively pass traffic. We included a dual path SAN fabric for storage connectivity.

When VC profile App-1 is applied to the server in bay1 and the server is powered up, it has one NIC connected through FlexFabric module 1 (connected to VLAN-101-1), the second NIC is connected through FlexFabric module 2 (connected to VLAN-101-2). Each NIC is configured at 6Gb. These NICs could now be configured as individual NICs with their own IP address or as a pair of TEAMED NICs. Either NIC could be active. As a result, this server could access the network through either NIC or either uplink, depending on which NIC is active at the time. Each NIC is configured for a guaranteed minimum bandwidth of 4Gb, with a maximum of 10Gb of network bandwidth and each FCOE port is configured for 4Gb of SAN bandwidth with the ability to burst to a maximum of 8Gb.

Additional NICs could be added within FlexFabric, by simply powering the server off and adding up to a total of 6 NICs, the NIC speed can then be adjusted accordingly to suit the needs of each NIC. If additional or less SAN bandwidth is required, the speed of the SAN connection can also be adjusted.

As additional servers are added to the enclosure, simply create additional profiles, or copy existing profiles, configure the NICs for LAN and SAN fabrics as required and apply them to the appropriate server bays and power the server on.

# Scenario 3 – Shared Uplink Set with Active/Active Uplinks and 802.3ad (LACP) -Ethernet and FCoE Boot from SAN – Windows 2008 R2

# **Overview**

This scenario will implement the Shared Uplink Set (SUS) to provide support for multiple VLANs. The upstream network switches connect a shared uplink set to two ports on each FlexFabric modules, LACP will be used to aggregate those links. This scenario is identical to Scenario 2, however, scenario 3 also provides the steps to configure a Windows 2008 R2 server to Boot from SAN using the FCoE connections provided by FlexFabric. When using Virtual Connect/FlexFabric in a Boot from SAN implementation, no custom or special HBA configuration is required. The HBA configuration is controlled by Virtual Connect and maintained as part of the server profile. Once the server profile has been configured and applied to the server bays, the controller will be configured on the next and subsequent boot. When we later configure the server profile, we will also configure the HBA boot parameters.

As multiple VLANs will be supported in this configuration, the upstream switch ports connecting to the FlexFabric modules will be configured to properly present those VLANs. In this scenario, the upstream switch ports will be configured for VLAN trunking/VLAN tagging.

When configuring Virtual Connect, we can provide several ways to implement network fail-over or redundancy. One option would be to connect TWO uplinks to a single Virtual Connect network; those two uplinks would connect from different Virtual Connect modules within the enclosure and could then connect to the same upstream switch or two different upstream switches, depending on your redundancy needs. An alternative would be to configure TWO separate Virtual Connect networks, each with a single, or multiple, uplinks configured. Each option has its advantages and disadvantages. For example; an Active/Standby configuration places the redundancy at the VC level, where Active/Active places it at the OS NIC teaming or bonding level. We will review the second option in this scenario.

In addition, several Virtual Connect Networks can be configured to support the required networks to the servers within the BladeSystem enclosure. These networks could be used to separate the various network traffic types, such as iSCSI, backup and VMotion from production network traffic.

This scenario will also leverage the Fibre Channel over Ethernet (FCoE) capabilities of the FlexFabric modules. Each fibre channel fabric will have two uplinks connected to each of the FlexFabric modules.

## Requirements

This scenario will support both Ethernet and fibre channel connectivity. In order to implement this scenario, an HP BladeSystem c7000 enclosure with one or more server blades and TWO Virtual Connect FlexFabric modules, installed in I/O Bays 1& 2 are required. In addition, we will require ONE or TWO external Network switches. As Virtual Connect does not appear to the network as a switch and is transparent to the network, any standard managed switch will work with Virtual Connect. The fibre channel uplinks will connect to the existing FC SAN fabrics. The SAN switch ports will need to be configured to support NPIV logins. Two uplinks from each FlexFabric module will be connected to the existing SAN fabrics.

**Figure 67 - Physical View;** Shows two Ethernet uplinks from Ports X5 and X6 on Module 1 and 2 to Ports 1 and 2 on each network switch. The SAN fabrics are also connected redundantly, with TWO uplinks per fabric, from ports X1 and X2 on module 1 to Fabric A and ports X1 and X2 to Fabric B.



**Figure 68 - Logical View;** the server blade profile is configured with TWO FlexNICs and 2 FlexHBAs. NICs 1 and 2 are connected to VLAN-101-x which are part of the Shared Uplink Sets, VLAN-Trunk-1 and VLAN-Trunk-2 respectively. The VLAN-Trunks are connected, at 10Gb, to a network switch, through Ports X5 and X6 on each FlexFabric Module in Bays 1 and 2. The FCoE SAN connections are connected through ports X1 and X2 on each FlexFabric module. In addition, SAN Fabric FCoE\_A connects to the existing SAN Fabric A through port X1 on Module 1 (Bay 1) and FCoE\_B connects to the existing SAN Fabric B through port X1 on Module 2 (Bay 2).



# **Installation and configuration**

## **Switch configuration**

As the Virtual Connect module acts as an edge switch, Virtual Connect can connect to the network at either the distribution level or directly to the core switch.

The appendices provide a summary of the cli commands required to configure various switches for connection to Virtual Connect. The configuration information provided in the appendices for this scenario assumes the following information:

 The switch ports are configured as VLAN TRUNK ports (tagging) to support several VLANs. All frames will be forwarded to Virtual Connect with VLAN tags. Optionally, one VLAN could be configured as (Default) untagged, if so, then a corresponding vNet within the Shared Uplink Set would be configured and set as "Default"

**Note:** when adding additional uplinks to the SUS, if the additional uplinks are connecting from the same FlexFabric module to the same switch, in order to ensure all the uplinks are active, the switch ports will need to be configured for LACP within the same Link Aggregation Group.

The network switch port should be configured for Spanning Tree Edge as Virtual Connect appears to the switch as an access device and not another switch. By configuring the port as Spanning Tree Edge, it allows the switch to place the port into a forwarding state much quicker than otherwise, this allows a newly connected port to come online and begin forwarding much quicker.

The SAN switch ports connecting to the FlexFabric module must be configured to accept NPIV logins.

#### **Configuring the VC module**

- Physically connect Port 1 of network switch 1 to Port X5 of the VC module in Bay 1
- Physically connect Port 2 of network switch 1 to Port X6 of the VC module in Bay 1
- Physically connect Port 1 of network switch 2 to Port X5 of the VC module in Bay 2
- Physically connect Port 2 of network switch 2 to Port X6 of the VC module in Bay 2

**Note:** if you have only one network switch, connect VC ports X5 and X6 (Bay 2) to an alternate port on the same switch. This will NOT create a network loop and Spanning Tree is not required.

- Physically connect Ports X1/X2 on the FlexFabric in module Bay 1 to switch ports in SAN Fabric A
- Physically connect Ports X1/X2 on the FlexFabric in module Bay 2 to switch ports in SAN Fabric B

#### **VC CLI commands**

Many of the configuration settings within VC can also be accomplished via a CLI command set. In order to connect to VC via a CLI, open an SSH connection to the IP address of the active VCM. Once logged in, VC provides a CLI with help menus. Through this scenario the CLI commands to configure VC for each setting will also be provided.

### **Configuring Expanded VLAN Capacity via GUI**

Virtual Connect release 3.30 provided an expanded VLAN capacity mode when using Shared Uplink Sets, this mode can be enabled through the Ethernet Settings tab or the VC CLI. The default configuration for a new Domain install is "Expanded VLAN Capacity" mode, Legacy mode is no longer available and the Domain cannot be downgraded.

## To verify the VLAN Capacity mode

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Expanded VLAN capacity
- Verify Expanded VLAN Capacity is configured and Legacy VLAN Capacity is greyed out.

**Note:** Legacy VLAN mode will only be presented if 1Gb Virtual Connect Modules are present, in which case the domain would be limited to Firmware version 3.6x.

#### **Configuring Expanded VLAN Capacity via CLI**

The following command can be copied and pasted into an SSH based CLI session with Virtual Connect;

# Set Expanded VLAN Capacity set enet-vlan -quiet VlanCapacity=Expanded

#### Figure 69 - Enabling Expanded VLAN Capacity

Define 🔻 Configure 👻 Tools 👻 Help 👻	
Ethernet Settings	
MAC Addresses Port Monitoring Advanced Settings	
VLAN	
Server VLAN Tagging Support	
Force server connections to use the same VLAN mappings as shared uplink sets	
VLAN Capacity         Legacy VLAN capacity (Up to 320 VLANs per module and 26 VLANs per server connection).         ? <ul></ul>	)
Multiple Networks Link Speed Settings	
When using mapped VLAN tags (multiple networks over a single link), these settings will be used for the overall Link speed control.	
Set a Custom value for Preferred Link Connection Speed	
Set a Custom value for Maximum Link Connection Speed ?	

**Note:** if a 1Gb VC Ethernet module is present in the Domain, Expanded VLAN capacity will be greyed out, this is only supported with 10Gb based VC modules. Also, once Expanded VLAN capacity is selected, moving back to Legacy VLAN capacity mode will require a domain deletion and rebuild.

#### **Defining a new Shared Uplink Set (VLAN-Trunk-1)**

Connect Ports X5 and X6 of FlexFabric module in Bay 1 to Ports 1 and 2 on switch 1

Create a SUS named VLAN-Trunk-1 and connect it to FlexFabric Ports X5 and X6 on Module 1

- On the Virtual Connect Home page, select Define, Shared Uplink Set
- Insert Uplink Set Name as VLAN-Trunk-1
- Select Add Port, then add the following port;
  - Enclosure 1, Bay 1, Port X5
  - Enclosure 1, Bay 1, Port X6

efine 🔻 Configu	ure <del>v</del> Tools <del>v</del> H	elp <del>v</del>						
Edit Shared	Uplink Set: \	/LAN-Trunk-1						
Ethornot Cha	ared External lin	link Cot						
Eulernet Shz	ared External Op	iiiik set						
Uplink Set Name		status PID						
VEAN-TRUNK-T								
External Uplin	nk Ports							
Port	Port Role	Port Status		Connector Type	e Connected To	PID	Speed/Duplex	Action
C7K-Bottom Bay 1: Port X5	NA	C Linked-Active	10 Gb	SFP-DAC	HP (Ten-GigabitEthernet1/0/5)	۲	Auto	Delete
C7K-Bottom Bay 1: Port X6	NA	Linked-Active	10 Gb	SFP-DAC	HP (Ten-GigabitEthernet1/0/6)	۲	Auto	Delete
Connection Mode	e: • Auto	ACP Timer:  Domain Default, Short (1 sec) Long (30 sec)	Short (1 sec)					
C7K-Bottom	>							
Associated	FCoE Network (V	'LAN tagged)						
						+	Add 🧪 Edit 🥤	Delete
Associated	Networks (VLAN	tagged)						
							+ Add 1	) Delete

Figure 70 - Shared Uplink Set (VLAN-Trunk-1) Uplinks Assigned

- Click Add Networks and select the Multiple Networks radio button and add the following VLANs;
  - o Enter Name as VLAN-
  - Enter Suffix as -1
  - Enter VLAN IDs as follows (and shown in the following graphic);
  - o **101-105,2100-2400**
- Enable SmartLink on ALL networks
- Click Advanced
  - Configure Preferred speed to 6Gb
  - Configure Maximum speed to 10Gb
- Click Apply

**Note:** You can optionally specify a network "color" or "Label" when creating a shared Uplinkset and its networks. In the example above we have not set either color or label. Also notice the new configurable LACP Timer setting.

Figure 71	I - Creating	VLANs in	a Shared	<b>Uplink Set</b>
-----------	--------------	----------	----------	-------------------

Associated Networks (VLAN tagged)	
Would you like to add	
O a single Associated Network 💿 multiple Associated Networks	
Network Name	
Sample network name: VLAN-2400-1	
VLANID(s) * 101-105,2100-2400	
Type to add Network Labels	
Sinart Link Private Network Advanced Network Settings  Selected Speed: B G G b 0.1 Gb 10 Gb	
Set maximum connection speed     Image: Connection speed     Image: Connection speed     Image: Connection speed       Selected Speed:     10     Image: Connection speed     Image: Connection speed     Image: Connection speed	
pe network access group names	
Default X	
pe letters or numbers ('a', '2', 'e', 'nag', 'default')	
Apply	Cancel

**Note:** If the VC domain is not in Expanded VLAN capacity mode, you will receive an error when attempting to create more that 128 VLANs in a SUS. If that occurs, go to Advanced Ethernet Settings and select Expanded VLAN capacity mode and apply.

After clicking apply, a list of VLANs will be presented as shown below. If one VLAN in the trunk is untagged/native, see note below.

• Click Apply at the bottom of the page to create the Shared Uplink Set

						T Muu III I
	Network Name	VLANID 👃	Native	Smart Link	Private Network	Action
]	VLAN-101-1	101	false	true	false	Edit 📼
	VLAN-102-1	102	false	true	false	Edit 👻
	VLAN-103-1	103	false	true	false	Edit 📼
	VLAN-104-1	104	false	true	false	Edit 💌
	VLAN-105-1	105	false	true	false	Edit 📼
	VLAN-2100-1	2100	false	true	false	Edit 💌
	VLAN-2101-1	2101	false	true	false	Edit 💌
	VLAN-2102-1	2102	false	true	false	Edit 💌
	VLAN-2103-1	2103	false	true	false	Edit 👻
	VLAN-2104-1	2104	false	true	false	Edit 👻
	VLAN-2105-1	2105	false	true	false	Edit 📼
	VLAN-2106-1	2106	false	true	false	Edit 💌
	VLAN-2107-1	2107	false	true	false	Edit 📼
	VLAN-2108-1	2108	false	true	false	Edit 💌
	VLAN-2109-1	2109	false	true	false	Edit 💌
	VLAN-2110-1	2110	false	true	false	Edit 💌
	VLAN-2111-1	2111	false	true	false	Edit 📼
	VLAN-2112-1	2112	false	true	false	Edit 💌
	VLAN-2113-1	2113	false	true	false	Edit 💌
	VLAN-2114-1	2114	false	true	false	Edit 💌
	VLAN-2115-1	2115	false	true	false	Edit 💌
	VLAN-2116-1	2116	false	true	false	Edit 💌
	VLAN-2117-1	2117	false	true	false	Edit 💌
	VLAN-2118-1	2118	false	true	false	Edit 👻

#### Figure 72 - Associated VLANs for Shared Uplink Set VLAN-Trunk-1

**Note:** Optionally, if one of the VLANs in the trunk to this shared uplink set were configured as Native or Untagged, you would be required to "edit" that VLAN in the screen above, and configure Native as TRUE. This would need to be set for BOTH VLAN-Trunk-1 and VLAN-Trunk-2.

Apply Cancel

#### Defining a new Shared Uplink Set (VLAN-Trunk-2)(Copying a Shared Uplink Set)

The second Shared Uplink Set could be created in the same manner as VLAN-Trunk-1 however; VC now provides the ability to COPY a VC Network or Shared Uplink Set.

- Connect Ports X5 and X6 of FlexFabric module in Bay 2 to Ports 1 and 2 on switch 2
- In the VC GUI screen, select Shared Uplink Sets in the left pane, in the right pane VLAN-Trunk-1 will be displayed, left click VLAN-Trunk-1, it will appear as blue, right click and select COPY
- Edit the Settings as shown below, the new SUS name will be VLAN-Trunk-2 and ALL the associated VLANs with have a suffix of 2
- In step 3, ADD uplinks X5 and X6 from Bay 2
- Click OK
- The SUS and ALL VLANs will be created

Figure 73 - Copying a SUS and ALL VLANs

Shared Uplink Set Name				
Name VLAN-Trunk-2				
Associated Networks (VLANs)				
Replace last 🗸 instance(s) of 1 with 2				
VLAN-Trunk-1 Original	VLAN-Trunk-2 Copy			
VLAN-101- <u>1</u>	▲ VLAN-101- <u>2</u>			
VLAN-102- <u>1</u>	VLAN-102-2			
VLAN-103- <u>1</u>	VLAN-103-2			
VLAN-104- <u>1</u>	VLAN-104-2			
VLAN-105- <u>1</u>	VLAN-105-2			
VLAN-2100- <u>1</u>	▼ VLAN-2100- <u>2</u>			
External Linlink Ports				
External Linlink Ports				

### **Defining a new Shared Uplink Set via CLI**

The following script can be used to create the first Shared Uplink Set (VLAN-Trunk-1)

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

# Create Shared Uplink Set VLAN-Trunk-1 and configure uplinks

```
add uplinkset VLAN-Trunk-1
add uplinkport enc0:1:X5 Uplinkset=VLAN-Trunk-1 speed=auto
add uplinkport enc0:1:X6 Uplinkset=VLAN-Trunk-1 speed=auto
```

# Create Networks VLAN-101-1 through VLAN-105-1 and 2100-2400 for Shared Uplink Set VLAN-Trunk-1 add network-range -quiet UplinkSet=VLAN-Trunk-1 NamePrefix=VLAN- NameSuffix=-1 VLANIds=101-105,2100-2400 State=enabled PrefSpeedType=Custom PrefSpeed=6000 MaxSpeedType=Custom MaxSpeed=10000 SmartLink=enabled

The following script can be used to create the Second Shared Uplink Set (VLAN-Trunk-2)

# Create Shared Uplink Set VLAN-Trunk-2 and configure uplinks add uplinkset VLAN-Trunk-2 add uplinkport enc0:2:X5 Uplinkset=VLAN-Trunk-2 speed=auto add uplinkport enc0:2:X6 Uplinkset=VLAN-Trunk-2 speed=auto

# Create Networks VLAN101-2 through VLAN105-2 and VLAN-2100-2 through VLAN-2400-2 for Shared Uplink Set VLAN-Trunk-2 add network-range -quiet UplinkSet=VLAN-Trunk-2 NamePrefix=VLAN- NameSuffix=-2 VLANIds=101-105,2100-2400 State=enabled PrefSpeedType=Custom PrefSpeed=6000 MaxSpeedType=Custom MaxSpeed=10000 SmartLink=enabled

Please refer to Appendix D; "Scripting the Native VLAN" for scripting examples.
**Note:** In this scenario we have created two independent Share Uplink Sets (SUS), each originating from the opposite FlexFabric Modules, by doing so we provide the ability to create separate and redundant connections out of the Virtual Connect domain. When we create the server profiles, you will see how the NICs will connect to VLANs accessed through the opposite VC module, which provides the ability to create an Active / Active uplink scenario. Alternatively, we could have created a single SUS and assigned both sets of these uplink ports to the same SUS, however, this would have provided an Active/Standby uplink scenario, as shown in Scenario 5.

#### Defining a new (FCoE) SAN Fabric via GUI

Create a Fabric and name it "FCoE\_A"

- On the Virtual Connect Manager screen, click Define, SAN Fabric to create the first Fabric
- Enter the Network Name of "FCoE\_A"
- Select Add Port, then add the following ports;
  - Enclosure 1, Bay 1, Port X1
  - o Enclosure 1, Bay 1, Port X2
- Ensure Fabric Type is set to "FabricAttach"
- Select Show Advanced Settings
  - Select Automatic Login Re-Distribution (FlexFabric Only)
  - Select Set Preferred FCoE Connect Speed
    - Configure for 4Gb
  - Select Set Maximum FCoE Connect Speed
    - Configure for 8Gb
- Select Apply

Create a second Fabric and name it "FCoE\_B"

- On the Virtual Connect Manager screen, click Define, SAN Fabric to create the second Fabric
- Enter the Network Name of "FCoE\_B"
- Select Add Port, then add the following ports;
  - Enclosure 1, Bay 2, Port X1
  - Enclosure 1, Bay 2, Port X2
- Ensure Fabric Type is set to "FabricAttach"
- Select Show Advanced Settings
  - Select Automatic Login Re-Distribution (FlexFabric Only)
    - Select Set Preferred FCoE Connect Speed
      - Configure for 4Gb
  - Select Set Maximum FCoE Connect Speed
    - Configure for 8Gb
- Select Apply

0

#### **Defining SAN Fabrics via CLI**

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

#Create the SAN Fabrics FCoE\_A and FCoE\_B and configure uplinks as discussed above add fabric FCoE\_A Type=FabricAttach Bay=1 Ports=1,2 Speed=Auto LinkDist=Auto PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000 add fabric FCoE\_B Type=FabricAttach Bay=2 Ports=1,2 Speed=Auto LinkDist=Auto PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000

	_						_			
	Fabr	ric Type icAttach		Login Re-Distribution	l	Configured Speed		how Advand Manual L Automati Selected Sp 0.1 Gb	ced Settings ogin Re-Distribution to Login Re-Distribution erred FCoE Connection beed: 4 0 Gb 8 Gb 8 Gb 1 0 Gb 8 Gb 8 Gb	2 2 Speed
Uplink Ports							_			
Enclosure	Bay	Port S	tatus	Connected To	Action					
C7K-Bottom	1	0	8 Gb	10:00:00:27:18:46:09:38	Delete					
C7K-Bottom	1	0	8 Gb	10:00:00:27:18:46:09:38	<u>Delete</u>					
*										
	Uplink Ports Enclosure C7K-Bottom C7K-Bottom	Uplink Ports Enclosure Bay C7K-Bottom 1 C7K-Bottom 1	Uplink Ports       Enclosure     Bay Ports       C7K-Botton     1       2	Endlosure     Bay     Port Status       C7K-Bottom     1     2     8 Gb	Eatric Type     Login Re-Distribution       Fabric Attach     •       AUTOMATIC         Uplink Ports       Enclosure     Bay       Port Status     Connected To       C7K-Bottom     1     2     8 Ob     10:00:00:27:16:46:09:38	Endosure     Bay     Port Status     Connected To     Addion       C7K-Bottom     1     2     8 Gb     10:00:00:27:18:46:09:38     Delete	Endosure     Bay     Port Status     Connected To     Action       C7K-Bottom     1     2     8 Gb     10:00:00:27:18:46:09:38     Delete	Fabric Type       Login Re-Distribution       Configured Speed         Pabric Attach       AUTOMATIC       Auto         Uplink Ports         Enclosure       Bay Port Status       Connected To       Action         C7K-Bottom       1       2       8 Gb       10:00:00:27:18:46:09:38       Delete         2       3	Fabric Type       Login Re-Distribution       Configured Speed         Fabric Attach       AUTOMATIC       Auto         Auto <ul> <li>Automatic</li> <li>Set Pref</li> <li>Selected Sp</li> <li>0.1 Gb</li> <li>Set Max</li> <li>Selected Sp</li> <li>0.1 Gb</li> <li>CrK-Botton</li> <li>8 Gb</li> <li>10:00:00:27:16:46:09:38</li> <li>Delete</li> <li>CrK-Botton</li> <li>8 Gb</li> <li>10:00:00:27:16:46:09:38</li> <li>Delete</li> <li>Set Max</li> <li>Set Max</li></ul>	Fabric Type       Login Re-Distribution         Fabric Attach       AUTOMATIC         Auto <ul> <li>Auto</li> <li>Automatic Login Re-Distribution</li> <li>Set Preferred FCoE Connection</li> <li>Selected Speed:</li> <li>Get 06</li> <li>0.1 0b</li> <li>8 0b</li> <li>0.0 0b</li> <li>8 0b</li> <li>0.0 0b</li> <li>8 0b</li> <li>0.0 0b</li> <li>8 0b</li> <li>0.0 0b</li> <li>9 0b</li> <li>0.0 0b</li></ul>

#### Figure 74 - SAN Configuration and Advanced Settings

**Figure 75 -** FCoE SAN fabrics configured with two 8Gb uplinks per fabric. Note the bay and port numbers on the right

Define 👻	Configure - T	ools <del>v</del> Help <del>v</del>								
SAN Fabrics										
Extern	al Connections	Server Connections								
Status	SAN Fabric	Fabric Type	Login Re-Distribution	Port	Status	Connected To	Enclosure	Bay	Port	Action
0	FCoE_A	FabricAttach	AUTOMATIC	0	8 Gb	10:00:00:27:18:46:09:38	C7K-Bottom	1	X1	Edit 👻
				0	8 Gb	10:00:00:27:18:46:09:38	C7K-Bottom	1	X2	
0	FCoE_B	FabricAttach	AUTOMATIC	0	8 Gb	10:00:00:27:18:3a:5d:88	C7K-Bottom	2	X1	Edit 💌
				0	8 Gb	10:00:00:27:f8:3a:5d:88	C7K-Bottom	2	X2	_
🕂 Add										

### **Defining a Server Profile**

We will create a server profile with two server NICs. Each server NIC will connect to a specific network.

- On the main menu, select Define, then Server Profile
- Create a server profile called "App-1"
- In the Network Port 1 drop down box, select VLAN-101-1
- In the Network Port 2 drop down box, select VLAN-101-2
- Expand the FCoE Connections box, for Bay 1, select FCoE\_A for Bay 2, select FCoE\_B
- Select the "Fibre Channel Boot Parameters" box under the FCoE configuration box
  - Select PORT 1 and click on the drop down under "SAN Boot" and select "Primary"
  - Click on the Target Port Name field and enter the SAN controller ID
  - Click on the LUN field and enter the boot LUN number, which is typically 1
  - Click on PORT 2 and click on the drop down under "SAN Boot" and select "Secondary"
  - Click on the Target Port Name field and enter the SAN controller ID
  - Click on the LUN field and enter the boot LUN number, which is typically 1

- Click Apply
- Do not configure iSCSI HBA or FC HBA Connection
- In the Assign Profile to Server Bay box, locate the Select Location drop down and select Bay 1, then apply

Prior to applying the profile, ensure that the server in Bay 1 is currently OFF

**Note:** you should now have a server profile assigned to Bay 1, with 2 Server NIC connections. NICs 1&2 should be connected to networks VLAN101-1 and VLAN101-2 and FCoE SAN fabrics FCoE\_A and FCoE\_B.

#### **Defining a Server Profile via CLI**

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

# Create Server Profile App-1 add profile App-1 -nodefaultfcconn -nodefaultfcoeconn set enet-connection App-1 1 pxe=Enabled Network=VLAN-101-1 set enet-connection App-1 2 pxe=Disabled Network=VLAN-101-2 add fcoe-connection App-1 set fcoe-connection App-1:1 Fabric=FCoE\_A SpeedType=4Gb BootPriority=Primary BootPort=50:08:05:F3:00:00:58:11 BootLun=1 add fcoe-connection App-1 set fcoe-connection App-1 set fcoe-connection App-1 set fcoe-connection App-1 set fcoe-connection App-1 poweroff server 1 assign profile App-1 enc0:1 Note: you will need to locate the WWN and Boot LUN numbers for the controller you are booting to and substitute the addresses above.

**Note:** The speed of the NIC and SAN connections, as well as the MAC and WWN. Also, note that the FCoE connections are assigned to the two SAN fabrics created earlier and use ports LOM:1-b and LOM:2-b.

Uetine •	Configure - I	oolsi∓ Helpi≠								
Edit \$	Server Profile	e: App-1								٦
Prof	ile									
Profile	Name	Network Access	Group Status	Serial Number	Serve	r UUD				
App-1		Default 💌	2 9 9	VCX0000//00	7fa08c	1f-7ea3-4988-b07c	-b4995ac0449e			
Ethe	met Adapter Co	nnections								
Port	Network Name		itatu Port Speed Typ		Allocated Port Spee	d PXE	Muticast Fiter	MAC	Mapping	Action
1	VLAN-101-1		PREFERRED	)	6 Gb - 10 Gb	ENABLED	None	00-17-A4-77-7C-00	LOM1:1-a => Bay 1:d1:v1	
2	VLAN-101-2		PREFERRED	0	6 Gb - 10 Gb	DISABLED	None	00-17-A4-77-7C-02	LOM1:2-a => Bay 2:d1:v1	
+ Add	1									
ISCS	I HBA Connectio	ns								
FC H	BA Connection									
FCoE	E HBA Connectio	ons								
Port	Connect: FC SAN /	FCoE Network Name	Туре	Status	Port Speed Type	Allocated Port Sp	ee VWAPN	MAC	Mapping	Action
1	Bay1 FCoE_A	)	SAN	0	4	4 Gb - 8 Gb	50:06:0B:00:00:C2:DE:00	00-17-A4-77-7C-04	LOM1:1-b => Bay 1:d1:v2	
2	Bay 2 FCoE_B	J	SAN	0	4	4 Gb - 8 Gb	50:06:08:00:00:C2:DE:02	00-17-A4-77-7C-05	LOM1:2-b => Bay 2:d1:v2	Delete
+ Ad	ld									
	re Channel Boot Paran	eters								
Assi	an Profile to Se	rver Bay								
Enclose	ure Seri	er	Model		SN	Status P	ower UD			
c	7K-Bottom	Bay 1	* ProL	iant BL460c G	en8 MKQ32102H	ю 📀	• •			
									Apply Apply & Close	Cancel

**Figure 76 -** Define a Server Profile (App-1)

Figure 77 - Boot from SAN Connection Settings

FCoB	FCoE HBA Connections -				
Port	SAN Boot	Target Port Name (VWVPN)	LUN		
1	PRIMARY	50:08:05:F3:00:00:58:11	1		
2	SECONDARY	50:08:05:F3:00:00:58:12	1		
		Apply	Cancel		

**Note:** When choosing the Primary and Secondary ports, ensure that each port can access the ID provided on the fabric, the SAN Administrator should be able to provide this address, or it can also be discovered through the HBA/CNA BIOS utilities. The LUN number will vary depending on SAN Array vendor/model and the order in which the LUNs were assigned to the host within the SAN configuration.

#### Figure 78 - Server Profile View Bay 1

Define 👻 Co	onfigure 🔻	Tools 🔻	Help 🔻					
Bay 1 (P	roLiant	BL46	0c Ger	18)				
• •				•				
Device Bay S	status - Bay≉	¥ 1						
Overall Statu	IS:		🕗 ок					
Hardware	status:		📀 Normal					
VC Status	3:		🛇 ок					
Assigned Se	erver Profile	::	App-1					
Enclosure N	ame:		C7K-Botton	n				
UID:								
Power Statu	s/Control:		Off					
							Momentary Pr	ess
Blade Serve	r Informatio	n - Bay # 1	10000004	an.				
Serial Numb	er:		VCV0000V	9P				
Serial Numb	er (Logical):	:	VGAUUUUVUU 21262626 2126 584D 5422 202220212050					
	.n.		9230d5ad-	526e-4hf7-8124-hh3acd2	08c70			
Droduct Nam			ProLiant BI	460c Gen8	00010			
Server Nam	р. р.		TTOEMIN DE					
Part Number	r:		666161-B2	1				
Asset Tag:			[Unknow n]					
						_		_
Server Ether	rnet Adapter	r Informat		88-4-1			140404	
Ethernet Adapter	Flex NIC	Location	Port	Model	MAC Address	Network	WWN	SAN Fabric
Port 1								
	LOM1:1- a	FLB1	Bay 1:d1:v1	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-00	VLAN- 101-1		
	LOM1:1- b	FLB1	Bay 1:d1:v2	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-04		50:06:0B:00:00:C2:DE:00	FCoE_A
	LOM1:1- c	FLB1	Bay 1:d1:v3	HP FlexFabric 10Gb 2- port 554FLB Adapter	6C-3B-E5-A4- B0-6A			
	LOM1:1- d	FLB1	Bay 1:d1:v4	HP FlexFabric 10Gb 2- port 554FLB Adapter	6C-3B-E5-A4- B0-6B			
Port 2								
	LOM1:2- a	FLB1	Bay 2:d1:v1	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-02	VLAN- 101-2		
	LOM1:2- b	FLB1	Bay 2:d1:v2	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-05	(	50:06:0B:00:00:C2:DE:02	FCoE_B
	LOM1:2- c	FLB1	Bay 2:d1:v3	HP FlexFabric 10Gb 2- port 554FLB Adapter	6C-3B-E5-A4- B0-6E			
	LOM1:2- d	FLB1	Bay 2:d1:v4	HP FlexFabric 10Gb 2- port 554FLB Adapter	6C-3B-E5-A4- B0-6F			

# **Review**

In this scenario we have created Two Shared Uplink Sets (SUS), providing support for many VLANs. Uplinks originating from each FlexFabric Module connect to each SUS, by doing so we provide redundant connections out of the Virtual Connect domain. As multiple uplinks are used for each SUS, we have also leveraged LACP to improve uplink performance. In this scenario, all uplinks will be active. We also created two FCoE SAN Fabrics.

We created a server profile, with two NICs connected to the same external VLAN (101) through VC networks VLAN-101-1 and VLAN-101-2, which provides the ability to sustain a link or module failure and not lose connection to the network. VLAN101-1 and VLAN101-2 are configured to support VLAN 101, frames will be presented to the NIC(s) without VLAN tags (untagged), these two NICs are connected to the same VLAN, but taking a different path out of the enclosure.

Additionally, FCoE port 1 is connected to SAN fabric FCoE\_A and FCoE SAN port 2 is connected to SAN Fabric FCoE\_B, providing a multi-pathed connected to the SAN. The server profile was also configured for Boot to SAN over the FCoE connections. With Virtual Connect, there is no need to configure the SAN HBA directly when booting to SAN, all required configuration is maintained in the server profile. During installation of windows 2008 R2, ensure that Microsoft the MPIO role is enabled.

The FCoE SAN fabric connects to each SAN fabric over two uplinks per module.

## **Results – Windows 2008 R2 Networking Examples**

We have successfully configured FlexFabric with a shared uplink set and redundant SAN fabrics. We have created a server profile to connect the TWO NICs to VLAN 101 and the SAN fabrics using the FCoE connections created within the profile. We also configured the profile to Boot Windows 2008 R2 from a SAN LUN.

Although both Ethernet and Fibre channel connectivity is provided by the CNA used in the G7 and Gen 8 servers; each capability (LAN and SAN) is provided by a different component of the adapter, they appear in the server as individual network and SAN adapters.

**Figure 79** - Example of Emulex's OneCommand Manager Utility (formerly known as HBA Anywhere). Note that there are 3 Ethernet personalities and one FCoE personality per port, as configured in the server profile.



The following graphics show a Windows 2008 R2 server with TWO FlexNICs configured at 6Gb. You will also notice that Windows believes there are 6 NICs within this server. However, only TWO NICs

Scenario 3 – Shared Uplink Set with Active/Active Uplinks and 802.3ad (LACP) - Ethernet and FCoE Boot from SAN – Windows 2008 R2 77

are currently configured within the FlexFabric profile, the extra NICs are offline and could be disabled. If we did not require SAN connectivity on this server, the FCoE connections could be deleted and the server would then have 8 NIC ports available to the OS.

**Note:** the BL465c G7 and BL685c G7 utilize an NC551i chipset (BE2), whereas the BL460c G7, BL620c G7 and BL680c G7 utilize an NC553i chipset (BE3) and the Gen 8 blades typically have a NC554 adapter which also utilizes the BE3 chipset. Both the BE2 and BE3 chipsets share common drivers and firmware.

🖹 🕥 🗢 💷 🔹 Network and Internet	Network Connections	Search Network Connections
		<b>2</b> ,
Organize 🔻		i= - 🔟 (
Name	Status ~	Device Name
🚇 Local Area Connection	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter
Local Area Connection 2	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter #
🚇 Local Area Connection 3	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter #
🚇 Local Area Connection 6	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter #
Local Area Connection 4	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter #
Local Area Connection 5	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter #

Figure 80 - Windows 2008 R2 Network Connections (2 Connections Active)

**Note:** The NICs that are not configured within VC will appear with a red x as not connected. You can go into Network Connections for the Windows 2008 server and Disable any NICs that are not currently in use. Windows assigns the NICs as NIC 1-6, whereas three of the NICs will reside on LOM:1 and three on LOM:2. You may need to refer to the FlexFabric server profile for the NIC MAC addresses to verify which NIC is which.

Figure 81	- Windows	2008 R2	Extra N	letwork (	onnections –	- Disabled
i igui c o i	williaow J	2000 112	LAUGU		John Cellons	Disubicu

🚺 Network Connections		_ D ×
🜀 🕞 🖉 🔹 Network and Interne	t • Network Connections •	- 🚱 Search Network Connections
Organize 🔻		III 🕶 🗔 🔞
Name	Status ^	Device Name
Local Area Connection	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter
Local Area Connection 2	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #2
Local Area Connection 3	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #3
Local Area Connection 6	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #6
Local Area Connection 4	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter #4
Local Area Connection 5	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter #5
•		•

Figure 82 - Windows 2008 R2 Network Connection Status

Local Area Connection 5 Sta	itus X
General	
Connection	
IPv4 Connectivity:	No Internet access
IPv6 Connectivity:	No Internet access
Media State:	Enabled
Duration:	00:28:48
Speed:	10.0 Gbps
Details	
Activity	
Sent —	- Received
Bytes: 41	1,234
😚 Properties 😚 Disable	Diagnose
	Close

**Note:** In Windows 2008 and later the actual NIC speed is displayed as configured in server Profile. Also, note that the speed displayed is the maximum speed setting, not the minimum setting.

**Figure 83 -** Windows 2008 R2, Device Manager, SIX NICs are shown, however, we have only configured two of the NICs and two FCoE HBAs.



The following graphics provides an example of a Windows 2008 R2 server with TWO NICs connected to the network, initially each NIC has its own TCP/IP address, alternatively, both NICs could be teamed to provide NIC fail-over redundancy. If an active uplink or network switch were to fail, Virtual Connect would fail-over to the standby uplink. In the event of a Virtual Connect FlexFabric module failure, the server's NIC teaming software would see one of the NICs go offline, assuming it was the active NIC, NIC teaming would fail-over to the standby NIC.

#### Figure 84 - Each NIC is connected to VLAN 101

```
C:\Users\Administrator>ipconfig

Windows IP Configuration

Ethernet adapter NIC 2:

Connection-specific DNS Suffix .: vaolab.net

Link-local IPv6 Address ... .: fe80::2cc2:2e68:2a17:4494:21

IPv4 Address ... .: 192.168.1.102

Subnet Mask ... ... .: 192.168.1.102

Subnet Mask ... .: .: .: 192.168.1.254

Ethernet adapter NIC 1:

Connection-specific DNS Suffix .: vaolab.net

Link-local IPv6 Address ... .: fe80::5576:c578:f6e5:cc98:19

IPv4 Address ... .: 192.168.1.103

Subnet Mask ... .: .: 255.255.0

Default Gateway ... .: 192.168.1.254
```

#### **NIC Teaming**

If higher availability is desired, NIC teaming in Virtual Connect works the same way as in standard network configurations. Simply, open the NIC teaming Utility and configure the available NICs for teaming. In this example, we have only TWO NICs available, so selecting NICs for teaming will be quite simple. However, if multiple NICs are available, ensure that the correct pair of NICs is teamed. You will note the BAY#-Port# indication within each NIC. Another way to confirm you have the correct NIC is to verify through the MAC address of the NIC. You would typically TEAM a NIC from Bay 1 to Bay 2 for example.

The following graphics provide an example of a Windows 2008 R2 server with TWO NICs teamed and connected to the network. In the event of an Uplink or switch failure, the SUS will lose connection to the network; SmartLink will alert the NIC teaming software to this event, by turning the server NIC port off, causing the NIC teaming software to fail-over to the alternate NIC.

#### Figure 85 – Team both NICs, using the HP Network Configuration Utility

Network Configuration Utility Properties	?
HP Network Configuration Utility	
HP NICs: [5] HP FlexFabric 10Gb 2-port 554FLB Adapter #5 I/O Bay 2 Port 1 / 1] [4] HP FlexFabric 10Gb 2-port 554FLB Adapter #4 I/O Bay 1 Port 1 / 1	Teaming Setup Team Dissolve
Make a selection. You may view properties of an item at any time by Double-Clicking on it or Selecting and, then, Clicking Properties.	Save Properties
Help License Manager 🗆 Enable UID 🔽 Display Tray Icon	

**Figure 86 -** Both NICs for Profile App-1 are teamed and connected to the network through VLAN-Trunk-x, either path could be active

Network Configuration Utility Properties		<u>?</u> ×
HP Network Configuration Utility		
HP NICs:	Team	ing Setup
HP Network Team #1	Tean	ing setup
[5] HP FlexFabric 10Gb 2-port 554FLB Adapter #51/0 Bay 2 Port 1 / 1		eam
[4] HP FlexFabric 10Gb 2-port 554FLB Adapter #4 I/O Bay 1 Port 1 / 1	D	ssolve
	VLA	I(802.1Q)
		Save
J Make a selection. You may view properties of an item at any time by Double-Clicking on it or	_	
Selecting and, then, Clicking Properties.	Pr	operties
Help License Manager   Enable OID   Display Tray Icon	. (	
	ОК	Cancel

Various modes can be configured for NIC Teaming, such as NFT, TLB etc. Once the Team is created, you can select the team and edit its properties. Typically, the default settings can be used.

Figure 87 - View – Network Connections – NIC Team #1 – Windows

Retwork Connections		
🕒 🖓 🛛 🖉 🔹 Network and Internet 🗸 Netwo	ork Connections 👻 👻 🏹	Search Network Connections
Organize 🔻		III 🕶 🗔 🔞
Name	Status ^	Device Name
🔋 Local Area Connection	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter
Local Area Connection 2	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #2
Local Area Connection 3	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #3
Local Area Connection 6	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #6
Local Area Connection 4	Enabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #4
Local Area Connection 5	Enabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #5
Local Area Connection 8	vaolab.net	HP Network Team #1

Figure 88 - Both NICs are teamed and connect to the network with a common IP Address

en. Administrator: Command Prompt												
C:\Users\Administrator>ipconfig												
Windows IP Configuration												
Ethernet adapter Local Area Connection 5:												
Connection-specific DNS Suffix	. : vaolab.net											
Link-local IPv6 Address	. : fe80::9943:165b:ba23:75d2%27											
IPv4 Address	. : 192.168.1.102											
Subnet Mask	. : 255.255.255.0											
Default Gateway	. : 192.168.1.254											

## Results – Windows 2008 R2 SAN Connectivity

**Figure 89 -** By access the HBA BIOS during server boot, you can see that Port 1 of the FlexHBA is connected to an EVA SAN LUN

Emulex OneConnect FCoE BIOS Utility, XA4.03a5											
01: 554FLB: Mem Base: FBE00000 Firmware Version: 4.2.401.2215 BIOS: Disabled Port Name: 50060B0000C2DE00 Node Name: 50060B00000C2DE01 Vlan ID: 1001 DCBX mode: CEE mode											
	Devices	Present	on This A	dapter							
01. DID:010000 02. DID:010100 03. DID:010200 04. DID:010300	WWPN:50001FE1 WWPN:50001FE1 WWPN:50001FE1 WWPN:50001FE1	5005D468 5005D46C 5005D46A 5005D46B	LUN:01 LUN:01 LUN:01 LUN:01	HP HP HP HP	HSU210 HSU210 HSU210 HSU210 HSU210	5000 5000 5000 5000					
	Enter	<esc> to</esc>	Previous	Menu							

Figure 90 - Windows 2008 R2 Disk Administrator. Note; that C: is the SAN attached volume

Server Hallager	
File Action View Help	
🗇 🔿 🖄 📷 🔽 🖬 😰 😫	3
Server Manager (WINDOWS-V14N5 Consection of the section of the se	Disk Management         Volume List + Graphical View           Volume         Layout         Type         File System         Status           BfS LUN (C:)         Simple         Basic         NTFS         Healthy (System, Boot, Page File, Active, Crash Dump, Primary Part)
Windows Server Backup Disk Management	x
	Bisk 0         Bfs LUN (C:)           Basic         80.00 GB NTFS           Online         Healthy (System, Boot, Page File, Active, Crash Dump, Primary Partition)
▼	Unallocated Primary partition

# Summary

We presented a Virtual Connect Network scenario by creating two shared uplink sets (SUS), each SUS is connected with TWO active uplinks, both SUS' can actively pass traffic. We included a dual path FCoE SAN fabric for storage connectivity and boot to SAN.

When VC profile App-1 is applied to the server in bay1 and the server is powered up, it has one NIC connected through FlexFabric module 1 (connected to VLAN-101-1), the second NIC is connected through FlexFabric module 2 (connected to VLAN-101-2). Each NIC is configured at 6Gb. These NICs could now be configured as individual NICs with their own IP address or as a pair of TEAMED NICs. Either NIC could be active. As a result, this server could access the network through either NIC or either uplink, depending on which NIC is active at the time. Each NIC is configured for a guaranteed minimum bandwidth of 8Gb, with a maximum of 10Gb of network bandwidth and each FCOE port is configured for 4Gb of SAN bandwidth with the ability to burst to a maximum of 8Gb.

We also configured the server profile to Boot to SAN, this configuration is part of the profile, if the profile is moved to a different server bay, the Boot to SAN information will follow with the profile. The profile can also be copied and assigned additional server bays, each new profile will retain the Boot to SAN configuration, however, will also acquire new WWN addresses.

Additional NICs could be added within FlexFabric, by simply powering the server off and adding up to a total of 6 NICs, the NIC speed can then be adjusted accordingly to suit the needs of each NIC. If additional or less SAN bandwidth is required, the speed of the SAN connection can also be adjusted.

As additional servers are added to the enclosure, simply create additional profiles, or copy existing profiles, configure the NICs for LAN and SAN fabrics as required and apply them to the appropriate server bays and power the server on.

# Scenario 4 – Shared Uplink Set with Active/Active Uplinks and 802.3ad (LACP) – Ethernet, FCoE SAN - Windows 2008 R2 Hyper-V

# **Overview**

This scenario will implement the Shared Uplink Set (SUS) to provide support for multiple VLANs. The upstream network switches connect a shared uplink set to two ports on each FlexFabric modules, LACP will be used to aggregate those links.

As multiple VLANs will be supported in this configuration, the upstream switch ports connecting to the FlexFabric modules will be configured to properly present those VLANs. In this scenario, the upstream switch ports will be configured for VLAN trunking/VLAN tagging.

When configuring Virtual Connect, we can provide several ways to implement network fail-over or redundancy. One option would be to connect TWO uplinks to a single Virtual Connect network; those two uplinks would connect from different Virtual Connect modules within the enclosure and could then connect to the same upstream switch or two different upstream switches, depending on your redundancy needs. An alternative would be to configure TWO separate Virtual Connect networks, each with a single, or multiple, uplinks configured. Each option has its advantages and disadvantages. For example; an Active/Standby configuration places the redundancy at the VC level, where Active/Active places it at the OS NIC teaming or bonding level. We will review the second option in this scenario.

In addition, several Virtual Connect Networks can be configured to support the required networks to the servers within the BladeSystem enclosure. These networks could be used to separate the various network traffic types, such as iSCSI, backup and VMotion from production network traffic.

This scenario will also leverage the Fibre Channel over Ethernet (FCoE) capabilities of the FlexFabric modules. Each fibre channel fabric will have two uplinks connected to each of the FlexFabric modules.

## Requirements

This scenario will support both Ethernet and fibre channel connectivity. In order to implement this scenario, an HP BladeSystem c7000 enclosure with one or more server blades and TWO Virtual Connect FlexFabric modules, installed in I/O Bays 1& 2 are required. In addition, we will require ONE or TWO external Network switches. As Virtual Connect does not appear to the network as a switch and is transparent to the network, any standard managed switch will work with Virtual Connect. The fibre channel uplinks will connect to the existing FC SAN fabrics. The SAN switch ports will need to be configured to support NPIV logins. Two uplinks from each FlexFabric module will be connected to the existing SAN fabrics.

**Figure 91 - Physical View;** Shows two Ethernet uplinks from Ports X5 and X6 on Module 1 and 2 to Ports 1 and 2 on each network switch. The SAN fabrics are also connected redundantly, with TWO uplinks per fabric, from ports X1 and X2 on module 1 to Fabric A and ports X1 and X2 to Fabric B.



**Figure 92 - Logical View;** the server blade profile is configured with Four FlexNICs and 2 FlexHBAs. NICs 1 and 2 are connected to VLAN-101-x, NICs 3 and 4 are connected to multiple networks VLAN-102-x through VLAN-105-x and VLAN-2100 through 2150-x, which are part of the Shared Uplink Sets, VLAN-Trunk-1 and VLAN-Trunk-2 respectively. The VLAN-Trunks are connected, at 10Gb, to a network switch, through Ports X5 and X6 on each FlexFabric Module in Bays 1 and 2. In addition, SAN Fabric FCoE\_A connects to the existing SAN Fabric A through port X1 on Module 1 (Bay 1) and FCoE\_B connects to the existing SAN Fabric B through port X1 on Module 2 (Bay 2)



# Installation and configuration

### **Switch configuration**

Appendices A and B provide a summary of the commands required to configure the switch in either a Cisco or HP Networking (with both ProCurve and Comware examples). The configuration information provided in the appendices assumes the following information:

 The switch ports are configured as VLAN TRUNK ports (tagging) to support several VLANs. All frames will be forwarded to Virtual Connect with VLAN tags. Optionally, one VLAN could be configured as (Default) untagged, if so, then a corresponding vNet within the Shared Uplink Set would be configured and set as "Default".

**Note:** when adding additional uplinks to the SUS, if the additional uplinks are connecting from the same FlexFabric module to the same switch, in order to ensure all the uplinks are active, the switch ports will need to be configured for LACP within the same Link Aggregation Group.

The network switch port should be configured for Spanning Tree Edge as Virtual Connect appears to the switch as an access device and not another switch. By configuring the port as Spanning Tree Edge, it allows the switch to place the port into a forwarding state much quicker than otherwise, this allows a newly connected port to come online and begin forwarding much quicker.

The SAN connection will be made with redundant connections to each Fabric. SAN switch ports connecting to the FlexFabric module must be configured to accept NPIV logins.

### **Configuring the VC module**

- Physically connect Port 1 of network switch 1 to Port X5 of the VC module in Bay 1
- Physically connect Port 2 of network switch 1 to Port X6 of the VC module in Bay 1
- Physically connect Port 1 of network switch 2 to Port X5 of the VC module in Bay 2
- Physically connect Port 2 of network switch 2 to Port X6 of the VC module in Bay 2

**Note:** if you have only one network switch, connect VC ports X5 and X6 (Bay 2) to an alternate port on the same switch. This will NOT create a network loop and Spanning Tree is not required.

- Physically connect Ports X1/X2 on the FlexFabric in module Bay 1 to switch ports in SAN Fabric A
- Physically connect Ports X1/X2 on the FlexFabric in module Bay 2 to switch ports in SAN Fabric B

#### **VC CLI commands**

Many of the configuration settings within VC can also be accomplished via a CLI command set. In order to connect to VC via a CLI, open an SSH connection to the IP address of the active VCM. Once logged in, VC provides a CLI with help menus. Through this scenario the CLI commands to configure VC for each setting will also be provided.

#### **Configuring Expanded VLAN Capacity via GUI**

Virtual Connect release 3.30 provided an expanded VLAN capacity mode when using Shared Uplink Sets, this mode can be enabled through the Ethernet Settings tab or the VC CLI. The default configuration for a new Domain install is "Expanded VLAN Capacity" mode, Legacy mode is no longer available and the Domain cannot be downgraded.

### To verify the VLAN Capacity mode

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Expanded VLAN capacity
- Verify Expanded VLAN Capacity is configured and Legacy VLAN Capacity is greyed out.

**Note:** Legacy VLAN mode will only be presented if 1Gb Virtual Connect Modules are present, in which case the domain would be limited to Firmware version 3.6x.

### **Configuring Expanded VLAN Capacity via CLI**

The following command can be copied and pasted into an SSH based CLI session with Virtual Connect;

# Set Expanded VLAN Capacity set enet-vlan -quiet VlanCapacity=Expanded

#### Figure 93 - Enabling Expanded VLAN Capacity

Define 👻 Configure 👻 Tools 👻 Help 👻
Ethernet Settings
MAC Addresses Port Monitoring Advanced Settings
VLAN
Server VLAN Tagging Support
Force server connections to use the same VLAN mappings as shared uplink sets
VLAN Capacity
O Legacy VLAN capacity (Up to 320 VLANs per module and 28 VLANs per server connection).
Expanded VLAN capacity (Up to 1000 VLANs per domain and 162 VLANs per physical server port).
Multiple Networks Link Speed Settings
When using mapped VLAN tags (multiple networks over a single link), these settings will be used for the overall Link speed control.
Set a Custom value for Preferred Link Connection Speed
Set a Custom value for Maximum Link Connection Speed

**Note:** if a 1Gb VC Ethernet module is present in the Domain, Expanded VLAN capacity will be greyed out, this is only supported with 10Gb based VC modules. Also, once Expanded VLAN capacity is selected, moving back to Legacy VLAN capacity mode will require a domain deletion and rebuild.

#### Defining a new Shared Uplink Set (VLAN-Trunk-1)

Connect Ports X5 and X6 of FlexFabric module in Bay 1 to Ports 1 and 2 on switch 1 Create a SUS named VLAN-Trunk-1 and connect it to FlexFabric Ports X5 and X6 on Module 1

- On the Virtual Connect Home page, select Define, Shared Uplink Set
- Insert Uplink Set Name as VLAN-Trunk-1
- Select Add Port, then add the following port;
  - Enclosure 1, Bay 1, Port X5
  - Enclosure 1, Bay 1, Port X6

efine 🔻 Configu	ıre <del>v</del> Tools <del>v</del> H	lelp 🕶			-			
Edit Shared	Uplink Set: '	VLAN-Trunk-1						
Ethernet Sha	ured External Up	olink Set						
Uplink Set Name		Status PID						
VLAN-Trunk-1		<b>O</b>						
External Uplin	nk Ports							
Port	Port Role	Port Status		Connector	Type Connected To	PID	Speed/Duplex	Action
C7K-Bottom Bay 1: Port X5	NA	C Linked-Active	10 Gb	SFP-DAC	HP (Ten-GigabitEthernet1/0/5)		Auto	Delete
C7K-Bottom Bay 1: Port X6	NA	C Linked-Active	10 Gb	SFP-DAC	HP (Ten-GigabitEthernet1/0/6)		Auto	Delete
Connection Mode	Auto     Failover	LACP Timer:	Short (1 sec)					
Associated I	FCoE Network (\	/LAN tagged)				+ A	dd 🧪 Edit 🥤	) Delete
Associated I	Networks (VLAN	tagged)				[	+ Add 1	) Delete

Figure 94 - Shared Uplink Set (VLAN-Trunk-1) Uplinks Assigned

- Click Add Networks and select the Multiple Networks radio button and add the following VLANs;
  - o Enter Name as VLAN-
  - o Enter Suffix as -1
  - Enter VLAN IDs as follows (and shown in the following graphic);
- 101-105,2100-2400
- Enable SmartLink on ALL networks
- Click Advanced
  - Configure Preferred speed to 4Gb
  - Configure Maximum speed to 8Gb
- Click Apply

**Note:** you can optionally specify a network "color" or "Label" when creating a shared Uplinkset and its networks. In the example above we have not set either color or label.

<b>Figure</b>	95 - (	Ireating	VLANs	in a	Shared	Uplink	Set

sociated Networks (VLAN tag	jed)	
Yould you like to add		
a single Associated Network 💿 n	nultiple Associated Networks	
,,		
Network Name VLAN-	+ VLAN ID + -1	
Sample network name: VLAN-2400-1		
VLAN ID(s) * 101-105,2100-	2400	
		-
Color none Labels	Type to add Network Labels	
	lype to add Network Labels	_
The 306 networks being created	cannot all be marked Private. The domain can only support 128 more private network(s) before reaching the limit of 128	-
Smart Link 🗌 Private Network		
Advanced Network Settings		
_	7	
Set preferred connection speed		
Selected Speed: 4 Gb		
0.1 Gb 8 Gb		
Selected Speed:		
0.1 Gb 10 Gb		
		~
e network access group names		
Default ×		
e letters or numbers ('a', '2', 'e', 'nag', 'defa	ult')	
	Apply	ncel

**Note:** If the VC domain is not in Expanded VLAN capacity mode, you will receive an error when attempting to create more that 128 VLANs in a SUS. If that occurs, go to Advanced Ethernet Settings and select Expanded VLAN capacity mode and apply.

After clicking apply, a list of VLANs will be presented as shown below. If one VLAN in the trunk is untagged/native, see note below.

• Click Apply at the bottom of the page to create the Shared Uplink Set

Figure 96 - Associated VLANs for Shared Uplink Set VLAN-Trunk-1

Define 🔻	Configure 👻 Tools 👻 Help 👻					
Edit S	hared Uplink Set: VLAN-Trunk-1					
Asso	ciated FCoE Network (VLAN tagged)					
					+ Ad	.d 🧪 Edit 🏦 Delete
Asso	ciated Networks (VLAN tagged)					
	(					+ Add 🏦 Delete
	Network Name	VLAN ID	Native	Smart Link	Private Network	Action
	VLAN-101-1	101	false	true	false	Edit 📼 🔺
	VLAN-102-1	102	false	true	false	Edit 📼
	VLAN-103-1	103	false	true	false	Edit 📼
	VLAN-104-1	104	false	true	false	Edit 👻
	VLAN-105-1	105	false	true	false	Edit 💌
	VLAN-2100-1	2100	false	true	false	Edit 📼
	VLAN-2101-1	2101	false	true	false	Edit 📼
	VLAN-2102-1	2102	false	true	false	Edit 💌
	VLAN-2103-1	2103	false	true	false	Edit 👻
	VLAN-2104-1	2104	false	true	false	Edit 💌
	VLAN-2105-1	2105	false	true	false	Edit 👻
	VLAN-2106-1	2106	false	true	false	Edit 📼
	VLAN-2107-1	2107	false	true	false	Edit 👻
	VLAN-2108-1	2108	false	true	false	Edit 👻
	VLAN-2109-1	2109	false	true	false	Edit 👻
	VLAN-2110-1	2110	false	true	false	Edit 👻
	VI 8NL2111-1	2111	folco	true	false	Edit -

**Note:** Optionally, if one of the VLANs in the trunk to this shared uplink set were configured as Native or Untagged, you would be required to "edit" that VLAN in the screen above, and configure Native as TRUE. This would need to be set for BOTH VLAN-Trunk-1 and VLAN-Trunk-2.

#### Defining a new Shared Uplink Set (VLAN-Trunk-2)(Copying a Shared Uplink Set)

The second Shared Uplink Set could be created in the same manner as VLAN-Trunk-1 however; VC now provides the ability to COPY a VC Network or Shared Uplink Set.

- Connect Ports X5 and X6 of FlexFabric module in Bay 2 to Ports 1 and 2 on switch 2
- In the VC GUI screen, select Shared Uplink Sets in the left pane, in the right pane VLAN-Trunk-1 will be displayed, left click VLAN-Trunk-1, it will appear as blue, right click and select COPY
- Edit the Settings as shown below, the new SUS name will be VLAN-Trunk-2 and ALL the associated VLANs with have a suffix of 2
- In step 3, ADD uplinks X5 and X6 from Bay 2
- Click OK
- The SUS and ALL VLANs will be created

Figure 97 - Copying a SUS and ALL VLANs

Name VLAN-Trunk-2	
Associated Networks (	VLANs)
Replace last 👻 instance(s	) of 1 with 2
VLAN-Trunk-1 Original	VLAN-Trunk-2 Copy
VLAN-101- <u>1</u>	▲ VLAN-101- <u>2</u>
VLAN-102- <u>1</u>	VLAN-102- <u>2</u>
VLAN-103- <u>1</u>	VLAN-103- <u>2</u>
VLAN-104- <u>1</u>	VLAN-104- <u>2</u>
VLAN-105- <u>1</u>	VLAN-105- <u>2</u>
VLAN-2100-1	▼ VLAN-2100- <u>2</u>

#### **Defining a new Shared Uplink Set via CLI**

The following script can be used to create the first Shared Uplink Set (VLAN-Trunk-1)

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

# Create Shared Uplink Set VLAN-Trunk-1 and configure uplinks add uplinkset VLAN-Trunk-1 add uplinkport enc0:1:X5 Uplinkset=VLAN-Trunk-1 speed=auto add uplinkport enc0:1:X6 Uplinkset=VLAN-Trunk-1 speed=auto

# Create Networks VLAN-101-1 through VLAN-105-1 and 2100-2400 for Shared Uplink Set VLAN-Trunk-1

add network-range -quiet UplinkSet=VLAN-Trunk-1 nameprefix=VLAN- namesuffix=-1 vlanids=101-105,2100-2400 NAGs=Default PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000 SmartLink=Enabled

The following script can be used to create the Second Shared Uplink Set (VLAN-Trunk-2)

# Create Shared Uplink Set VLAN-Trunk-2 and configure uplinks add uplinkset VLAN-Trunk-2 add uplinkport enc0:2:X5 Uplinkset=VLAN-Trunk-2 speed=auto add uplinkport enc0:2:X6 Uplinkset=VLAN-Trunk-2 speed=auto

# Create Networks VLAN101-2 through VLAN105-2 and VLAN-2100-2 through VLAN-2400-2 for Shared Uplink Set VLAN-Trunk-2 add network-range -quiet UplinkSet=VLAN-Trunk-2 NamePrefix=VLAN- NameSuffix=-2 VLANIds=101-105,2100-2400 NAGs=Default PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000 SmartLink=Enabled

Please refer to Appendix D; "Scripting the Native VLAN" for scripting examples.

**Note:** In this scenario we have created two independent Share Uplink Sets (SUS), each originating from the opposite FlexFabric Modules, by doing so we provide the ability to create separate and redundant connections out of the Virtual Connect domain. When we create the server profiles, you will see how the NICs will connect to VLANs accessed through the opposite VC module, which provides the ability to create an Active / Active uplink scenario. Alternatively, we could have created a single SUS and assigned both sets of these uplink ports to the same SUS, however, this would have provided an Active/Standby uplink scenario, as shown in Scenario 5.

### Defining a new (FCoE) SAN Fabric via GUI

Create a Fabric and name it "FCoE\_A"

- On the Virtual Connect Manager screen, click Define, SAN Fabric to create the first Fabric
- Enter the Network Name of "FCoE\_A"
- Select Add Port, then add the following ports;
  - o Enclosure 1, Bay 1, Port X1
  - o Enclosure 1, Bay 1, Port X2
- Ensure Fabric Type is set to "FabricAttach"
- Select Show Advanced Settings
  - Select Automatic Login Re-Distribution (FlexFabric Only)
  - Select Set Preferred FCoE Connect Speed
    - Configure for 4Gb
  - Select Set Maximum FCoE Connect Speed
    - Configure for 8Gb
- Select Apply

Create a second Fabric and name it "FCoE\_B"

- On the Virtual Connect Manager screen, click Define, SAN Fabric to create the second Fabric
- Enter the Network Name of "FCoE\_B"
- Select Add Port, then add the following ports;
  - Enclosure 1, Bay 2, Port X1
  - Enclosure 1, Bay 2, Port X2
- Ensure Fabric Type is set to "FabricAttach"
- Select Show Advanced Settings
  - Select Automatic Login Re-Distribution (FlexFabric Only)
  - Select Set Preferred FCoE Connect Speed
    - Configure for 4Gb
  - Select Set Maximum FCoE Connect Speed
    - Configure for 8Gb
- Select Apply

#### **Defining SAN Fabrics via CLI**

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

#Create the SAN Fabrics FCoE\_A and FCoE\_B and configure uplinks as discussed above add fabric FCoE\_A Type=FabricAttach Bay=1 Ports=1,2 Speed=Auto LinkDist=Auto PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000 add fabric FCoE\_B Type=FabricAttach Bay=2 Ports=1,2 Speed=Auto LinkDist=Auto PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000

etine - Conti		→ H     H	eip 🔻	_				_		
efine SAI	N Fabric									
Fabric										
Fabric Name FC0E_A		Fabri	ric Type	*	Login Re-Distribution		Configured Speed		Show Advanced Settings         Manual Login Re-Distribution         Automatic Login Re-Distribution         Setected Speed:         Image: Set Maximum FCoE Connection Speed:         Image: Setected Speed:	ad (
Enclosure	Uplink Ports									_
Uplink Port	Enclosure	Bay	/ Port S	Status	Connected To	Action				
Uplink Port X1	C7K-Bottom	1	0	8 Gb	10:00:00:27:18:46:09:38	Delete				
Uplink Port X2	C7K-Bottom	1	0	8 Gb	10:00:00:27:f8:46:09:38	<u>Delete</u>				
Add Port										
Bay 1	*									

#### Figure 98 - SAN Configuration and Advanced Settings

**Figure 99 -** FCoE SAN fabrics configured with two 8Gb uplinks per fabric. Note the bay and port numbers on the right

AN Fabrics												
I Connections	Server Connections											
SAN Fabric	Fabric Type	Login Re-Distribution	Port Status	Connected To	Enclosure	Bay	Port	Action				
FCoE_A	FabricAttach	AUTOMATIC	🔮 8 Gb	10:00:00:27:18:46:09:38	C7K-Bottom	1	X1	Edit 📼				
			📀 8 Gb	10:00:00:27:18:46:09:38	C7K-Bottom	1	X2					
FCoE_B	FabricAttach	AUTOMATIC	💙 8 Gb	10:00:00:27:18:3a:5d:88	C7K-Bottom	2	X1	Edit 💌				
			🔮 8 Gb	10:00:00:27:f8:3a:5d:88	3 C7K-Bottom	2	X2					
	Abrics	Server Connections           San Fabric         Fabric Attach           FC0E_B         Fabric Attach	Server Connections           San Fabric         Fabric Type         Login Re-Distribution           FCoE_A         FabricAttach         AUTOMATIC           FCoE_B         FabricAttach         AUTOMATIC	Server Connections           San Fabric         Fabric Type         Login Re-Distribution         Port Status           FCoE_A         FabricAttach         AUTOMATIC         © 8 Gb         % 8 Gb	Software         Server Connections           SAN Flakmic         Fabric Type         Login Re-Distribution         Port Status         Connected To           FCoE_A         FabricAttach         AUTOMATIC         © 8 Gb         10:00:00:27/16:46:09:36           FCoE_B         FabricAttach         AUTOMATIC         © 8 Gb         10:00:00:27/16:46:09:38           FCoE_B         FabricAttach         AUTOMATIC         © 8 Gb         10:00:00:27/16:36:36:38	SAN FabricS         Server Connections         Server Connections         Port Status         Connected To         Enclosure           SAN Fabric         Fabric Type         Login Re-Distribution         Port Status         Connected To         Enclosure           FCoE_A         Fabric Attach         AUTOMATIC              8 6b         10:00:00:27:16:46:09:38 C7K-Bottom              9 8 6b         10:00:00:27:16:46:09:38 C7K-Bottom              FCoE_B              PabricAttach         AUTOMATIC              8 8 6b              10:00:00:27:16:36:08:36 C7K-Bottom	Sourcetions         Server Connections           SAN Flatnic         Fabric Type         Login Re-Distribution         Port Status         Connected To         Enclosure         Bay           FCoE_A         FebricAttach         AUTOMATIC         © 8 Gb         10000027/16/36/08/38 C7K-Bottom         1           FCoE_B         FabricAttach         AUTOMATIC         © 8 Gb         10000027/16/36/88 C7K-Bottom         1           FCoE_B         FabricAttach         AUTOMATIC         © 8 Gb         10000027/16/36/88 C7K-Bottom         1	Sourcections         Server Connections           SAN Flakmic         Fabric Type         Login Re-Distribution         Port Status         Connected To         Enclosure         Bay         Port           FCoE_A         FebricAttach         AUTOMATIC         © 8 Gb         10000027/16/36/08/38 C7K-Bottom         1         X1           FCoE_B         FabricAttach         AUTOMATIC         © 8 Gb         10000027/16/36/88 C7K-Bottom         1         X2           FCoE_B         FabricAttach         AUTOMATIC         © 8 Gb         10000027/16/36/88 C7K-Bottom         1         X2				

### **Defining a Server Profile**

We will create a server profile with two server NICs. Each server NIC will connect to a specific network.

- On the main menu, select Define, then Server Profile
- Create a server profile called "App-1"
- In the Network Port 1 drop down box, select VLAN101-1
- Set the port speed to Custom at 1Gb
- In the Network Port 2 drop down box, select VLAN101-2
- Set the port speed to Custom at 1Gb
- Left click on either of Port 1 or Port 2 in the Ethernet Connections box, and select ADD network (add two additional network connections)
- In the Network Port 3 drop down box, select Multiple Networks
- Configure for networks VLAN-102-1 through VLAN-105-1 and VLAN-2100-1 through VLAN-2150-1
- Leave the network speed as Auto
- In the Network Port 4 drop down box, select Multiple Networks
- Configure for networks VLAN-102-2 through VLAN-105-2 and VLAN-2100-2 through

VLAN-2150-2

- Leave the network speed as Auto
- Expand the FCoE Connections box, for Bay 1, select FCoE\_A for Bay 2, select FCoE\_B
- Do not configure FC SAN or iSCSI Connection
- In the Assign Profile to Server Bay box, locate the Select Location drop down and select Bay 1, then apply

Prior to applying the profile, ensure that the server in Bay 1 is currently OFF

**Note:** You should now have a server profile assigned to Bay 1, with 4 Server NIC connections. NICs 1&2 should be connected to networks VLAN-101-x, NICs 3&4 should be connected to networks VLAN102-x through VLAN105-x and VLAN-2100-x through VLAN-2150-x. FCoE SAN fabrics are connected to, Port 1 - FCoE\_A and Port 2 - FCoE\_B.

#### **Defining a Server Profile via CLI**

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

# Create Server Profile App-1 add profile App-1 -nodefaultfcconn -nodefaultfcoeconn set enet-connection App-1 1 pxe=Enabled Network=VLAN-101-1 SpeedType=Custom Speed=1000 set enet-connection App-1 2 pxe=Disabled Network=VLAN-101-2 SpeedType=Custom Speed=1000 add enet-connection App-1 pxe=Disabled add server-port-map-range App-1:3 UplinkSet=VLAN-Trunk-1 VLanIds=102-105.2100-2150 add enet-connection App-1 pxe=Disabled add server-port-map-range App-1:4 UplinkSet=VLAN-Trunk-1 VLanIds=102-105,2100-2150 set enet-connection App-1 3 SpeedType=Preferred set enet-connection App-1 4 SpeedType=Preferred add fcoe-connection App-1 Fabric=FCoE\_A SpeedType=4Gb add fcoe-connection App-1 Fabric=FCoE B SpeedTvpe=4Gb poweroff server 1 assign profile App-1 enc0:1

**Note:** The "add server-port-map-range" command is new to VC firmware release 3.30 and can be used to map many VLANs to a server NIC, in a single command. Prior releases would have required one command to create the NIC and one additional command per VLAN mapping added. This command will make profile scripting much easier, less complicated and quicker.

**Note:** The speed of the NIC and SAN connections, as well as the MAC and WWN. Also, note that the FCoE connections are assigned to the two SAN fabrics created earlier and use ports LOM:1-b and LOM:2-b.

Figure 100 - Define a Server Profile (App-1) Hyper-V Host

Uenn	e <del>-</del> Configure	+ Tools + Help +											
Edi	Edit Server Profile: App-1												
Pro	file Norne	Network Acces	s Group Status	Serial Num	ber Serve	UUD							
Ар	ч	Default		VCX0000V	10 53ed29	10-0980-4189-ad1	5-c6b633c13a7c						
Et	hemet Adapte	r Connections								-			
Po	t Network Name		Statu Port Speed Typ	•	Allocated Port Spee.	PXE	Multicest Filter	MAC	Mapping	Action			
1	VLAN-101-1		CUSTOM		(1 Gb-8 Gb	ENABLED	None	00-17-A4-77-7C-00	LOM1:1-a => Bay 1:d1:v1				
2	VLAN-101-2		CUSTOM		😒 1 Gb - 8 Gb	DISABLED	None	00-17-A4-77-7C-02	LOM1:2-a => Bay 2:d1:v1				
3	Multiple Netw	orks 😒	PREFERRED	)	5 Gb - 10 Gb	DISABLED	None	00-17-A4-77-7C-04	LOM1:1-c => Bay 1:d1:v3				
4	Multiple Netw	orks 😒	PREFERRED	)	5 Gb - 10 Gb	DISABLED	None	00-17-A4-77-7C-06	LOM1:2-c => Bay 2:d1:v3	Delete			
iS F(	CSI HBA Conn : HBA Connec	ections tions								÷			
F	OE HBA Conr	ections								-			
Po	t Connecti FC	SAN / FCoE Network Name	Туре	Status	Port Speed Type	Allocated Port Spe	e VWVPN	MAC	Mapping	Action			
1	Bay 1 FC	E_A	SAN	<b>e</b>	4	4 Gb - 8 Gb	50:06:0B:00:00:C2:DE:00	00-17-A4-77-7C-08	LOM1:1-b => Bay 1:d1:v2				
2	Bay 2 FC	E_B	SAN	<b>•</b>	4	4 Gb - 8 Gb	50.06.0B.00.00.C2.DE.02	00-17-A4-77-7C-09	LOM1:2-b => Bay 2:d1:v2	Delete			
+	Add Fibre Channel Boot	Poromotors											
A	isign Profile t	o Server Bay											
En	losure	Server	Model		SN	Stetus I	Power UID						
	C7K-Bottom	Boy 1	▼ Prol	iant BL460	c Gen8 MXQ32102H	к 📀	•						
_									Apply Apply & Close	Cancel			

Figure 101 - Configure NICs 3 and 4 for multiple Networks and select the appropriate VLANs

t Server Profile: App-1					
le Name Network Access Group Status 1 Default • ?					
ernet Adapter Connections Iver VLAN Tag to vNet Mappings 💿					
Force the same VLAN mappings as in the Shared Uplink Set None tworks not in mapping unchapetical Filtered	•	Networks in mapping Drag and drop networks	(55 mapped; li to include them (	mit is 162) or remove them fro	om the mapping
All A-C D-F G-I J-L M-O P-R S-V W-Z D-3 4-	6 7-9	∨Net Name	Stat us	Uplink Server VLAN Id VLAN Id	Untagg ed
ℓ VLAN-101-1 Ø	<b>A</b>	VLAN-102-1	⊘ (	102 102	
ຍ ຢີຍ VLAN-101-2 ⊘		VLAN-103-1	0	103 103	
🖞 VLAN-102-2	í 🗌	VLAN-104-1	0	104 104	
	í	VLAN-105-1	0	105 105	
🖉 VLAN-104-2	í 📗	VLAN-2100-1	0	2100 2100	
🖞 VLAN-105-2	1	VLAN-2101-1	0	2101 2101	
🖉 VI AN-2100-2		VLAN-2102-1	0	2102 2102	
() · · · · · · · · · · · · · · · · · · ·	( L	VLAN-2103-1	0	2103 2103	
A VLAN-2101-2					

**Note:** "Server VLAN ID" and "Untagged" boxes can be edited. One network per port could be marked as "Untagged', in which case the server would not be configured for tagging on that VLAN. It is also possible to change the VLAN ID that is presented to the server (VLAN translation), in which case the communications between Virtual Connect and the network would be the VLAN ID in grey, if the Server VLAN ID box to the right were changed, VC would communication with the server on the new VLAN ID, providing a VLAN translation function. VLAN translation could be a very useful feature, in the event that VLAN renumbering is required within the datacenter. The network VLAN numbers and Shared Uplink Set configurations could be changed to reflect the new VLAN IDs used, however, the old VLAN IDs could still be presented to the server providing the ability to delay or eliminate the need to change the VLAN ID used within the server/vSwitch.

#### Figure 102 - Server Profile View Bay 1

efine 👻 C	onfigure 🔻	Tools 🔻	Help 🔻					
Bay 1 (F	ProLiant	BL460	)c Ger	18)				
Device Bay S	Status - Bav #	¥1						-
- Overall Statu	us:		Ок					
Hardware	e Status:		Normal					
VC Status	s:		Øок					
Assigned S	erver Profile	:	App-1					
- Enclosure N	lame:		C7K-Botton	n				
UID:								
Power Statu	ıs/Control:		● Off					
							Momentary Pr	ess
Blade Serve	r Informatio	n - Bav #4						
Serial Numb	er:		MXQ30301	9P				
Serial Numb	er (Logical):		VCX0000V	00				
UUID:			31363636-	3136-584D-5133-3033303	313950			
UUID (Logica	al):		5a7144e8-:	2876-4868-a2cd-f61dfcdr	de4d0			
Product Nan	ne:		ProLiant BL	.460c Gen8				
Server Nam	e:							
Part Numbe	г:		666161-B2	1				
Asset Tag:			[Unknown]					
Server Ethei	rnet Adaptei	r Informati	ion					
Ethernet Adapter	Flex NIC	Location	Module Port	Model	MAC Address	Network	WWN	SAN Fabri
Port 1								
	LOM1:1- a	FLB1	Bay 1:d1:v1	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-00	VLAN- 101-1		
	LOM1:1- b	FLB1	Bay 1:d1:v2	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-08	$\sum$	50:06:0B:00:00:C2:DE:00	FCoE
	LOM1:1- c	FLB1	Bay 1:d1:v3	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-04	Multiple Networks		
	LOM1:1- d	FLB1	Bay 1:d1:v4	HP FlexFabric 10Gb 2- port 554FLB Adapter	6C-3B-E5-A4- B0-6B			
Port 2								
	LOM1:2- a	FLB1	Bay 2:d1:v1	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-02	VLAN- 101-2		
	LOM1:2- b	FLB1	Bay 2:d1:v2	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-09		50:06:0B:00:00:C2:DE:02	FCoE
	LOM1:2- c	FLB1	Bay 2:d1:v3	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-06	Multiple Networks	]	

**Figure 103 -** By clicking on the "Multiple Networks" statement for each LOM, the following page is displayed, which lists the VLAN connections for this port.

Define -	Configura -	Toolo -	Holp -	

		Back to Previoue Page
		Dack to Flevious Fage
lultip	e Networks	
	Network Name	VLAN ID
	VLAN-102-1	102
	VLAN-103-1	103
)	VLAN-104-1	104
	VLAN-105-1	105
i	VLAN-2100-1	2100
;	VLAN-2101-1	2101
r	VLAN-2102-1	2102
3	VLAN-2103-1	2103
)	VLAN-2104-1	2104
0	VLAN-2105-1	2105
1	VLAN-2106-1	2106
2	VLAN-2107-1	2107
3	VLAN-2108-1	2108
4	VLAN-2109-1	2109
5	VLAN-2110-1	2110
6	VLAN-2111-1	2111
7	VLAN-2112-1	2112
8	VLAN-2113-1	2113
9	VLAN-2114-1	2114
20	VLAN-2115-1	2115
21	VLAN-2116-1	2116
22	VLAN-2117-1	2117
3	VLAN-2118-1	2118
24	VLAN-2119-1	2119
5	VLAN-2120-1	2120
:6	VLAN-2121-1	2121
27	VLAN-2122-1	2122
8	VLAN-2123-1	2123
29	VLAN-2124-1	2124
0	VLAN-2125-1	2125
4	VU AN DADE 4	24.26

## Review

In this scenario we have created Two Shared Uplink Sets (SUS), providing support for many VLANs. Uplinks originating from each FlexFabric Module connect to each SUS, by doing so we provide redundant connections out of the Virtual Connect domain. As multiple uplinks are used for each SUS, we have also leveraged LACP to improve uplink performance. In this scenario, all uplinks will be active. We also create two FCoE SAN Fabrics.

We created a server profile, with FOUR NICs. Two connected to the same VLAN (101), Port 1 connects to VLAN-101-1 and Port 2 connects to VLAN-101-2, which provides the ability to sustain a link or module failure and not lose connection to the network. VLAN-101-1 and VLAN-101-2 are configured to support VLAN 101, frames will be presented to the NIC(s) without VLAN tags (untagged), these two NICs are connected to the same VLAN, but taking a different path out of the enclosure.

Network Ports 3 and 4 were added, these NICs will be connected to "Multiple Networks" and each NIC will then be configured for networks VLAN-102-x through VLAN-105-x and networks VLAN-

2100-x through VLAN-2150-x. As these networks are tagging, frames will be presented to the server with VLAN tags. NICs 3 and 4 will be teamed and connected to a Hyper-V virtual switch. VLAN tagged frames for these networks will be forwarded to the Virtual switch and then passed on to the appropriate Virtual Machine, VLAN tags will be removed as the frames are passed to the virtual machine. NICs 3 and 4 had their speed set to Auto, as NICs 1 and 2 were set to 1Gb, NICs 3 and 4 received 5Gb of bandwidth. As the networks had a maximum speed configured for 8Gb, the maximum speed for all NICs is 8Gb.

Additionally, FCoE port 1 is connected to SAN fabric FCoE\_A and FCoE SAN port 2 is connected to SAN Fabric FCoE\_B, providing a multi-pathed connected to the SAN.

The FCoE SAN fabric connects to each SAN fabric over a pair of uplinks per module. SAN logins are distributed across the multiple paths.

## **Results – Windows 2008 R2 Networking Examples**

We have successfully configured FlexFabric with two shared uplink sets and redundant SAN fabrics. We have created a server profile with FOUR NICs, two connected to VLAN 101 and TWO connected to multiple tagged VLANs. We also configured SAN fabrics using the FCoE connections created within the profile.

Although both Ethernet and Fibre channel connectivity is provided by the CNA used in the G7 and Gen 8 servers; each capability (LAN and SAN) is provided by a different component of the adapter, they appear in the server as individual network and SAN adapters.

**Figure 104 -** Example of Emulex's OneCommand Manager Utility (formerly known as HBA Anywhere). Note that there are 3 Ethernet personalities and one FCoE personality per port, as configured in the server profile.



The following graphics show a Windows 2008 R2 server with FOUR FlexNICs configured, two at 1Gb and two at 5Gb. You will also notice that Windows believes there are 6 NICs within this server. However, only four NICs are currently configured within FlexFabric, the extra NICs are offline and could be disabled. If we did not require SAN connectivity on this server, the FCoE connections could be deleted and the server would then have 8 NIC ports available to the OS.

**Note:** the BL465c G7 and BL685c G7 utilize an NC551i chipset (BE2), whereas the BL460c G7, BL620c G7 and BL680c G7 utilize an NC553i chipset (BE3) and the Gen 8 blades typically have a NC554 adapter which also utilizes the BE3 chipset. Both the BE2 and BE3 chipsets share common drivers and firmware.

Network Connections			
GO V 🔮 • Network and	I • Network Connections •	Search Network Connections	2
Organize 🔻		8== -	•
Name	Status -	Device Name	
💭 Local Area Connection 2	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter #	2
💭 Local Area Connection 3	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter #	3
Local Area Connection	Unidentified network	HP FlexFabric 10Gb 2-port 554FLB Adapter	
Local Area Connection 6	Unidentified network	HP FlexFabric 10Gb 2-port 554FLB Adapter #	6
Local Area Connection 4	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter #	4
Local Area Connection 5	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter #	5

Figure 105 - Windows 2008 R2 Network Connections (4 Connections Active)

**Note:** The NICs that are not configured within VC will appear with a red x as not connected. You can go into Network Connections for the Windows 2008 R2 server and disable any NICs that are not currently in use. Windows assigns the NICs as NIC 1-6, whereas three of the NICs will reside on LOM:1 (a,c &d)and three on LOM:2 (a,c &d). You may need to refer to the FlexFabric server profile for the NIC MAC addresses to verify which NIC is which.

Figure 106 - Windows 2008 R2 Network Connections (2 Connections Disabled)

→ 🖓 🗢 🔛 🗸	d I • Network Connections •	<ul> <li>Search Network Connections</li> </ul>
Organize 🔻		III 👻 🔽 🚺
Name	Status ~	Device Name
Local Area Connection 2	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #2
Local Area Connection 3	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #3
Local Area Connection	Unidentified network	HP FlexFabric 10Gb 2-port 554FLB Adapter
Local Area Connection 6	Unidentified network	HP FlexFabric 10Gb 2-port 554FLB Adapter #6
Local Area Connection 4	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter #4
Local Area Connection 5	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter #5





**Note:** In windows 2003 the NIC speeds may not be shown accurately when speeds are configured in 100MB increments above 1Gb. ie: if a NIC is configured for 2.5Gb it will be displayed in Windows 2003 as a 2Gb NIC. Windows 2008 does not have this limitation. In addition, as Virtual Connect 4.01 now provides the Min/Max network speed setting, even though we set the NIC to 1 and 5Gb, and set the maximum to 8Gb, the NIC displays the speed of 8Gb.

**Figure 108 -** Windows 2008 R2, Device Manager, SIX NICs are shown, however, we have only configured four of the NICs and two FCoE HBAs.



The following graphics provides an example of a Windows 2008 R2 server with four NICs connected to the network, initially each NIC has its own TCP/IP address, alternatively, NICs could be teamed to provide NIC fail-over redundancy. In this scenario we will create two teams, one for the management network (VLAN 101) and one for the Virtual guest networks (VLANs 102 through 105 and VLANs 2100 through 2150). If an active uplink or network switch were to fail, Virtual Connect would fail-over to the standby uplink. In the event of a Virtual Connect FlexFabric module failure, the server's NIC teaming software would see one of the NICs go offline, assuming it was the active NIC, NIC teaming would fail-over to the standby NIC.

**Figure 109 –** Two NICs for Profile App-1are connected to the network through VLAN-101 and two NICs are connected to support all other VLANs. Those VLANs are tagged and no DHCP server is present on that network.

Administrator: Command Prompt				
Microsoft Windows [Version 6.1.7601] Copyright (c) 2009 Microsoft Corporation	n. All rights reserved.			
C:\Users\Administrator>ipconfig				
Windows IP Configuration				
Ethernet adapter Local Area Connection (	6 :			
Connection-specific DNS Suffix . : ; Link-local IPV6 Address . : ; Autoconfiguration IPV4 Address . : ; Subnet Mask . : ; Default Gateway : ;	fe80::c988:19b3:5040:7b3fx20 169.254 £23.63 255.255.0.0			
Ethernet adapter Local Area Connection S	5:			
Connection-specific DNS Suffix Link-local IPv6 Address IPv4 Address	vaolab.net fe80::bf:b90b:4f39:b04ax19 192.168.101.101 255.255.255.0 192.168.101.254			
Ethernet adapter Local Area Connection 4	4:			
Connection-specific DNS Suffix Link-local IPv6 Address IPv4 Address	vaolab.net fe80::8e01:7ba9:4cec:d017%17 192.168.101.102 255.255.255.0 192.168.101.254			
Ethernet adapter Local Area Connection:				
Connection-specific DNS Suffix .: Link-local IPv6 Address	fe80::b4e8:bd58:b847:b39b×11 169.254.179.155 255.255.0.0			

#### **NIC Teaming**

Before configuring NIC teaming, ensure that the Hyper-V role has been added, then install the latest version of the HP ProLiant Network Teaming Software (Minimum version 10.45, current version 10.70) and run the utility. It is also important to note that the NIC driver version needs to be current with NCU, the current (Emulex) version is 4.2.390.6.

Notice the NIC names that were set earlier. You can also highlight each NIC and select properties to verify the MAC address of the NIC and compare it to the MAC address shown in the VC manager, before creating the team.

NIC teaming in Virtual Connect works the same way as in standard network configurations. Simply, open the NIC teaming Utility and configure the available NICs for teaming. In this example, we have FOUR NICs available and will create two teams. The first team, using the two 1Gb NICs will be used for access to and management of the local operating system. You will note the BAY#-Port# indication within each NIC. Another way to confirm you have the correct NIC is to verify through the MAC address of the NIC. Select the NICs that are indicated as Bay 1 Port 1/1 and Bay 2 Port 1/1 as the NICs for the first team.

The second team will be used to provide access to the guest VMs. Select the NICs that are indicated as Bay 1 Port 1/3 and Bay 2 Port 1/3 as the NICs for the second team.

The following graphics provide an example of a Windows 2008 R2 server with TWO NIC teams and connected to the network. In the event of an Uplink or switch failure, the SUS will lose connection to the network; SmartLink will alert the NIC teaming software to this event, by turning the server NIC port off, causing the NIC teaming software to fail-over to the alternate NIC.

Please refer to the Hyper-V Windows 2008 R2 best practice whitepaper - http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01663264/c01663264.pdf

Figure 110 - Uninstall the HP NCU, reinstall the current version of NCU is (10.70).

Local Area Connection 4 Properties	2
Networking Sharing	
Connect using:	
P RexFabric 10Gb 2-port 554FLB Adapter	#4
	Configure
This connection uses the following items:	
Client for Microsoft Networks QoS Packet Scheduler File and Printer Sharing for Microsoft Network HP Network Configuration Utility - Microsoft Virtual Network Switch Protocol - Internet Protocol Version 6 (TCP/IPv6) - Internet Protocol Version 4 (TCP/IPv4)	vorks
Install Uninstall Description Allows you to Team together HP NICs for the pu Network Fault Tolerance and Load Balancing.	Properties inposes of
ОК	Cancel

**Note:** The Hyper-V role must be added before the NIC teaming software is installed or configured. If the HP NIC teaming Utility (NCU) is installed, prior to the Hyper-V role being added, uninstall the NCU by opening the property of one of the existing Local Area Connections, select the "HP Network Configuration Utility" and click Uninstall.

**Figure 111 -** Team both NICs, using the HP Network Configuration Utility – Note the NIC numbers on the Left and the Bay Port # on the right. You typically would team the same port number to the opposite bay number.

HP Network Configuration Utility Properties	? ×
HP Network Configuration Utility	
HP NIC: (1) HP FlexFabric 10Gb 2-port 554FLB Adapter 1/0 Bay 2 Port 1 / 3 (6) HP FlexFabric 10Gb 2-port 554FLB Adapter #6 I/0 Bay 1 Port 1 / 3 (5) HP FlexFabric 10Gb 2-port 554FLB Adapter #5 I/0 Bay 2 Port 1 / 1 (4) HP FlexFabric 10Gb 2-port 554FLB Adapter #4 I/0 Bay 1 Port 1 / 1	Teaming Setup Team Dissolve VLAN(802.10)
	Save
Make a selection. You may view properties of an item at any time by Double-Clicking on it or Selecting and, then, Clicking Properties.	Properties
Help License Manager Enable UID 🔽 Display Tray Icon	
	OK Cancel

**Figure 112 –** The four NICs configured within the profile (App-1) are teamed in pairs and connected to the network, you will need to create the teams one at a time. Note that each Team leverages one NIC from Bay 1 and 1 NIC from Bay 2. Team 1 is the management network and Team 2 connects to the VM network.

HP Network Configuration Utility Properties	? ×
HP Network Configuration Utility	
HP NICs: IS HP Network Team #1 IS HP FlexFabric 10Gb 2-port 554FLB Adapter #5 I/O Bay 2 Port 1 / 1 I HP Network Team #2 II HP FlexFabric 10Gb 2-port 554FLB Adapter I/O Bay 2 Port 1 / 3 IS HP FlexFabric 10Gb 2-port 554FLB Adapter I/O Bay 2 Port 1 / 3 IS HP FlexFabric 10Gb 2-port 554FLB Adapter #6 I/O Bay 1 Port 1 / 3	Teaming Setup Team Dissolve VLAN(802.10)
Make a selection. You may view properties of an item at any time by Double-Clicking on it or Selecting and, then, Clicking Properties.	Save Properties
Help License Manager Enable UID 🔽 Display Tray Icon	
	OK Cancel

**Note:** Various modes can be configured for NIC Teaming, such as NFT or TLB. Once the Team is created, you can select the team and edit its properties. Typically, the default settings can be used. However, the team that will be used for the VM Guests will need to have Promiscuous mode enabled, if VLAN tagging pass-through is required.



Team MAC Address 00-17-A4-	77-7C-06 Default: 00-17-A4-77-7C-06 Restore Default
Path Validation Finable transmit path validation	Transmit path validation timer interval 3 Seconds
Enable receive path validation	Receive path validation timer interval Seconds
UDP Checksum Offload (IPv4) UDP Checksum Offload (IPv4) Large Send Offload (IPv6) Large Send Offload Version 2 (IPv4) Large Send Offload Version 2 (IPv6) VLAN Promiscuous	4088 Bytes 9014 Bytes Default: 1514 Bytes Restore Default

**Figure 114 - View –** Network Connections – NIC Team #1 (management) Team #2 Hyper-V Guests. Note; if no untagged VLANs are presented to Team #2, it may display as an unidentified network.

Retwork Connections				
🌀 🕠 📱 • Control Panel • Network and Internet • Network Connections • 🛛 🔹 🕼 Search Network Connections 🖉				
Organize 💌		III 🕶 🗖 🕑		
Name ^	Status	Device Name		
🏺 Local Area Connection	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter		
Local Area Connection 2	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #2		
Local Area Connection 3	Enabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #3		
Local Area Connection 4	Enabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #4		
Local Area Connection 5	Enabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #5		
Local Area Connection 6	Enabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #6		
Local Area Connection 8	vaolab.net	HP Network Team #1		
Local Area Connection 9	vaolab.net	HP Network Team #2		
R				
		<u>-</u>		

**Figure 115 -** On TEAM #2, which will connect to the vSwitch and provide VM connectivity to many VLANs, configure Promiscuous mode within the NIC team, as shown below.

Network Address Team MAC Address	00-17-A4-	77-7C-06 Default	: 00-17-A4-77-7C-06	Restore Default
Path Validation Finable transmit path	validation	Transmit path v	alidation timer interval 3	Seconds
Enable receive path	validation	Receive path v	alidation timer interval	Seconds
UDP Checksum Offload UDP Checksum Offload UDP Checksum Offload Large Send Offload Vers Large Send Offload Vers	(IPv6) (IPv6) ion 1 (IPv4) ion 2 (IPv4) ion 2 (IPv4)	Default: Disa	bled	

**Note:** VLAN Promiscuous is a feature that was added to version 10.45 of the HP NCU. The purpose of VLAN Promiscuous is to allow VLAN tagged frames to pass through the NIC teaming software. If VLAN Promiscuous is not enabled, VLAN tagged frames will be dropped. In earlier versions of the HP NCU, in order to support VLAN tagging, an Ethernet connection needed to be defined for each VLAN. VLAN promiscuous provides the ability of supporting many VLANs, without the need to define each VLAN individually within the NCU.

**Figure 116** - Both teams are connected to the network, Team #1 (Connection 10) is configured for DHCP on VLAN 101 and received an IP Address. Team 2 (Connection 11) is connected to the Hyper-v Virtual Switch and will not obtain an IP address.

#### **Configuring Hyper-V Virtual Network**

On the Windows 2008 R2 server, verify that the Hyper-V role has been added and that HP NCU version 10.45 or later has been installed and both NIC teams as described above have been created. Open the Hyper-V manager console in Window 2008 R2 and click on Virtual Network Manager. Select New Virtual Network, in the create Virtual Network box, select "External" and click ADD.

S Virtual Network Manager	
Virtual Networks   New virtual network  Global Network Settings  MAC Address Range 00-15-5D-68-67-00 to 00-15-5D-6	Create virtual network
	Creates a virtual network that binds to the physical network adapter so that virtual machines can access a physical network.
	More about creating virtual networks

Figure 117 - Create a new virtual network (step 1)

Create the Virtual network for the guest Virtual Machines. Name the virtual network as "VM Network", select TEAM #2 as the network connection (which Virtual Connect is configured for VLAN tagging on VLANs 102-105 and 2100-2150). Optionally, if this network will not be used to manage the host, de-select Allow management operating system to share this network adapter. Click apply to create the virtual network, a warning box will appear and the network adapter may reset as the virtual network is created.

**Figure 118 -** Create the virtual network (step 2)

Virtual Networks	New Virtual Network
💏 New virtual network	
VM Network	Name: VM Network
HP Network Team #2	
Global Network Settings	Notes:
00-15-5D-68-67-00 to 00-15-5D-6.	
	Connection type
	What do you want to connect this network to?
	C Extends
	ve External:
	HP Network Team #2
	Alow management operating system to share this network adapter
	C Internal only
	C Private virtual machine network
	Enable virtual LAN identification for management operating system
	VLAN ID
	The VLAN identifier specifies the virtual LAN that the management operating system will use for all network communications through this network adapter. This
	setting does not affect virtual machine networking.
	2
	Remove
	Mare about menoring victual patronder
	Hore about managing virtual networks
	1

#### Creating a Virtual Machine and connecting to the virtual network

Click "NEW" in the Hyper-V manager and select Virtual Machine to create a new virtual machine. In the Virtual Machine settings box, click on the network adapter and configure it to use the VM Network created earlier, click on "enable virtual LAN identification" and input the VLAN ID 102. This system will then be connected to VLAN 102, click OK to apply the settings. The next step will be to install an operating system in the virtual machine and then test network connectivity.

:	Hardware	🔋 🔋 Network Adapter
	Md Hardware	Specify the coefficientian of the network adapter or remains the petwork adapter
	BIOS	Specify the configuration of the network adapter or remove the network adapter.
	Boot from CD	Network:
	512 MB	
	Processor	MAC Address
	1 Virtual processor	C Dynamic
]	IDE Controller 0	C Static
	🗀 Hard Drive	00 - 15 - 50 - 68 - 67 - 03
1	VM-1.vhd	
	DVD Drive	Enable spoofing of MAC addresses
	en windows server 2008 r2	
	SCSI Controller	Enable virtual LAN identification
	Network Adapter	VLAN ID
	VM Network	The VLAN identifier specifies the virtual LAN that this virtual machine will use for all
	COM 1	network communications through this network adapter.
	None TT com a	102
	None	
	Diskette Drive	To remove the network adapter from this virtual machine, click Remove.
	None	Remove
	Management	I lee a legacy network adapter instead of this network adapter to perform a
	I Name	network-based installation of the guest operating system or when integration
	VM-1	services are not installed in the guest operating system.
	All services offered	Some settings cannot be modified because the virtual machine was running when
	Snapshot File Location	virtual machine and then reopen this window.
	C:\ProgramData\Microsoft\Windo	
	Automatic Start Action	
	Restart if previously running	
	Automatic Stop Action	



#### **Testing VM connectivity**

After installing Windows 2008 R2 onto the VM, we can move the VM from VLAN 102 to any other VLAN that is presented to the server via Team #2, by simply changing the VM ID that is configured on the Network Adapter within the VM Settings page.

Figure 120 - VM <sup>2</sup>	I has received an IP address on VLAN 102
------------------------------	------------------------------------------

<u>ب</u>	🐙 VM-1 on localhost - Virtual Machine Connection					
File	Action Media Clipboard	View Help				
2	💿 💿 🗿 💿 📗	1 Ba 10				
	Network Connection Deta	ils 🔀				
	Network Connection Details:					
١ĭ	Property	Value				
	Connection-specific DN	vaolab.net				
	Description	Microsoft Virtual Machine Bus Network Ac				
	Physical Address	00-15-5D-68-67-03				
	DHCP Enabled	Yes				
	IPv4 Address	192.168.102.101				
Re	IPv4 Subnet Mask	255.255.255.0				
	Lease Obtained	Monday, October 10, 2011 1:08:06 PM				
	Lease Expires	Tuesday, October 18, 2011 1:08:05 PM				
	IPv4 Default Gateway	192.168.102.254				
	IPv4 DHCP Server	192.168.1.201				
	IPv4 DNS Server	192.168.1.201				
	IPv4 WINS Server					
	NetBIOS over Tcpip En	Yes				
	Link-local IPv6 Address	fe80::8842:2db8:218e:a7dc%11				
	IPv6 Default Gateway					
	IPv6 DNS Server					
	•	• •				
		Close				
		0000				

By simply changing the VLAN ID indicated in the Settings of the Network Adapter for this VM, we can change the VLAN that this VM connects to.

Figure 121 - Move VM1 to VLAN 105 by changing the VLAN ID used for this VM.



Figure 122 – VM1 has now received an IP address on VLAN 105.



## **Results – Windows 2008 R2 SAN Connectivity**

**Figure 123 -** By access the HBA BIOS during server boot, you can see that Port 1 of the FlexHBA is connected to an EVA SAN LUN

	Emulex OneConnect FCoE BIOS Utility, XA4.03a5						
01: 554FLB: Mem Base: FBE000000 Firmware Version: 4.2.401.2215 BIOS: Disabled Port Name: 50060B0000C2DE00 Node Name: 50060B0000C2DE01 Vlan ID: 1001 DCBX mode: CEE mode							
		Devices	Present o	on This f	Adapter:		
01. 02.	DID:010000 DID:010100	WWPN:50001FE1 WWPN:50001FE1	5005D468 5005D46C	LUN:01 LUN:01	HP HP	HSV210 HSV210	5000 5000
03. 04.	DID:010200 DID:010300	WWPN:50001FE1 WWPN:50001FE1	5005D46A 5005D46B	LUN:01 LUN:01	HP HP	HSV210 HSV210	5000 5000
		Enter	<esc> to</esc>	Previous	s Menu		
Figure 124 - Windows 2008 R2 Disk Administrator. Note; that D: is the SAN attached volume

Server Manager	
File Action View Help	
🗢 🔿   🖄 📅 🛛 🖬	
Server Manager (W2K8R;     Roles     Roles     Features     Diagnostics     Storage     Windows Server E     Disk Management	Disk Management       Volume List + Graphical View         Volume       Layout       Type       File System       Status         Image: C(:)       Simple       Basic       NTFS       Healthy (System, Boot, Page File         Image: Guest Volume (SAN) (D:)       Simple       Basic       NTFS       Healthy (Primary Partition)         Image: Disk 0       Guest Volume (SAN) (D:)       Simple       Basic       NTFS       Healthy (Primary Partition)         Image: Disk 0       Guest Volume (SAN) (D:)       Image: Disk 0       Image: Disk
۲ <b>)</b>	Unallocated Primary partition

# **Summary**

We presented a Virtual Connect Network and SAN scenario by creating two shared uplink sets (SUS), each SUS is connected with TWO active uplinks; both SUS' can actively pass traffic. We included a dual path SAN fabric for storage connectivity.

When VC profile App-1 is applied to the server in bay1 and the server is powered up, it has one NIC connected through the FlexFabric module 1 in Bay 1(connected to VLAN-101-1), the second NIC is connected through the FlexFabric module in Bay 2 (connected to VLAN-101-2). Each NIC is configured at 1Gb. These NICs are teamed (Team #1) and will be used to manage the Hyper-v host. Either NIC or path could be active. The second pair of NICs is also teamed (Team #2) and the team is configured in promiscuous mode to support multiple tagged VLANs (102-105 and 2100-2150). Each of these NICs is configured for 5Gb. Either NIC could be active. As a result, this server could access the network through either NIC or either uplink, depending on which NIC is active at the time. This host is also configured for FCoE based SAN access and connects to a SAN LUN to store the Guest VMs. Each FCoE port is configured for 4Gb of SAN bandwidth.

Additional NICs could be added within FlexFabric, by simply powering the server off and adding up to a total of 6 NICs, the NIC speed can then be adjusted accordingly to suit the needs of each NIC. If additional or less SAN bandwidth is required, the speed of the SAN connection can also be adjusted. If the FCoE SAN connections are not required, these could be deleted, in which two additional NIC ports would then be made available to the host.

We then added the Hyper-V role to the server and created a VM guest. The guest was configured for VLAN 102, and then was later moved to VLAN 105, by simply changing the VLAN id as configured in the VM settings tab. Additional VLANs can be configured within the Shared Uplink Set and presented to the NIC team supporting the guests; those VLANs would then be made available to Hyper-V manager and any VM guests.

As additional servers are added to the enclosure, simply create additional profiles, or copy existing profiles, configure the NICs for LAN and SAN fabrics as required and apply them to the appropriate server bays and power the server on.

# Scenario 5 – Shared Uplink Set with Active/Standby Uplinks and 802.3ad (LACP) - Ethernet and FCoE SAN - vSphere

# **Overview**

This scenario will implement the Shared Uplink Set (SUS) to provide support for multiple VLANs. The upstream network switches connect a shared uplink set to two ports on each FlexFabric modules, LACP will be used to aggregate those links.

As multiple VLANs will be supported in this configuration, the upstream switch ports connecting to the FlexFabric modules will be configured to properly present those VLANs. In this scenario, the upstream switch ports will be configured for VLAN trunking/VLAN tagging.

When configuring Virtual Connect, we can provide several ways to implement network fail-over or redundancy. One option would be to connect multiple uplinks to a single Virtual Connect network; those uplinks would connect from different Virtual Connect modules within the enclosure and could then connect to the same upstream switch or two different upstream switches, depending on your redundancy needs. An alternative would be to configure TWO separate Virtual Connect networks, each with a single, or multiple, uplinks configured. Each option has its advantages and disadvantages. For example; an Active/Standby configuration places the redundancy at the VC level, where Active/Active places it at the OS NIC teaming or bonding level. We will review the first option in this scenario.

In addition, several Virtual Connect Networks can be configured to support the required networks to the servers within the BladeSystem enclosure. These networks could be used to separate the various network traffic types, such as iSCSI, backup and VMotion from production network traffic.

This scenario will also leverage the Fibre Channel over Ethernet (FCoE) capabilities of the FlexFabric modules. Each fibre channel fabric will have two uplinks connected to each of the FlexFabric modules.

# **Requirements**

This scenario will support both Ethernet and fibre channel connectivity. In order to implement this scenario, an HP BladeSystem c7000 enclosure with one or more server blades and TWO Virtual Connect FlexFabric modules, installed in I/O Bays 1& 2 are required. In addition, we will require ONE or TWO external Network switches. As Virtual Connect does not appear to the network as a switch and is transparent to the network, any standard managed switch will work with Virtual Connect. The Fibre Channel uplinks will connect to the existing FC SAN fabrics. The SAN switch ports will need to be configured to support NPIV logins. Two uplinks from each FlexFabric module will be connected to the existing SAN fabrics.

**Figure 125 - Physical View;** Shows two Ethernet uplinks from Ports X5 and X6 on Modules 1 and 2 to Ports 1 and 2 on each network switch. The SAN fabrics are also connected redundantly, with TWO uplinks per fabric, from ports X1 and X2 on module 1 to Fabric A and ports X1 and X2 to Fabric B.



**Figure 126 - Logical View;** the server blade profile is configured with SIX FlexNICs and 2 FlexHBAs. NICs 1 and 2 are connected to VLAN-101, NICs 3 and 4 are connected to VLAN-102 and NICs 4 and 5 are connected to VLAN-103 through VLAN-105 and VLAN-2100 through VLAN-2150, which are part of the Shared Uplink Set, VLAN-Trunk. The VLAN-Trunk is connected, at 10Gb, to a network switch, through Ports X5 and X6 on each FlexFabric Module in Bays 1 and 2. This configuration will cause one set of uplinks to be Active and the other to be in Standby. The FCoE SAN connections are connected through ports X1 and X2 on each FlexFabric module.



# Installation and configuration

# **Switch configuration**

As the Virtual Connect module acts as an edge switch, Virtual Connect can connect to the network at either the distribution level or directly to the core switch.

The appendices provide a summary of the cli commands required to configure various switches for connection to Virtual Connect. The configuration information provided in the appendices for this scenario assumes the following information:

 The switch ports are configured as VLAN TRUNK ports (tagging) to support several VLANs. All frames will be forwarded to Virtual Connect with VLAN tags. Optionally, one VLAN could be configured as (Default) untagged, if so, then a corresponding vNet within the Shared Uplink Set would be configured and set as "Default".

**Note:** When adding additional uplinks to the SUS, if the additional uplinks are connecting from the same FlexFabric module to the same switch, in order to ensure all the uplinks are active, the switch ports will need to be configured for LACP within the same Link Aggregation Group.

The network switch port should be configured for Spanning Tree Edge as Virtual Connect appears to the switch as an access device and not another switch. By configuring the port as Spanning Tree Edge, it allows the switch to place the port into a forwarding state much quicker than otherwise, this allows a newly connected port to come online and begin forwarding much quicker.

The SAN connection will be made with redundant connections to each Fabric. SAN switch ports connecting to the FlexFabric module must be configured to accept NPIV logins.

# **Configuring the VC module**

- Physically connect Port 1 of network switch 1 to Port X5 of the VC module in Bay 1
- Physically connect Port 2 of network switch 1 to Port X6 of the VC module in Bay 1
- Physically connect Port 1 of network switch 2 to Port X5 of the VC module in Bay 2
- Physically connect Port 2 of network switch 2 to Port X6 of the VC module in Bay 2

**Note:** if you have only one network switch, connect VC ports X5 and X6 (Bay 2) to an alternate port on the same switch. This will NOT create a network loop and Spanning Tree is not required.

- Physically connect Ports X1/X2 on the FlexFabric in module Bay 1 to switch ports in SAN Fabric A
- Physically connect Ports X1/X2 on the FlexFabric in module Bay 2 to switch ports in SAN Fabric B

## **VC CLI commands**

Many of the configuration settings within VC can also be accomplished via a CLI command set. In order to connect to VC via a CLI, open an SSH connection to the IP address of the active VCM. Once logged in, VC provides a CLI with help menus. Through this scenario the CLI commands to configure VC for each setting will also be provided.

# **Configuring Expanded VLAN Capacity via GUI**

Virtual Connect release 3.30 provided an expanded VLAN capacity mode when using Shared Uplink Sets, this mode can be enabled through the Ethernet Settings tab or the VC CLI. The default configuration for a new Domain install is "Expanded VLAN Capacity" mode, Legacy mode is no longer available and the Domain cannot be downgraded.

# To verify the VLAN Capacity mode

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Expanded VLAN capacity
- Verify Expanded VLAN Capacity is configured and Legacy VLAN Capacity is greyed out.

**Note:** Legacy VLAN mode will only be presented if 1Gb Virtual Connect Modules are present, in which case the domain would be limited to Firmware version 3.6x.

### **Configuring Expanded VLAN Capacity via CLI**

The following command can be copied and pasted into an SSH based CLI session with Virtual Connect;

# Set Expanded VLAN Capacity set enet-vlan -quiet VlanCapacity=Expanded

#### Figure 127 - Enabling Expanded VLAN Capacity

Define 🔻 Configure 👻 Tools 👻 Help 👻
Ethernet Settings
MAC Addresses Port Monitoring Advanced Settings
VLAN
Server VLAN Tagging Support
Force server connections to use the same VLAN mappings as shared uplink sets
VLAN Capacity
Legacy VLAN capacity (Up to 320 VLANs per module and 28 VLANs per server connection).
Expanded VLAN capacity (up to 1000 VLANs per domain and 152 VLANs per physical server port).
Multiple Networks Link Speed Settings
When using mapped VLAN tags (multiple networks over a single link), these settings will be used for the overall Link speed control.
Set a Custom value for Preferred Link Connection Speed
Set a Custom value for Maximum Link Connection Speed

**Note:** if a 1Gb VC Ethernet module is present in the Domain, Expanded VLAN capacity will be greyed out, this is only supported with 10Gb based VC modules. Also, once Expanded VLAN capacity is selected, moving back to Legacy VLAN capacity mode will require a domain deletion and rebuild.

### **Configuring Fast MAC Cache Failover**

When an uplink on a VC Ethernet Module that was previously in standby mode becomes active, it can take several minutes for external Ethernet switches to recognize that the c-Class server blades must now be reached on this newly active connection.

Enabling Fast MAC Cache Failover forces Virtual Connect to transmit Ethernet packets on newly active links, which enables the external Ethernet switches to identify the new connection more quickly (and update their MAC caches appropriately). This transmission sequence repeats a few times at the MAC refresh interval (five seconds is the recommended interval) and completes in about one minute.

# Configuring the VC Module for Fast Mac Cache Fail-over via GUI (Ethernet settings)

Set Fast MAC Cache Fail-over to 5 Seconds

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Click the "Other" tab
- Select Fast MAC Cache Fail-over with a refresh of 5
- Select Apply

## Configuring the VC Module for Fast Mac Cache Fail-over via CLI (Ethernet settings)

The following command can be copied and pasted into an SSH based CLI session with Virtual Connect;

# Set Advanced Ethernet Settings to Enable Fast MAC cache fail-over set mac-cache Enabled=True Refresh=5

Figure 128 - Set Fast MAC Cache (under Ethernet Settings "Advanced Settings - Other)

MAC Addresses Port Monitoring Advanced Settings	
VLAN	
Server VLAN Tagging Support	
Force server connections to use the same VLAN mappings as	shared uplink sets
vLAN Capacity	
O Legacy VLAN capacity (Up to 320 VLANs per module and 28	VLANs per server connection).
<ul> <li>Expanded VLAN capacity (Up to 1000 VLANs per domain and</li> </ul>	162 VLANs per physical server port).
Multiple Networks Link Speed Settings	
When using mapped VLAN tags (multiple networks over a single I settings will be used for the overall Link speed control.	ink), these
Set a Custom value for Preferred Link Connection Speed	?
Set a Custom value for Maximum Link Connection Speed	?
Set a Custom value for Maximum Link Connection Speed	2
Set a Custom value for Maximum Link Connection Speed Other MAC Cache Fail-over	
Set a Custom value for Maximum Link Connection Speed Other MAC Cache Fail-over	•
Set a Custom value for Maximum Link Connection Speed Other MAC Cache Fail-over MAC Refresh Interval 5 Seconds	2
Set a Custom value for Maximum Link Connection Speed Other MAC Cache Fail-over MAC Refresh Interval S Seconds Dependent Protection	2
Set a Custom value for Maximum Link Connection Speed  Other  MAC Cache Fail-over  MAC Refresh Interval  Seconds  Port Protection  Fable Loop Protection	2
Set a Custom value for Maximum Link Connection Speed Other MAC Cache Fail-over MAC Refresh Interval 5 seconds Port Protection  Enable Loop Protection  Enable Pause Flood Protection	2
Set a Custom value for Maximum Link Connection Speed Other MAC Cache Fail-over MAC Refresh Interval S Seconds Port Protection Finable Loop Protection Finable Pause Flood Protection	2 - - - - - - - - - - - - - - - - - - -
Set a Custom value for Maximum Link Connection Speed Other MAC Cache Fail-over MAC Refresh Interval S Port Protection Enable Loop Protection Enable Pause Flood Protection Throughput Statistics	2
Set a Custom value for Maximum Link Connection Speed Other MAC Cache Fail-over MAC Refresh Interval 5 Seconds Port Protection C Enable Loop Protection C Enable Pause Flood Protection Throughput Statistics C Enable Throughput Statistics	2
Set a Custom value for Maximum Link Connection Speed  Other  MAC Cache Fail-over  MAC Refresh Interval  Throughput Statistics  Configurations: Sample rate of 5 minutes, collecting up to 25 ho	2 - 2 2 2 2 2 2 2 2 2 2 2 2 2
Set a Custom value for Maximum Link Connection Speed  Other  MAC Cache Fail-over  MAC Refresh Interval  Throughput Statistics  Configurations: Sample rate of 5 minutes, collecting up to 25 ho  LACP Configuration	2 - 2 2 2 2 2 2 2 2 2 2 2 2 2

# **Defining a new Shared Uplink Set (VLAN-Trunk)**

Connect Ports X5 and X6 of FlexFabric module in Bay 1 to Ports 1 and 2 on switch 1, then connect Ports X5 and X6 from FlexFabric Module 2 to ports 1 and 2 of switch 2.

Create a SUS named "VLAN-Trunk" and connect it to FlexFabric Ports X5 and X6 on both modules 1 and 2

- On the Virtual Connect Home page, select Define, Shared Uplink Set
- Insert Uplink Set Name as VLAN-Trunk-1
- Select Add Port, then add the following port;
  - Enclosure 1, Bay 1, Port X5
  - Enclosure 1, Bay 1, Port X6
  - o Enclosure 1, Bay 2, Port X5
  - o Enclosure 1, Bay 2, Port X6

#### Figure 129 - Shared Uplink Set (VLAN-Trunk) Uplinks Assigned

Edit Shared	Uplink Set: '	VLAN	l-Trunk						
Ethernet Shar	red External Up	link S	et						
Uplink Set Name		Status	PID						
VLAN-Trunk		0							
External Uplin	k Ports								-
Port	Port Role	Port	Status	)	Connector Typ	e Connected To	PI	D Speed/Duplex	Action
C7K-Bottom Bay 1: Port X5	NA	<b></b>	Linked-Active	10 Gb	SFP-DAC	CORE_IRF (Ten-	-GigabitEthernet1/0/3)	Auto	Delete
C7K-Bottom Bay 1: Port X6	NA	0	Linked-Active	10 Gb	SFP-DAC	CORE_IRF (Ten-	-GigabitEthernet1/0/4)	🔊 Auto	<u>Delete</u>
C7K-Bottom Bay 2: Port X5	NA	0	Linked-Standby	10 Gb	SFP-DAC	CORE_IRF (Ten-	-GigabitEthernet2/0/3) 🌘	🔊 Auto	<u>Delete</u>
C7K-Bottom Bay 2: Port X6	NA	0	Linked-Standby	10 Gb	SFP-DAC	CORE_IRF (Ten-	-GigabitEthernet2/0/4)	🔊 Auto	<u>Delete</u>
Add Port  C7K-Bottom	Auto     Failover	LACP Ti	mer:   Domain  Short (1  Long (3)	Default, Short (1 sec) sec) 0 sec)	)				
Associated F	CoE Network (	/LAN t	agged)						+
Associated N	letworks (VLAN	tagge	d)				ſ	+ Add 1	- T Delete
Network	Name			VLAN ID	Native	Smart Link	Private Network	Action	
								Apply	Cancel

- Click Add Networks and select the Multiple Networks radio button and add the following VLANs;
  - Enter Name as VLAN-
  - Enter VLAN IDs as follows (and shown in the following graphic);
- 101-105,2100-2400
- Enable SmartLink on ALL networks
- Click Advanced
  - Configure Preferred speed to 4Gb
  - Configure Maximum speed to 8Gb
- Click Apply

**Note:** you can optionally specify a network "color" or "Label" when creating a shared Uplinkset and its networks. In the example above we have not set either color or label.

sociated Networks (VLAN tagged)  fould you like to add  a single Associated Network @ multiple Associated Networks  wetwork Name VLAN.      VLAN D(4)     (UAN.     VLAN-2400 VLAN D(4)     (101-105,2100-2400     (2)     (101-105,2100-2400     (2)     (101-105,2100-2400     (2)     (101-105,2100-2400     (2)     (2)     (2)     (2)     (2)     (2)     (2)     (2)     (2)     (2)     (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)      (2)			
Total you like to add       a single Associated Network       Wetwork Name    VLAN D +        Semple retevork name:    VLAN D(*)    • 101-105_2100-2400    Color    one    Labels Type to add Network Labels    Type to add Network Labels Type to add Network Labels Type to add Network Labels Type to add Network Labels Type to add Network Labels Type to add Network Labels Type to add Network Labels Type to add Network Labels Type to add Network Labels Type to add Network Labels Type to add Network Labels Type to add Network Labels Type to add Network Labels Type to add Network Labels Type to add Network Labels Type to add Network Labels Type to add Network Labels Type to add Network Labels Type to add Network Labels Type to add Network Seling created cannot all be marked Private. The domain can only support 128 more private network(s) before reaching the limit of 128. Sectore Speciet Set preferred cornection speed	sociated Networks (VLAN tagged)		
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a single Associated Network @ multiple Associated Networks          Network Name       VLAN D +         Sample network name:       VLAN-2400         VLAN D(a)       * 101-105_2100-2400         VLAN D(a)       * 101-105_2100-2400         Color       none         Labels       Type to add Network Labels         Type to add Network Labels       Type to add Network Labels         Image: State of the Native VLAN setting supported only when adding or editing a single Associated Network         Image: State of the Native VLAN setting supported only when adding or editing a single Associated Network         Image: State of the Native VLAN setting supported only when adding or editing a single Associated Network         Image: State of the Native VLAN setting supported only when adding or editing a single Associated Network         Image: State of the Native VLAN setting supported only when adding or editing a single Associated Network         Image: State of the Native VLAN setting supported only when adding or editing a single Associated Network         Image: State of the Native Network Setting         Image: State of State of the Native Network         Image: State of State of State of the Native Network Setting         Image: State of	vould you like to add		
Wetwork Name VLAN-2400   Sample network name:      VLAN D(s)        Order     Inne        Type to add Network Labels     Type to add Network Labels           The Native VLAN setting supported only when adding or editing a single Associated Network                The Native VLAN setting supported only when adding or editing a single Associated Network                                   Type to add Network Labels   Type to add Network Labels         The Native VLAN setting supported only when adding or editing a single Associated Network    The Native VLAN setting supported only when adding or editing a single Associated Network    Advanced Network Settings    Set preferred connection speed      Settered Speet:   Solo   Set preferred connection speed   Set preferred conscioned speed   Set preferred conscioned speed    Set preferred conscioned speed   Set preferred conscioned speed     Interview Network access group names   Default is	) a single Associated Network 💿 multiple Associated Net	works	
Sample network name: VLAN-2400 MLAN D(s) * [01-105,2100-2400] 2 Colornone Lades Type to add Network Labels Type to add Network Labels * The Native VLAN setting supported only when adding or editing a single Associated Network * The 306 networks being created cannot all be marked Private. The domain can only support 128 more private network(s) before reaching the limit of 128. * The 306 networks being created cannot all be marked Private. The domain can only support 128 more private network(s) before reaching the limit of 128. * The 306 networks Settings * Set preferred connection speed * Setting * Set preferred connection speed * Setting * Set preferred connection speed * Setting * Set preferred to 10 6b * 8 6b * Set neximum connection speed * Setting * Set preferred connection * Setting *	Network Name VLAN- + VLAN	1 ID +	
VLAN D(s)       * 101-105,2100-2400       Image: Control of the second s	Sample network name: VLAN-2400		
Coor nome Labels Type to add Network Labels The Native VLAN setting supported only when adding or editing a single Associated Network The 306 networks being created cannot all be marked Private. The domain can only support 128 more private network(s) before reaching the limit of 128. Smart Link Private Network Settings Set preferred connection speed Setected Speed Setecte	VLAN ID(s) * 101 105 2100 2400	2	
Color       Labels         Type to add Network Labels         The Native VLAN setting supported only when adding or editing a single Associated Network         The 306 networks being created cannot all be marked Private. The domain can only support 128 more private network(s) before reaching the limit of 128.         Smart Link       Private Network         Advanced Network Settings         Set preferred connection speed       G         Set connection speed       G         Set does       G         1 6b       G         1	101-100,2100-2400		
Color       Image: Type to add Network Labels         The Native VLAN setting supported only when adding or editing a single Associated Network         Image: The Native VLAN setting supported only when adding or editing a single Associated Network         Image: The Native VLAN setting supported only when adding or editing a single Associated Network         Image: The Native VLAN setting support 128 more private network(s) before reaching the limit of 128.         Image: The Native Network         Advanced Network Settings         Set preferred connection speed         Image: Set preferred connection speed         Image: Set preferred connection speed         Image: Set maximum connect			
Type to add Network Labels         Image: Type to add Network Settings         Image: Type to add Network Settings         Image: Set preferred connection speed       Image: Type to add Network access group names         Set network access group names       Image: Type to add Network access group names         Default X       Image: Type to add Network (default)	Color none Labels Type to add Network L	abels	]
<ul> <li>The Native VLAN setting supported only when adding or editing a single Associated Network</li> <li>The 306 networks being created cannot all be marked Private. The domain can only support 128 more private network(s) before reaching the limit of 128.</li> <li>Smart Link Private Network</li> <li>Advanced Network Settings</li> <li>Set preferred connection speed</li> <li>Sected Speet</li> <li>Sected Speet</li> <li>Sected Speet</li> <li>Set maximum connection speed</li> <li>Set m</li></ul>	Type to add Network Labe	Is	
Set maximum connection speed   Selected Speed:   B   Cb   10 Gb	Set preferred connection speed       2         Selected Speed:       4 3         Gb       8 Gb		
Selected Speed:	Set maximum connection speed		
0.1 Gb 10 Gb e network access group names Default x letters or numbers (%', 2', 'e', 'nag', 'default')	Selected Speed: 8 🗘 Gb		
e network access group names Default × letters or numbers ('a', '2', 'a', 'nag', 'default')	0.1 Gb10 Gb		
e network access group names Default × letters or numbers ('a', '2', 'a', 'nag', 'default')			
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Default X	e network access group names		
s letters or numbers ('ø', 'Z', 'ø', 'nøg', 'default')	Default ×		
	e letters or numbers ('a', '2', 'e', 'nag', 'default')		

**Note:** If the VC domain is not in Expanded VLAN capacity mode, you will receive an error when attempting to create more that 128 VLANs in a SUS. If that occurs, go to Advanced Ethernet Settings and select Expanded VLAN capacity mode and apply.

**Note:** When configuring Preferred and Maximum networks speeds, these speeds will only be reflected when the network is configured individually on a specific NIC. In order to set a Maximum network speed for a NIC configured with Multiple Networks, configure the "Multiple Networks Link Speed Settings" un Ethernet, Advanced Settings in the left tree view pane of the VC console.

After clicking apply, a list of VLANs will be presented as shown below. If one VLAN in the trunk is untagged/native, see note below.

• Click Apply at the bottom of the page to create the Shared Uplink Set

Figure 131 - Associated VLANs for Shared Uplink Set "VLAN-Trunk"

Define 👻 Configure 👻 Tools 👻 Help 👻

Edit	Shared Uplink Set: VLAN-	Trunk				
Ass	ociated Networks (VLAN tagged)					
					-	🕇 Add 🏦 Delete
	Network Name	VLAN ID	Native	Smart Link	Private Network	Action
	VLAN-101	101	false	false	false	Edit 💌 🔺
	VLAN-102	102	false	false	false	Edit 💌
	VLAN-103	103	false	false	false	Edit 📼
	VLAN-104	104	false	false	false	Edit 👻
	VLAN-105	105	false	false	false	Edit 💌
	VLAN-2100	2100	false	false	false	Edit 💌
	VLAN-2101	2101	false	false	false	Edit 👻
	VLAN-2102	2102	false	false	false	Edit 👻
	VLAN-2103	2103	false	false	false	Edit 👻
	VLAN-2104	2104	false	false	false	Edit 💌
	VLAN-2105	2105	false	false	false	Edit 👻
	VLAN-2106	2106	false	false	false	Edit 👻
	VLAN-2107	2107	false	false	false	Edit 👻
	VLAN-2108	2108	false	false	false	Edit 💌
	VLAN-2109	2109	false	false	false	Edit 👻
	VLAN-2110	2110	false	false	false	Edit 💌
	VLAN-2111	2111	false	false	false	Edit 💌
	VLAN-2112	2112	false	false	false	Edit 💌

**Note:** Optionally, if one of the VLANs in the trunk to this shared uplink set were configured as Native or Untagged, you would be required to "edit" that VLAN in the screen above, and configure Native as TRUE. This would need to be set for BOTH VLAN-Trunk-1 and VLAN-Trunk-2.

Please refer to Appendix D; "Scripting the Native VLAN" for scripting examples.

#### Defining a new Shared Uplink Set via CLI

The following script can be used to create the first Shared Uplink Set (VLAN-Trunk-1)

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

# Create Shared Uplink Set "VLAN-Trunk" and configure uplinks add uplinkset VLAN-Trunk add uplinkport enc0:1:X5 Uplinkset=VLAN-Trunk speed=auto add uplinkport enc0:1:X6 Uplinkset=VLAN-Trunk speed=auto add uplinkport enc0:2:X5 Uplinkset=VLAN-Trunk speed=auto add uplinkport enc0:2:X6 Uplinkset=VLAN-Trunk speed=auto # Create Networks VLAN-101 through VLAN-105 and 2100-2400 for Shared Uplink Set "VLAN-Trunk" add network-range -quiet UplinkSet=VLAN-Trunk NamePrefix=VLAN- VLANIds=101-105,2100-2400 NAGs=Default PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000 SmartLink=Enabled

**Note:** In this scenario we have created a single Share Uplink Set (SUS) with both active and standby uplinks originating from the opposite FlexFabric Modules, by doing so we provide the ability to create separate and redundant connections out of the Virtual Connect domain. When we create the server profiles, you will see how the NICs will connect to the same VLANs accessed through the same VC module, which provides the ability to create an Active / Standby uplink scenario.

# Defining a new (FCoE) SAN Fabric via GUI

Create a Fabric and name it "FCoE\_A"

- On the Virtual Connect Manager screen, click Define, SAN Fabric to create the first Fabric
- Enter the Network Name of "FCoE\_A"
- Select Add Port, then add the following ports;
  - Enclosure 1, Bay 1, Port X1
  - Enclosure 1, Bay 1, Port X2
- Ensure Fabric Type is set to "FabricAttach"
- Select Show Advanced Settings
  - Select Automatic Login Re-Distribution (FlexFabric Only)
  - Select Set Preferred FCoE Connect Speed
    - Configure for 4Gb
  - Select Set Maximum FCoE Connect Speed
    - Configure for 8Gb
- Select Apply

Create a second Fabric and name it "FCoE\_B"

- On the Virtual Connect Manager screen, click Define, SAN Fabric to create the second Fabric
- Enter the Network Name of "FCoE\_B"
- Select Add Port, then add the following ports;
  - Enclosure 1, Bay 2, Port X1
  - Enclosure 1, Bay 2, Port X2
- Ensure Fabric Type is set to "FabricAttach"
- Select Show Advanced Settings
  - Select Automatic Login Re-Distribution (FlexFabric Only)
  - Select Set Preferred FCoE Connect Speed
    - Configure for 4Gb
  - Select Set Maximum FCoE Connect Speed
    - Configure for 8Gb
- Select Apply

### **Defining SAN Fabrics via CLI**

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

#Create the SAN Fabrics FCoE\_A and FCoE\_B and configure uplinks as discussed above add fabric FCoE\_A Type=FabricAttach Bay=1 Ports=1,2 Speed=Auto LinkDist=Auto PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000 add fabric FCoE\_B Type=FabricAttach Bay=2 Ports=1,2 Speed=Auto LinkDist=Auto PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000

efine <del>v</del> Confi	gure <del>v</del> Tools	<b>-</b> H	elp <del>v</del>							
efine SAN	V Fabric									
Fabric										
Fabric Name		Fabr	ric Typ	Э	Login Re-Distribution		Configured Speed	Show Advar	nced Settings	_
FCoE_A		Fabr	icAttac	h			Auto -	Manual I     Automat     Selected S     0.1 Gb     Selected S     Selected S     Selected S     Old Selected S     Old Selected S	cogin Re-Distribution ferred FCoE Connection Sp peed: 4 3 Gb 8 Gb dinum FCoE Connection Sp peed: 8 3 Gb 8 Gb	eed
Enclosure	Uplink Ports								•••••	
Uplink Port	Enclosure	Bay 1	/ Port	Status	Connected To	Action				
Uplink Port X2	C7K-Bottom	1	0	8 Gb	10:00:00:27:18:46:09:38	<u>Delete</u>				
Add Port										
Bay 1	*									
							Apply	Cancel		

#### Figure 132 - SAN Login Distribution Setting and preferred Speed Settings

**Figure 133 -** FCoE SAN fabrics configured with two 8Gb uplinks per fabric. Note the bay and port numbers on the right

Define -	Configure - T	ools <del>v</del> Help <del>v</del>								
SAN F	abrics									
Extern	al Connections	Server Connections								
Status	SAN Fabric	Fabric Type	Login Re-Distribution	Port	Status	Connected To	Enclosure	Вау	Port	Action
0	FCoE_A	FabricAttach	AUTOMATIC	0	8 Gb	10:00:00:27:18:46:09:38	C7K-Bottom	1	X1	Edit 👻
				0	8 Gb	10:00:00:27:f8:46:09:38	C7K-Bottom	1	X2	
0	FCoE_B	FabricAttach	AUTOMATIC	0	8 Gb	10:00:00:27:18:3a:5d:88	C7K-Bottom	2	X1	Edit 👻
				0	8 Gb	10:00:00:27:f8:3a:5d:88	C7K-Bottom	2	X2	_
🕂 Add										

# **Defining a Server Profile**

We will create a server profile with SIX server NICs and TWO SAN adapters. Each server NIC will connect to a specific network.

- On the main menu, select Define, then Server Profile
- Create a server profile called "ESX-1"
- In the Network Port 1 drop down box, select a Network, then chose VLAN101
- Set the port speed to Custom at 100Mb
- In the Network Port 2 drop down box, select a Network, then chose VLAN101
- Set the port speed to Custom at 100Mb
- Left click on either of Port 1 or Port 2 in the Ethernet Connections box, and select ADD network (add four additional network connections)
- In the Network Port 3 drop down box, select a Network, then chose VLAN-102
- Set the port speed to Custom at 2Gb
- In the Network Port 4 drop down box, select a Network, then chose VLAN-102
- Set the port speed to Custom at 2Gb
- In the Network Port 5 drop down box, select Multiple Networks
- Configure for networks VLAN-103 through VLAN-105 and VLAN-2100 through VLAN-2150

- Leave the network speed as Auto
- In the Network Port 6 drop down box, select Multiple Networks
- Configure for networks VLAN-103 through VLAN-105 and VLAN-2100 through VLAN-2150
- Leave the network speed as Auto
- Expand the FCoE Connections box, for Bay 1, select FCoE\_A for Bay 2, select FCoE\_B
- Do not configure FC SAN or iSCSI Connection
- In the Assign Profile to Server Bay box, locate the Select Location drop down and select Bay 1, then apply

Prior to applying the profile, ensure that the server in Bay 1 is currently OFF

**Note:** you should now have a server profile assigned to Bay 2, with 4 Server NIC connections. NICs 1&2 should be connected to networks VLAN-101 (MGMT), NICs 3&4 should be connected VLAN-102 (VMotion) to networks VLAN103 through VLAN105 and VLAN-2100 through VLAN-2150. FCoE SAN fabrics are connected to, Port 1 - FCoE\_A and Port 2 - FCoE\_B.

### **Defining a Server Profile via CLI**

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

# Create Server Profile ESX-1 add profile ESX-1 -nodefaultfcconn -nodefaultfcoeconn set enet-connection ESX-1 1 pxe=Enabled Network=VLAN-101 SpeedType=Custom Speed=100 set enet-connection ESX-1 2 pxe=Disabled Network=VLAN-101 SpeedType=Custom Speed=100 add enet-connection ESX-1 pxe=Disabled Network=VLAN-102 SpeedType=Custom Speed=2000 add enet-connection ESX-1 pxe=Disabled Network=VLAN-102 SpeedType=Custom Speed=2000 add enet-connection ESX-1 pxe=Disabled add server-port-map-range ESX-1:5 UplinkSet=VLAN-Trunk VLanIds=103-105,2100-2150 add enet-connection ESX-1 pxe=Disabled add server-port-map-range ESX-1:6 UplinkSet=VLAN-Trunk VLanIds=103-105,2100-2150 add fcoe-connection ESX-1 Fabric=FCoE\_A SpeedType=4Gb add fcoe-connection ESX-1 Fabric=FCoE\_B SpeedType=4Gb poweroff server 2 assign profile ESX-1 enc0:2

**Note:** The "add server-port-map-range" command is new to VC firmware release 3.30 and can be used to map many VLANs to a server NIC, in a single command. Prior releases would have required one command to create the NIC and one additional command per VLAN mapping added. This command will make profile scripting much easier, less complicated and quicker.

**Note:** The speed of the NIC and SAN connections, as well as the MAC and WWN. Also, note that the FCoE connections are assigned to the two SAN fabrics created earlier and use ports LOM:1-b and LOM:2-b.

Pro	file									
Profil	e Name	Network Access (	roup Status	Serial Number	Server UU		7777400-0			
ESX-1	1	Default 🔻	2   *	VCX0000V01	97659550-4	8010-41 09-0990-1	aa////100ab			
Eth	ernet Adapter Conn	ections								
Port	Network Name	Statu Por	t Speed Type	Allocated Port S	. PXE M	ulticast Filter	MAC	Мар	ping	Ac
1	VLAN-101	🔮 CL	STOM	😒 100 Mb - 8 Gb	ENABLED No	one	00-17-A4-77-7	C-0A LOM	1:1-a => Bay 1:d2:v1	
2	VLAN-101	📀 cu	STOM	😒 100 Mb - 8 Gb	DISABLED No	one	00-17-A4-77-7	D-0C LOM	1:2-a => Bay 2:d2:v1	
3	VLAN-102	🥝 ci	STOM	📡 2 Gb - 8 Gb	DISABLED No	one	00-17-A4-77-7	D-OE LOM	1:1-c => Bay 1:d2:v3	
4	VLAN-102	🥝 ci	STOM	😒 2 Gb - 8 Gb	DISABLED No	one	00-17-A4-77-7	>-10 LOM	1:2-c => Bay 2:d2:v3	
5	Multiple Networks	😒 📀 PF	EFERRED	3.9 Gb - 10 Gb	DISABLED No	one	00-17-A4-77-7	D-12 LOM	1:1-d => Bay 1:d2:v4	
5 - A1 SC	Multiple Networks	PP 🛇 🔏	EFERRED	3.9 Gb - 10 Gb	DISABLED No	one	00-17-A4-77-71	>-14 LOM	1:2-d => Bay 2:d2:v4	
6 - A	Multiple Networks)	S O PF	EFERRED	3.9 Gb - 10 Gb	DISABLED NO	one	00-17-A4-77-7	>14 LOM	1:2-d => Bay 2:d2:v4	[
6 - A4 SC	Multiple Networks) id SI HBA Connection HBA Connections	S	EFERRED	3.9 Gb - 10 Gb	DISABLED NE	ne	00-17-A4-77-71	>-14 LOM	1:2-d ⇒> Bay 2:d2:v4	2
6  - A4   SC   FC	Multiple Networks) dd SI HBA Connection HBA Connections DE HBA Connection	S S	EFERRED	3.9 0b - 10 0b	DISABLED NG	ne	00-17-44-77-71	D-14 LOM	1.2-d => Bay 2:d2:v4	
6 - A( SC =C =C	Multiple Networks dd SI HBA Connection HBA Connections DE HBA Connection Connection FC SAN/FCC	S S PF	EFERRED	3.9 Ob - 10 Ob	Allocated Port S	WARN	00-17-44-77-71	C-14 LOM	1.2-d => Bay 2:d2:v4	Action
6 - Al SC - C - C - C - C - C - C - C - C - C	Multiple Networks dd SI HBA Connection HBA Connections DE HBA Connection Connecti FC SAN/FC Bay 1 FC SEA	Solution San San San San San San San San San Sa	EFERRED Status F	3.9 Gb - 10 Gb	Allocated Port S 4 Gb - 8 Gb	WWARN	00-17-A4-77-71 00:C2:DE:04 0	с.14 LOM мас 0-17-A4-77-7С-16	1.2-d => Bay 2:d2:v4 Macoing LOM1:1-b => Bay	Actor 1:d2:v2
6 ISC FC Port 1 2	Multiple Networks dd SI HBA Connection HBA Connections DE HBA Connection Connect FC SAN/FC Bay 1 FCoE_A Bay 2 FCoE_B	S SAN SAN	EFERRED Status F © 4	3.9 Gb - 10 Gb	Allocated Port S 4 Gb - 8 Gb 4 Gb - 8 Gb	WMPN 50.06:08:00: 50.06:08:00:	00-17-A4-77-74 00:C2:DE:04 00:C2:DE:06 00:C2:DE:06	XAC 0-17-A4-77-7C-16 0-17-A4-77-7C-17	1.2-d => Bay 2:d2:v4 Macoing LOM1:1-b => Bay LOM1:2-b => Bay	E Actor 1:d2:v2 2:d2:v2 Destr
6 FC FC Port 1 2	Multiple Networks dd SI HBA Connection HBA Connections DE HBA Connection Connect FC SAN/FC Bay 1 FCoE_A Bay 2 FCoE_B Add	S S S S S AE Network S AN S AN S AN	Status F C 4	3.9 Gb - 10 Gb	Allocated Port S 4 Gb - 8 Gb 4 Gb - 8 Gb	MARN 50.06.08.00 50.06.08.00	00-17-A4-77-74 00:C2:DE:04 00:C2:DE:06 0	2-14 LOM MAC 0-17-A4-77-7C-16 0-17-A4-77-7C-17	1.2-d => Bay 2:d2:v4 Mecoing LOM1:1-b => Bay LOM1:2-b => Bay	Actor 1:d2:v2 2:d2:v2 Deter
6 SC C C C C C C C C C C C C C C C C C C	Multiple Networks dd SI HBA Connection HBA Connection Connection Connection Connection Bay 1 FCoE_A Bay 2 FCoE_B dd HDP Chancel Bod Barande	<ul> <li>№ PF</li> <li>№ PF</li> <li>8</li> <li>9</li> <li>9</li></ul>	Status F	3.9 Gb - 10 Gb	Allocated Port S 4 Gb - 8 Gb 4 Ob - 8 Gb	www.en \$0.06.08.00 \$0.06.08.00	00-17-A4-77-71 00-02-DE-04 00-02-DE-06 00-02-DE-06 0	XAC 0-17-A4-77-7C-16 0-17-A4-77-7C-17	1.2-d => Bay 2:d2:v4 Macoing LOM1:1-b => Bay LOM1:2-b => Bay	E Action 1:d2v2 2:d2v2 Detet
6 SC C C C C C C C C C C C C C	Multiple Networks dd SI HBA Connection HBA Connection Connection Connection Connection Bay 1 FCoE_A Bay 2 FCoE_B dd there Channel Bod Parameter	<ul> <li>№ PF</li> <li>№ PF</li> <li>8</li> <li>9</li> <li>9</li></ul>	Status F C 4	3.9 Gb - 10 Gb	Allocated Port S 4 Ob - 8 Ob	www.en 50.06.08.00 50.06.08.00	00-17-A4-77-71 00-02-DE-04 00-02-DE-04 00-02-DE-06 0	XAC 0-17-A4-77-7C-16 0-17-A4-77-7C-17	1.2-d => Bay 2:d2:v4 Macoing LOM1:1-b => Bay LOM1:2-b => Bay	Actor 1:d2:v2 2:d2:v2 Detet
6 FC FC Port 1 2 Fi Ass	Multiple Networks dd SI HBA Connection HBA Connection Connection Connection Gamedi FC SAN /FC Bay 1 FCoE_A Bay 2 FCoE_B dd three Channel Boot Parameter Sign Profile to Serve	S ♥ PF S Network Type F S Network Ty	Status F	3.9 Gb - 10 Gb	Allocated Rot S 4 Gb - 8 Gb		00-17-A4-77-71	XAC 0-17-A4-77-7C-16 0-17-A4-77-7C-17	1.2-d => Bay 2:d2:v4 Mecoing LOM1:1-b => Bay LOM1:2-b => Bay	Actor 1:02:v2 2:02:v2 Detet

Figure 134 - Define a Server Profile ESX-1, assigned to Bay 2

Figure 135 - Configure NICs 5 and 6 for multiple Networks and select the appropriate VLANs

lit Server Profile: ESX-1								
X-1 Default -	2 VCX0000V01	976	59330-ebf0-41c9-k	99b-1aa77	777188a6			
themet Adapter Connections								
Server VLAN Tag to vNet Mappings 🔋								
Force the same VLAN mappings as in the Sha	red Uplink Set None		Notworks in a		64 manuals lines	ii in 460)		
Networks not in mapping			Oran and drop	napping ( networke t	54 mapped; IIm o include them or	remove then	n from the mo	<b>a</b> n
Alphabetical Filtered			vNet Name	Statue	Liplick VLANId	Server		1/4 
All A-C D-F G-I J-L M-O	P-R S-V W-Z 0-3 4-6 7-9	]	THOSE HOUTING					
			VLAN-103	0	103	103		
<u>ຢ</u> VLAN-101	0		VLAN-104	0	104	104		
<u>ຢ</u> VLAN-102	0		VLAN-105	0	105	105	Ĩ 🗆	
<u>ຢ</u> VLAN-2151	0		VLAN-2100	0	2100	2100	1 🗆	
( € VLAN-2152	0		VLAN-2101	0	2101	2101	j 🗆	
0 VLAN-2153	0		VLAN-2102	0	2102	2102	j 🗆	
(ย์ 0 VLAN-2154	0		VLAN-2103	0	2103	2103	i o	
U VLAN-2155	0		VLAN-2104	0	2104	2104		
U VLAN-2156	0	T	VLAN-2105	0	2105	2105	i o	
I N T T							_	

**Note:** "Server VLAN ID" and "Untagged" boxes can be edited. One network per port could be marked as "Untagged', in which case the server would not be configured for tagging on that VLAN. It is also possible to change the VLAN ID that is presented to the server (VLAN translation), in which case the communications between Virtual Connect and the network would be the VLAN ID in grey, if the Server VLAN ID box to the right were changed, VC would communication with the server on the new VLAN ID, providing a VLAN translation function. VLAN translation could be a very useful feature, in the event that VLAN renumbering is required within the datacenter. The network VLAN numbers and Shared Uplink Set configurations could be changed to reflect the new VLAN IDs used, however, the old VLAN IDs could still be presented to the server providing the ability to delay or eliminate the need to change the VLAN ID used within the server/vSwitch.

Define <del>v</del> Co	nfigure 🔻	Tools 🔻	Help 🔻					
C7K-Bot	ttom: B	ay 2 (I	ProLia	nt BL460c Gei	n8)			
Device Bay S	tatus-Bay≱	‡ 2			_			
Overall Statu			🛇 ок					
Hardware	Status:		Normal					
VC Status			🕗 ок					
Assigned Se	rver Profile	:	ESX-1					
Enclosure Na	ame:		C7K-Bottor	n				
UID:								
Power Statu	s/Control:		Off Off				Momentary Pr	ess
Blade Server	Inform atio	n - Bav # 2		_	_		_	
Serial Numbe	er:		MXQ30301	9S				
Serial Numbe	er (Logical)		VCX0000V	'01				
UUID:			31363636-	3136-584D-5133-3033303	313953			
UUID (Logical	l):		97659330-	ebf0-41c9-b99b-1aa7777	188a6			
Product Nam			ProLiant BL	.460c Gen8				
Server Name								
Part Number			666161-B2	1				
Asset Tag:			[Unknow n]					
Server Ether	net Adapte	r Inform at	ion					
Ethernet Adapter	Flex NIC	Location	Module Port	Model	MAC Address	Network	WWN	SAN Fabric
Port 1								
	LOM1:1- a	FLB1	Bay 1:d2:v1	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-0A	VLAN- 101		
	LOM1:1- b	FLB1	Bay 1:d2:v2	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-16		50:06:0B:00:00:C2:DE:04	FCoE_A
	LOM1:1- c	FLB1	Bay 1:d2:v3	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-0E	VLAN- 102		
_	LOM1:1- d	FLB1	Bay 1:d2:v4	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-12	Multiple Networks	)	
Port 2								
	LOM1:2- a	FLB1	Bay 2:d2:v1	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-0C	(VLAN- 101	)	
	LOM1:2- b	FLB1	Bay 2:d2:v2	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-17		50:06:0B:00:00:C2:DE:06	FCoE_E
	LOM1:2- c	FLB1	Bay 2:d2:v3	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-10	VLAN- 102		
	LOM1:2- d	FLB1	Bay 2:d2:v4	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-14	Multiple Networks	)	

#### Figure 136 - Server Profile View Bay 2

**Figure 137 -** By clicking on the "Multiple Networks" statement for each LOM, the following page is displayed, which lists the VLAN connections for this port.

1ultip	le Networks - Windows Internet Explorer		.
	HP Virtual Connect Manager		
Aultip	le Networks		F
ю.	Network Name	VLAN ID	
	VLAN-103	103	
2	VLAN-104	104	
	VLAN-105	105	
	VLAN-2100	2100	
	VLAN-2101	2101	
	VLAN-2102	2102	
	VLAN-2103	2103	
	VLAN-2104	2104	
	VLAN-2105	2105	
0	VLAN-2106	2106	
1	VLAN-2107	2107	
2	VLAN-2108	2108	
3	VLAN-2109	2109	
4	VLAN-2110	2110	
5	VLAN-2111	2111	
6	VLAN-2112	2112	
7	VLAN-2113	2113	
8	VLAN-2114	2114	
9	VLAN-2115	2115	
0	VLAN-2116	2116	
1	VLAN-2117	2117	
2	VLAN-2118	2118	
3	VLAN-2119	2119	
4	VLAN-2120	2120	
5	VLAN-2121	2121	
6	VLAN-2122	2122	
7	V/LAN 2123	2123	

# Review

In this scenario we have created One Shared Uplink Set (SUS), providing support for many VLANs. Uplinks originating from each FlexFabric Module connect to the same SUS, by doing so we provide redundant connections out of the Virtual Connect domain. As multiple uplinks are used from each module, we have also leveraged LACP to improve uplink performance. In this scenario, uplinks from one module only will be active at any given time. We also create two FCoE SAN Fabrics.

We created a server profile, with SIX NICs. Two connected to the same VLAN (101), Ports 1 and 2 connect to VLAN-101, which provides the ability to sustain a link or module failure and not lose connection to the network, these NICs were set to 100Mb with a Maximum speed of 8Gb. VLAN-101 frames will be presented to the NIC(s) without VLAN tags (untagged), these two NICs are connected to the same VLAN, but taking a different path through the enclosure. VLAN 101 is used for Management connections to the ESX host.

Network Ports 3 and 4 connect to the same VLAN (102), these NICs were set to 2Gb with a maximum speed of 8Gb. VLAN-102 frames will be presented to the NIC(s) without VLAN tags (untagged), these two NICs are connected to the same VLAN, but taking a different path out of the enclosure. VLAN 102 is used for VMotion.

Network Ports 5 and 6 were added, these NICs will be connected to "Multiple Networks" and each NIC will then be configured for networks VLAN-103 through VLAN-105 and networks VLAN-2100 through VLAN-2150. As these networks are tagging, frames will be presented to the server with VLAN tags. NICs 5 and 6 will be connected to the same vSwitch to support VM connections. VLAN tagged frames for these networks will be forwarded to the Virtual switch and then passed on to the appropriate Virtual Machine, VLAN tags will be removed as the frames are passed to the virtual machine. These NICs will use the remaining available bandwidth of 3.9Gb with a maximum speed of 10Gb.

Additionally, FCoE port 1 is connected to SAN fabric FCoE\_A and FCoE SAN port 2 is connected to SAN Fabric FCoE\_B, providing a multi-pathed connected to the SAN. The SAN fabric connections are set to 8Gb/Sec.

The FCoE SAN fabric connects to each SAN fabric over a pair of uplinks per module. SAN logins are distributed across the multiple paths.

The following graphic provides an example of an ESX server with TWO NICs connected to the same console vSwitch configured for VLAN 101, which was the Default (untagged) VLAN. Additional vSwitches have been configured for VMotion and product VLANs.

**Figure 138 -** As NICs 1 and 2 are connected directly to VLAN-101, the connection acts as an Access or Untagged switch port, you need to ensure that the Hypervisor in NOT configured for VLAN tagging. However, if you want to put this server onto a VLAN that is tagged, this setting will need to be configured for that VLAN.



# **Results – vSphere Networking Examples**

We successfully configured FlexFabric with Share Uplink Sets, supporting several VLANs and redundant SAN fabrics. We created a server profile to connect to the various vNet with SIX NICs and the SAN fabrics using the FCoE connections created within the profile.

Although both Ethernet and Fibre channel connectivity is provided by the CNA used in the G7 and Gen 8 servers; each capability (LAN and SAN) is provided by a different component of the adapter, they appear in the server as individual network and SAN adapters.

The following graphics show an ESXi 5 server with SIX FlexNICs configured, two at 100Mb (console), two at 2Gb (VMotion) and two at 3.9Gb (Guests port groups), however, as we utilized the new Min/Max network bandwidth feature of Virtual Connect 4.01, the NIC speeds will now be displayed at their maximum configured speed, therefore; when configuring NICs within the ESXi host, you may need to compare MAX addresses to confirm the correct NIC has been selected.

If we did not require SAN connectivity on this server, the FCoE connections could be deleted and the server would then have 8 NIC ports available to the OS. In addition, if we did not want FCoE connectivity and instead wanted to leverage iSCSI, we could delete the FCoE connected and recreate those connects as iSCSI connections, with offload and optionally iSCSI boot.

**Note:** the BL465c G7 and BL685c G7 utilize an NC551i chipset (BE2), whereas the BL460c G7, BL620c G7 and BL680c G7 utilize an NC553i chipset (BE3) and the Gen 8 blades typically have a NC554 adapter which also utilizes the BE3 chipset. Both the BE2 and BE3 chipsets share common drivers and firmware.

Virtual Connect supports the use of either Standard or Distributed vSwitches, examples of both are provided below.

# vSphere Standard vSwitch

Figure 139 – ESXi 5.1 Network Connections

etwork Access	Select which vSphere standard switch will have vSphere standard switch using the unclaimed	dle the network tra network adapters	affic for this connection. You may also create a new listed below.
onnection Settings ummary	Create a vSphere standard switch	Speed	Networks
	Emulex Corporation HP FlexFabric	c 10Gb 2-port 5	54FLB Adapter
	🔽 📟 vmnic4	8000 Full	None
	Vmnic5	8000 Full	None
	🕅 📟 vmnic6	10000 Full	0.0.0.1-255.255.255.254 ( VLAN 104 )
	🖂 🖼 vmnic7	10000 Full	0.0.0.1-255.255.255.254 ( VLAN 104 )
	O Use vSwitch0	Speed	Networks
	Emulex Corporation HP FlexFabric	c 10Gb 2-port 5	54FLB Adapter
	🔲 📟 vmnic1	8000 Full	192.168.101.185-192.168.101.185
	📁 🖼 vmnic0	8000 Full	192.168.101.185-192.168.101.185
	I Preview:		
	Virtual Machine Port Group	Physical Adapters	
		Vmnics	



Figure 140 - ESXi 5.1 networking - three vSwitches configured. (Note the NIC speeds)

**Note:** As VLAN 101 is set as untagged at the upstream switch port, the management network port group should be defined as untagged. This will allow the server to be deployed, without having the set a VLAN ID for the management network.

**Figure 141 -** You may want to specify a specific NIC for VMotion traffic. This will ensure that all VMotion traffic between servers within the enclosure will remain on the same VC module, reducing the likelihood of multiple hops between servers. Edit the VMotion Configuration.

🛃 vSwitch1 Properties					_ 🗆 ×
Ports Network Adapters					
Configuration	Summary	Port Properties			1 =
🖈 vSwitch	120 Ports	Network Label:	VMotion		
	vMotion and IP	VLAN ID:			
		vMotion:	Enabled		
		Fault Tolerance Logging:	Disabled		
		Management Traffic:	Disabled		
		iSCSI Port Binding:	Disabled		
		NIC Settings			
		MAC Address:	00:50:56:6e:2c:9c		
		MTU:	1500		
		IP Settings			
		IP Address:	192.168.102.170		
		Subnet Mask:	255.255.255.0		
				View Routing Table	
		Effective Policies			7
		Security			
		Promiscuous Mode:	Reject		
		MAC Address Changes:	Accept		
Add	Edit Remove	Forged Transmits:	Accept		•
				Close He	elp

**Figure 142 –** Edit the NIC Team for VMotion and set one of the Adapters in Standby, this will ensure that ALL VMotion traffic remains on the SAME VC module. ESX NIC vmnic5 is connected to the VC module in bay 1.

🖉 VI	Motion Proper	ties				×
Ge	neral   IP Setting	gs   Security   1	Traffic Shapirlg	NIC Teaming		1
Г	Policy Exception	s				
	Load Balancing:		🗖 Rot	ite based on the orig	ginating virtu	Jal port ID 🔽
	Network Failove	r Detection:	🗖 Link	status only		~
	Notify Switches:		T Yes			
	Failback:		Ves			
-						
	<ul> <li>Override swi</li> </ul>	tch failover orde	er:			
	Select active and adapters activat	d standby adapt e in the order s	ters for this port specified below.	group. In a failover	situation, sl	tandby
	Name	Speed	Networks			Move Up
	Active Adapte	275			ſ	Mouro Down
	wnic5	8000 Full	None		L	MOVE DOWN
	Standby Adap	oters				
4	Tioused Adam	ouou ruii	None			
	onascanaap					
	- Adapter Detail	s				
	Emulex Corpor	ation HP FlexFa	bric 10Gb 2-port	554FLB Ada		
	Name:		vmnic4			
	Location:		PCI 04:00.4			
	Driver:		be2net			
				ок	Cancel	Help

**Note:** As this Scenario is based on an Active/Standby configuration, to ensure that ALL VMotion traffic between servers within the enclosure is contained to the same module, on each server edit the VMotion vSwitch properties and move one of the Adapters to Standby. This will ensure that ALL VMotion traffic will occur on the same Virtual Connect module.

**Figure 143 -** Configuring the vSwitch for multiple port groups / VLANs

🛃 vSwi	tch2 Properties			[ <b>_</b> _	١×
Ports	Network Adapters	1			
COD	iguration	Summary	vSphere Standard Switch Properties -		
1	vSwitch	120 Ports	Number of Ports:	120	
	VLAN-2120	Virtual Machine			
	VLAN-2119	Virtual Machine	Advanced Properties		
0	VLAN-2118	Virtual Machine	MTU:	1500	
0	VLAN-2117	Virtual Machine			
0	VLAN-2116	Virtual Machine	- Default Policies		
0	VLAN-2115	Virtual Machine	Security		
0	VLAN-2114	Virtual Machine	Security 1		
0	VLAN-2113	Virtual Machine	Promiscuous Mode:	Reject	
0	VLAN-2112	Virtual Machine	MAC Address Changes:	Accept	
0	VLAN-2111	Virtual Machine	Forged Transmits:	Accept	
0	VLAN-2110	Virtual Machine	Traffic Shaping		
9	VLAN-2109	Virtual Machine	Average Bandwidth:		
0	VLAN-2108	Virtual Machine	Parala Dan davideba		
9	VLAN-2107	Virtual Machine	Peak Bandwidth:		
9	VLAN-2106	Virtual Machine	Burst Size:		
9	VLAN-2105	Virtual Machine	Failover and Load Balancing		
0	VLAN-2104	Virtual Machine	Load Balancing:	Port ID	
0	VLAN-2103	Virtual Machine	Network Eailure Detection	Link status only	
9	VLAN-2102	Virtual Machine			
0	VLAN-2101	Virtual Machine	Notify Switches:	Yes	
-			Failback:	Yes	
A	1d	Edit Remove	Active Adapters:	vmnic6, vmnic7	-
				Close Help	
					_

🚱 VM-1 - Virtual Machine Propert	ties			
Hardware Options Resources Pro	ofiles vServices			Virtual Machine Version: 8
Chow All Dovicos	odd	Remove	-Memory Config	uration
		NGIIIOVG	1011 GB	Memory Size: 4 🗧 GB 💌
Hardware	Summary		512 GB	Maximum recommended for this
Memory	4096 MB		256 68	guest OS: 1011 GB.
CPUs	1		200 00	Maximum recommended for best
Video card	Video card		128 GB	performance: 16348 MB.
	I ST Logic SAS		64 GB	Default recommended for this
Hard disk 1	Virtual Disk		32 GB	<ul> <li>guest OS: 4 GB.</li> <li>Minimum measure de d'Annubia</li> </ul>
CD/DVD drive 1	Client Device		16 68	<ul> <li>guest OS: 512 MB.</li> </ul>
Network adapter 1	VLAN-104		10 65	
Floppy drive 1	Client Device		8 GBH	
			4 GB	
			2 GB	
			1.68	
			1 GD	
			512 MB	
			256 MB	
			128 MB	
			64 MB	
			01110	
			32 MB	
			16 MB	
			8 MB -	
			4 MB	
1				
Help				OK Cancel
				11

### Figure 144 - VM1 configured for VLAN 104





# vSphere Distributed vSwitch

#### 192.168.101.170 VMware ESXi, 5.1.0, 1117900 Getting Started Summary Virtual Machines Performance Configuration Tasks & Events Alarms Permissions Maps Hardware View: vSphere Standard Switch vSphere Distributed Switch Processors Networking Memory Storage Remove... Properties... Standard Switch: vSwitch0 Networking -Virtual Machine Port Group -Physical Adapters Storage Adapters 🖵 VM Network 0 🗕 🤬 vmnic1 🛛 8000 Full P Network Adapters P 🖵 🌇 vmnic0 8000 Full -VMkernel Port-Advanced Settings 🖵 Management Network 0 Power Management vmk0:192.168.101.170 fe80::217:a4ff:fe77:7c08 Software Licensed Features Remove... Properties... Standard Switch: vSwitch1 Time Configuration -VMkernel Port--Physical Adapters DNS and Routing 🖵 VMotion 0 🛶 🖼 vmnic4 8000 Full Authentication Services 0 🖵 🌇 vmnic5 8000 Full vmk1:192.168.102.170 | Power Management Virtual Machine Startup/Shutdown Virtual Machine Swapfile Location Security Profile Host Cache Configuration System Resource Allocation Agent VM Settings Advanced Settings

#### Figure 146 - Management and VMotion NICs are connected to Standard vSwitches

Figure 147 - VM Networks are connected to a Distributed vSwitch





### Figure 148 - VM Connected to VLAN 104 on Distributed vSwitch

# **Results – vSphere SAN Connectivity**

**Figure 149 -** By access the HBA BIOS during server boot, you can see that Port 1 of the FlexHBA is connected to an EVA SAN LUN. Also note the CNA firmware version, this is the minimum version required for vSphere 5.

E	mulex OneConne	ct FCoE B	IOS Utili	ty, XA4.	03a5	
01: 554FLB: Mem Base: FBE000 Port Name: 50060 Vlan ID: 1001 D	00 Firmware U B0000C2DE04 CBX mode: CEE	Jersion: [ 2 mode	Bus#: 0 4.2.401.2 Node Na	04 Dev#: 215 B me: 500	00 Func#: 02 IOS: Disabled 6080000C2DE05	
	Devices P	resent on	This Ada	pter:		
01. DID:010000 W	WPN:50001FE1 5	005D468 L	UN:01	НР	HSV210	6220
02. DID:010100 W	WPN:50001FE1 5	5005D46C L	UN:01	HP	HSV210	6220
03. DID:010200 W	WPN:50001FE1 5	005D46A L	UN:01	HP	HSV210	6220
04. DID:010300 W	WPN:50001FE1 5	6005D46B L	UN:01	HP	HSV210	6220
	Enter <	Esc> to P	revious M	lenu		

**Figure 150** – ESXi 5 storage configuration, the Shared Storage LUN is provided through the FCoE connections to the SAN.

192.168.101.170 VMware ESXi, 5.1.0, 1	117900	
Getting Started Summary Virtual Mach	hrres Performance Configuration Tasls & Events Alams Permissions Magis Storage Views Network Views Hardware Status HP Insight Management	
Hardware	View: Datastores Devices	
Processors	Datastores	
Memory	Identification > Status Device Drive Type Capacity Free Type Last Update Alarm Actions Storage I/O Control Hardware Accelerable	0
<ul> <li>Storage</li> </ul>	I datastore1 ⊘ Normal HP Serial Attached Non-SSD 274.25 GB 266.36 GB WP55 7/14/2013 11:36-43 PM Enabled Disabled Unknown	
Networking	ESK-0001 📀 Normal HP Fibre Channel Non-SSD 499.75 GB 498.80 GB VMPS5 3/20/2013 11:24:18 PM Enabled Disabled Unknown	
Storage Adapters	ESX-0002 O Normal HP Fibre Channel Non-SSD 499.75 GB 499.16 GB VMPS3 3/20/2013 11:24:18 PM Enabled Disabled Unknown	_
Network Adapters	■ ESX-0003  Normal HP Fibre Channel Non-SSD 499.75 GB 499.20 GB VMFS3 3/20/2013 11:24:18 PM Enabled Disabled Unknown	
Advanced Settings		
Power Management		
Software		
Licensed Features		
Time Configuration		
DNS and Routing		
Authentication Services		
Power Management		
Virtual Machine Startup/Shutdown		
Virtual Machine Swapfile Location		
Security Profile		
Host Cache Configuration	Dataston Dataile	
System Resource Allocation		_
Agent VM Settings	499.75 GB Capably	
Advanced Settings	Hardware Acceleration: Unknown 973.00 MB Used	
	Refresh Strang Cambilities 498.00 GB 🔲 Free	
	System Storage Capability: N/A	
	User-defined Storage Capability: N/A	
	Path Selection Properties Extents Storage 1/0 Control	
	Host Recently Us Volume Label: ESX-0001 HP Fibre Channel Disk (na 499.99 GB Disabled	
	Detastore Name: ESX-0001 Total Formatted Capacity 499,75 GB	
	Table 7 Formatting	
	Booken 0 File System: VMFS 5.54	
	Disabled: 0 Block Size: 1 MB	

# Summary

We presented a Virtual Connect Network scenario by creating a single shared uplink set (SUS). The SUS is connected to TWO different LAN switches through 4 uplinks, two from each FlexFabric module. We included a dual path SAN fabric for storage connectivity.

When VC profile ESX-1 is applied to the server in bay 2 and the server is powered up, it has one NIC connected through FlexFabric module 1 (connected to VLAN-101), the second NIC is connected through FlexFabric module 2 (connected to VLAN-101). Each NIC is configured at 100Mb. These NICs are connected to the console vSwitch. The second pair of NICs are connected to the second vSwitch, which is configured for VMotion and is connected to VLAN102 through NICs 3 and 4 which are configured at 2Gb. The last pair of NICs 5 and 6, are connected to the third vSwitch, which is configured to support VLANS 103 through 105 and 2100 through 2150. This host is also configured for FCoE based SAN access and connects to a SAN LUN to store the Guest VMs. Each FCoE port is configured for 8Gb of SAN bandwidth.

In the event of a LAN switch or uplink cable failure, VC would fail-over the uplinks to the alternate path. The host operating system would likely not realize a failure and fail-over occurred, however, the systems connected to these VLANs would now be accessible though different LAN switches/ports.

As additional servers are added to the enclosure, simply create additional profiles, or copy existing profiles, configure the NICs for LAN and SAN fabrics as required and apply them to the appropriate server bays and power the server on.

# Scenario 6 – Shared Uplink Set with Active/Active Uplinks, 802.3ad (LACP) -Ethernet and FCoE SAN – vSphere

# **Overview**

This scenario will implement the Shared Uplink Set (SUS) to provide support for multiple VLANs. The upstream network switches connect a shared uplink set to two ports on each FlexFabric modules, LACP will be used to aggregate those links.

As multiple VLANs will be supported in this configuration, the upstream switch ports connecting to the FlexFabric modules will be configured to properly present those VLANs. In this scenario, the upstream switch ports will be configured for VLAN trunking/VLAN tagging.

When configuring Virtual Connect, we can provide several ways to implement network fail-over or redundancy. One option would be to connect TWO uplinks to a single Virtual Connect network; those two uplinks would connect from different Virtual Connect modules within the enclosure and could then connect to the same upstream switch or two different upstream switches, depending on your redundancy needs. An alternative would be to configure TWO separate Virtual Connect networks, each with a single, or multiple, uplinks configured. Each option has its advantages and disadvantages. For example; an Active/Standby configuration places the redundancy at the VC level, where Active/Active places it at the OS NIC teaming or bonding level. We will review the second option in this scenario.

In addition, several Virtual Connect Networks can be configured to support the required networks to the servers within the BladeSystem enclosure. These networks could be used to separate the various network traffic types, such as iSCSI, backup and VMotion from production network traffic.

This scenario will also leverage the Fibre Channel over Ethernet (FCoE) capabilities of the FlexFabric modules. Each fibre channel fabric will have two uplinks connected to each of the FlexFabric modules.

# Requirements

This scenario will support both Ethernet and fibre channel connectivity. In order to implement this scenario, an HP BladeSystem c7000 enclosure with one or more server blades and TWO Virtual Connect FlexFabric modules, installed in I/O Bays 1& 2 are required. In addition, we will require ONE or TWO external Network switches. As Virtual Connect does not appear to the network as a switch and is transparent to the network, any standard managed switch will work with Virtual Connect. The Fibre Channel uplinks will connect to the existing FC SAN fabrics. The SAN switch ports will need to be configured to support NPIV logins. Two uplinks from each FlexFabric module will be connected to the existing SAN fabrics.

**Figure 151 - Physical View;** Shows two Ethernet uplinks from Ports X5 and X6 on Module 1 to Ports 1 and 2 on the first network switch and two Ethernet uplinks from Ports X5 and X6 on Module 2 to Ports 1 and 2 on the second network switch. The SAN fabrics are also connected redundantly, with TWO uplinks per fabric, from ports X1 and X2 on module 1 to Fabric A and ports X1 and X2 to Fabric B.



**Figure 152 - Logical View;** the server blade profile is configured with SIX FlexNICs and 2 FlexHBAs. NICs 1 and 2 are connected to VLAN-101-x, NICs 3 and 4 are connected to VLAN-102-x and NICs 4 and 5 are connected to VLAN-103-x through VLAN-105-x and VLAN-2100x through VLAN-2150-x, which are part of the Shared Uplink Sets, VLAN-Trunk-1 and VLAN-Trunk-2 respectively. The VLAN-Trunks are connected, at 10Gb, to a network switch, through Ports X5 and X6 on each FlexFabric Module in Bays 1 and 2. The FCoE SAN connections are connected through ports X1 and X2 on each FlexFabric module.



# Installation and configuration

# **Switch configuration**

As the Virtual Connect module acts as an edge switch, Virtual Connect can connect to the network at either the distribution level or directly to the core switch.

The appendices provide a summary of the cli commands required to configure various switches for connection to Virtual Connect. The configuration information provided in the appendices for this scenario assumes the following information:

 The switch ports are configured as VLAN TRUNK ports (tagging) to support several VLANs. All frames will be forwarded to Virtual Connect with VLAN tags. Optionally, one VLAN could be configured as (Default) untagged, if so, then a corresponding vNet within the Shared Uplink Set would be configured and set as "Default".

**Note:** when adding additional uplinks to the SUS, if the additional uplinks are connecting from the same FlexFabric module to the same switch, in order to ensure all the uplinks are active, the switch ports will need to be configured for LACP within the same Link Aggregation Group.

The network switch port should be configured for Spanning Tree Edge as Virtual Connect appears to the switch as an access device and not another switch. By configuring the port as Spanning Tree Edge, it allows the switch to place the port into a forwarding state much quicker than otherwise, this allows a newly connected port to come online and begin forwarding much quicker.

The SAN connection will be made with redundant connections to each Fabric. SAN switch ports connecting to the FlexFabric module must be configured to accept NPIV logins.

# **Configuring the VC module**

- Physically connect Port 1 of network switch 1 to Port X5 of the VC module in Bay 1
- Physically connect Port 2 of network switch 1 to Port X6 of the VC module in Bay 1
- Physically connect Port 1 of network switch 2 to Port X5 of the VC module in Bay 2
- Physically connect Port 2 of network switch 2 to Port X6 of the VC module in Bay 2

**Note:** if you have only one network switch, connect VC ports X5 and X6 (Bay 2) to an alternate port on the same switch. This will NOT create a network loop and Spanning Tree is not required.

- Physically connect Ports X1/X2 on the FlexFabric in module Bay 1 to switch ports in SAN Fabric A
- Physically connect Ports X1/X2 on the FlexFabric in module Bay 2 to switch ports in SAN Fabric B

# **VC CLI commands**

Many of the configuration settings within VC can also be accomplished via a CLI command set. In order to connect to VC via a CLI, open an SSH connection to the IP address of the active VCM. Once logged in, VC provides a CLI with help menus. Through this scenario the CLI commands to configure VC for each setting will also be provided.

# **Configuring Expanded VLAN Capacity via GUI**

Virtual Connect release 3.30 provided an expanded VLAN capacity mode when using Shared Uplink Sets, this mode can be enabled through the Ethernet Settings tab or the VC CLI. The default configuration for a new Domain install is "Expanded VLAN Capacity" mode, Legacy mode is no longer available and the Domain cannot be downgraded.

# To verify the VLAN Capacity mode

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Expanded VLAN capacity
- Verify Expanded VLAN Capacity is configured and Legacy VLAN Capacity is greyed out.

**Note:** Legacy VLAN mode will only be presented if 1Gb Virtual Connect Modules are present, in which case the domain would be limited to Firmware version 3.6x.

## **Configuring Expanded VLAN Capacity via CLI**

The following command can be copied and pasted into an SSH based CLI session with Virtual Connect;

# Set Expanded VLAN Capacity set enet-vlan -quiet VlanCapacity=Expanded

### Figure 153 - Enabling Expanded VLAN Capacity

Define 🔻 Configure 👻 Tools 👻 Help 👻
Ethernet Settings
MAC Addresses Port Monitoring Advanced Settings
VLAN
Server VLAN Tagging Support
Force server connections to use the same VLAN mappings as shared uplink sets
VLAN Capacity           O Legacy VLAN capacity (Up to 320 VLANs per module and 28 VLANs per server connection).           P Expanded VLAN capacity (Up to 1000 VLANs per domain and 162 VLANs per physical server port).
Multiple Networks Link Speed Settings
When using mapped VLAN tags (multiple networks over a single link), these settings will be used for the overall Link speed control.
Set a Custom value for Preferred Link Connection Speed
Set a Custom value for Maximum Link Connection Speed

**Note:** if a 1Gb VC Ethernet module is present in the Domain, Expanded VLAN capacity will be greyed out, this is only supported with 10Gb based VC modules. Also, once Expanded VLAN capacity is selected, moving back to Legacy VLAN capacity mode will require a domain deletion and rebuild.

## **Defining a new Shared Uplink Set (VLAN-Trunk-1)**

Connect Ports X5 and X6 of FlexFabric module in Bay 1 to Ports 1 and 2 on switch 1

Create a SUS named VLAN-Trunk-1 and connect it to FlexFabric Ports X5 and X6 on Module 1

- On the Virtual Connect Home page, select Define, Shared Uplink Set
- Insert Uplink Set Name as VLAN-Trunk-1
- Select Add Port, then add the following port;
  - Enclosure 1, Bay 1, Port X5
  - Enclosure 1, Bay 1, Port X6

Ethernet Sha	red External Up	link Set					
Jplink Set Name		Status PID					
LAN-Trunk-1		<b>O</b>					
External Uplir	nk Ports						
Port	Port Role	Port Status		Connector Ty	pe Connected To	PID Speed/Du	plex Action
C7K-Bottom Bay 1: Port X5	NA	Contractive	10 Gb	SFP-DAC	HP (Ten-GigabitEthernet1/0/5)	Auto	Delete
C7K-Bottom Bay 1: Port X6	NA	Contractive	10 Gb	SFP-DAC	HP (Ten-GigabitEthernet1/0/6)	Auto	Delete
onnection Mode	: • Auto	LACP Timer:  Domain Default, Short (1 sec) Long (30 sec)	Short (1 sec)				
dd Port	>						
Associated F	FCoE Network (\	/LAN tagged)				-hann a r	Et. T. Dolot

#### Figure 154 - Shared Uplink Set (VLAN-Trunk-1) Uplinks Assigned

- Click Add Networks and select the Multiple Networks radio button and add the following VLANs;
  - Enter Name as VLAN-
  - Enter Suffix as -1
  - Enter VLAN IDs as follows (and shown in the following graphic);
- 101-105,2100-2400
- Enable SmartLink on ALL networks
- Click Advanced
  - Configure Preferred speed to 4Gb
  - Configure Maximum speed to 8Gb
- Click Apply

**Note:** you can optionally specify a network "color" or "Label" when creating a shared Uplinkset and its networks. In the example above we have not set either color or label.

sociated Networks (	VLAN tagged)
fould you like to add	
) a single Associated Ne	twork 💿 multiple Associated Networks
Network None	
	+ VLAN D + _1
Sample network name: V	LAN-2400-1
*LANND(S) *[1	01-105,2100-2400
Color	Labels Tune In and Network Labels
	Type to add Network Labels
Selected Speed: 4 0.1 Gb	n speed 2 Gb 8 Gb
[	
Set maximum connection	n speed
Set maximum connection	n speed G
Set maximum connection Selected Speed: 8	n speed C
Set maximum connection Selected Speed: 8 0.1 Gb	n speed 2 Gb 10 Gb
Set maximum connection Selected Speed:  0.1 Gb e network access group	n speed 2 66 10 Gb
Set maximum connectit Selected Speed: 0.1 Gb e network access group Default ×	n speed 2 Co 10 Gb
Set maximum connectit Selected Speed: 0.1 Gb e network access group Default × e letters or numbers (0', 2',	nn speed C Co 10 Go names
Set maximum connectit Selected Speed: 0.1 Gb e network access group Default × letters or numbers ('a', '2',	n speed C Gb 10 Gb 10 Gb 11 Gb 12 Gb 1

**Note:** When configuring Preferred and Maximum networks speeds, these speeds will only be reflected when the network is configured individually on a specific NIC. In order to set a Maximum network speed for a NIC configured with Multiple Networks, configure the "Multiple Networks Link Speed Settings" un Ethernet, Advanced Settings in the left tree view pane of the VC console.

After clicking apply, a list of VLANs will be presented as shown below. If one VLAN in the trunk is untagged/native, see note below.

• Click Apply at the bottom of the page to create the Shared Uplink Set

Figure 156 - Associated VLANs for Shared Uplink Set VLAN-Trunk-1

550	ociated Networks (VLAN tagged)						
						🕇 Add 🏦 🛙	elet
		VLAN ID					
	VLAN-101-1	101	false	true	false	Edit 💌	4
	VLAN-102-1	102	false	true	false	Edit 💌	
	VLAN-103-1	103	false	true	false	Edit 💌	1
	VLAN-104-1	104	false	true	false	Edit 📼	
	VLAN-105-1	105	false	true	false	Edit 💌	
	VLAN-2100-1	2100	false	true	false	Edit 💌	
	VLAN-2101-1	2101	false	true	false	Edit 💌	
	VLAN-2102-1	2102	false	true	false	Edit 💌	
	VLAN-2103-1	2103	false	true	false	Edit 💌	
	VLAN-2104-1	2104	false	true	false	Edit 💌	
	VLAN-2105-1	2105	false	true	false	Edit 💌	
	VLAN-2106-1	2106	false	true	false	Edit 💌	
7	VLAN-2107-1	2107	false	true	false	Edit	

Note: Optionally, if one of the VLANs in the trunk to this shared uplink set were configured as Native

or Untagged, you would be required to "edit" that VLAN in the screen above, and configure Native as TRUE. This would need to be set for BOTH VLAN-Trunk-1 and VLAN-Trunk-2.

Please refer to Appendix D; "Scripting the Native VLAN" for scripting examples.

# Defining a new Shared Uplink Set (VLAN-Trunk-2) (Copying a Shared UplinkSet)

The second Shared Uplink Set could be created in the same manner as VLAN-Trunk-1 however; VC now provides the ability to COPY a VC Network or Shared Uplink Set.

- Connect Ports X5 and X6 of FlexFabric module in Bay 2 to Ports 1 and 2 on switch 2
- In the VC GUI screen, select Shared Uplink Sets in the left pane, in the right pane VLAN-Trunk-1 will be displayed, left click VLAN-Trunk-1, it will appear as blue, right click and select COPY
- Edit the Settings as shown below, the new SUS name will be VLAN-Trunk-2 and ALL the associated VLANs with have a suffix of 2
- In step 3, ADD uplinks X5 and X6 from Bay 2
- Click OK
- The SUS and ALL VLANs will be created

#### Figure 157 - Copying a SUS and ALL VLANs

		Copy Sha	red Uplink Set		
Shared Up	link Set Name	¢			
Associate Replace las	d Networks (VI t → instance(s) o	LANs)	with 2		
VLAN-Trunk-1	Original		VLAN-Trunk-2	Сору	
VLAN-101- <u>1</u>			VLAN-101-2		
VLAN-102- <u>1</u>			VLAN-102-2		
VLAN-103- <u>1</u>			VLAN-103-2		
VLAN-104- <u>1</u>			VLAN-104-2		
VLAN-105- <u>1</u>			VLAN-105-2		
VLAN-2100-	L		VLAN-2100-;	2	

## **Defining a new Shared Uplink Set via CLI**

The following script can be used to create the first Shared Uplink Set (VLAN-Trunk-1)

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

# Create Shared Uplink Set VLAN-Trunk-1 and configure uplinks add uplinkset VLAN-Trunk-1 add uplinkport enc0:1:X5 Uplinkset=VLAN-Trunk-1 speed=auto add uplinkport enc0:1:X6 Uplinkset=VLAN-Trunk-1 speed=auto

# Create Networks VLAN-101-1 through VLAN-104-1 and 2100-2400 for Shared Uplink Set VLAN-Trunk-1

add network-range -quiet UplinkSet=VLAN-Trunk-1 NamePrefix=VLAN- NameSuffix=-1 VLANIds=101-105,2100-2400 State=enabled PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000 SmartLink=enabled The following script can be used to create the Second Shared Uplink Set (VLAN-Trunk-2)

# Create Shared Uplink Set VLAN-Trunk-2 and configure uplinks add uplinkset VLAN-Trunk-2 add uplinkport enc0:2:X5 Uplinkset=VLAN-Trunk-2 speed=auto add uplinkport enc0:2:X6 Uplinkset=VLAN-Trunk-2 speed=auto

# Create Networks VLAN101-2 through VLAN105-2 and VLAN-2100-2 through VLAN-2400-2 for Shared Uplink Set VLAN-Trunk-2 add network-range -quiet UplinkSet=VLAN-Trunk-2 NamePrefix=VLAN- NameSuffix=-2 VLANIds=101-105,2100-2400 State=enabled PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000 SmartLink=enabled

**Note:** In this scenario we have created two independent Share Uplink Sets (SUS), each originating from the opposite FlexFabric Modules, by doing so we provide the ability to create separate and redundant connections out of the Virtual Connect domain. When we create the server profiles, you will see how the NICs will connect to VLANs accessed through the opposite VC module, which provides the ability to create an Active / Active uplink scenario. Alternatively, we could have created a single SUS and assigned both sets of these uplink ports to the same SUS, however, this would have provided an Active/Standby uplink scenario, as shown in Scenario 5.

## Defining a new (FCoE) SAN Fabric via GUI

Create a Fabric and name it "FCoE\_A"

- On the Virtual Connect Manager screen, click Define, SAN Fabric to create the first Fabric
- Enter the Network Name of "FCoE\_A"
- Select Add Port, then add the following ports;
  - o Enclosure 1, Bay 1, Port X1
  - Enclosure 1, Bay 1, Port X2
- Ensure Fabric Type is set to "FabricAttach"
- Select Show Advanced Settings
  - Select Automatic Login Re-Distribution (FlexFabric Only)
  - Select Set Preferred FCoE Connect Speed
    - Configure for 4Gb
  - Select Set Maximum FCoE Connect Speed
    - Configure for 8Gb
- Select Apply

Create a second Fabric and name it "FCoE\_B"

- On the Virtual Connect Manager screen, click Define, SAN Fabric to create the second Fabric
- Enter the Network Name of "FCoE\_B"
- Select Add Port, then add the following ports;
  - Enclosure 1, Bay 2, Port X1
  - Enclosure 1, Bay 2, Port X2
- Ensure Fabric Type is set to "FabricAttach"
- Select Show Advanced Settings
  - Select Automatic Login Re-Distribution (FlexFabric Only)
  - Select Set Preferred FCoE Connect Speed
    - Configure for 4Gb
  - Select Set Maximum FCoE Connect Speed
    - Configure for 8Gb
- Select Apply

# **Defining SAN Fabrics via CLI**

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

#Create the SAN Fabrics FCoE\_A and FCoE\_B and configure uplinks as discussed above add fabric FCoE\_A Type=FabricAttach Bay=1 Ports=1,2 Speed=Auto LinkDist=Auto PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000 add fabric FCoE\_B Type=FabricAttach Bay=2 Ports=1,2 Speed=Auto LinkDist=Auto PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000

Figure 158 -	SAN Confid	uration and	Advanced	Settings
--------------	------------	-------------	----------	----------

Define SAN	N Fabric									
Fabric										
Fabric Name FCOE_A		Fabri	ic Type cAttach	•	AUTOMATIC		Configured Speed	Show Adve Manual Autome Autome Selected : 0.1 Gb Selected : 0.1 Gb	Inced Settings Login Re-Distribution atic Login Re-Distribution eferred FCoE Connection Spec Speed: 4 6 6b 8 Gb 8 Gb 8 Gb 8 Gb 8 Gb 8 Gb 8 Gb 8 G	ad
Enclosure	Uplink Ports									_
Uplink Port	Enclosure	Bay	Port S	tatus	Connected To	Action			1	
Uplink Port X1	C7K-Bottom	1	0	8 Gb	10:00:00:27:18:46:09:38	<u>Delete</u>				
Uplink Port X2	C7K-Bottom	1	0	8 Gb	10:00:00:27:18:46:09:38	<u>Delete</u>				
Add Port										
Bay 1	*									
							Apply	Cancel	-	

**Figure 159** - FCoE SAN fabrics configured with two 8Gb uplinks per fabric. Note the bay and port numbers on the right

Define 👻	Configure 👻 T	ools <del>v</del> Help <del>v</del>								
SAN F	abrics									
Extern	al Connections	Server Connections								
Status	SAN Fabric	Fabric Type	Login Re-Distribution	Port Stat	tus	Connected To	Enclosure	Bay	Port	Action
0	FCoE_A	FabricAttach	AUTOMATIC	<ul><li>8</li><li>8</li></ul>	Gb	10:00:00:27:18:46:09:38 10:00:00:27:18:46:09:38	C7K-Bottom C7K-Bottom	1	X1 X2	Edit 💌
0	FCoE_B	FabricAttach	AUTOMATIC	୦ ୫ ୦ ୫	Gb	10:00:00:27:f8:3a:5d:88 10:00:00:27:f8:3a:5d:88	C7K-Bottom C7K-Bottom	2 2	X1 X2	Edit 💌

🕂 Add

## **Defining a Server Profile**

We will create a server profile with SIX server NICs and TWO SAN adapters.

Each server NIC will connect to a specific network.

- On the main menu, select Define, then Server Profile
- Create a server profile called "ESX-1"
- In the Network Port 1 drop down box, select a Network, then chose VLAN101-1

- Set the port speed to Custom at 100Mb
- In the Network Port 2 drop down box, select a Network, then chose VLAN101-2
- Set the port speed to Custom at 100Mb
- Left click on either of Port 1 or Port 2 in the Ethernet Connections box, and select ADD network (add four additional network connections)
- In the Network Port 3 drop down box, select a Network, then chose VLAN-102-1
- Set the port speed to Custom at 2Gb
- In the Network Port 4 drop down box, select a Network, then chose VLAN-102-2
- Set the port speed to Custom at 2Gb
- In the Network Port 5 drop down box, select Multiple Networks
- Configure for networks VLAN-103-1 through VLAN-105-1 and VLAN-2100-1 through VLAN-2150-1
- Leave the network speed as Auto
- In the Network Port 6 drop down box, select Multiple Networks
- Configure for networks VLAN-103-2 through VLAN-105-2 and VLAN-2100-2 through VLAN-2150-2
- Leave the network speed as Auto
- Expand the FCoE Connections box, for Bay 1, select FCoE\_A for Bay 2, select FCoE\_B
- Do not configure FC SAN or iSCSI Connection
- In the Assign Profile to Server Bay box, locate the Select Location drop down and select Bay 2, then apply

Prior to applying the profile, ensure that the server in Bay 2 is currently OFF

**Note:** You should now have a server profile assigned to Bay 2, with 4 Server NIC connections. NICs 1&2 should be connected to networks VLAN-101-x (MGMT), NICs 3&4 should be connected VLAN-102-x (VMotion) to networks VLAN103-x through VLAN105-x and VLAN-2100-x through VLAN-2150-x. FCoE SAN fabrics are connected to, Port 1 - FCoE\_A and Port 2 - FCoE\_B.

# **Defining a Server Profile via CLI**

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

```
# Create Server Profile ESX-1
add profile ESX-1 -nodefaultfcconn -nodefaultfcoeconn
set enet-connection ESX-1 1 pxe=Enabled Network=VLAN-101-1 SpeedType=Custom Speed=100
add enet-connection ESX-1 2 pxe=Disabled Network=VLAN-101-2 SpeedType=Custom Speed=2000
add enet-connection ESX-1 pxe=Disabled Network=VLAN-102-1 SpeedType=Custom Speed=2000
add enet-connection ESX-1 pxe=Disabled Network=VLAN-102-2 SpeedType=Custom Speed=2000
add enet-connection ESX-1 pxe=Disabled Network=VLAN-102-2 SpeedType=Custom Speed=2000
add enet-connection ESX-1 pxe=Disabled
add server-port-map-range ESX-1:5 UplinkSet=VLAN-Trunk-1 VLanIds=103-105,2100-2150
add enet-connection ESX-1 pxe=Disabled
add server-port-map-range ESX-1:6 UplinkSet=VLAN-Trunk-2 VLanIds=103-105,2100-2150
add fcoe-connection ESX-1 Fabric=FCoE_A SpeedType=4Gb
add fcoe-connection ESX-1 Fabric=FCoE_B SpeedType=4Gb
poweroff server 2
assign profile ESX-1 enc0:2
```

**Note:** the "add server-port-map-range" command is new to VC firmware release 3.30 and can be used to map many VLANs to a server NIC, in a single command. Prior releases would have required one command to create the NIC and one additional command per VLAN mapping added. This command will make profile scripting much easier, less complicated and quicker.

**Note:** The speed of the NIC and SAN connections, as well as the MAC and WWN. Also, note that the FCoE connections are assigned to the two SAN fabrics created earlier and use ports LOM:1-b and LOM:2-b.

efine		·▼ Help ▼							
Edit	Server Profile:	ESX-1							
Pro	file								
Profile	e Name	Network Acce	ss Group Statu	is Serial Number	Server	JUD			
ESX-1		Default	- 🛛 🔍	VCX0000V01	e5285ee	3-c37e-4e88-a1fa-386d160a871	0		
Eth	ernet Adapter Conne	ctions							
Port	Network Name	Statu	Port Speed Type	Allocated Port Sp	e PXE	Multicast Filter	MAC	Mapping	Actio
1	VLAN-101-1	0	CUSTOM	🖄 100 Mb - 8 Gb	ENABLED	None	00-17-A4-77-7C-10	LOM1:1-a => Bay 1:d2:v1	
2	VLAN-101-2	0	CUSTOM	🕥 100 Mb - 8 Gb	DISABLED	None	00-17-A4-77-7C-12	LOM1:2-a => Bay 2:d2:v1	
3	VLAN-102-1	0	CUSTOM	😒 2 Gb - 8 Gb	DISABLED	None	00-17-A4-77-7C-14	LOM1:1-c => Bay 1:d2:v3	
4	VLAN-102-2	0	CUSTOM	😒 2 Gb - 8 Gb	DISABLED	None	00-17-A4-77-7C-16	LOM1:2-c => Bay 2:d2:v3	
5	Multiple Networks	S 🖉	PREFERRED	3.9 Gb - 10 Gb	DISABLED	None	00-17-A4-77-7C-18	LOM1:1-d => Bay 1:d2:v4	
6	Multiple Networks	S 0	PREFERRED	3.9 Gb - 10 Gb	DISABLED	None	00-17-A4-77-7C-1A	LOM1:2-d => Bay 2:d2:v4	Dele
501	UDA Connections								
FCI	HBA Connections								
FCo	E HBA Connections								
Port	Connect: FC SAN / FCot	Ne Type	Status Por	t Speed Type	Allocated Port S.	. WAPN	MAC	Mapping	Action
1	Bay1 FCoE_A	SAN	<b>O</b> 4	ĺ	4 Gb - 8 Gb	50:06:0B:00:00:C2:DE:04	00-17-A4-77-3	7C-0E LOM1:1-b => Bay 1:d2:	v2
2	Bay 2 FCoE_B	SAN	<b>O</b> 4	l	4 Gb - 8 Gb	50:06:0B:00:00:C2:DE:06	00-17-A4-77-3	7C-0F LOM1:2-b => Bay 2:d2:	v2 Delete
+ A	dd								
🗌 Fi	bre Channel Boot Parameters	;							
Ass	ign Profile to Serve	r Bay							
Enclo	sure Server		м	lodel	SN	Status Power UID			
	C7K-Bottom	Bay 2	-	ProLiant BL460c Gen8	MXQ32102HE	o 😜 🔘			

#### Figure 160 - Define a Server Profile ESX-1, assigned to Bay 2

Figure 161 - Configure NICs 5 and 6 for multiple Networks and select the appropriate VLANs

Denne + Configure + Tools + help +							
Edit Server Profile: ESX-1							
ESX-1 Default	? VCXUUUUVUU 763	162atc-2077-453U-auti d-9dda	2deabau/				
Ethemet Adapter Connections							
Server VLAN Tag to vNet Mappings 🔋							_
Force the same VLAN mappings as in the Shared	Uplink Set						
Networks not in mapping		Networks in mapping	(54 mapped; li	mit is 16	12)		
Alphabetical Filtered		Drag and drop networks	to include them	or remove	them from	n the maj	oping
		vNet Name		Uplink			
All A-C D-F G-I J-L M-O P-F	R S-V W-Z U-3 4-6 7-9			VLAN Id	Id Id		
0 VLAN-101-1		VLAN-103-1	0	103	103		<b>^</b>
ULAN-101-2	0	VLAN-104-1	0	104	104		E
vLAN-102-1	9	VLAN-105-1	0	105	105		
A VI AN-102-2		VLAN-2100-1	0	2100	2100		
1 VI IN 102 2		VLAN-2101-1	0	2101	2101		
0 0 VLAN-103-2		VLAN-2102-1	0	2102	2102		
VLAN-104-2		VLAN-2103-1	0	2103	2103		
VLAN-105-2		VI AN-2104-1	0	2104	2104		
ULAN-2100-2	♥	VI AN-2105-1	0	2105	2104		
🚍 List	📰 Detail	VLAN 2100-1		2103	2105		~

**Note:** "Server VLAN ID" and "Untagged" boxes can be edited. One network per port could be marked as "Untagged', in which case the server would not be configured for tagging on that VLAN. It is also possible to change the VLAN ID that is presented to the server (VLAN translation), in which case the communications between Virtual Connect and the network would be the VLAN ID in grey, if the Server VLAN ID box to the right were changed, VC would communication with the server on the new VLAN ID, providing a VLAN translation function. VLAN translation could be a very useful feature, in the event that VLAN renumbering is required within the datacenter. The network VLAN numbers

and Shared Uplink Set configurations could be changed to reflect the new VLAN IDs used, however, the old VLAN IDs could still be presented to the server providing the ability to delay or eliminate the need to change the VLAN ID used within the server/vSwitch.

Figure 162 - Server Profile View Bay 2

Jevice Bav 3	Status - Bava	¥ 2							
Overall Stat	us:		📀 ок						
Hardware	e Status:		Normal						
VC Statu	s:		🛇 ок						
Assigned S	erver Profile		ESX-1						
Enclosure N	lam e:		C7K-Bottor	n					
JID:									
Power Statı	us/Control:		Off				Mome	ntary Press	
Made Serve	r Informatio	n - Bay # 2	2						
erial Numb	ber:		MXQ32102	HB					
Gerial Numb	per (Logical)		VCX0000V	00					
JUID:			31363636-	3136-584D-5133-3231303	324842				
JUID (Logica	ai):		76382afc-2e77-4530-a01d-9dde2dea8a07						
Product Nar	ne:		ProLiant BL	.460c Gen8					
Server Nam	e:								
Part Numbe			666161-B2	1					
erver Ethe Sthernet Adapter	rnet Adapte Flex NIC	r Informa Locatio	tion n Module Port	Model	MAC Address	Network	WWN	SAN Fabr	
Port 1									
Port 1	LOM1:1- a	FLB1	Bay 1:d2:v1	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- ( 7C-10	VLAN- 101-1	)		
Port 1	LOM1:1- a LOM1:1- b	FLB1 FLB1	Bay 1:d2:v1 Bay 1:d2:v2	HP FlexFabric 10Gb 2- port 554FLB Adapter HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-10 00-17-A4-77- 7C-0E	VLAN- 101-1	50:06:0B:00:00:0	C2:DE:04 FCoE	
Port 1	LOM1:1- a LOM1:1- b LOM1:1- c	FLB1 FLB1 FLB1	Bay 1:d2:v1 Bay 1:d2:v2 Bay 1:d2:v3	HP FlexFabric 10Gb 2- port 554FLB Adapter HP FlexFabric 10Gb 2- port 554FLB Adapter HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-10 00-17-A4-77- 7C-0E 00-17-A4-77- 7C-14	VLAN- 101-1 VLAN- 102-1	50:06:0B:00:00:0	C2:DE:04 FCoE	
Port 1	LOM1:1- a LOM1:1- b LOM1:1- c LOM1:1- d	FLB1 FLB1 FLB1 FLB1	Bay 1:d2:v1 Bay 1:d2:v2 Bay 1:d2:v3 Bay 1:d2:v4	HP FlexFabric 10Gb 2- port 554FLB Adapter HP FlexFabric 10Gb 2- port 554FLB Adapter HP FlexFabric 10Gb 2- port 554FLB Adapter HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-10 00-17-A4-77- 7C-0E 00-17-A4-77- 7C-14 00-17-A4-77- 7C-18	VLAN- 101-1 VLAN- 102-1 Multiple Netw orks	50:06:0B:00:00:0	C2:DE:04 FCoE	
Port 1	LOM1:1- a LOM1:1- b LOM1:1- c LOM1:1- d	FLB1 FLB1 FLB1 FLB1	Bay 1:d2:v1 Bay 1:d2:v2 Bay 1:d2:v3 Bay 1:d2:v4	HP FlexFabric 10Gb 2- port 554FLB Adapter HP FlexFabric 10Gb 2- port 554FLB Adapter HP FlexFabric 10Gb 2- port 554FLB Adapter HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-10 00-17-A4-77- 7C-0E 00-17-A4-77- 7C-14 00-17-A4-77- 7C-18	VLAN- 101-1 VLAN- 102-1 Multiple Networks	50:06:0B:00:00:0	C2:DE:04 FCoE	
Port 1 Port 2	LOM1:1- a LOM1:1- b LOM1:1- c LOM1:1- d LOM1:2- a	FLB1 FLB1 FLB1 FLB1 FLB1	Bay 1:d2:v1 Bay 1:d2:v2 Bay 1:d2:v3 Bay 1:d2:v4 Bay 2:d2:v1	HP FlexFabric 10Gb 2- port 554FLB Adapter HP FlexFabric 10Gb 2- port 554FLB Adapter HP FlexFabric 10Gb 2- port 554FLB Adapter HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-10 00-17-A4-77- 7C-0E 00-17-A4-77- 7C-14 00-17-A4-77- 7C-18 00-17-A4-77- 7C-12	VLAN- 101-1 VLAN- 102-1 Multiple Networks VLAN- 101-2	50:06:08:00:00:0	C2:DE:04 FCoE	
Port 1 Port 2	LOM1:1- a LOM1:1- b LOM1:1- c LOM1:1- d LOM1:2- a LOM1:2- b	FLB1 FLB1 FLB1 FLB1 FLB1 FLB1	Bay 1:d2:v1 Bay 1:d2:v2 Bay 1:d2:v3 Bay 1:d2:v4 Bay 2:d2:v1 Bay 2:d2:v2	HP FlexFabric 10Gb 2- port 554FLB Adapter HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-10 00-17-A4-77- 7C-0E 00-17-A4-77- 7C-14 00-17-A4-77- 7C-18 00-17-A4-77- 7C-12 00-17-A4-77- 7C-0F	VLAN- 101-1 VLAN- 102-1 Multiple Networks VLAN- 101-2	50:06:0B:00:00:0	C2:DE04 FC0E	
Port 1 Port 2	LOM1:1- a LOM1:1- b LOM1:1- c LOM1:1- d LOM1:2- b LOM1:2- c	FLB1 FLB1 FLB1 FLB1 FLB1 FLB1 FLB1	Bay 1:d2:v1 Bay 1:d2:v2 Bay 1:d2:v3 Bay 2:d2:v4 Bay 2:d2:v1 Bay 2:d2:v2 Bay 2:d2:v3	HP FlexFabric 10Gb 2- port 554FLB Adapter HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-10 00-17-A4-77- 7C-0E 00-17-A4-77- 7C-14 00-17-A4-77- 7C-18 00-17-A4-77- 7C-12 00-17-A4-77- 7C-0F 00-17-A4-77- 7C-16 00-17-A4-77- 7C-16 00-17-A4-77- 7C-16	VLAN- 101-1 VLAN- 102-1 Multiple Networks VLAN- 101-2 VLAN- 101-2	50:06:0B:00:00:0	C2:DE04 FC0E	

**Figure 163 -** By clicking on the "Multiple Networks" statement for each LOM, the following page is displayed, which lists the VLAN connections for this port.

Multiple	Networks	
No.	Network Name	V LAN ID
1	VLAN-103-1	103
2	VLAN-104-1	104
3	VLAN-105-1	105
4	VLAN-2100-1	2100
5	VLAN-2101-1	2101
6	VLAN-2102-1	2102
7	VLAN-2103-1	2103
8	VLAN-2104-1	2104
9	VLAN-2105-1	2105
10	VLAN-2106-1	2106
11	VLAN-2107-1	2107
12	VLAN-2108-1	2108
13	VLAN-2109-1	2109
14	VLAN-2110-1	2110
15	VLAN-2111-1	2111
16	VLAN-2112-1	2112
17	VLAN-2113-1	2113
18	VLAN-2114-1	2114
19	VLAN-2115-1	2115
20	VLAN-2116-1	2116
21	VLAN-2117-1	2117
22	VLAN-2118-1	2118
23	VLAN-2119-1	2119
24	VLAN-2120-1	2120
25	VLAN-2121-1	2121
26	VLAN-2122-1	2122
27	VLAN-2123-1	2123
28	VLAN-2124-1	2124
29	VLAN-2125-1	2125
30	VLAN-2126-1	2126
31	VI AN.2127-1	2127

# Review

In this scenario we have created Two Shared Uplink Sets (SUS), providing support for many VLANs. Uplinks originating from each FlexFabric Module connect to each SUS, by doing so we provide redundant connections out of the Virtual Connect domain. As multiple uplinks are used for each SUS, we have also leveraged LACP to improve uplink performance. In this scenario, all uplinks will be active. We also create two FCoE SAN Fabrics.

We created a server profile, with SIX NICs. Two connected to the same VLAN (101), Port 1 connects to VLAN-101-1 and Port 2 connects to VLAN-101-2, which provides the ability to sustain a link or module failure and not lose connection to the network, these NICs were set to 100Mb/Sec with the Maximum speed set to 8Gb. VLAN-101-1 and VLAN-101-2 are configured to support VLAN 101, frames will be presented to the NIC(s) without VLAN tags (untagged), these two NICs are connected to the same VLAN, but taking a different path out of the enclosure. VLAN 101 is used for Management connections to the ESX host.

Network Ports 3 and 4 connect to the same VLAN (102), Port 3 connects to VLAN-102-1 and Port 4 connects to VLAN-102-2, which provides the ability to sustain a link or module failure and not lose connection to the network, these NICs were set to 2Gb/Sec with the Maximum speed set to 8Gb. VLAN-102-1 and VLAN-102-2 are configured to support VLAN 102, frames will be presented to the NIC(s) without VLAN tags (untagged), these two NICs are connected to the same VLAN, but taking a different path out of the enclosure. VLAN 102 is used for VMotion.

Network Ports 5 and 6 were added, these NICs will be connected to "Multiple Networks" and each NIC will then be configured for networks VLAN103-x through VLAN105-x and networks VLAN-2100-x through VLAN-2150-x. As these networks are tagging, frames will be presented to the server with VLAN tags. NICs 5 and 6 will be connected to the same vSwitch to support VM connections. VLAN tagged frames for these networks will be forwarded to the Virtual switch and then passed on
to the appropriate Virtual Machine, VLAN tags will be removed as the frames are passed to the virtual machine. These NICs will use the remaining available bandwidth of 3.9Gb/Sec with the Maximum speed set to 10Gb.

Additionally, FCoE port 1 is connected to SAN fabric FCoE\_A and FCoE SAN port 2 is connected to SAN Fabric FCoE\_B, providing a multi-pathed connected to the SAN. The SAN fabric connections are set to 4Gb/Sec.

The FCoE SAN fabric connects to each SAN fabric over a pair of uplinks per module. SAN logins are distributed across the multiple paths.

The following graphic provides an example of an ESX server with TWO NICs connected to the same console vSwitch configured for VLAN 101, which was the Default (untagged) VLAN. Additional vSwitches have been configured for VMotion and product VLANs.

**Figure 164 -** As NICs 1 and 2 are connected directly to VLAN-101, the connection acts as an Access or Untagged switch port, you need to ensure that the Hypervisor in NOT configured for VLAN tagging. However, if you want to put this server onto a VLAN that is tagged, this setting will need to be configured for that VLAN.



### **Results – vSphere Networking Examples**

We successfully configured FlexFabric with Share Uplink Sets, supporting several VLANs and redundant SAN fabrics. We created a server profile to connect to the various vNet with SIX NICs and the SAN fabrics using the FCoE connections created within the profile.

Although both Ethernet and Fibre channel connectivity is provided by the CNA adapter used in the G7 and Gen 8 servers; each capability (LAN and SAN) is provided by a different component of the adapter, they appear in the server as individual network and SAN adapters.

The following graphics show an ESXi 5.1 server with SIX FlexNICs configured, FOUR presented at 8Gb (two on the console network and two on the VMotion network) and two at 10Gb (Guest VLAN port groups). If we did not require SAN connectivity on this server, the FCoE connections could be deleted and the server would then have 8 NIC ports available to the OS. In addition, if we did not want FCoE connectivity and instead wanted to leverage iSCSI, we could delete the FCoE connected and re-create those connects as iSCSI connections, with offload and optionally iSCSI boot.

**Note:** the BL465c G7 and BL685c G7 utilize an NC551i chipset (BE2), whereas the BL460c G7, BL620c G7 and BL680c G7 utilize an NC553i chipset (BE3) and the Gen 8 blades typically have a NC554 adapter which also utilizes the BE3 chipset. Both the BE2 and BE3 chipsets share common drivers and firmware.

Virtual Connect supports the use of either Standard or Distributed vSwitches, examples of both are provided below.

#### vSphere Standard vSwitch

Figure 165 – ESXi 5.1 Network Connections





Figure 166 - ESXi 5.1 networking - three vSwitches configured. (Note the NIC speeds)

**Note:** As VLAN 101 is set as untagged at the upstream switch port, the management network port group should be defined as untagged. This will allow the server to be deployed, without having the set a VLAN ID for the management network.

**Figure 167 -** You may want to specify a specific NIC for VMotion traffic. This will ensure that all VMotion traffic between servers within the enclosure will remain on the same VC module, reducing the likelihood of multiple hops between servers. Edit the VMotion Configuration.

🛃 vSwil	tch1 Properties				_	. 🗆 ×
Ports	Network Adapters					
Conf	figuration	Summary	Port Properties			
11	vSwitch	120 Ports	Network Label:	VMotion		
1 Q	VMotion	vMotion and IP	VLAN ID:			
			vMotion:	Enabled		
			Fault Tolerance Logging:	Disabled		
			Management Traffic:	Disabled		
			iSCSI Port Binding:	Disabled		
			-NIC Settings			
			MAC Address:	00:50:56:6e:2c:9c		
			MTU:	1500		
			IP Settings			
			IP Address:	192.168.102.170		
			Subnet Mask:	255.255.255.0		
					View Routing Table	
			Effective Policies			1
			Security			
			Promiscuous Mode:	Reject		
			MAC Address Changes:	Accept		
A	dd	Edit Remove	Forged Transmits:	Accept		-
					Close Hel	lp

**Figure 168 -** Edit the NIC Team for VMotion and set one of the Adapters in Standby, this will ensure that ALL VMotion traffic remains on the SAME VC module. ESX NIC vmnic5 is connected to the VC module in bay 1.

🛿 VMotion Properties		×
·		
General   IP Settings   Security   Traf		
Policy Exceptions		
Load Balancing:	Route based on the originating virt	ual port ID 🔽
Network Failover Detection:	Link status only	~
Notify Switches:	Yes	
Failback:	Ves	
	~ <u>- 1</u>	
Failover Order:		
Select active and standby adapters	لے for this port group. In a failover situation, s	tandhy
adapters activate in the order spe	cified below.	
Name Speed	Networks	Move Up
Active Adapters		
i vmnic5 8000 Full	None	Move Down
Standby Adapters		
vmnic4 8000 Full	None	
Unused Adapters		
Adapter Details		
Emulex Corporation HP FlexFabric	: 10Gb 2-port 554FLB Ada	
Name:	vmnic4	
Location:	PCI 04:00.4	
Driver:	be2net	
	or I creat	1
	OK Cancel	Неір

**Note:** As this Scenario is based on an Active/Active configuration, to ensure that ALL VMotion traffic between servers within the enclosure is contained to the same module, on each server edit the VMotion vSwitch properties and move one of the Adapters to Standby. This will ensure that ALL VMotion traffic will occur on the same Virtual Connect module.

**Figure 169 -** Configuring the vSwitch for multiple port groups / VLANs

Configuration	Summary 🔺	vSphere Standard Switch Propertie	s	
🗊 vSwitch	120 Ports	Number of Ports:	120	
VLAN-2120	Virtual Machine			
🕤 VLAN-2119	Virtual Machine	Advanced Properties		
👽 VLAN-2118	Virtual Machine	MTU:	1500	
👽 VLAN-2117	Virtual Machine			
👤 VLAN-2116	Virtual Machine	Default Policies		
文 VLAN-2115	Virtual Machine	Security		
👤 VLAN-2114	Virtual Machine	Promisquous Moder	Deject	
👤 VLAN-2113	Virtual Machine	Promiscuous mode:	Kejett	
Q VLAN-2112	Virtual Machine	MAC Address Changes:	Accept	
🧕 VLAN-2111	Virtual Machine	Forged Transmits:	Accept	
🧕 VLAN-2110	Virtual Machine	Traffic Shaping		
Q VLAN-2109	Virtual Machine	Average Bandwidth:		
Q VLAN-2108	Virtual Machine	Dook Pondwidth		
Q VLAN-2107	Virtual Machine	Peak banuwiden:		
Q VLAN-2106	Virtual Machine	Burst Size:		
Q VLAN-2105	Virtual Machine	Failover and Load Balancing		
Q VLAN-2104	Virtual Machine	Load Balancing:	Port ID	
VLAN-2103	Virtual Machine	Network Failure Detection:	Link status only	
VLAN-2102	Virtual Machine	Nakifu Cushaka au		
👷 VLAN-2101	Virtual Machine 👻	Noury Switches:	res	
		Failback:	Yes	
Add	Edit Remove	Active Adapters:	vmnic6, vmnic7	

#### 🛃 W2K8\_VM1 - Virtual Machine Properties \_ 🗆 🗵 Virtual Machine Version: 8 Hardware Options Resources Profiles vServices Memory Configuration □ Show All Devices Add.... 1011 GB 4 🗧 🛛 🐨 Memory Size: Hardware Summary 512 GB Maximum recommended for this guest OS: 1011 GB. Memory 4096 MB 256 GB CPUs 4 Maximum recommended for best <u>,</u> Video card Video card 128 GB < performance: 32732 MB. VMCI device Restricted Default recommended for this 64 GB SCSI controller 0 LSI Logic SAS guest OS: 4 GB. 32 GB 😑 🛛 Hard disk 1 Virtual Disk Minimum recommended for this guest OS: 512 MB. O\_ CD/DVD drive 1 Client Device 4 16 GB VLAN-104 🔢 Network adapter 1 8 GB Floppy drive 1 Client Device 4 GB 2 GB $1 \; \text{GB}$ 512 MB 256 MB 128 MB 64 MB 32 MB 16 MB 8 MB 4 MB Help OK. Cancel







### vSphere Distributed vSwitch

#### 192.168.101.170 VMware ESXi, 5.1.0, 1117900 Getting Started Summary Virtual Machines Performance Configuration Tasks & Events Alarms Permissions Maps Hardware View: vSphere Standard Switch vSphere Distributed Switch Processors Networking Memory Storage Remove... Properties... Standard Switch: vSwitch0 Networking -Virtual Machine Port Group -Physical Adapters Storage Adapters 🖵 VM Network 0 🗕 🤬 vmnic1 🛛 8000 Full P Network Adapters P 🖵 🌇 vmnic0 8000 Full -VMkernel Port-Advanced Settings 🖵 Management Network 0 Power Management vmk0:192.168.101.170 fe80::217:a4ff:fe77:7c08 Software Licensed Features Remove... Properties... Standard Switch: vSwitch1 Time Configuration -VMkernel Port--Physical Adapters DNS and Routing 🖵 VMotion 0 🛶 🖼 vmnic4 8000 Full Authentication Services Q. 🖵 🌇 vmnic5 8000 Full vmk1:192.168.102.170 | Power Management Virtual Machine Startup/Shutdown Virtual Machine Swapfile Location Security Profile Host Cache Configuration System Resource Allocation Agent VM Settings Advanced Settings

#### Figure 172 - Management and VMotion NICs are connected to Standard vSwitches

Figure 173 - VM Networks are connected to a Distributed vSwitch





#### Figure 174 - VM Connected to VLAN 104 on Distributed vSwitch

### **Results – vSphere SAN Connectivity**

**Figure 175 -** By access the HBA BIOS during server boot, you can see that Port 1 of the FlexHBA is connected to an EVA SAN LUN. Also note the CNA firmware version, this is the minimum version required for vSphere 5.

	Emulex OneCon	nect FCoE	BIOS Uti	lity,	XA4.03a5	
01: 554FLB: Mem Base: FBE0 Port Name: 500 Vlan ID: 1001	0000 Firmware 6080000C2DE04 DCBX mode: C	Version: EE mode	Bus#: 4.2.401 Node	04 De .2215 Name:	v#: 00 Func#: 02 BIOS: Disabled 50060B0000C2DE05	
	Devices	Present o	on This A	lapter	:	
01. DID:010000	WWPN:50001FE1	5005D468	LUN:01	HP	HSV210	6220
02. DID:010100	WWPN:50001FE1	5005D46C	LUN:01	HP	HSV210	6220
03. DID:010200	WWPN:50001FE1	5005D46A	LUN:01	HP	HSV210	6220
04. DID:010300	WWPN:50001FE1	5005D46B	LUN:01	HP	HSV210	6220
	Enter	<esc> to</esc>	Previous	Menu		

**Figure 176 –** ESXi 5 storage configuration, the Shared Storage LUN is provided through the FCoE connections to the SAN.

192.168.101.170 VMware ESXi, 5.1.0, 1	117900	
Getting Started Summary Virtual Mach	hines Performance Configuration Tasks & Events Alams Permissions Maps. Storage Views Network Views Hardware Status H2 Insight Management	
Hardware	View: Datastores Devices	
Processors	Datastores	
Memory	Identification > Status Device Drive Type Capacity Free Type Last Update Alarm Actions Storage I/O Control Hardware Accelerable	0
<ul> <li>Storage</li> </ul>	👔 datastore1 🥑 Normal HP Serial Attached Non-SSD 274.25 GB 266.36 GB VMP55 7/14/2013 11:36:43 PM Enabled Disabled Unknown	
Networking	ESX-0001      Normal HP Fibre Channel Non-SSD 499.75 GB 498.80 GB VMPS5 3/20/2013 11:24:18 PM Enabled Disabled Unknown	
Storage Adapters	ESX-0002     Normal HP Fibre Channel Non-SSD 499.75 GB 499.16 GB VMPS3 3/20/2013 11:24:18 PM Enabled Disabled Unknown	_
Network Adapters	■ ESX-0003	
Advanced Settings		
Power Management		
Software		
Licensed Features		
Time Configuration		
DNS and Routing		
Authentication Services		
Power Management		
Virtual Machine Startup/Shutdown		
Virtual Machine Swapfile Location		
Security Profile		
Host Cache Configuration	Determined by the second se	
System Resource Allocation		
Agent VM Settings	499,75 GB Capacity	
Advanced Settings	Bardware Acceleration: Unknown 973.00 MB 973.00 MB 973.00 MB	
	199.00 GB E Free	
	Netres Loração Capolitar NA	
	User-defined Storage Capability: N/A	
	Path Selection	
	Most Recently Us Properties Extents Storage I/O Control	
	Volume Laber: EDA-UDU m*/ http://chainel.bek.(naa	
	Paths Total Formatted Capacity 499.75 GB	
	Total: 7 Formatting UNESE Ed.	
	Broken: 0 rite system: vitro 3-34 Mick Steet 1MB	
1	Disabled: 0	

### Summary

We presented a Virtual Connect Network scenario by creating two shared uplink sets (SUS), each SUS is connected with TWO active uplinks; both SUS' can actively pass traffic. We included a dual path SAN fabric for storage connectivity.

When VC profile ESX-1 is applied to the server in bay 2 and the server is powered up, it has one NIC connected through FlexFabric module 1 (connected to VLAN-101-1), the second NIC is connected through FlexFabric module 2 (connected to VLAN-101-2). Each NIC is configured at 100Mb. These NICs are connected to the management vSwitch. The second pair of NICs are connected to the second vSwitch, which is configured for VMotion and is connected to VLAN102-x through NICs 3 and 4 which are configured at 2Gb. The last pair of NICs 5 and 6, are connected to the third vSwitch, which is configured to support VLANs 103 through 105 and 2100 through 2150. This host is also configured for FCoE based SAN access and connects to a SAN LUN to store the Guest VMs. Each FCoE port is configured for 4Gb of SAN bandwidth.

As additional servers are added to the enclosure, simply create additional profiles, or copy existing profiles, configure the NICs for LAN and SAN fabrics as required and apply them to the appropriate server bays and power the server on.

# Scenario 7 – Tunneled VLANs *and* Shared Uplink Set with Active/Active Uplinks and 802.3ad (LACP) - Ethernet and FCoE SAN vSphere

# **Overview**

This scenario will implement the VLAN-Tunnel to provide support for multiple VLANs. The upstream network switches connect VLAN-Tunnels to two ports on each FlexFabric modules, LACP will be used to aggregate those links. A Shared Uplink Set will also be used to provide connectivity for the Management and VMotion networks only.

As multiple VLANs will be supported in this configuration, the upstream switch ports connecting to the FlexFabric modules will be configured to properly present those VLANs. In this scenario, the upstream switch ports will be configured for VLAN trunking/VLAN tagging.

When configuring Virtual Connect, we can provide several ways to implement network fail-over or redundancy. One option would be to connect TWO uplinks to a single Virtual Connect network; those two uplinks would connect from different Virtual Connect modules within the enclosure and could then connect to the same upstream switch or two different upstream switches, depending on your redundancy needs. An alternative would be to configure TWO separate Virtual Connect networks, each with a single, or multiple, uplinks configured. Each option has its advantages and disadvantages. For example; an Active/Standby configuration places the redundancy at the VC level, where Active/Active places it at the OS NIC teaming or bonding level. We will review the second option in this scenario.

In addition, several Virtual Connect Networks can be configured to support the required networks to the servers within the BladeSystem enclosure. These networks could be used to separate the various network traffic types, such as iSCSI, backup and VMotion from production network traffic.

This scenario will also leverage the Fibre Channel over Ethernet (FCoE) capabilities of the FlexFabric modules. Each fibre channel fabric will have two uplinks connected to each of the FlexFabric modules.

### Requirements

This scenario will support both Ethernet and fibre channel connectivity. In order to implement this scenario, an HP BladeSystem c7000 enclosure with one or more server blades and TWO Virtual Connect FlexFabric modules, installed in I/O Bays 1& 2 are required. In addition, we will require ONE or TWO external Network switches. As Virtual Connect does not appear to the network as a switch and is transparent to the network, any standard managed switch will work with Virtual Connect. The Fibre Channel uplinks will connect to the existing FC SAN fabrics. The SAN switch ports will need to be configured to support NPIV logins. Two uplinks from each FlexFabric module will be connected to the existing SAN fabrics.

**Figure 177 - Physical View;** Shows three Ethernet uplinks from Ports X4, X5 and X6 on Module 1 to Ports 1, 2 and 3 on the first network switch and three Ethernet uplinks from Ports X4, X5 and X6 on Module 2 to Ports 1, 2 and 3 on the second network switch. The SAN fabrics are also connected redundantly, with TWO uplinks per fabric, from ports X1 and X2 on module 1 to Fabric A and ports X1 and X2 to Fabric B.



**Figure 178 - Logical View;** the server blade profile is configured with SIX FlexNICs and 2 FlexHBAs. NICs 1 and 2 are connected to VLAN-101-x, NICs 3 and 4 are connected to VLAN-102-x, which are part of the Shared Uplink Sets VLAN-Trunk-1 and VLAN-Trunk-2, respectively. The VLAN-Trunks are connected, at 10Gb, to a network switch, through Port X4 on each FlexFabric Module in Bays 1 and 2. NICs 5 and 6 are connected to VLAN-Tunnel-x which is supporting the VM guest VLANs 103-105 and 2100-2150. The VLAN-Tunnels are connected, at 10Gb, to a network switch, through Ports X5 and X6 on each FlexFabric Module in Bays 1 and 2.



# Installation and configuration

### **Switch configuration**

As the Virtual Connect module acts as an edge switch, Virtual Connect can connect to the network at either the distribution level or directly to the core switch.

The appendices provide a summary of the cli commands required to configure various switches for connection to Virtual Connect. The configuration information provided in the appendices for this scenario assumes the following information:

 The switch ports are configured as VLAN TRUNK ports (tagging) to support several VLANs. All frames will be forwarded to Virtual Connect with VLAN tags. Optionally, one VLAN could be configured as (Default) untagged, if so, then a corresponding vNet within the Shared Uplink Set would be configured and set as "Default".

**Note:** when adding additional uplinks to the SUS, if the additional uplinks are connecting from the same FlexFabric module to the same switch, in order to ensure all the uplinks are active, the switch ports will need to be configured for LACP within the same Link Aggregation Group.

The network switch port should be configured for Spanning Tree Edge as Virtual Connect appears to the switch as an access device and not another switch. By configuring the port as Spanning Tree Edge, it allows the switch to place the port into a forwarding state much quicker than otherwise, this allows a newly connected port to come online and begin forwarding much quicker.

The SAN connection will be made with redundant connections to each Fabric. SAN switch ports connecting to the FlexFabric module must be configured to accept NPIV logins.

#### **Configuring the VC module**

- Physically connect Port 1 of network switch 1 to Port X4 of the VC module in Bay 1
- Physically connect Port 2 of network switch 1 to Port X5 of the VC module in Bay 1
- Physically connect Port 3 of network switch 1 to Port X6 of the VC module in Bay 1
- Physically connect Port 1 of network switch 2 to Port X4 of the VC module in Bay 2
- Physically connect Port 2 of network switch 2 to Port X5 of the VC module in Bay 2
- Physically connect Port 3 of network switch 1 to Port X6 of the VC module in Bay 2

**Note:** If you have only one network switch, connect VC ports X4, X5 & X6 (Bay 2) to an alternate port on the same switch. This will NOT create a network loop and Spanning Tree is not required.

- Physically connect Ports X1/X2 on the FlexFabric in module Bay 1 to switch ports in SAN Fabric A
- Physically connect Ports X1/X2 on the FlexFabric in module Bay 2 to switch ports in SAN Fabric B

#### **VC CLI commands**

Many of the configuration settings within VC can also be accomplished via a CLI command set. In order to connect to VC via a CLI, open an SSH connection to the IP address of the active VCM. Once logged in, VC provides a CLI with help menus. Through this scenario the CLI commands to configure VC for each setting will also be provided.

#### **Configuring Expanded VLAN Capacity via GUI**

Virtual Connect release 3.30 provided an expanded VLAN capacity mode when using Shared Uplink Sets, this mode can be enabled through the Ethernet Settings tab or the VC CLI. The default configuration for a new Domain install is "Expanded VLAN Capacity" mode, Legacy mode is no longer available and the Domain cannot be downgraded.

#### To verify the VLAN Capacity mode

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Expanded VLAN capacity
- Verify Expanded VLAN Capacity is configured and Legacy VLAN Capacity is greyed out.

**Note:** Legacy VLAN mode will only be presented if 1Gb Virtual Connect Modules are present, in which case the domain would be limited to Firmware version 3.6x.

#### **Configuring Expanded VLAN Capacity via CLI**

The following command can be copied and pasted into an SSH based CLI session with Virtual Connect;

# Set Expanded VLAN Capacity set enet-vlan -quiet VlanCapacity=Expanded

#### Figure 179 - Enabling Expanded VLAN Capacity

Define 🕶 Configure 🕶 Tools 🕶 Help 🕶	
Ethernet Settings	
MAC Addresses Port Monitoring Advanced Settings	
VLAN	-
Server VLAN Tagging Support	
Force server connections to use the same VLAN mappings as shared uplink sets	2
VLAN Capacity	ך
<ul> <li>Legacy VLAN capacity (Up to 320 VLANs per module and 28 VLANs per server connection).</li> </ul>	2
Expanded VLAN capacity (Up to 1000 VLANs per domain and 162 VLANs per physical server port).	
	_
When using mapped VLAN tags (multiple networks over a single link), these settings will be used for the overall Link speed control.	
Set a Custom value for Preferred Link Connection Speed	?
Set a Custom value for Maximum Link Connection Speed	?

**Note:** If a 1Gb VC Ethernet module is present in the Domain, Expanded VLAN capacity will be greyed out, this is only supported with 10Gb based VC modules. Also, once Expanded VLAN capacity is selected, moving back to Legacy VLAN capacity mode will require a domain deletion and rebuild.

#### **Defining a new Shared Uplink Set (VLAN-Trunk-1)**

Connect Port X6 of FlexFabric module 1 to Port 2 on switch 1 Create a SUS named VLAN-Trunk-1 and connect it to FlexFabric Port X6 on Module 1

- On the Virtual Connect Home page, select Define, Shared Uplink Set
- Insert Uplink Set Name as VLAN-Trunk-1
- Select Add Port, then add the following port;
  - o Enclosure 1, Bay 1, Port X4

Ethernet Sh	ared External Lipi	ink Set						
Jplink Set Name	area Externar opr	in oct						
LAN-Trunk-1								
External Upli	nk Ports							
Port	Port Role	Port Status		Connector Type	Connected To	PI	D Speed/Duplex	Actio
C7K-Bottom Bay 1: Port X4	NA	Cinked-Active	10 Gb	SFP-DAC	HP (Ten-GigabitEtherr	net1/0/8)	Auto 🖉	Dele
onnection Mod	e: 💿 Auto 🛛 🗌	ACP Timer: 💿 Domain	Default, Short (1 sec)					
	O Failover	🔵 Short (*	1 sec)					
	l l	🔾 Long (3	30 sec)					
dd Port	_							
7K-Bottom	~							
arre-bouoin	~							
Associated	FCoE Network (VI	LAN tagged)						
						-	- Add 🧪 Edit 🥤	' Dele
Associated	Networks (VLAN 1	tagged)						
							+ Add	) Dele
						1		
Nistron			V/LONLIN	N I white and	Descent Linds	Deitsenke Madessends	0 miliana	

Figure 180 - Shared Uplink Set (VLAN-Trunk-1) Uplink Assigned

- Click Add Networks and select the Multiple Networks radio button and add the following VLANs;
  - Enter Name as VLAN-
  - Enter Suffix as -1
  - Enter VLAN IDs as follows (and shown in the following graphic);
- 101-102
- Enable SmartLink on ALL networks
- Click Advanced
  - Configure Preferred speed to 2Gb
  - Configure Maximum speed to 4Gb
- Click Apply

**Note:** you can optionally specify a network "color" or "Label" when creating a shared Uplinkset and its networks. In the example above we have not set either color or label.

Figure 181 - Creating VI	ANs in a Shared Uplink Set
--------------------------	----------------------------

It is ingle Associated Network     In it is ingle Associat	ated Networks (VLAN tagged)
single Associated Network  mode network  mode network nerve:  VLAN-102-1  ND(s) * 101-102  Coor  none Labels  Type to add Network Labels  The Native VLAN setting supported only when adding or editing a single Associated Network Smet Link  Private Network Advanced Network Settings  Set preferred connection speed  Set preferred connection speed  Set maximum connecti	I you like to add
Is ingle Associated Network C midliple Associated Network Isongle Associate	ingle Accessioned Natwork
work Name VLAN-102-1 mple petwork zeros: VLAN-102-1 NN D(s) *101-102 2 Cotor	
mple network name: VLAN-102-1  NN D(s)	ork Name VLAN VLAN ID + 1
AN D(s) * 101-102 2 Color none Labels Type to add Network Labels Type to add Network Labels The Native VLAN setting supported only when adding or editing a single Associated Network Smart Link Private Network Advanced Network Settings 3 set preferred connection speed 2 elected Speed: 2 0 Gb 1 Gb 4 Gb 1 Gb 4 Gb 1 Gb 4 B Gb 1	vie network name: VLAN-102-1
Color Inne     Labels         The Native VLAN setting supported only when adding or editing a single Associated Network   Smart Link   Private Network   Advanced Network Settings   Set preferred connection speed   Image: Im	ID(s) *
Color	
Color       Image: Type to add Network Labels         Type to add Network Labels         The Native VLAN setting supported only when adding or editing a single Associated Network         Smart Link       Private Network         Advanced Network Settings         3 Set preferred connection speed       Image: Color         1 Gb       4 Gb         1 Gb       4 Gb         I Gb       Gb         1 Gb       Gb </td <td></td>	
Type to add Network Labels         Type to add Network Labels         The Native VLAN setting supported only when adding or editing a single Associated Network         Smart Link       Private Network         Advanced Network Settings         3 Set preferred connection speed       Image: Connection speed         I Ob       4 Ob         I Ob       4 Ob         I Ob       4 Ob         I Ob       6 Do Image: Connection speed         I Ob       4 Ob         I Ob       4 Ob         I Ob       0 Ob <td>Color none Labels Trace to and Alekandri alean</td>	Color none Labels Trace to and Alekandri alean
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Smart Link Private Network Advanced Network Settings Set preferred connection speed C seted Speed: 2 G G b 1 G b 4 G b 6 b 1 G	The Native VLAN setting supported only when adding or editing a single Associated Network
Advanced Network Settings          B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Settings         B       Image Network Setting Network Settings	mart Link 🗌 Drivsta Network
Advanced Network Settings	
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Set preterred connection speed       Image: Connet speed       Image: Connection speed	
elected Speed: 2 G Gb 1 Gb 4 Gb 3 Set maximum connection speed 7 elected Speed: 4 G Gb 1 Gb 10 Gb elected Speed: 9 elected Speed: 9	Set preferred connection speed
1 Gb 4 Gb 3 Set maximum connection speed 1 elected Speed: 4 3 Gb 1 Gb 10 Gb etwork access group names autt x ters or numbers (e', '2', 'e', 'neg', 'default')	ected Speed: 2 Gb
1 05       4 05         3 Set maximum connection speed       1         elected Speed:       4         4       6b         1 05       10 6b         1 05       10 6b         etwork access group names         [ault x]         ters or numbers (ol', '2', 'ol', 'neg', 'default')	
etwork access group names aut x ters or numbers (o', '2', 'o', 'nog', 'default')	Gb 4 Gb
Set maximum connection speed C	
Set maximum connection speed     Image: Connection speed     Image: Connection speed       elected Speed:     Image: Connection speed     Image: Connection speed       1 Gb     10 Gb       I Gb	
elected Speed: 4	Set maximum connection speed 🛛 👔
t Gb 10 Gb etwork access group names aut x ters or numbers (o', '2', 'o', 'nog', 'default')	ected Speed: 4 Gb
etwork access group names taut x ters or numbers (e', '2', 'e', 'neg, 'default')	
etwork access group names fault × ters or numbers (e', '2', 'e', 'neg, 'default')	Gb 10 Gb
etwork access group names fault × ters or numbers (e', '2', 'e', 'neg', 'default')	
etwork access group names fault x fars (a', '2', 'e', 'nag', 'default')	
tetwork access group names fault x fault x fers or numbers (el, '2', 'e', 'neg, 'default')	
fault × ters or numbers (e', '2', 'e', 'neg', 'default')	work access group names
ters or numbers ('a', '2', 'a', 'nag', 'default')	
uers or numbers (a, z, e, nag, denaul)	an annual ann dial. Mu tait anna i Ialafaudh).
	rs or numbers (a, z, e, nag, denaul)

**Note:** If the VC domain is not in Expanded VLAN capacity mode, you will receive an error when attempting to create more that 128 VLANs in a SUS. If that occurs, go to Advanced Ethernet Settings and select Expanded VLAN capacity mode and apply.

After clicking apply, a list of VLANs will be presented as shown below. If one VLAN in the trunk is untagged/native, see note below.

• Click Apply at the bottom of the page to create the Shared Uplink Set

thernet SI	nared Extern	al Uplink	Set								
plink Set Name		Statu	s PID								
AN-Trunk-1		0									
xternal Up	link Ports										
ort		Port Role	Port Status			Connector Typ	connected To		PID	Speed/Duplex	Acti
7K-Bottom ay 1: Port X4	1	IA	🛇 Linke	d-Active	10 Gb	SFP-DAC	HP (Ten-Gigab	itEthernet1/0/8)	۲	Auto	Dek
onnection Mo	de: 💿 Auto	LACE	Timer: 💿	Domain Default, Shor	: (1 sec)						
	O Failover		0	Short (1 sec)							
	-										
<b>Id Port</b> 7K-Bottom	»		0	Long (30 sec)							
<b>Id Port</b> 7K-Bottom	*		0	Long (30 sec)							
<b>td Port</b> 7K-Bottom	*		0	Long (30 sec)							
Id Port	»			Long (30 sec)							
Itl Port 7K-Bottom Associated	» d FCoE Netw	ork (VLA	V tagged)	Long (30 sec)					- 0	nd 2 Calif	Dela
id Port 7K-Bottom Associated	* H FCoE Netw	ork (VLAI	V tagged)	Long (30 sec)					+ Ac	del 🥕 Edit 😭	* Dela
td Port 7K-Bottom Associated Associated	* d FCoE Netw	ork (VLAI /LAN tag	V tagged)	Long (30 sec)					+ A(	del 🥕 Edit 😭	† Dele
ld Port 7K-Bottom Associated	> I FCoE Netw I Networks (1	ork (VLAI /LAN tag	V tagged)	Long (30 sec)					+ Ac	dd ≠ Edit 😭 + Add 😭	° Dele
Iti Port 7K-Bottom Associated Associated	> H FCoE Netw N Networks (*	ork (VLAI /LAN tag	V tagged)	VLAN D	1	lative	Smart Link	Private Netwo	+ Ac	td / Edit	† Dele
H Port TK-Bottom Associated Associated Network ULAN	> H FCoE Netw N Networks (* vrk Name i-101-1	ork (VLAI /LAN tag	V tagged)	VLANID 101	h f	lative	Smart Link true	Private Netwo Talse	+ Ac	dd / Edit () + Add () Action Edit (v)	† Dele

Figure 182 - Associated VLANs for Shared Uplink Set VLAN-Trunk-1

**Note:** Optionally, if one of the VLANs in the trunk to this shared uplink set were configured as Native or Untagged, you would be required to "edit" that VLAN in the screen above, and configure Native as TRUE. This would need to be set for BOTH VLAN-Trunk-1 and VLAN-Trunk-2.

#### Defining a new Shared Uplink Set (VLAN-Trunk-2) (Copying a Shared UplinkSet)

The second Shared Uplink Set could be created in the same manner as VLAN-Trunk-1 however; VC now provides the ability to COPY a VC Network or Shared Uplink Set.

- Connect Port X4 of FlexFabric module 2 to Port 2 on switch 2
- In the VC GUI screen, select Shared Uplink Sets in the left pane, in the right pane VLAN-Trunk-1 will be displayed, left click VLAN-Trunk-1, it will appear as blue, right click and select COPY
- Edit the Settings as shown below, the new SUS name will be VLAN-Trunk-2 and ALL the associated VLANs with have a suffix of 2
- In step 3, ADD uplink X4 from Bay 2
- Click OK
- The SUS and ALL VLANs will be created

Figure 183 - Copying a SUS and ALL VLANs

hared Uplink Set Name			
me VLAN-Trunk-2			
ssociated Networks (VLA	Ns)		
eplace 🛛 🖛 instance(s) of 🗌	1 with 2		
.AN-Trunk-1 Original	VLAN-Trunk-2	Сару	
/LAN-101- <u>1</u>	▲ VLAN-101- <u>2</u>		
'LAN-102- <u>1</u>	▼ VLAN-102- <u>2</u>		
	ssociated Networks (VLA) eplace last instance(s) of .AN-Trunk-1 Original /LAN-101-1 /LAN-102-1	ssociated Networks (VLANs)         eplace last instance(s) of 1         AN-Trunk-1         Original         VLAN-Trunk-2         /LAN-101-1         /LAN-102-1	ssociated Networks (VLANs)         eplace last instance(s) of 1         .AN-Trunk-1       Original         VLAN-Trunk-2       Copy         /LAN-101-1       VLAN-101-2         /LAN-102-1       VLAN-102-2

### **Defining a new Shared Uplink Set via CLI**

The following script can be used to create the first Shared Uplink Set (VLAN-Trunk-1)

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

# Create Shared Uplink Set VLAN-Trunk-1 and configure uplinks add uplinkset VLAN-Trunk-1 add uplinkport enc0:1:X4 Uplinkset=VLAN-Trunk-1 speed=auto # Create Networks VLAN-101-1 through VLAN-102-1 for Shared Uplink Set VLAN-Trunk-1 add network-range -quiet UplinkSet=VLAN-Trunk-1 NamePrefix=VLAN- NameSuffix=-1 VLANIds=101-102 State=enabled PrefSpeedType=Custom PrefSpeed=2000 MaxSpeedType=Custom MaxSpeed=4000 SmartLink=enabled

The following script can be used to create the Second Shared Uplink Set (VLAN-Trunk-2)

# Create Shared Uplink Set VLAN-Trunk-2 and configure uplinks add uplinkset VLAN-Trunk-2 add uplinkport enc0:2:X4 Uplinkset=VLAN-Trunk-2 speed=auto # Create Networks VLAN101-2 through VLAN102-2 for Shared Uplink Set VLAN-Trunk-2 add network-range -quiet UplinkSet=VLAN-Trunk-2 NamePrefix=VLAN- NameSuffix=-2 VLANIds=101-102 State=enabled PrefSpeedType=Custom PrefSpeed=2000 MaxSpeedType=Custom MaxSpeed=4000 SmartLink=enabled

#### Defining a new vNet Tunnel (Tunnel-1)

Connect Port X5 and X6 of FlexFabric module 1 to Port 3 and 4 on switch 1 Create an Ethernet Network named Tunnel-1 and connect it to FlexFabric Ports X5 and X6 on Module 1

- On the Virtual Connect Home page, select Define a Network
- Insert Network Name as Tunnel-1
- Select Add Port, then add the following port;
  - Enclosure 1, Bay 1, Ports X5 and X6
  - o Enable SmartLink
  - Enable VLAN Tunneling

- Click Advanced
  - Configure Preferred speed to 4Gb
  - Configure Maximum speed to 8Gb
- Click Apply

#### Figure 184 - Tunnel Network VLAN-Tunnel-1

nine V Configur	e 👻 Tools 👻	neip 👻						
dit Ethernet	t Network:	VLAN-Tunnel-1						
Network								
Network Name		Enabled Status	PID					
	Labela (							
	Labers	Type to add Netwo Type to add Networl	<i>k Labels</i> Labels					
Smart Link	rivate Network 🔽	Enable VLAN Tunne	ling					
_ Advanced Netwo	rk Settings_							
External Uplini	k Ports							-
Port	Port Rol	e Port Status		Connector Type	Connected To	PID	Speed/Duplex	Action
C7K-Bottom Bay 1: Port X5	NA	O Linked	Active 10 Gb	SFP-DAC	HP (Ten-GigabitEthernet1/0/5)	۲	Auto	<u>Delete</u>
C7K-Bottom Bay 1: Port X6	NA	📀 Linked	Active 10 Gb	SFP-DAC	HP (Ten-GigabitEthernet1/0/6)	۲	Auto	<u>Delete</u>
Connection Mode	: 💿 Auto	LACP Timer: 🧕	) Domain Default, Short (1 sec)					
	Failover	C	) Short (1 sec)					
Add Dort		C	) Long (30 sec)					
C7K-Bottom	*							
Network Acces	s Groups							+
						A	oply	Cancel

#### Figure 185 - VLAN-Tunnel-1 Advanced network settings

Edit Ethernet Network: VLAN-Tunnel-1	
Network	
Network Name	
VLAN-Tunnel-1	
Color Labels Type to add Network Labels Type to add Network Labels	
Smart Link  Private Network  Enable VLAN Tunneling Advanced Network Settings	
Set preferred connection speed	
Selected Speed: 4 G Gb	
Set maximum connection speed	
Selected Speed: 8 Gb	
0.1 Gb 10 Gb	
	Apply Cancel

#### Defining a new vNet Tunnel (Tunnel-2)

Connect Port X5 and X6 of FlexFabric module 2 to Ports 3 and 4 on switch 2 Create an Ethernet Network named Tunnel-2 and connect it to FlexFabric Ports X5 and X6 on Module 2

- On the Virtual Connect Home page, select Define a Network
- Insert Network Name as Tunnel-2
- Select Add Port, then add the following port;
  - Enclosure 1, Bay 2, Ports X5 and X6
  - Enable SmartLink
  - Enable VLAN Tunneling
- Click Advanced
  - Configure Preferred speed to 4Gb
  - Configure Maximum speed to 8Gb
- Click Apply

**Note:** The vNet Tunnel provides the ability to pass an unlimited number of VLANs to the server NIC., Typically, that NIC would be connected to Hypervisor vSwitch. By using a Tunnel, we can exceed any VLAN limits that VC may have, example; VC 3.30 will support up to 1000 VLAN in a Shared Uplink Set, the Tunnel allows us to exceed that limit. In addition, the Tunnel allows the Network administrator to add and remove VLANs at will, without the need to configure those VLANs within Virtual Connect, they will however, need to be configured in the Hypervisor.

#### **Defining a new Network Tunnel via CLI**

The following script can be used to create the vNet Tunnel (Tunnel-1)

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

# Create vNet Tunnel "Tunnel-1" and configure uplinks add network VLAN-Tunnel-1 VLanTunnel=Enabled LacpTimer=Domain-Default PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000 add uplinkport enc0:1:X5 Network=VLAN-Tunnel-1 Speed=Auto add uplinkport enc0:1:X6 Network=VLAN-Tunnel-1 Speed=Auto set network VLAN-Tunnel-1 SmartLink=Enabled

# Create vNet Tunnel "Tunnel-2" and configure uplinks add network VLAN-Tunnel-2 VLanTunnel=Enabled LacpTimer=Domain-Default PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000 add uplinkport enc0:2:X5 Network=VLAN-Tunnel-2 Speed=Auto add uplinkport enc0:2:X6 Network=VLAN-Tunnel-2 Speed=Auto set network VLAN-Tunnel-2 SmartLink=Enabled

**Note:** In this scenario we have created two independent Share Uplink Sets (SUS), each originating from the opposite FlexFabric Modules, by doing so we provide the ability to create separate and redundant connections out of the Virtual Connect domain. When we create the server profiles, you will see how the NICs will connect to VLANs accessed through the opposite VC module, which provides the ability to create an Active / Active uplink scenario. Alternatively, we could have created a single SUS and assigned both sets of these uplink ports to the same SUS, however, this would have provided an Active/Standby uplink scenario, as shown in Scenario 5.

In addition to the Shared Uplink Set, we also created a pair of vNet (Network) Tunnels. The Tunnel can be used to pass many VLANs (up to 4094 VLANs) without the need to define each VLAN, as in the Shared Uplink Set.

#### Defining a new (FCoE) SAN Fabric via GUI

Create a Fabric and name it "FCoE\_A"

- On the Virtual Connect Manager screen, click Define, SAN Fabric to create the first Fabric
- Enter the Network Name of "FCoE\_A"
- Select Add Port, then add the following ports;
  - Enclosure 1, Bay 1, Port X1
  - o Enclosure 1, Bay 1, Port X2
- Ensure Fabric Type is set to "FabricAttach"
- Select Show Advanced Settings
  - Select Automatic Login Re-Distribution (FlexFabric Only)
  - Select Set Preferred FCoE Connect Speed
    - Configure for 4Gb
  - Select Set Maximum FCoE Connect Speed
    - Configure for 8Gb
- Select Apply

Create a second Fabric and name it "FCoE\_B"

- On the Virtual Connect Manager screen, click Define, SAN Fabric to create the second Fabric
- Enter the Network Name of "FCoE\_B"
- Select Add Port, then add the following ports;
  - Enclosure 1, Bay 2, Port X1
  - Enclosure 1, Bay 2, Port X2
- Ensure Fabric Type is set to "FabricAttach"
- Select Show Advanced Settings
  - Select Automatic Login Re-Distribution (FlexFabric Only)
  - Select Set Preferred FCoE Connect Speed
    - Configure for 4Gb
    - Select Set Maximum FCoE Connect Speed
      - Configure for 8Gb
- Select Apply

0

#### **Defining SAN Fabrics via CLI**

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

#Create the SAN Fabrics FCoE\_A and FCoE\_B and configure uplinks as discussed above add fabric FCoE\_A Type=FabricAttach Bay=1 Ports=1,2 Speed=Auto LinkDist=Auto PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000 add fabric FCoE\_B Type=FabricAttach Bay=2 Ports=1,2 Speed=Auto LinkDist=Auto PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000

Fabric								
Fabric Name FCoE_A		Fabric	Attach		Login Re-Distribution AUTOMATIC		Configured Speed	Show Advanced Settings     Manual Login Re-Distribution     Automatic Login Re-Distribution     Automatic Login Re-Distribution     Selected Speed: 4 6 6b     0.1 6b     8 6b     9 Selected Speed: 8 6b     0.1 6b     8 6b
Enclosure	Uplink Ports							
	Enclosure	Bay	Port Status	\$	Connected To	Action		
Uplink Port		1	💟 8G	b .	10:00:00:27:18:46:09:38	<u>Delete</u>		
Uplink Port Jplink Port X1	C7K-Bottom		-					
Uplink Port Jplink Port X1 Jplink Port X2	C7K-Bottom C7K-Bottom	1	86	b	10:00:00:27:18:46:09:38	<u>Delete</u>		

#### Figure 186 - SAN Configuration and Advanced Settings

**Figure 187 -** FCoE SAN fabrics configured with two 8Gb uplinks per fabric. Note the bay and port numbers on the right

Define 👻	Configure 👻 T	ools <del>v</del> Help <del>v</del>								
SAN F	abrics									
Extern	al Connections	Server Connections								
Status	SAN Fabric	Fabric Type	Login Re-Distribution	Port :	Status	Connected To	Enclosure	Bay	Port	Action
0	FCoE_A	FabricAttach	AUTOMATIC	0	8 Gb	10:00:00:27:18:46:09:38	C7K-Bottom	1	X1	Edit 👻
				0	8 Gb	10:00:00:27:f8:46:09:38	C7K-Bottom	1	X2	
0	FCoE_B	FabricAttach	AUTOMATIC	0	8 Gb	10:00:00:27:18:3a:5d:88	C7K-Bottom	2	X1	Edit 💌
				0	8 Gb	10:00:00:27:18:3a:5d:88	C7K-Bottom	2	X2	
+ Add										

#### **Defining a Server Profile**

We will create a server profile with SIX server NICs and TWO SAN adapters. Each server NIC will connect to a specific network.

- On the main menu, select Define, then Server Profile
- Create a server profile called "ESX-1"
- In the Network Port 1 drop down box, select a Network, then chose VLAN101-1
- Set the port speed to Custom at 100Mb
- In the Network Port 2 drop down box, select a Network, then chose VLAN101-2
- Set the port speed to Custom at 100Mb
- Left click on either of Port 1 or Port 2 in the Ethernet Connections box, and select ADD network (add four additional network connections)
- In the Network Port 3 drop down box, select a Network, then chose VLAN-102-1
- Leave the network speed as Preferred
- In the Network Port 4 drop down box, select a Network, then chose VLAN-102-2
- Leave the network speed as Preferred
- In the Network Port 5 drop down box, select a Network and chose VLAN-Tunnel-1
- Leave the network speed as Preferred
- In the Network Port 6 drop down box, select a Network and chose VLAN-Tunnel-2
- Leave the network speed as Preferred
- Expand the FCoE Connections box, for Bay 1, select FCoE\_A for Bay 2, select FCoE\_B
- Leave the SAN Port speed as Preferred
- Do not configure FC SAN or iSCSI Connection
- In the Assign Profile to Server Bay box, locate the Select Location drop down and select Bay 2, then apply

Prior to applying the profile, ensure that the server in Bay 2 is currently OFF

**Note:** You should now have a server profile assigned to Bay 2, with 6 Server NIC connections. NICs 1&2 should be connected to VLAN VLAN-101-x (MGMT), NICs 3&4 should be connected and VLAN-102x (VMotion) and NICs 5 and 6 are connected to VLAN-Tunnel-x (VM Guest Networks). FCoE SAN fabrics are connected to, Port 1 - FCoE\_A and Port 2 - FCoE\_B.

#### **Defining a Server Profile via CLI**

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

# Create Server Profile ESX-1
add profile ESX-1 -nodefaultfcconn -nodefaultfcoeconn
set enet-connection ESX-1 1 pxe=Enabled Network=VLAN-101-1 SpeedType=Custom
Speed=100
set enet-connection ESX-1 2 pxe=Disabled Network=VLAN-101-2 SpeedType=Custom
Speed=100
add enet-connection ESX-1 pxe=Disabled Network=VLAN-102-1
add enet-connection ESX-1 pxe=Disabled Network=VLAN-102-2
add enet-connection ESX-1 pxe=Disabled Network=VLAN-Tunnel-1 SpeedType=Auto
add fcoe-connection ESX-1 Fabric=FCOE\_A SpeedType=Preferred
add fcoe-connection ESX-1 Fabric=FCOE\_B SpeedType=Preferred
Poweroff server 2
assign profile ESX-1 enc0:2

**Note:** The speed of the NIC and SAN connections, as well as the MAC and WWN. Also, note that the FCoE connections are assigned to the two SAN fabrics created earlier and use ports LOM:1-b and LOM:2-b.

**Figure 188 -** Define a Server Profile (ESX-1) ESXi 5 NICs 5 & 6 are connected to the vNet tunnels VLAN-Tunnel-x

dit Server Profile:       ESX1         Profile         Server Ux0         Server Ux0         Etheret Adapter Connections         Server Ux0         Made Red Speed Symet Tyme         Made Red Speed Tyme          Made Red Sp	Define		ure <del>v</del> Toe	ols <del>v</del> Help	· •									
Profile         Monte         Monte         Seriel Auror         Auror         Marcent Flaw         Auror         Auror         Auror         Marcent Flaw         Marcent Flaw         Mar	Edit	Server	Profile:	ESX-1										
Note Name         Network Access Group         Status         Sanuel LLO           EX.1         Default         Status	Pro	file												
Exit et al. 1 Ethere & Adapter & Onnections Ethere & Adapter & Onnections 1 VLAN-101-1 C CUSTOM 1 (00.MB-4.00) ENABLED None 00-17.44-77.7C-10 LOM1:1-a=> Bay1:02X1 2 VLAN-101-2 C CUSTOM 1 (00.MB-4.00) EIABLED None 00-17.44-77.7C-14 LOM1:1-a=> Bay1:02X3 2 VLAN-102-2 PREFERRED 2 06-4.06 DISABLED None 00-17.44-77.7C-18 LOM1:2-a=> Bay2:02X1 2 VLAN-102-2 PREFERRED 2 06-4.06 DISABLED None 00-17.44-77.7C-18 LOM1:2-a=> Bay2:02X1 2 VLAN-100ne+1 PREFERRED 2 06-4.06 DISABLED None 00-17.44-77.7C-18 LOM1:2-a=> Bay2:02X1 2 VLAN-100ne+2 PREFERRED 2 06-4.06 DISABLED None 00-17.44-77.7C-18 LOM1:2-a=> Bay2:02X4 2 VLAN-100ne+2 PREFERRED 2 06-8.06 DISABLED None 00-17.44-77.7C-18 LOM1:2-a=> Bay2:02X4 2 VLAN-100ne+2 PREFERRED 2 06-8.06 DISABLED None 00-17.44-77.7C-18 LOM1:2-a=> Bay2:02X4 2 VLAN-100ne+2 PREFERRED 2 06-8.06 DISABLED None 00-17.44-77.7C-18 LOM1:2-a=> Bay2:02X4 2 VLAN-100ne+2 PREFERRED 2 06-8.06 DISABLED None 00-17.44-77.7C-18 LOM1:2-a=> Bay2:02X4 2 VLAN-100ne+2 PREFERRED 2 06-8.06 DISABLED None 00-17.44-77.7C-18 LOM1:2-a=> Bay2:02X4 2 VLAN-100ne+2 PREFERRED 2 06-8.06 DISABLED None 00-17.44-77.7C-18 LOM1:2-a=> Bay2:02X4 2 VLAN-100ne+2 PREFERRED 2 06-8.06 DISABLED None 00-17.44-77.7C-18 LOM1:2-a=> Bay2:02X4 2 VLAN-100ne+2 PREFERRED 4 06-8.06 DISABLED None 00-17.44-77.7C-18 LOM1:2-a=> Bay2:02X4 2 VLAN-100ne+2 PREFERRED 4 06-8.06 DISABLED None 00-17.44-77.7C-18 LOM1:2-a=> Bay2:02X4 2 VLAN-100ne+4 PREFERRED 4 06-8.06 DISABLED NONE 00-17.44-77.7C-0.07 LOM1:1-b=> Bay1:02X2 2 VLAN-100ne+4 PREFERRED 4 06-8.06 DISABLED 00-17.44-77.7C-0.07 LOM1:1-b=> Bay2:02X2 2 Context PREFERRED 4 PREFERRED 4 06-8.06 DISABLED 00-17.44-77.7C-0.07 LOM1:1-b=> Bay2:02X2 2 Context PREFERRED 2 2 DISABLED 00-17.44-77.7C-0.07 LOM1:1-b=> Bay2:02X2 2 Context PREFERRED 2 2 DISABLED 00-17.44-77.7C-0.07 LOM1:1-b=> Bay2:02X2 2 Context PREFERRED 2 2 PREFERRED 2 2 DISABLED 00-17.44-77.7C-0.07 LOM1:1-b=> Bay2:02X2 2 Context PREFERRED 2 2 PREFERRED 2 2 DISABLED 00-17.44-77.7C-0.07 LOM1:1-b=> Bay2:02X2 2 Context PREFERRED 2 2 PREFERR	Profik	e Name		Network A	ccess Group	itatus Seri	ial Number	Server	UUD					
Ethermet Adapter Connections         Image: connections           Part         Maccine Maine         Stadl, Port Speed Type         Maccine Maine         Users Maccine Maine         Maccine Maine         Maccine Maine         Accine Maine         Accine Maine         Accine Maine         Accine Maine         Accine Maine         Accine Maine         Maccine Maine         Maccine Maine         Maccine Maine         Accine         Accine <th>ESX-1</th> <th></th> <th></th> <th>Default</th> <th>- 2</th> <th>🔮 усх</th> <th>0000V01</th> <th>e5285ee</th> <th>3-c37e-4e88-a1fa-38</th> <th>5d160a8710</th> <th></th> <th></th> <th></th> <th></th>	ESX-1			Default	- 2	🔮 усх	0000V01	e5285ee	3-c37e-4e88-a1fa-38	5d160a8710				
Ethem # 4 dapter Connections           Prof. Marking Mark States         Other of Speen         Additional Filter         MAC         Marking														
Prot         Max of Same         Statulord Same         Pre         Max at Filer         MAC         Mapping         Add           1         VLAN-101-1         C. CUSTOM         100.06.4 Gb         DBMBLED         None         00-17.44-77.7C-10         LOM1:1-a => Bay 1:32 VI         LOM1:1-a => Bay 2:32 VI         LOM1:1-a => Bay 1:32 VI         LOM1:1-a => Bay 1:3	Eth	ernet Ada	pter Conr	nections										-
1       VLAN-101-1       C CUSTOM       C MABLED       None       00-17-A4-77-7C-10       LOM1:1-a => Bay 1:d2x1         2       VLAN-102-2       C CUSTOM       100 Ab - 4 Ob       DISABLED       None       00-17-A4-77-7C-12       LOM1:1-a => Bay 1:d2x1         3       VLAN-102-2       P REFERRED       2 Ob - 4 Ob       DISABLED       None       00-17-A4-77-7C-14       LOM1:1-a => Bay 1:d2x1         4       VLAN-102-2       P REFERRED       2 Ob - 4 Ob       DISABLED       None       00-17-A4-77-7C-16       LOM1:1-a => Bay 2:d2x1         5       VLAN-100+2       P REFERRED       2 Ob - 8 Ob       DISABLED       None       00-17-A4-77-7C-18       LOM1:1-d= > Bay 2:d2x1       LOM1:1-d= > Bay 1:d2x1       LOM1:1-d= > Bay 2:d2x1       LOM1:1-d= > Bay 1:d2x1       LOM1:1-d= > Bay 1:d2x1       LOM1:1-d= > Bay 2:d2x1       LOM1:1-d= > Bay 1:d2x1	Port	Network I	Varne	Statu	Port Speed Type		Allocated Port Spe	PXE	Multicast Filter	MAC	Mapping			Actio
2       VLAN-101-2       C CUSTOM       ID 00.86 - 4 0b       DIBABLED       None       00-17-A4-77-7C-12       LOM12-2a = Bay 2d2v1         3       VLAN-102-1       P REFERRED       2 0b - 4 0b       DIBABLED       None       00-17-A4-77-7C-14       LOM11-2a = Bay 2d2v1         4       VLAN-102-1       P REFERRED       2 0b - 4 0b       DIBABLED       None       00-17-A4-77-7C-14       LOM11-1a = Bay 1d2v4         5       VLAN-Turnel-1       P REFERRED       3 9 0b - 8 0b       DIBABLED       None       00-17-A4-77-7C-18       LOM11-1a = Bay 1d2v4       DM11-1a = Bay 1d2v4         6       VLAN-Turnel-1       P REFERRED       3 9 0b - 8 0b       DIBABLED       None       00-17-A4-77-7C-18       LOM11-1a = Bay 1d2v4       DM11-1a = Bay 2d2v4       DM11-1a = Bay 2d2v4       DM11-1a = Bay 2d2v4       DM11-1a = Bay 1d2v4       DM11-1a = Bay 2d2v4       DM11-1a = Bay 2d2v4       DM11-1a = Bay 1d2v4       DM11	1	VLAN-10	1-1	0	CUSTOM	8	100 Mb - 4 Gb	ENABLED	None	00-17-A4-77-7C-10	LOM1:1	-a => Bay 1:d2:v1	)	
3       VLAN-102-1 <ul> <li>PREFERRED</li> <li>2 0b - 4 0b</li> <li>DIBABLED</li> <li>None</li> <li>00-17-A4-77-7C-14</li> <li>LOM12-c=&gt; Bay 1 d2V3</li> <li>IDM12-d=&gt; Bay 2 d2V3</li> <li>LOM12-d=&gt; Bay 2 d2V3</li> <li>LOM12-d=&gt; Bay 2 d2V4</li> <li>DIBABLED</li> <li>None</li> <li>00-17-A4-77-7C-18</li> <li>LOM11-d=&gt; Bay 1 d2V3</li> <li>Compact FOSANT FORE</li> <li>PREFERRED</li> <li>Bay 1</li> <li>PREFERRED</li> <li>Bay 1</li> <li>Compact FOSANT FORE</li> <li>Compact FOSANT FORE</li></ul>	2	VLAN-101	-2	0	CUSTOM	5	100 Mb - 4 Gb	DISABLED	None	00-17-A4-77-7C-12	2 LOM1:2	-a => Bay 2:d2:v1		
4         VLNH-1022         PREFERRED         2 Gb - 4 Gb         DISABLED         None         00-17-A4-77-70-16         LOM1:2-(=> Bay 2.02X)           5         VLNH-Tunnel-1         PREFERRED         3 9 Gb - 8 Ob         DISABLED         None         00-17-A4-77-70-18         LOM1:1-(=> Bay 2.02X)         LOM1:1-(=> Bay 2.02X)           6         VLAN-Tunnel-1         PREFERRED         3 9 Gb - 8 Ob         DISABLED         None         00-17-A4-77-70-18         LOM1:1-(=> Bay 2.02X)         Lom1:1-(=> Bay 2.02X)           4         Add         IDMABLED         None         00-17-A4-77-70-14         LOM1:2-(=> Bay 2.02X)         Lom2:2-(=> Bay 2.02X)	3	VLAN-10	2-1	0	PREFERRED		2 Gb - 4 Gb	DISABLED	None	00-17-A4-77-7C-14	4 LOM1:1	-c => Bay 1:d2:v3		
5         VLAN-Tunnel-1         PREFERRED         39 0b-8 0b         DISABLED         None         00-17-A4-77-70-18         LOM1:1-d => Bay 1:32Y4           6         VLAN-Tunnel-2         PREFERRED         39 0b-8 0b         DISABLED         None         00-17-A4-77-70-18         LOM1:1-d => Bay 1:32Y4         Loms           Add         ISCSI HBA Connections         ISCSI HBA Connections         ISCSI HBA Connections         ISCSI HBA Connections         ISCSI FOR Connections           FC HBA Connections         ISCSI FOR Connections	4	VLAN-10	2-2	0	PREFERRED		2 Gb - 4 Gb	DISABLED	None	00-17-A4-77-7C-18	5 LOM1:2	-c => Bay 2:d2:v3		
6         VLAN-Tunnel-2         PREFERRED         39 0b-8 0b         DISABLED         None         00-17-A4-77-7C-1A         LOM1:2-d => Bay 2:d2:V4         Date           + Add	5	VLAN-Tur	nnel-1	0	PREFERRED		3.9 Gb - 8 Gb	DISABLED	None	00-17-A4-77-7C-18	B LOM1:1	-d => Bay 1:d2:v4		
Add         ISCSI HBA Connections         FC HBA Connections         FC HBA Connections         FC HBA Connections         Poil       Overedit PC SAN FOOL Network Name Type         1 Bay1       FCOE_A         9 Bay2       FCOE_B         8 Bay1       FCOE_B         9 Bay2       FCOE_B         8 Bay1       FCOE_CE_B         9 Bay2       FCOE_B         8 Bay1       FCOE_CE_B         9 Bay2       FCOE_B         8 Bay1       FCOE_CE_B         8 Bay1       FCOE_B         9 Bay2       FCOE_B         8 Bay1       FCOE_CE_B         8 Bay1       FCOE_EA         9 Bay2       FCOE_B         8 Bay1       FCOE_EA         9 Bay2       FCOE_B         8 Bay1       FCOE_CE_B         9 Bay2       FCOE_B         8 Bay2       FCOE_B         9 FCOE_B       Status	6	VLAN-Tur	nnel-2	0	PREFERRED		3.9 Gb - 8 Gb	DISABLED	None	00-17-A4-77-7C-1/	A LOM1:2	-d => Bay 2:d2:v4	J	Delet
Process         Process         Max Connections           Proce         Connect PC SAM PFOR Nerver         Type         Abouted - MMAN         MAAC         Marging         Addon           1         Bay 1         FCOE_B         SAN         PREFERRED         4 0b - 8 0 500 60 80 000 00 C 2 DE 04         00-17.44-77-7C-0E         CON11-0 => Bay 1.02 v2         Context           2         Bay 2         FCOE_B         SAN         PREFERRED         4 0b - 8 0 500 60 80 00 00 C 2 DE 05         00-17.44-77-7C-0F         CON11-0 => Bay 2.02 v2         Codes           + Add	FCI		actions											
FCoE HBA Connections         MAC         Mapping         Action           Pot         Connect IPC SAN / FCoE Helwork Name         Type         Status         Port Speed Type         Accord         WMPN         MAC         Mapping         Accord           1         Bay 1         FCOE_A         SAN         PREFERRED         4 0b - 80 500 60 00 00 02 DE 04         00-17.44-77-70-0E         LOMI1-b => Bay 1 d2 v2         Low           2         Bay 2         FCOE_B         SAN         PREFERRED         4 0b - 80 500 60 00 00 02 DE 08         00-17.44-77-70-0F         LOMI1-b => Bay 2 d2 v2         Detete           + Add	FUI	HBA COM	lecuons											10
Rott         Connect/L FCSEN//FCGE_NetWork Nome         Type         Status         Port Speed Type         Addoced         MMXN         MAC         Magging         Addoc           1         Bay 1         FCGE_A         SAN <ul></ul>	FCo	E HBA C	onnection	ıs										
1         Bay 1         FCOE_A         SAN         PREFERRED         4 Gb - B G 500 60 80 00 00 02 2 DE 04         00-17.44-77-70-0E         COM1.1-b => Bay 1.42 v2           2         Bay 2         FCOE_B         SAN         PREFERRED         4 Gb - B G 500 60 80 00 00 02 2 DE 05         00-17.44-77-70-0E         COM1.1-b => Bay 2.42 v2         Detete           + Add	Port	Connecte	FC SAN / FC	CoE Network N	lame Type	Status	Port Speed Type	β	located VWVPN		MAC	Mapping		Action
2         Bay2         FC0E_B         SAN         ● PREFERRED         4 GB- B G 500 60 00 00 00 02 DE 06         00-17-44-77-70-0F         LOMI12-b => Bay 2 d2 V2         Dedde           + Add         -         Fare Channel Box Parisenters         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -	1	Bay 1	FC0E_A		SAN	0	PREFERRED	ſ	4 Gb - 8 G 50:06:0B	:00:00:C2:DE:04	00-17-A4-77-7C-	E LOMI:1-	b => Bay 1:d2:v2	
Add           Pare Channel Boot Parameters           Assign Profile to Server Bay           Enclosure         Server           CrK-Bottom         Bay 2:         ProLeart BL4600 Gen8	2	Bay 2	FCoE_B		SAN	0	PREFERRED	U	4 Gb - 8 G 50:06:0B	:00:00:C2:DE:06	00-17-A4-77-7C-	DF LOM1:2	b => Bay 2:d2:v2	Delete
Fibre Channel Book Parameters           Assign Profile to Server Bay           Snobsare         Server           Model         SN         Status           Prover         LD           C7X-Bottom         Bay 2         Y           ProLiant BL4000 Gen8         MXX032102HB         So         So	+ A	dd												
Assign Profile to Server Bay           Endosure         Server         Model         SN         Status         Power         LD           C7K-Bottom         Bay 2         Y         ProLiver BL450c Gen8         MX/032102/B         Image: Color Black and Status         Image: Color Black and Status <td>🗌 Fil</td> <td>bre Channel I</td> <td>Boot Paramet</td> <td>ers</td> <td></td>	🗌 Fil	bre Channel I	Boot Paramet	ers										
Assign Profile to Server Bay           Enclosure         Server         Model         SN         Status         Power         LD           C7K-Bottom         Bay 2         Y         Produlart BL450c Gen8         MX/032102/B         Image: Color C														
Enclosure Server Model SN Status Power UE C7K-Bottom Bay 2 V ProLlart BL450c Gen8 MX/032102/B C C	Ass	ign Profi	le to Serv	ver Bay										
C7X-Bettom Bay 2 v ProLlant BL 460c Gen8 MX/032102HB O G	Enclo	sure	Server	r		Model	s	SN	Status Powe	r UID				
		C7K-Bottom		Bay 2	•	ProLiant	BL460c Gen8	MXQ32102HE	3 📀 😜	۲				
Anniv											۵	anty Ar	vriv & Cinse	Cancel

### Figure 189- Server Profile View Bay 2

Pervice Exp Status - Bay # 2 Diversall Status:													
Dycraft Status:         O k           Hardware Status:         Normal           VC Status:/Control:         EXX-1           Process and Hold         MC032102/B           Serial Number:         MC032102/B           Serial Number:         VCX0000/01           JUID / Cogical):         VCX000/01           JUID / Cogical):         Sesses-0:37e-468-a1ra-366160a8710           Product Name:         ProLant BL480: Gen8           Part Number:         G66161-B21           Kasset Tag:         U/Inhow n           Prover Part Number:         Module         Model         MAC Address         Network         WWN         SAN           Part Number:         G66161-B21         Module         MAC Address         Network         WWN         SAN           Part Number:         G66161-B21         Module         MAC Address         Network         WWN         SAN           Port 1         Prover Prover Part Number:         G66161-B21         G0.17:A4-77.         VLAN-           Colum:1-	Device Bay S	Status - Bay a	¥2										
Hardware Status: VC Status: VC Status: Power Status: Biological: RAG2 2102HB Serial Number: MC032102HB VCX000V01 VCX00V01 VCX00V01 VCX00V01 VCX00V01 VCX000V01 VCX000V01 VCX00V01 VVVN1 VCX01 VCX01 VCX0	Overall State	us:		🕗 ок	🖉 ок								
VC Status : Assigned Server Profile: EX.1 Friclosure Name : AD: Power Status Control: Rade Server Information - Bay # 2 Serial Number: MC032102HB VC X0000V01 VC X0000V01 VLAH VLA	Hardware	e Status:		📀 Normal									
Sasigned Server Profile:       ESX-1         Enclosure Name:       C7K-Bottom         Power Status/Control:       Image: Control Contro	VC Statu:	s:		🛇 ок									
Proclosure Name:       C7K-Bottom         ADD:	Assigned S	erver Profile	::	ESX-1									
ID:         Press and Hold           Bade Server Information - Bay # 2         Serial Number:         MXQ32102HB         Press and Hold         Press and Hold         ID:	Enclosure N	lam e :		C7K-Bottom									
Power Status/Control:         Press and Hold           Bade Server Information - Bay # 2         Momentary Press         Press and Hold           Bade Server Information - Bay # 2         MC032102/HB         Press and Hold           Serial Number:         MC032102/HB         VCX0000V01         Press and Hold           Bade Server Information - Bay # 2         VCX0000V01         Press and Hold         Press and Hold           Bade Server Information - Bay # 2         VCX000V01         VCX000V01         Press Server Information - Bay # 2           JUID Logical):         VCX0000V01         Server Information - Bay # 2         VCX000V01         Press Server Information - Bay # 2           Server Name :         esx-1 vaolab.nel         MAC Address         Network         WWN         SAN Mapter           Port 1         Fex NC         LoAmiti- Res NC         Nodule         MAC Address         Network         WWN         SAN Mapter           COM1:1- FLB1         Bay         HP Res/Fabric 10Gb 2: 102-7         00-17.A4-77.         VLAN- 7C-16         50:06:08:00:00:02:02:0E-04         Fool           LOM1:1- FLB1         Bay         HP Res/Fabric 10Gb 2: 102:02         00-17.A4-77.         VLAN- 7C-18         102:1         102:1         102:1         102:1         102:1         101:2         50:06:08:00:00:02:02:0E-06	UID:												
Bade Server Information - Bay # 2           Server Name :         Server Name :           Server Name :         Server Name :           Server Information           Colspan="2">Server Ethernet Adapter Information           Colspan="2">Module Model         MAC Address         Network WWWN         SAN           Server Ethernet Adapter Information           Colspan="2">Server Ethernet Adapter Information           Colspan= 2           Colspan= 2           Colspan= 2           Colspan= 2           Colspan= 2            Server Ethernet Ad	Power Status/Control:			🝚 On		N	lomentary P	ress Press and	Hold				
Berial Number:         MKQ32102HB           Serial Number (Logical):         VCX000V01           J1363636-3136-5840-5133-323130324842         J1363636-3136-5840-5133-323130324842           JUDL (Logical):         S235663-378-4688-a1fa-366d160.a6710           Product Name :         Poclant BL460c Gen8           Server Name :         esx-1 vaolab.nef           Part Number :         666161-B21           Vaset Tag:         Uluknow n           Server Ethernet Adapter Information         MAC Address           Network Mare :         esx-1 vaolab.nef           Port 1         MAC Address           LOM1:1-         FLB1           Bay         HP FexFabric 10Gb 2-           00-17-A4-77-         VLAN-           7C-10         101-1           102-2         port 554FLB Adapter           COM1:1-         FLB1         Bay           112/22         port 554FLB Adapter           102/21         port 554FLB Adapter           COM1:1-         FLB1         Bay           112/22         port 554FLB Adapter           CoM1:1-         FLB1         Bay           HP FexFabric 10Gb 2-         00-17-A4-77-         VLAN-           CoM1:1-         FLB1         Bay      <	Blade Serve	r Informatio	n - Bay # 2		_	_		_					
Barial Number (Logical):         VCX0000V01           JUD:         31363836-3136-584D-5133-323130324842           JUD (Logical):         65285e3-378-4888-a118-3860160a8710           VOduct Name :         Pollant EL480c Gen8           Server Name :         esx.1 vaolab.nel           Server Name :         656161-B21           Vaget I and	Serial Numb			MXQ32102	НВ								
JUDC         31363836-3136-584D-5133-323130324842           JUDC (Logical):         5526863-6.378-468.417a-3660160.86710           Forduct Name:         F526863-6.378-468.417a-3660160.86710           Forduct Name:         F521           Forduct Name:         665161-821           Forduct Name:         Control Name           Forduct Name:         665161-821           Value Nubel Name:         Control Name           Forduct Name:         Port Name           LOM1:1:         FLB1         Bay           HP FeerFabric 10Gb2         Control Address           Control - FLB1         Bay           HP FeerFabric 10Gb2         Control - 7.44-77.           Control - FLB1         <	Serial Numb	er (Logical)		VCX0000V	01								
JULD (Logical):         e5285e8-c37e-de88-a f17a-38601f0a8710           Yoduct Name:         POLINI EL480c Ge88           Server Name:         Sext 1 yaolab.nel           Server Name:         G66161-B27           Server Name:         G66161-B27           Server Name:         Control Dial           Server Name:         G68161-B27           Server Chlemert         Docation         Module         Model         MAC Address         Network         WWN         SAA           Febr Adapter         Flex NC         Location         Module         Model         MAC Address         Network         WWN         SAA           Port 1         Flex         Bay         HP FesrFabric 10Gb 2- 00-17-A4-77         OI-17-A4-77- 7C-10         YUAH- 101-1         S008-08:00:00:C2:DE04         Fool Fool Fool Fool           LOM1:1-         FLB1         Bay         HP FesrFabric 10Gb 2- 00-17-A4-77         OU-17-A4-77         YUAH- 102-1         Fool Fool Fool Fool Fool Fool Fool Fool	UUID:			31363636-3136-584D-5133-323130324842									
Product Name:         ProLlant BL480c Gen8           Server Name:         695.11 vaolab.net           Server Name:         696.161-B21           Part Number:         696.161-B21           Vasaet Tag:         Uhknown           Server Ethernet:         Karnet Tag:           Server Ethernet:         Ukknown           Server Ethernet:         Karnet Tag:           Server Ethernet:         Ukknown           Server Ethernet:         Valation           Model:         Model:         MAC Address           Network         VLAN-           Port 1         Server Sthernet:         VLAN-           LOM1:1-         FLB1         Bay 1 d2/v1         PFlexFabric 10Gb 2- port 554FLB Adapter         00-17-A4-77.         VLAN-           CoM1:1-         FLB1         Bay 1 d2/v2         PPlexFabric 10Gb 2- port 554FLB Adapter         00-17-A4-77.         VLAN-           CoM1:1-         FLB1         Bay 1 d2/v2         PPlexFabric 10Gb 2- port 554FLB Adapter         00-17-A4-77.         VLAN-           CoM1:1-         FLB1         Bay 2 d2/v2         PPlexFabric 10Gb 2- port 554FLB Adapter         00-17-A4-77.         VLAN-           CoM1:2-         FLB1         Bay 2 d2/v2         PPlexFabric 10Gb 2- port	UUID (Logica	al):		e5285ee3-c37e-4e88-a1fa-386d160a8710									
Baryer Ikane:         esx-1 vaolab.nel           Yari Aumber:         666161-B21           Yari Aumber:         666161-B21           Vasaet Tag:         Unknown j           Server Ethernet:         Verver Weither Verter Ethernet:           Port 1         Port 1           Image: Constraint of the Server Ethernet:         MAC Address           Network         WWN           SAN         MAC Address           Port 1         Bay           Image: Constraint of the Server Ethernet:         Press Fabric 10Go 2- 102.7 Address           LOM1:1-         FLB1         Bay           1 d2:v1         port 554FLB Adapter           Constraint of the PressFabric 10Go 2- 0 d17:A4:77.         VLAN- 7C-10           LOM1:1-         FLB1         Bay           d         1 d2:v1         port 554FLB Adapter           Constraint of the PressFabric 10Go 2- 0 d17:A4:77.         VLAN- 7C-16           Constraint of the PressFabric 10Go 2- 0 d17:A4:77.         VLAN- 7C-18           Port 2         port 554FLB Adapter           Port 2         port 554FLB Adapter           Port 2         port 554FLB Adapter           LOM1:2-         FLB1         Bay           d         1 d2:v2         port 554FLB Adapter <td colspan="3">Product Name:</td> <td colspan="8">ProLiant BL460c Gen8</td>	Product Name:			ProLiant BL460c Gen8									
Part Number:         666161-B21           Asset Tag:         (Unknow n)           Errorer Ethernet Adapter         Flex NC         Location         Module Module         Model Model         MAC Address         Network         WWN         SAN           Port 1         Env NC         Location         Module 102/V         Model         MAC Address         Network         WWN         SAN           Port 1         Env NC         Location         Module 102/V         Prestabric 10Gb 2- 102/V         00-17-A4-77- 7C-10         VLAH- 101-1         SO 06:08:00:00:C2:DE04         FOol           LOM1:1- b         FLB1         Bay 102/V2         Prestabric 10Gb 2- 102/V         00-17-A4-77- 7C-12         VLAH- 7C-10         FOOL         FOOL           LOM1:1- c         FLB1         Bay 102/V2         Prestabric 10Gb 2- 901554FLB Adapter         00-17-A4-77- 7C-18         VLAH- 7C-18         FOOL         FOOL           Port 2         E         E         HP FexFabric 10Gb 2- 901554FLB Adapter         00-17-A4-77- 7C-12         VLAH- 7C-18         FOOL	Server Name:			esx-1.vaol	ab.net								
Lownown           Server Ethernet: Adapter Internet: Adapter         Model: Model Model Model Model MAC Address Network WWN SAA Fab.           Server Ethernet: Adapter Internet: Flernet: Flernet: Flernet: Flernet: Topological adapter         Model: Model Model Model MAC Address Network WWN SAA Fab.           Port 1         Port 54FLB Adapter           LOM1:1-         FLB1         Bay HP FexFabric 10Gb 2- 00-17-A4-77- 7C-10         VLAN- 101-1           LOM1:1-         FLB1         Bay HP FexFabric 10Gb 2- 00-17-A4-77- 7C-10         S0 06:08:00:00.02:2:0E:04 Fool 7C-0E           LOM1:1-         FLB1         Bay HP FexFabric 10Gb 2- 00-17-A4-77- 7C-18         VLAN- 102-1           LOM1:1-         FLB1         Bay HP FexFabric 10Gb 2- 00-17-A4-77- 7C-18         VLAN- 102-1           LOM1:1-         FLB1         Bay HP FexFabric 10Gb 2- 00-17-A4-77- 7C-18         VLAN- 102-1           Port 2         VIAN- 102-1           LOM1:2-         FLB1         Bay 200 port 554FLB Adapter 7C-14         VLAN- 101-2           LOM1:2-         FLB1         Bay 200 port 554FLB Adapter 7C-14         VLAN- 101-2           LOM1:2-         FLB1         Bay 400 per 554FLB Adapter 7C-14         VLAN- 101-2           LOM1:2-         FLB1         <	Part Numbe	r:		666161-B2	1								
Baye         Percent Ethernet Adapter Information         Module Port         Model Port         MAC Address         Network         WWN         SAM           Port 1         Formation         Formation         Module Port         MAC Address         Network         WWN         SAM           Port 1         LOM1:1- LOM1:1- LOM1:1- C         FLB1         Bay 1d2/2         HP FlexFabric 10Gb 2- port 554FLB Adapter         00-17-A4-77- 7C-10         7C-10         101-1         FOR 102-1         50:06:08:00:00:C2:DE:04         FOR FOR           LOM1:1- c         FLB1         Bay 1d2/2         HP FlexFabric 10Gb 2- port 554FLB Adapter         00-17-A4-77- 7C-14         VLAN- 102-1         FOR 102-1         FOR 102-1         FOR FOR FOR FOR FOR         FOR FOR FOR FOR FOR FOR FOR FOR FOR FOR	Asset Tag:			[Unknow n]									
Baryon Ethernet Adapter Information         Model Port         MAC Address         Network         WWN         SAN           Thernet         Flex NC         Location         Module Port         MAC Address         Network         WWN         SAN           Port 1         Example         Id2v1         port 554FLB Adapter         7C-10         101-1         50:06:08:00:00:C2:DE04         FCol           LOM1:1-         FLB1         Bay         HP FexFabric 10Gb 2:         00-17:A4-77:         VLAN-           C         1:d2v1         port 554FLB Adapter         7C-10         101-1         50:06:08:00:00:C2:DE04         FCol           LOM1:1-         FLB1         Bay         HP FexFabric 10Gb 2:         00-17:A4-77:         VLAN-           C         1:d2:v3         port 554FLB Adapter         7C-14         102-1         102-1           LOM1:1-         FLB1         Bay         HP FexFabric 10Gb 2:         00-17:A4-77:         VLAN-           d         1:d2:v4         port 554FLB Adapter         7C-18         Tunnet-1         50:06:08:00:00:C2:DE06         FCol           Port 2         LOM1:2-         FLB1         Bay         HP FexFabric 10Gb 2:         00-17:A4-77:         VLAN-           LOM1:2-         FLB1         B													
Eher net Mapper         Fiex NC         Location         Module Model         Model Model         MAC Address         Network         WWN         SAM Fab           Port 1         Full         Bay         HP FlexFabric 10Gb 2- 102/V1         00-17.A4.77- port 554FLB Adapter         00-17.A4.77- 7C-10         VLAN- 101-1         50.06:08:00:00:02:2:DE:04         FCol           LOM1:1- b         FLB1         Bay         HP FlexFabric 10Gb 2- 10:2/V2         00-17.A4.77- port 554FLB Adapter         VLAN- 7C-10         50.06:08:00:00:02:2:DE:04         FCol           LOM1:1- c         FLB1         Bay         HP FlexFabric 10Gb 2- port 554FLB Adapter         00-17.A4.77- 7C-14         VLAN- Turnel-1         To:2-1         To:2-1           LOM1:1- d         FLB1         Bay         HP FlexFabric 10Gb 2- 20:2:V2         00-17.A4.77- port 554FLB Adapter         00-17.A4.77- 7C-18         VLAN- Turnel-1         FCol           Port 2         LOM1:2- b         FLB1         Bay         HP FlexFabric 10Gb 2- 20:2:V2         00-17.A4.77- 7C-12         VLAN- 7C-12         50:06:08:00:00:02:2:DE:06         FCol           LOM1:2- b         FLB1         Bay         HP FlexFabric 10Gb 2- 20:2:V2         00-17.A4.77- 7C-12         VLAN- 7C-14         50:06:08:00:00:02:2:DE:06         FCol           LOM1:2- b         FLB1         Bay         HP	Server Ethe	rnet Adapte	r Informat	ion									
Port 1         LoM1:1         FLB1         Bay 1d2:v         PPExFabric 10Gb 2         00-17.44-77         VLAN- 7C-10         S0:06:08:00:00:C2:DE:04         FOor FOO           LOM1:1         FLB1         Bay 1d2:v         PPTexFabric 10Gb 2         00-17.44-77         VLAN- 7C-10         S0:06:08:00:00:C2:DE:04         FOO           LOM1:1         FLB1         Bay 1d2:v         PPTexFabric 10Gb 2         00-17.44-77         VLAN- 7C-14         VLAN- 7C-14         VLAN- 7C-14         TO2-1         TO1-2         TO1-1         TO1-1 <th>Ethernet Adapter</th> <th>Flex NIC</th> <th>Location</th> <th>Module Port</th> <th>Model</th> <th>MAC Address</th> <th>8 Network</th> <th>wwn</th> <th>SAN Fabric</th>	Ethernet Adapter	Flex NIC	Location	Module Port	Model	MAC Address	8 Network	wwn	SAN Fabric				
LOM11- a         FLB1 LOM12- b         Bay LOM12- b         PFBer/ LOM2- b         PFBer/ LDM2- b         PFBer/ LDM2- b         PFBer/ LDM2- b </td <td>Port 1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Port 1												
LOM11- Communication         FLB1 Id2/2/2 c         Bay Id2/2/2 Id2/2/2 c         PPRexFabric 10G 2 ro 554FLB Adapter         00-17-A4-77- 7C-14         VLAN- 102-1           LOM11- c         FLB1 C         Bay Id2/2/2         PPRexFabric 10G 2- 102/2         00-17-A4-77- 7C-14         VLAN- 102-1         VLAN- 102-1         FOR 102-1           LOM11- c         FLB1 C         Bay Id2/2/2         PPRExFabric 10G 2- 20157A-REA Adapter         00-17-A4-77- 7C-18         VLAN- Tunnel-1         FOR 102-1           Port 2         LOM12- a         FLB1 2d2/2         Bay PPRExFabric 10G 2- 20157A-REA Adapter         00-17-A4-77- 7C-18         VLAN- Tunnel-1         FOR 2017           LOM12- b         FLB1 2d2/2         Bay PPRExFabric 10G 2- 20157A-REA Adapter         00-17-A4-77- 7C-6         VLAN- 101-2         FOR 2017           LOM12- LOM12- C         FLB1 2d2/2         Bay PPRExFabric 10G 2- 2d2/4         00-17-A4-77- 7C-6         VLAN- 102-2         FOR 2017           LOM12- LOM12- C         FLB1 2d2/2         Bay PPRExFabric 10G 2- 2d2/4         00-17-A4-77- 7C-6         VLAN- 102-2         FOR 2d2/4           LOM12- LOM12- C         FLB1 2d2/4         Bay PPRExFabric 10G 2- 2d2/4         00-17-A4-77- 7C-6         VLAN- 102-2		LOM1:1- a	FLB1	Bay 1:d2:v1	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-10	VLAN- 101-1						
LOM11- or         FLB1 FLB1         Bay Id22V3 brot 554FLB Adapter         PTexFabric 10Gb 2- 7C-14         0.17.A4.77- 10-2         VLAN- 102-1           LOM12- a         FLB1         Bay Current Bay         HP FlexFabric 10Gb 2- 202V1         0.17.A4.77- port 554FLB Adapter         VLAN- 7C-18         VLAN- Turnel-1           LOM12- b         FLB1         Bay Current 202V2         HP FlexFabric 10Gb 2- port 554FLB Adapter         0.17.A4.77- 7C-12         VLAN- TO-12           LOM12- b         FLB1         Bay Current 202V2         HP FlexFabric 10Gb 2- port 554FLB Adapter         0.17.A4.77- 7C-16         VLAN- TO-12           LOM12- b         FLB1         Bay Current 202V2         HP FlexFabric 10Gb 2- port 554FLB Adapter         0.17.A4.77- 7C-16         VLAN- 102-2           LOM12- b         FLB1         Bay Current 202V2         HP FlexFabric 10Gb 2- port 554FLB Adapter         0.17.A4.77- 7C-16         VLAN- 102-2           LOM12- b         FLB1         Bay Current 202V2         HP FlexFabric 10Gb 2- port 554FLB Adapter         0.17.A4.77- 7C-16         VLAN- 102-2           LOM12- b         FLB1         Bay Current 202V2         HP FlexFabric 10Gb 2- 7C-16         0.17.A4.77- 102-2         VLAN- 102-2		LOM1:1- b	FLB1	Bay 1:d2:v2	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-0E		50:06:0B:00:00:C2:DE:04	FCoE_/				
LOM1:1- or         FLB1 LOM1:2- a         Bay LOM1:2- b         FLB1 EX242V         Bay POT 554FLB Adapter         00-17.A4.77- 7C-18         VLAN- Tunnel-1           LOM1:2- b         FLB1 COM1:2- b         Bay C2/22V         HP FexFabric 10Gb 2- 2/22V2         00-17.A4.77- 7C-16         VLAN- 101-2           LOM1:2- b         FLB1 COM1:2- c         Bay C2/2V2         HP FexFabric 10Gb 2- 2/22V2         00-17.A4.77- 7C-16         VLAN- 102-2           LOM1:2- c         FLB1 COM1:2- C2/2V3         Bay POT 554FLB Adapter         7C-16         VLAN- 102-2           LOM1:2- c         FLB1 COM1:2- C2/2V4         Bay POT 554FLB Adapter         7C-16         VLAN- 102-2           LOM1:2- c         FLB1 C2/2V2         Bay C2/2V4         HP FexFabric 10Gb 2- C2/2V4         00-17.A4.77- C16         VLAN- 102-2		LOM1:1- c	FLB1	Bay 1:d2:v3	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-14	VLAN- 102-1						
Port 2         LOM1:2- a         FLB1         Bay 2:d2:V1         PFRexFabric 10Gb 2- 2:d2:V1         00-17-A4-77- PFRexFabric 10Gb 2- 0:17-A4-77-         VLAN- 101-2           LOM1:2- b         FLB1         Bay 2:d2:V2         HP FexFabric 10Gb 2- 0:154FLB Adapter         00-17-A4-77- 7C-0F         50:06:00:00:02:DE:06         FOol FOol           LOM1:2- b         FLB1         Bay 2:d2:V2         HP FexFabric 10Gb 2- 0:17-A4-77-         00-17-A4-77- 102-2         VLAN- 102-2           LOM1:2- d         FLB1         Bay 2:d2:V3         HP FexFabric 10Gb 2- 0:17-A4-77-         00-17-A4-77- 102-2         VLAN- 102-2		LOM1:1- d	FLB1	Bay 1:d2:v4	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-18	VLAN- Tunnel-1						
LOM1:2- a         FLB1 2.02/V1         Bay port 554FLB Adapter         00-17-A4-77- 7C-12         VLAN- 101-2           LOM1:2- b         FLB1 2.02/V2         Bay port 554FLB Adapter         7C-12         101-2         50:06:08:00:00:C2:DE:06         FCol           LOM1:2- b         FLB1 2.02/V2         Bay port 554FLB Adapter         7C-0F         50:06:08:00:00:C2:DE:06         FCol           LOM1:2- c         FLB1 2.02/V2         Bay port 554FLB Adapter         7C-16         102-2         10-17-A4-77-         VLAN- 102-2           LOM1:2- c         FLB1 2.02/V3         Bay port 554FLB Adapter         7C-16         102-2         10-17-A4-77-         VLAN- 102-2           LOM1:2- d         FLB1 2.02/V3         Bay port 554FLB Adapter         7C-16         102-2         10-17-A4-77-         VLAN- 102-2	Port 2												
LOM1:2- b         FLB1         Bay 2d2/2         HP FlexFabric 10Gb 2- 2d2/2         00-17-A4-77- port554FLB Adapter         50:06:08:00:00:02:2DE06         FCol           LOM1:2- c         FLB1         Bay 2d2/2         HP FlexFabric 10Gb 2- port554FLB Adapter         00-17-A4-77- 7C-16         VLAN- 102-2           LOM1:2- c         FLB1         Bay 4D FlexFabric 10Gb 2- 547LB         00-17-A4-77- 7C-16         VLAN- 102-2           LOM1:2- d         FLB1         Bay 4D FlexFabric 10Gb 2- 7C-16         00-17-A4-77- 7C-16         VLAN- 7C-16		LOM1:2- a	FLB1	Bay 2:d2:v1	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-12	VLAN- 101-2						
LOM1:2-         FLB1         Bay         HP FlexFabric 10Gb 2-         00-17-A4-77-         VLAN-           c         2/2/3         port 554FLB Adapter         7C-16         102-2           LOM1:2-         FLB1         Bay         HP FlexFabric 10Gb 2-         00-17-A4-77-         VLAN-           d         2/d2/4         port 554FLB Adapter         7C-16         102-2         10-17-A4-77-		LOM1:2- b	FLB1	Bay 2:d2:v2	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-0F		50:06:0B:00:00:C2:DE:06	FCoE_E				
LOM1:2- FLB1 Bay HP FlexFabric 10Gb 2- 00-17-A4-77- VLAN- d 2:d2:v4 port 554FLB Adapter 7C-1A Tunnel-2		LOM1:2- c	FLB1	Bay 2:d2:v3	HP FlexFabric 10Gb 2- port 554FLB Adapter	00-17-A4-77- 7C-16	VLAN- 102-2						
		LOM1:2	FLB1	Bay	HP FlexFabric 10Gb 2-	00-17-A4-77-	VLAN-						

## **Review**

In this scenario we have created Two Shared Uplink Sets (SUS), providing support for our infrastructure VLANs (101 and 102). Uplinks originating from each FlexFabric Module connect to each SUS, by doing so we provide redundant connections out of the Virtual Connect domain. Additionally, we have created a pair of vNet Network Tunnels. These Tunnels will provide the ability to transparently pass any and all VLANs between the connected servers and network switches, each VLAN Tunnel has TWO active uplinks to provide additional connectivity to the network. In this scenario, all uplinks will be active. We also create two FCOE SAN Fabrics.

We created a server profile, with SIX NICs. NICs 1 and 2 connect to VLAN 101 (untagged), NICs 3 and 4 connect VLAN 102 (untagged) and NICs 5 and 6 connect to the VLAN tunnels which will provide connection to VLANs 103-105 and 2100-2400 (tagged). By connecting to the networks in pairs of NICs, we provide the ability to sustain a link or module failure and not loose connection to the network. We have configured NICs 1 and 2 with a custom NIC speed of 100Mb, NICs 3 and 4 were left as preferred, which was configured to 2Gb when we created the Shared Uplink Set and NICs 5 and 6 are set to auto and will accept the remaining bandwidth.

Additionally, FCoE port 1 is connected to SAN fabric FCoE\_A and FCoE SAN port 2 is connected to SAN Fabric FCoE\_B, providing a multi-pathed connected to the SAN. The SAN fabric connections are set to 4Gb/Sec.

The FCoE SAN fabric connects to each SAN fabric over a pair of uplinks per module. SAN logins are distributed across the multiple paths.

**Figure 190 -** As NICs 1 and 2 are connected directly to VLAN-101, the connection acts as an Access or Untagged switch port, you need to ensure that the Hypervisor in NOT configured for VLAN tagging. However, if you want to put this server onto a VLAN that is tagged, this setting will need to be configured for that VLAN.



### **Results – vSphere Networking Examples**

We successfully configured FlexFabric with Share Uplink Sets, supporting several VLANs and redundant SAN fabrics. We created a server profile to connect to the various vNet with SIX NICs and the SAN fabrics using the FCoE connections created within the profile.

Although both Ethernet and Fibre channel connectivity is provided by the CNA adapter used in the G7 and Gen 8 servers; each capability (LAN and SAN) is provided by a different component of the adapter, they appear in the server as individual network and SAN adapters.

The following graphics show an ESXi 5.1 server with SIX FlexNICs configured, FOUR presented at 4Gb (two on the console network and two on the VMotion network) and two at 8Gb (Guest VLAN port groups). If we did not require SAN connectivity on this server, the FCoE connections could be deleted and the server would then have 8 NIC ports available to the OS. In addition, if we did not want FCoE connectivity and instead wanted to leverage iSCSI, we could delete the FCoE connected and re-create those connects as iSCSI connections, with offload and optionally iSCSI boot.

**Note:** the BL465c G7 and BL685c G7 utilize an NC551i chipset (BE2), whereas the BL460c G7, BL620c G7 and BL680c G7 utilize an NC553i chipset (BE3) and the Gen 8 blades typically have a NC554 adapter which also utilizes the BE3 chipset. Both the BE2 and BE3 chipsets share common drivers and firmware.

The following graphic provides an example of an ESX server with TWO NICs connected to the same console vSwitch configured for VLAN 101, which was the Default (untagged) VLAN. Additional vSwitches have been configured for VMotion and product VLANs.

### vSphere Standard vSwitch

#### Figure 191 - ESXi 5.1 Network Connections





Figure 192 – ESXi 5 Networking - three vSwitches configured. (Note the NIC speeds)

**Note:** As VLAN 101 is set as untagged at the upstream switch port, the management network port group should be defined as untagged. This will allow the server to be deployed, without having the set a VLAN ID for the management network.

**Figure 193 -** You may want to specify a specific NIC for VMotion traffic. This will ensure that all VMotion traffic between servers within the enclosure will remain on the same VC module, reducing the likelihood of multiple hops between servers. Edit the VMotion Configuration.

🖓 vSwitch1 Properties				
Ports Network Adapters				
Configuration	Summary	Port Properties		
vSwitch	120 Ports	Network Label:	VMotion	
VMotion	vMotion and IP	VLAN ID:		
		vMotion:	Enabled	
		Fault Tolerance Logging:	Disabled	
		Management Traffic:	Disabled	
		iSCSI Port Binding:	Disabled	
		-NIC Settings		
		MAC Address:	00:50:56:6e:2c:9c	
		MTU:	1500	
		IP Settings		
		IP Address:	192.168.102.170	
		Subnet Mask:	255.255.255.0	
				View Routing Table
		Effective Policies		
		Security		
		Promiscuous Mode:	Reject	
		MAC Address Changes:	Accept	
Add	Edit Remove	Forged Transmits:	Accept	
				Close Help

**Figure 194 -** Edit the NIC Team for VMotion and set one of the Adapters in Standby, this will ensure that ALL VMotion traffic remains on the SAME VC module. ESX NIC vmnic5 is connected to the VC module in bay 1.

🗿 ¥Motion Prope	rties				2
la thaa w	1				
General   IP Settin	ngs   Security   1	rathic Shaping in			
Policy Exception	ns				
Load Balancing	:	Roul	e based on the	originating v	irtual port ID 🔄
Network Failov	er Detection:	🗖 Link	status only		<b>T</b>
Notify Switches	;;	T Yes			-
Failback:		T Yes			
Failover Order:					
Override sv	vitch failover orde	er:			
Select active an	nd standby adapt	ers for this port g	roup. In a failov	er situation/	, standby
		pecifica below.			
Name	Speed	Networks			Move Up
Active Adap	ters				Move Down
Chan dhu Ada	8000 Full				
	8000 Full	None			
Unused Ada	oters				
Adapter Deta	ils —				
Emulex Corpo	oration HP FlexFa	bric 10Gb 2-port 5	54FLB Ada		
Name:		vmnic4			
Location:		PCI 04:00.4			
Driver:		be2net			
			ОК	Cance	el Help

**Note:** As this Scenario is based on an Active/Active configuration, to ensure that ALL VMotion traffic between servers within the enclosure is contained to the same module, on each server edit the VMotion vSwitch properties and move one of the Adapters to Standby. This will ensure that ALL VMotion traffic will occur on the same Virtual Connect module.

Figure 195 - Configuring the vSwitch for multiple port groups / VLANs

Configuration	Summary 🔺	Sphere Scandard Switch Property		1
🗊 vSwitch	120 Ports	Number of Ports:	120	
👷 VLAN-2120	Virtual Machine			
👤 VLAN-2119	Virtual Machine	Advanced Properties		
👳 VLAN-2118	Virtual Machine	MTU:	1500	
👤 VLAN-2117	Virtual Machine			
👮 VLAN-2116	Virtual Machine	Default Policies		
Q VLAN-2115	Virtual Machine	Security		
👷 VLAN-2114	Virtual Machine	Promiscuous Mode:	Reject	
👷 VLAN-2113	Virtual Machine	Mac address Channel	A	
VLAN-2112	Virtual Machine	MAC Address Changes:	мссерс	
VLAN-2111	Virtual Machine	Forged Transmits:	Accept	
VLAN-2110	Virtual Machine	Traffic Shaping		
VLAN-2109	Virtual Machine	Average Bandwidth:		
VLAN-2108	Virtual Machine	Peak Bandwidth:		
VLAN-2107	Virtual Machine	Burch Sizer		
VIAN-2106	Virtual Machine			
VLAN-2103	Virtual Machine			
VLAN-2103	Virtual Machine	Load Balancing:	Port ID	
VLAN-2102	Virtual Machine	Network Failure Detection:	Link status only	
VLAN-2101	Virtual Machine	Notify Switches:	Yes	
<u></u>		Failback:	Yes	
Add	Edit Remove	Active Adapters:	vmpic6, vmpic7	

lardware Options Resources	Profiles vServices		Virtual Machine Version:
	Add Remov	1011 GB	guration
Hardware	Summary	512 GB	Maximum recommended for this
Memory	4096 MB	256 GB	guest OS: 1011 GB.
🔲 CPOS 🛄 Video card	4 Video card	128 GB	Maximum recommended for best
	Restricted	64 GB-	Default recommended for this
SCSI controller U Hard disk 1	LSI Logic SAS Virtual Disk	32 GB	◄ guest OS: 4 GB.
CD/DVD drive 1	Client Device	16 GB	Minimum recommended for this guest OS: 512 MB.
Network adapter 1	VLAN-104	8 68	
Floppy drive 1	Client Device	4 GB	
		2 (8	
		1 GR	
		E12 MP	
		256 MB	
		128 MB	
		64 MB	
		32 MB	
		16 MB	
		8 MB -	
		4 MB	
Help			OK Cancel

#### Figure 196 - VM1 configured for VLAN 104

#### Figure 197 - VM1 on VLAN 104



### vSphere Distributed vSwitch

#### 192.168.101.170 ¥Mware ESXi, 5.1.0, 1117900 Getting Started Summary Virtual Machines Performance Configuration Tasks & Events Alarms Permissions Maps Hardware View: vSphere Standard Switch vSphere Distributed Switch Processors Networking Memory Storage Remove... Properties... Standard Switch: vSwitch0 Networking -Virtual Machine Port Group -Physical Adapters Storage Adapters 🖵 VM Network 0 🕳 🌇 vmnic1 8000 Full P Network Adapters P 🗕 🌇 vmnic0 8000 Full -VMkernel Port-Advanced Settings 🖵 Management Network 0 Power Management vmk0:192.168.101.170 fe80::217:a4ff:fe77:7c08 Software Licensed Features Remove... Properties... Time Configuration Standard Switch: vSwitch1 -VMkernel Port--Physical Adapters DNS and Routing 🖵 VMotion 🛶 🌇 vmnic4 8000 Full 0 Authentication Services Q. 🖵 🌇 vmnic5 8000 Full vmk1:192.168.102.170 | Power Management Virtual Machine Startup/Shutdown Virtual Machine Swapfile Location Security Profile Host Cache Configuration System Resource Allocation Agent VM Settings Advanced Settings

#### Figure 198 - Management and VMotion NICs are connected to Standard vSwitches

Figure 199 - VM Networks are connected to a Distributed vSwitch





#### Figure 200 - VM Connected to VLAN 104 on Distributed vSwitch

### **Results – vSphere SAN Connectivity**

**Figure 201 -** By access the HBA BIOS during server boot, you can see that Port 1 of the FlexHBA is connected to an EVA SAN LUN. Also note the CNA firmware version, this is the minimum version required for vSphere 5.

	Emulex OneCon	nect FCoE	BIOS Uti	lity,	XA4.03a5	
01: 554FLB: Mem Base: FBE( Port Name: 50( Vlan ID: 1001	90000 Firmware 96080000C2DE04 DCBX mode: C	Version: EE mode	Bus#: 4.2.401 Node 1	04 De .2215 Name:	v#: 00 Func#: 02 BIOS: Disabled 50060B00000C2DE05	
	Devices	Present o	on This Ad	lapter		
01. DID:010000 02. DID:010100 03. DID:010200 04. DID:010300	<pre>9 WWPN:500001FE1 9 WWPN:500001FE1 9 WWPN:500001FE1 9 WWPN:500001FE1</pre>	5005D468 5005D46C 5005D46A 5005D46B	LUN:01 LUN:01 LUN:01 LUN:01	HP HP HP HP	HSU210 HSU210 HSU210 HSU210	6220 6220 6220 6220
	Enter	<esc> to</esc>	Previous	Menu		

**Figure 202** – ESXi 5 storage configuration, the Shared Storage LUN is provided through the FCoE connections to the SAN.

192.168.101.170 VMware E5Xi, 5.1.0, 1	117900
Getting Started Summary Virtual Mach	nnes Performance, <mark>Configueation</mark> Table & Events Allema, Permissions (Maps (Storage Hever, Network Heve), Hardware Sakus (He Disight Management
Hardware	View: Datastores Devices
Processors	Datastores
Memory	Identification × Status Device Drive Type Capacity Fire Type Last Update Alarm Actions Storage I/O Control Hardware Acceleration
<ul> <li>Storage</li> </ul>	👔 datastore1 🥑 Normal HP Serial Attached Non-SSD 274.25 GB 266.36 GB VMP55 7/14/2013 11:36:43 PM Enabled Disabled Unknown
Networking	1 ESX-0001 🥏 Normal HP Fibre Channel Non-SSD 499.75 GB 496.80 GB VMP55 3/20/2013 11:24:18 PM Enabled Disabled Unknown
Storage Adapters	ESX-0002 O Normal HP Fibre Channel Non-SSD 499.75 GB 499.16 GB VMFS3 3/20/2013 11:24:18 PM Enabled Disabled Unknown
Network Adapters	ESX-0003 O Normal HP Fibre Channel Non-SSD 499.75 GB 499.20 GB VMPS3 3/20/2013 11:24:18 PM Enabled Disabled Unknown
Advanced Settings	
Power Management	
Software	
Licensed Features	
Time Configuration	
DNS and Routing	
Authentication Services	
Power Management	
Virtual Machine Startup/Shutdown	
Virtual Machine Swapfile Location	
Security Profile	
Host Cache Configuration	- Datastore Details
System Resource Allocation	FSV-0001 400.72 (2) Crawler
Agent VM Settings	Location: //mfs/valumes/5124b382-0202b24-6994-0017e4775010
Advanced Settings	Hardware Acceleration: Unknown 973.00 MB 🔲 Used
	Refresh Sprace Capabilities 499.80 GB Free
	System Storage Capability: N/A
	User-defined Storage Capability: N/A
	Path Selection Properties Extents Storage I/0 Control
	Most Recently Us Volume Label: ESX-0001 HP Fbre Channel Disk (naa 499,99 GB Disabled
	Datastore Name: ESX-0001 Total Enrouting Canacity 499.75 GB
	Paths Formatting
	1004: / File System: VMFS 5.54
	Disable 0 Block Size: 1 MB

## Summary

We presented a Virtual Connect Network scenario by creating two shared uplink sets (SUS), each SUS is connected with one active uplink; both SUS' can actively pass traffic. The SUS' will be used to support the management and VMotion VLANs. We also configured two VLAN Tunnels, which will provide connectivity for the product VLANs for the VM hosts. We included a dual path SAN fabric for storage connectivity.

When VC profile ESX-1 is applied to the server in bay 2 and the server is powered up, it has one NIC connected through FlexFabric module 1 (connected to VLAN-101-1), the second NIC is connected through FlexFabric module 2 (connected to VLAN-101-2). Each NIC is configured at 100Mb. These NICs are connected to the console vSwitch. The second pair of NICs are connected to the second vSwitch, which is configured for VMotion and is connected to VLAN-102-x through NICs 3 and 4 which are configured at 2Gb. The last pair of NICs 5 and 6, are configured at 3.9Gb and connected to the third vSwitch, which is configured to support VLANs 103 through 105 and 2100 through 2400. This host is also configured for FCoE based SAN access and connects to a SAN LUN to store the Guest VMs. Each FCoE port is configured for 4Gb of SAN bandwidth.

As additional servers are added to the enclosure, simply create additional profiles, or copy existing profiles, configure the NICs for LAN and SAN fabrics as required and apply them to the appropriate server bays and power the server on.

# Scenario 8 – Network Access Groups in a Shared Uplink Set - Ethernet and FCoE SAN – Windows 2008R2

## **Overview**

This scenario will implement the Shared Uplink Set (SUS) to provide support for multiple VLANs and will also leverage Network Access Groups to provide access control to specific VLANs.

The Network Access Group (NAG) is a feature enhancement with VC firmware release 3.30 and provides the ability to group VLANs based on application or security boundaries. We will create a Shared Uplink Set, and then identify VLANs that will associate with different applications and then create Network Access Groups to contain those VLANs. We can then create server profiles and assign server profiles to specific Network Access Groups, which will restrict their ability to connect to networks which are outside the Network Access Group they belong to.

As multiple VLANs will be supported in this configuration, the upstream switch ports connecting to the FlexFabric modules will be configured to properly present those VLANs. The upstream switch ports will be configured for VLAN trunking/VLAN tagging. LACP will also be used to connect two uplinks per module.

This scenario will focus on Ethernet connectivity only; however, FCoE connectivity is still support when using Network Access Groups.

### Requirements

In order to implement this scenario, an HP BladeSystem c7000 enclosure with one or more server blades and TWO Virtual Connect FlexFabric (or Flex-10) modules, installed in I/O Bays 1& 2 are required. In addition, we will require ONE or TWO external Network switches. As Virtual Connect does not appear to the network as a switch and is transparent to the network, any standard managed switch will work with Virtual Connect.

**Figure 203 - Physical View;** Shows two Ethernet uplinks from Ports X5 and X6 on Module 1 to Ports 1 and 2 on the first network switch and two Ethernet uplinks from Ports X5 and X6 on Module 2 to Ports 1 and 2 on the second network switch.



**Figure 204 - Logical View – WEB-0001;** the server blade profile WEB-0001 is configured with TWO FlexNICs and is assigned to the Network Access Group (NAG) "WEB-Tier". All VLANs are presented to FlexFabric using Shared Uplink Sets (VLAN-Trunk-1 and VLAN-Trunk-2) through Ports X5 and X6 on each FlexFabric Module in Bays 1 and 2. The WEB-Tier NAG contains VLANs specified for WEB servers only. This profile will have access to only the VLANs (2100-2105) that are configured in the WEB-Tier NAG and has been configured for VLAN 2100. FCOE SAN connections were not configured for this scenario, but would be supported, if required.



**Figure 205 - Logical View – APP-0001;** the server blade profile APP-0001 is configured with TWO FlexNICs and is assigned to the Network Access Group (NAG) "APP-Tier". All VLANs are presented to FlexFabric using Shared Uplink Sets (VLAN-Trunk-1 and VLAN-Trunk-2) through Ports X5 and X6 on each FlexFabric Module in Bays 1 and 2. The APP-Tier NAG contains VLANs specified for APP servers only. This profile will have access to only the VLANs (2200-2205) that are configured in the APP-Tier NAG and has been configured for VLAN 2200. FCOE SAN connections were not configured for this scenario, but would be supported, if required.



**Figure 206 - Logical View – DB-0001;** the server blade profile DB-0001 is configured with TWO FlexNICs and is assigned to the Network Access Group (NAG) "DB-Tier". All VLANs are presented to FlexFabric using Shared Uplink Sets (VLAN-Trunk-1 and VLAN-Trunk-2) through Ports X5 and X6 on each FlexFabric Module in Bays 1 and 2. The DB-Tier NAG contains VLANs specified for DB servers only. This profile will have access to only the VLANs (2300-2305) that are configured in the DB-Tier NAG and has been configured for VLAN 2300. FCoE SAN connections were not configured for this scenario, but would be supported, if required.



# Installation and configuration

### **Switch configuration**

As the Virtual Connect module acts as an edge switch, Virtual Connect can connect to the network at either the distribution level or directly to the core switch.

The appendices provide a summary of the cli commands required to configure various switches for connection to Virtual Connect. The configuration information provided in the appendices for this scenario assumes the following information:

 The switch ports are configured as VLAN TRUNK ports (tagging) to support several VLANs. All frames will be forwarded to Virtual Connect with VLAN tags. Optionally, one VLAN could be configured as (Default) untagged, if so, then a corresponding vNet within the Shared Uplink Set would be configured and set as "Default".

**Note:** when adding additional uplinks to the SUS, if the additional uplinks are connecting from the same FlexFabric module to the same switch, in order to ensure all the uplinks are active, the switch ports will need to be configured for LACP within the same Link Aggregation Group.

The network switch port should be configured for Spanning Tree Edge as Virtual Connect appears to the switch as an access device and not another switch. By configuring the port as Spanning Tree Edge, it allows the switch to place the port into a forwarding state much quicker than otherwise, this allows a newly connected port to come online and begin forwarding much quicker.

#### **Configuring the VC module**

- Physically connect Port 1 of network switch 1 to Port X5 of the VC module in Bay 1
- Physically connect Port 2 of network switch 1 to Port X6 of the VC module in Bay 1
- Physically connect Port 1 of network switch 2 to Port X5 of the VC module in Bay 2
- Physically connect Port 2 of network switch 2 to Port X6 of the VC module in Bay 2

**Note:** if you have only one network switch, connect VC ports X5 & X6 (Bay 2) to an alternate port on the same switch. This will NOT create a network loop and Spanning Tree is not required.

#### **VC CLI commands**

Many of the configuration settings within VC can also be accomplished via a CLI command set. In order to connect to VC via a CLI, open an SSH connection to the IP address of the active VCM. Once logged in, VC provides a CLI with help menus. Through this scenario the CLI commands to configure VC for each setting will also be provided.

#### **Configuring Expanded VLAN Capacity via GUI**

Virtual Connect release 3.30 provided an expanded VLAN capacity mode when using Shared Uplink Sets, this mode can be enabled through the Ethernet Settings tab or the VC CLI. The default configuration for a new Domain install is "Expanded VLAN Capacity" mode, Legacy mode is no longer available and the Domain cannot be downgraded.

#### To verify the VLAN Capacity mode

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Expanded VLAN capacity

• Verify Expanded VLAN Capacity is configured and Legacy VLAN Capacity is greyed out. **Note:** Legacy VLAN mode will only be presented if 1Gb Virtual Connect Modules are present, in which case the domain would be limited to Firmware version 3.6x.

#### **Configuring Expanded VLAN Capacity via CLI**

The following command can be copied and pasted into an SSH based CLI session with Virtual Connect;

# Set Expanded VLAN Capacity set enet-vlan -quiet VlanCapacity=Expanded

#### Figure 207 - Enabling Expanded VLAN Capacity

Define 👻 Configure 👻 Tools 👻 Help 👻
Ethernet Settings
MAC Addresses Port Monitoring Advanced Settings
VLAN
Server VLAN Tagging Support
Force server connections to use the same VLAN mappings as shared uplink sets
VLAN Capacity
O Legacy VLAN capacity (Up to 320 VLANs per module and 28 VLANs per server connection).
• Expanded VLAN capacity (Up to 1000 VLANs per domain and 162 VLANs per physical server port).
Multiple Networks Link Speed Settings When using mapped VLAN tags (multiple networks over a single link), these settings will be used for the overall Link speed control.
Set a Custom value for Preferred Link Connection Speed
Set a Custom value for Maximum Link Connection Speed

**Note:** If a 1Gb VC Ethernet module is present in the Domain, Expanded VLAN capacity will be greyed out, this is only supported with 10Gb based VC modules. Also, once Expanded VLAN capacity is selected, moving back to Legacy VLAN capacity mode will require a domain deletion and rebuild.

#### **Defining a new Shared Uplink Set (VLAN-Trunk-1)**

Connect Ports X5 and X6 of FlexFabric module in Bay 1 to Ports 1 and 2 on switch 1

Create a SUS named VLAN-Trunk-1 and connect it to FlexFabric Ports X5 and X6 on Module 1

- On the Virtual Connect Home page, select Define, Shared Uplink Set
- Insert Uplink Set Name as VLAN-Trunk-1
- Select Add Port, then add the following port;
  - Enclosure 1, Bay 1, Port X5
  - Enclosure 1, Bay 1, Port X6

File and Changed Endowed United Code								
Ethernet Snz	ared External Op							
/LAN-Trunk-1								
External Uplii	nk Ports							
Port	Port Role	Port Status	-	Connector Ty	pe Connected To	PID	Speed/Duplex	Action
C7K-Bottom Bay 1: Port X5	NA	C Linked-Active	10 Gb	SFP-DAC	HP (Ten-GigabitEthernet1/0/5)		Auto	Delete
C7K-Bottom Bay 1: Port X6	NA	C Linked-Active	10 Gb	SFP-DAC	HP (Ten-GigabitEthernet1/0/6)	۲	Auto	Delete
onnection Mode	*      Auto     Failover	LACP Timer:  Domain Default, Short (1 sec) Long (30 sec)	Short (1 sec)					
C7K-Bottom	*							
	ECoE Network ()	VLAN tagged)						

#### Figure 208 - Shared Uplink Set (VLAN-Trunk-1) Uplinks Assigned

- Click Add Networks and select the Multiple Networks radio button and add the following VLANs;
  - Enter Name as VLAN-
  - Enter Suffix as -1
  - Enter VLAN IDs as follows (and shown in the following graphic);
- 101-105,2100-2400
- Enable SmartLink on ALL networks
- Click Advanced
  - Configure Preferred speed to 4Gb
  - Configure Maximum speed to 8Gb
- Click Apply

**Note:** You can optionally specify a network "color" or "Label" when creating a shared Uplinkset and its networks. In the example above we have not set either color or label.
Figure 209 - Creating VLANs in	n a Shared Uplink Set
--------------------------------	-----------------------

Yould you like to add								
voulu you like to aut								
) a single Associated h	vetwork 💿 r	nuitiple Associat	ed Networks					
Network Name	VLAN-		+ VLAN ID + _1					
Sample network name:	VLAN-2400-1							
VLAN ID(s) *	101-105.2100-	2400		2				
				-				
Color	Labels	Type to add Ne	work Labels					
		Type to add Netwo	vk Lahels					
		.,,						
<ol> <li>The Native VLAN s</li> </ol>	etting support	ed only when ad	lding or editing a si	ngle Associated N	atwork			
<ul> <li>The mative viden s</li> </ul>	eung suppon	eu only when au	iuniy or euting a si	rigie Associated N	SUVOIK			
						into potrugaliza) hi	ofere recebing the l	limit of 1 20
(1) The 200 setup dec.	to a last a supervised at	a subscription of a life in a sub-	and an efficiency of the second se			ate network(s) ni	etore reachind the i	UPDU OT 1 78
<li>The 306 networks</li>	being created	cannot all be m	arked Private. The	domain can only su	ipport 128 more pri		····· . · · · · · · · · · · · · · · · ·	infint of 120.
① The 306 networks	being created	cannot all be m	arked Private. The	domain can only su	ipport 128 more pri			111111 01 1 20.
<ul> <li>The 306 networks</li> <li>Smart Link Privation</li> </ul>	being created e Network	cannot all be m	arked Private. The	domain can only su	ipport 128 more pri			111111 01 120.
<ul> <li>The 306 networks</li> <li>Smart Link Private</li> </ul>	being created e Network	cannot all be m	arked Private. The	domain can only su	ipport 128 more pri	ato notinoni(o/ o		
The 306 networks     Smart Link Privat	being created e Network #tings	cannot all be m	arked Private. The	domain can only su	pport 128 more pr		, ,	
The 306 networks     Smart Link Privat     Advanced Network Se	being created e Network #ttings	cannot all be m	arked Private. The	domain can only su	pport 128 more prr		, ,	
The 306 networks     Smart Link Privat     Advanced Network Se	being created e Network ettings	cannot all be m	arked Private. The	domain can only su	pport 128 more pr			
<ul> <li>The 306 networks</li> <li>Smart Link Private</li> <li>Advanced Network Set</li> <li>Set preferred connect</li> </ul>	being created e Network attings attion speed	cannot all be m	arked Private. The	domain can only su	pport 128 more pr			
The 306 networks     Smart Link Private     Advanced Network Se     Set preferred connect     Selected Speed	being created e Network attings tion speed ? Gh	cannot all be m	arked Private. The	domain can only su	pport 128 more pr			
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<ul> <li>The 306 networks</li> <li>Smart Link Privat</li> <li>Advanced Network Se</li> <li>Set preferred connec</li> <li>Selected Speed: 4</li> <li>0.1 Gb</li> </ul>	being created e Network sttings tion speed Gb 8 Gb	cannot all be m	arked Private. The	domain can only su	pport 128 more pr			
The 306 networks     Smart Link Privat     Advanced Network Se     Set preterred connec     Selected Speet 4     0.1 Gb	being created e Network attings ttion speed Gb 8 Gb	cannot all be m	arked Private. The	domain can only su	pport 128 more pr		, , , , , , , , , , , , , , , , , , ,	
The 306 networks     Smart Link Privat     Advanced Network Se     Set preferred connec     Selected Speed 4     0.1 Gb	being created e Network sttings tion speed ? Gb 8 Gb	cannot all be m	arked Private. The	domain can only su	pport 128 more pr		, , , , , , , , , , , , , , , , , , ,	
The 306 networks     Smart Link Private     Advanced Network Se     Set preferred connec     Selected Speed: 4     0.1 Gb     Set maximum connec     Set Maximum connece	being created e Network ettings tion speed ? Gb 8 Gb	cannot all be m	arked Private. The	domain can only su	(pport 128 more pr			
The 306 networks     Smart Link Privat     Advanced Network Se     Set preferred connect     Selected Speed: 4     0.1 Gb     Set maximum connect     Set maximum connect	being created e Network sttings tion speed ? Gb 8 Gb 8 Gb	cannot all be m	Arked Private. The i	domain can only su	pport 126 more pr			
The 306 networks     Smart Link Privat     Advanced Network Se     Set preferred connec     Selected Speed: 4     0.1 Gb     Set maximum connec     Selected Speed: 8	being created e Network sttings stion speed 8 Gb 8 Gb tion speed 3 Gb	cannot all be m	arked Private. The	domain can only su	pport 126 more pr			
The 306 networks     Smart Link Privat     Advanced Network Se     Selected Speet.     di 0.1 Gb     Selected Speet.     e     Selected Speet.     e     Selected Speet.     e	being created e Network ettings tion speed 2 G Gb 8 Gb tion speed 2 G Gb	cannot all be m	arked Private. The	domain can only su	pport 126 more pr			in in 61 120.
The 306 networks     Smart Link Privat     Advanced Network Se     Set preferred connect     Selected Speed: 4     0.1 Gb     Selected Speed: 8     0.1 Gb	being created e Network ettings tion speed 6 6 6 7 6 6 7 6 8 6 8 7 7 7 8 6 8 7 7 7 8 7 8	cannot all be m	arked Private. The r	domain can only su	pport 126 more pr			in in 61 120.
The 306 networks Smart Link Privat Advanced Network Se Selected Speet.	being created e Network titings tion speed 2 0 Gb 8 Gb tion speed 2 0 Gb 10 Gb	cannot all be m	arked Private. The	domain can only su	pport 126 more pr			in in 61 120.
The 306 networks Sonart Link Advanced Network Se Advanced Network Se Selected Speed:  Selected Speed: Selected Speed:  Selected Speed:  1 Gb	being created e Network sting speed Gb 8 Gb 10 speed Gb 10 Gb 10 Gb	cannot all be m	arked Private. The	domain can only su	pport 126 more pr			in in 61 120.
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The 306 networks     Smart Link     Privat     Advanced Network Se     Set preferred connec Selected Speed:     4     1    6b     Set maximum connec Selected Speed:     8     1    6b     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9     9	being created e Network tttings tton speed 2 Gb 8 Gb tton speed 2 Gb 10 Gb 10 Gb 10 Gb	cannot all be m	arked Private. The	domain can only su	pport 128 more pr			
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**Note:** If the VC domain is not in Expanded VLAN capacity mode, you will receive an error when attempting to create more that 128 VLANs in a SUS. If that occurs, go to Advanced Ethernet Settings and select Expanded VLAN capacity mode and apply.

After clicking apply, a list of VLANs will be presented as shown below. If one VLAN in the trunk is untagged/native, see note below.

• Click Apply at the bottom of the page to create the Shared Uplink Set

Figure 210 - Associated VLANs for Shared Uplink Set VLAN-Trunk-1

Denne	Configure      Tools      The rep									
Edit	Edit Shared Uplink Set: VLAN-Trunk-1									
Asso	ociated Networks (VLAN tagged)					-				
						🕂 Add 🏦 Delete				
	Network Name	VLAN ID	Native	Smart Link	Private Network	Action				
	VLAN-101-1	101	false	true	false	Edit 👻 🔺				
	VLAN-102-1	102	false	true	false	Edit 💌				
	VLAN-103-1	103	false	true	false	Edit 💌				
	VLAN-104-1	104	false	true	false	Edit 📼				
	VLAN-105-1	105	false	true	false	Edit 💌				
	VLAN-2100-1	2100	false	true	false	Edit 📼				
	VLAN-2101-1	2101	false	true	false	Edit 💌				
	VLAN-2102-1	2102	false	true	false	Edit 📼				
	VLAN-2103-1	2103	false	true	false	Edit 💌				
	VLAN-2104-1	2104	false	true	false	Edit 💌				
	VLAN-2105-1	2105	false	true	false	Edit 💌				
	VLAN-2106-1	2106	false	true	false	Edit 💌				
	VLAN-2107-1	2107	false	true	false	Edit 📼				

**Note:** Optionally, if one of the VLANs in the trunk to this shared uplink set were configured as Native or Untagged, you would be required to "edit" that VLAN in the screen above, and configure Native as TRUE. This would need to be set for BOTH VLAN-Trunk-1 and VLAN-Trunk-2.

Please refer to Appendix D; "Scripting the Native VLAN" for scripting examples.

#### Defining a new Shared Uplink Set (VLAN-Trunk-2) (Copying a Shared UplinkSet)

The second Shared Uplink Set could be created in the same manner as VLAN-Trunk-1 however; VC now provides the ability to COPY a VC Network or Shared Uplink Set.

- Connect Ports X5 and X6 of FlexFabric module in Bay 2 to Ports 1 and 2 on switch 2
- In the VC GUI screen, select Shared Uplink Sets in the left pane, in the right pane VLAN-Trunk-1 will be displayed, left click VLAN-Trunk-1, it will appear as blue, right click and select COPY
- Edit the Settings as shown below, the new SUS name will be VLAN-Trunk-2 and ALL the associated VLANs with have a suffix of 2
- In step 3, ADD uplinks X5 and X6 from Bay 2
- Click OK
- The SUS and ALL VLANs will be created

#### Figure 211 - Copying a SUS and ALL VLANs

Name VI AN Truck 2	
Associated Networks (VLANs)	
Replace Tast 👻 instance(s) of 🚺 1	with 2
VLAN-Trunk-1 Original	VLAN-Trunk-2 Copy
VLAN-101- <u>1</u>	▲ VLAN-101- <u>2</u>
VLAN-102- <u>1</u>	VLAN-102- <u>2</u>
VLAN-103- <u>1</u>	VLAN-103- <u>2</u>
VLAN-104- <u>1</u>	VLAN-104- <u>2</u>
VLAN-105- <u>1</u>	VLAN-105- <u>2</u>
VLAN-2100- <u>1</u>	▼ VLAN-2100- <u>2</u>

#### **Defining a new Shared Uplink Set via CLI**

The following script can be used to create the first Shared Uplink Set (VLAN-Trunk-1)

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

# Create Shared Uplink Set VLAN-Trunk-1 and configure uplinks add uplinkset VLAN-Trunk-1 add uplinkport enc0:1:X5 Uplinkset=VLAN-Trunk-1 speed=auto add uplinkport enc0:1:X6 Uplinkset=VLAN-Trunk-1 speed=auto

# Create Networks VLAN-101-1 through VLAN-105-1 and 2100-2400 for Shared Uplink Set VLAN-Trunk-1

add network-range -quiet UplinkSet=VLAN-Trunk-1 NamePrefix=VLAN- NameSuffix=-1 VLANIds=101-105,2100-2400 State=enabled PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000 SmartLink=enabled The following script can be used to create the Second Shared Uplink Set (VLAN-Trunk-2)

# Create Shared Uplink Set VLAN-Trunk-2 and configure uplinks add uplinkset VLAN-Trunk-2 add uplinkport enc0:2:X5 Uplinkset=VLAN-Trunk-2 speed=auto add uplinkport enc0:2:X6 Uplinkset=VLAN-Trunk-2 speed=auto

# Create Networks VLAN101-2 through VLAN105-2 and VLAN-2100-2 through VLAN-2400-2 for Shared Uplink Set VLAN-Trunk-2

add network-range -quiet UplinkSet=VLAN-Trunk-2 NamePrefix=VLAN- NameSuffix=-2 VLANIds=101-105,2100-2400 State=enabled PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000 SmartLink=enabled

**Note:** In this scenario we have created two independent Share Uplink Sets (SUS), each originating from the opposite FlexFabric Modules, by doing so we provide the ability to create separate and redundant connections out of the Virtual Connect domain. When we create the server profiles, you will see how the NICs will connect to VLANs accessed through the opposite VC module, which provides the ability to create an Active / Active uplink scenario. Alternatively, we could have created a single SUS and assigned both sets of these uplink ports to the same SUS, however, this would have provided an Active/Standby uplink scenario, as shown in Scenario 5.

#### **Defining the Network Access Groups**

Networks can be placed into Network Access Groups when they are created, alternatively, existing networks can be manually placed in Network Access Groups using the following steps.

We will create Network Access groups to organize the various VLANs

- On the main menu, select Define, then Network Access Group
- Create a Network Access Group called "WEB-Tier"
- Include VLANs 2100-2105
- Create a Network Access Group called "APP-Tier"
- Include VLANs 2200-2205
- Create a second Network Access Group called "DB-Tier"
- Include VLANs 2300-2305

**Note:** Once the above Network Access Groups have been defined, you can edit the Default Network Access Group and remove the above VLANs, this will ensure that in order to use these VLANs the server profile MUST be in the correct Network Access group. If a common network (VLAN) is used for management or monitoring, ensure that network is in ALL Network Access Groups.

#### **Defining the Network Access Groups (CLI)**

# Create the Network Access Group for the WEB-Tier add network-access-group WEB-Tier add nag-network Nag=WEB-Tier Network=VLAN-2100-1,VLAN-2101-1,VLAN-2102-1,VLAN-2103-1,VLAN-2104-1,VLAN-2105-1,VLAN-2100-2,VLAN-2101-2,VLAN-2102-2,VLAN-2103-2,VLAN-2104-2,VLAN-2105-2

# Create the Network Access Group for the APP-Tier add network-access-group APP-Tier add nag-network Nag=APP-Tier Network=VLAN-2200-1,VLAN-2201-1,VLAN-2202-1,VLAN-2203-1,VLAN-2204-1,VLAN-2205-1,VLAN-2200-2,VLAN-2201-2,VLAN-2202-2,VLAN-2203-2,VLAN-2204-2,VLAN-2205-2

# Create the Network Access Group for the DB-Tier add network-access-group DB-Tier add nag-network Nag=DB-Tier Network=VLAN-2300-1,VLAN-2301-1,VLAN-2302-1,VLAN-2303-1,VLAN-2304-1,VLAN-2305-1,VLAN-2300-2,VLAN-2301-2,VLAN-2302-2,VLAN-2303-2,VLAN-2304-2,VLAN-2305-2

#### **Defining a Server Profile (WEB-Tier)**

We will create a server profile with TWO server NICs. Each server NIC will connect to a specific network.

- On the main menu, select Define, then Server Profile
- Create a server profile called "WEB-0001"
- In the Network Access group drop down chose WEB-Tier
- In the Network Port 1 drop down box, select a Network, then chose VLAN-2100-1

**Note:** You will notice that only the VLANs that were defined in the WEB-Tier NAG will be available for selection

- Leave Port Speed as Preferred
- In the Network Port 2 drop down box, select a Network, then chose VLAN-2100-2
- Leave Port Speed as Preferred
- Do not configure FCoE, FC SAN or iSCSI Connections
- In the Assign Profile to Server Bay box, locate the Select Location drop down and select Bay 1, then apply

Prior to applying the profile, ensure that the server in Bay 1 is currently OFF

**Note:** You should now have a server profile assigned to Bay 1, with 2 Server NIC connections. NICs 1&2 should be connected to networks VLAN-2100-x.

#### **Defining a Server Profile (APP-Tier)**

We will create a server profile with TWO server NICs. Each server NIC will connect to a specific network.

- On the main menu, select Define, then Server Profile
- Create a server profile called "APP-0001"
- In the Network Access group drop down chose APP-Tier
- In the Network Port 1 drop down box, select a Network, then chose VLAN-2200-1

**Note:** You will notice that only the VLANs that were defined in the APP-Tier NAG will be available for selection

- Leave Port Speed as Preferred
- In the Network Port 2 drop down box, select a Network, then chose VLAN-2200-2
- Leave Port Speed as Preferred
- Do not configure FCoE, FC SAN or iSCSI Connections
- In the Assign Profile to Server Bay box, locate the Select Location drop down and select Bay 1, then apply

Prior to applying the profile, ensure that the server in Bay 2 is currently OFF

**Note:** You should now have a server profile assigned to Bay 2, with 2 Server NIC connections. NICs 1&2 should be connected to networks VLAN-2200-x.

#### Defining a Server Profile (DB-Tier)

We will create a server profile with TWO server NICs. Each server NIC will connect to a specific network.

- On the main menu, select Define, then Server Profile
- Create a server profile called "DB-0001"
- In the Network Access group drop down chose DB-Tier
- In the Network Port 1 drop down box, select a Network, then chose VLAN-2300-1

**Note:** You will notice that only the VLANs that were defined in the WEB-Tier NAG will be available for selection

- Leave Port Speed as Preferred
- In the Network Port 2 drop down box, select a Network, then chose VLAN-2300-2
- Leave Port Speed as Preferred
- Do not configure FCoE, FC SAN or iSCSI Connections
- In the Assign Profile to Server Bay box, locate the Select Location drop down and select Bay 3, then apply

Prior to applying the profile, ensure that the server in Bay 3 is currently OFF

**Note:** You should now have a server profile assigned to Bay 3, with 2 Server NIC connections. NICs 1&2 should be connected to networks VLAN-2300-x.

**Note:** As these servers are all in difference VLANs they will not be able to communicate with each other within the enclosure and will be required to go through an external router or firewall to do so.

#### Defining a Server Profile via CLI

# Create and Assign Server Profile WEB-0001 to server bay 1 add profile WEB-0001 -nodefaultfcconn -nodefaultfcoeconn Nag=WEB-Tier set enet-connection WEB-0001 1 pxe=Enabled Network=VLAN-2100-1 set enet-connection WEB-0001 2 pxe=Disabled Network=VLAN-2100-2 set profile WEB-0001 Nag=WEB-Tier assign profile WEB-0001 enc0:1

# Create and Assign Server Profile APP-0001 to server bay 2 add profile APP-0001 -nodefaultfcconn -nodefaultfcoeconn Nag=APP-Tier set enet-connection APP-0001 1 pxe=Enabled Network=VLAN-2200-1 set enet-connection APP-0001 2 pxe=Disabled Network=VLAN-2200-2 set profile APP-0001 Nag=APP-Tier assign profile APP-0001 enc0:2

# Create and Assign Server Profile DB-0001 to server bay 3 add profile DB-0001 -nodefaultfcconn -nodefaultfcoeconn Nag=DB-Tier set enet-connection DB-0001 1 pxe=Enabled Network=VLAN-2300-1 set enet-connection DB-0001 2 pxe=Disabled Network=VLAN-2300-2 set profile DB-0001 Nag=DB-Tier assign profile DB-0001 enc0:3

Figure 212 - Define a Server Profile (WEB-0001) Windows (Example WEB-Tier)

Edit Server Profile: W	/EB-0001					?
Profile						
Profile Name Ne	etwork Access Group Status Serial N	umber Server UUD				
WEB-0001	NEB-Tier 💌 👔 🔍 VCX0000	00102 08f82ebb-677	3-4d96-be30-f6f46875f97c			
Ethernet Adapter Connect	tions					-
Port Network Name	Statu Port Speed Type	Allocated Port Sp PXE	Multicast Filter	MAC	Mapping	Action
1 VLAN-2100-1	PREFERRED	4 Gb - 8 Gb ENABLED	None	00-17-A4-77-7C-1C	LOM1:1-a => Bay 1:d1:v1	
2 VLAN+2100+2	PREFERRED	4 Gb - 8 Gb DISABLED	None	00-17-A4-77-7C-1E	LOM1:2-a => Bay 2:d1:v1	
+ Add						
iSCSI HBA Connections						Ŧ
FC HBA Connections						+
FCoE HBA Connections						÷
Assign Profile to Server I	Bay					
Enclosure Server	Model	SN	Status Power UID			
C7K-Bottom	Bay 1   ProLiant BL4	60c Gen8 MXQ32102HC	O 🕚 🌑			
					Apply Apply & Close	Cancel

**Figure 213 -** Configure NICs 1 and 2 for VLAN 2100. **Note;** only VLANs in the Network Access Group WEB-Tier are available for selection.

	FIGHE. WEB-0							
Profile								
	Network J	iccess Group Status Seri						
v/EB-0001	vVEB-Tie	VCX	0000∨02	08182ebb-6771	9-4d96-be30-16146875197c			
Ethernet Ada	apter Connections							
Port Network	Name	Statu Port Speed Type	Allocated Port Sp.	. PXE	Muticast Filter	MAC	Mapping	Acti
1 VLAN-21	00-1	PREFERRED	4 Gb - 8 Gb	ENABLED	None	00-17-A4-77-7C-1C	LOM1:1-a => Bay 1:d1:v1	
2 VLAN-21	00-2	PREFERRED	4 Gb - 8 Gb	DISABLED	None	00-17-A4-77-7C-1E	LOM1:2-a => Bay 2:d1:v1	
h a 44								
T MOO		Selec	t Ethernet Network					
C.	urrent network in Profil	selec c: VLAN-2100-1	t Ethernet Network					
	urrent network in Profil Alphabetical Filtered	Selec e: VLAN-2100-1	t Ethernet Network		_			
FC HBA	urrent network in Profil Alphabetical Filtered All A-C D-F G	Selec :: VLAN-2100-1 -I J-L M-O P-R S-\	<pre>t Ethernet Network ✓ W-Z 0-3 4-6</pre>	7-9				
FC HBA	urrent network in Profil Alphabetical Filtered All A-C D-F G $\begin{pmatrix} \theta \\ \theta \end{pmatrix}$ (VLAN-2100-1	Selec :: VLAH-2100-1 	x Ethernet Network ✓ W-Z 0-3 4-6	7-9				
FC HBA	urrent network in Profil Alphabetical Filtered All A-C D-F G $\begin{pmatrix} \theta \\ \theta $	Selec :: VLAH-2100-1 	✓ W-Z 0-3 4-6	7-9				
FC HBA	urrent network in Profil Alphabetical Filtered All A-C D-F G $\begin{pmatrix} \theta^0_{B} \\ \theta^0_{B} \end{pmatrix}$ VLAN-2100-2 $\begin{pmatrix} \theta^0_{B} \\ \theta^0_{B} \end{pmatrix}$ VLAN-2101-1	Selec 5: VLAH-210-1 	<ul> <li>✓ W-Z 0-3 4-6</li> <li>O</li> <li>O</li> <li>O</li> </ul>	7-9				
FC HBA FC HBA FC CE HE Assign I	arrent network in Profil           Alphabetical         Filtered           All         A-C         D-F         G           θ <sup>0</sup> VLAN-2100-1         VLAN-2100-2         VLAN-2100-2           θ <sup>0</sup> VLAN-2101-1         VLAN-2101-1         VLAN-2101-2	Selec :: VLAH-2100-1 H J-L M-O P-R S-1	<ul> <li>✓ W-Z 0-3 4-6</li> <li>♥</li> <li>♥</li> <li>♥</li> </ul>	7-9	À			
FC HBA FC HBA FC CHBA FC CHBA	urrent network in Profil           Alphabetical         Filtered           All         A-C         D-F         G $a_{0}^{0}$ VLAN-2100-1         VLAN-2100-2         VLAN-2101-2 $a_{0}^{0}$ VLAN-2101-2         VLAN-2101-2         VLAN-2101-2 $a_{0}^{0}$ VLAN-2102-1         VLAN-2102-1         VLAN-2102-1	Selec 1: VLAH-2100-1	V W-Z 0-3 4-6	7.9	À			
FC HBA FC HBA FC CE HE Assign I Erdbare C7K-B	arrent network in Profil           Alphabetical         Filterad           All         A-C         D-F         G           all         A-C         D-F         G         G           all         A-C         D-F         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G         G	Selec 11: VLAH-2100-1	<ul> <li>V W-Z 0-3 4-6</li> <li>O</li> <li>O</li></ul>	7-9	A V			

Figure 214 - Server Profile WEB-0001 View Bay 1

Diverse Distritus - Bay # 1       Diversall Status:       Imadvare Status:	7K-Bot	ttom: Bav	1 (ProLia	nt BL460	)c Gen8)		
Device Bay Status - Eay # 1 Overall Status:  Power Status:  C Normal  C Status:  C Normal  C Normal C Normal  C Normal C Normal  C Normal C Normal C Normal  C Normal  C Normal C Normal C Normal C Normal C N		·····,	. (		,		
Overall Status:         O K           Hardware Status:         K Normal           VC Status:         K K           Assigned Server Profile:         WEB-0001           Enclosure Name:         C7K-Bottom           UID:             Power Status/Control:             Bidde Server Information - Eay # 1             Strial Number:         Mc0032102HC           Serial Number (Logical):         VCX0000/V02           UUD:         31363636-3136-5840-5133-323130324843           UUD:         31363636-3136-5840-5133-323130324843           UUD:         08162ebb-6779-4496-be30-16146875197c           Product Name:         ProLiant BL460c Gen8           Server Mame:             Product Name:         ProLiant BL460c Gen8           Server Mame:             Prot Namber:             666161-B21             Asset Tag:             CoM1:1-a         FLB1         Bay 1d1v1             Adapter                 Port 1	Device Bay S	Status - Bay # 1					
Hardware Status:         Oromal           VC Status:         O K           Assigned Server Profile:         WEB-0001           Enclosure Name:         C7K-Bottom           UID:         Off         Momentary Press           Blade Server Information - Bay # 1         Momentary Press           Blade Server Information - Bay # 1         Momentary Press           Blade Server Information - Bay # 1         Momentary Press           Blade Server Information - Bay # 1         Momentary Press           Blade Server Information - Bay # 1         Momentary Press           Blade Server Information - Bay # 1         Momentary Press           Breade Server Information - Bay # 1         Momentary Press           Blade Server Information - Bay # 1         Momentary Press           Blade Server Name:         ProLiant BL460c Gen8         Momentary Press           Server Information         Model         MAC Address         Network Adapter           Part Number:         666161-B21         Adapter         Model         MAC Address         Network Adapter           Port 1         Location         Module         Model         MAC Address         Network Adapter           Port 1         LOMI:1-a         FLB1         Bay 1d1v1         PFexFabric 10Gb 2-port 554FLB         08-90	Overall State	us:	🕗 ок				
VC Status:         O k           Assigned Server Profile:         WEB-0001           Enclosure Name:         CTK-Battom           UID:             Power Status/Control:             ID:             Serial Number:         MK032102HC           Serial Number:         MK032102HC           Serial Number:         MK032102HC           Serial Number (Logical):         VCX0000/V02           UUD:         31363636-3136-584D-5133-323130324843           UUD:         10882ceb-6779-4096-be30-16146875197c           Product Name:          Portulat BL460c Gen8           Server Name:             Part Number:         666161-B21           Asset Tag:              [Uhknow n]           Ethernet Adapter Information <td>Hardware</td> <td>e Status:</td> <td>💛 Norma</td> <td>l</td> <td></td> <td></td> <td></td>	Hardware	e Status:	💛 Norma	l			
Assigned Server Profile:         WEB-0001           Enclosure Name:         C7K-Bottom           UID:         ●           Power Status/Control:         ● Off           Momentary Press         ●           Blade Server Information - Bay # 1         Mc032102HC           Serial Number:         Mc032102HC           Serial Number (Logical):         VCX0000V02           UUID:         31363638-3136-584D-5133-323130324843           UUID:         31363638-3136-584D-5133-323130324843           UUID:         08782ebb-6779-4496-be30-16146875f97c           Product Name:         Pollant BL460c Gen8           Server Name:         ●           Part Number:         666161-B21           Asset Tag:         UINknown]           Server Information         ●           Erkernet         Adapter           Flex NIC         Location         Module           Port 1         ●           I. OMI:1-a         FLB1         Bay 1:d1:v2           HP FlexFabric 10Gb 2-port 554FLB         D8-90-67-68-24.41           Adapter         I. OMI:1-a         FLB1         Bay 1:d1:v3           HP FlexFabric 10Gb 2-port 554FLB         D8-90-67-68-24.42         Adapter           I. OMI:1-a <td< td=""><td>VC Statu</td><td>s:</td><td>🗢 ок</td><td></td><td></td><td></td><td></td></td<>	VC Statu	s:	🗢 ок				
Enclosure Name:       C7K-Bottom         UID: <ul> <li>Off</li> <li>Momentary Press</li> </ul> Blade Server Information - Bay # 1 <ul> <li>Serial Number:</li> <li>MK032102HC</li> <li>Serial Number(Logical):</li> <li>VCX0000V02</li> <li>UID0(Logical):</li> <li>VCX0000V02</li> <li>UID0(Logical):</li> <li>VCX0000V02</li> <li>UID0(Logical):</li> <li>D88/2ebA-bc93-16146875197c</li> <li>Product Name:</li> <li>ProLlant BL460c Gen8</li> <li>Server Name:</li> <li>Part Number:</li> <li>G666161-B21</li> <li>Unknow n]</li> </ul> MAC Address         Network           Server Bhernet Adapter Information           Ethernet LOM1:1-a         FLB1         Bay 1:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         00-17-A4-77-7C-1C         VLAN-2100         1         1           I LOM1:1-a         FLB1         Bay 1:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         08-9D-67-68-24-42         Adapter           I LOM1:1-a         FLB1         Bay 1:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         08-9D-67-68-24-42         2         1         1<	Assigned S	erver Profile:	WEB-000	1			
Uite:         ●           Power Status/Control:         ● Off         Momentary Press           Blade Server Information - Bay # /          Momentary Press           Serial Number:         MX032102HC            Serial Number (Logical):         VCX0000V02            UUID:         3136363-3138-584D-5133-323130324843             UUID:         31363636-3138-584D-5133-323130324843             UUID:         08f82ebb-6779-4096-be30-f6f46875f97c             Product Name:         ProLlant BL460c Gen8             Server Name:               Part Number:         6666161-B21              Adapter         IUnknow n]            Network           Server Ethernet Adapter Information            Network            Charlapter         FLB1         Bay 1:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         00-17-A4-77-7C-1C         VLAN-2100           Adapter          LOM1:1-b         FLB1         Bay 1:d1:v3         HP FlexFabric 10Gb 2-port 554FLB         08-9D-67-68-24-41         Adapter	Enclosure N	lame:	C7K-Botto	m			
Power Status/Control:         Off         Momentary Press           Blade Server Information - Bay # 1         Serial Number:         MK032102HC           Serial Number:         MK032102HC         Serial Number(Logical):         VCX0000V02           UUID:         31363636-3136-584D-5133-323130324843         Seriel Number:         Potlant BL460c Gen8           Server Name:         ProLlant BL460c Gen8         Server Name:         Pert Name:           Part Number:         666161-B21         Asset Tag:         Unknow n]           Server Ethernet Adapter Information         MAC Address         Network           Phot 1         LOM1:1-a         FLB1         Bay 1:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         00-17-A4-77-CC (1 1 Adapter           LOM1:1-b         FLB1         Bay 1:d1:v2         HP FlexFabric 10Gb 2-port 554FLB         08-9D-67-68-24-41 Adapter           LOM1:1-c         FLB1         Bay 1:d1:v3         HP FlexFabric 10Gb 2-port 554FLB         08-9D-67-68-24-42 Adapter           LOM1:1-d         FLB1         Bay 1:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         08-9D-67-68-24-42 Adapter           LOM1:1-d         FLB1         Bay 1:d1:v2         HP FlexFabric 10Gb 2-port 554FLB         08-9D-67-68-24-42 Adapter           LOM1:1-d         FLB1         Bay 2:d1:v2         HP FlexFabric 10	UID:						
Biade Server Information - Bay # 1           Servial Number:         MXC032102HC           Servial Number (Logical):         VCX0000V02           UUID(:         31363636-3136-584D-5133-323130324843           UUID(:         31363636-3136-584D-5133-323130324843           UUID(:         08762ebb-6779-4d96-be30-f6f46875f97c           Product Name:         ProLiant BL460c Gen8           Server Name:	Power Statu	us/Control:	Off			Momen	tary Press
Serial Number:         MXQ32102HC           Serial Number (Logical):         VCX0000/02           UUID:         31363636-3136-584D-5133-323130324843           UUID:         31363636-3136-584D-5133-323130324843           UUID:         08182ebb-6779-4d96-be30-f6f46875197c           Product Name :         ProdLant BL460c Gen8           Server Name :         666161-B21           Asset Tag:         [Unknown]           Server Ethernet Adapter Information         666161-B21           Asset Tag:         [Unknown]           Server Ethernet Adapter Information         Module           Port 1         Information           Condition         Module         Mode1         MAC Address           Port 1         Information         VLAN-2100           1         Information         Adapter         00-17-A4-77-7C-1C         VLAN-2100           1         Information         HP FlexFabric 10Gb 2-port 554FLB         08-9D-67-6B-24-41         Adapter           1         Information         HP FlexFabric 10Gb 2-port 554FLB         08-9D-67-6B-24-42         Adapter           1         Information         HP FlexFabric 10Gb 2-port 554FLB         08-9D-67-6B-24-43         Adapter           2         Informatin distribution         HP FlexFabric 10G	Blade Serve	r Information - E	3ay # 1	_			_
Serial Number (Logical):       VCX0000V02         UUID:       31363636-3136-584D-5133-323130324843	Serial Numb	ber:	MXQ3210	2HC			
UUD:         31363636-3136-584D-5133-323130324843           UUD (Logical):         08f82ebb-6779-4d96-be30-f6f46875f97c           Product Name :         ProLiant BL460c Gen8           Server Name :         ProLiant BL460c Gen8           Server Rame :         Image: Comparison of the server Name in the server Name	Serial Numb	ber (Logical):	VCX0000	V02			
UUID (Logical):         08f82ebb-6779-4d96-be30-f6f46875f97c           Product Name:         ProLiant BL 460c Gen8           Server Name:         666161-B21           Part Number:         666161-B21           Asset Tag:         (Unknow n)           Server Ethernet         Horizant Store           Betrenet Adapter Information         Module Port         Model         MAC Address         Network           Betrenet Adapter         Flex NIC         Location         Module Port         Model         MAC Address         Network           Port 1         Flex NIC         LoCation         Module Port         Model         Dot 7.44-77.7C-1C         VLAN-2100 1           Common Section         FLB1         Bay 1:d1:v2         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-41         VLAN-2100 1           Common Section         FLB1         Bay 1:d1:v2         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-42         VLAN-2100 2           LoM1:1-b         FLB1         Bay 1:d1:v4         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-43         VLAN-2100 2           Port 2         E         E         Bay 2:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-43         VLAN-2100 2           DM11:-b         FLB1         Bay 2:d1	UUID:		31363636	-3136-584D-51	33-323130324843		
Product Name:       PolLiant EL460c Gen8         Server Name:       666161-B21         Part Number:       666161-B21         Asset Tag:       (Inknown)         Unknown       Unknown         Server Name:       (Inknown)         IoM11:1-0       FLB1       Bay 1:d1:v2       IP FlexFabric 10Gb 2-port 554FLB       De3-De67-6B-24-43	UUID (Logica	al):	08f82ebb	-6779-4d96-be3	30-f6f46875f97c		
Server Name:         666161-B21           Colspan="4">666161-B21           Colspan="4">Colspan="4"Colspan="4">Colspan="4"Colspan="4">Colspan="4"	Product Nan	ne:	ProLiant E	3L460c Gen8			
Part Number:         666161-B21           Asset Tag:         [Unknow n]           Server Ethernet Adapter         Flex NIC         Location Port         Model Model Port         Model Model Port         MAC Address         Network           Pert 1         Ethernet Adapter         FLB1         Bay 1:d1:v1 Adapter         HP FlexFabric 10Gb 2-port 554FLB Adapter         00-17-A4-77-7C-1C         VLAN-2100 1           LOM1:1-a         FLB1         Bay 1:d1:v1 Adapter         HP FlexFabric 10Gb 2-port 554FLB Adapter         09-0-67-6B-24-41         Adapter           LOM1:1-b         FLB1         Bay 1:d1:v3 Adapter         HP FlexFabric 10Gb 2-port 554FLB Adapter         D8-9D-67-6B-24-42         Adapter           LOM1:1-c         FLB1         Bay 1:d1:v3 Adapter         HP FlexFabric 10Gb 2-port 554FLB Adapter         D8-9D-67-6B-24-42         Adapter           LOM1:1-c         FLB1         Bay 2:d1:v1 Adapter         HP FlexFabric 10Gb 2-port 554FLB Adapter         D8-9D-67-6B-24-43         Adapter           Port 2           HP FlexFabric 10Gb 2-port 554FLB Adapter         D8-9D-67-6B-24-43         Adapter           LOM1:2-a         FLB1         Bay 2:d1:v1 Adapter         HP FlexFabric 10Gb 2-port 554FLB Adapter         D8-9D-67-6B-24-45         Z           LOM1:2-b         FLB1         Bay 2:d1:v1 Adapter	Server Nam	e:					
Asset Tag:         [Unknow n]           [Unknow n]           Server Ethernet Adapter Information           Ethernet Adapter         Flex NIC         Location         Module Port         Model         MAC Address         Network           Port 1         Image: Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4"Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4"Colspan="4">Colspan="4"Colspan="4">Colspan="4"Colspan="4">Colspan="4"Colspan="4">Colspan="4"Colspan="4"Colspan="4">Colspan="4"	Part Numbe	er:	666161-B	21			
Server Ethernet Adapter Information         Ethernet Adapter       Filex NIC       Location       Module Port       Model       MAC Address       Network         Port 1       Port 1       Image: Server Ethernet Adapter       00-17-A4-77-7C-1C       VLAN-2100 1         LOM1:1-a       FLB1       Bay 1:d1:v1       HP FlexFabric 10Gb 2-port 554FLB       00-17-A4-77-7C-1C       VLAN-2100 1         LOM1:1-b       FLB1       Bay 1:d1:v2       HP FlexFabric 10Gb 2-port 554FLB       D8-9D-67-6B-24-41 Adapter         LOM1:1-c       FLB1       Bay 1:d1:v3       HP FlexFabric 10Gb 2-port 554FLB       D8-9D-67-6B-24-42 Adapter         LOM1:1-d       FLB1       Bay 1:d1:v4       HP FlexFabric 10Gb 2-port 554FLB       D8-9D-67-6B-24-43 Adapter         LOM1:1-d       FLB1       Bay 2:d1:v1       HP FlexFabric 10Gb 2-port 554FLB       D8-9D-67-6B-24-43 Adapter         Port 2       Image: Server Ethernet adapter       Image: Server Ethernet adapter       VLAN-2100 2         LOM1:2-a       FLB1       Bay 2:d1:v1       HP FlexFabric 10Gb 2-port 554FLB       D8-9D-67-6B-24-43 Adapter         LOM1:2-b       FLB1       Bay 2:d1:v2       HP FlexFabric 10Gb 2-port 554FLB       D8-9D-67-6B-24-45 Adapter         LOM1:2-c       FLB1       Bay 2:d1:v3       HP FlexFabric 10Gb 2-port 554FLB       D8-9D-67-6B-24-	Asset Tag:		[Unknow r	1]			
Server Ethernet Adapter Information         Location         Module Port         Model         MAC Address         Network           Ethernet Adapter         Flex NIC         Location         Module Port         Model         MAC Address         Network           Port 1         Image: Comparison of Compariso							
Ethernet Adapter         Fiex NIC         Location         Module Port         Model         MAC Address         Network           Port 1         FLB1         Bay 1:d1:v1         HP FlexFabric 10Gb 2-port 554FLB Adapter         00-17-A4-77-7C-1C         VLAN-2100 1           LOM1:1-b         FLB1         Bay 1:d1:v2         HP FlexFabric 10Gb 2-port 554FLB Adapter         D8-9D-67-6B-24-41 Adapter         D8-9D-67-6B-24-42 Adapter           LOM1:1-c         FLB1         Bay 1:d1:v3         HP FlexFabric 10Gb 2-port 554FLB Adapter         D8-9D-67-6B-24-42 Adapter         D8-9D-67-6B-24-42 Adapter           LOM1:1-d         FLB1         Bay 1:d1:v3         HP FlexFabric 10Gb 2-port 554FLB Adapter         D8-9D-67-6B-24-42 Adapter         VLAN-2100 2           Port 2         LOM1:2-a         FLB1         Bay 2:d1:v1         HP FlexFabric 10Gb 2-port 554FLB Adapter         D8-9D-67-6B-24-42 Adapter         VLAN-2100 2           LOM1:2-a         FLB1         Bay 2:d1:v1         HP FlexFabric 10Gb 2-port 554FLB Adapter         D8-9D-67-6B-24-45 Adapter         VLAN-2100 2           LOM1:2-b         FLB1         Bay 2:d1:v3         HP FlexFabric 10Gb 2-port 554FLB Adapter         D8-9D-67-6B-24-45         D8-9D-67-6B-24-45           LOM1:2-c         FLB1         Bay 2:d1:v3         HP FlexFabric 10Gb 2-port 554FLB Adapter         D8-9D-67-6B-24-46         D8-9D-67-6B-24-47 <td>Server Ethe</td> <td>rnet Adapter Inf</td> <td>ormation</td> <td></td> <td></td> <td></td> <td></td>	Server Ethe	rnet Adapter Inf	ormation				
Port 1           LOM1:1-a         FLB1         Bay 1:d1:v1         Adapter         00-17-A4-77-7C-1C         VLAN-2100 1           LOM1:1-b         FLB1         Bay 1:d1:v2         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-41         1           LOM1:1-c         FLB1         Bay 1:d1:v2         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-42         1           LOM1:1-c         FLB1         Bay 1:d1:v3         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-42         1           LOM1:1-d         FLB1         Bay 1:d1:v4         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-42         1           LOM1:1-d         FLB1         Bay 1:d1:v4         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-43         1           Port 2          FLB1         Bay 2:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-43         1           LOM1:2-a         FLB1         Bay 2:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-45         1           LOM1:2-b         FLB1         Bay 2:d1:v3         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-46         1           LOM1:2-c         FLB1         Bay 2:d1:v3         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-46         1	Ethernet Adapter	Flex NIC	Location	Module Port	Model	MAC Address	Network
LOM1:1-a         FLB1         Bay 1:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         00-17-A4-77-7C-1C         VLAN-2100 1           LOM1:1-b         FLB1         Bay 1:d1:v2         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-41         1           LOM1:1-c         FLB1         Bay 1:d1:v3         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-41         1           LOM1:1-c         FLB1         Bay 1:d1:v3         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-42         1           LOM1:1-d         FLB1         Bay 1:d1:v4         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-43         1           Adapter         D8-9D-67-6B-24-41         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-43         1           Port 2         FLB1         Bay 2:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-43         1           LOM1:2-a         FLB1         Bay 2:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-45         1           LOM1:2-b         FLB1         Bay 2:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-45         1           LOM1:2-c         FLB1         Bay 2:d1:v3         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-46         2           LOM1:2-c         FLB1 </td <td>Port 1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Port 1						
LOM1:1-b         FLB1         Bay 1:d1:v2         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-41           LOM1:1-c         FLB1         Bay 1:d1:v3         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-42           LOM1:1-d         FLB1         Bay 1:d1:v4         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-42           LOM1:1-d         FLB1         Bay 1:d1:v4         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-42           Port 2           FLB1         Bay 2:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-43           LOM1:2-a         FLB1         Bay 2:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         D0-17-A4-77-7C-1E         VLAN-2100           LOM1:2-b         FLB1         Bay 2:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-45         Adapter           LOM1:2-b         FLB1         Bay 2:d1:v2         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-45         Adapter           LOM1:2-c         FLB1         Bay 2:d1:v3         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-46         Adapter           LOM1:2-c         FLB1         Bay 2:d1:v3         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-47         Adapter		LOM1:1-a	FLB1	Bay 1:d1:v1	HP FlexFabric 10Gb 2-port 554FLB Adapter	00-17-A4-77-7C-1C	VLAN-2100- 1
LOM1:1-c         FLB1         Bay 1:d1:v3         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-42           Adapter         Adapter         Bay 1:d1:v4         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-43           Port 2         LOM1:1-d         FLB1         Bay 2:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-43           LOM1:2-a         FLB1         Bay 2:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         00-17-A4-77-7C-1E         VLAN-2100           LOM1:2-b         FLB1         Bay 2:d1:v2         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-45         Adapter           LOM1:2-b         FLB1         Bay 2:d1:v2         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-45         Adapter           LOM1:2-c         FLB1         Bay 2:d1:v3         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-46         Adapter           LOM1:2-c         FLB1         Bay 2:d1:v3         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-46         Adapter           LOM1:2-c         FLB1         Bay 2:d1:v3         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-46         Adapter		LOM1:1-b	FLB1	Bay 1:d1:v2	HP FlexFabric 10Gb 2-port 554FLB Adapter	D8-9D-67-6B-24-41	
LOM1:1-d         FLB1         Bay 1:d1:v4         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-43           Adapter         Adapter         Adapter         VLAN-2100         VLAN-2100 <td></td> <td>LOM1:1-c</td> <td>FLB1</td> <td>Bay 1:d1:v3</td> <td>HP FlexFabric 10Gb 2-port 554FLB Adapter</td> <td>D8-9D-67-6B-24-42</td> <td></td>		LOM1:1-c	FLB1	Bay 1:d1:v3	HP FlexFabric 10Gb 2-port 554FLB Adapter	D8-9D-67-6B-24-42	
LOM1:2-a         FLB1         Bay 2:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         00-17-A4-77-7C-1E         VLAN-2100           LOM1:2-b         FLB1         Bay 2:d1:v2         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-45         Adapter           LOM1:2-c         FLB1         Bay 2:d1:v3         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-46         Adapter           LOM1:2-d         FLB1         Bay 2:d1:v4         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-46           LOM1:2-d         FLB1         Bay 2:d1:v4         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-47	<b>D</b>	LOM1:1-d	FLB1	Bay 1:d1:v4	HP FlexFabric 10Gb 2-port 554FLB Adapter	D8-9D-67-6B-24-43	
LOM1:2-a         FLB1         Bay 2:d1:v1         HP FlexFabric 10Gb 2-port 554FLB         00-17-A4-77-7C-1E         VLAN-2100           LOM1:2-b         FLB1         Bay 2:d1:v2         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-45         2           LOM1:2-c         FLB1         Bay 2:d1:v3         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-45         Adapter           LOM1:2-c         FLB1         Bay 2:d1:v3         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-46         Adapter           LOM1:2-d         FLB1         Bay 2:d1:v4         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-47           Adapter         Adapter         Bay 2:d1:v4         HP FlexFabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-47	Port 2						(
LOM1:2-b         FLB1         Bay 2:d1:v2         HP Flex/Fabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-45           LOM1:2-c         FLB1         Bay 2:d1:v3         HP Flex/Fabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-46           LOM1:2-d         FLB1         Bay 2:d1:v4         HP Flex/Fabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-46           LOM1:2-d         FLB1         Bay 2:d1:v4         HP Flex/Fabric 10Gb 2-port 554FLB         D8-9D-67-6B-24-47           Adapter         Adapter         Adapter         D8-9D-67-6B-24-47		LOM1:2-a	FLB1	Bay 2:d1:v1	HP FlexFabric 10Gb 2-port 554FLB Adapter	00-17-A4-77-7C-1E	VLAN-2100- 2
LOW1.2-C FLB1 Bay 2:01:V3 HF FleXFabric 10Gb 2-port 554FLB D8-9D-67-6B-24-46 Adapter LOM1:2-d FLB1 Bay 2:d1:V4 HP FlexFabric 10Gb 2-port 554FLB D8-9D-67-6B-24-47 Adapter		LOM1:2-b	FLB1	Bay 2:d1:v2	HP Hex Fabric 10Gb 2-port 554FLB Adapter	D8-9D-67-6B-24-45	
Lowitz-u FLDT Day 2.01.14 HP Fex Fault TUGD 2-poil 554FLD D6-9D-67-6B-24-47 Adapter		LOM1:2-c	FLB1	Бау 2:d1:v3	HP Hex Fabric 10Gb 2-port 554FLB Adapter	D8 9D 67 6B 24 47	
		LOWIT.2-0	FLDI	bay 2.01.V4	Adapter	L0-3L-0/-0D-24-4/	

### **Review**

In this scenario we have created Two Shared Uplink Sets (SUS), providing support for many VLANs. Uplinks originating from each FlexFabric Module connect to each SUS, by doing so we provide redundant connections out of the Virtual Connect domain. As multiple uplinks are used for each SUS, we have also leveraged LACP to improve uplink performance. In this scenario, all uplinks will be active.

We defined Network Access Groups for Web, APP and DB Tiers and assigned networks to those groups. We created three server profiles, each with two NICs configured at 10Gb each. Each profile resides in a specific Network Access Group. Based on Network Access Group membership, the servers are provided access to only their respective VLANs.

Virtual connect networks can reside in one or many Network Access Groups. This provides the ability to have a Management, VMotion or Backup networks assigned to ALL servers, but then segment Finance, DMZ, Application or WEB VLANs into specific network groups.

There are no SAN connections in this scenario.

### Results – Windows 2008 R2 Networking Examples

We have successfully configured FlexFabric with shared uplink sets and Network Access groups, and no SAN connectivity. We have created three server profiles and assigned them to specific Network Access groups.

Although both Ethernet and Fibre channel connectivity is provided by the CNA adapter used in the G7 and Gen 8 servers; each capability (LAN and SAN) is provided by a different component of the adapter, they appear in the server as individual network and SAN adapters.

**Figure 215 -** Example of Emulex's OneCommand Manager Utility (formerly known as HBA Anywhere). **Note:** That there are 4 Ethernet personalities per port.

File Edit View Port Discovery Batch Help	Find Host:	<u> </u>	<b>?</b>		
Hosts	Port Information PCI Reg	jisters VPD			
WatkB2         WatkB2	Driver Name: Driver Version: MAC Address: Perm MAC Address: IPv4 Address: Subnet Mask: Gateway Address: Link Status: Inkerface Name: Port Speed: IPv6 Address: Fer Fort Speed: IPv6 Address: Fer Fort Speed: IPv6 Address: Fer Min. Bandwidth: Max. Bandwidth:	bees ( +FC ) be2dds.sys ( 4.2.390.6 ) 00-17:44-77-7C-00 D8-90-67-88-24-40 192.168.101.102 255.255.255.0 192.168.101.254 Up (Device)(MTPMP_PC10029 10 GBR/sec 10.00 GBR/sec 10.00 GBR/sec	Device ID: SubSys Device ID: Yendor ID: SubSys Vendor ID: IP Address Origin: PCI Punction: PCI Punction: PCI Punction: Max MTU: Current MTU: Bandwidth Limit: Unter VLAN ID: 1000	0710 3375 19a2 103c DHCP 0 4 9000 1500 10 GBit/sec	

The following graphics show a Windows 2008 R2 server with TWO FlexNICs configured at 10Gb. You will also notice that Windows believes there are 8 NICs within this server. However, only TWO NICs are currently configured within the FlexFabric profile, the extra NICs are offline and could be disabled. If we did require SAN connectivity on this server, the FCoE connections would consume two of the connections, leaving 6 NICs available to the OS.

**Note:** The BL465c G7 and BL685c G7 utilize an NC551i chipset (BE2), whereas the BL460c G7, BL620c G7 and BL680c G7 utilize an NC553i chipset (BE3) and the Gen 8 blades typically have a NC554 adapter which also utilizes the BE3 chipset. Both the BE2 and BE3 chipsets share common drivers and firmware.

Fi	<b>gure 216 -</b> W	indows 2008 R2/	Network Co	nnections (2	Connections A	ctive)

🗸 🗸 🔹 🗸 🗸 🗸	el 👻 Network and Internet 👻 Netw	ork Connections 👻 🛛 👻 Search Netw	vork Connections
organize 🔻			:= 🕶 🚺 🔞
Vame	Status *	Device Name	Connectivity
📮 Local Area Connection	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter	
🚇 Local Area Connection 2	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter #2	
🚇 Local Area Connection 3	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter #3	
🚇 Local Area Connection 6	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter #6	
🚇 Local Area Connection 7	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter #7	
🚇 Local Area Connection 8	Network cable unplugged	HP FlexFabric 10Gb 2-port 554FLB Adapter #8	
🏺 Local Area Connection 4	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter #4	Internet access
🏺 Local Area Connection 5	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter #5	Internet access

**Note:** The NICs that are not configured within VC will appear with a red x as not connected. You can go into Network Connections for the Windows 2008 server and Disable any NICs that are not currently in use. Windows assigns the NICs as NIC 1-8, whereas four of the NICs will reside on LOM:1 and four on LOM:2. You may need to refer to the FlexFabric server profile for the NIC MAC addresses to verify which NIC is which.

Figure 217 - Windows 2008 R2 Extra Network Connections – Disabled

Control Pan	el 👻 Network and Internet 👻 Network	< Connections • • • 5 Search Network •	Connections
Organize 👻			:= - 1 0
Name	Status 🔶	Device Name	Connectivity
🏺 Local Area Connection	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter	
📮 Local Area Connection 2	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #2	
🏺 Local Area Connection 3	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #3	
🏺 Local Area Connection 6	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #6	
🏺 Local Area Connection 7	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #7	
📮 Local Area Connection 8	Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #8	
🏺 Local Area Connection 4	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter #4	Internet access
🏺 Local Area Connection 5	vaolab.net	HP FlexFabric 10Gb 2-port 554FLB Adapter #5	Internet access
1			

Figure 218 - Windows 2008 R2 Network Connection Status

🏺 Local Area Conne	ection 6 Statu	5	×
General			
Connection			
IPv4 Connectivi	iy:	No Interr	net access
IPv6 Connectivi	:y:	No Interr	net access
Media State:			Enabled
Duration:			00:25:18
Speed:			10.0 Gbps ]
Details			
Activity			
	Sent —	<b>N</b> –	Received
Bytes:	17,392		47,537
😗 Properties	🌍 Disable	Diagnose	
			Close

**Note:** In Windows 2008 and later the actual NIC speed is displayed as configured in server Profile. Also, note that the speed displayed is the maximum speed setting, not the minimum setting.

**Figure 219 -** Windows 2008 R2, Device Manager, Eight NICs are shown, however, we have only configured two of the NICs and NO FCoE HBAs.



The following graphics provides an example of a Windows 2008 R2 server with TWO NICs connected to the network, initially each NIC has its own TCP/IP address, alternatively, both NICs could be teamed to provide NIC fail-over redundancy. If an active uplink or network switch were to fail, Virtual Connect would fail-over to the standby uplink. In the event of a Virtual Connect FlexFabric module failure, the server's NIC teaming software would see one of the NICs go offline, assuming it was the active NIC, NIC teaming would fail-over to the standby NIC.

Figure 220 - Both NICs for Profile App-1are connected to the network through VLAN-2100-x

#### **NIC Teaming**

If higher availability is desired, NIC teaming in Virtual Connect works the same way as in standard network configurations. Simply, open the NIC teaming Utility and configure the available NICs for teaming. In this example, we have only TWO NICs available, so selecting NICs for teaming will be quite simple. However, if multiple NICs are available, ensure that the correct pair of NICs is teamed. You will note the BAY#-Port# indication within each NIC. Another way to confirm you have the correct NIC is to verify through the MAC address of the NIC. You would typically TEAM a NIC from Bay 1 to Bay 2 for example.

The following graphics provide an example of a Windows 2008 R2 server with TWO NICs teamed and connected to the network. In the event of an Uplink or switch failure, VC will fail-over to the standby uplinks, if a VC FlexFabric module were to fail, the NIC teaming software would fail-over to the standby NIC.

Figure 221 - Team both NICs, using the HP Network Configuration Utility



**Figure 222 -** Both NICs for Profile APP-001 are teamed and connected to the network through VLAN-2100-x

IP Network Configuration Utility Properties		? X
HP Network Configuration Utility		
HP NICs:	_	
HP Network Team #1	lear	ing Setup
[5] HP FlexFabric 10Gb 2-port 554FLB Adapter #51/0 Bay 2 Port 1 / 1		[eam
[4] HP FlexFabric 10Gb 2-port 554FLB Adapter #4 I/O Bay 1 Port 1 / 1	Di	ssolve
	VLAN	(802.1Q)
	:	Save
Make a selection. You may view properties of an item at any time by Double-Clicking on it or Selecting and, then, Clicking Properties.	Pro	operties
Help License Manager Enable UID 🔽 Display Tray Icon		
	ок	Cancel

Various modes can be configured for NIC Teaming, such as NFT, TLB etc. Once the Team is created, you can select the team and edit its properties. Typically, the default settings can be used.

Figure 223 - Viev	v – Network Connect	tions – NIC Tea	m #1 – Windows
-------------------	---------------------	-----------------	----------------

Control Panel      Network and Internet      Network Connections     Search Network Connections									
		iii 🕶 🔟 🔞							
Status *	Device Name	Connectivity							
Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter								
Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #2								
Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #3								
Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #6								
Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #7								
Disabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #8								
Enabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #4								
Enabled	HP FlexFabric 10Gb 2-port 554FLB Adapter #5								
vaolab.net	HP Network Team #1	Internet access							
	Status A Disabled Disabled Disabled Disabled Disabled Disabled Enabled Enabled Enabled Vaolab.net	Status     Device Name       Disabled     HP FlexFabric 10Gb 2-port 554FLB Adapter       Disabled     HP FlexFabric 10Gb 2-port 554FLB Adapter #2       Disabled     HP FlexFabric 10Gb 2-port 554FLB Adapter #3       Disabled     HP FlexFabric 10Gb 2-port 554FLB Adapter #4       Disabled     HP FlexFabric 10Gb 2-port 554FLB Adapter #6       Disabled     HP FlexFabric 10Gb 2-port 554FLB Adapter #6       Disabled     HP FlexFabric 10Gb 2-port 554FLB Adapter #7       Disabled     HP FlexFabric 10Gb 2-port 554FLB Adapter #7       Disabled     HP FlexFabric 10Gb 2-port 554FLB Adapter #7       Disabled     HP FlexFabric 10Gb 2-port 554FLB Adapter #8       Enabled     HP FlexFabric 10Gb 2-port 554FLB Adapter #8       Notest     HP Network Team #1							

Figure 224 - Both NICs are teamed and connect to the network with a common IP Address

🖦 Administrator: Command Prompt	×
C:\Users\Administrator>ipconfig	<b>^</b>
Windows IP Configuration	
Ethernet adapter Local Area Connection 10:	
Connection-specific DNS Suffix . : vaolab.net Link-local IPv6 Address : fe80::3000:af54:9067:6390%31 IPv4 Address : 192.168.101.101 Subnet Mask : 255.255.255.0 Default Gateway : 192.168.101.254	
Tunnel adapter isatap.vaolab.net:	
Media State : Media disconnected Connection-specific DNS Suffix . : vaolab.net	
C:\Users\Administrator>	

## Summary

We presented a Virtual Connect Network scenario by creating two shared uplink sets (SUS), each SUS is connected with TWO active uplinks, both SUS' can actively pass traffic.

When VC profile WEB-0001 is applied to the server in bay1 and the server is powered up, it has one NIC connected through FlexFabric module 1 (connected to VLAN-2100-1), the second NIC is connected through FlexFabric module 2 (connected to VLAN-2100-2). VLAN access is controlled by Profile membership of a specific Network Access group, profile WEB-0001 is a member of the WEB-Tier Network Access Group and can be connected to any VLAN in that group, but only VLANs in that group.

These NICs could now be configured as individual NICs with their own IP address or as a pair of TEAMED NICs. Either NIC could be active. As a result, this server could access the network through either NIC or either uplink, depending on which NIC is active at the time. Each NIC is configured for 10Gb of network bandwidth.

Additional NICs could be added within FlexFabric, by simply powering the server off and adding up to a total of 8 NICs, (or SIX NICs and TWO FCoE connections) speed can then be adjusted accordingly to suit the needs of each NIC. However, any additional NICs would still need to adhere to the Network Access Group policy.

Network Access Groups for the APP and DB tiers were also created and have profiles configured and assigned to Bays 2 and 3.

As additional servers are added to the enclosure, simply create additional profiles, or copy existing profiles, configure the NICs for LAN and SAN fabrics as required and apply them to the appropriate server bays and power the server on.

# Scenario 9 – Shared Uplink Set with Active/Active Uplinks, 802.3ad (LACP) – Flex-10 and VC-Fibre Channel SAN – vSphere

## **Overview**

This scenario will implement the Shared Uplink Set (SUS) to provide support for multiple VLANs. The upstream network switches connect a shared uplink set to two ports on each FlexFabric modules, LACP will be used to aggregate those links.

As multiple VLANs will be supported in this configuration, the upstream switch ports connecting to the FlexFabric modules will be configured to properly present those VLANs. In this scenario, the upstream switch ports will be configured for VLAN trunking/VLAN tagging.

When configuring Virtual Connect, we can provide several ways to implement network fail-over or redundancy. One option would be to connect TWO uplinks to a single Virtual Connect network; those two uplinks would connect from different Virtual Connect modules within the enclosure and could then connect to the same upstream switch or two different upstream switches, depending on your redundancy needs. An alternative would be to configure TWO separate Virtual Connect networks, each with a single, or multiple, uplinks configured. Each option has its advantages and disadvantages. For example; an Active/Standby configuration places the redundancy at the VC level, where Active/Active places it at the OS NIC teaming or bonding level. We will review the second option in this scenario.

In addition, several Virtual Connect Networks can be configured to support the required networks to the servers within the BladeSystem enclosure. These networks could be used to separate the various network traffic types, such as iSCSI, backup and VMotion from production network traffic.

This scenario will also leverage the Fibre Channel over Ethernet (FCoE) capabilities of the FlexFabric modules. Each fibre channel fabric will have two uplinks connected to each of the FlexFabric modules.

### Requirements

This scenario will support both Ethernet and fibre channel connectivity. In order to implement this scenario, an HP BladeSystem c7000 enclosure with one or more server blades and TWO Virtual Connect Flex-10 or Flex-10/10D modules, installed in I/O Bays 1& 2 and two Virtual Connect Fibre Channel (VC-FC) Modules in Bays 3 and 4. In addition, we will require ONE or TWO external Network switches. As Virtual Connect does not appear to the network as a switch and is transparent to the network, any standard managed switch will work with Virtual Connect. The Fibre Channel uplinks will connect to the existing FC SAN fabrics. The SAN switch ports will need to be configured to support NPIV logins. Two uplinks from each VC-FC module will be connected to the existing SAN fabrics.

**Figure 225 - Physical View;** Shows two Ethernet uplinks from Ports X5 and X6 on Module 1 to Ports 1 and 2 on the first network switch and two Ethernet uplinks from Ports X5 and X6 on Module 2 to Ports 1 and 2 on the second network switch. The SAN fabrics are also connected redundantly, with TWO uplinks per fabric, from ports 1 and 2 of the VC-FC Modules in Bays 3 and 4.



**Figure 226 - Logical View;** The server blade profile is configured with SIX FlexNICs and 2 HBAs. NICs 1 and 2 are connected to VLAN-101-x, NICs 3 and 4 are connected to VLAN-102-x and NICs 5 and 6 are connected to VLANs 103-x through VLAN-105-x and VLAN-2100x through VLAN-2150-x, which are part of the Shared Uplink Sets, VLAN-Trunk-1 and VLAN-Trunk-2 respectively. The VLAN-Trunks are connected, at 10Gb, to a network switch, through Ports X5 and X6 on each Flex-10/10D Module in Bays 1 and 2. The SAN connections are connected through ports 1 and 2 on each VC-FC module in Bays 3 and 4.



Scenario 9 – Shared Uplink Set with Active/Active Uplinks, 802.3ad (LACP) – Flex-10 and VC-Fibre Channel SAN – vSphere 194

# Installation and configuration

#### **Switch configuration**

As the Virtual Connect module acts as an edge switch, Virtual Connect can connect to the network at either the distribution level or directly to the core switch.

The appendices provide a summary of the cli commands required to configure various switches for connection to Virtual Connect. The configuration information provided in the appendices for this scenario assumes the following information:

 The switch ports are configured as VLAN TRUNK ports (tagging) to support several VLANs. All frames will be forwarded to Virtual Connect with VLAN tags. Optionally, one VLAN could be configured as (Default) untagged, if so, then a corresponding vNet within the Shared Uplink Set would be configured and set as "Default".

**Note:** when adding additional uplinks to the SUS, if the additional uplinks are connecting from the same Flex-10 module to the same switch, in order to ensure all the uplinks are active, the switch ports will need to be configured for LACP within the same Link Aggregation Group.

The network switch port should be configured for Spanning Tree Edge as Virtual Connect appears to the switch as an access device and not another switch. By configuring the port as Spanning Tree Edge, it allows the switch to place the port into a forwarding state much quicker than otherwise, this allows a newly connected port to come online and begin forwarding much quicker.

The SAN connection will be made with redundant connections to each Fabric. SAN switch ports connecting to the VC-FC module must be configured to accept NPIV logins.

#### **Configuring the VC module**

- Physically connect Port 1 of network switch 1 to Port X5 of the VC module in Bay 1
- Physically connect Port 2 of network switch 1 to Port X6 of the VC module in Bay 1
- Physically connect Port 1 of network switch 2 to Port X5 of the VC module in Bay 2
- Physically connect Port 2 of network switch 2 to Port X6 of the VC module in Bay 2

**Note:** If you have only one network switch, connect VC ports X5 & X6 (Bay 2) to an alternate port on the same switch. This will NOT create a network loop and Spanning Tree is not required.

- Physically connect Ports 1&2 on the VC-FC in module Bay 3 to switch ports in SAN Fabric A
- Physically connect Ports 1&2 on the VC-FC in module Bay 4 to switch ports in SAN Fabric B

#### **VC CLI commands**

Many of the configuration settings within VC can also be accomplished via a CLI command set. In order to connect to VC via a CLI, open an SSH connection to the IP address of the active VCM. Once logged in, VC provides a CLI with help menus. Through this scenario the CLI commands to configure VC for each setting will also be provided.

#### **Configuring Expanded VLAN Capacity via GUI**

Virtual Connect release 3.30 provided an expanded VLAN capacity mode when using Shared Uplink Sets, this mode can be enabled through the Ethernet Settings tab or the VC CLI. The default configuration for a new Domain install is "Expanded VLAN Capacity" mode, Legacy mode is no longer available and the Domain cannot be downgraded.

#### To verify the VLAN Capacity mode

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Expanded VLAN capacity
- Verify Expanded VLAN Capacity is configured and Legacy VLAN Capacity is greyed out.

**Note:** Legacy VLAN mode will only be presented if 1Gb Virtual Connect Modules are present, in which case the domain would be limited to Firmware version 3.6x.

#### **Configuring Expanded VLAN Capacity via CLI**

The following command can be copied and pasted into an SSH based CLI session with Virtual Connect;

# Set Expanded VLAN Capacity set enet-vlan -quiet VlanCapacity=Expanded

#### Figure 227 - Enabling Expanded VLAN Capacity

	Advanced Settings
/LAN	
erver <sup>y</sup>	VLAN Tagging Support
F	orce server connections to use the same VLAN mappings as shared uplink sets
LAN C	apacity
	apacity egacy VLAN capacity (Up to 320 VLANs per module and 28 VLANs per server connection).
LAN C	apacify egacy VLAN capacity (Up to 320 VLANs per module and 28 VLANs per server connection). xpanded VLAN capacity (Up to 1000 VLANs per domain and 162 VLANs per physical server port).
LAN C	apacity egacy VLAN capacity (Up to 320 VLANs per module and 28 VLANs per server connection). xpanded VLAN capacity (Up to 1000 VLANs per domain and 162 VLANs per physical server port).
LAN C L E	apacity egacy VLAN capacity (Up to 320 VLANs per module and 28 VLANs per server connection). xpanded VLAN capacity (Up to 1000 VLANs per domain and 162 VLANs per physical server port). Networks Link Speed Settings
LAN C L E L L L L L L L L L L L L L	apacity egacy VLAN capacity (Up to 320 VLANs per module and 28 VLANs per server connection). xpanded VLAN capacity (Up to 1000 VLANs per domain and 162 VLANs per physical server port). Networks Link Speed Settings n using mapped VLAN tags (multiple networks over a single link), these ugs will be used for the overall Link speed control.

**Note:** If a 1Gb VC Ethernet module is present in the Domain, Expanded VLAN capacity will be greyed out, this is only supported with 10Gb based VC modules. Also, once Expanded VLAN capacity is selected, moving back to Legacy VLAN capacity mode will require a domain deletion and rebuild.

#### Defining a new Shared Uplink Set (VLAN-Trunk-1)

Connect Ports X5 and X6 of FlexFabric module in Bay 1 to Ports 1 and 2 on switch 1

Create a SUS named VLAN-Trunk-1 and connect it to FlexFabric Ports X5 and X6 on Module 1

- On the Virtual Connect Home page, select Define, Shared Uplink Set
- Insert Uplink Set Name as VLAN-Trunk-1
- Select Add Port, then add the following port;
  - Enclosure 1, Bay 1, Port X5
  - Enclosure 1, Bay 1, Port X6

#### Figure 228 - Shared Uplink Set (VLAN-Trunk-1) Uplinks Assigned

Ethernet Shar	red External Upl	ink Set						
Uplink Set Name	s	tatus PID						
/LAN-Trunk-1		o (						
External Uplin	k Ports							
Port	Port Role	Port Status		Connector Type	Connected To	PID S	Speed/Duplex	Action
C7K-Bottom Bay 1: Port X5	NA	C Linked-Active	10 Gb	SFP-DAC	HP (Ten-GigabitEthernet1/0/5)	A	\uto	Delete
C7K-Bottom Bay 1: Port X6	NA	C Linked-Active	10 Gb	SFP-DAC	HP (Ten-GigabitEthernet1/0/6)	A	\uto	Delete
		-						
Connection Mode: Add Port C7K-Bottom	Auto     Failover	ACP Timer:   Domain Default  Short (1 sec)  Long (30 sec)	, Short (1 sec)					

- Click Add Networks and select the Multiple Networks radio button and add the following VLANs;
  - Enter Name as VLAN-
  - Enter Suffix as -1
  - Enter VLAN IDs as follows (and shown in the following graphic);
- 101-105,2100-2400
- Enable SmartLink on ALL networks
- Click Advanced
  - Configure Preferred speed to 4Gb
  - Configure Maximum speed to 8Gb
- Click Apply

**Note:** you can optionally specify a network "color" or "Label" when creating a shared Uplinkset and its networks. In the example above we have not set either color or label.

Figure 229 - Creating VLANs in a Shared Uplink Se
---------------------------------------------------

sociated Networks	(VLAN tagged)
Vould you like to add	
) a single Associated 1	etwork 💿 multiple Associated Networks
Network Name	VLAN- + VLAN ID + -1
Sample network name:	VLAN-2400-1
VLAN ID(s) *	101-105,2100-2400 ?
[]	
Color none	Labels Type to add Network Labels
	Type to add Network Labels
The Native VLAN s	atting supported only when adding or editing a single Associated Network
<ol> <li>The 306 networks</li> </ol>	peing created cannot all be marked Private. The domain can only support 128 more private network(s) before reaching the limit of 128.
🗹 Smart Link 🗌 Privat	Network
Advanced Network Se	ings
Set preferred conner	tion speed
Selected Speed: 4	Gb Gb
0.1 Gb	8 Gb
[	
🗹 Set maximum connec	ion speed 🛛
Selected Speed: 8	Gb
0.1 Gb	10 Gb
De network access gro	ip names
Default X	
e letters or numbers ('a', '2	'e', 'nag', 'default')
	Apply Cano
	( ign) Calc

**Note:** When configuring Preferred and Maximum networks speeds, these speeds will only be reflected when the network is configured individually on a specific NIC. In order to set a Maximum network speed for a NIC configured with Multiple Networks, configure the "Multiple Networks Link Speed Settings" un Ethernet, Advanced Settings in the left tree view pane of the VC console.

After clicking apply, a list of VLANs will be presented as shown below. If one VLAN in the trunk is untagged/native, see note below.

• Click Apply at the bottom of the page to create the Shared Uplink Set

Figure 230 - Associated VLANs for Shared Uplink Set VLAN-Trunk-1

ssociated Networks (VLAN	tagged)				
					🕂 Add 🏦 De
Network Name	VLAN ID	Native		Private Network	
VLAN-101-1	101	false	true	false	Edit 💌
VLAN-102-1	102	false	true	false	Edit 💌
VLAN-103-1	103	false	true	false	Edit 💌
VLAN-104-1	104	false	true	false	Edit 💌
VLAN-105-1	105	false	true	false	Edit 💌
VLAN-2100-1	2100	false	true	false	Edit 💌
VLAN-2101-1	2101	false	true	false	Edit 💌
VLAN-2102-1	2102	false	true	false	Edit 💌
VLAN-2103-1	2103	false	true	false	Edit 💌
VLAN-2104-1	2104	false	true	false	Edit 👻
VLAN-2105-1	2105	false	true	false	Edit 💌
VLAN-2106-1	2106	false	true	false	Edit 💌
VLAN-2107-1	2107	false	true	false	Edit

**Note:** Optionally, if one of the VLANs in the trunk to this shared uplink set were configured as Native or Untagged, you would be required to "edit" that VLAN in the screen above, and configure Native as TRUE. This would need to be set for BOTH VLAN-Trunk-1 and VLAN-Trunk-2.

Please refer to Appendix D; "Scripting the Native VLAN" for scripting examples.

#### Defining a new Shared Uplink Set (VLAN-Trunk-2) (Copying a Shared UplinkSet)

The second Shared Uplink Set could be created in the same manner as VLAN-Trunk-1 however; VC now provides the ability to COPY a VC Network or Shared Uplink Set.

- Connect Ports X5 and X6 of FlexFabric module in Bay 2 to Ports 1 and 2 on switch 2
- In the VC GUI screen, select Shared Uplink Sets in the left pane, in the right pane VLAN-Trunk-1 will be displayed, left click VLAN-Trunk-1, it will appear as blue, right click and select COPY
- Edit the Settings as shown below, the new SUS name will be VLAN-Trunk-2 and ALL the associated VLANs with have a suffix of 2
- In step 3, ADD uplinks X5 and X6 from Bay 2
- Click OK
- The SUS and ALL VLANs will be created

#### Figure 231 - Copying a SUS and ALL VLANs

		Copy Shared	Uplink Set			
Shared Uplink	Set Name					4
Name VLAN-Trunk-2						
Associated Net	works (VLAN	s)				
Replace last 💌	nstance(s) of	1	with 2			
VLAN-Trunk-1 Origin	al		VLAN-Trunk-2	Сору		
VLAN-101- <u>1</u>		*	VLAN-101-2			
VLAN-102- <u>1</u>			VLAN-102-2			
VLAN-103-1			VLAN-103-2			
VLAN-104-1			VLAN-104-2			
VLAN-105-1			VLAN-105-2			
VLAN-2100- <u>1</u>		*	VLAN-2100-2			- 1

#### **Defining a new Shared Uplink Set via CLI**

The following script can be used to create the first Shared Uplink Set (VLAN-Trunk-1)

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

# Create Shared Uplink Set VLAN-Trunk-1 and configure uplinks add uplinkset VLAN-Trunk-1 add uplinkport enc0:1:X5 Uplinkset=VLAN-Trunk-1 speed=auto add uplinkport enc0:1:X6 Uplinkset=VLAN-Trunk-1 speed=auto

# Create Networks VLAN-101-1 through VLAN-104-1 and 2100-2400 for Shared Uplink Set VLAN-Trunk-1

add network-range -quiet UplinkSet=VLAN-Trunk-1 NamePrefix=VLAN- NameSuffix=-1 VLANIds=101-105,2100-2400 State=enabled PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000 SmartLink=enabled

The following script can be used to create the Second Shared Uplink Set (VLAN-Trunk-2)

# Create Shared Uplink Set VLAN-Trunk-2 and configure uplinks add uplinkset VLAN-Trunk-2 add uplinkport enc0:2:X5 Uplinkset=VLAN-Trunk-2 speed=auto add uplinkport enc0:2:X6 Uplinkset=VLAN-Trunk-2 speed=auto

# Create Networks VLAN101-2 through VLAN105-2 and VLAN-2100-2 through VLAN-2400-2 for Shared Uplink Set VLAN-Trunk-2 add network-range -quiet UplinkSet=VLAN-Trunk-2 NamePrefix=VLAN- NameSuffix=-2 VLANIds=101-105,2100-2400 State=enabled PrefSpeedType=Custom PrefSpeed=4000 MaxSpeedType=Custom MaxSpeed=8000 SmartLink=enabled

**Note:** In this scenario we have created two independent Share Uplink Sets (SUS), each originating from the opposite FlexFabric Modules, by doing so we provide the ability to create separate and redundant connections out of the Virtual Connect domain. When we create the server profiles, you will see how the NICs will connect to VLANs accessed through the opposite VC module, which provides the ability to create an Active / Active uplink scenario. Alternatively, we could have created a single SUS and assigned both sets of these uplink ports to the same SUS, however, this would have provided an Active/Standby uplink scenario, as shown in Scenario 5.

#### **Defining a new SAN Fabric via GUI**

Create a Fabric and name it "SAN\_A"

- On the Virtual Connect Manager screen, click Define, SAN Fabric to create the first Fabric
- Enter the Network Name of "SAN\_A"
- Select Add Port, then add the following ports;
  - Enclosure 1, Bay 3, Port 1
  - o Enclosure 1, Bay 3, Port 2
- Select Apply

Create a second Fabric and name it "SAN\_B"

- On the Virtual Connect Manager screen, click Define, SAN Fabric to create the second Fabric
- Enter the Network Name of "SAN\_B"
- Select Add Port, then add the following ports;
  - Enclosure 1, Bay 4, Port 1
  - o Enclosure 1, Bay 4, Port 2
- Select Apply

#### **Defining SAN Fabrics via CLI**

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

#Create the SAN Fabrics SAN\_A and SAN\_B and configure uplinks as discussed above add fabric SAN\_A Bay=3 Ports=1,2 add fabric SAN\_B Bay=4 Ports=1,2

#### Figure 232 - SAN Configuration

D	efine 🔻	Config	ure 🔻	Tools	<b>-</b> H∉	elp 🚽	-									
E	Edit S	AN F	abric	SAN	L_A											
	Fabri	c														
		ame			Statu		Fabric Ty			Login Re-Distri	ibutio			Configured	Speed	
	SAN_A				] 🤇	)	FabricAtt	ach	Ŧ	MANUAL			[	Auto		-
	Enclo	sure	Uplink	Ports												
	Uplink Po	ort	Enclos	ure	Bay	Por	t Status	Conne	ecte	d To		Action				
ſ	Uplink Po	d 1	C7K-Bo	ttom	3	0	8 Gb	10:00:0	00:2	7:F8:84:7E:58		<u>Delete</u>				
l	Uplink Po	ft 2	C7K-Bo	ttom	3	0	8 Gb	10:00:	00:2	7:F8:84:7E:58	J	<u>Delete</u>				
	Add Port	t														
	Bay 3			»												
														Apply		Cancel

**Figure 233** - SAN fabrics configured with two 8Gb uplinks per fabric. Note the bay and port numbers on the right

AN F	abrics									
Extern	al Connections	Server Connections								
tatus	SAN Fabric	Fabric Type	Login Re-Distribution	Port	Status	Connected To	Enclosure	Bay	Port	Action
0	SAN_A	FabricAttach	MANUAL	0	8 Gb	10:00:00:27:F8:84:7E:58	C7K-Bottom	3	1	Edit 💌
				0	8 Gb	10:00:00:27:F8:84:7E:58	C7K-Bottom	3	2	
0	SAN_B	FabricAttach	MANUAL	0	8 Gb	10:00:00:27:F8:84:81:60	C7K-Bottom	4	1	Edit 💌
				0	8 Gb	10:00:00:27:F8:84:81:60	C7K-Bottom	4	2	

#### **Defining a Server Profile**

We will create a server profile with SIX server NICs and TWO SAN adapters.

Each server NIC will connect to a specific network.

- On the main menu, select Define, then Server Profile
- Create a server profile called "ESX-1"
- In the Network Port 1 drop down box, select a Network, then chose VLAN101-1
- Set the port speed to Custom at 100Mb
- In the Network Port 2 drop down box, select a Network, then chose VLAN101-2
- Set the port speed to Custom at 100Mb
- Left click on either of Port 1 or Port 2 in the Ethernet Connections box, and select ADD network (add four additional network connections)
- In the Network Port 3 drop down box, select a Network, then chose VLAN-102-1

- Set the port speed to Custom at 2Gb
- In the Network Port 4 drop down box, select a Network, then chose VLAN-102-2
- Set the port speed to Custom at 2Gb
- In the Network Port 5 drop down box, select Multiple Networks
- Configure for networks VLAN-103-1 through VLAN-105-1 and VLAN-2100-1 through VLAN-2150-1
- Leave the network speed as Auto
- In the Network Port 6 drop down box, select Multiple Networks
- Configure for networks VLAN-103-2 through VLAN-105-2 and VLAN-2100-2 through VLAN-2150-2
- Leave the network speed as Auto
- Expand the FC SAN Connections box, for Bay 1, select SAN\_A for Bay 2, select SAN\_B
- Do not configure FCoE SAN or iSCSI Connection
- In the Assign Profile to Server Bay box, locate the Select Location drop down and select Bay 2, then apply

Prior to applying the profile, ensure that the server in Bay 2 is currently OFF

**Note:** You should now have a server profile assigned to Bay 2, with 6 Server NIC connections. NICs 1&2 should be connected to networks VLAN-101-x (MGMT), NICs 3&4 should be connected VLAN-102-x (VMotion) and NICs 5&6 are connected to networks VLAN103-x through VLAN105-x and VLAN-2100-x through VLAN-2150-x. FC SAN fabrics are connected to, Port 1 - SAN\_A and Port 2 - SAN\_B. if additional NICs are required, you could ADD two more NICs to this profile and assigned them to VLANs as required.

#### **Defining a Server Profile via CLI**

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect

```
# Create Server Profile ESX-1
add profile ESX-1 -nodefaultfcconn -nodefaultfcoeconn
set enet-connection ESX-1 1 pxe=Enabled Network=VLAN-101-1 SpeedType=Custom Speed=100
add enet-connection ESX-1 2 pxe=Disabled Network=VLAN-102-1 SpeedType=Custom Speed=2000
add enet-connection ESX-1 pxe=Disabled Network=VLAN-102-2 SpeedType=Custom Speed=2000
add enet-connection ESX-1 pxe=Disabled Network=VLAN-102-2 SpeedType=Custom Speed=2000
add enet-connection ESX-1 pxe=Disabled
add server-port-map-range ESX-1:5 UplinkSet=VLAN-Trunk-1 VLanIds=103-105,2100-2150
add enet-connection ESX-1 pxe=Disabled
add server-port-map-range ESX-1:6 UplinkSet=VLAN-Trunk-2 VLanIds=103-105,2100-2150
add fc-connection ESX-1 Fabric=SAN_A
add fc-connection ESX-1 Fabric=SAN_B
poweroff server 2
assign profile ESX-1 enc0:2
```

**Note:** The "add server-port-map-range" command is new to VC firmware release 3.30 and can be used to map many VLANs to a server NIC, in a single command. Prior releases would have required one command to create the NIC and one additional command per VLAN mapping added. This command will make profile scripting much easier, less complicated and quicker.

**Note:** The speed of the NIC and SAN connections, as well as the MAC and WWN. Also, note that the FCoE connections are assigned to the two SAN fabrics created earlier and use ports LOM:1-b and LOM:2-b.

		e ESX-1								
dit	Server Profi									
Prot	file									
Profile	e Name	Network	Access Group	status S	Serial Number	Server IIIID	_	_		
SV 4		Defaul		Q V	CX0000V01	9e25e429-227	a-4262-90d5-2	7ed5d808db3		
.5/-1		Derau								
Ethe	ernet Adapter C	onnections								
Port	Network Name	Sta	tu Port Speed Type	A	llocated Port Spe	. PXE Multicast Fil	ter MA	،c	Mapping	A
1	VLAN-101-1	C	CUSTOM	1	100 Mb - 8 Gb	ENABL None	00-	17-A4-77-7C-0	18 LOM1:1-a => Bay 1:d2:v1	
2	VLAN-101-2	¢	CUSTOM	S 1	100 Mb - 8 Gb	DISABL None	00-	17-A4-77-7C-0	IA LOM1:2-a => Bay 2:d2:v1	
3	VLAN-102-1	C	CUSTOM	8 2	2 Gb - 8 Gb	DISABL None	00-	17-A4-77-7C-0	IC LOM1:1-b => Bay 1:d2:v2	
4	VLAN-102-2	C	CUSTOM	S 2	2 Gb - 8 Gb	DISABL None	00-	17-A4-77-7C-0	IE LOM1:2-b => Bay 2:d2:v2	
5	Multiple Networks	🕥 🤇	PREFERRED	7	7.9 Gb - 10 Gb	DISABL None	00-	17-A4-77-7C-1	0 LOM1:1-c => Bay 1:d2:v3	
6 - Ad SCS	Multiple Networks	🔊 🔇	PREFERRED		7.9 Gb - 10 Gb	DISABL None	00-	17-A4-77-7C-1	2 (LOM1:2-c => Bay 2:d2:r3)	
6 - Ad SCS	Multiple Networks	🔊 🕻	PREFERRED		7.9 Gb - 10 Gb	DISABL None	00-	17-A4-77-7C-1	2 (LOM1:2-c ⇒ Bay 2:d2∨3)	
6 - Ad SCS -C H	Multiple Networks Id SI HBA Connect HBA Connectior	🔊 🕻	PREFERRED		7.9 Gb - 10 Gb	DISABL None	00-	17-A4-77-7C-1	2 (LOM1:2-c ⇒ Bay 2:d2 v3)	<u>D</u>
6 FCF Port	Multiple Networks	ions SAN Name	PREFERRED	Status	Port Speed Typ	e WMPN	00-	17-84-77-7C-1	2 LOM1:2-c ⇒ Bay 2:d2 v3	Actio
6 FC H Port	Multiple Networks Id SI HBA Connect HBA Connection Connected To FC Bay 3 SAT	Ions SAN Name	PREFERRED	Status	Port Speed Typ AUTO	e vwvPN 50:06:09:00:00:C2:	00-	17-A4-77-7C-1	2 LOM1:2-c => Bay 2:d2 v3	D Actio
6 Ad SCS FC H Port 1 2	Multiple Networks Id SI HBA Connect HBA Connection Connected To FC Bay 3 SAP Bay 4 SAP	Ions IS SAN Name LA LB	PREFERRED	Status © ©	Port Speed Typ AUTO AUTO	e vwvPN 50:06:09:00:00:C2: 50:06:09:00:00:C2:	00- DE:04 DE:06	17-A4-77-7C-1	2 LOM1:2-c ⇒ Bay 2:d2 v3 Mepping IEZZ1:1 ⇒ Bay 3:d2 IEZZ1:2 ⇒ Bay 4:d2	Actio
6 F Ad ISCS FC H Port 1 2 + Ad	Multiple Networks Id SI HBA Connect HBA Connection Connected To FC Bay 3 SAP Bay 4 SAP dd	IONS IS SAN Nome LA LB	PREFERRED	Status	Port Speed Typ AUTO AUTO	e vwvPN 50:06:09:00:00:C2: 50:06:09:00:00:C2:	00- DE:04 DE:06	17-A4-77-7C-1	2     LOM1:2-c ⇒ Bay 2:d2 v3       Mapping       EZZ1:1 ⇒ Bay 3:d2       HEZZ1:2 ⇒ Bay 4:d2	Action
6 F Ad ISCS FC H Port 1 2 Fik Fik	Multiple Networks Id SI HBA Connect HBA Connection Connected To FC Bay 3 SAP Bay 4 SAP dd tre Channel Boot Pars	IS SAN Name	PREFERRED	Status ©	Port Speed Typ AUTO AUTO	e vww.PN 60.06:08:00:00:C2: 50:06:08:00:00:C2:	DE:04 DE:06	17-A4-77-7C-1	44pping Mapping IEZZ1:1 => Bay 3:d2 IEZZ1:2 => Bay 4:d2	Actio
6 FC H Port 1 2 Fik	Multiple Networks Id SI HBA Connection HBA Connection Connected To FC Bay 3 SAP Bay 4 SAP dd tre Channel Bod Pare	Ions IS SAN Name IA B meters	PREFERRED	Status ©	Port Speed Typ AUTO AUTO	e WWPN 60:06:08:00:00:C2: 50:06:08:00:00:C2:	00- DE:04 DE:06	17-A4-77-7C-1	44ppang EZZ1:1 => Bay 3:d2 IEZZ1:2 => Bay 4:d2	Actio
6 F Ad iSCS FC H Port 1 2 F Al FR FCo	Multiple Networks Id SI HBA Connection Connected To FC Bay 3 GAN Bay 4 SAN dd tre Channel Boot Para E HBA Connect	Ions IS SAN Name ILB Insters Ions	PREFERRED	Status ©	Port Speed Typ AUTO AUTO	DISABL None	00-	17-A4-77-7C-1	2 LOM1:2-c => Bay 2:d2 v3	Actio
6 F Ad ISC: FC H Port 1 2 F Al Fik FCo	Multiple Networks Id SI HBA Connect HBA Connection Connected To FC Bay 3 SAh Bay 4 SAh dd bre Channel Boot Para bE HBA Connect	IN Norme IS SAN Norme LA LB Inters Ions	PREFERRED	Status O	Port Speed Typ AUTO AUTO	DISABL None	00-	17-A4-77-7C-1	2 LOM1:2-c => Bay 2:d2 v3	Actio
6 F Ad ISCS FC H Port 1 2 FC o FC o Ass	Multiple Networks Id SI HBA Connect HBA Connection Connected To FC Bay 3 SAh Bay 4 SAh Connect Connected To FC Bay 3 SAh Bay 4 SAh Connect Connected To FC Bay 5 SAh Bay 4 SAh Connect Connected To FC Connect	In the second se	PREFERRED	Status ©	Port Speed Typ AUTO AUTO	DISABL None	00-	17-A4-77-7C-1	44ppling (EZZ1:1 => Bay 3:d2 (EZZ1:2 => Bay 4:d2	Action     Detet
6 F Ad iSCS FC H Port 1 2 F A FC Ass Enclose	Multiple Networks Id SI HBA Connect HBA Connection Connected To FC Bay 3 SAH Bay 4 SAH Connect Connected To FC Bay 3 SAH Bay 4 SAH Connect Stree Channel Boot Para Stree Se	In the second se	PREFERRED	Status © © Model	Port Speed Typ AUTO AUTO	DISABL None	00-	er UD	2 LOM1:2-c => Bay 2:d2 v3	Dr Action

Figure 234 - Define a Server Profile ESX-1, assigned to Bay 2

Figure 235 - Configure NICs 5 and 6 for multiple Networks and select the appropriate VLANs

Edit Server Profile: ESX-1						
ESX-1 Default	? VCX0000V00 //	b362atC-2e77-453U-aU10-9006	ezdeabau/			
Ethernet Adapter Connections						
Server VLAN Tag to vNet Mappings 👔						
Force the same VLAN mappings as in the Shared Networks not in mapping	Uplink Set None	Networks in mapping	(54 mapped; lir	mit is 162)	)	
Alphabetical Filtered		Drag and drop networks	to include them o	or remove ti	hem from th	e mapping
All A-C D-F G-I J-L M-O P-R	8 S-V W-Z 0-3 4-6 7-9	∨Net Name		Uplink S VLAN Id V	Server Ur VLAN eo d	ntagg s
ULAN-101-1	0	VLAN-103-1	0	103 1	03 ĺ	
P VLAN-101-2	0	VLAN-104-1	٢	104 1	04 [	_ ≡
ຢື VLAN-102-1	0	VLAN-105-1	0	105 1	05 [	
€ VLAN-102-2	0	VLAN-2100-1	0	2100 2	2100 [	
VLAN-103-2		VLAN-2101-1	0	2101 2	2101 [	-
ULAN-104-2	0	VLAN-2102-1	0	2102 2	2102 [	
VLAN-105-2		VLAN-2103-1	0	2103 2	2103 [	-
0 VLAN-2100-2	<u> </u>	VLAN-2104-1	0	2104 2	2104 [	
List	= Detail	VLAN-2105-1	0	2105 2	2105	

**Note:** "Server VLAN ID" and "Untagged" boxes can be edited. One network per port could be marked as "Untagged', in which case the server would not be configured for tagging on that VLAN. It is also possible to change the VLAN ID that is presented to the server (VLAN translation), in which case the communications between Virtual Connect and the network would be the VLAN ID in grey, if the Server VLAN ID box to the right were changed, VC would communication with the server on the new VLAN ID, providing a VLAN translation function. VLAN translation could be a very useful feature, in the event that VLAN renumbering is required within the datacenter. The network VLAN numbers and Shared Uplink Set configurations could be changed to reflect the new VLAN IDs used, however, the old VLAN IDs could still be presented to the server providing the ability to delay or eliminate the need to change the VLAN ID used within the server/vSwitch.

#### Figure 236 - Server Profile View Bay 2

7K-Bot	tom: Bay	2 (ProLia	ant BL460	)c Gen8)		
Device Bav S	Status - Bav # 2					
Overall Statu	us:	📀 ок				
Hardware	e Status:	Norm	al			
VC Status	s:	🛇 ок				
ssigned S	erver Profile:	ESX-1				
nclosure N	ame:	C7K-Bot	tom			
ID:						
Power Statu	is/Control:	● Off			Moment	ary Press
lada Sarua	r Information (	201 # 2				
iade servei ierial Numb	er:	MXO321	02HB			
erial Numb	er (Logical):	VCX000	0/01			
JUID:		3136363	6-3136-584D-51	33-323130324842		
JUID (Logica	al):	9e25e42	9-227a-4262-90	d5-27ed5d808db3		
Product Nan	ne:	ProLiant	BL460c Gen8			
Server Nam	e:					
Part Numbe	r:	666161-	B21			
Asset Tag:		[Unknow	n]			
Server Ethei	rnet Adapter Inf	ormation				
ähernet Adapter	Flex NIC	Location	Module Port	Model	MAC Address	Networ
Port 1						
	LOM1:1-a	FLB1	Bay 1:d2:v1	HP FlexFabric 10Gb 2-port 554FLB Adapter	00-17-A4-77-7C-08	VLAN-10
	LOM1:1-b	FLB1	Bay 1:d2:v2	HP FlexFabric 10Gb 2-port 554FLB Adapter	00-17-A4-77-7C-0C	VLAN-1
	LOM1:1-c	FLB1	Bay 1:d2:v3	HP FlexFabric 10Gb 2-port 554FLB Adapter	00-17-A4-77-7C-10	Multiple Netw ork
	LOM1:1-d	FLB1	Bay 1:d2:v4	HP FlexFabric 10Gb 2-port 554FLB Adapter	D8-9D-67-6B-D3-A3	
Port 2						
	LOM1:2-a	FLB1	Bay 2:d2:v1	HP FlexFabric 10Gb 2-port 554FLB Adapter	00-17-A4-77-7C-0A	VLAN-10
	LOM1:2-b	FLB1	Bay 2:d2:v2	HP FlexFabric 10Gb 2-port 554FLB Adapter	00-17-A4-77-7C-0E	VLAN-10
	LOM1:2-c	FLB1	Bay 2:d2:v3	HP FlexFabric 10Gb 2-port 554FLB Adapter	00-17-A4-77-7C-12	Multiple Netw ork
	LOM1:2-d	FLB1	Bay 2:d2:v4	HP FlexFabric 10Gb 2-port 554FLB	D8-9D-67-6B-D3-A7	l

SAN Ports					
Port Number	Adapter	Module Port	Model	WWN	SAN Fabric
Port 1	MEZZ1	Bay 3:d2	HP LPe1205A 8Gb FC HBA for BladeSystem c-Class	50:06:0B:00:00:C2:DE:04	SAN_A
Port 2	MEZZ1	Bay 4:d2	HP LPe1205A 8Gb FC HBA for BladeSystem c-Class	50:06:0B:00:00:C2:DE:06	SAN_B

**Figure 237 -** By clicking on the "Multiple Networks" statement for each LOM, the following page is displayed, which lists the VLAN connections for this port.

Рн	P Virtual Connect Manager	
Aultinle	Makuraha	
ицпріе	Network Name	VI ANID
1	VIAN 402.4	102
,	VLAN 104.1	103
2	VLAN 105.1	104
1	VLAN 2100-1	2100
• 5	VI ANL2101-1	2100
6	VI 4NL2102-1	2102
7	VI AN-2103-1	2102
B	VLAN-2104-1	2104
9	VLAN-2105-1	2105
10	VLAN-2106-1	2106
11	VLAN-2107-1	2107
12	VLAN-2108-1	2108
13	VLAN-2109-1	2109
14	VLAN-2110-1	2110
15	VLAN-2111-1	2111
16	VLAN-2112-1	2112
17	VLAN-2113-1	2113
18	VLAN-2114-1	2114
19	VLAN-2115-1	2115
20	VLAN-2116-1	2116
21	VLAN-2117-1	2117
22	VLAN-2118-1	2118
23	VLAN-2119-1	2119
24	VLAN-2120-1	2120
25	VLAN-2121-1	2121
26	VLAN-2122-1	2122
27	VLAN-2123-1	2123
28	VLAN-2124-1	2124
29	VLAN-2125-1	2125
30	VLAN-2126-1	2126
31	VLAN-2127-1	2127

### Review

In this scenario we have created Two Shared Uplink Sets (SUS), providing support for many VLANs. Uplinks originating from each FlexFabric Module connect to each SUS, by doing so we provide redundant connections out of the Virtual Connect domain. As multiple uplinks are used for each SUS, we have also leveraged LACP to improve uplink performance. In this scenario, all uplinks will be active. We also create two FCoE SAN Fabrics.

We created a server profile, with SIX NICs. Two connected to the same VLAN (101), Port 1 connects to VLAN-101-1 and Port 2 connects to VLAN-101-2, which provides the ability to sustain a link or module failure and not lose connection to the network, these NICs were set to 100Mb/Sec with the Maximum speed set to 8Gb. VLAN-101-1 and VLAN-101-2 are configured to support VLAN 101, frames will be presented to the NIC(s) without VLAN tags (untagged), these two NICs are connected to the same VLAN, but taking a different path out of the enclosure. VLAN 101 is used for Management connections to the ESX host.

Network Ports 3 and 4 connect to the same VLAN (102), Port 3 connects to VLAN-102-1 and Port 4 connects to VLAN-102-2, which provides the ability to sustain a link or module failure and not lose connection to the network, these NICs were set to 2Gb/Sec with the Maximum speed set to 8Gb. VLAN-102-1 and VLAN-102-2 are configured to support VLAN 102, frames will be presented to the NIC(s) without VLAN tags (untagged), these two NICs are connected to the same VLAN, but taking a different path out of the enclosure. VLAN 102 is used for VMotion.

Network Ports 5 and 6 were added, these NICs will be connected to "Multiple Networks" and each NIC will then be configured for networks VLAN103-x through VLAN105-x and networks VLAN-2100-x through VLAN-2150-x. As these networks are tagging, frames will be presented to the server with VLAN tags. NICs 5 and 6 will be connected to the same vSwitch to support VM connections.

VLAN tagged frames for these networks will be forwarded to the Virtual switch and then passed on to the appropriate Virtual Machine, VLAN tags will be removed as the frames are passed to the virtual machine. These NICs will use the remaining available bandwidth of 3.9Gb/Sec with the Maximum speed set to 10Gb.

Additionally, FCoE port 1 is connected to SAN fabric FCoE\_A and FCoE port 2 is connected to SAN Fabric FCoE\_B, providing a multi-pathed connected to the SAN. The SAN fabric connections are set to 4Gb/Sec.

The FCoE SAN fabrics connects to each SAN fabric over a pair of uplinks per module. SAN logins are distributed across the multiple paths.

The following graphic provides an example of an ESX server with TWO NICs connected to the same console vSwitch configured for VLAN 101, which was the Default (untagged) VLAN. Additional vSwitches have been configured for VMotion and product VLANs.

**Figure 238 -** As NICs 1 and 2 are connected directly to VLAN-101, the connection acts as an Access or Untagged switch port, you need to ensure that the Hypervisor in NOT configured for VLAN tagging. However, if you want to put this server onto a VLAN that is tagged, this setting will need to be configured for that VLAN.



### **Results – vSphere Networking Examples**

We successfully configured FlexFabric with Share Uplink Sets, supporting several VLANs and redundant SAN fabrics. We created a server profile to connect to the various vNet with SIX NICs and the SAN fabrics using the FCoE connections created within the profile.

Although both Ethernet and Fibre channel connectivity is provided by the CNA adapter used in the G7 and Gen 8 servers; each capability (LAN and SAN) is provided by a different component of the adapter, they appear in the server as individual network and SAN adapters.

The following graphics show an ESXi 5.1 server with SIX FlexNICs configured, FOUR presented at 8Gb (two on the console network and two on the VMotion network) and two at 10Gb (Guest VLAN port groups). If we did not require SAN connectivity on this server, the FCoE connections could be deleted and the server would then have 8 NIC ports available to the OS. In addition, if we did not want FCoE connectivity and instead wanted to leverage iSCSI, we could delete the FCoE connected and re-create those connects as iSCSI connections, with offload and optionally iSCSI boot.

**Note:** the BL465c G7 and BL685c G7 utilize an NC551i chipset (BE2), whereas the BL460c G7, BL620c G7 and BL680c G7 utilize an NC553i chipset (BE3) and the Gen 8 blades typically have a NC554 adapter which also utilizes the BE3 chipset. Both the BE2 and BE3 chipsets share common drivers and firmware.

Virtual Connect supports the use of either Standard or Distributed vSwitches, examples of both are provided below.

#### vSphere Standard vSwitch



Figure 239 – ESXi 5.1 Network Connections

Figure 240 - ESXi 5.1 networking - three vSwitches configured. (Note the NIC speeds)



**Note:** As VLAN 101 is set as untagged at the upstream switch port, the management network port group should be defined as untagged. This will allow the server to be deployed, without having the set a VLAN ID for the management network.

**Figure 241 -** You may want to specify a specific NIC for VMotion traffic. This will ensure that all VMotion traffic between servers within the enclosure will remain on the same VC module, reducing the likelihood of multiple hops between servers. Edit the VMotion Configuration.

🛃 vSwi	tch1 Properties				_	
Ports	Network Adapters					
	figuration vSwitch VMotion	Summary 120 Ports vMotion and IP	Port Properties Network Label: VLAN ID: vMotion: Fault Tolerance Logging:	VMotion Enabled Disabled		
			Management Traffic: iSCSI Port Binding:	Disabled Disabled		
			MAC Address: MAC Address: MTU:	00:50:56:6e:2c:9c 1500		
			IP Settings IP Address: Subnet Mask:	192.168.102.170 255.255.255.0		
A	dd	Edit Remove	Effective Policies Security Promiscuous Mode: MAC Address Changes: Forged Transmits:	Reject Accept Accept	View Routing Table	
					Close He	lp

**Figure 242 -** Edit the NIC Team for VMotion and set one of the Adapters in Standby, this will ensure that ALL VMotion traffic remains on the SAME VC module. ESX NIC vmnic3 is connected to the VC module in bay 1.

Load Balancing:			ute based on the	originating vi	rtual port ID
Network Failover D	etection:		ik status only	originating vi	
Notify Switches:			:5		
Failback:		T Ye	s		
Failover Order: Override switch Select active and st adapters activate	failover order: andby adapters in the order spe	for this port cified below.	tgroup. In a failo	ver situation,	standby
Name S	peed	Network	;		Move Up
Active Adapters With the Adapter of the Adapter o	000 Full <b>rs</b>	None			Move Down
wnic2 8	000 Full	None			
Adapter Details -	-				
Emulex Corporatio	on HP FlexFabri	: 10Gb 2-por	t 554FLB Ada		
Name:		VMDIC2			
LOCATION:		PCI 04:00.2			

Figure 243 - Configuring the vSwitch for multiple port groups / VLANs

	- Jannary -		
🗊 vSwitch	120 Ports	Number of Ports:	120
Q VLAN-2120	Virtual Machine		
😡 VLAN-2119	Virtual Machine	Advanced Properties	
👳 VLAN-2118	Virtual Machine	MTU:	1500
👤 VLAN-2117	Virtual Machine		
👳 VLAN-2116	Virtual Machine	Default Policies	
Q VLAN-2115	Virtual Machine	Security	
Q VLAN-2114	Virtual Machine	Promiscuous Mode:	Reject
VLAN-2113	Virtual Machine	MAC Address Chapters	Accept
VLAN-2112	Virtual Machine	MAC Address changes:	Accept
VLAN-2111	Virtual Machine	Forged Transmits:	Accept
VLAN-2110	Virtual Machine	Traffic Shaping	
VLAN-2109	Virtual Machine	Average Bandwidth:	
VLAN-2108	Virtual Machine	Peak Bandwidth:	
VLAN-2107	Virtual Machine	Burst Size:	
VLAN-2105	Virtual Machine	Epilouer and Load Palancing	
VLAN-2104	Virtual Machine		
VLAN-2103	Virtual Machine	Load Balancing:	Port ID
VLAN-2102	Virtual Machine	Network Failure Detection:	Link status only
👿 VLAN-2101	Virtual Machine	Notify Switches:	Yes
<u>~</u> /		Failback:	Yes
Add	Edit Remove	Active Adapters:	vmnic4, vmnic5

ardware Options Resources	Profiles VServices		Virtual Machine Version:
Show All Devices	Add Remove		Juration
lardware	Summary	512 68	
Memory	4096 MB		Maximum recommended for this
🔲 CPUs	4	256 GB	Maximum recommended for back
📃 Video card	Video card	128 GB	<ul> <li>performance: 32732 MB.</li> </ul>
VMCI device SCSI controller 0	Restricted LSI Logic SAS	64 GB-	Default recommended for this
Hard disk 1	Virtual Disk	32 GB	Mainer and a fearblic
CD/DVD drive 1	Client Device	16 CB	<ul> <li>guest OS: 512 MB.</li> </ul>
Network adapter 1	VLAN-104		-
Floppy drive 1	Client Device	8 GBH	
_		4 GB 🚽	
		2 GB -	
		1 GB -	
		512 MB	
		256 MB	
		128 MB	
		64 MB	
		32 MB	
		16 MB	
		8 MB	
		4 MB	

#### Figure 244 - VM1 configured for VLAN 104

#### Figure 245 - VM1 on VLAN 104

etwork Connection Deta	ils
Network Connection Details	:
Property	Value
Connection-specific DN	vaolab.net
Description	Intel(R) PRO/1000 MT Network Connec
Physical Address	00-50-56-84-4E-14
DHCP Enabled	Yes
IPv4 Address	192.168.104.101
IPv4 Subnet Mask	255.255.255.0
Lease Obtained	Wednesday, March 20, 2013 10:42:34
Lease Expires	Thursday, March 28, 2013 10:42:34 PM
IPv4 Default Gateway	192.168.104.254
IPv4 DHCP Server	192.168.1.201
IPv4 DNS Server IPv4 WINS Server	192.168.1.201
NetBIOS over Tcpip En	Yes
Link-local IPv6 Address	fe80::6050:cf09:4a60:983e%11
IPv6 Default Gateway	
IPv6 DNS Server	

#### vSphere Distributed vSwitch

Figure 246 - Management and VMotion NICs are connected to Standard vSwitches



Figure 247 - VM Networks are connected to a Distributed vSwitch



Hardware Options Resources	Profiles VServices	Virtual Machine Versio	on: 8
	Add Remove	Memory Configuration	1
Hardware  Hardware  Memory  CPUs  Video card  VMCI device  SCSI controller 0  Hard disk 1  CD/DVD drive 1  Network adapter 1  Floppy drive 1	Summary 4096 MB 4 Video card Restricted LSI Logic SAS Virtual Disk Client Device VLAN-104 (dvSwitch), Client Device	<ul> <li>1011 GB</li> <li>Memory Size:</li> <li>GB</li> <li>GB</li> <li>S12 GB</li> <li>256 GB</li> <li>Quest OS: 1011 GB.</li> <li>Maximum recommended for this guest OS: a2732 MB.</li> <li>GF GB</li> <li>GF GB</li> <li>GF GB</li> <li>GF GB</li> <li>Default recommended for this guest OS: 512 MB.</li> <li>GF GB</li> <li></li></ul>	
Help		16 MB 4 MB	

#### Figure 248 - VM Connected to VLAN 104 on Distributed vSwitch

### **Results – vSphere SAN Connectivity**

**Figure 249 -** By access the HBA BIOS during server boot, you can see that Port 1 of the FlexHBA is connected to an EVA SAN LUN. Also note the CNA firmware version, this is the minimum version required for vSphere 5.

	Emulex Light	Pulse BIG	DS Utilit	y, UB3.	20a1			
01: HP-LPe1205A: Bus#: 05 Dev#: 00 Func#: 00 Mem Base: FBFE0000 Firmware Version: US2.00A8 Boot BIDS: Disabled! Port Name: 50060B0000C2DE04 Node Name: 50060B0000C2DE05 Topology: Auto Topology: Loop First (Default)								
	Devices	Present o	on This A	dapter:				
01. DID:010000 4 02. DID:010100 4 03. DID:010200 4 04. DID:010300 4	JWPN:50001FE1 JWPN:50001FE1 JWPN:50001FE1 JWPN:50001FE1	5005D468 5005D46C 5005D46A 5005D46B	LUN : 01 LUN : 01 LUN : 01 LUN : 01	HP HP HP HP	HSU210 HSU210 HSU210 HSU210	6220 6220 6220 6220		
	Enter	<esc> to</esc>	Previous	Menu				
Copyr	right (c) 1997	-2012 Emi	ilex. All	rights	reserved.			

**Figure 250** – ESXi 5 storage configuration, the Shared Storage LUN is provided through the FCoE connections to the SAN.

192.168.101.170 VMmare ESX, 5.1.0, 1117900						
Getting Started Summary Virtual Machines Performance Configuration Tasks & Events Alamic Permissions Maps Storage Hews Network Hews Hardware Status HP Insight Management						
Hardware	View: Datastores Devices					
Processors	Datastores					
Memory	Identification / Status Device Drive Type Capacity Free Type Last Update Alarm Actions Storage 1/0 Control Hardware Acceleration					
<ul> <li>Storage</li> </ul>	👔 datastore1 🥑 Normal HP Serial Attached Non-SSD 274.25 GB 266.36 GB VMP55 7/14/2013 11:36:43 PM Enabled Disabled Unknown					
Networking	ESX-0001 O Normal HP Fibre Channel Non-SSD 499.75 GB 498.80 GB VMPSS 3/20/2013 11:24:18 PM Enabled Disabled Unknown					
Storage Adapters	ESX-0002 O Normal HP Fibre Channel Non-SSD 499.75 GB 499.16 GB VMF53 3/20/2013 11:24:18 PM Enabled Disabled Unknown					
Network Adapters	ESX-0003 🥏 Normal HP Fibre Channel Non-SSD 499.75 GB 499.20 GB VMP53 3/20/2013 11:24:18 PM Enabled Disabled Unknown					
Advanced Settings						
Power Management						
Software						
Licensed Features						
Time Configuration						
DNS and Routing						
Authentication Services						
Power Management						
Virtual Machine Startup/Shutdown						
Virtual Machine Swapfile Location						
Security Profile						
Host Cache Configuration	Datastore Details					
System Resource Allocation	tem Resource Alcolori et M Settings Loodern / wrlstvolumes/51260002 00252524-0994-0017/w175010					
Agent VM Settings						
Advanced settings	Hardware Acceleration: Unknown 973.00 MB Used					
	Refresh Storage Capabilities 930.00 UB III Pree					
	System Storage Capability: N/A					
	User-defined Storage Cepability: N/A					
	Path Selection Properties Estents Storage I/0 Control					
	Most Recently US Volume Label: ESI-0001 HP Fibre Channel Disk (naa 499,99 GB Disabled					
	Detastore Name: ESX-0001 Total Formatted Capacity 499.75 GB					
	Total 7 Formatting					
	Broken: 0 File System: VMFS 5.54					
	Disabled: 0 BROK 328: 1 MB					

### Summary

We presented a Virtual Connect Network scenario by creating two shared uplink sets (SUS), each SUS is connected with TWO active uplinks; both SUS' can actively pass traffic. We included a dual path SAN fabric for storage connectivity using separate VC-FC modules and an 8Gb FC HBA.

When VC profile ESX-1 is applied to the server in bay 2 and the server is powered up, it has one NIC connected through FlexFabric module 1 (connected to VLAN-101-1), the second NIC is connected through FlexFabric module 2 (connected to VLAN-101-2). Each NIC is configured at 100Mb. These NICs are connected to the console vSwitch. The second pair of NICs are connected to the second vSwitch, which is configured for VMotion and is connected to VLAN102-x through NICs 3 and 4 which are configured at 2Gb. The last pair of NICs 5 and 6, are connected to the third vSwitch, which is configured to support VLANs 103 through 105 and 2100 through 2150. This host is also configured for FC based SAN access and connects to a SAN LUN to store the Guest VMs. Each FC port is configured for 8Gb of SAN bandwidth.

As additional servers are added to the enclosure, simply create additional profiles, or copy existing profiles, configure the NICs for LAN and SAN fabrics as required and apply them to the appropriate server bays and power the server on.

# Appendix A1 – Scenario-based CISCO IOS **Command Line Reference**

All of the following commands in this appendix assume an unaltered factory default configuration before execution of the switch commands.

### Scenario 1– Cisco IOS command line configuration (Simple vNet with Active/Standby Uplinks)

Connect to the Cisco switch servicing the VC Ethernet uplink ports and enter the following IOS commands.

#### NOTE: If two switches are being used, issue the same commands on the second switch.

Configure Port 1 of each switch, connected to Port X5				
Command	Shortcut	Description		
>enable	>en	Privilege mode		
#configure terminal	#config t	Configure via terminal		
#interface gigabitethernet0/1	#int gi1/0/1	Focus on Port 1		
#switchport mode access	#sw mo ac	Set port 1 for Single VLAN mode		
#switchport access vlan 1	#sw ac vl 1	Allow Port 1 access to VLAN 1		
#spanning-tree portfast trunk	#sp portf tr	Enable portfast on Port 1		
#exit	#exit	Remove focus from Port 1		
#show vlan brief	#sh vl br	Display all VLANs		
#show interface gigabitethernet0/1 status	#sh int gi0/1 status	Display the status of Port 1		
#copy running-config startup-config (For permanent changes only)	#cop ru st	Save the running configuration to NVRAM. Otherwise, the changes will be lost on the next reboot.		

Table 1 Cisco IOS command line configuration

### Scenarios 2 through 6, 8 and 9 - Cisco IOS command line configuration (Shared Uplink Set with VLAN tagging and 802.3ad (LACP) Active/Active Uplinks)

Connect to the Cisco switch servicing the VC Ethernet uplink ports and enter the following IOS commands.

#### NOTE: If two switches are being used, issue the same commands on the second switch.

 Table 2
 Cisco IOS command line configuration (802.1Q, 802.3ad)

Configure Port 1 and 2 of each	switch, connected to Port X5 and X	5
Command	Shortcut	Description
>enable	>en	Privilege mode
#configure terminal	#config t	Configure via terminal
#interface TenGigabitethernet0/1	#int Ten0/1	Focus on Port 1
#switchport trunk allowed vlan 101- 105,2100-2400	#sw tr ac vl 101- 105,2100-2400	Configure port for VLANs 101 through 105, 2100-2400
#switchport mode trunk	#sw mo tr	Enable trunking on Port 1
#channel-protocol lacp	#channel-p l	Configure port 1 for 802.3ad LACP
#channel-group 10 mode active	#channel-g 10 mo ac	Enable channel group 10
#spanning-tree portfast trunk	#sp portf tr	Enable portfast on Port 1
#exit	#ex	Remove focus from Port 1
#interface TenGigabitethernet0/2	#int Ten0/2	Focus on Port 2
#switchport trunk allowed vlan 101- 105,2100-2400	#sw tr ac vl 101- 105,2100-2400	Configure port for VLANs 101 through 105, 2100-2400
#switchport mode trunk	#sw mo tr	Enable trunking on Port 2
#channel-protocol lacp	#channel-p l	Configure Port 2 for 802.3ad LACP
#channel-group 10 mode active	#channel-g 10 mo ac	Enable channel group 10
#spanning-tree portfast trunk	#sp portf tr	Enable portfast on Port 2
#exit	#ex	Remove focus from Port 2

-		
Command	Shortcut	Description
#show lacp 10 internal	#sh la 10 i	Show the LACP group 10 configuration
#show etherchannel summary	#sh eth sum	Show the etherchannel configuration
#show interface port- channel10 trunk	#sh int port-channel 10 tr	Show the port channel 10 trunk configuration
#copy running-config startup-config (For permanent changes only)	#cop ru st	Save the running configuration to NVRAM. Otherwise, the changes will be lost on the next reboot.

**Table 2** Cisco IOS command line configuration (802.1Q, 802.3ad)Configure Port 1 and 2 of each switch, connected to Port X5 and X6
# Scenarios 7 - Cisco IOS command line configuration (Shared Uplink Set with VLAN tagging and 802.3ad (LACP) Active/Active Uplinks and Tunneled VLANs)

Connect to the Cisco switch servicing the VC Ethernet uplink ports and enter the following IOS commands.

#### NOTE: If two switches are being used, issue the same commands on the second switch.

Configure Port s 2 and 3 of each	n switch for vNet Tunnel (Port X5 a	nd X6)
Command	Shortcut	Description
>enable	>en	Privilege mode
#configure terminal	#config t	Configure via terminal
#interface TenGigabitEthernet 0/2	#int ten0/2	Focus on Port 2
#switchport trunk allowed vlan 101- 105,2100-2400	#sw tr ac vl 101- 105,2100-2400	Configure port for VLANs 101 through 105,2100-2400
#switchport mode trunk	#sw mo tr	Enable trunking on Port 2
#channel-protocol lacp	#channel-p l	Configure port 1 for 802.3ad LACP
#channel-group 10 mode active	#channel-g 10 mo ac	Enable channel group 10
#spanning-tree portfast trunk	#sp portf tr	Enable portfast on Port 2
#exit	#ex	Remove focus from Port 2
#interface TenGigabitEthernet 0/3	#int ten0/3	Focus on Port 3
#switchport trunk allowed vlan 101- 105,2100-2400	#sw tr ac vl 101- 105,2100-2400	Configure port for VLANs 101 through 105,2100-2400
#switchport mode trunk	#sw mo tr	Enable trunking on Port 3
#channel-protocol lacp	#channel-p l	Configure Port 3 for 802.3ad LACP
#channel-group 10 mode active	#channel-g 10 mo ac	Enable channel group 10
#switchport trunk native vlan 500	#sw tr na vl 500	Configure Vlan 500 as the native Vlan
#spanning-tree portfast trunk	#sp portf tr	Enable portfast on Port 3

 Table 3 Cisco IOS command line configuration (802.1Q, 802.3ad)

Command	Shortcut	Description
#exit	#ex	Remove focus from Port 3
#show lacp 10 internal	#sh la 10 i	Show the LACP group 10 configuration
#show etherchannel summary	#sh eth sum	Show the etherchannel configuration
#show interface port- channel10 trunk	#sh int port-channel 10 tr	Show the port channel 10 trunk configuration
#copy running-config startup-config (For permanent changes only)	#cop ru st	Save the running configuration to NVRAM. Otherwise, the changes will be lost on the next reboot.

# **Table 3** Cisco IOS command line configuration (802.1Q, 802.3ad)Configure Port s 2 and 3 of each switch for vNet Tunnel (Port X5 and X6)

**Table 4** Cisco IOS command line configuration (802.1Q)Configure Port s 2 and 3 of each switch for vNet Tunnel (Port X4)

Command	Shortcut	Description
>enable	>en	Privilege mode
#configure terminal	#config t	Configure via terminal
#interface TenGigabitEthernet 0/1	#int ten 0/1	Focus on Port 1
#switchport trunk allowed vlan 101-102	#sw tr ac vl 101-102	Configure port for VLANs 101 through 102
#switchport mode trunk	#sw mo tr	Enable trunking on Port 1
#spanning-tree portfast trunk	#sp portf tr	Enable portfast on Port 1
#exit	#ex	Remove focus from Port 1
#copy running-config startup-config (For permanent changes only)	#cop ru st	Save the running configuration to NVRAM. Otherwise, the changes will be lost on the next reboot.

# Appendix A2 – Scenario-based CISCO NX-OS Command Line Reference

All of the following commands in this appendix assume an unaltered factory default configuration before execution of the switch commands.

# Scenario 1– Cisco NX-OS command line configuration (Simple vNet with Active/Standby Uplinks)

Connect to the Cisco switch servicing the VC Ethernet uplink ports and enter the following NX-OS commands.

#### NOTE: If two switches are being used, issue the same commands on the second switch.

Configure Port 1 of each s	Configure Port 1 of each switch, connected to Port X5			
Command	Shortcut	Description		
>enable	>en	Privilege mode		
#configure terminal	#config t	Configure via terminal		
#interface gigabitethernet0/1	#int gi1/0/1	Focus on Port 1		
#switchport mode access	#sw mod a	Set port 1 for Single VLAN mode		
#switchport access vlan 4	#sw ac vl 4	Allow Port 1 access to VLAN 4		
#spanning-tree portfast trunk	#sp portf tr	Enable portfast on Port 1		
#exit	#exit	Remove focus from Port 1		
#show vlan brief	#sh vl br	Display all VLANs		
#show interface Ethernet 1/1 status	#sh int et1/1 st	Display the status of Port 1		
#copy running-config startup-config (For permanent changes only)	#cop ru st	Save the running configuration to NVRAM. Otherwise, the changes will be lost on the next reboot.		

**Table 5** Cisco NX-OS command line configuration

 Configure Port 1 of each switch, connected to Port X5

# Scenarios 2 through 6,8 and 9 - Cisco NX-OS command line configuration (Shared Uplink Set with VLAN tagging and 802.3ad (LACP) Active/Active Uplinks)

Connect to the Cisco switch servicing the VC Ethernet uplink ports and enter the following NX-OS commands.

#### NOTE: If two switches are being used, issue the same commands on the second switch.

Configure Port 1 and 2 of each switch, connected to Port X5 and X6			
Command	Shortcut	Description	
>enable	>en	Privilege mode	
#configure terminal	#config t	Configure via terminal	
 #feature LACP	#feature l	Enable LACP on the switch	
 #interface Ethernet 1/1	#int eth1/1	Focus on Port 1	
 #switchport mode trunk	#sw mod t	Enable trunking on Port 1	
 #switchport trunk allowed vlan 101- 105,2100-2400	#sw tr a v 101- 105,2100-2400	Configure port for VLANs 101 through 105, 2100-2400	
 #switchport trunk native vlan 101	#sw t n v 101	Set the native VLAN for the 802.1Q trunk	
 #channel-group 10 mode active	#ch 10 mo ac	Enable channel group 10	
#exit	#ex	Remove focus from Port- channel10	
#interface Ethernet 1/2	ttint oth 1/2	Focus on Port 2	
 	#IIIL ELITI/2		
 #switchport mode trunk	#sw mod t	Enable trunking on Port 2	
 #switchport mode trunk #switchport trunk allowed vlan 101- 105,2100-2400	#sw mod t #sw tr a v 101- 105,2100-2400	Enable trunking on Port 2 Configure port for VLANs 101 through 105, 2100-2400	
 #switchport mode trunk #switchport trunk allowed vlan 101- 105,2100-2400 #switchport trunk native vlan 101	#int eth 172 #sw mod t #sw tr a v 101- 105,2100-2400 #sw t n v 101	Enable trunking on Port 2 Configure port for VLANs 101 through 105, 2100-2400 Set the native VLAN for the 802.1Q trunk	
 #switchport mode trunk #switchport trunk allowed vlan 101- 105,2100-2400 #switchport trunk native vlan 101 #channel-group 10 mode active	#int eth 172 #sw mod t #sw tr a v 101- 105,2100-2400 #sw t n v 101 #ch 10 mo ac	Enable trunking on Port 2 Configure port for VLANs 101 through 105, 2100-2400 Set the native VLAN for the 802.1Q trunk Enable channel group 10	
 #switchport mode trunk #switchport trunk allowed vlan 101- 105,2100-2400 #switchport trunk native vlan 101 #channel-group 10 mode active #exit	#int eth 172 #sw mod t #sw tr a v 101- 105,2100-2400 #sw t n v 101 #ch 10 mo ac #ex	Enable trunking on Port 2 Configure port for VLANs 101 through 105, 2100-2400 Set the native VLAN for the 802.1Q trunk Enable channel group 10 Remove focus from Port- channel10	
 #switchport mode trunk         #switchport trunk allowed vlan 101- 105,2100-2400         #switchport trunk native vlan 101         #switchport trunk native vlan 101         #channel-group 10 mode active         #exit         #interface port- channel 10	#int eth 172 #sw mod t #sw tr a v 101- 105,2100-2400 #sw t n v 101 #ch 10 mo ac #ex #int po 10	Enable trunking on Port 2 Configure port for VLANs 101 through 105, 2100-2400 Set the native VLAN for the 802.1Q trunk Enable channel group 10 Remove focus from Port- channel10 Create a port channel 10	
 #switchport mode trunk         #switchport trunk allowed vlan 101- 105,2100-2400         #switchport trunk native vlan 101         #switchport trunk native vlan 101         #channel-group 10 mode active         #exit         #interface port- channel 10         #spanning-tree port type edge trunk	#int eti 172 #sw mod t #sw tr a v 101- 105,2100-2400 #sw t n v 101 #ch 10 mo ac #ex #int po 10 #spa port t e t	Enable trunking on Port 2 Configure port for VLANs 101 through 105, 2100-2400 Set the native VLAN for the 802.1Q trunk Enable channel group 10 Remove focus from Port- channel10 Create a port channel 10 Enable PortFast on Port-channel 10	

**Table 6** Cisco NX-OS command line configuration (802.1Q, 802.3ad)

 Configure Port 1 and 2 of each switch, connected to Port X5 and X6

-		
Command	Shortcut	Description
 #show interface port- channel 10	#sh int po 10	Displays the status of a port- channel interface.
#copy running-config startup-config (For permanent changes only)	#cop ru st	Save the running configuration to NVRAM. Otherwise, the changes will be lost on the next reboot.

**Table 6** Cisco NX-OS command line configuration (802.1Q, 802.3ad)Configure Port 1 and 2 of each switch, connected to Port X5 and X6

# Scenarios 7 - Cisco NX-OS command line configuration (Shared Uplink Set with VLAN tagging and 802.3ad (LACP) Active/Active Uplinks and Tunneled VLANs)

Connect to the Cisco switch servicing the VC Ethernet uplink ports and enter the following NX-OS commands.

### NOTE: If two switches are being used, issue the same commands on the second switch.

 Command	Shortcut	Description
>enable	>en	Privilege mode
#configure terminal	#config t	Configure via terminal
#feature LACP	#feature l	Enable LACP on the switch
#interface Ethernet 1/2	#int eth1/2	Focus on Port 2
 #switchport mode trunk	#sw mod t	Enable trunking on Port 2
#switchport trunk allowed vlan 101- 105,2100-2400	#sw tr a v 101- 105,2100-2400	Configure port for VLANs 101 through 105, 2100-2400
#switchport trunk native vlan 101	#sw t n v 101	Set the native VLAN for the 802.1Q trunk
#channel-group 10 mode active	#ch 10 mo ac	Enable channel group 10
#exit	#ex	Remove focus from Port- channel10
#interface Ethernet 1/3	#int eth1/3	Focus on Port 3
#switchport mode	#sw mod t	Enable trunking on Port 3
 trunk		
 trunk #switchport trunk allowed vlan 101- 105,2100-2400	#sw tr a v 101- 105,2100-2400	Configure port for VLANs 101 through 105, 2100-2400
 trunk #switchport trunk allowed vlan 101- 105,2100-2400 #switchport trunk native vlan 101	#sw tr a v 101- 105,2100-2400 #sw t n v 101	Configure port for VLANs 101 through 105, 2100-2400 Set the native VLAN for the 802.1Q trunk
 trunk #switchport trunk allowed vlan 101- 105,2100-2400 #switchport trunk native vlan 101 #channel-group 10 mode active	#sw tr a v 101- 105,2100-2400 #sw t n v 101 #ch 10 mo ac	Configure port for VLANs 101 through 105, 2100-2400 Set the native VLAN for the 802.1Q trunk Enable channel group 10
 trunk #switchport trunk allowed vlan 101- 105,2100-2400 #switchport trunk native vlan 101 #channel-group 10 mode active #exit	#sw tr a v 101- 105,2100-2400 #sw t n v 101 #ch 10 mo ac #ex	Configure port for VLANs 101 through 105, 2100-2400 Set the native VLAN for the 802.1Q trunk Enable channel group 10 Remove focus from Port- channel10
 trunk #switchport trunk allowed vlan 101- 105,2100-2400 #switchport trunk native vlan 101 #channel-group 10 mode active #exit #interface port- channel 10	#sw tr a v 101- 105,2100-2400 #sw t n v 101 #ch 10 mo ac #ex #int po 10	Configure port for VLANs 101 through 105, 2100-2400 Set the native VLAN for the 802.1Q trunk Enable channel group 10 Remove focus from Port- channel10 Create a port channel 10
trunk #switchport trunk allowed vlan 101- 105,2100-2400 #switchport trunk native vlan 101 #channel-group 10 mode active #exit #interface port- channel 10 #spanning-tree port type edge trunk	#sw tr a v 101- 105,2100-2400 #sw t n v 101 #ch 10 mo ac #ex #int po 10 #spa port t e t	Configure port for VLANs 101         through 105, 2100-2400         Set the native VLAN for the         802.1Q trunk         Enable channel group 10         Remove focus from Port-         channel10         Create a port channel 10         Enable PortFast on Port-channel         10

**Table 7** Cisco NX-OS command line configuration (802.1Q, 802.3ad)

 Configure Port s 2 and 3 of each switch for vNet Tunnel (Port X5 and X6)

Configure Port 3 2				
Command	Sh	ortcut I	Description	
#show interface channel 10	port- #sl	n int po 10 l	Displays the status of a port- channel interface.	
#copy running-c startup-config (For permanent changes only)	onfig #co	op ru st st st	Save the running configuration to NVRAM. Otherwise, the changes will be lost on the next reboot.	

**Table 7** Cisco NX-OS command line configuration (802.1Q, 802.3ad)Configure Port s 2 and 3 of each switch for vNet Tunnel (Port X5 and X6)

**Table 8** Cisco NX-OS command line configuration (802.1Q)Configure Port s 2 and 3 of each switch for vNet Tunnel (Port X4)

Command	Shortcut	Description
>enable	>en	Privilege mode
#configure terminal	#config t	Configure via terminal
#feature LACP	#feature l	Enable LACP on the switch
#interface Ethernet 1/1	#int eth1/1	Focus on Port 1
#switchport mode trunk	#sw mod t	Enable trunking on Port 1
#switchport trunk allowed vlan 101- 105,2100-2400	#sw tr a v 101- 105,2100-2400	Configure port for VLANs 101 through 105, 2100-2400
#exit	#ex	Remove focus from Port
#copy running-config startup-config (For permanent changes only)	#cop ru st	Save the running configuration to NVRAM. Otherwise, the changes will be lost on the next reboot.

# Appendix B1 – Scenario-based ProCurve Command Line Reference

# Scenario 1 – ProCurve command line configuration (Simple vNet with Active/Standby Uplinks)

Connect to the ProCurve switch servicing the VC Ethernet uplink ports and enter the following commands.

#### NOTE: If two switches are being used, issue the same commands on the second switch.

 Command	Shortcut	Description
 >enable	>en	Privilege mode
#configure terminal	#conf	Configure in global mode
#span	#span	Enables spanning-tree (MSTP mode by default)
#vlan 1 untagged [Ethernet] 1	#vlan 1 untag 1	Allow VLAN 1 on Port 1 , and set Port 1 to untagged mode
#spanning-tree 1 admin-edge-port	#span 1 admin-edge	Set Port 1 to be an edge port (non-bridging port). Note: port is set by default in "auto- edge" mode which automatically sets port to Edge if no BPDU are received after 3 sec.
#show interface brief 1	#sh int br 1	Display the status of Port 1
#show vlan ports 1 detail	# show vlan ports 1 detail	Displays the VLAN detail for Port 1
#show vlan 1	#sh vlan 1	Display VLAN 1 port information
#write memory (For permanent changes only)	#write mem	Save the running configuration to NVRAM. Otherwise, the changes will be lost on the next reboot.

**Table 9** ProCurve command line configurationConfigure Port 1 of each switch, connected to Port X5

# Scenarios 2 through 6, 8 and 9 - ProCurve command line configuration (Shared Uplink Set with VLAN tagging and 802.3ad (LACP) Active/Active Uplinks)

Connect to the ProCurve switch servicing the VC Ethernet uplink ports and enter the following commands.

#### NOTE: If two switches are being used, issue the same commands on the second switch.

Command	Shortcut	Description
>enable	>en	Privilege mode
#configure terminal	#conf	Configure in global mode
#span	#span	Enables spanning-tree (MSTP mode by default)
#trunk 1-2 trk1 lacp	#trunk 1-2 trk1 lacp	Configure LACP port-trunk 1 to include Ports 1 & 2
#vlan 101 tagged trk1	#vlan 101 tag trk1	Allow VLAN 101 on Ports 1 and Trk1 (tagged)
#vlan 102 tagged trk1	#vlan 102 tag trk1	Allow VLAN 102 on Ports 1 and Trk1 (tagged)
#vlan 103 tagged trk1	#vlan 103 tag trk1	Allow VLAN 103 on Ports 1 and Trk1 (tagged)
#vlan 104 tagged trk1	#vlan 104 tag trk1	Allow VLAN 104 on Ports 1 and Trk1 (tagged)
		Configure all other VLANs
#vlan 2400 tagged trk1	#vlan 2400 tag trk1	Allow VLAN 2400 on Ports 1 an Trk1 (tagged)
#spanning-tree ethernet trk1 admin- edge-port	#span e trk1 admin- edge	Set trk1 as an edge port (non bridging port). Note: default is "auto-edge" mode which automatically sets port to Edge no BPDU are received after 3 se
#show vlan 101	#sh vlan 101	Display VLAN 101
#show vlan 102	#sh vlan 102	Display VLAN 102
#show vlan 103	#sh vlan 103	Display VLAN 103
#show vlan 104	#sh vlan 104	Display VLAN 104
#show vlan ports trk1 detail	# show vlan ports trk1 detail	Displays the VLAN detail for Tru 1
#show interface brief1- 2	#sh int br1-2	Show Port 1-2 status
#write memory	#wr mem	Save Running Config

Table 10 Dep Curve command line configuration (002 10, 002 2ad)

# Scenarios 7 - ProCurve command line configuration (Shared Uplink Set with VLAN tagging and 802.3ad (LACP) Active/Active Uplinks and Tunneled VLANs)

Connect to the ProCurve switch servicing the VC Ethernet uplink ports and enter the following commands.

#### NOTE: If two switches are being used, issue the same commands on the second switch.

Command	Shortcut	Description
>enable	>en	Privilege mode
#configure terminal	#conf	Configure in global mode
#span	#span	Enables spanning-tree (MSTP mode by default)
#trunk 1-2 trk1 lacp	#trunk 1-2 trk1 lacp	Configure LACP port-trunk 1 to include Ports 1 & 2
#vlan 101 tagged trk1	#vlan 101 tag trk1	Allow VLAN 101 on Ports 2 and 3. Trk1 (tagged)
#vlan 102 tagged trk1	#vlan 102 tag trk1	Allow VLAN 102 on Ports 2 and 3. Trk1 (tagged)
#vlan 103 tagged trk1	#vlan 103 tag trk1	Allow VLAN 103 on Ports 2 and32. Trk1 (tagged)
#vlan 104 tagged trk1	#vlan 104 tag trk1	Allow VLAN 104 on Ports 2 and 3. Trk1 (tagged)
		Configure all other VLANs
#vlan 2400 tagged trk1	#vlan 2400 tag trk1	Allow VLAN 2400 on Ports 2 and32. Trk1 (tagged)
#spanning-tree ethernet trk1 admin- edge-port	#span e trk1 admin- edge	Set trk1 as an edge port (non bridging port). Note: default is "auto-edge" mode which automatically sets port to Edge if no BPDU are received after 3 sec.
#show vlan 101	#sh vlan 101	Display VLAN 101
#show vlan 102	#sh vlan 102	Display VLAN 102
#show vlan 103	#sh vlan 103	Display VLAN 103
#show vlan 104	#sh vlan 104	Display VLAN 104
#show vlan ports trk1 detail	# show vlan ports trk1 detail	Displays the VLAN detail for Trunk 1
#show interface brief1- 3	#sh int br1-3	Show Port 2-3 status
#write memory	#wr mem	Save running configuration

NOTE: If two switches are being used, issue the same commands on the second switch.

Configure Port s 2 and 3 of each switch for vNet Tunnel (Port X4)	

Command	Shortcut	Description
>enable	>en	Privilege mode
#configure terminal	#conf	Configure in global mode
#span	#span	Enables spanning-tree (MSTP mode by default)
#vlan 101 tagged 2	#vlan 101 tag 2	Allow VLAN 101 on Port 1 and set to tagged mode
#vlan 102 tagged 2	#vlan 102 tag 2	Add VLAN 102 on Port 1 and set to tagged mode
#exit	#exit	Exit VLAN 102
#show vlan ports 1 detail	# show vlan ports 1 deta	Displays the VLAN detail for Port 1
#show vlan ports 2 detail	# show vlan ports 2 deta	Displays the VLAN detail for Port 1
#write memory (For permanent changes only)	#write mem	Save the running configuration to NVRAM. Otherwise, the changes will be lost on the next reboot.

# Appendix B2 – Scenario-based Comware Command Line Reference

# Scenario 1– NPN Comware command line configuration (Simple vNet with Active/Standby Uplinks)

Connect to the HPN switch servicing the VC Ethernet uplink ports and enter the following Comware commands.

#### NOTE: It is assumed that the two switches have been configured for IRF.

Configure Port 1 of each switch	Configure Port 1 of each switch, connected to Port X5		
Command	Shortcut	Description	
#system	#sys	System View	
#stp bpdu-protection	#stp bpdu	Enable Spanning Tree	
#vlan 101	#vlan 101	Create VLAN 101	
#interface Ten- Gigabitethernet 1/0/1	#int ten 1/0/1	Focus on Port 1/0/1	
#port access vlan 101	#port ac v 101	Set port 1/0/1 access to VLAN 101	
#interface Ten- Gigabitethernet 2/0/1	#int ten 2/0/1	Focus on Port 2/0/1	
#port access vlan 101	#port ac v 101	Set port 2/0/1 access to VLAN 101	
#quit	#quit	Remove focus from Port 2/0/1	
#save	#sa	Save the running configuration	

**Table 13** Comware command line configuration

 Configure Port 1 of each switch, connected to Port X

# Scenarios 2 through 6, 8 and 9 – HPN Comware command line configuration (Shared Uplink Set with VLAN tagging and 802.3ad (LACP) Active/Active Uplinks)

Connect to the HPN switch servicing the VC Ethernet uplink ports and enter the following IOS commands.

#### NOTE: If two switches are being used, issue the same commands on the second switch.

Configure Port 1 and 2 of each switch, conflected to Port XS and X6		
Command	Shortcut	Description
>system	>sys	System View
#stp bpdu-protection	#stp bpdu	Enable Spanning Tree
 #vlan 101 to 105 2100 to 2400	#vl 101 to 105 2100 to 2400	Create VLANs 101 to 105 and 2100 to 2400
#interface Bridge- Aggregation 1	#int br 1	Create bridge Aggregate 1
#port link-type trunk	#port-l t	Enable Port Trunk on Bridge Aggregate 1
#port trunk permit vlan 101 to 105 2100 to 2400	#port tr pe v 101 to 105 2100 to 2400	Configure bridge aggregate for VLANs 101 through 105, 2100- 2400
#link-aggregation mode dynamic	#link m d	Set Link Aggregation mode to dynamic
#interface Ten- GigabitEthernet 1/0/1	#int ten 1/0/1	Set focus on Interface Ten 1/0/1
#port link-type trunk	#port link-t t	Enable trunking on port
#port trunk permit vlan 101 to 105 2100 to 2400	#port tr pe v 101 to 105 2100 to 2400	Configure port for VLANs 101 through 105, 2100-2400
# port link-aggregation group 1	#port link-a 1	Place port in Bridge Aggregate 1
#interface Ten- GigabitEthernet 1/0/2	#int ten 1/0/2	Set focus on Interface Ten 1/0/2
#port link-type trunk	#port link-t t	Enable trunking on port
#port trunk permit vlan 101 to 105 2100 to 2400	#port tr pe v 101 to 105 2100 to 2400	Configure port for VLANs 101 through 105, 2100-2400
 # port link-aggregation group 1	#port link-a 1	Place port in Bridge Aggregate 1
#interface Bridge- Aggregation 2	#int br 2	Create Bridge Aggregate 2

 Table 14
 Comware command line configuration (802.1Q, 802.3ad)

 Configure Port 1 and 2 of each switch, connected to Port X5 and X6

Command	Shortcut	Description
#port link-type trunk	#port-l t	Enable Port Trunk on Bridge Aggregate 2
#port trunk permit vlan 101 to 105 2100 to 2400	#port tr pe v 101 to 105 2100 to 2400	Configure bridge aggregate for VLANs 101 through 105, 2100- 2400
#link-aggregation mode dynamic	#link m d	Set Link Aggregation mode to dynamic
#interface Ten- GigabitEthernet 1/0/1	#int ten 2/0/1	Set focus on Interface Ten 2/0/1
#port link-type trunk	#port link-t t	Enable trunking on port
#port trunk permit vlan 101 to 105 2100 to 2400	#port tr pe v 101 to 105 2100 to 2400	Configure port for VLANs 101 through 105, 2100-2400
# port link-aggregation group 1	#port link-a 1	Place port in Bridge Aggregate 2
#interface Ten- GigabitEthernet 1/0/2	#int ten 2/0/2	Set focus on Interface Ten 2/0/2
#port link-type trunk	#port link-t t	Enable trunking on port
#port trunk permit vlan 101 to 105 2100 to 2400	#port tr pe v 101 to 105 2100 to 2400	Configure port for VLANs 101 through 105, 2100-2400
# port link-aggregation group 1	#port link-a 1	Place port in Bridge Aggregate 2
#save	#save	Save running config

**Table 14** Comware command line configuration (802.1Q, 802.3ad)Configure Port 1 and 2 of each switch, connected to Port X5 and X6

Note: As an alternative, ports could be configured for ALL VLANs as follows "port trunk permit vlan all"

# Scenarios 7 - Comware command line configuration (Shared Uplink Set with VLAN tagging and 802.3ad (LACP) Active/Active Uplinks and Tunneled VLANs)

Connect to the HPN switch servicing the VC Ethernet uplink ports and enter the following IOS commands.

#### NOTE: If two switches are being used, issue the same commands on the second switch.

Configure Port 1 of each sy	Configure Port 1 of each switch for Shared Uplink Set (Port X4)		
Command	Shortcut	Description	
>system	>sys	System View	
#stp bpdu-protection	#stp bpdu	Enable Spanning Tree	
#vlan 101 to 105	#vl 101 to 105	Create VLANs 101 to 105	
#interface Ten- GigabitEthernet 1/0/1	#int ten 1/0/1	Set focus on Interface Ten 1/0/1	
#port link-type trunk	#port link-t t	Enable trunking on port	
#port trunk permit vlan 101 to 102	#port tr pe v 101 to 102	Configure port for VLANs 101 to 102	
#interface Ten- GigabitEthernet 1/0/2	#int ten 2/0/1	Set focus on Interface Ten 2/0/1	
#port link-type trunk	#port link-t t	Enable trunking on port	
#port trunk permit vlan 101 to 102	#port tr pe v 101 to 102	Configure port for VLANs 101 to 102	
#save	#save	Save running config	

**Table 15** Comware command line configuration (802.1Q, 802.3ad)

 Configure Port 1 of each switch for Shared Uplink Set (Port X4)

Note: As an alternative, ports could be configured for ALL VLANs as follows "port trunk permit vlan all"

	-		
	Command	Shortcut	Description
	>system	>sys	System View
	#stp bpdu-protection	#stp bpdu	Enable Spanning Tree
	#vlan 101 to 105 2100 to 2400	#vl 101 to 105 2100 to 2400	Create VLANs 101 to 105 and 2100 to 2400
	#interface Bridge- Aggregation 1	#int br 1	Create bridge Aggregate 1
	#port link-type trunk	#port-l t	Enable Port Trunk on Bridge Aggregate 1
	#port trunk permit vlan 101 to 105 2100 to 2400	#port tr pe v 101 to 105 2100 to 2400	Configure bridge aggregate for VLANs 101 through 105, 2100- 2400
	#link-aggregation mode dynamic	#link m d	Set Link Aggregation mode to dynamic
	#interface Ten- GigabitEthernet 1/0/1	#int ten 1/0/2	Set focus on Interface Ten 1/0/2
	#port link-type trunk	#port link-t t	Enable trunking on port
	#port trunk permit vlan 101 to 105 2100 to 2400	#port tr pe v 101 to 105 2100 to 2400	Configure port for VLANs 101 through 105, 2100-2400
	# port link-aggregation group 1	#port link-a 1	Place port in Bridge Aggregate 1
	#interface Ten- GigabitEthernet 1/0/2	#int ten 1/0/3	Set focus on Interface Ten 1/0/3
	#port link-type trunk	#port link-t t	Enable trunking on port
	#port trunk permit vlan 101 to 105 2100 to 2400	#port tr pe v 101 to 105 2100 to 2400	Configure port for VLANs 101 through 105, 2100-2400
	# port link-aggregation group 1	#port link-a 1	Place port in Bridge Aggregate 1
	#interface Bridge- Aggregation 2	#int br 2	Create Bridge Aggregate 2
	#port link-type trunk	#port-l t	Enable Port Trunk on Bridge Aggregate 2
	#port trunk permit vlan 101 to 105 2100 to 2400	#port tr pe v 101 to 105 2100 to 2400	Configure bridge aggregate for VLANs 101 through 105, 2100- 2400
	#link-aggregation mode dynamic	#link m d	Set Link Aggregation mode to dynamic
_	#interface Ten- GigabitEthernet 1/0/1	#int ten 2/0/2	Set focus on Interface Ten 2/0/2

**Table 16** Comware command line configuration (802.1Q)Configure Ports 2 & 3 of each switch for the vNet Tunnel (Ports X5 & X6)

Co	ommand	Shortcut	Description
#p	oort link-type trunk	#port link-t t	Enable trunking on port
#p 10 24	port trunk permit vlan 01 to 105 2100 to 400	#port tr pe v 101 to 105 2100 to 2400	Configure port for VLANs 101 through 105, 2100-2400
#⊺ gr	port link-aggregation oup 1	#port link-a 1	Place port in Bridge Aggregate 2
#i Gi	nterface Ten- gabitEthernet 1/0/2	#int ten 2/0/3	Set focus on Interface Ten 2/0/3
#p	oort link-type trunk	#port link-t t	Enable trunking on port
#p 10 24	port trunk permit vlan 01 to 105 2100 to 400	#port tr pe v 101 to 105 2100 to 2400	Configure port for VLANs 101 through 105, 2100-2400
#  gr	port link-aggregation oup 1	#port link-a 1	Place port in Bridge Aggregate 2
#s	save	#save	Save running config

**Table 16** Comware command line configuration (802.1Q)Configure Ports 2 & 3 of each switch for the vNet Tunnel (Ports X5 & X6)

Note: As an alternative, ports could be configured for ALL VLANs as follows "port trunk permit vlan all"

# **Appendix C – Acronyms and abbreviations**

Term	Definition
Auto Port Speed**	Let VC automatically determine best Flex NIC speed
CLP String	Flex-10 NIC settings written to the server hardware by VC/OA when the server is power off. Read by the server hardware upon power in.
Custom Port Speed**	Manually set Flex NIC speed (up to Maximum value defined)
DCC**	Dynamic Control Channel. Future method for VC to change Flex-10 NIC port settings on the fly (without power no/off)
EtherChannel*	A Cisco proprietary technology that combines multiple NIC or switch ports for greater bandwidth, load balancing, and redundancy. The technology allows for bi-directional aggregated network traffic flow.
Flex NIC**	One of four virtual NIC partitions available per Flex-10 Nic port. Each capable of being tuned from 100Mb to 10Gb
Flex-10 Nic Port**	A physical 10Gb port that is capable of being partitioned into 4 Flex NICs
Flex HBA***	Physical function 2 or a FlexFabric CNA can act as eitheran Ethernet NIC, FCoE connection or iSCSI NIC with boot and iSCSI offload capabilities.
IEEE 802.1Q	An industry standard protocol that enables multiple virtual networks to run on a single link/port in a secure fashion through the use of VLAN tagging.
IEEE 802.3ad	An industry standard protocol that allows multiple links/ports to run in parallel, providing a virtual single link/port. The protocol provides greater bandwidth, load balancing, and redundancy.
LACP	Link Aggregation Control Protocol (see IEEE802.3ad)
LOM	LAN-on-Motherboard. Embedded network adapter on the system board
Maximum Link Connection Speed**	Maximum Flex NIC speed value assigned to vNet by the network administrator. Can NOT be manually overridden on the server profile.
Multiple Networks Link Speed Settings**	Global Preferred and Maximum Flex NIC speed values that override defined vNet values when multiple vNets are assigned to the same Flex NIC
MZ1 or MEZZ1; LOM	Mezzanine Slot 1; (LOM) Lan Motherbard/systemboard NIC
Network Teaming Software	A software that runs on a host, allowing multiple network interface ports to be combined to act as a single virtual port. The software provides greater bandwidth, load balancing, and redundancy.
pNIC**	Physical NIC port. A Flex NIC is seen by VMware as a pNIC
Port Aggregation	Combining ports to provide one or more of the following benefits: greater bandwidth, load balancing, and redundancy.
Port Bonding	A term typically used in the Unix/Linux world that is synonymous to NIC teaming in the Windows world.
Preferred Link Connection Speed**	Preferred Flex NIC speed value assigned to a vNet by the network administrator.
Share Uplink Set (SUS)	A set of Ethernet uplinks that are used together to provide improved throughput and availability to a group of associated Virtual Connect networks. Each associated Virtual Connect network is mapped to a specific VLAN on the external connection and appropriate VLAN tags are removed or added as Ethernet packets enter or leave the Virtual Connect domain.
SmartLink	A feature that, when enabled, configures a Virtual Connect network so that if all external uplinks lose link to external switches, Virtual Connect will drop the Ethernet link on all local server blade Ethernet ports connected to that network.
Trunking (Cisco)	802.1Q VLAN tagging
Trunking (Industry)	Combining ports to provide one or more of the following benefits: greater bandwidth, load balancing, and redundancy.
Trunking (Industry)	Combining ports to provide one or more of the following benefits: greater bandwidth, load balancing, and redundancy.
VLAN	A virtual network within a physical network.
VLAN Tagging	Tagging/marking an Ethernet frame with an identity number representing a virtual network.
VLAN Trunking Protocol (VTP)*	A Cisco proprietary protocol used for configuring and administering VLANs on Cisco network devices.
vNIC	Virtual NIC port. A software-based NIC used by Virtualization Managers
vNet	Virtual Connect Network used to connect server NICs to the external Network

\*The feature is not supported by Virtual Connect

\*\*This feature was added for Virtual Connect Flex-10

\*\*\*This feature was added for Virtual Connect FlexFabric

# Appendix D – Useful VC CLI Command sets

The following are a collection of useful VC CLI commands. These CLI commands and many more are documented in detail in Virtual Connect Manager Command Line Interface Version 1.31 (or later) User Guide. The following CLI commands can be copied and pasted into an SSH session with the VCM and will apply immediately upon paste.

In addition to the following CLI commands and scripting examples, there have been several telemetry and troubleshooting commands added to the VC CLI. Please refer to the VC CLI guide for more details on how to sue these commands.

# **VC Domain Configuration**

#Enclosure Setup #Import Enclosure and Set Domain Name #Ensure password matches the OA password import enclosure username=Administrator password=Administrator set domain name=VC\_Domain\_1

#Importing additional or multiple Enclosures to an existing VC Domain
# Importing an Enclosure into an existing VC Domain (Note: As of this writing (VC firmware 2.30) the following commands must be executed individually and cannot be part of a larger script).
#The IP address, login and password information used in this command are from the OA of the enclosure being imported.
Import enclosure 10.0.0.60 UserName=Administrator Password=password
Import enclosure 10.0.0.40 UserName=Administrator Password=password

#Configure MAC and WWN to VC Defined and select pool #1 set domain mactype=vc-defined macpool=1 set domain wwntype=vc-defined wwnpool=1 set serverid type=vc-defined poolid=1

#Set default domain settings set mac-cache Enabled=true Refresh=5 set igmp Enabled=false set enet-vlan -quiet VlanCapacity=Expanded set statistics-throughput -quiet Enabled=true SampleRate=5m set port-protect networkLoop=Enabled set port-protect pauseFlood=Enabled set lacp-timer Default=Short

#Changing the Flow Control setting set advanced-networking -quiet PacketBufferOverallocationRatio=1 FlowControl=auto #Setting Flow Control to off set advanced-networking FlowControl=off

# Set CLI/GUI time-out value – default is 15 minutes set session Timeout=0

#Set snmp community string, trap destination and contact set snmp enet ReadCommunity=public SystemContact="System Admin" set snmp fc ReadCommunity=public SystemContact="System Admin" add snmp-trap SIM Address=192.168.1.185 Community=public Format=SNMPv2 Severity="Critical, Minor" DomainCategories="ServerStatus, FabricStatus, EnetStatus, Legacy, DomainStatus, NetworkStatus, ProfileStatus, FcStatus" EnetCategories="PortThreshold, PortStatus, Other" FcCategories="Other, PortStatus" #Change Administrator default password set user Administrator password=password

#Add additional User to VCM, creates User steve add user steve password=password privileges=domain,network,server,storage

# Set Advanced Ethernet Settings to a Preferred speed of 2Gb and a Max Speed of 6Gb set enet-vlan PrefSpeedType=Custom PrefSpeed=2000 MaxSpeedType=Custom MaxSpeed=6000

### Simple Network (vNet)

Creating vNets #Create vNet "Prod-Net" and configure uplinks add Network Prod-Net add uplinkport enc0:1:X3 Network=Prod-Net speed=auto #Optionally enable the vNet as a Private Network set network Prod-Net Private=Enabled

### **Shared Uplink Set**

Creating Shared Uplink Sets #Create Shared Uplink Set "Prod-Net" and configure one uplink VC module 1, port X1 add uplinkport enc0:1:X1 Uplinkset=Prod-Net speed=auto

#Create Shared Uplink Set "Prod-Net" and configure multiple uplinks on VC Module 1, Ports X1 – X3
add uplinkset Prod-Net
add uplinkport enc0:1:X1 Uplinkset=Prod-Net speed=auto
add uplinkport enc0:1:X2 Uplinkset=Prod-Net speed=auto
add uplinkport enc0:1:X3 Uplinkset=Prod-Net speed=auto

# Create Networks VLAN\_101 through VLAN\_104, supporting VLANs 101 through 104 on Shared Uplink Set "Prod-Net"

add network VLAN\_101 uplinkset=Prod-Net VLanID=101 add network VLAN\_102 uplinkset=Prod-Net VLanID=102 add network VLAN\_103 uplinkset=Prod-Net VLanID=103 add network VLAN\_104 uplinkset=Prod-Net VLanID=104 # (optionally) Set network VLAN\_104 as a "Private Network" set network VLAN\_104 Private=Enabled

## SAN Fabric (VC-FC)

Creating FC SAN Fabrics #Create SAN Fabrics A and B on VC-FC modules in Bays 3 and 4 Add fabric SAN\_A Bay=3 Ports=1,2 Add fabric SAN\_B Bay=4 Ports=1,2

### **Server Profiles**

#Create Server Profile App-1, apply this profile to Server Slot 1 and configure NIC 1 to Multiple Networks VLAN\_101 and VLAN\_102 add profile App-1 -nodefaultenetconn add enet-connection App-1 pxe=Enabled add enet-connection App-1 pxe=Disabled add server-port-map App-1:1 VLAN\_101 VLanId=101 add server-port-map App-1:1 VLAN\_102 VLanId=102 assign profile App-1 enc0:1 # As an alternative when connection to Multiple Networks, if you want ALL networks # configured on a specific Shared Uplink Set to be presented to a server NIC, ensure that # the "Force VLAN mappings as Shared Uplink Set" check box is enabled. # Shared Uplink Set, use the following commands to do so # This will set the Force same VLAN mappings as Shared Uplink Sets check box to enabled # Result is that only VLANs from this shared uplink will be available to this NIC add server-port-map App-1:1 VLAN\_101 Uplinkset=Prod-Net add server-port-map App-1:1 VLAN\_102 Uplinkset=Prod-Net

# Create Server Profile App-1 – Both NICs are configured on network VLAN\_102
add profile App-1 -nodefaultenetconn
add enet-connection App-1 pxe=Enabled
add enet-connection App-1 pxe=Disabled
set enet-connection App-1 1 Network=VLAN\_102
set enet-connection App-1 2 Network=VLAN\_102
assign profile App-1 enc0:2

# Create Server Profile ESX-1 - Both NICs are configured on both networks VLAN\_102 and VLAN\_102 add profile ESX-1 -nodefaultenetconn add enet-connection ESX-1 pxe=Enabled add enet-connection ESX-1 pxe=Disabled add server-port-map ESX-1:1 VLAN\_101 VLanId=101 add server-port-map ESX-1:1 VLAN\_102 VLanId=102 add server-port-map ESX-1:2 VLAN\_101 VLanId=101 add server-port-map ESX-1:2 VLAN\_102 VLanId=102 assign profile ESX-1 enc0:1

# Create Server Profile Server-1 with 8 Flex-10 NICs configured for specific speeds add profile Server-1 –nodefaultenetconn -nodefaultfcconn -nodefaultfcoeconn add enet-connection Server-1 pxe=Enabled Network=Console-101-1 SpeedType=Custom Speed=500 add enet-connection Server-1 pxe=Disabled Network=Console-101-2 SpeedType=Custom Speed=2500 add enet-connection Server-1 pxe=Disabled Network=VMotion-102-1 SpeedType=Custom Speed=2500 add enet-connection Server-1 pxe=Disabled Network=VMotion-102-2 SpeedType=Custom Speed=2500 add enet-connection Server-1 pxe=Disabled Network=Prod-103-1 SpeedType=Custom Speed=2000 add enet-connection Server-1 pxe=Disabled Network=Prod-103-2 SpeedType=Custom Speed=2000 add enet-connection Server-1 pxe=Disabled Network=Prod-103-2 SpeedType=Custom Speed=2000 add server-port-map Server-1:7 Prod-104-1 VLanId=104 add server-port-map Server-1:7 Prod-105-1 VLanId=105 add enet-connection Server-1 pxe=Disabled add server-port-map Server-1:8 Prod-104-2 VLanId=104 add server-port-map Server-1:8 Prod-104-2 VLanId=105 Assign profile Server-1 enc0:1

# Add TWO fc connections to Profile ESX-1 with a specific WWN add fc-connection ESX-1 Fabric=SAN\_3 AddressType=User-Defined PortWWN=50:06:0B:00:00:C2:ff:00 NodeWWN=50:06:0B:00:00:c2:ff:01 add fc-connection ESX-1 Fabric=SAN\_4 AddressType=User-Defined PortWWN=50:06:0B:00:00:C2:ff:02 NodeWWN=50:06:0B:00:00:C2:ff:03

# Add TWO NIC connections to Profile ESX-1 with a specific MAC and iSCSI MAC address add enet-connection ESX-1 AddressType=User-Defined EthernetMac=00-17-00-00-AA-AA IScsiMac=00-17-00-00-BB-BB pxe=Enabled add enet-connection ESX-1 AddressType=User-Defined EthernetMac=00-17-00-00-AA-CC IScsiMac=00-17-00-00-BB-CC pxe=Disabled

# **FlexFabric Scripting Additions**

#Create the *FCoE SAN Fabrics* FCoE\_A and FCoE\_B and configure uplinks as discussed above Add fabric FCoE\_A Bay=1 Ports=1,2 LinkDist=Auto Add fabric FCoE\_B Bay=2 Ports=1,2 LinkDist=Auto

## **Release 3.30 Scripting Additions**

## **Scripting a Shared Uplink Set**

When creating a Shared Uplink Set, you can now bulk create the VLAN entries for the Shared Uplink Set through the use of the "add Network-range" command.

# Create Shared Uplink Set VLAN-Trunk-1 and configure uplinks add uplinkset VLAN-Trunk-1 add uplinkport enc0:1:X5 Uplinkset=VLAN-Trunk-1 speed=auto add uplinkport enc0:1:X6 Uplinkset=VLAN-Trunk-1 speed=auto # Create Networks VLAN-1-1 through VLAN-3-1, VLAN-101-1 through VLAN-105-1, VLAN-201-1 through VLAN-205-1, VLAN-301-1 through VLAN-305-1 for Shared Uplink Set VLAN-Trunk-1 add network-range -quiet UplinkSet=VLAN-Trunk-1 NamePrefix=VLAN- NameSuffix=-1 VLANIds=101-105,201-205,301-305 State=enabled PrefSpeedType=auto SmartLink=enabled

### Scripting a Shared Uplink Set – with a Native VLAN and SmartLink

When creating a Shared Uplink Set, you can now bulk create the VLAN entries for the Shared Uplink Set through the use of the "add Network-range" command.

# Create Shared Uplink Set VLAN-Trunk-1 and configure uplinks add uplinkset VLAN-Trunk-1 add uplinkport enc0:1:X5 Uplinkset=VLAN-Trunk-1 speed=auto add uplinkport enc0:1:X6 Uplinkset=VLAN-Trunk-1 speed=auto # Create Network VLAN-1-1 for Shared Uplink Set VLAN-Trunk-1, enable SmartLink and NativeVLAN add network VLAN-1-1 uplinkset=VLAN-Trunk-1 VLanID=1 NativeVLAN=Enabled Set Network VLAN-1-1 SmartLink=Enabled # Create Networks VLAN-2-1 through VLAN-3-1, VLAN-101-1 through VLAN-105-1, VLAN-2100 through 2400 for Shared Uplink Set VLAN-Trunk-1 add network-range -quiet UplinkSet=VLAN-Trunk-1 NamePrefix=VLAN- NameSuffix=-1 VLANIds=2,3,101-105.2100-2400 State=enabled PrefSpeedTvpe=auto SmartLink=enabled

### Copying a Shared Uplink Sets – with a Native VLAN and SmartLink

Virtual Connect provides the ability to copy a Shared Uplink Set. This can be very handy when defining an Active/Active Shared Uplink Set design. You simply create the first SUS, then copy it.

For example, after creating Shared Uplink Set VLAN-Trunk-1 you can copy it to VLAN-Trunk-2. You will then need to add uplinks to the new SUS and ensure all networks have SmartLink enabled. This can be accomplished as follows;

copy uplinkset VLAN-Trunk-1 VLAN-Trunk-2 fromVlanStr=1 toVlanStr=2 replace=last add uplinkport enc0:2:X5 Uplinkset=VLAN-Trunk-2 speed=auto add uplinkport enc0:2:X6 Uplinkset=VLAN-Trunk-2 speed=auto set network-range -quiet UplinkSet=VLAN-Trunk-1 VLANIds=1,2,3,101-105,2100-2400 SmartLink=enabled

## **Scripting a Server Profile**

When creating a server profile, mapping multiple VLANs to a server NIC is further simplified through the use of the "add server-port-map-range" command

# Create Server Profile ESX-1 add profile ESX-1 -nodefaultfcconn -nodefaultfcoeconn set enet-connection ESX-1 1 pxe=Enabled Network=VLAN-101-1 SpeedType=Custom Speed=100 add enet-connection ESX-1 2 pxe=Disabled Network=VLAN-101-2 SpeedType=Custom Speed=2000 add enet-connection ESX-1 pxe=Disabled Network=VLAN-102-1 SpeedType=Custom Speed=2000 add enet-connection ESX-1 pxe=Disabled Network=VLAN-102-2 SpeedType=Custom Speed=2000 add enet-connection ESX-1 pxe=Disabled Network=VLAN-102-2 SpeedType=Custom Speed=2000 add enet-connection ESX-1 pxe=Disabled add server-port-map-range ESX-1:5 UplinkSet=VLAN-Trunk-1 VLanIds=103-105,2100-2150 add enet-connection ESX-1 pxe=Disabled add server-port-map-range ESX-1:6 UplinkSet=VLAN-Trunk-2 VLanIds=103-105,2100-2150 add fcoe-connection ESX-1 Fabric=FCOE\_A SpeedType=4Gb add fcoe-connection ESX-1 Fabric=FCOE\_B SpeedType=4Gb assign profile ESX-1 enc0:1

### **Copying a Server Profile**

Virtual Connect CLI provides the ability to COPY a profile. The example below will copy an existing profile (ESX-1), then apply it to a vacant server bay (bay 2-4), and optionally power it on.

copy profile ESX-1 ESX-2 assign profile ESX-2 enc0:2 Poweron server enc0:2 copy profile ESX-1 ESX-3 assign profile ESX-2 enc0:3 Poweron server enc0:3 copy profile ESX-1 ESX-4 assign profile ESX-2 enc0:4 Poweron server enc0:4

# Appendix E – Configuring QoS

This appendices will provide an overview and configuration to enable QoS on an existing Virtual Connect Domain. QoS can be configured within a Domain at any time after the Domain have been created.

### **Virtual Connect QoS**

With Virtual Connect 4.01 QoS features have been add to provide the ability to enable and configure QoS services to align with the QoS implementation as configured within your network.

There are 3 QoS modes available within Virtual Connect:

- Passthrough (Default)
- Custom (with FCoE Lossless), Selected when FlexFabric and/or when Dual Hop FCoE is implemented within the Domain
- Custom (without FCoE Lossless), Selected when FCoE is not implemented within the Domain

### Configuring the QoS type via GUI

To configure QoS through the GUI, log into VCM and Select "Quality of Service (QoS", from the Configure Menu drop down, or from the Network box on the Virtual Connect Home page.

Define 👻	Configure - Tools -	Help 🗸	
	Domain Settings		
	Ethernet Network Settings sFlow Settings	3	
	Quality of Service(QoS) IGMP Settings	rofile Wizard	View All Server Profiles
Fibre Channel Settings Serial Number Settings	erver Profile mber Settings	Assigned Server Profiles Unassigned Server Profiles	
Ň	Local User Accounts		
	Certificate Administration		
Network	Mana Adva Defin Defin Netw Defin Qual	ge inced Netw ork Settings e a Netw ork e a Shared Uplink Set ork Setup Wizard e Netw ork Access Group ty of Service(QoS)	View Port Monitoring Netw ork Settings SNMP Settings Quality of Service(QoS)

#### Figure 251 - Configuring QoS

The default Virtual Connect QoS configuration mode is Passthrough. In this mode, two classes of service are provided, one for FCoE with lossless service and one for Ethernet without any form of Quality of Service (FIFO).

To improve the Ethernet traffic service level control and have Virtual Connect take a specific action on a specified classified traffic, the Virtual Connect QoS settings can be changed to **Custom (with FCoE Lossless)** or **Custom (without FCoE Lossless)**. In these modes, Virtual Connect monitors the Ethernet traffic for Layer 2 802.1p Priority bits, or Layer 3 DSCP or ToS markings and places packets on the pre-defined egress queues. The Ethernet traffic is then prioritized based on the traffic classification.

When configured for **Custom (with FCoE Lossless)** or **Custom (without FCoE Lossless)**, Virtual Connect provides up to eight (8) configurable QoS queues. In either mode one queue is assigned to "Best Effort", and in **Custom (with FCoE Lossless)** one queue is assigned to FCoE traffic classes.

**Note:** FCoE Lossless applies to both FlexFabric in a Single Hop FCoE configuration, this would be considered a traditional FlexFabric configuration, or when using the new Dual Hop FCoE feature provided in Virtual Connect 4.01.

**Note:** You can change between any QoS modes as long as No Dual Hop FCoE SAN Fabrics exist. Once a DUAL HOP FCoE SAN fabric has been created, you will be limited to selecting "Passthrough" or "Custom with FCoE Lossless" QoS modes. This only applies when FCoE is configured within a Shared Uplink Set and does not apply to a traditional FlexFabric FCoE SAN Fabric connection.

Figure 252 – Selecting	the QoS mode
------------------------	--------------

Define 👻 Configure 👻 Tools 👻	Help 🕶	
Quality of Service(Qo	S)	2
QoS Configuration Type:	Passthrough 3	
	Passthrough Custom (with FCoE Lossless) Custom (without FCoE Lossless) Custom (without FCoE Lossless)	

## Configuring the QoS Type via CLI

The following command can be copied and pasted into an SSH based CLI session with Virtual Connect:

# Set QoS Config Type to Passthrough set qos Passthrough

# Set QoS Config Type to Custom with FCoE Lossless class set qos CustomWithFCoE

# Set QoS Config Type to Custom no FCoE Lossless class set qos CustomNoFCoE

### **Configuring the QoS Traffic Class via GUI**

The next section is only available when you have <u>not</u> chosen the "Passthrough" QoS configuration type. If selected accordingly, you will see the following menu option where you have the possibility to enable specific queues, define the minimum and maximum bandwidth per queue and the associated 802.1p (COS) priority.

In the **Custom (with FCoE Lossless)** mode, Virtual Connect supports up to 8 configurable traffic classes.

- 1 predefined system class for Best Effort.
- 1 predefined system class for FCoE Lossless.
- 6 user defined classes.

	oE Lossless)	Re	eset ?		
Traffic Classes	Ingress Traffic Classifiers				
Traffic Classes 2					
	- IT			5 007/001 V	
Name ECoE Lossless	Real line	Snare Rer Connection*	Max Share	Egress DOTTP Priority	Enabled
Best Effort		65	100	0	
Medium		25	100	2	✓
Class1		0	100	0	- H
		0	100	0	
Class2					
Class2 Class3		0	100	0	
Class2 Class3 Class4		0	100 100	0	

Figure 253 - Configure the remaining Queues when with FCoE Lossless is selected

The "Share" parameter defines the available bandwidth per output queue. The sum of all individual Share values must be 100. If you add more bandwidth to a specific queue the requested bandwidth is deducted from the "Best\_Effort" traffic class. The "Best\_Effort" Share is therefore not changeable because it gets automatically the remaining unallocated bandwidth.

In the **Custom (without FCoE Lossless)** mode, Virtual Connect supports up to 8 configurable traffic classes.

- 1 predefined system class for Best Effort.
- 7 user defined classes.

Figure 254 - Configure the remaining Queues when without FCoE Lossless is selected

Share	Max Share	Egress DOT1P Priority	Enabled
25	100		
-2.5	100	2	
0	100	0	
0	100	0	
0	100	0	
0	100	0	
0	100	0	
	Share 65 25 0 0 0 0 0	Max Share         Max Share           65         100           0         100           0         100           0         100           0         100           0         100           0         100           0         100           0         100           0         100           0         100	Max Share         Egress DOT1P Priority           65         100         0           25         100         2           0         100         0           0         100         0           0         100         0           0         100         0           0         100         0           0         100         0           0         100         0

Note: The default unchangeable 802.1p priority for the Lossless FCoE traffic class is 3.

### **Configuring the QoS Traffic Class via CLI**

# Set QoS Config Traffic classes set qos-class Medium Enabled=true RealTime=false Share=25 EgressDOT1P=2 MaxShare=100 set qos-class Real\_Time Enabled=true RealTime=true Share=10 EgressDOT1P=5 MaxShare=10 set qos-class Class1 Enabled=false RealTime=false MaxShare=100 set qos-class Class2 Enabled=false RealTime=false MaxShare=100 set qos-class Class3 Enabled=false RealTime=false MaxShare=100 set qos-class Class4 Enabled=false RealTime=false MaxShare=100 set qos-class Class4 Enabled=false RealTime=false MaxShare=100 set qos-class Best\_Effort MaxShare=100

The FCoE Lossless traffic share is based on the Virtual Connect server profile configuration. The MAX Share is based on the FCoE Fabric configuration.

#### Figure 255 - FCoE Bandwidth definition

FC0E HBA Connections										
Port	Connect	FC SAN / FCoE Network Name	Туре	Status	Port Speed Type	Allocated Port S	WWPN	MAC	Mapping	Action
1	Bay 1	FCoE_A	SAN	0	PREFERRED	4 Gb - 8 Gb	50:06:0B:00:00:C2:DE:00	00-17-A4-77-7C-14	LOM1:1-b => Bay 1:d1:v2	
2	Bay 2	FCoE_B	SAN	0	PREFERRED	4 Gb - 8 Gb	50:06:0B:00:00:C2:DE:02	00-17-A4-77-7C-15	LOM1:2-b => Bay 2:d1:v2	Delete
+ 4	+ Add									
🗌 Fik	Fore Channel Boot Parameters									

For each user defined class you want to use, check the **Enabled** box and enter the appropriate Share/Max share and matching 802.1p priority. The total share value must equal 100, as changes in share value are made the Best\_Effort value will adjust automatically. Only ONE queue can be active as Real Time.

Figure 256 – Configure Share Values and DOT1P Priority

OS Configuration Type: Custom (with Classes	h FCoE Lossless) 🔽 ? Ingress Traffic Classifiers	R	eset ?		
Traffic Classes 2					
Name	Real Time	Share	Max Share	Egress DOT1P Priority	Enable
FCoE_Lossless		Per Connection*	Per Fabric*	3	
Best_Effort		65	100	0	
Medium		25	100	2	<ul> <li>✓</li> </ul>
Class1		0	100	0	
Class2		0	100	0	
Class3		0	100	0	
Class4		0	100	0	
Deal Time		L 10 J	10	5	

**Note**: When configured for Dual Hop FCoE, FCoE Ethernet Bandwidth allocation on Virtual Connect uplinks is always fixed (Min=50% - Max=100%). This means that FCoE network will use 100% of bandwidth if no other networks are configured or if other networks are not using their bandwidth

Within the Ingress Traffic Classifiers tab in the **classification for uplinks** and **classification for downlinks** drop-down windows you can define which frame marking you trust when it arrives; the choices include DOT1P, DCSP or DCSP/DOT1P.

In addition you can do a re-marking for IEEE 802.1p or DSCP marked frames.

### Configuring the QoS Ingress Traffic Classifier on Uplinks and Downlinks via GUI

In this section you can define what QoS marking will be trusted when packets are received and how the 802.1p and DSCP mapping is handled.

257 – Configu	Iring Ingress Traffic Classes	
e configure e roc	ns v incip v	
ality of Service(	QoS)	
oS Configuration Ty	Pe: Custom (with FCoE Lossless)	
Traffic Classe	s Ingress Traffic Classifiers	
Ingress Traffic Cla	ssifiers 2	
Classification for u		
Classification for de		
* When DSCP and DOT1P an	e both in use, DSCP will be used to classify IP traffic and DOT1P will be used for non-IP traffic.	
DOT1P Mapping		
Ingress DOT1P Value	Traffic Classes	Egress DOT1P Prio
0	Best_Effort	0
1	Best_Effort	0
2	Medium	2
3 (Non-FCoE traffic)	Medium	2
3 (FCoE traffic)	FCoE_Lossless	3
4	Medium	2
5	Real_Time	5
6	Real_Time	5
7	Real_Time	5
DSCP Mapping		
Ingress DSCP Value	Traffic Classes	Egress DOT1P Prio
DSCP 10, AF11	Best_Effort	0
DSCP 12, AF12	Best_Effort	0
DSCP 14, AF13	Best_Effort	0
DSCP 18, AF21	Medium	2
DSCP 20, AF22	Medium	2
DSCP 22, AF23	Medium	2
DSCP 26, AF31	Medium	2
DSCP 28, AF32	Medium	2
DSCP 30, AF33	Medium	2
DSCP 34, AF41	Medium	2
DSCP 36, AF42	Medium	2
DSCP 38, AF43	Medium	2
DSCP 46, EF	Real Time	5

**Note**: You are forced to re-mark traffic with CoS=3 to a different CoS value. This is done to protect the FCoE traffic which uses the default value of CoS=3.

First you specify what priority values you trust when packets are received from the up- or downlinks (server-links).

You have the choice to select between:

- 802.1p (COS value inside the Layer2 VLAN tag)
- DSCP (Differentiated services code point inside a Layer 3 IPv4 header)
- DSCP/802.1p (When DSCP and DOT1P are both in use, DSCP will be used to classify IP traffic and DOT1P will be used for non-IP traffic)

#### Figure 258 - QoS Ingress Classification

Der	ine 👻 Configure 👻 Tools 👻	Help 👻
Q	uality of Service(Qo	S)
	QoS Configuration Type:	Custom (with FCoE Lossless)
	Traffic Classes	Ingress Traffic Classifiers
	Ingress Traffic Classi	fiers
	Ingress Traffic Classif	
	Ingress Traffic Classif Classification for uplink Classification for down	
	Ingress Traffic Classif Classification for uplink Classification for downl * When DSCP and DOT1P are both	Fiers DOT1P DOT1P DSCP DSCP/DOT1P * to classify IP traffic and DOT1P

### Configuring the QoS Ingress Traffic Classifier on Uplinks and Downlinks via CLI

# Set QoS Ingress Traffic Classifier set qos-classifier Downlinks Classifiers=DOT1P,DSCP set qos-classifier Uplinks Classifiers=DOT1P

### Configuring the QoS Dot1P and DSCP Traffic Mappings via GUI

You can overwrite the egress 802.1q field based on the ingress 802.1p or DSCP values. In the next two screenshots you can see how to map the marked ingress traffic to a specific VC Traffic Class. The system will then automatically apply the corresponding egress 802.1p value to this traffic.

DOT1P Mapping							
Ingress DOT1P Value	Traffic Classes	Egress DOT1P Priority					
0	Best_Effort	0					
1	Best_Effort	0					
2	Medium	2					
3 (Non-FCoE traffic)	Real_Time	2					
3 (FCoE traffic)	Class1	3					
4	Class2 (Disabled)	2					
5	Real_Time	5					
6	Real_Time 💌	5					
7	Real_Time	5					

Figure 259 – GUI QoS 802.1p mapping

**Note:** Non FCoE traffic with an 802.1p value of 3 is enforced to use a different value. This is done to protect FCoE against other traffic.

### **Configuring the QoS Dot1P and DSCP Traffic Mappings via CLI**

# Set QoS Ingress Traffic Classifier set qos-map DOT1P Class=Best\_Effort Values="0-7" set qos-map DSCP Class=Best\_Effort Values="AF11-CS7"

set qos-class Medium Enabled=true RealTime=false Share=25 EgressDOT1P=2 MaxShare=100 set qos-class Real\_Time Enabled=true RealTime=true Share=10 EgressDOT1P=5 MaxShare=10 set qos-class Class1 Enabled=false RealTime=false MaxShare=100 set qos-class Class2 Enabled=false RealTime=false MaxShare=100 set qos-class Class3 Enabled=false RealTime=false MaxShare=100 set qos-class Class4 Enabled=false RealTime=false MaxShare=100 set qos-class Class4 Enabled=false RealTime=false MaxShare=100 set qos-class Best\_Effort MaxShare=100

set qos-classifier Downlinks Classifiers=DOT1P,DSCP set qos-classifier Uplinks Classifiers=DOT1P

set qos-map DOT1P Class=Best\_Effort Values="0,1" set qos-map DOT1P Class=Medium Values="2,3,4" set qos-map DOT1P Class=Real\_Time Values="5,6,7" set qos-map DSCP Class=Best\_Effort Values="AF11,AF12,AF13,CS0,CS1" set qos-map DSCP Class=Medium Values="AF21,AF22,AF23,AF31,AF32,AF33,AF41,AF42,AF43,CS2,CS3,CS4" set qos-map DSCP Class=Real\_Time Values="CS5,CS6,CS7,EF"

set qos CustomWithFCoE

### For more information

To read more about Virtual Connect, go to: hp.com/go/virtualconnect

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