HP Virtual Connect Ethernet Cookbook: Single and Multi Enclosure Domain (Stacked) Scenarios



Part number 603028-003 Third edition August 2010 © Copyright 2009,2010 Hewlett-Packard Development Company, L.P.

The information contained herein is subject to change without notice. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

Confidential computer software. Valid license from HP required for possession, use or copying. Consistent with FAR 12.211 and 12.212, Commercial Computer Software, Computer Software Documentation, and Technical Data for Commercial Items are licensed to the U.S. Government under vendor's standard commercial license.

Microsoft, Windows, and Windows Server are U.S. registered trademarks of Microsoft Corporation. Intel, Pentium, and Itanium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. UNIX is a registered trademark of The Open Group.

Intended audience

This document is for the person who installs, administers, and troubleshoots HP BladeSystem servers with Virtual Connect. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

Contents

Purpose	6
Introduction to Virtual Connect	7
Tunneled VLAN and Mapped VLANS	9
Chapter 1: Single Domain/Enclosure Scenarios Overview Requirements	12
Scenario 1:1 – Simple vNet with Active/Standby Uplinks and Optional Link Aggregation 802.3ad (LACP) Windows Overview Requirements Installation and configuration Switch configuration Optionally Configuring Additional Uplinks to a vNet (LACP) Switch configuration Summary Results	13 13 15 15 20 21 23 23
Scenario 1:2 – Multiple Simple Networks with Active \Active Uplinks and Optional Link Aggregation 802. (LACP) - Windows Overview Requirements Installation and configuration Optionally Configuring Additional Uplinks to a vNet (LACP) Summary Results	26 26 26 28 32 38
Scenario 1:3 – Multiple Simple Networks Providing Redundancy and Link Aggregation 802.3ad (LACP) w Tunneling – VMware ESX Overview Requirements Configuring Uplinks to a vNet (LACP) Installation and configuration Summary Results	40 40 40 40 42 49
Scenario 1:4 – VLAN Tagging (802.1Q) with a Shared Uplink Set (SUS) with Link Aggregation using LAC (802.3ad) – Windows. Overview Requirements. Configuring Uplinks to a vNet (LACP). Installation and configuration Summary. Results	52 52 52 52 54 60
Scenario 1:5 – VLAN Tagging (802.1Q) with a Shared Uplink Set (SUS) with Link Aggregation using LAC (802.3ad) – VMware ESX Overview Requirements	62 62

Configuring Uplinks to a vNet (LACP)	
Installation and configuration	
Summary	
Results	
Scenario 1:6 – VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS) and Link	Aggregation using LACP
(802.3ad) – VMware ESX	73
Overview	
Requirements	
Configuring Uplinks to a vNet (LACP)	
Installation and configuration	
Summary	
Results	
Scenario 1:7 – Private Networks (Simple vNet)	
Overview	
Requirements	
Installation and configuration	
Summary	
Results	95
Chapter 2: Flex-10 Scenario	00
Overview	
Requirements	
•	
Scenario 2:1 - Flex-10 - VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS)	and Mapped VLANs -
Windows 2003/2008	
Overview	
Requirements	
Installation and configuration	
Summary	109
Result	
Adding additional NICs to an existing server Profile	
Summary	
Result	119
Scenario 2:2 - Flex-10 - VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS)	and Mapped VLANs -
Windows 2008 Hyper-V	
Overview	
Requirements	
Installation and configuration	
Summary	
, , , , , , , , , , , , , , , , , , ,	
Scenario 2:3 - Flex-10 - VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS)	
4	
Overview	
Requirements	
Installation and configuration	
Summary Result	
Scenario 2:4 - Flex-10 - VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS)	and Tunneled VLANs - ES
4	155
Overview	155
Requirements	156
Installation and configuration	157

Summary Result	
Chapter 3: Multi-Enclosure (Stacking) Scenarios Overview Requirements	170
Scenario 3:1 – Multi-Enclosure stacking, with Multiple Simple vNets, Redundant Uplinks and	
Overview Requirements Installation and configuration Summary Results	
Scenario 3:2 - Flex-10 with Multi-Enclosure stacking - VLAN Tagging (802.1Q) with Multipl (SUS) - VMware ESX - (4 Enclosures) Overview Requirements Installation and configuration Summary Result.	
Appendix A: Scenario-based Cisco command line reference	
Appendix B: Scenario-based ProCurve command line reference	214
Appendix C: Acronyms and abbreviations	
Appendix D: Useful VC CLI Command sets	

Purpose

The purpose of this Virtual Connect Cookbook is to provide new users to Virtual Connect with a better understanding of the concepts and steps required when integrating HP BladeSystem and Virtual Connect 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 solutions. Although these scenarios are shown individually, some scenarios could be combined to create a more complex and versatile Virtual Connect environment, however, keeping in mind the difference between mapped and tunneled VLANs, discussed later in this paper are mutually exclusive.

This is not meant to be a complete or detailed guide to Virtual Connect, but is intended to provide the reader with some valid examples of how Virtual Connect could be deployed. Many additional configurations or scenarios could also be implemented.

Introduction to Virtual Connect

Virtual Connect is an industry standard-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 (Figure 1). Once the LAN and SAN connections are physically made to the pool of servers, the server administrator uses Virtual Connect management tools (Virtual Connect Enterprise Manager or Virtual Connect Manager) to create an Interconnect modules connection profile for each server.

Additional Virtual Connect Reference Material

Link to HP Virtual Connect technology for the HP BladeSystem c-Class, 2nd edition when available <u>http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00814156/c00814156.pdf</u> Link to HP Virtual Connect for c-Class BladeSystem Setup and Installation Guide <u>http://bizsupport1.austin.hp.com/bc/docs/support/SupportManual/c01732252/c01732252.pdf</u> Link to HP Flex-10 technology <u>http://bizsupport2.austin.hp.com/bc/docs/support/SupportManual/c01608922/c01608922.pdf</u>

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 2.30 Firmware Release

Shared Uplink Sets provide administrators 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.)

Virtual Connect firmware 2.30 was released in September 2009 and provided a number of new features. Among those feature enhancements are a couple which are relevant to this paper;

- DCC (Device Control Channel), which adds support for link state, notification and dynamic bandwidth allocation for Flex-10 NICs.
- DCC provides the ability to dynamically edit or modify a Flex-10 profile, renaming the Flex-10 profile, editing NIC connections within a profile and/or adjusting link speed without the need for a server power down or reboot

Note: in order to obtain the full functionality of DCC, NC532i/m NIC firmware level must be 2.2.3 or later.

The following Shared Uplink Set rules apply per domain:

- 320 Unique VLANs per Virtual Connect Ethernet module
- 128 Unique VLANs per Shared Uplink Set
- 28 Unique Server Mapped VLANs per Server Profile Network Connection

Please see the Virtual Connect 2.30 Release Notes for future details on these and other new features.

Tunneled VLAN and Mapped VLANS

Virtual Connect provides two Ethernet networks connection methods. Both of these connection types are discussed within the following scenarios.

vNet

A vNet is a term used to describe a network within Virtual Connect. A vNet could represent a dedicated network within Virtual Connect, in which case it would operate in one of two modes, the first is a simple vNet that will pass untagged frames. The second is a vNet tunnel which will pass tagged frames for one or many VLANs. An individual "Network" as configured within a Shared Uplink Set, which would define a specific VLAN, is also vNet.

The vNet is a network connection between one or many server NICs to one or many uplink ports. A vNet could also exist without uplink ports, to provide connectivity between server NICs within an enclosure to for local only communications such as, cluster a heartbeat network.

A vNet could be used to connect a single VLAN, no tagging, to one or many server NICs. If this network is part of 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. 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 has no limit to the number of VLANs it can support.

Benefits of a vNet

If no VLAN support is required, support for a single specific VLAN being presented as untagged or many VLANs need to be presented to the server a vNet is a very simple network to configure and manage within Virtual Connect.

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.

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;

1. Select 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 VC, those frames will not be tagged, however; Virtual Connect will add the VLAN tag and forward the frame onto the correct VLAN.

2. Select 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 VC 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 and present them to the guests. Using Mapped VLAN Tags minimizes the number of uplinks required.

In order to utilize the Multiple Networks feature of Virtual Connect, the Map VLAN Tags feature, needs to be turned on under the Ethernet Settings/Advanced tab within the Virtual Connect manager or the Virtual Connect CLI.

SUS - Restrictions and limitations

When configuring a Shared Uplink Set the following limitations apply;

- 64 VLANs per uplink (128 VLAN Support is provided in VC firmware 2.30 and later)
- 320 VLANs per module
- 28 VLANs to a server down link
- Every VLAN on every uplink counts towards the 320-VLAN limit. If a Shared Uplink Set is comprised of multiple uplinks, each VLAN on that Shared Uplink Set is counted multiple times

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.

Tunnel vs. Map VLAN tags setting

It is important to note that the behavior of both vNets and Shared Uplink Sets is dependent on whether VLAN Tunnel or Map VLAN Tags is set. Server VLAN Tagging Support, as configured in the "Advanced Ethernet Settings" tab of Virtual Connect is a Domain wide configuration.

If Virtual Connect is set to Tunnel Mode, you can do the following;

- Create a Shared Uplink Set which can support several VLANs up to the publish limits
- These VLANs can be presented to a Server NIC, one at a time No multiple VLANS supported, frames are presented to the NIC untagged
- Create a vNet which can support both TAGGED or UNTAGGED frames, if tagged the host system will need to interpret those tags

If Virtual Connect is set to Map VLAN Tags Mode, you can do the following;

- Create a Shared Uplink Set (the behavior of a SUS changes and now provides the ability to connect multiple networks to a NIC) which can support several VLANs up to the publish limits.
- These VLANs can be presented to a Server NIC, as either a single Network (where VC will remove the tags and present an untagged frame to the NIC), or as multiple Networks, where VC will present all frames with their VLAN tags, in which case the host system will need to interpret the tags (one network could be configured as untagged)
- Create a vNet (the behavior of a vNet also changes) a vNet can now only support UNTAGGED frames, which means a vNet could then only support ONE VLAN/network

Chapter 1: Single Domain/Enclosure Scenarios

Overview

This chapter will provide several simple configuration scenarios of Virtual Connect, using a Single HP BladeSystem c7000 enclosure with two Virtual Connect Ethernet modules installed in Bays 1 and 2. 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 will also be provided.

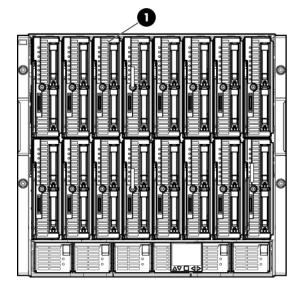
Requirements

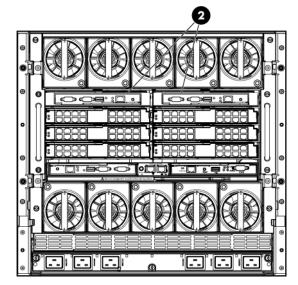
This chapter will utilize a single HP BladeSystem c7000 enclosure with TWO Virtual Connect Ethernet modules and a half height BladeSystem Server. The server will connect to the Virtual Connect models with two 1Gb NICs. NIC 1 will connect to the VC module in Bay 1 and NIC 2 will connect to the VC module in Bay 2.

A pair of managed network switches should also be provided, the switches should also be trunked together.

It is assumed that a Virtual Connect Domain has been created either through the GUI or a CLI script and no VC Networks, uplink sets or Server Profiles have been created.

Figure 1-1 c7000 enclosure with four Half Height G6 BladeSystem servers and two Virtual Connect 1:10 Ethernet modules in Interconnect module bays 1& 2.





ltem	Description
1	Half Height blades
2	VC Ethernet modules

Scenario 1:1 – Simple vNet with Active/Standby Uplinks and Optional Link Aggregation 802.3ad (LACP) - Windows

Overview

This simple configuration uses the Virtual Connect vNet. 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 VC module.

No special upstream switch configuration is required as the switch is in the factory default configuration, typically configured as an Access ports.

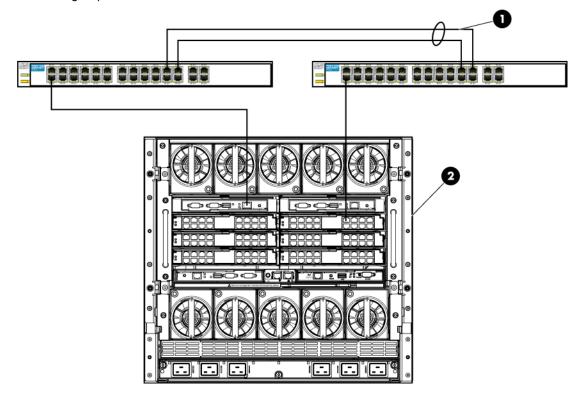
When configuring Virtual Connect, we can provide several ways to implement network fail-over or redundancy. One option would be to connect TWO uplinks to a single vNet; those two uplinks would connect from different Virtual Connect modules within the enclosure and could then connect to the same upstream switch or two different upstream switches, depending on your redundancy needs. An alternative would be to configure TWO separate vNets, each with a single uplink configured. Each option has its advantages and disadvantages. 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, such as iSCSI, backup, VMotion from production network traffic.

Requirements

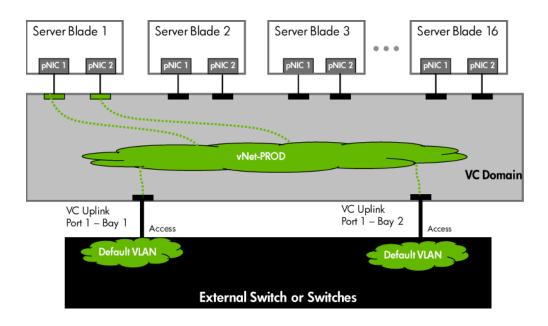
In order to implement this scenario, an HP BladeSystem c7000 enclosure with one or more server blades and TWO Virtual Connect Ethernet modules, installed in Bays 1& 2 are required. In addition, we will require ONE or TWO external Network switches. As Virtual Connect does not appear to the network as a switch and is transparent to the network, any standard managed switch will work with Virtual Connect.

Figure 1-2 Physical View; Shows a single Ethernet uplink from Port 1 on Module 1 to Port 1 on the first network switch and a single uplink from Port 1 on Module 2 to Port 1 on the second network switch.



ltem	Description
1	Switch Cross Connect
2	c7000 Enclosure, rear view

Figure 1-3 Logical View; Shows a single Ethernet uplink from Port 1 on Module 1 on the first network switch and a single uplink from Port 1 on Module 2 to Port 1 on the second network switch.



Installation and configuration

Switch configuration

Appendices A and B provide a summary of the commands required to configure the switch in either a Cisco IOS or a ProCurve network infrastructure. The configuration information provided in the appendices assumes the following information:

- The switch ports are configured as ACCESS ports, either presenting the Default VLAN or a specific VLAN and will for 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. The connected host would then need to be configured to interpret those VLAN tags.

This scenario assumes the switch port is configured as an Access port and the frames are presented to Virtual Connect as untagged

VC CLI commands

In addition to the GUI many of the configuration settings within VC can be 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. Throughout this scenario the CLI commands to configure VC for each setting will also be provided.

Configuring the VC module

Physically connect Port 1 of Network switch 1 to Port 1 on the VC module in Bay 1.

• Physically connect Port 1 of the second Network switch to Port 1 of the VC module in Bay 2, if you have only one network switch, connect VC port 1 (Bay 2) to an alternate port on the same switch. This will NOT create a network loop and does not require Spanning Tree to be configured.

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 can 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 (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 VLAN Tunneling via GUI (Ethernet settings)

Enable Tunnel VLAN Tags within Virtual Connect

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Tunnel VLAN Tags
- Select Fast MAC Cache Fail-over with a refresh of 5
- Select Apply

Configuring the VC Module for VLAN Tunneling 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 "Tunnel VLAN Tags" and Enable Fast MAC cache fail-over
- set enet-vlan vlantagcontrol=Tunnel
- set mac-cache Enabled=True Refresh=5

Figure 1-4 Ethernet settings.

C Addresses Port Monitoring	Advanced Settings	
er VLAN Tagging Support		
Tunnel VLAN Tags		?
C Mop VLAN Togs		
-		
Force server connections to use the Cache Fail-over Enable Fast MAC Cache Fail-over	same VLAN mappings as shared upli	nk sets 🔢
Cache Fail-over	2	nk sets 👔
Cache Fail-over	2	rk sets 🖬

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 network and profile wizards.
- On the Virtual Connect Manager screen, click Define, Ethernet Network to create a vNet
- Ether the Network Name of "vNet-PROD"
 - a. Note; Do NOT select any of the options (ie; Smart Link, Private Networks etc.)
- Select Add Port, then add the following ports;
 - a. Enclosure 1, Bay 1, Port 1
 - b. Enclosure 1, Bay 2, Port 1
- Leave Connection Mode as Auto
- 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.

Note: Smart Link – 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 or SUS are down. We will use Smartlink in a later scenario.

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 enc0:1:1 Network=vNet-PROD speed=auto add uplinkport enc0:2:1 Network=vNet-PROD speed=auto set network vNet-PROD SmartLink=Disabled Figure 1-5 Define Ethernet Network (vNet-PROD).

Note: The Port Status and Connected to information. If the connected switch supports LLDP, the connected to information should be displayed as below

Define 👻 Configure 👻 Tools 👻 Help 👻	
Edit Ethernet Network: vNet-PROD	
Network	
Network Name Smart Link ? Private No vNet-PROD	Network ? Enable VLAN Tunneling ? Status PID State
Advanced	
External Uplink Ports	
Use Shared Uplink Set	
Port Port Role Port Status	Connector Type Connected To PID Speed/Duplex Delete
C7000_1: Bay 1: Port 1 NA	
C7000_1: Bay 2: Port 1 NA QOK Linked/Standb	by 1 Gb RJ45 00:12:79:84:6e:40 (1) Auto 🔽 X
Add Port 👻	
Connection Mode: Auto	
Refresh Delete	Clear Apply Cancel

Defining a Server Profile with NIC 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"
- In the Assign the Profile to a Server Bay, select Bay 1 and apply

Defining a Server Profile with NIC 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 -nodefaultenetconn add enet-connection App-1 pxe=Enabled add enet-connection App-1 pxe=Disabled set enet-connection App-1 1 Network=vNet-PROD set enet-connection App-1 2 Network=vNet-PROD assign profile App-1 enc0:1

Figure 1-6 Define Server Profile (App- 1)

le									
rofile Na		Status 5	orial Num	ber (Logical)	Cornor III	JID (Logical)			
.pp-1		-	CX0000100			9055-4191-8bfb-6t	a6ef7773f7		
1910 I									
rnet Net	twork Connections (Phys	ical ports)							
ort Ne	twork Name		Status	Port Speed	Allocated	PXE	MAC	Mapping	Delete
				Setting	Bandwidth				
VN	Net-PROD	•	📀 ок	Preferred 💌	1 Gb	Enabled 💌	00-17-A4-77-04-00		×
VN	let-PROD	-	🛇 ок	Preferred 💌	1 Gb	Disabled 💌	00-17-A4-77-04-02	LOM:2	×
h bA	Network Connection								
gn Prof	ile to Server Bay								
Power	Serve	r Bay Assignmen	t		SN	Model	Status	s UID	
Off			ect Locatio	use841F	TYW	ProLiant BL495c G	5 🛇 ок		
UTT 👻									

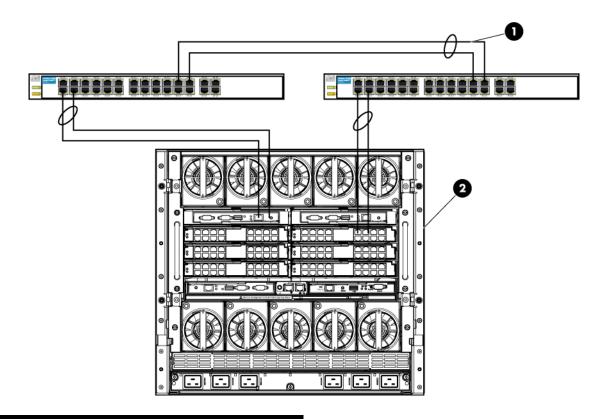
Figure 1-7 Server Profile View Bay 1.

Server Bay Status - Bay #1					
Overall Status:	🛇 ок				
Hardware Status:	🕗 ок				
VC Status:	🕗 ок				
OA Communication Status:	🛇 ок				
Assigned Server Profile:	App-1				
Enclosure Name:	C7000_1				
UID:					
Power Status/Control:	🔍 🔍 Off				
				Mom	entary Press
	#1		_	Mom	entary Press
Serial Number:			_	Mom	entary Press
Serial Number: Product Name:	# 1 USE841FTYW	5c G5	_	Mom	entary Press
Serial Number: Product Name: Server Name:	# 1 USE841FTYW ProLiant BL49	5c G5		Mom	entary Press
Blade Server Information - Bay Serial Number: Product Name: Server Name: Part Number: Asset Tag:	#1 USE841FTYWW ProLiant BL49: ESX-BL495-1.	5c G5		Mom	entary Press
Serial Number: Product Name: Server Name: Part Number: Asset Tag: Server Ethernet Adapter Inforr	#1 USE841FTYW ProLiant BL49 ESX-BL495-1. 454314-B21 [Unknown]	Sc GS vaclab.net			
Serial Humber: Product Name: Server Name: Part Number: Asset Tag:	#1 USE841FTYW ProLiant BL49: ESX-BL495-1. 454314-B21 [Unknown]	5c G5	MAC Address 00-17-X4-72-04-00	Mom Network vNet-PROD	entary Press

Optionally Configuring Additional Uplinks to a vNet (LACP)

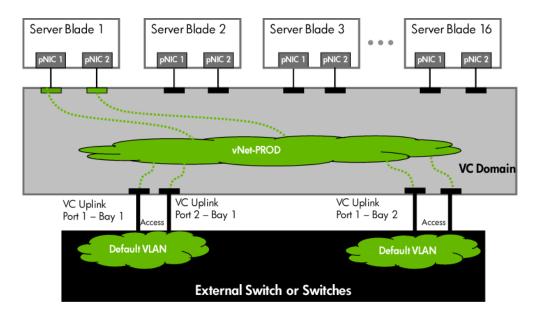
If additional uplink bandwidth or redundancy is required, additional uplinks can be configured for an existing vNet. There are two options available when configuring additional uplinks, when all uplinks configured within a vNet connect a single VC module to a single upstream switch, ALL links will be active, providing additional bandwidth, using Link Aggregation Protocol (LACP 802.3ad), this requires the upstream switch to be configured, on these ports, for link aggregation control protocol (LACP) and be configured in the same link aggregation group. When some of the uplinks configured within a vNet connect a VC module to different upstream switches, or from multiple VC modules to a single or multiple switches, some links will be active and the remaining will be Standby, potentially providing additional bandwidth as well as increase availability, using Link Aggregation Protocol (LACP 802.3.ad).

Figure 1-8 Shows two Ethernet uplinks from Port 1 and 2 on Module 1 to Port 1 and 2 on the first network switch and two uplinks from ports 1 and 2 on Module 2 to Ports 1 and 2 on the second network switch.



ltem	Description
1	Switch Cross Connect
2	c7000 Enclosure, rear view

Figure 1-9 Logical View; Shows two Ethernet uplinks from Ports 1& 2 of each VC module to the network switch.



Switch configuration

Appendices A and B provide a summary of the commands required to configure the switch in either a Cisco IOS or a ProCurve network infrastructure. The configuration information provided in the appendices assumes the following information:

Note: when adding the additional uplinks, the switch ports connected to Virtual Connect will need to be configured for LACP and in the same Link Aggregation Group.

Adding uplinks to an existing vNet via GUI

Edit the vNet named "vNet-PROD"

- In the left pane of the Virtual Connect Manager screen, click on the Network "vNet-Prod"
- Select Add Port, then add the following ports;
 - a. Enclosure 1, Bay 1, Port 2
 - b. Enclosure 1, Bay 2, Port 2
- Leave Connection Mode as Auto
- Select Apply

Note: By connecting FOUR Uplinks from this vNet we have provided additional bandwidth and a redundant path to the network as two uplinks will be active and two will be in standby.

Adding uplinks to an existing vNet via CLI

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect # Edit the vNet "vNet-PROD" and configure uplinks as discussed above

add uplinkport enc0:1:2 Network=vNet-PROD speed=auto add uplinkport enc0:2:2 Network=vNet-PROD speed=auto

set network vNet-PROD SmartLink=Disabled

Figure 1-10 Adding uplinks to an existing vNet (vNet-PROD).

Note: The Port Status and Connected to information. If the connected switch supports LLDP, the connected to information should be displayed as below

work								
Network Name	Sm	art Link 【	Private Network	? Enable VLA	N Tunneling ?	Status F	PID State	
vNet-PROD			Γ			🛇 ок 🌘	Enabled	-
Advanced								
ernal Uplink Ports								
Use Shared Uplink Se			~					
Use Shared Uplink Se	Port Role	/		Connector Type			ID Speed/D	
Use Shared Uplink Se Port C7000_1: Bay 1: Port 1	Port Role NA	́⊘ок/ і	Linked/Active 1 Gb	RJ45	00:17:08:23:0	05:c0 (1)	Auto	•
Use Shared Uplink Se Port C7000_1: Bay 1: Port 1 C7000_1: Bay 1: Port 2	Port Role NA NA	⊘ок ⊘ок	Linked/Active 1 Gb	RJ45 RJ45 (00:17:08:23:0	05:c0 (1) 05:c0 (2)	-	
Use Shared Uplink Se Port C7000_1: Bay 1: Port 1	Port Role NA	©ок ©ок	Linked/Active 1 Gb	RJ45 RJ45 (00:17:08:23:0	05:c0 (1) 05:c0 (2)	Auto	•
Use Shared Uplink Se Port C7000_1: Bay 1: Port 1 C7000_1: Bay 1: Port 2	Port Role NA NA	⊘ok ⊘ok ⊘ok	Linked/Active 1 Gb	RJ45 RJ45 RJ45	00:17:08:23:0	05:c0 (1) 05:c0 (2) 6e:40 (1)	Auto	
Use Shared Uplink Se Port C7000_1: Bay 1: Port 1 C7000_1: Bay 1: Port 2 C7000_1: Bay 2: Port 1	Port Role NA NA NA	⊘ok ⊘ok ⊘ok	Linked/Active Linked/Active Linked/Standby	RJ45 RJ45 RJ45	00:17:08:23:0 00:17:08:23:0 00:12:79:84:6	05:c0 (1) 05:c0 (2) 6e:40 (1)	Auto Auto Auto	
Use Shared Uplink Se Port C7000_1: Bay 1: Port 1 C7000_1: Bay 2: Port 2 C7000_1: Bay 2: Port 1 C7000_1: Bay 2: Port 2	Port Role NA NA NA NA	⊘ok ⊘ok ⊘ok	Linked/Active Linked/Active Linked/Standby	RJ45 RJ45 RJ45	00:17:08:23:0 00:17:08:23:0 00:12:79:84:6	05:c0 (1) 05:c0 (2) 6e:40 (1)	Auto Auto Auto	

Figure 1-11 Link aggregation confirmed – Bay 1.

Note: All connections within an active/active LACP group will have the same LAG ID. To view this, go to the Interconnect bay and view Uplink Port Information. If you are having trouble establishing an active/active connection, confirm the LAG ID.

)efine 🔻	Configure 🖥	r Tool	s 👻 Help 👻					
Bay 1	(HP 1/1	0Gb '	VC-Enet	Modi	ule)			
Uplink I	Port Informatio	n						
Label	Network(s)	Status			Connector Type	LAGIO	Connected To	Detailed statistics
Port 1	vNet-PROD	Ок	Linked/Active	1 Gb	RJ45	(26)	00:17:08:23:05:c0(1)	Detailed statistics/information
Port 2	vNet-PROD	📀 ок	Linked/Active	1 Gb	RJ45	26	00:17:08:23:05:c0(2)	Detailed statistics/information
Port 3			Linked	1 Gb	RJ45	\bigcirc	00:12:79:84:6e:40(21)	Detailed statistics/information
Port 4			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 5			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 6			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 7			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 8			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port X0	Stacking Link	🕗 ок	Linked	10 Gb	Internal	27	00:14:c2:44:ce:d7(X0)	Detailed statistics/information
Port X1			Not Linked	0 Mb	CX4			Detailed statistics/information
Port X2			Not Linked	0 Mb	CX4			Detailed statistics/information

Figure 1-12 Link aggregation confirmed - Bay 2.

lefine 🔻	Configure ·	, Too	is 👻 Help 👻					
3ay 2	? (HP 1/1	0Gb	VC-Enet N	۸odu	le)			
Uplink F	Port Informatio	n						
Label	Network(s)	Status			Connector Type	LAG ID	Connected To	Detailed statistics
Port 1	vNet-PROD	Ок	Linked/Standby	1 Gb	RJ45	26	00:12:79:84:6e:40(1)	Detailed statistics/information
Port 2	vNet-PROD	📀 ок	Linked/Standby	1 Gb	RJ45	(26)	00:12:79:84:6e:40(2)	Detailed statistics/information
Port 3			Linked	1 Gb	RJ45	\smile	00:12:79:84:6e:40(22)	Detailed statistics/information
Port 4			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 5			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 6			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 7			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 8			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port X0	Stacking Link	🕗 ок	Linked	10 Gb	Internal	27	00:14:c2:44:be:cd(X0)	Detailed statistics/information
Port X1			Not Linked	0 Mb	CX4			Detailed statistics/information
Port X2			Not Linked	0 Mb	CX4			Detailed statistics/information

Summary

We created a couple different Virtual Connect Network solutions; base initially for availability, one link was active while the second was in standby mode. We later added two additional links; this increased the network bandwidth to the Virtual Connect network, while still maintaining availability.

When VC profile App-1 is applied to the server in bay1 and is powered up, it has one NIC through each module connected to "vNet-PROD", which connects to the network infrastructure through a pair of 1Gb uplinks. These NICs could now be configured as individual NICs (<u>Figure 1-8</u>) with their own IP address or as a pair of TEAMED NICs (<u>Figure 1-9</u>). 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.

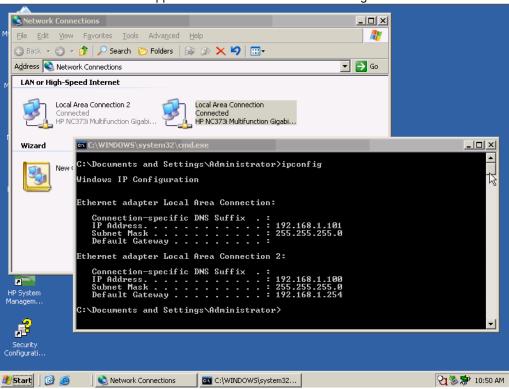
When additional bandwidth was required, additional uplinks were added to the existing vNet, this process had no effect on the server profile.

As additional servers are added to the enclosure, simply create additional profiles, or copy existing profiles, configure the NICs for vNet-PROD and apply them to the appropriate server bays.

Results

The following graphic provides an example of a Windows 2003 server with TWO NICs connected to the network, each NIC has its own TCP/IP address, either or both NICs could be actively working on the network.

Figure 1-13 Both NICs for Profile App-1 are connected to the network through vNet-PROD.

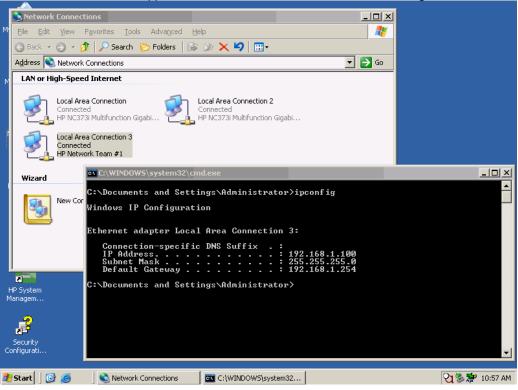


The following graphics provide an example of a Windows 2003 server with TWO NICs teamed and connected to the network. One NIC will be active while the other is in standby. In the event of an Uplink or switch failure, VC will fail-over to the standby uplinks.

Figure 1-14 Both NICs, using the HP Network Configuration Utility.

HP Network Configuration Utility Properties	<u>?</u> ×
Ethernet Devices SCSI Devices	
HP NICs:	Teaming Setup
[1] HP NC373i Multifunction Gigabit Server Adapter I/O Bay 1 Port 2 [2] HP NC373i Multifunction Gigabit Server Adapter #2 I/O Bay 2 Port 2	
	<u>V</u> LAN(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.	<u>Properties</u>
Help License Manager Finable UID 🔽 Display Tray Icon	invent.
	OK Cancel

Figure 1-15 Both NICs for Profile App-1 are teamed and connected to the network through vNet-PROD.



Scenario 1:2 – Multiple Simple Networks with Active Active Uplinks and Optional Link Aggregation 802.3ad (LACP) - Windows

Overview

This simple configuration uses the Virtual Connect vNet. 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 VC module.

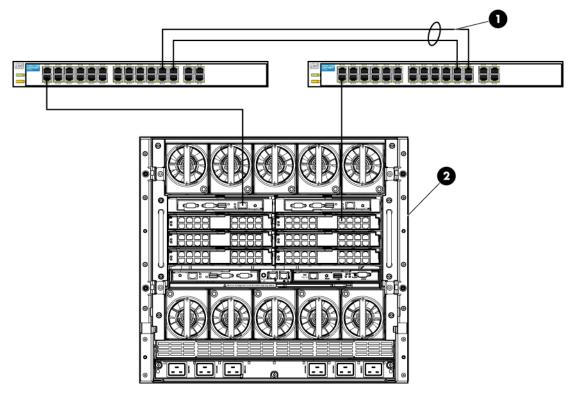
No special upstream switch configuration is required as the switch is in the factory default configuration.

As discussed in scenario 1:1, when configuring Virtual Connect, we can provide several ways to implement network fail-over or redundancy. In this scenario we will configure TWO separate vNets, each with a single uplink configured from each VC module. We will later connect additional uplinks, to provide additional bandwidth.

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, such as iSCSI, backup, VMotion from production network traffic.

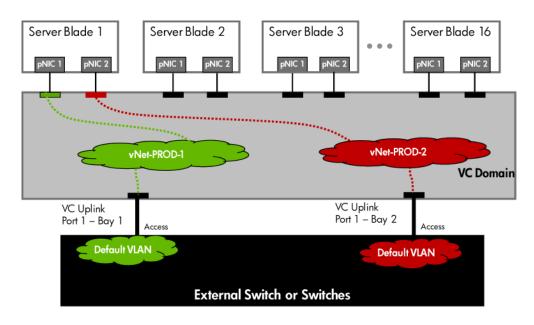
Requirements

In order to implement this scenario, an HP BladeSystem c7000 enclosure with one or more server blades and TWO Virtual Connect Ethernet modules, installed in 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 1-16** Physical View; Shows a single Ethernet uplink from Port 1 on Module 1 to Port 1 on the first network switch and a single uplink from Port 1 on Module 2 to Port 1 on the second network switch.



ltem	Description
1	Switch Cross Connect
2	c7000 Enclosure, rear view

Figure 1-17 Logical View; Shows a single Ethernet uplink from Port 1 on Module 1 to Port 1 on the first network switch and a single uplink from Port 1 on Module 2 to Port 1 on the second network switch. The Uplink from Module 1 is associated with vNet-PROD-1 and the Uplink from Module 2 is associated with vNet-PROD-2. Both of these connections, in this example, connect to the same network.



Installation and configuration

Switch configuration

Appendices A and B provide a summary of the commands required to configure the switch in either a Cisco IOS or a ProCurve network infrastructure. The configuration information provided in the appendices assumes the following information:

- The switch ports are configured as ACCESS ports, either presenting the Default VLAN or a specific VLAN and will for 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. The connected host would then need to be configured to interpret those VLAN tags.

This scenario assumes the switch port is configured as an Access port and the frames are presented to Virtual Connect as untagged

VC CLI commands

In addition to the GUI many of the configuration settings within VC can be 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. Throughout this scenario the CLI commands to configure VC for each setting will also be provided.

Configuring the VC module

• Physically connect port 1 of the Network switch to port 1 on the VC module in Bay 1.

• Connect Port 1 of the second Network switch to Port 1 of the VC module in Bay 2, if you have only one network switch, connect the second VC module, port 1 to an alternate port on the same switch. This will NOT create a network loop and does not require Spanning Tree to be configured.

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 can 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 (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 VLAN Tunneling via GUI (Ethernet settings)

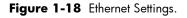
Enable Tunnel VLAN Tags within Virtual Connect

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Tunnel VLAN Tags
- Select Fast MAC Cache Fail-over with a refresh of 5
- Select Apply

Configuring the VC Module VLAN Tunneling 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 "Tunnel VLAN Tags" and Enable Fast MAC cache fail-over set enet-vlan vlantagcontrol=Tunnel

set mac-cache Enabled=True Refresh=5



	es Port Monitoring Advanced Settings
r VLAN Ta	iging Support
 Tunnel 	VLAN Tegs 2
C Mop V	AN Tags
Cache Fail	erver connections to use the same VLAN mappings as shared uplink sets 2 been Fast MAC Cache Fail over 7
Cache Fail	Diver
Cache Fail	Secr 2

Defining two new vNet via GUI

Create a vNet and name it "vNet-PROD-1"

- On the Virtual Connect Manager screen, click Define, Ethernet Network to create a vNet
- Ether the Network Name of "vNet-PROD-1"
 - a. Optionally select Smart Link, but, do NOT select any of the other options (ie; Private Networks etc.)
- Select Add Port, then add the following ports;
 - a. Enclosure 1, Bay 1, Port 1
- Leave Connection Mode as Auto
- Select Apply

Create a vNet and name it "vNet-PROD-2"

- On the Virtual Connect Manager screen, click Define, Ethernet Network to create a vNet
- Ether the Network Name of "vNet-PROD-2"
 - a. Select Smart Link, but, do NOT select any of the other options (ie; Private Networks etc.)
- Select Add Port, then add the following ports;
 - a. Enclosure 1, Bay 2, Port 1
- Leave Connection Mode as Auto
- Select Apply

Note: By creating TWO vNets we have provided a redundant path to the network. As each uplink originates from a different VC module and vNet both, uplinks will be active. 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.

Note: Smart Link – In this configuration Smartlink SHOULD be enabled. Smartlink is used to turn off downlink ports within Virtual Connect if ALL available uplinks to a vNet or SUS are down. In this scenario if an upstream switch or all cables to a vNet were to fail on a specific vNet, VC would turn off the downlink ports connect to that vNet, which would then force the NIC Teaming software to fail-over to the alternate NIC.

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-1

add uplinkport enc0:1:1 Network=vNet-PROD-1 speed=auto

set network vNet-PROD-1 SmartLink=Enabled

add Network vNet-PROD-2

add uplinkport enc0:2:1 Network=vNet-PROD-2 speed=auto

set network vNet-PROD-2 SmartLink=Enabled

Figure 1-19 Define Ethernet Network (vNet-PROD-1).

Note: The Port Status and Connected to information. If the connected switch supports LLDP, the connected to information should be displayed as below.

fine 🔻 Configure 🔻	Tools -	Help 👻						
dit Ethernet N	letwork:	vNet-PR	OD-1					
etwork								
SCWOLK								
Network Name	Sma	art Link ?	Private Network	? Enable VLA	I Tunneling ?	Status	PID State	
vNet-PROD-1		•				📀ок	Enabled	-
Advanced								
ternal Uplink Ports								
aternal opinik Forts								
Use Shared Uplink S	Set							
Port	Port Role	Port Statu	19	Connector Type	Connected I	_	PID Speed/D	uplex Delete
		I OI COLUC						
C7000_1: Bay 1: Port 1	NA		nked/Active 1 Gb	RJ45 (00:17:08:23:05			
	NA		nked/Active 1 Gb				Auto	-
C7000_1: Bay 1: Port 1 Add Port -			nked/Active 1 Gb					
C7000_1: Bay 1: Port 1			nked/Active 1 Gb					
C7000_1: Bay 1: Port 1 Add Port -			nked/Active 1 Gb					
C7000_1: Bay 1: Port 1 Add Port - Connection Mode: Auto			nked/Active 1 Gb					

Figure 1-20 Define Ethernet Network (vNet-PROD-2).

Note: The Port Status and Connected to information. If the connected switch supports LLDP, the connected to information should be displayed as below

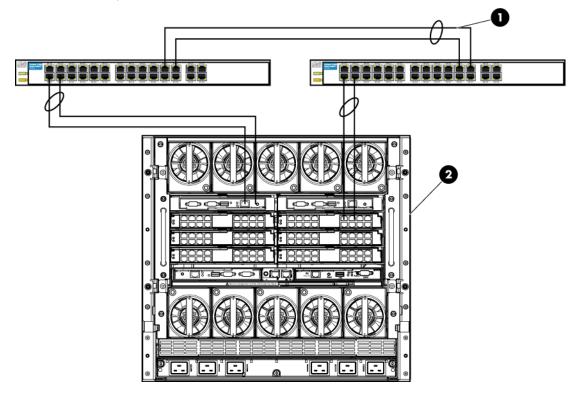
nine - dit E	Configure -	Tools -	Help -	:OD-2	_	_	_	_	_	-
etwork										
_	vork Name -PROD-2		rt Link ?	Private Network	? Enable VL#	AN Tunneling ?	Status OK	PID State	•	
Ad	vanced									
ternal l	Uplink Ports									
	e Shared Uplink Se	1								1
_	L_1: Bay 2: Port 1 I Port →	Port Role NA	Port Statu	inked/Active 1 Gb	Connector Typ RJ45	e <u>Connected T</u> 00:12:79:84:6e		PID Speed/I)uplex	Delete X
Connect	tion Mode: Auto	• ?	1							
Refres	sh Dele					Clear		Apply	Cano	

Scenario 1:2 – Multiple Simple Networks with Active \Active Uplinks and Optional Link Aggregation 802.3ad (LACP) - Windows

Optionally Configuring Additional Uplinks to a vNet (LACP)

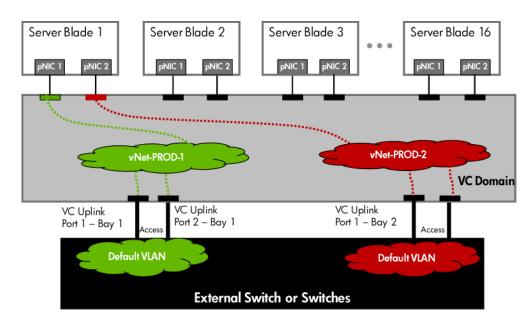
If additional uplink bandwidth or redundancy is required, additional uplinks can be configured for an existing vNet. There are two options available when configuring additional uplinks, when all uplinks configured within a vNet connect a single VC module to a single upstream switch, ALL links will be active, providing additional bandwidth, using Link Aggregation Protocol (LACP 802.3ad), this requires the upstream switch to be configured, on these ports, for link aggregation control protocol (LACP) and be configured in the same link aggregation group. When some of the uplinks configured within a vNet connect a VC module to different upstream switches, or from multiple VC modules to a single or multiple switches, some links will be active and the remaining will be Standby, potentially providing additional bandwidth as well as increase availability, using Link Aggregation Protocol (LACP 802.3.ad).

Figure 1-21 Physical View; Shows two Ethernet uplinks from Ports 1 & 2 on Module 1 to Ports 1 & 2 on the first network switch and two uplinks from Ports 1 and 2 on Module 2 to Ports 1 & 2 on the second network switch.



ltem	Description
1	Switch Cross Connect
2	c7000 Enclosure, rear view

Figure 1-22 Logical View; Shows two Ethernet uplinks from Ports 1&2 of each VC module to the network switch.



Switch configuration

Appendices A and B provide a summary of the commands required to configure the switch in either a Cisco IOS or a ProCurve network infrastructure. The configuration information provided in the appendices assumes the following information:

- The switch ports are configured as ACCESS ports, either presenting the Default VLAN or a specific VLAN and will for 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. The connected host would then need to be configured to interpret those VLAN tags.
- When adding the additional uplinks to the vNet, the switch ports connected to Virtual Connect will need to be configured for LACP and configured for the same Link Aggregation Group.

Adding uplinks to an existing vNet via GUI

Edit the vNet named "vNet-PROD-1"

- In the left pane of the Virtual Connect Manager screen, click on the vNet
- Select Add Port, then add the following ports;
 - a. Enclosure 1, Bay 1, Port 2
- Leave Connection Mode as Auto
- Select Apply
- Edit the vNet named "vNet-PROD-2"
- In the left pane of the Virtual Connect Manager screen, click on the vNet
- Select Add Port, then add the following ports;
 - a. Enclosure 1, Bay 2, Port 1
- Leave Connection Mode as Auto
- Select Apply

Note: By connecting two Uplinks from each vNet we have provided additional bandwidth and redundant paths to the network.

Adding uplinks to an existing vNet via CLI

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

Edit the vNet "vNet-PROD-1" and configure uplinks as discussed above

add uplinkport enc0:1:2 Network=vNet-PROD-1 speed=auto

Edit the vNet "vNet-PROD-2" and configure uplinks as discussed above

add uplinkport enc0:2:2 Network=vNet-PROD-2 speed=auto

Figure 1-23 Adding uplinks to an existing vNet (vNet-PROD-1).

Note: The Port Status and Connected to information. If the connected switch supports LLDP, the connected to information should be displayed as below

Define 👻 Configure 👻	Tools 🔻	Help 👻							
Edit Ethernet Ne	twork:	vNet-PR	OD-1						
Network									
Network Name	Sma	rt Link ?	Private Network	? Enable \	/LAN Tunneling	? Status	PID	State	
vNet-PROD-1						🛇 ок	۲	Enabled 💌	
Advanced									
External Uplink Ports									
Use Shared Uplink Se	t								
Port	Port Role	Port Statu		Connector T			PID	Speed/Duplex	Delete
C7000_1: Bay 1: Port 1	NA	7	nked/Active 1 Gb	RJ45	(3:05:c0 (1)	\mathbf{v}	Auto 💌	×
C7000_1: Bay 1: Port 2	NA	Ock Li	nked/Active 1 Gb	RJ45	00:17:08:2	3:05:c0 (2)		Auto 💌	×
Add Port 👻									
Connection Mode: Auto	• ?								
Refresh Delet	e				Cle	ear	App	oly Can	cel

Figure 1-24 Adding uplinks to an existing vNet (vNet-PROD-2).

Note: The Port Status and Connected to information. If the connected switch supports LLDP, the connected to information should be displayed as below

efine 👻 Configure 👻	Tools v	Help 🔻							_		_
dit Ethernet Ne	etwork:	vNet-PR	OD-2								
etwork											
Network Name vNet-PROD-2		rt Link ?	Private Ne	twork	? Enable VI	.AN Tu	unneling ?	Status	PID	State Enabled	
Advanced											
xternal Uplink Ports											
🔲 Use Shared Uplink Se	et										
Port	Port Role	Port Statu	IS		Connector Ty	pe 🛛	Connected T	'n	PID	Speed/Dup	lex Delete
C7000_1: Bay 2: Port 1	NA	OK/Li	inked/Active	∖d Cp	RJ45	/	00:12:79:84:66	40 (1)	-	Auto	
		1		1	1045		00.12.79.04.00	5.40 (1)	$\mathbf{\nabla}$	Auto	• X
C7000_1: Bay 2: Port 2	NA	Or Li	inked/Active) Gb	RJ45	$\left(\right)$	00:12:79:84:66		X	Auto	• × • ×
	NA	⊘ok Li		удь		$\left(\right)$			Z		
C7000_1: Bay 2: Port 2	NA			удь		$\left(\right)$			Z		

Figure 1-25 Link aggregation confirmed – Bay 1.

Note: All connections within an active/active LACP group will have the same LAG ID. To view this, go to the Interconnect bay and view Uplink Port Information. If you are having troubles establishing an active/active connection, confirm the LAG ID.

lefine 🔻	Configure 🛪	r Tool	ls ▼ Help ▼					
Rav 1	(HP 1/1)	nGh '	VC-Enet	Modi	ile)			
/ a y 1			VO Enot	mout	10)			
Uplink F	ort Informatio	n						
Label	Network(s)	Status			Connector Type	LAGIO	Connected To	Detailed statistics
Port 1	vNet-PROD-1	Ок	Linked/Active	1 Gb	RJ45	(26)	00:17:08:23:05:c0(1)	Detailed statistics/information
Port 2	vNet-PROD-1	Ок	Linked/Active	1 Gb	RJ45	26 /	00:17:08:23:05:c0(2)	Detailed statistics/information
Port 3			Linked	1 Gb	RJ45	\bigcirc	00:12:79:84:6e:40(21)	Detailed statistics/information
Port 4			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 5			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 6			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 7			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 8			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port X0	Stacking Link	🕗 ок	Linked	10 Gb	Internal	27	00:14:c2:44:ce:d7(X0)	Detailed statistics/information
Port X1			Not Linked	0 Mb	CX4			Detailed statistics/information
Port X2			Not Linked	0 Mb	CX4			Detailed statistics/information

Figure 1-26 Link aggregation confirmed - Bay 2.
Define - Configure - Tools - Help -

Bay 2 (HP 1/10Gb VC-Enet Module)

Uplink P	ort Informatio	n						
Label	Network(s)	Status			Connector Type	LAGIO	Connected To	Detailed statistics
Port 1	vNet-PROD-2	🕗 ок	Linked/Active	1 Gb	RJ45	26	00:12:79:84:6e:40(1)	Detailed statistics/information
Port 2	vNet-PROD-2	📀 ок	Linked/Active	1 Gb	RJ45	26	00:12:79:84:6e:40(2)	Detailed statistics/information
Port 3			Linked	1 Gb	RJ45	\smile	00:12:79:84:6e:40(22)	Detailed statistics/information
Port 4			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 5			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 6			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 7			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 8			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port X0	Stacking Link	📀 ок	Linked	10 Gb	Internal	27	00:14:c2:44:be:cd(X0)	Detailed statistics/information
Port X1			Not Linked	0 Mb	CX4			Detailed statistics/information
Port X2			Not Linked	0 Mb	CX4			Detailed statistics/information

Defining a Server Profile with NIC Connections, via GUI

Each server NIC will connect to a specific network.

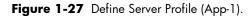
On the Virtual Connect Manager screen, click Define, Server Profile to create a Server Profile

- Create a server profile called "App-1"
- In the Network Port 1 drop down box, select "vNet-PROD-1"
- In the Network Port 2 drop down box, select "vNet-PROD-2"
- In the Assign the Profile to a Server Bays, select Bay 1 and apply

Defining a Server Profile with NIC 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

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=vNet-PROD-1 set enet-connection App-1 2 Network=vNet-PROD-2 assign profile App-1 enc0:1



Profi	ile Name	Status	erial Num	ber (Logical)	Server U	UID (Logical)			
≜,pp-'	1		/CX0000100			9055-4191-8bfb-6	iba6e1777317	1	
_									
rne	t Network Connections (Phys	sical ports)							
Port	Network Name		Status	Port Speed	Allocated	PXE	MAC	Mapping	Delet
	vNet-PROD	•	Ок	Setting Preferred	Bandwidth 1 Gb	Enabled •	00-17-A4-77-04-00	LOM:1	X
	vNet-PROD	-	🛇 ок	Preferred -	1 Gb	Disabled -	00-17-A4-77-04-02	LOM:2	X
	,								
	Add Network Connection								
ign I	Profile to Server Bay								
	wer Serve	er Bay Assignmen	t		SN	Model	Status	UID	
Pov	C7000 1: Bay 1 (ProLiar	nt BL495c Sel	ect Locatic	uses41F	TYW	ProLiant BL495c (≫5 ⊘ок		
Pov							000		

Figure 1-28 View Bay 1.

Denne + Conngure + Too	is ▼ neiµ ▼							
Bay 1 (ProLiant BL4	495c G5)							
Server Bay Status - Bay #1								
Overall Status:	Ок							
Hardware Status:	Ок							
VC Status:	Ок							
OA Communication Status:								
Assigned Server Profile:	App-1							
Enclosure Name:	C7000_1							
UID:								
Power Status/Control:	Off			Mom	entary Press			
Blade Server Information - Bay Serial Number:	USE841FTYM	,						
Product Name:	ProLiant BL49							
Server Name:	ESX-BL495-1							
Part Number:	454314-821	.vaolab.rict						
Asset Tag:	[Unknown]							
Haadd Tug.	torikitoring							
Server Ethernet Adapter Infor	mation							
Ethernet Adapter Flex NIC	Location	Model	MAC Address	Network	Connected To			
Port 1	Embedded NIC	Flex-10 Embedded Ethernet	00-17-A4-77-04-00	vNet-PROD	Bay 1 (1)			
Port 2	Embedded NIC	Flex-10 Embedded Ethernet	00-17-A4-77-04-02	vNet-PROD	Bay 2 (1)			

Summary

We created a couple different Virtual Connect Network solutions; base initially for bandwidth, which also provided additional availability. Two VC networks were created, both with a single active uplink. We later added two additional links; this increased the network bandwidth to the Virtual Connect networks, while still maintaining availability.

When VC profile App-1 is applied to the server in bay1 and is powered up, it has two NICs connected to "vNet-PROD-1" and "vNet-PROD-2", which connects to the network infrastructure through a two 1Gb 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 NIC is active at the time.

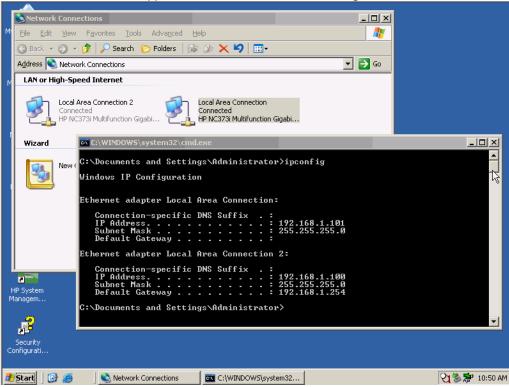
When additional bandwidth was required, additional uplinks were added to each vNet.

As additional servers are added to the enclosure, simply create additional profiles, configure the NICs for vNet-PROD-1 and vNet-PROD-2 and apply them to the appropriate server bays.

Results

The following graphic provides an example of a Windows 2003 server with TWO NICs connected to the network, each NIC has its own TCP/IP address, either or both NICs could be actively working on the network.

Figure 1-29 Both NICs for Profile App-1 are connected to the network through vNet-PROD-1 or vNet-PROD-2.

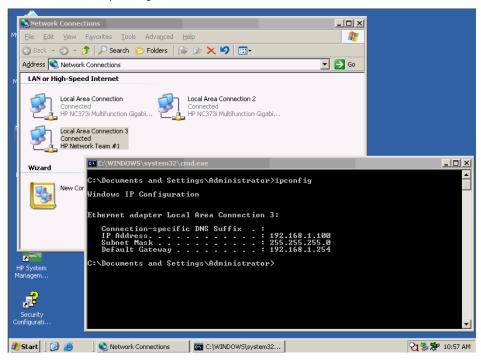


The following graphics provide an example of a Windows 2003 server with TWO NICs teamed and connected to the network. One NIC will be active, the other NIC will be in standby, in the event of an Uplink, switch or VC module failure; the teaming software will fail the NIC over to the alternate path, as required.

HP Network Configuration Utility Properties	? ×
Ethernet Devices iSCSI Devices	
HP NICs: HP Network Team #1 [1] HP NC373i Multifunction Gigabit Server Adapter I/O Bay 1 Port 2 [2] HP NC373i Multifunction Gigabit Server Adapter #2 I/O Bay 2 Port 2	Teaming Setup
	<u>VLAN(802.10)</u>
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 Ico	on invent
	OK Cancel

Figure 1-30 Team both NICs, using the HP Network Configuration Utility.

Figure 1-31 Both NICs for Profile App-1 are teamed and could connect connected to the network through either vNet-PROD-1 or vNet-PROD-2, depending on which NIC is active.



Scenario 1:2 – Multiple Simple Networks with Active Active Uplinks and Optional Link Aggregation 802.3ad (LACP) - Windows

Scenario 1:3 – Multiple Simple Networks Providing Redundancy and Link Aggregation 802.3ad (LACP) with VLAN Tunneling – VMware ESX

Overview

This configuration uses the Virtual Connect vNet. The vNet is the simplest way to connect Virtual Connect to a network and server. In this scenario, the upstream network switch is configured to pass multiple VLANs to two ports on each VC module.

The upstream switch ports will be configured as "trunk" ports for several VLANs, VLAN 101 will be configured as untagged as this VLAN will be used for console or management access.

Requirements

In order to implement this scenario, an HP BladeSystem c7000 enclosure with one of more server blades and TWO Virtual Connect Ethernet modules, installed in 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.

Configuring Uplinks to a vNet (LACP)

When all uplinks configured within a vNet connect a VC module to an upstream switch, ALL links could be active, providing additional bandwidth, using Link Aggregation Protocol (LACP 802.3ad), this requires the upstream switch to be configured, on these ports, for link aggregation control protocol (LACP).

When some of the uplinks configured within a vNet connect a VC module to different upstream switches, some links will be active and the remaining will be Standby, providing additional bandwidth and/or availability, using Link Aggregation Protocol (LACP 802.3.ad).

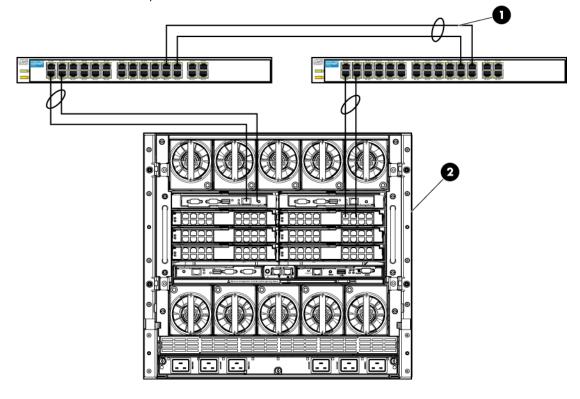


Figure 1-32 Physical View; Shows two Ethernet uplinks from Ports 1 & 2 on Module 1 to Ports 1 & 2 on the first network switch and two uplinks from Ports 1 and 2 on Module 2 to Ports 1 & 2 on the second network switch.

ltem	Description
1	Switch Cross Connect
2	c7000 Enclosure, rear view

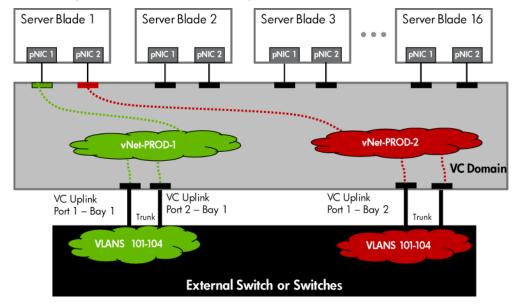


Figure 1-33 Logical View; Shows two Ethernet uplinks from Ports 1&2 of each VC module to the network switch.

Installation and configuration

Switch configuration

Appendices A and B provide a summary of the commands required to configure the switch in either a Cisco IOS or a ProCurve network infrastructure. The configuration information provided in the appendices assumes the following information:

- The upstream switch ports are configured as TRUNK ports, presenting VLANs 101-104 (VLAN 101 is set to default (untagged)).
- The upstream switch ports are configured within the same Link Aggregation Group
- When adding the additional uplinks to the vNet, the switch ports connected to Virtual Connect will need to be configured for LACP and configured for the same Link Aggregation Group.

VC CLI commands

Many of the configuration settings within VC can be 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 the VC module

- Physically connect Ports 1 and 2 of the first network switch to Ports 1 and 2 on the VC module in Bay 1.
- Physically connect Ports 1 and 2 of the second network switch to Ports 1 and 2 of the VC module in Bay 2, if you have only one network switch, connect the second VC module cables to alternates port on the same switch. This will NOT create a network loop and does not require Spanning Tree to be configured.

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 can 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 (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.

Note: Fast MAC Cache Fail-over is less critical with this scenario, as no uplinks are configured in standby mode, all uplinks are active.

Configuring the VC Module for VLAN Tunneling via GUI (Ethernet settings)

Enable Tunnel VLAN Tags within Virtual Connect

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Tunnel VLAN Tags
- Select Fast MAC Cache Fail-over with a refresh of 5
- Select Apply

Configuring the VC Module for VLAN Tunneling 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 "Tunnel VLAN Tags" and Enable Fast MAC cache fail-over set enet-vlan vlantagcontrol=Tunnel set mac-cache Enabled=True Refresh=5

Figure 1-34 Ethernet Settings.

er VLAN Taggin	ng Support	
Tunnel VLA	AN Tags	?
C Map VLAN	Togs	
E Force serve		
Cache Fail-over	er connections to use the same VLAN mappings as share	d uplink sets
Cache Fail-over	-	d uplink sets 🖬
Cache Fail-over	r t MAC Cache Fall-over	d uplink sets
Cache Fail-over	r tMAC Cache Fail-over sh interval S seconds	d uplink sets

Defining two new vNets via GUI

- 1. Create a vNet and name it "vNet-PROD-1"
- On the Virtual Connect Manager screen, click Define, Ethernet Network to create a vNet
- Ether the Network Name of "vNet-PROD-1"
 - a. Select Enable VLAN Tunneling
 - b. Optionally select Smart Link, but, do NOT select Private Networks
- Select Add Port, then add the following ports;
 - a. Enclosure 1, Bay 1, Ports1 & 2
- Leave Connection Mode as Auto
- Select Apply
- 2. Create a vNet and name it "vNet-PROD-2"
- On the Virtual Connect Manager screen, click Define, Ethernet Network to create a vNet
- Ether the Network Name of "vNet-PROD-2"
 - a. Select Enable VLAN Tunneling
 - b. Optionally select Smart Link, but, do NOT select Private Networks
- Select Add Port, then add the following ports;
 - a. Enclosure 1, Bay 2, Ports 1 & 2
- Leave Connection Mode as Auto
- Select Apply

Note: By creating TWO vNets we have provided a redundant path to the network. As each uplink pair originates from a different VC module within each vNet, both uplinks pairs will be active. This configuration provides the ability to lose an uplink cable/pair, network switch or depending on how the NICs are configured at the server (teamed or un-teamed), even a VC module.

Note: Smart Link – In this configuration Smartlink SHOULD be enabled. Smartlink is used to turn off downlink ports within Virtual Connect if ALL available uplinks to a vNet or SUS are down. In this scenario if an upstream switch or all cables to a vNet were to fail, VC would turn off the downlink ports connect to that vNet, which would then force the NIC Teaming software to fail-over to the alternate NIC.

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-1 add uplinkport enc0:1:1 Network=vNet-PROD-1 speed=auto add uplinkport enc0:1:2 Network=vNet-PROD-1 speed=auto set network vNet-PROD-1 SmartLink=Enabled VLanTunnel=Enabled add Network vNet-PROD-2 add uplinkport enc0:2:1 Network=vNet-PROD-2 speed=auto add uplinkport enc0:2:2 Network=vNet-PROD-2 speed=auto set network vNet-PROD-2 SmartLink=Enabled VLanTunnel=Enabled Figure 1-35 Adding uplinks to an existing vNet (vNet-PROD-1).

Note: The Port Status and Connected to information. If the connected switch supports LLDP, the connected to information should be displayed as below

lit Ethernet Ne	etwork:	vNet-PR	OD-1						
work									
Network Name	Sma	rt Link ?	Private Network	? Enable V	'LAN Tunneling	? Status	PID	State	
vNet-PROD-1		$\overline{\mathbf{N}}$		I)	🛇 ок		Enabled	•
	zt								
Use Shared Uplink Se	t Port Role	Port Statu	15	Connector T	ype Connected	L To	PID	Speed/Dup	olex Dela
Use Shared Uplink Se Port			is1 Gb	Connector T RJ45	ype Connected		PID	Speed/Dup Auto	olex Dela V
Use Shared Uplink Se Port C7000_1: Bay 1: Port 1	Port Role	🛛 ок / Ці	\sim			:05:c0 (1)	PID		
Use Shared Uplink Se Port C7000_1: Bay 1: Port 1	Port Role	🛛 ок / Ці	nked/Active 1 Gb	RJ45	00:17:08:23	:05:c0 (1)	PID	Auto	• >
Use Shared Uplink Se Ort C7000_1: Bay 1: Port 1 C7000_1: Bay 1: Port 2 Add Port - onnection Mode: Auto	Port Role	⊘ок Ці ⊘ок Ці	nked/Active 1 Gb	RJ45	00:17:08:23	:05:c0 (1)	PID	Auto	• >

Figure 1-36 Adding uplinks to an existing vNet (vNet-PROD-2).

Note: The Port Status and Connected to information. If the connected switch supports LLDP, the connected to information should be displayed as below

fine - Configure - dit Ethernet Ne	twork:	Help -	DD-2	_				_	_	_	_	_
twork												
Network Name	Sma	rt Link ?	Private Ne	twork	? Enable V	LAN T	unneling ?	Status	PID	State		
vNet-PROD-2					<u> </u>	\geq		ОК		Enabled	•	
Advanced												
ternal Uplink Ports												
ternal Uplink Ports	et											
	st Port Role	Port Status	S		Connector T	уре	Connected	<u>[n_</u>	PID	Speed/Du	Jplex	Delete
Use Shared Uplink Se		Port Status	\sim	Y Gb	Connector T RJ45	уре	Connected 1 00:12:79:84:6		PID	Speed/Du	ıplex	Delete X
Use Shared Uplink Se	Port Role		ked/Active	J Gb		уре		e:40 (1)	PID		_	
Use Shared Uplink Se Port C7000_1: Bay 2: Port 1	Port Role	OK Lin	ked/Active		RJ45	уре	00:12:79:84:6	e:40 (1)	PID	Auto	•	х
Use Shared Uplink Se Port C7000_1: Bay 2: Port 1 C7000_1: Bay 2: Port 2	Port Role	OK Lin OK Lin	ked/Active		RJ45	уре	00:12:79:84:6	e:40 (1)	PID	Auto	•	х
Use Shared Uplink Se Port C7000_1: Bay 2: Port 1 C7000_1: Bay 2: Port 2 Add Port ~	Port Role NA NA	OK Lin OK Lin	ked/Active		RJ45	уре	00:12:79:84:6	e:40 (1)	PID	Auto	•	
Use Shared Uplink Se Port C7000_1: Bay 2: Port 1 C7000_1: Bay 2: Port 2 Add Port ~	Port Role NA NA	OK Lin OK Lin	ked/Active		RJ45	уре	00:12:79:84:6	e:40 (1)	PID	Auto Auto	•	××

Figure 1-37 Link aggregation confirmed – Bay 1.

Note: All connections within an active/active LACP group will have the same LAG ID. To view this, go to the Interconnect bay and view Uplink Port Information. If you are having troubles establishing an active/active connection, confirm the LAG ID

efine 🔻	Configure •	r Tool	s v Help v		_		_	
Bay 1	(HP 1/1	0Gb '	VC-Enet	Modu	ule)			
lletiel. T	D4 I-6		_	_	_	_	_	
uplink i Label	Port Informatio	n Status			Connector Type	LAGIO	Connected To	Detailed statistics
Port 1	vNet-PROD-1	Ок	Linked/Active	1 Gb	RJ45	26	00:17:08:23:05:c0(1)	Detailed statistics/information
Port 2	vNet-PROD-1	Ок	Linked/Active	1 Gb	RJ45	26	00:17:08:23:05:c0(2)	Detailed statistics/information
Port 3			Linked	1 Gb	RJ45	\smile	00:12:79:84:6e:40(21)	Detailed statistics/information
Port 4			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 5			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 6			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 7			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 8			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port X0	Stacking Link	🛇 ок	Linked	10 Gb	Internal	27	00:14:c2:44:ce:d7(X0)	Detailed statistics/information
Port X1			Not Linked	0 Mb	CX4			Detailed statistics/information
Port X2			Not Linked	0 Mb	CX4			Detailed statistics/information

Figure 1-38 Link aggregation confirmed - Bay 2.
Define - Configure - Tools - Help -

Bay 2 (HP 1/10Gb VC-Enet Module)

Uplink F	Port Informatio	n						
Label	Network(s)	Status			Connector Type	LAGU	Connected To	Detailed statistics
Port 1	vNet-PROD-2	📀 ок	Linked/Active	1 Gb	RJ45	(26)	00:12:79:84:6e:40(1)	Detailed statistics/information
Port 2	vNet-PROD-2	📀 ок	Linked/Active	1 Gb	RJ45	26	00:12:79:84:6e:40(2)	Detailed statistics/information
Port 3			Linked	1 Gb	RJ45	\sim	00:12:79:84:6e:40(22)	Detailed statistics/information
Port 4			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 5			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 6			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 7			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 8			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port X0	Stacking Link	📀 ок	Linked	10 Gb	Internal	27	00:14:c2:44:be:cd(X0)	Detailed statistics/information
Port X1			Not Linked	0 Mb	CX4			Detailed statistics/information
Port X2			Not Linked	0 Mb	CX4			Detailed statistics/information

Defining a Server Profile with NIC 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 "ESX-1"
- In the Network Port 1 drop down box, select "vNet-PROD-1"
- In the Network Port 2 drop down box, select "vNet-PROD-2"
- In the Assign the Profile to a Server Bays, select Bay 1 and apply

Defining a Server Profile with NIC 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 ESX-1 add profile ESX-1 –nodefaultenetconn add enet-connection ESX-1 pxe=Enabled add enet-connection ESX-1 pxe=Disabled set enet-connection ESX-1 1 Network=vNet-PROD-1 set enet-connection ESX-1 2 Network=vNet-PROD-2

assign profile ESX-1 enc0:1

Figure 1-39 Define a Server Profile (ESX-1).

Profile Name Status Serial Number (Logical) Server UUID (Logical) ESX-1 Image: Constraint of the second seco		
ESX-1 OK VCX0000100 c9709004-5134-4ad4-8640-5ba5587994f0		
ernet Network Connections (Physical ports)		
er net wetwork Connections (Engstral ports)		
Port Network Name Status Port Speed Allocated PXE MAC Setting Bandwidth	Mapping	Delet
1 vNet-PROD-1 COK Preferred V 1 Gb Enabled V 00-17-A4-77-04-00	D LOM:1	X
2 vNet-PROD-2 🔽 🔮 OK Preferred 🔽 1 Gb Disabled 💌 00-17-A4-77-04-02	2 LOM:2	X
Add Network Connection		
sign Profile to Server Bay		
Power Server Bay Assignment SN Model Status	s UID	

Figure 1-40 View Bay 1

Server Bay Status - Bay #1							
Overall Status:	🛇 ок						
Hardware Status:	🕗 ок						
VC Status:							
OA Communication Stat	is: 🚫 OK						
Assigned Server Profile:	ESX-1						
Enclosure Name:	C7000_1						
UID:							
Power Status/Control:	• Off			Mom	entary Press		
Blade Server Information -	Bay#1			_			
Serial Number:	USE841FTYV	V					
	ProLiant BL4	95c G5					
Product Name:		ESX-BL495-1.vaolab.net					
Product Name: Server Name:	ESX-BL495-1	.vaolab.net					
	ESX-BL495-1 454314-B21	.vaolab.net					

Summary

We created two VC networks, both with TWO active uplinks. Both VC Networks will pass several VLANs as configured/defined by the connected switch, without modification or interpreting the VLAN tags.

When VC profile ESX-1 is applied to the server in bay1 and is powered up, it has two NICs, these NICs are connected to "vNet-PROD-1" and "vNet-PROD-2" respectively, which connects to the network infrastructure through uplinks. These NICs could be configured within the OS as individual NICs with their own IP address or as a pair of TEAMED NICs connected to the same vSwitch. Either NIC could be active. As a result, this server could access the network through either NIC or either set of uplink cables, depending on which NIC is active at the time.

When additional bandwidth is required, additional uplinks could be added to each vNet.

If additional VLANs needed to be supported by these vNets, simply configure the upstream switch ports for the new VLANs, then configure the ESX vSwitch with additional port groups to support these VLANs, no additional Virtual Connect configuration is required.

As additional servers are added to the enclosure, simply create additional profiles, configure the NICs for vNet-PROD-1 and vNet-PROD-2 and apply them to the appropriate server bays.

Results

The following graphic provides an example of an ESX server with TWO NICs connected to the same vSwitch, the console is configured for VLAN 101, which was the Default (untagged) VLAN. Additional port groups were configured to support each additional VLAN.

Figure 1-41 Both NICs for Profile ESX-1 are connected to the network through vNet=PROD-1 and vNet-PROD-2, VLANs are configured as Port Groups within the virtual switch.

Note: if the management/console VLAN was not set to Default within the server Profile, then the console would need to be configured for the appropriate VLAN

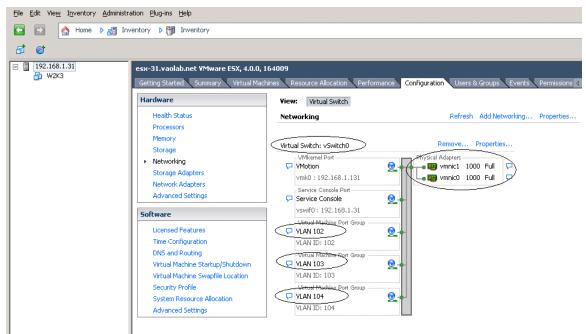


Figure 1-42 Configuring the ESX vSwitch for Multiple Networks / VLANs. If additional VLANs need to be supported, simply configure the upstream switch ports for those VLANs, then configure the vSwitch as below to support those additional VLANs.

🛃 vSwitch0 Properties			
Ports Network Adapters			
Configuration	Summary	Switch Properties	
1 vSwitch	24 Ports	Number of Ports:	24
VMotion	VMotion and IP		
Service <u>Console</u>	<u>Service</u> Console	Default Policies	
VLAN 102	Virtual Machine	Security	
VLAN 103	Virtual Machine Virtual Machine	Promiscuous Mode:	Reject
		MAC Address Changes:	Accept
		Forged Transmits:	Accept
		Traffic Shaping	
		Average Bandwidth:	
		Peak Bandwidth:	
		Burst Size:	
		Failover and Load Balancing	
		Load Balancing:	Port ID
		Network Failure Detection:	Beacon Probing
		Notify Switches:	Yes
		Failback:	Yes
		Active Adapters:	vmnic0, vmnic1
		Standby Adapters:	None
Add	Edit Remove	Unused Adapters:	None
			Close Help

When configuring the virtual guest, edit the Network Adapter configuration and select which VLAN this guest will connect to.

🛃 W2K3 - Virtual Machine Proper	ties		
Hardware Options Resources			Virtual Machine Version: 7
Hardware Options Resources Hardware Memory CPUs Video card Video card VMCI device Floppy drive 1 CO/DVD Drive 1 CD/DVD Drive 1 SCSI controller 0 Hard disk 1	Add Remove	Device Status Connected ✓ Connect at power on Adapter Type Current adapter: VMXNET 3 MAC Address ● Automatic ● Manual Network Connection ● Network Label VLAN 102 VLAN 102 VLAN 103 UAN 104 Port ID:	
Help			DK Cancel

Figure 1-43 The guest Virtualization Manager's network adapter is then configured for the appropriate VLAN.

Scenario 1:4 – VLAN Tagging (802.1Q) with a Shared Uplink Set (SUS) with Link Aggregation using LACP (802.3ad) – Windows

Overview

This configuration uses the Virtual Connect Shared Uplink Set (SUS). The SUS provides the ability to present a single or multiple VLANs to a server NIC. In this scenario, the upstream network switch connects multiple VLANs to two ports on each VC module.

Requirements

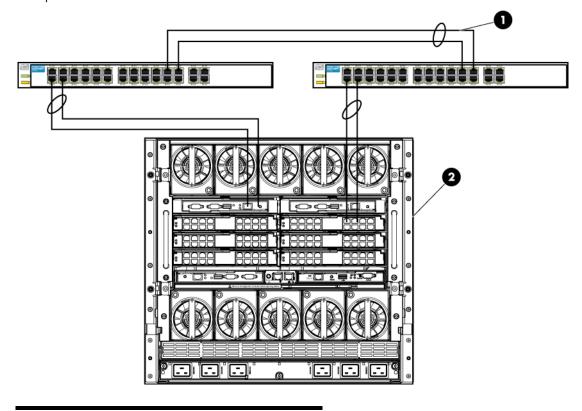
In order to implement this scenario, an HP BladeSystem c7000 enclosure with one of more server blades and TWO Virtual Connect Ethernet modules, installed in Bays 1& 2 are required. In addition, we will require ONE or TWO external Network switches. As Virtual Connect does not appear to the network as a switch and is transparent to the network, any standard managed switch will work with Virtual Connect.

Configuring Uplinks to a vNet (LACP)

When all uplinks configured within a vNet connect a VC module to an upstream switch, ALL links could be active, providing additional bandwidth, using Link Aggregation Protocol (LACP 802.3ad), this requires the upstream switch to be configured, on these ports, for link aggregation control protocol (LACP).

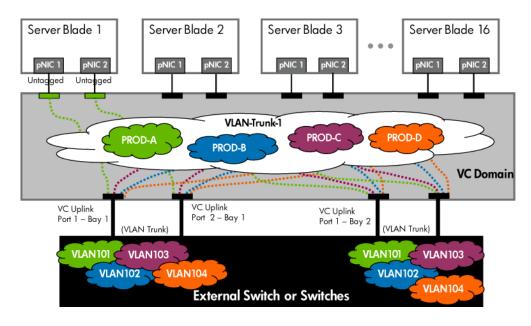
When some of the uplinks configured within a vNet connect a VC module to different upstream switches, some links will be active and the remaining will be Standby, providing additional bandwidth and/or availability, using Link Aggregation Protocol (LACP 802.3.ad).

Figure 1-44 Physical View; Shows two Ethernet uplinks from Ports 1 and 2 on Module 1 to Ports 1 and 2 on the first network switch and two uplinks from Ports 1 and 2 on Module 2 to Ports 1 and 2 on the second network switch.



ltem	Description
1	Switch Cross Connect
2	c7000 Enclosure, rear view

Figure 1-45 Logical View; Shows two Ethernet uplinks from each VC module to the network switches. The Uplinks from both Modules are associated with the Shared Uplink Set "VLAN-Trunk-1. Both NICs for blade App-1 are connected to PROD-A, all frames are received untagged.



Installation and configuration

Switch configuration

Appendices A and B provide a summary of the commands required to configure the switch in either a Cisco IOS or a ProCurve network infrastructure. The configuration information provided in the appendices assumes the following information:

- The switch ports are configured as TRUNK ports to support VLANs 101, 102, 103 and 104. All frames will be forwarding to VC with VLAN tags.
- When adding the additional uplinks to the SUS, the switch ports connected to Virtual Connect will need to be configured for LACP and configured for the same Link Aggregation Group.

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 the VC module

- Physically connect Ports 1 and 2 of the first network switch to Ports 1 and 2 on the VC module in Bay 1.
- Physically connect Ports 1 and 2 of the second network switch to Ports 1 and 2 of the VC module in Bay 2, if you have only one network switch, connect the second VC module cables to alternates port on the same switch. This will NOT create a network loop and does not require Spanning Tree to be configured.

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 can 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 (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 Map VLAN Tags via GUI (Ethernet settings)

Enable Map VLAN Tags within Virtual Connect

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Map VLAN Tags
- Select Fast MAC Cache Fail-over with a refresh of 5
- Select Apply

Configuring the VC Module for Map VLAN Tags 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 "Map VLAN Tags" and Enable Fast MAC cache fail-over set enet-vlan vlantagcontrol=map sharedservervlanid=false set mac-cache Enabled=True Refresh=5

Figure 1-46 Ethernet Settings.

Define 🕶 Configure 👻 Tools 👻 Help 👻	
Ethernet Settings	
MAC Addresses Port Monitoring Advanced Settings	
Server VLAN Tagging Support	
	?
Map VLAN Tags	
\square Force server connections to use the same VLAN mappings as shared uplink sets	?

Defining a new Shared Uplink Set via GUI

Create a SUS and name it "VLAN-Trunk-1"

- On the Virtual Connect Manager screen, click Define, Shared Uplink Set to create a SUS
- Ether the Network Name of "VLAN-Trunk-1"
- Select Add Port, then add the following ports;

- a. Enclosure 1, Bay 1, Port 1
- b. Enclosure 1, Bay 1, Port 2
- c. Enclosure 1, Bay 2, Port 1
- d. Enclosure 1, Bay 2, Port 2
- Add Networks as follows;
 - a. PROD-A = VLAN ID=101
 - **b.** PROD-B = VLAN ID=102
 - c. PROD-B = VLAN ID=103
 - d. PROD-B = VLAN ID=104
- Leave Connection Mode as Auto

Note: By creating a SUS we have provided the ability to present one or many VLANs to a server NIC. As two uplinks are configure from each VC module and the SAME SUS we have provided an active/standby configuration with Link Aggregation (802.3ad, LACP). This configuration provides additional bandwidth and the ability to lose an uplink cable, network switch or depending on how the NICs are configured at the server (teamed or untamed), even a VC module. However, only one uplink pair will be active at a time.

Note: Smart Link – 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 or SUS are down.

Defining a new Shared Uplink Set via CLI

#Create Shared Uplink Set "VLAN-Trunk-1" and configure an uplink on VC Module 1, Port 1 and VC Module 2, Port 1 add uplinkset VLAN-Trunk-1 add uplinkport enc0:1:1 Uplinkset=VLAN-Trunk-1 speed=auto add uplinkport enc0:1:2 Uplinkset=VLAN-Trunk-1 speed=auto add uplinkport enc0:2:1 Uplinkset=VLAN-Trunk-1 speed=auto add uplinkport enc0:2:2 Uplinkset=VLAN-Trunk-1 speed=auto

Create Networks VLAN_101 and VLAN_104 for Shared Uplink Set "VLAN-TRUNK-1" add network PROD-A uplinkset=VLAN-Trunk-1 VLanID=101 add network PROD-B uplinkset=VLAN-Trunk-1 VLanID=102 add network PROD-C uplinkset=VLAN-Trunk-1 VLanID=103 add network PROD-D uplinkset=VLAN-Trunk-1 VLanID=104 Figure 1-47 Define Shared Uplink Set (VLAN-Trunk-1).

ernet Shared External										
	-									
Uplink Set Name				Status	PID					
VLAN-Trunk-1				00	ж					
ernal Uplink Ports										
ernar oplink Ports										
Port	Port Role	Port St	atua		Connector Type Co	winected To	PID	Speed/D	Juplov	Delete
C7000_1: Bay 1: Port 1	NA	Ок		ive 1 Gb		:17:08:23:05:c0 (1		Auto	-	X
C7000_1: Bay 1: Port 2	NA	Ок	Linked/Acti	ive 1 Gb	RJ45 (00	:17:08:23:05:c0 (2	. 6	Auto	-	×
C7000_1: Bay 2: Port 1	NA	Ок	Linked/Star	ndby 1 Gb	RJ45 (00	:12:79:84:6e:40 (1	, 6	Auto	-	×
C7000_1: Bay 2: Port 2	NA	⊘ок	Linked/Star	ndby 1 Gb	RJ45 00	:12:79:84:6e:40 (2	»/ õ	Auto	-	×
Add Port 👻						\checkmark		,	_	
Connection Mode: Auto	• ?									
connection Mode: Auto										
		?	ve ?	Smart Link	Private Network	Advanced				
, sociated Networks (V		?		Smart Link ?	Private Network ?	Advanced				
, sociated Networks (V		? Nati				Advanced		×		
sociated Networks (V Network Name	LAN tagged)	? Nati		?	?			×		
sociated Networks (V Network Name PROD-A	VLAN ID	? Nati		?	?	<u> </u>				

Figure 1-48 Link aggregation confirmed – Bay 1.

Note: All connections within an active/active LACP group will have the same LAG ID. To view this, go to the Interconnect bay and view Uplink Port Information. If you are having troubles establishing an active/active connection, confirm the LAG ID

lefine 🔻	Configure 👻	Tools	; 🛨 Help 🛨					
3av 1	(HP 1/10	Gb ∖	/C-Enet I	Modu	le)			
	(,				,			
Uplink F	ort Information)						
Label	Network(s)	Status			Connector Type	LAG ID	Connected To	Detailed statistics
Port 1	VLAN-Trunk-1	🕗 ок	Linked/Active	1 Gb	RJ45	26	00:17:08:23:05:c0(1)	Detailed statistics/information
Port 2	VLAN-Trunk-1	📀 ок	Linked/Active	1 Gb	RJ45	(26)	00:17:08:23:05:c0(2)	Detailed statistics/information
Port 3			Linked	1 Gb	RJ45	\bigcirc	00:12:79:84:6e:40(21)	Detailed statistics/information
Port 4			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 5			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 6			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 7			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 8			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port X0	Stacking Link	🕗 ок	Linked	10 Gb	Internal	27	00:14:c2:44:ce:d7(X0)	Detailed statistics/information
Port X1			Not Linked	0 Mb	CX4			Detailed statistics/information
Port X2			Not Linked	0 Mb	CX4			Detailed statistics/information

Figure 1-49 Link aggregation confirmed - Bay 2.

3ay 2	2 (HP 1/10	Gb \	/C-Enet N	Iodul	e)			
Uplink F	ort Information	1						
Label	Network(s)	Status			Connector Type	LAGID	Connected To	Detailed statistics
Port 1	VLAN-Trunk-1	🕗 ок	Linked/Standby	1 Gb	RJ45	26	00:12:79:84:6e:40(1)	Detailed statistics/information
Port 2	VLAN-Trunk-1	📀 ок	Linked/Standby	1 Gb	RJ45	26	00:12:79:84:6e:40(2)	Detailed statistics/information
Port 3			Linked	1 Gb	RJ45	\sim	00:12:79:84:6e:40(22)	Detailed statistics/information
Port 4			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 5			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 6			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 7			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 8			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port X0	Stacking Link	📀 ок	Linked	10 Gb	Internal	27	00:14:c2:44:be:cd(X0)	Detailed statistics/information
Port X1			Not Linked	0 Mb	CX4			Detailed statistics/information
Port X2			Not Linked	0 Mb	CX4			Detailed statistics/information

Defining a Server Profile with NICs Connections to a single VLAN, via GUI

Each server NIC will connect to a 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 "PROD-A"
- In the Network Port 2 drop down box, select "PROD-A"
- In the Assign the Profile to a Server Bays, select Bay 1 and apply

Defining a Server Profile with NICs Connections to a single VLAN, 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 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=PROD-A

set enet-connection App-1 2 Network=PROD-A assign profile App-1 enc0:1

Note: the graphic below is an example of a how a Windows or Linux server might be configured for a specific VLAN. In this case both NICs are configured for network PROD-A, which is mapped to VLAN 101. Any frames received by Virtual Connect for this server will have their VLAN tags intact, Virtual Connect will remove the tags and present the frames to the server NICs, and therefore, the VC port is acting as an ACCESS port.

Figure 1-50 Define a Server Profile (App-1).

ofile						
Profile Name	Status Serial	Number (Logical) 00100		UID (Logical) -f6ab-4f8c-aa24-3	038c55851f4	
l' and a						
hernet Network Connections (Physica	l ports)					
Port Network Name	Sta	itus Port Speed	Allocated	PXE	MAC	Mapping
1 PROD-A		OK Preferred	Bandwidth T Gb	Enabled 💌	00-17-A4-77-04-00	LOM:1
PROD-A			▼ 1 Gb	Disabled V		
	· · ·	on presence	<u> </u>			
Add Network Connection						
Power Server B Off C7000_1: Bay 1 (ProLiant Bl O5)	ay Assignment L495C Select Lo	ocation - USE8	SN 341FTYW	Model ProLiant BL495c (
Delete Copy Profile				Clear	Apply Ca	ncel
					1440	
51 View Bay 1.						
DI View Bay I. Define → Configure → Tool:	s ▼ Help ▼		-	_	_	-
,		-	-	-	-	-
^{Define}						
Define • Configure • Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay #1	195c G5)					
Define Configure Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay #1 Overall Status:	195с G5) ⊘ок					
Define - Configure - Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay # 1 Overall Status: Hardware Status:	195с G5) Оск Оск					
Define Configure Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay #1 Overall Status:	195с G5) ⊘ок	_				
Define - Configure - Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay # 1 Overall Status: Hardware Status: VC Status:	195с G5) ©ок ©ок ©ок					
Define Configure Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay #1 Overall Status: Hardware Status: VC Status: OA Communication Status:	195с G5) ©ок ©ок ©ок ©ок					
Define Configure Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay #1 Overall Status: Hardware Status: VC Status: OA Communication Status: Assigned Server Profile:	195с G5) [©] ок [©] ок [©] ок [©] ок Арр-1					
Define Configure Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay #1 Overall Status: Hardware Status: VC Status: OA Communication Status: Assigned Server Profile: Enclosure Name:	195с G5) [©] ок [©] ок [©] ок [©] ок Арр-1					
Define Configure Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay #1 Overall Status: Hardware Status: VC Status: OA Communication Status: Assigned Server Profile: Enclosure Name: UID:	195с G5) Оок Оок Оок Оок Арр-1 с7000_1 ©					Iomentary
Define Configure Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay #1 Overall Status: Hardware Status: VC Status: OA Communication Status: Assigned Server Profile: Enclosure Name: UID: Power Status/Control:	195с G5) [©] ок [©] ок [©] ок [©] ок Арр-1 с7000_1 [©] [©] оrf				M	lomentary
Define Configure Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay #1 Overall Status: Hardware Status: VC Status: OA Communication Status: Assigned Server Profile: Enclosure Name: UID: Power Status/Control: Blade Server Information - Bay	195с G5) [©] ок [©] ок [©] ок [©] ок App-1 с7000_1 [©] [©] orf					lomentary
Define Configure Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay #1 Overall Status: Hardware Status: VC Status: OA Communication Status: Assigned Server Profile: Enclosure Name: UID: Power Status/Control: Blade Server Information - Bay Serial Number:	195с G5) [©] ок [©] ок [©] ок [©] ок Арр-1 с7000_1 [©] [©] оrf					lomentary
Define Configure Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay #1 Overall Status: Hardware Status: VC Status: OA Communication Status: Assigned Server Profile: Enclosure Name: UID: Power Status/Control: Blade Server Information - Bay Serial Number: Product Name:	195c G5) ○ ok ○ ok ○ ok ○ ok ○ ok App-1 c7000_1 ○ ○ off USE841FTYW	5c G5				Iomentary
Define Configure Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay #1 Overall Status: Hardware Status: VC Status: OA Communication Status: Assigned Server Profile: Enclosure Name: UID: Power Status/Control: Blade Server Information - Bay Serial Number:	195с G5) Ок Ок Ок Ок Ок Арр-1 С7000_1 О Оff USE841FTYW ProLiant BL493	5c G5				Iomentary
Define Configure Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay #1 Overall Status: Hardware Status: VC Status: OA Communication Status: Assigned Server Profile: Enclosure Name: UID: Power Status/Control: Blade Server Information - Bay Serial Number: Product Name: Server Name:	195с G5) Ок Ок Ок Ок Ок Арр-1 С7000_1 ОК Арр-1 С7000_1 ОК Арр-1 С7000_1 ОК Фок Арр-1 С7000_1 ОК Фок Слование Слова	5c G5				lomentary
Define Configure Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay #1 Overall Status: Hardware Status: VC Status: OA Communication Status: Assigned Server Profile: Enclosure Name: UID: Power Status/Control: Blade Server Information - Bay Serial Number: Product Name: Part Number: Part Number:	195с G5) ○ ок ○ ок ○ ок ○ ок ○ ок ○ ок Арр-1 С7000_1 ○ ○ off USE841FTYW ProLiant BL493 ESX-BL495-1; 454314-B21	5c G5				lomentary
Define Configure Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay #1 Overall Status: Hardware Status: VC Status: OA Communication Status: Assigned Server Profile: Enclosure Name: UID: Power Status/Control: Blade Server Information - Bay Serial Number: Product Name: Part Number: Part Number:	195с G5) ○ ок ○ ок ○ ок ○ ок ○ ок ○ ок Арр-1 С7000_1 ○ ○ off USE841FTYW ProLiant BL493 ESX-BL495-1; 454314-B21	5c G5				lomentary
Define Configure Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay # 1 Overall Status: Hardware Status: VC Status: OA Communication Status: Assigned Server Profile: Enclosure Name: UID: Power Status/Control: Blade Server Information - Bay Serial Number: Product Name: Server Name: Part Number: Asset Tag: Server Ethernet Adapter Information	495c G5) ○ OK ○ OK ○ OK ○ OK ○ OK App-1 C7000_1 ○ ○ Off W USE841FTYW ProLiant BL493 ESX-BL495-1: 454314-B21 [Unknown]	5c G5 vaolab.net				
Define Configure Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay #1 Overall Status: Hardware Status: VC Status: OA Communication Status: Assigned Server Profile: Enclosure Name: UID: Power Status/Control: Blade Server Information - Bay Serial Number: Product Name: Server Name: Part Number: Asset Tag:	195c G5) ○ OK ○ OK ○ OK ○ OK ○ OK ○ OK App-1 C7000_1 ○ ○ Off ○ Off W USE841FTYW ProLiant BL492 ESX-BL495-1: 454314-B21 [Unknown]	5c G5 vaolab.net Model		MAC Addre	ess Netwo	rk Con
Define Configure Tool Bay 1 (ProLiant BL4 Server Bay Status - Bay # 1 Overall Status: Hardware Status: VC Status: OA Communication Status: Assigned Server Profile: Enclosure Name: UID: Power Status/Control: Blade Server Information - Bay Serial Number: Product Name: Server Name: Part Number: Asset Tag: Server Ethernet Adapter Information	495c G5) ○ OK ○ OK ○ OK ○ OK ○ OK App-1 C7000_1 ○ ○ Off W USE841FTYW ProLiant BL493 ESX-BL495-1: 454314-B21 [Unknown]	5c G5 vaolab.net		MAC Addre 00-17-A4-77 00-17-A4-77	ess Netwo	rk Conn A Bay 1

Summary

We created a Virtual Connect Shared Uplink Set (SUS), to support 4 VLANs (101-104). The SUS was created with both Active and standby uplinks, to provide both additional bandwidth and availability.

When VC profile App-1 is applied to the server in bay1 and is powered up, it has two NICs connected to "PROD-A", which connects to the network infrastructure through a two (active) 1Gb uplinks. These NICs are configured in VLAN 104, however, Virtual Connect is removing the VLAN tags and presenting the frames as untagged, so the operating system does not need to understand which VLAN it is on.

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 NIC is active at the time.

As additional servers are added to the enclosure, simply create additional profiles, configure the NICs for the appropriate network and apply them to the appropriate server bays.

Results

The following graphic provides an example of a Windows 2003 server with TWO NICs connected to the network, each NIC has its own TCP/IP address, either or both NICs could be actively working on the network.

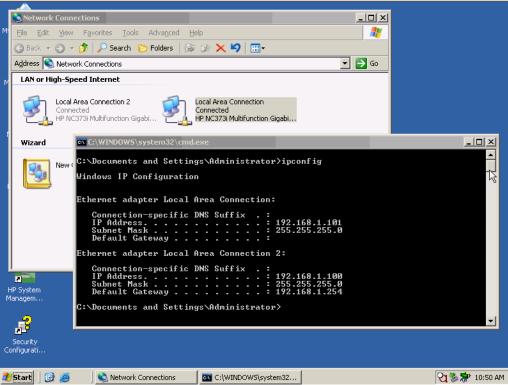


Figure 1-52 Both NICs for Profile App-1 are connected to the network through PROD-A.

The following graphics provide an example of a Windows 2003 server with TWO NICs teamed and connected to the network. One NIC will be active, the other in standby, in the event of an Uplink, switch or VC module failure; the teaming software will fail the NIC over to the alternate path, as required.

Figure 1-53 Team both NICs, using the HP Network Configuration Utility.

Scenario 1:4 – VLAN Tagging (802.1Q) with a Shared Uplink Set (SUS) with Link Aggregation using LACP (802.3ad) – Windows 60

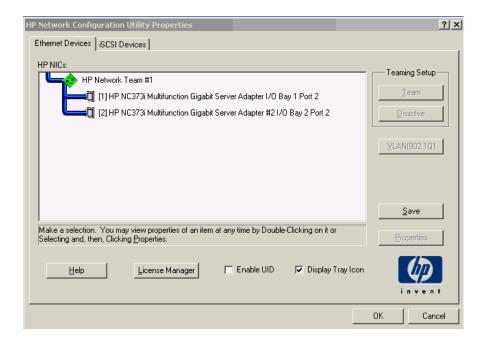
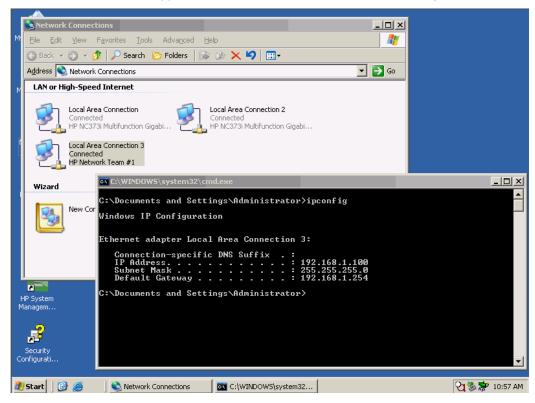


Figure 1-54 Both NICs for Profile App-1 are teamed and connected to the network through PROD-A.



Scenario 1:5 – VLAN Tagging (802.1Q) with a Shared Uplink Set (SUS) with Link Aggregation using LACP (802.3ad) – VMware ESX

Overview

This configuration uses the Virtual Connect Shared Uplink Set (SUS). The SUS provides the ability to present a single or multiple VLANs to a server NIC. In this scenario, the upstream network switch connects multiple VLANs to two ports on each VC module.

Requirements

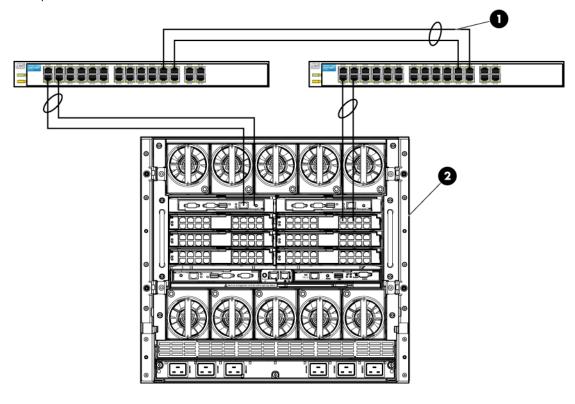
In order to implement this scenario, an HP BladeSystem c7000 enclosure with one of more server blades and TWO Virtual Connect Ethernet modules, installed in Bays 1& 2 are required. In addition, we will require ONE or TWO external Network switches. As Virtual Connect does not appear to the network as a switch and is transparent to the network, any standard managed switch will work with Virtual Connect.

Configuring Uplinks to a vNet (LACP)

When all uplinks configured within a vNet connect a VC module to an upstream switch, ALL links could be active, providing additional bandwidth, using Link Aggregation Protocol (LACP 802.3ad), this requires the upstream switch to be configured, on these ports, for link aggregation control protocol (LACP).

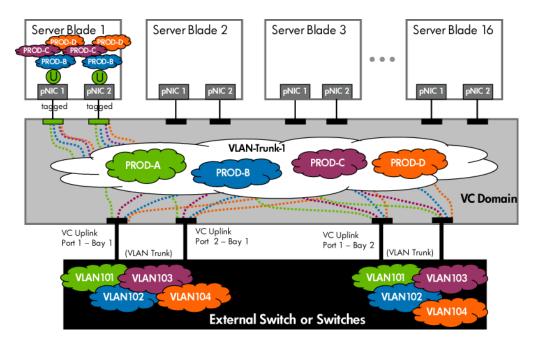
When some of the uplinks configured within a vNet connect a VC module to different upstream switches, some links will be active and the remaining will be Standby, providing additional bandwidth and/or availability, using Link Aggregation Protocol (LACP 802.3.ad).

Figure 1-55 Physical View; Shows two Ethernet uplinks from Ports 1 and 2 on Module 1 to Ports 1 and 2 on the first network switch and two uplinks from Ports 1 and 2 on Module 2 to Ports 1 and 2 on the second network switch.



ltem	Description
1	Switch Cross Connect
2	c7000 Enclosure, rear view

Figure 1-56 Server Profile ESX-1 configured with Multiple Networks on NICs 1&2 with PROD-A configured as the Default VLAN (untagged). All additional networks will be presented with tags.



Installation and configuration

Switch configuration

Appendices A and B provide a summary of the commands required to configure the switch in either a Cisco IOS or a ProCurve network infrastructure. The configuration information provided in the appendices assumes the following information:

- The switch ports are configured as TRUNK ports to support VLANs 101, 102, 103 and 104. All frames will be forwarding to VC with VLAN tags.
- When adding the additional uplinks to the SUS, the switch ports connected to Virtual Connect will need to be configured for LACP and configured for the same Link Aggregation Group.

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 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 can 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 (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.

Scenario 1:5 – VLAN Tagging (802.1Q) with a Shared Uplink Set (SUS) with Link Aggregation using LACP (802.3ad) – VMware ESX 64

Configuring the VC Module for Map VLAN Tags via GUI (Ethernet settings)

Enable Tunnel VLAN Tags within Virtual Connect

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Map VLAN Tags
- Select Fast MAC Cache Fail-over with a refresh of 5
- Select Apply

Configuring the VC Module for Map VLAN Tags 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 "Map VLAN Tags" and Enable Fast MAC cache fail-over set enet-vlan vlantagcontrol=map sharedservervlanid=false set mac-cache Enabled=True Refresh=5

Figure 1-57 Ethernet Settings.

Define ▼ Configure ▼ Tools ▼ Help ▼	
Ethernet Settings	
MAC Addresses Port Monitoring Advanced Settings	
Server VLAN Tagging Support	
C Tunnel VLAN Tags	?
Map VLAN Tags	
☐ Force server connections to use the same VLAN mappings as shared uplin	nk sets ?

Defining a new Shared Uplink Set via GUI

Create a SUS and name it "VLAN-Trunk-1"

- On the Virtual Connect Manager screen, click Define, Shared Uplink Set to create a SUS
- Ether the Network Name of "VLAN-Trunk-1"
- Select Add Port, then add the following ports;
 - a. Enclosure 1, Bay 1, Port 1
 - b. Enclosure 1, Bay 1, Port 2
 - c. Enclosure 1, Bay 2, Port 1
 - d. Enclosure 1, Bay 2, Port 2
- Add Networks as follows;
 - a. PROD-A = VLAN ID=101
 - **b.** PROD-B = VLAN ID=102
 - c. PROD-B = VLAN ID=103
 - d. PROD-B = VLAN ID=104
- Leave Connection Mode as Auto

Note: By creating a SUS we have provided the ability to present one or many VLANs to a server NIC. As two uplinks are configure from each VC module and the SAME SUS we have provided an active/standby configuration with Link Aggregation (LACP). This configuration provides additional bandwidth and the ability to lose an uplink cable, network switch or depending on how the NICs are configured at the server (teamed or untamed), even a VC module. However, only one uplink pair will be active at a time.

Note: Smart Link – 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 or SUS are down.

Defining a new Shared Uplink Set via CLI

#Create Shared Uplink Set "VLAN-Trunk-1" and configure an uplink on VC Module 1, Port 1 and VC Module 2, Port 1

add uplinkset VLAN-Trunk-1 add uplinkport enc0:1:1 Uplinkset=VLAN-Trunk-1 speed=auto add uplinkport enc0:1:2 Uplinkset=VLAN-Trunk-1 speed=auto add uplinkport enc0:2:1 Uplinkset=VLAN-Trunk-1 speed=auto add uplinkport enc0:2:2 Uplinkset=VLAN-Trunk-1 speed=auto

Create Networks VLAN_101 and VLAN_104 for Shared Uplink Set "VLAN-TRUNK-1" add network PROD-A uplinkset=VLAN-Trunk-1 VLanID=101 add network PROD-B uplinkset=VLAN-Trunk-1 VLanID=102 add network PROD-C uplinkset=VLAN-Trunk-1 VLanID=103 add network PROD-D uplinkset=VLAN-Trunk-1 VLanID=104 Figure 1-58 Define Shared Uplink Set (VLAN-Trunk-1).

Note: The Port Status and Connected to information. If the connected switch supports LLDP, the connected to information should be displayed as below

	ink Set:	VLAN-	Trufik-T							
ernet Shared External	Uplink Set									
Uplink Set Name			s	itatus	PID					
VLAN-Trunk-1				0	ж 🔘					
ernal Uplink Ports										
Port	Port Role	Port Stat			Connector Type	Connected To	PID	Speed/Du		Delete
C7000_1: Bay 1: Port 1	NA		Linked/Active	1 Gb	RJ45	00:17:08:23:05:c0 (1		Auto	u lex	X
C7000_1: Bay 1: Port 2	NA	Ook I	Linked/Active	1 Gb	RJ45	00:17:08:23:05:c0 (2	\rightarrow	Auto	-	x
C7000_1: Bay 2: Port 1	NA	Ок І	Linked/Standby	1 Gb	RJ45 (00:12:79:84:6e:40 (1	, 6	Auto	-	х
C7000_1: Bay 2: Port 2	NA	Ок	Linked/Standby	1 Gb	RJ45	00:12:79:84:6e:40 (2	/~	Auto	-	х
						<hr/>	-	1		
Add Port 👻						<u> </u>				
Add Port V	• ?									
onnection Mode: Auto			₽? Smar ?	t Link	Private Network ?	Advanced				
onnection Mode: Auto	LAN tagged)	?	?			Advanced		×		
onnection Mode: Auto sociated Networks (Vi Network Name	LAN tagged)	? Nativo	?	1	?			X		
onnection Mode: Auto sociated Networks (Vi Network Name PROD-A	VLAN ID	? Nativo		1	?	<u>Q</u>				

Figure 1-59 Link aggregation confirmed – Bay 1.

Note: All connections within an active/active LACP group will have the same LAG ID. To view this, go to the Interconnect bay and view Uplink Port Information. If you are having troubles establishing an active/active connection, confirm the LAG ID

lefine 🔻	Configure 🔻	Tools	s 👻 Help 👻					
3av 1	(HP 1/10)Gb \	/C-Enet I	Modu	le)			
· · · , ·								
Uplink A	Port Information	า						
Label	Network(s)	Status			Connector Type	LAG ID	Connected To	Detailed statistics
Port 1	VLAN-Trunk-1	🛇 ок	Linked/Active	1 Gb	RJ45	26	00:17:08:23:05:c0(1)	Detailed statistics/information
Port 2	VLAN-Trunk-1	📀 ок	Linked/Active	1 Gb	RJ45	(26)	00:17:08:23:05:c0(2)	Detailed statistics/information
Port 3			Linked	1 Gb	RJ45	\smile	00:12:79:84:6e:40(21)	Detailed statistics/information
Port 4			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 5			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 6			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 7			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 8			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port X0	Stacking Link	🕗 ок	Linked	10 Gb	Internal	27	00:14:c2:44:ce:d7(X0)	Detailed statistics/information
Port X1			Not Linked	0 Mb	CX4			Detailed statistics/information
Port X2			Not Linked	0 Mb	CX4			Detailed statistics/information

Figure 1-60 Link aggregation confirmed - Bay 2.

efine 🔻	Configure 🔻	Tool	s v Help v	_	_	_	_	_
Ray 2	HP 1/10		/C-Enet N	lodul	e)			
Jay 2	. (111-17)			louui	0)			
Unlink I	Port Information							
Label	Network(s)	Status			Connector Type	LAGID	Connected To	Detailed statistics
Port 1	VLAN-Trunk-1	Ок	Linked/Standby	1 Gb	RJ45	26	00:12:79:84:6e:40(1)	Detailed statistics/informatic
Port 2	VLAN-Trunk-1	Ок	Linked/Standby	1 Gb	RJ45	26	00:12:79:84:6e:40(2)	Detailed statistics/informatic
Port 3			Linked	1 Gb	RJ45	\sim	00:12:79:84:6e:40(22)	Detailed statistics/informatic
Port 4			Not Linked	0 Mb	RJ45			Detailed statistics/informatic
Port 5			Not Linked	0 Mb	RJ45			Detailed statistics/informatic
Port 6			Not Linked	0 Mb	RJ45			Detailed statistics/informatic
Port 7			Not Linked	0 Mb	RJ45			Detailed statistics/informatio
Port 8			Not Linked	0 Mb	RJ45			Detailed statistics/informatio
Port X0	Stacking Link	📀 ок	Linked	10 Gb	Internal	27	00:14:c2:44:be:cd(X0)	Detailed statistics/informatic
Port X1			Not Linked	0 Mb	CX4			Detailed statistics/informatic
Port X2			Not Linked	0 Mb	CX4			Detailed statistics/informatio

Defining a Server Profile with NICs Connections to Multiple VLANs, 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 "Multiple Networks"
 - When the Server VLAN Tag to vNet Mappings popup appears, configure as follows;
 - In the vNet Name drop down, select PROD-A and check Untagged
 - Click Add Mapping
 - Select PROD-B
 - Click Add Mapping
 - Select PROD-C
 - Click Add Mapping
 - Select PROD-D
 - Click OK
 - In the Network Port 2 drop down box, Do the same as configured for Port 1
- In the Assign the Profile to a Server Bays, select Bay 1 and apply

Defining a Server Profile with NICs Connections to Multiple VLANs, 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 add profile ESX-1 -nodefaultenetconn -nodefaultfcconn add enet-connection ESX-1 pxe=Enabled add enet-connection ESX-1 pxe=Disabled add server-port-map ESX-1:1 PROD-A VLanId=101 Untagged=True add server-port-map ESX-1:1 PROD-B VLanId=102 add server-port-map ESX-1:1 PROD-C VLanId=103 add server-port-map ESX-1:1 PROD-C VLanId=104 add server-port-map ESX-1:2 PROD-A VLanId=101 Untagged=True add server-port-map ESX-1:2 PROD-A VLanId=102 add server-port-map ESX-1:2 PROD-B VLanId=102 add server-port-map ESX-1:2 PROD-C VLanId=104 add server-port-map ESX-1:2 PROD-C VLanId=104 add server-port-map ESX-1:2 PROD-C VLanId=104 add server-port-map ESX-1:2 PROD-C VLanId=104

Figure 1-61 Server Profile (App-1) with Multiple Networks configured.

Define 👻 Config	gure 👻 🛛 Tools	→ Help →							
Edit Server Profile: ESX-1									
Profile									
Profile Name		Statu	s Serial Number	(Logical)	Server UUID	(Logical)]	
SX-1		⊘ок				0-4b44-b9cf-8226d	a51bb2e		
Ethernet Network	« Connections (I	Physical ports)							
Port Network	k Name		Status	Port Speed	Allocated	PXE	MAC	Mapping	Delete
1 Multiple N			💽 🛐 🖉ок	Setting Preferred	Bandwidth 1 Gb	Enabled 💌	00-17-A4-77-04- 00	LOM:1	×
2 Multiple N	Networks	\geq	💽 🕥 ок	Preferred 💌	1 Gb	Disabled 💌	00-17-A4-77-04- 02	LOM:2	×
Add Netwo	ork Connection								
Assign Profile to	Server Bay								
Power	S 7000_1: Bay 1 (Pri	erver Bay Assig DLiant BL495c	nment Select Location -	SN USE841FTY	/V Pro	Model Liant BL495c G5	Status		
GE							- On		
Delete	Copy Profile	1			Cle	ar App	iy Cance	el (

Figure 1-62 Configuring NIC Port 1 with Multiple Networks, note PROD-A is not tagged, Note; that both NICs are configured with the same settings below.

Х
X

Note: the above graphic is an example of a how an ESX hypervisor might be configured for multiple VLANs. In this case both NICs are configured for networks PROD-A though PROD-D which are mapped to VLANs 101-104. Any frames received by Virtual Connect for this server will have their tags intact and forward to the server NICs, therefore acting as a TRUNK port. This works well for a hypervisor host/vSwitch that can be configured to interpret the tag. In addition, PROD-A is defined as the default VLAN, therefore any frames received by VC for VLAN 101 will be forwarded to the server NIC, with the tags removed. This would work well for the console NICs, so that the console does not need to be configured to understand the VLAN tags. It we did not un-tag VLAN 101, then the ESX console would need to be configured for this VLAN.

Summary

We created a Virtual Connect Shared Uplink Set (SUS) to support 4 VLANs (101-104). The SUS was created with Active and standby uplinks, to provide both additional bandwidth and availability.

When VC profile ESX-1 is applied to the server in bay1 and is powered up, it has two NICs configured for "Multiple Networks" which connects to the network infrastructure through two (active) 1Gb uplinks. These NICs are configured to support LANs 101 through 104 with VLAN 101 configured as Default (untagged), so the operating system does not need to understand which VLAN it is on.

As additional servers are added to the enclosure, simply create additional profiles, configure the NICs for Multiple Networks and apply them to the appropriate server bays.

Results

The following graphic provides an example of an ESX Server with TWO NICs connected to the network. Both NICs are configured to support VLANs 101-104. VLAN 101 is the default VLAN and is not tagged. Port Groups are added to support each VLAN.

Figure 1-63 Both NICs for Profile ESX-1 are connected to the network through Multiple Networks; VLANs are configured as Port Groups within the virtual switch.

Elle Edit View Inventory Administration Plug-ins Help						
🖸 🔂 Home 🕨 👸 Inventory 🕨 🕅 Inventory						
5 6						
□ 🔲 192.168.1.31	esx-31.vaolab.net VMware E5X, 4.0.0, Getting Started Summary Virtual Ma	chines Resource Allocation Performance	Configuration Users & Groups Events Permissions (
	Hardware	View: Virtual Switch				
	Health Status Processors	Networking	Refresh Add Networking Properties			
	Memory Storage • Networking Storage Adapters Network Adapters Advanced Settings	vmkD : 192.168.1.131 Service Console Port Service Console	Remove Properties			
	Software	vswif0 : 192.168.1.31				
	Licensed Features Time Configuration DNS and Routing Virtual Machine Startup/Shutdown Virtual Machine Swapfile Location Security Profile System Resource Allocation Advanced Settings	Ulevel Hacking Port Group VLAN ID: 102 VLAN ID: 102 VLAN ID: 103 VLAN ID: 103 VLAN ID: 103 VLAN ID: 104 VLAN ID: 104				

Figure 1-64 Configuring the ESX vSwitch for Multiple Networks / VLANs.

🖓 vSwitch0 Properties			
Ports Network Adapters			
Configuration Summary	vSwitch Properties		
vSwitch 24 Ports	Number of Ports:	24	
Service Console Service Console	Default Policies		
VLAN 102 Virtual Machine	Security		
Wotion VMotion and IP Service Console Service Console VIAN 102 Virtual Machine VLAN 103 Virtual Machine VAN 104 Virtual Machine	Promiscuous Mode:	Reject	
	MAC Address Changes:	Accept	
	Forged Transmits:	Accept	
	Traffic Shaping		
	Average Bandwidth:		
	Peak Bandwidth:		
	Burst Size:		
	Failover and Load Balancing		
	Load Balancing:	Port ID	
	Network Failure Detection:	Beacon Probing	
	Notify Switches:	Yes	
	Failback:	Yes	
	Active Adapters:	vmnic0, vmnic1	
	Standby Adapters:	None	
	Unused Adapters:	None	
Add Edit Remove			
		[
		Close	<u>H</u> elp

When configuring the virtual guest, edit the Network Adapter configuration and select which VLAN this guest will connect to.

Figure 1-65 Edit the configuration of the Guest network adapter and configure it for the appropriate VLAN.

🛃 ₩2K3 - Virtual Machine Propert	ies	
Hardware Options Resources		Virtual Machine Version: 7
	Add Remove	Device Status
Hardware Memory CPUs Video card VMCI device Floppy drive 1 CD/DVD Drive 1 Network adapter 1 SCST controller θ Hard disk 1	Summary 1024 MB 1 Video card Restricted Client Device <u>Client Device</u> VLAN 102 <u>LSTCOG</u> C Parallel Virtual Disk	Image: Connect at power on Adapter Type Current adapter: VMXNET 3 MAC Address Image: Connection Image: Connection<
Help		OK Cancel

Scenario 1:6 – VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS) and Link Aggregation using LACP (802.3ad) – VMware ESX

Overview

This configuration uses the Virtual Connect Shared Uplink Set (SUS). The SUS provides the ability to present a single or multiple VLANs to a server NIC. In this scenario, the upstream network switches present several VLANs to two ports on each VC module.

Requirements

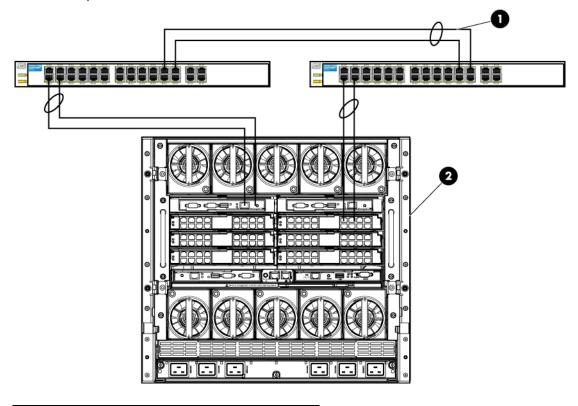
In order to implement this scenario, an HP BladeSystem c7000 enclosure with one of more server blades and TWO Virtual Connect Ethernet modules, installed in Bays 1& 2 are required. In addition, we will require ONE or TWO external Network switches. As Virtual Connect does not appear to the network as a switch and is transparent to the network, any standard managed switch will work with Virtual Connect.

Configuring Uplinks to a vNet (LACP)

When all uplinks configured within a vNet connect a VC module to an upstream switch, ALL links could be active, providing additional bandwidth, using Link Aggregation Protocol (LACP 802.3ad), this requires the upstream switch to be configured, on these ports, for link aggregation control protocol (LACP).

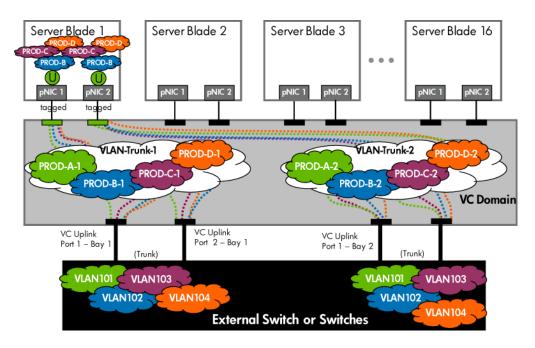
When some of the uplinks configured within a vNet connect a VC module to different upstream switches, some links will be active and the remaining will be Standby, providing additional bandwidth and/or availability, using Link Aggregation Protocol (LACP 802.3.ad).

Figure 1-66 Physical View; Shows two Ethernet uplinks from Ports 1 and 2 on Module 1 to Ports 1 and 2 on the first network switch and two uplinks from Ports 1 and 2 on Module 2 to Ports 1 and 2 on the second network switch.



ltem	Description
1	Switch Cross Connect
2	c7000, rear view

Figure 1-67 Server Profile ESX-1 configured with Multiple Networks on NICs 1&2 with PROD-A-1 and PROD-A-2 configured as the Default VLAN (untagged) at the server profile. All additional networks will be presented with tags.



Installation and configuration

Switch configuration

Appendices A and B provide a summary of the commands required to configure the switch in either a Cisco IOS or a ProCurve network infrastructure. The configuration information provided in the appendices assumes the following information:

- The switch ports are configured as TRUNK ports to support VLANs 101, 102, 103 and 104. All frames will be forwarding to VC with VLAN tags.
- When adding the additional uplinks to the SUS, the switch ports connected to Virtual Connect will need to be configured for LACP and configured for the same Link Aggregation Group.

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 the VC module

- Physically connect Ports 1 and 2 of the first network switch to Ports 1 and 2 on the VC module in Bay 1.
- Physically connect Ports 1 and 2 of the second network switch to Ports 1 and 2 of the VC module in Bay 2, if you have only one network switch, connect the second VC module cables to alternates port on the same switch. This will NOT create a network loop and does not require Spanning Tree to be configured.

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 can 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 (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 Map VLAN Tags via GUI (Ethernet settings)

Enable Map VLAN Tags within Virtual Connect

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Map VLAN Tags
- Select Fast MAC Cache Fail-over with a refresh of 5
- Select Apply

Configuring the VC Module for Map VLAN Tags via CLI (Ethernet settings)

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

Set Advanced Ethernet Settings to "Map VLAN Tags" and set "Force server connections" to disabled

set enet-vlan vlantagcontrol=map sharedservervlanid=false

set mac-cache Enabled=True Refresh=5

Figure 1-68 Ethernet Settings.

Define 🕶 Configure 👻 Tools 👻 Help 💌
Ethernet Settings
MAC Addresses Port Monitoring Advanced Settings
Server VLAN Tagging Support
C Turnel VLAN Tegs
C Map VLAN Tags
Force server connections to use the same VLAN mappings as shared uplink sets
Multiple Networks Link Speed Settings
When using mapped VLAN tags (multiple networks over 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

Defining a new Shared Uplink Sets via the GUI

Create a SUS and name it "VLAN-Trunk-1"

- On the Virtual Connect Manager screen, click Define, Shared Uplink Set to create a SUS
- Ether the Network Name of "VLAN-Trunk-1"
- Select Add Port, then add the following ports;
 - a. Enclosure 1, Bay 1, Port 1
 - **b.** Enclosure 1, Bay 1, Port 2
- Add Networks as follows;
 - a. PROD-A-1 = VLAN ID=101
 - **b.** PROD-B-1 = VLAN ID=102
 - **c.** PROD-C-1 = VLAN ID=103
 - d. PROD-D-1 = VLAN ID=104
- Enable Smart Link for All networks
- Leave Connection Mode as Auto
- 1. Create a SUS and name it "VLAN-Trunk-2"
- On the Virtual Connect Manager screen, click Define, Shared Uplink Set to create a SUS
- Ether the Network Name of "VLAN-Trunk-2"
- Select Add Port, then add the following ports;
 - a. Enclosure 1, Bay 2, Port 1
 - b. Enclosure 1, Bay 2, Port 2

Add Networks as follows;

- a. PROD-A-2 = VLAN ID=101
- **b.** PROD-B-2 = VLAN ID=102
- c. PROD-C-2 = VLAN ID=103
- d. PROD-D-2 = VLAN ID=104

Enable Smart Link for All networks

Leave Connection Mode as Auto

Note: By creating a SUS we have provided the ability to present one or many VLANs to a server NIC. As two uplinks are configure from each VC module within different SUS' we have provided an active/active configuration with Link Aggregation (LACP). This configuration provides additional bandwidth through LACP and independent SUS, providing the ability to lose an uplink cable, network switch or depending on how the NICs are configured at the server (teamed or untamed), even a VC module. Both pairs of uplinks will be active at any time

Note: Smart Link – In this configuration Smartlink should be enabled. Smartlink is used to turn off downlink ports within Virtual Connect, if ALL available uplinks to a vNet or SUS are down.

Defining a new Shared Uplink Set via the CLI

#Create Shared Uplink Set "VLAN-Trunk-1" and configure an uplink on VC Module 1, Ports 1 and 2 add uplinkset VLAN-Trunk-1 add uplinkport enc0:1:1 Uplinkset=VLAN-Trunk-1 speed=auto add uplinkport enc0:1:2 Uplinkset=VLAN-Trunk-1 speed=auto

```
# Create Networks VLAN_101 and VLAN_104 for Shared Uplink Set "VLAN-TRUNK-1"
add network PROD-A-1 uplinkset=VLAN-Trunk-1 VLanID=101
Set Network PROD-A-1 SmartLink=Enabled
add network PROD-B-1 uplinkset=VLAN-Trunk-1 VLanID=102
Set Network PROD-C-1 smartLink=Enabled
add network PROD-C-1 SmartLink=Enabled
add network PROD-C-1 SmartLink=Enabled
add network PROD-D-1 uplinkset=VLAN-Trunk-1 VLanID=104
Set Network PROD-D-1 SmartLink=Enabled
```

#Create Shared Uplink Set "VLAN-Trunk-2" and configure an uplink on VC Module 2, Ports 1 and 2 add uplinkset VLAN-Trunk-2

add uplinkport enc0:2:1 Uplinkset=VLAN-Trunk-2 speed=auto

add uplinkport enc0:2:2 Uplinkset=VLAN-Trunk-2 speed=auto

Create Networks VLAN_101 and VLAN_104 for Shared Uplink Set "VLAN-TRUNK-2" add network PROD-A-2 uplinkset=VLAN-Trunk-2 VLanID=101 Set Network PROD-A-2 SmartLink=Enabled add network PROD-B-2 uplinkset=VLAN-Trunk-2 VLanID=102 Set Network PROD-C-2 uplinkset=VLAN-Trunk-2 VLanID=103 Set Network PROD-C-2 SmartLink=Enabled add network PROD-C-2 uplinkset=VLAN-Trunk-2 VLanID=104 Set Network PROD-D-2 uplinkset=VLAN-Trunk-2 VLanID=104 Set Network PROD-D-2 SmartLink=Enabled Figure 1-69 Define Shared Uplink Set (VLAN-Trunk-1).

Note: The Port Status and Connected to information. If the connected switch supports LLDP, the connected to information should be displayed as below

Note: Smart Link is enabled, if ALL uplinks to this SUS fail, then server downlinks will be turned off, initiating a NIC teaming fail-over.

	• Tools •	Help 🔻						
dit Shared Up	link Set:	VLAN-Trun	<- 1					
ernet Shared Extern	al Uplink Set							
Uplink Set Name			Status	PID				
MLAN-Trunk-1	_		0 0					
ernal Uplink Ports								
Port	Port Role	Port Status	<u> </u>		unested Te	PID	Speed/	
C7000_1: Bay 1: Port 1		တြတ်K Linked)	(17:08:23:05:c0 (1)	- P	Auto	• X
C7000_1: Bay 1: Port 2	NA NA	Or Linked	/Active /1 Gb	RJ45 00:*	17:08:23:05:c0 (2)		Auto	• X
Add Port 👻								
	₀ ▼ ?							
Connection Mode: Auto		1						
sociated Networks (VLAN tagged)	?						
sociated Networks (VLAN tagged)	?						
sociated Networks (Network Name	VLAN tagged) VLAN ID	? Native ?	Smart Link	Private Network	Advanced			
			Smart Link ?		Advanced		×	
Network Name	VLAN ID	Native ?	?	?			× ×	
Network Name PROD-A-1	VLAN ID	Native ?	?	?	<u>単</u>			
Network Name PROD-A-1 PROD-B-1	VLAN ID 101 102	Native ?	?	?	<u>Q</u>		X	

Figure 1-70 Define Shared Uplink Set (VLAN-Trunk-2).

Note: The Port Status and Connected to information. If the connected switch supports LLDP, the connected to information should be displayed as below.

Note: Smart Link is enabled, if ALL uplinks to this SUS fail, then server downlinks will be turned off, initiating a NIC teaming fail-over.

lit Shared Up	olink Set:	VLAN-Trunk	-2					
ernet Shared Extern	al Uplink Set							
Uplink Set Name			Status	PID				
VLAN-Trunk-2			Øo	к 🔘				
ernal Uplink Ports								
Port	Port Role	Port Status			nnected To	PID	Speed/Du	uplex Delete
C7000_1: Bay 2: Port 1	I NA	OK Linked.	Active 1 Gb	RJ45 00:	12:79:84:6e:40 (1		Auto	• X
C7000_1: Bay 2: Port 2	2 NA	OK Linked.	Active 1 Gb	RJ45 00:	12:79:84:6e:40 (2	20	Auto	• X
Add Port 👻							,	
	₀ ▼ ?							
onnection Mode: Aut	0 💆 👔							
sociated Networks (VLAN tagged)	?						
	VLAN ID	Native ?	Smart Link	Private Network	Advanced			
Network Name				Г	Ģ		×	
Network Name PROD-A-2	101						×	
	101			E C				
PROD-A-2		Π		-	<u> </u>		x	
PROD-A-2 PROD-B-2	102	-	$- \langle - \rangle$		<u> </u>			

Figure 1-71 Link aggregation confirmed – Bay 1.

Note: All connections within an active/active LACP group will have the same LAG ID. To view this, go to the Interconnect bay and view Uplink Port Information. If you are having troubles establishing an active/active connection, confirm the LAG ID

say 1	(HP 1/10	N aÐi	/C-Enet I	viodu	ie)			
Uplink F	ort Information	1						
Label	Network(s)	Status			Connector Type	LAGID	Connected To	Detailed statistics
Port 1	VLAN-Trunk-1	Ок	Linked/Active	1 Gb	RJ45	26	00:17:08:23:05:c0(1)	Detailed statistics/information
Port 2	VLAN-Trunk-1	Ок	Linked/Active	1 Gb	RJ45	26	00:17:08:23:05:c0(2)	Detailed statistics/information
Port 3			Linked	1 Gb	RJ45	\sim	00:12:79:84:6e:40(21)	Detailed statistics/information
Port 4			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 5			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 6			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 7			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 8			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port X0	Stacking Link	📀 ок	Linked	10 Gb	Internal	27	00:14:c2:44:ce:d7(X0)	Detailed statistics/information
Port X1			Not Linked	0 Mb	CX4			Detailed statistics/information
Port X2			Not Linked	0 Mb	CX4			Detailed statistics/information

Figure 1-72 Link aggregation confirmed - Bay 2.

lefine 🔻	Configure 👻	Tools	; 👻 Help 👻					
3ay 2	2 (HP 1/10)Gb \	/C-Enet I	Modu	le)			
Uplink P	Port Informatior	ì						
Label	Network(s)	Status			Connector Type	LAG ID	Connected To	Detailed statistics
Port 1	VLAN-Trunk-2	Ок	Linked/Active	1 Gb	RJ45	26	00:12:79:84:6e:40(1)	Detailed statistics/information
Port 2	VLAN-Trunk-2	Ок	Linked/Active	1 Gb	RJ45	26	00:12:79:84:6e:40(2)	Detailed statistics/information
Port 3			Linked	1 Gb	RJ45	\sim	00:12:79:84:6e:40(22)	Detailed statistics/information
Port 4			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 5			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 6			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 7			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port 8			Not Linked	0 Mb	RJ45			Detailed statistics/information
Port X0	Stacking Link	🕗 ок	Linked	10 Gb	Internal	27	00:14:c2:44:be:cd(X0)	Detailed statistics/information
Port X1			Not Linked	0 Mb	CX4			Detailed statistics/information
Port X2			Not Linked	0 Mb	CX4			Detailed statistics/information

Defining a Server Profile with NICs Connections to Multiple VLANs, 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 "ESX-1"
- In the Network Port 1 drop down box, select "Multiple Networks"
 - When the Server VLAN Tag to vNet Mappings popup appears, configure as follows;
 - In the vNet Name drop down, select PROD-A-1 and check Untagged
 - Click Add Mapping
 - Select PROD-B-1
 - Click Add Mapping
 - Select PROD-C-1
 - Click Add Mapping
 - Select PROD-D-1
 - Click OK
- In the Network Port 2 drop down box, select "Multiple Networks"
 - When the Server VLAN Tag to vNet Mappings popup appears, configure as follows;
 - In the vNet Name drop down, select PROD-A-2 and check Untagged
 - Click Add Mapping
 - Select PROD-B-2
 - Click Add Mapping
 - Select PROD-C-2
 - Click Add Mapping
 - Select PROD-D-2
 - Click OK
- In the Assign the Profile to a Server Bays, select Bay 1 and apply

Defining a Server Profile with NICs Connections to Multiple VLANs, 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 add profile ESX-1 -nodefaultenetconn -nodefaultfcconn add enet-connection ESX-1 pxe=Enabled add enet-connection ESX-1 pxe=Disabled add server-port-map ESX-1:1 PROD-A-1 VLanId=101 Untagged=True add server-port-map ESX-1:1 PROD-B-1 VLanId=102 add server-port-map ESX-1:1 PROD-C-1 VLanId=103 add server-port-map ESX-1:1 PROD-C-1 VLanId=104 add server-port-map ESX-1:1 PROD-D-1 VLanId=104 add server-port-map ESX-1:2 PROD-A-2 VLanId=101 Untagged=True add server-port-map ESX-1:2 PROD-B-2 VLanId=102 add server-port-map ESX-1:2 PROD-C-2 VLanId=104 add server-port-map ESX-1:2 PROD-C-2 VLanId=104 add server-port-map ESX-1:2 PROD-C-2 VLanId=104 add server-port-map ESX-1:2 PROD-C-2 VLanId=104

Figure 1-73	Server Profile	(ESX-1)	with Mult	iple Network	s configured.
-------------	----------------	---------	-----------	--------------	---------------

efine - Configure - Tools dit Server Profile: E								_
rofile								
Profile Name	Status	Serial Numbe	r (Logical)	Server UUID (I	_ogical)			
jsx-1	🛇 ок	VCX0000100		b3155bdf-2a93	-4368-8e6e-75de1	a04cc23		
hernet Network Connections (F	hysical ports)							
Port Network Name		Status	Port Speed	Allocated	PXE	MAC	Mapping	Delete
			Setting	Bandwidth				
1 Multiple Networks		🚽 😒 🛇 ок	Preferred 💌	1 Gb	Enabled	00-17-A4-77-04- 00	LOM:1	X
2 Multiple Networks	[🖃 😒 🛇 ок	Preferred 💌	1 Gb	Disabled 💌	00-17-A4-77-04- 02	LOM:2	X
Add Network Connection								
ssign Profile to Server Bay								
° ,								
Power Se	erver Bay Assignm	ent	SN		Model	Status	UID	
Off C7000_1: Bay 1 (Pro G5)	Liant BL495c	Select Location	USE841FTY	VV ProL	iant BL495c G5	🛇 ок	۲	

Figure 1-74 Configuring NIC Port 1 with Multiple Networks, PROD-A-1 is not tagged, Note; that both NICs are configured with the same settings below, except NIC 2 is connected to PROD-x-2.

Profile Name ESX-1	□ Force same VLAN n		Tag to vNet Mappings ik Sets ?	-	X		
Port Network Connection Port Network Name 1 Multiple Networks 2 Multiple Networks	Vilet Name PROD-A-1 PROD-B-1 PROD-C-1 PROD-D-1	• •	Server VLAN Id 0 102 103 104	Untagged ?	Delete X X X X X	ng	Delet X
Add Network Connect sign Profile to Server Bay	Add Mapping	Copy From	i ?				
Power			I	ок	Cancel		

Scenario 1:6 – VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS) and Link Aggregation using LACP (802.3ad) – VMware ESX 83 Edit Server Profile: ESX-1 Profile Server VLAN Tag to vNet Mappings ESX-1 Force same VLAN mappings as Shared Uplink Sets ? **Ethernet Network Connection** 🛇 ок 🛛 (v) PROD-A-2 ř 🛇 ок 🛛 102 -PROD-B-2 PROD-C-2 -Ок 103 Multiple Networks -OK 104 X PROD-D-2 Multiple Networks Copy From... Add Mapping ? Assign Profile to Server Bay Cancel Off C7000_1: Bay G5) Copy Profile

Figure 1-75 Configuring NIC Port 2 with Multiple Networks, PROD-A-2 is not tagged, Note; that both NICs are configured with the same settings below, except NIC 2 is connected to PROD-x-2.

Note: the above graphic is an example of a how an ESX hypervisor might be configured for multiple VLANs. In this case both NICs are configured for networks VLAN-Trunk-1 and VLAN-Trunk-2, supporting PROD-A-1&2 though PROD-D-1&2 which are mapped to VLANs 101-104. Any frames received by Virtual Connect for this server will have their tags intact and forward to the server NICs, therefore acting as a TRUNK port. This works well for a hypervisor host/vSwitch that can be configured to interpret the tag. In addition, PROD-A is defined as the default VLAN, therefore any frames received by VC for VLAN 101 will be forwarded to the server NIC, with the tags removed. This would work well for the console NICs, so that the console does not need to be configured to understand the VLAN tags. It we did not untag VLAN 101, then the ESX console would need to be configured for this VLAN.

Summary

We created a Virtual Connect Shared Uplink Set (SUS) to support 4 VLANs (101-104). The SUS was created with Active and standby uplinks, to provide both additional bandwidth and availability.

When VC profile ESX-1 is applied to the server in bay1 and is powered up, it has two NICs configured for "Multiple Networks" which connects to the network infrastructure through two (active) 1Gb uplinks. These NICs are configured to support LANs 101 through 104 with VLAN 101 configured as Default (untagged), so the operating system does not need to understand which VLAN it is on.

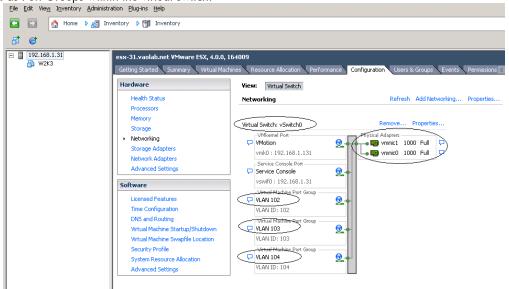
As this is an ESX environment, both NICs would be connected to a vSwitch with port groups configured for VLANs 102 through 104. VLAN 101 would be configured as the console network.

As additional servers are added to the enclosure, simply create additional profiles, configure the NICs for Multiple Networks and apply them to the appropriate server bays.

Results

The following graphic provides an example of an ESX Server with TWO NICs connected to the network. Both NICs are configured to support VLANs 101-104. VLAN 101 is the default VLAN and is not tagged. Port Groups are added to support each VLAN.

Figure 1-76 Both NICs for Profile ESX-1 are connected to the network through Multiple Networks, VLANs are configured as Port Groups within the virtual switch.



đ٧	Switch0 Properties			
Po	rts Network Adapters			
Б	Configuration	Summary	VSwitch Properties	
	T vSwitch	24 Ports	Number of Ports:	24
1	VMotion	VMotion and IP		
	VMotion Service Console	<u>Servic</u> e Console	- Default Policies	
	VLAN 102	Virtual Machine	Security	
	👳 VLAN 103	Virtual Machine	Promiscuous Mode:	Reject
	👷 VLAN 104	Virtual Machine	MAC Address Changes:	Accept
			-	
			Forged Transmits:	Accept
			Traffic Shaping	
			Average Bandwidth:	
			Peak Bandwidth:	
			Burst Size:	
			Failover and Load Balancing	
			Load Balancing:	Port ID
			Network Failure Detection:	Beacon Probing
			Notify Switches:	Yes
			Failback:	Yes
			Active Adapters:	vmnic0, vmnic1
			Standby Adapters:	None
	1		Unused Adapters:	None
	Add	Edit Remove		
				Close <u>H</u> elp

Figure 1-77 Configuring the ESX vSwitch for Multiple Networks / VLANs.

When configuring the virtual guest, edit the Network Adapter configuration and select which VLAN this guest will connect to.

W2K3 - Virtual Machine Proper	ties	_ 🗖 Virtual Machine Version:	_
Hardware Options Resources Show All Devices Hardware Memory CPUs Video card VMCI device Floppy drive 1 CO/OVD Drive 1 Network adapter 1 SCS1 controller 0 Hard disk 1	Add Remove		
Help		OK Cancel	

Figure 1-78 Edit the configuration of the Guest network adapter and configure it for the appropriate VLAN.

Scenario 1:7 – Private Networks (Simple vNet)

Overview

This scenario uses the private Networks feature to restrict communications between hosts within a Virtual Connect Network. In this scenario, a single uplink port from the VC module will be used to carry a single or multiple VLANs to a simple vNet. The vNet is configured with the Private Networks feature enabled. The adjacent hosts within the vNet will not be able to talk to other servers within the VC Domain, even if on the same VLAN, and an external router would be required.

This configuration uses the Virtual Connect vNet. 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 VC module.

No special upstream switch configuration is required as the switch is in the factory default configuration.

Requirements

In order to implement this scenario, an HP BladeSystem c7000 enclosure with one of more server blades and TWO Virtual Connect Ethernet modules, installed in 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.

Depending how we assign the VC networks to the servers, will determine whether the VC-Enet module will simply pass these VLANs through and not interpret the VLAN tag, in which case the VLAN tag will be interpreted by the OS on the assigned blade. Or an individual VLAN could be assigned to a server NIC, in which case, VC could interpret the VLAN tag and then forward the untagged frame to the server NIC.

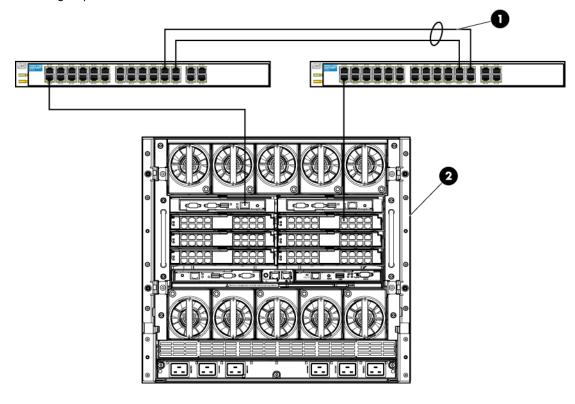
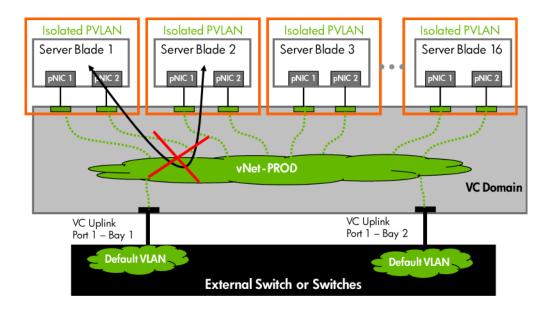


Figure 1-79 Physical View; Shows a single Ethernet uplink from Port 1 on Module 1 to Port 1 on the first network switch and a single uplink from Port 1 on Module 2 to Port 1 on the second network switch.

1 Switch Cross Connect	
2 C7000 Enclosure, rear view	

Figure 1-80 Private VLANs - Simple Network Connection showing a single Ethernet uplink to a single VC-Enet port (Port 1). VC-Enet Port 1 is configured as part of the VC Network Prod-Net. As the Private Network feature is enabled on Prod-Net, servers that are connected to Prod-Net will not be able to talk directly to each other within VC, an external router would be required. "Prod-Net" is presented to Server Profiles Web-1 through Web-4. Each profile is applied to bays 1-4 respectively.



Installation and configuration

Switch Configuration

Appendices A and B provide a summary of the commands required to configure the switch in either a Cisco IOS or a ProCurve network infrastructure. The configuration information provided in the appendices assumes the following information:

 The switch ports are configured as ACCESS ports, either presenting the Default VLAN or a specific VLAN and will for forwarding untagged frames.

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 the VC module

- Physically connect Ports 1 and 2 of the first network switch to Ports 1 and 2 on the VC module in Bay
 1.
- Physically connect Ports 1 and 2 of the second network switch to Ports 1 and 2 of the VC module in Bay 2, if you have only one network switch, connect the second VC module cables to alternates port on the same switch. This will NOT create a network loop and does not require Spanning Tree to be configured.

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 can 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 (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 (Ethernet settings)

- Private Networks is supported on both Tunnel VLAN tags AND Map VLAN tags, so either setting could be used here
- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select either Tunnel or Map VLAN Tags
- Select Fast MAC Cache Fail-over with a refresh of 5
- Select Apply

Figure 1-81 Ethernet Settings.

	Port Monitoring Advanced Settings
er VLAN Tagging	Support
Tunnel VLAN	Tags
C Map VLAN Ta	gs
Force server	connections to use the same VLAN mappings as shared uplink sets 🔋
Cache Fail-over	
Enable Fast M	AC Cache Fail-over
MAC Refresh	
	Interval 5 seconds

Defining a new vNet via GUI

Create a vNet and name it "vNet-PROD"

- On the Virtual Connect Manager screen, click Define, Ethernet Network to create a vNet
- Ether the Network Name of "vNet-PROD"
 - a. Select Private Networks
- Select Add Port, then add the following ports;

set network vNet-PROD Private=Enabled

- a. Enclosure 1, Bay 1, Port 1
- b. Enclosure 1, Bay 2, Port 1
- Leave Connection Mode as Auto
- 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.

Note: Smart Link – In this configuration Smartlink should NOT be enabled. Smartlink is used to turn if downlink ports within Virtual Connect, if ALL available uplinks to a vNet or SUS are down.

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 SmartLink=Disabled add uplinkport enc0:1:1 Network=vNet-PROD speed=auto add uplinkport enc0:2:1 Network=vNet-PROD speed=auto

Define 🔻 Configure 👻 Tools 👻 Help 👻	
Edit Ethernet Network: vNet-PROD	
Network	
Network Name Smart Link ? Private Network ? I WNet-PROD Image: Comparison of the second	Enable VLAN Tunneling ? Status PID State
Advanced	
External Uplink Ports	
Use Shared Uplink Set	
Port Port Role Port Status Con C7000_1: Bay 1: Port 1 NA Or Linked/Active 1 Gb C7000_1: Bay 2: Port 1 NA Or Linked/Standby 1 Gb	Inector Type Connected To PID Speed/Duplex Delete RJ45 00:17:08:23:05:c0 (1) Auto X RJ45 00:12:79:84:6e:40 (1) Auto X
Add Port -	
Connection Mode: Auto	
Refresh Delete	Clear Apply Cancel

Figure 1-82 Define a new vNet (vNet-Prod) and enable Private Networks.

Defining a Server Profile

Four server profiles will be required; both Network ports will be connected to vNet-PROD

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

- Create a server profile called "Web-1"
- In the Network Port 1 drop down box, select "vNet-PROD"
- In the Network Port 2 drop down box, select "vNet-PROD"
- In the Assign the Profile to a Server Bays, select Bay 1 and apply

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

- Create a server profile called "Web-2"
- In the Network Port 1 drop down box, select "vNet-PROD"
- In the Network Port 2 drop down box, select "vNet-PROD"
- In the Assign the Profile to a Server Bays, select Bay 2 and apply

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

- Create a server profile called "Web-3"
- In the Network Port 1 drop down box, select "vNet-PROD"
- In the Network Port 2 drop down box, select "vNet-PROD"
- In the Assign the Profile to a Server Bays, select Bay 3 and apply

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

- Create a server profile called "Web-4"
- In the Network Port 1 drop down box, select "vNet-PROD"
- In the Network Port 2 drop down box, select "vNet-PROD"
- In the Assign the Profile to a Server Bays, select Bay 4 and apply

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 Web-1 – Web-4 add profile Web-1 -nodefaultenetconn add enet-connection Web-1 pxe=Enabled Network=vNet-PROD add enet-connection Web-1 pxe=Disabled Network=vNet-PROD assign profile Web-1 enc0:1 add profile Web-2 -nodefaultenetconn add enet-connection Web-2 pxe=Enabled Network=vNet-PROD add enet-connection Web-2 pxe=Disabled Network=vNet-PROD assign profile Web-2 enc0:2 add profile Web-3 -nodefaultenetconn add enet-connection Web-3 pxe=Enabled Network=vNet-PROD add enet-connection Web-3 pxe=Disabled Network=vNet-PROD assign profile Web-3 enc0:3 add profile Web-4 -nodefaultenetconn add enet-connection Web-4 pxe=Enabled Network=vNet-PROD add enet-connection Web-4 pxe=Disabled Network=vNet-PROD assign profile Web-4 enc0:4

Figure 1-83 Define a Server Profile (Web-1 to Web-4).

w:	Assigned Se	erver Profiles	•								
1		Profile			Power	Serve	er Bay Assignment	Po	ort	MAC/WWN	LAN/SAN
-	Ок	Web-1		х	Off		C7000_1: Bay 1 (ProLiant BL495c	1	Ethernet	00-17-A4-77-04-00	vNet-PROD
					001	•	G5)	2	Ethernet	00-17-A4-77-04-02	vNet-PROD
1	Ок	Web-2		х	Off		C7000_1: Bay 2 (ProLiant BL495c	1	Ethernet	00-17-A4-77-04-04	vNet-PROD
					0 011		G5)	2	Ethernet	00-17-A4-77-04-06	vNet-PROD
1	📀 ок	Web-3		X	Off		C7000_1: Bay 3 (ProLiant BL495c	1	Ethernet	00-17-A4-77-04-08	vNet-PROD
					0 0		G5)	2	Ethernet	00-17-A4-77-04-0A	vNet-PROD
1	📀 ок	Web-4		X	Off		C7000_1: Bay 4 (ProLiant BL460c	1	Ethernet	00-17-A4-77-04-0C	vNet-PROD
					- VII		G6)	2	Ethernet	00-17-A4-77-04-0E	vNet-PROD

Figure 1-84 View Server Bay 1.

Define 👻 Configure 👻 Tools 👻 Help 👻

3ay 1 (ProLiant BL4	,				
Server Bay Status - Bay #1					
Overall Status:	Ок				
Hardware Status:	🛛 🛇 ок				
VC Status:	🛛 🛇 ок				
OA Communication Status:	🛛 🛇 ок				
Assigned Server Profile:	Web-1				
Enclosure Name:	C7000_1				
UID:					
Power Status/Control:	Off				
ower outcost control.	- OII			Mom	entary Press
Blade Server Information - Bay	#1		_	Mom	entary Press
Blade Server Information - Bay Serial Number:	#1 USE841FTYM			Mom	entary Press
Blade Server Information - Bay Serial Number: Product Name:	#1 USE841FTYV ProLiant BL4S	95c G5		Mom	entary Press
Blade Server Information - Bay Serial Number: Product Name: Server Name:	# 1 USE841FTYM ProLiant BL49 ESX-BL495-1	95c G5		Mom	entary Press
Blade Server Information - Bay Serial Number: Product Name: Server Name: Part Number:	#1 USE841FTYW ProLiant BL49 ESX-BL495-1 454314-B21	95c G5		Mom	entary Press
Blade Server Information - Bay Serial Number: Product Name: Server Name: Part Number:	# 1 USE841FTYM ProLiant BL49 ESX-BL495-1	95c G5		Mom	entary Press
Blade Server Information - Bay Serial Number: Product Name: Server Name: Part Number: Asset Tag:	#1 USE841FTYW ProLiant BL49 ESX-BL495-1 454314-B21 [Unknown]	95c G5		Mom	entary Press
Blade Server Information - Bay Serial Number: Product Name: Server Name: Part Number: Asset Tag: Server Ethernet Adapter Inform	#1 USE841FTYW ProLiant BL49 ESX-BL495-1 454314-B21 [Unknown]	95c G5	MAC Address	Network	
Blade Server Information - Bay Serial Number: Product Name: Server Name: Part Number: Asset Tag: Server Ethernet Adapter Inform	#1 USE841FTYM ProLiant BL49 ESX-BL495-1 454314-B21 [Unknown]	95c G5 .vaolab.net	MAC Address 00-17-A4-77-04-00		Connected To Bay 1 (1)

Summary

All server blades are assigned a Server Profile which is configured with a single NIC on vNet PROD_NET. When the blades are powered up and their profiles are applied, the blades in bays 1 through 4 will have both NICs connected to the vNet-PROD network. Even though these servers are connect to the same vNet, as the Private VLANs check box is enabled on this network, these servers will not be able to talk directly to each other within this VC Network. To do so an external router would be required.

Results

The following graphic provides an example of a Windows 2003 server with TWO NICs connected to the network, each NIC has its own TCP/IP address, either or both NICs could be actively working on the network.

	Network Connections	
M	Eile Edit View Favorites Iools Advanced Help	
	🔇 Back 🔻 🕥 👻 🦻 Search 🜔 Folders 🔊 📎 🗙 🍤 🛄 -	
	Address 🗞 Network Connections 🔽 🔁 Go	
Μ	LAN or High-Speed Internet	
	Local Area Connection 2 Connected HP NC373i Multifunction Gigabi	
	Wizard C:\WINDOW5\system32\cmd.exe	
	News C:\Documents and Settings\Administrator>ipconfig Windows IP Configuration Ethernet adapter Local Area Connection: Connection-specific DNS Suffix : IP Address	
	C:\Documents and Settings\Administrator>	
	Security onfigurati	
2	Start 0 3 Network Connections C:\WINDOW5\system32	😋 🏷 🚔 10:50 AM

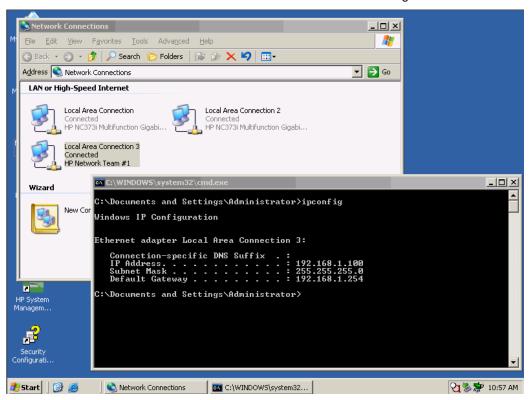
Figure 1-85 Both NICs for Profile Web-1 are connected to the network through vNet-PROD.

The following graphics provides an example of a Windows 2003 server with TWO NICs teamed and connected to the network. One NIC will be active, in the event of an Uplink, switch or VC module failure; the teaming software will fail the NIC over to the alternate path, if required.

Figure 1-86	Team both NICs, using the HP Network Configuration Utility.	
Figure 1-86	Team both NICs, using the HP Network Configuration Utility.	

P Network Configuration Utility Properties	?)
Ethernet Devices iSCSI Devices	
HP NICs: HP Network Team #1 [1] HP NC373i Multifunction Gigabit Server Adapter I/O Bay 1 Port 2 [2] HP NC373i Multifunction Gigabit Server Adapter #2 I/O Bay 2 Port 2	Teaming Setup Ieam 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 <u>P</u> roperties.	<u>S</u> ave <u>P</u> roperties
Help License Manager Enable UID 🔽 Display Tray I	con invent
	OK Cancel

Figure 1-87 Both NICs for Profile Web-1 are teamed and connected to the network through vNet-PROD.



Chapter 2: Flex-10 Scenario

Overview

This chapter will provide configuration scenarios of Virtual Connect Flex-10, using a single HP BladeSystem c7000 enclosure with two Virtual Connect Flex-10 Ethernet modules installed in Bays 1 and 2. If additional Network ports are required, over what TWO Flex-10 NICs will provide, additional network ports can be added along with additional VC or VC Flex-10 modules, switches or Pass-Thru modules.

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, Windows Hyper-V and/or VMware will also be provided.

CISCO and ProCurve CLI commands used to configure the upstream switches are also provided in the appendices.

Flex-10 technology can be provided in two ways;

- 3. Through the use the 10Gb (LOM) NICs integrated on the main PCB, or;
- Through the installation of a DUAL PORT 10Gb-KR mezzanine card (NC532m) in an HP BladeSystem server. The first server to provide 10Gb LOM NICs is the BL495c, which is what is being used in the following example.

The key benefit of Flex-10 is that; we now have 10Gb of network bandwidth available per NIC port with the ability to partition or divide that bandwidth into as many as four (4) independent configurable physical NICs per port. These NICs can be configured at speeds of between 100Mb and 10Gb providing the ability to tune bandwidth to the specific need, such as, management, VMotion or production networks. With current technology, all networks would be provided with the same 1Gb speed and would require independent discrete NICs. With Flex-10, we can now provide each network with the desired speed as shown in the following table.

Flex-10 provides significant investment protections as both 1Gb and 10Gb uplink connections are supported. If 10Gb ports are not currently available within the datacenter, Flex-10 could be deployed initially with 1Gb uplinks and then later upgraded to 10Gb uplink connections once those ports become available.

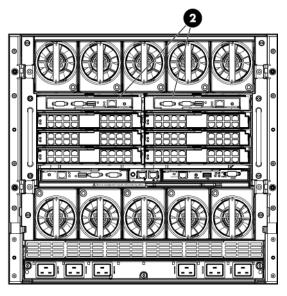
Requirements

This chapter will utilize a single HP BladeSystem c7000 enclosure with TWO Virtual Connect Flex-10 Ethernet modules and a half height BladeSystem server installed in Bay 1. The server will connect to the Virtual Connect models with two 10Gb NICs. Network adapter Port 1 connects to the VC Flex-10 module in Bay 1 and Network adapter Port 2 connects to the VC Flex-10 module in Bay 2.

It is assumed that a Virtual Connect Domain has been created either through the GUI or a CLI script and no VC Networks or Server Profiles have been created.

Figure 2-1 c7000 enclosure with four Half Height G6 BladeSystem servers and two Virtual Connect Flex-10 Ethernet modules in Interconnect modules Bays 1 & 2.

Ū	
	6



ltem	Description
1	Half Height BladeSystem Server
2	VC Ethernet Modules

Scenario 2:1 - Flex-10 - VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS) and Mapped VLANs - Windows 2003/2008

Overview

This scenario discusses the Flex-10 features provided in Virtual Connect. For an overview of Flex-10, please refer to the following technology brief. HP Flex-10 technology brief:

http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01608922/c01608922.pdf

Virtual Connect Flex-10 provides the ability to either present the 10Gb server NICs as single 10Gb NICs, or divide each NIC into as many as 4 "physical function" NICs per NIC port. These physical function NICs look to the server hardware and OS as physical NICs, have their own MAC address and can be configured at speeds from 100Mb to 10Gb.

As shown in earlier scenarios, VLAN access can be handled in two different ways. Virtual Connect can either pass VLAN/Non-VLAN traffic untouched to the host (Tunneling Mode) or Virtual Connect can handle all VLAN tagging (Server Mapped VLANs). Each has their advantages as discussed in the Introduction to Virtual Connect section, earlier in this document.

This scenario, using Map VLAN Tags, will focus more on the Virtual Connect Flex-10 technology. In this scenario we have two10Gb uplinks configured with multiple VLANs. We will configure a Windows 2003 and Windows 2008 server initially with two 10Gb NICs. We will then show how Flex-10 can be used to provide additional NICs to the server, without adding additional hardware. We will also show how the speed of each NIC can be varied from speeds ranging between 100Mb to 10Gb.

Requirements

In order to implement this scenario, an HP BladeSystem c7000 enclosure with one of more Blade G6 servers with 10Gb NICs and TWO Virtual Connect Flex-10 Ethernet modules, installed in 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.

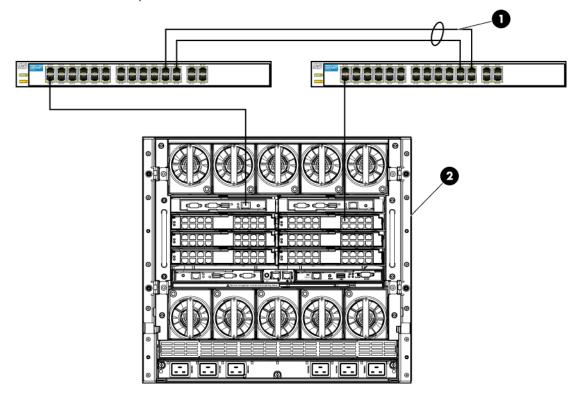
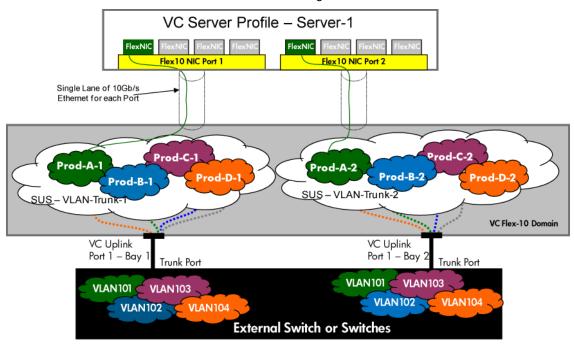


Figure 2-2 Physical View; Shows one 10Gb Ethernet uplink from Ports 1 on Module 1 to Port 1 on the first network switch and one 10Gb uplink from Port 1 on Module 2 to Port 1 on the second network switch.

ltem	Description		
1	Switch Cross Connect		
2	c7000 Enclosure, rear view		

Figure 2-3 Server blade profile with TWO Flex-10 NICs configured. Each NIC is connected to a vNet (Prod-101-1 and Prod-101-2), 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 X1 on VC module 1 and Port X1 on VC module 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 IOS or a ProCurve network infrastructure. The configuration information provided in the appendices assumes the following information:

 The switch ports are configured as TRUNK ports to support VLANs 101, 102, 103 and 104. All frames will be forwarding to VC with VLAN tags.

Note: when adding the additional uplinks to the SUS, the switch ports connected to Virtual Connect will need to be configured for LACP and configured for the same Link Aggregation Group.

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 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 can 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 (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 Map VLAN Tags via GUI (Ethernet settings)

Note: Flex-10 has also provided additional controls when configuring VC for mapped VLAN tags (Multiple Networks over a single link) support. These features provide the ability to set a Custom or Preferred network speed value for each NIC. These are VC domain settings and when configured will limit the maximum configurable speed of a NIC.

Enable Map VLAN Tags within Virtual Connect

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Map VLAN Tags
- Select Fast MAC Cache Fail-over with a refresh of 5
- Optionally, select a preferred/Maximum link speed
- Select Apply

Configuring the VC Module for Map VLAN Tags via CLI (Ethernet settings)

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

Set Advanced Ethernet Settings to "Map VLAN Tags" and set "Force server connections" to disabled

set enet-vlan vlantagcontrol=map sharedservervlanid=false

set mac-cache Enabled=True Refresh=5

Note: Do not set a Preferred or Max speed for this scenario. This example is provided for reference only. For the purpose of this scenario, we will not be configuring the custom values for Preferred Link or Maximum Connection speeds. However, the CLI commands are provided below for reference.

Selecting the Set a Custom value for Preferred Link Connection Speed and/or Set a Customer value for Maximum Link Connection Speed, Sets the respective speed for all connections using multiple networks to 500Mb and maximum connection speed to 2.5Gb.

Set Advanced Ethernet Settings to a Preferred speed of 500Mb and a Max Speed of 2500Mb set enet-vlan PrefSpeedType=Custom PrefSpeed=500 MaxSpeedType=Custom MaxSpeed=2500

Figure 2-4 Ethernet Settings.

Define 🔻 Configure 👻 Tools 👻 Help 👻	
Ethernet Settings	
MAC Addresses Port Monitoring Advanced Settings	
Server VLAN Tagging Support	
C Tunnel VLAN Tags	?
Map VLAN Tags	
Force server connections to use the same VLAN mappings as shared uplink sets	?

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

Connect Port X1 of VC module 1 to Port 1 on switch 1 Create a SUS named "VLAN-Trunk-1" and connect it to Flex-10 Port X1 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; a. Enclosure 1, Bay 1, Port X1
- Add Networks as follows;
 - a. PROD-A-1 = VLAN ID=101
 - b. PROD-B-1 = VLAN ID=102
 - c. PROD-C-1 = VLAN ID=103
 - d. PROD-D-1 = VLAN ID=104
- Enable SmartLink on ALL networks
- Click Apply

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

Connect Port X1 of VC module 2 to Port 1 on switch 2

Create a SUS named "VLAN-Trunk-2" and connect it to Flex-10 Port X1 on Module 2

- On the Virtual Connect Home page, select Define, Shared Uplink Set
- Insert Uplink Set Name as VLAN-Trunk-2
- Select Add Port, then add the following port;
 - a. Enclosure 1, Bay 2, Port X1
- Add Networks as follows;
 - a. PROD-A-2 = VLAN ID=101
 - b. PROD-B-2 = VLAN ID=102
 - c. PROD-C-2 = VLAN ID=103
 - d. PROD-D-2 = VLAN ID=104
- Enable SmartLink on ALL networks
- Click Apply

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:X1 Uplinkset=VLAN-Trunk-1 speed=auto # Create Networks Prod-A-1 through Prod-D-1 for Shared Uplink Set "VLAN-Trunk-1" add network PROD-A-1 uplinkset=VLAN-Trunk-1 VLanID=101 Set Network PROD-A-1 SmartLink=Enabled add network PROD-B-1 uplinkset=VLAN-Trunk-1 VLanID=102 Set Network PROD-B-1 SmartLink=Enabled add network PROD-C-1 uplinkset=VLAN-Trunk-1 VLanID=103 Set Network PROD-C-1 SmartLink=Enabled add network PROD-D-1 uplinkset=VLAN-Trunk-1 VLanID=104 Set Network PROD-D-1 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:X1 Uplinkset=VLAN-Trunk-2 speed=auto # Create Networks Prod-A-2 through Prod-D-2 for Shared Uplink Set "VLAN-Trunk-2" add network PROD-A-2 uplinkset=VLAN-Trunk-2 VLanID=101 Set Network PROD-A-2 SmartLink=Enabled add network PROD-B-2 uplinkset=VLAN-Trunk-2 VLanID=102 Set Network PROD-B-2 SmartLink=Enabled add network PROD-C-2 uplinkset=VLAN-Trunk-2 VLanID=103 Set Network PROD-C-2 SmartLink=Enabled add network PROD-D-2 uplinkset=VLAN-Trunk-2 VLanID=104 Set Network PROD-D-2 SmartLink=Enabled

Note: It is important to point out at this time, if you are familiar with VC scripting, or have existing VC scripts that you had used on Virtual Connect 1:10 modules, and may want to use with Flex-10, the numbering of the Flex-10 external ports is different than with early modules of VC. VC-E and VC-F uplinks ports are numbered as Ports 1, 2, 3 etc., however; Flex-10 ports are referenced as X1, X2, X3 etc., plus some of the ports are shared, IE the CX4 is shared with SFP+ Port X1, both are configured as X1, but only one is usable at a time. If a CX-4 cable is connected the SFP+ port will become disable, the same is true for Ports X7 & X8, which are the internal cross connect ports, the cross connects will disconnect, if an SFP+ module is plugged in Ports X7 or X8.

Figure 2-5	Define a Shared U	plink Set (VLAN-Tru	unk-1) and add VLANs.
------------	-------------------	---------------------	-----------------------

in onarea op	link Set:	VLAN-Trui	nk-1					
ernet Shared Extern	al Uplink Set							
Uplink Set Name			Status	PID				
VLAN-Trunk-1			O Oł	•				
ernal Uplink Ports								
Port	Port Role	Port Status			nnected To	PID	Speed/	
C7000_1: Bay 1: Port >	(1 NA	OK Link	ed/Active 10 Gb	CX4 🔍 🛛	:12:79:4a:d8:00 (*	シー)	Auto	- ×
Add Port 👻								
							,	
Add Port -	o 💌 ?						1	
	o 🔽 ?							
		?						
connection Mode: Aut	VLAN tagged)							
Connection Mode: Aut		? Native ?	Smart Link ?	Private Network ?	Advanced			
connection Mode: Aut	VLAN tagged)				Advanced		×	
ionnection Mode: Aut sociated Networks (Network Name	VLAN tagged) VLAN ID	Native ?	?	?			x x	
connection Mode: Aut sociated Networks (Network Name PROD-A-1	VLAN tagged) VLAN ID 101	Native ?	?	?	<u> </u>			

Note: The "*Connected to*" field in the graphic above displays the MAC address and port number of the switch this uplink is connected to. This information is provided through LLDP discover and is not available in all switch products. This information can be very helpful when determining which switches and ports VC is connected to.

Figure 2-6 Active / Active SUS.

Shared Upli	nk Sets						
External Connec	tions Associated	l Networks					
Shared Uplink Se		Port Status	\frown	Connector Type	Uplink Po		
🕗 ок 🛛 🔘	VLAN-Trunk-1	OK Linked/Active	(10 Gb	CX4 CX4	©ок ⊘ок	C7000_1: Bay 1: Port X1 C7000_1: Bay 2: Port X1	

Figure 2-7 Associated Networks.

External Con	nections As	ssociated Networks			
Uplink Sets		Network Status	VLAN ID	Smart Link	Private Network
	/LAN-Trunk-1	OK PROD-A-1	101	Enabled	
		OK PROD-B-1	102	Enabled	
		OK PROD-C-1	103	Enabled	
		OK PROD-D-1	104	Enabled	
🕗 ок 🔘 🕚	/LAN-Trunk-2	OK PROD-A-2	101	Enabled	
		OK PROD-B-2	102	Enabled	
		OK PROD-C-2	103	Enabled	
		OK PROD-D-2	104	Enabled	

Summary Note: In this scenario we have created two independent Share Uplink Sets (SUS), each originating from the opposite VC-Modules, by doing so we provide the ability to create separate and redundant connections out of VC. 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 of these uplink ports to the same SUS, however, this would have provided an Active/ Standby uplink scenario, example below.

Figure 2-8 Example of an Active / Standby SUS.

Shared Uplink Sets						E ?
External Connections Associate	d Networks					
Shared Uplink Set	Port Status		Connector Type	Uplink Po	ort	
OK 💿 VLAN-Trunk-1	OK Linked/Active	10 Gb	CX4	🕗 ок	C7000_1: Bay 1: Port X1	
	OK Linked/Standby	10 Gb	CX4	🛇 ок	C7000_1: Bay 2: Port X1	

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 "Server-1"
- In the Network Port 1 drop down box, select PROD-A-1
- In the Network Port 2 drop down box, select PROD-A-2
- Do not select a FC SAN connection

• In the Assign Profile to Server Bay box, locate the Select Location drop down and select Bay 1, they apply

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 PROD-A-1 and PROD-A-2.

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 Server-1

add profile Server-1 –nodefaultenetconn -nodefaultfcconn

add enet-connection Server-1 pxe=Enabled Network=PROD-A-1

add enet-connection Server-1 pxe=Disabled Network=PROD-A-2

assign profile Server-1 enc0:1

Figure 2-9 Define a Server Profile.

ile									
rofile	e Name			ber (Logical)		IID (Logical)			
Server	r-1	🛇 ок 🛝	/CX0000000)	Ob1e4063-	74f9-4ddc-9bbf-c0	952b4004b9		
								_	
rnet	Network Connections (Phys	ical ports)							
ort	Network Name		Status	Port Speed	Allocated	PXE	MAC	Mapping	Delete
				Setting	Bandwidth				
	PROD-A-1	•		Preferred 💌	10 Gb	Enabled 💌	00-17-A4-77-04-00	LOM:1-a => Bay 1	X
	PROD-A-2	-	🛛 🛇 ок	Preferred 💌	10 Gb	Disabled 💌	00-17-A4-77-04-02	LOM:2-a => Bay 2	\times
Ac	dd Network Connection								
The second secon									
ign Pı	rofile to Server Bay								
Pow	Jer Serue	r Bay Assignmen	t		SN	Model	Status		
-			ect Locatio			ProLiant BL495c G			
. 🔴 с									

Server NIC Speed and LOM Mappings

What has been shown and discussed to this point is standard Virtual Connect functionality. We will now focus more of the specific Flex-10 features.

Note the "Allocated Bandwidth" and the LOM "Mapping" settings in the following graphic. Flex-10 based NICs have the ability of being configured as a Single 10Gb NIC or divided into as many as FOUR (4) physical NICs. It is important to note the LOM mappings when configuring which NIC will be connected to which network as a NIC on a specific LOM can connect to a network only once. (IE, NIC

LOM:1-a can be assigned to Prod-101-1, no other NIC on LOM:1 can be assigned to Prod-101-1) This is discussed in further details in the Flex-10 technology brief mentioned earlier in this scenario.

As additional NICs are added to a server profile that is assigned to a server with a 10Gb Flex-NIC, the assignment will alternate between LOM:1 and LOM:2. The first NIC will be LOM:1-a, the second will be LOM:2-a, then LOM:1-b, LOM:2-b etc. to a max of 4 NICs per LOM.

Figure 2-10 Server NIC speed and LOM Mappings.

ofile						
Profi	ie Name	Status	Serial Number (Logical)	Server UUID (Logical)		
		Ок	VCX0000000	0b1e4063-74f9-4ddc-9bbf-0	09526400469	
∣perve	er-1	VOK	*CA000000	00164003-7413-4000-3001-0	.03325400453	
șerve	er-1	UK UK		00104003-7413-4446-3601-6		
,	er-1 t Network Connections (Ph		*0,000000	00164000-7413-400C-3001-0	000000000000000000000000000000000000000	
,				00104000-1410-4000-0001-0		
,			Status Port Speed	Allocated PXE		pping Delete
,. nernet	t Network Connections (Ph	ysical ports)			МАС Мар	pping Delete :1-a => Bay 1 X

Summary

This profile will present Network Port 1 to "PROD-A-1" which is configured on VC Flex-10 module 1, and Network Port 1, with Network Port 2 to "PROD-A-2", which is configured on VC Flex-10 module 2. Both PROD-A-1 and PROD-A-2 are configured to support VLAN 101, so these two NICs are connected to the same VLAN, but taking a different path out of the enclosure. These two NICs could now be teamed within the OS.

Result

Windows 2003 Networking Configuration Example

The following graphics show a Windows 2003 server with TWO Flex-10 NICs configured as single NICs, at FULL 10Gb speed. You will also notice that Windows currently believes there are 8 NICs within this server. However, only TWO NICs are currently configured within Virtual Connect Flex-10, so the additional NICs show as disconnected.

Figure 2-11 Windows 2003 Network Connections (2 Connections Active).

Network Connections				
Elle Edit View Favorites Iool				11
🕜 Back 🔹 🕥 🔹 🗊 🔎 Search	🏷 Folders 🎼 🎶 🗙 🌱 [H.	1999 Personal State Sta	
Address 🛸 Network Connections		1		
Name	Туре	Status	Device Name	Phone #
LAN or High-Speed Internet		and the second		
Local Area Connection 5	LAN or High-Speed Inter	Connected	HP NC532i Dual Port 10GbE Multifunctio	
Local Area Connection 8	LAN or High-Speed Inter	Network cable unplugged	HP NC532i Dual Port 10GbE Multifunctio	
Local Area Connection 3	LAN or High-Speed Inter	Network cable unplugged	HP NC532i Dual Port 10GbE Multifunctio	
Local Area Connection	LAN or High-Speed Inter	Connected	HP NC532i Dual Port 10GbE Multifunctio	
Local Area Connection 7	LAN or High-Speed Inter	Network cable unplugged	HP NC532i Dual Port 10GbE Multifunctio	
Local Area Connection 6	LAN or High-Speed Inter	Network cable unplugged	HP NC532i Dual Port 10GbE Multifunctio	
Local Area Connection 2	LAN or High-Speed Inter	Network cable unplugged	HP NC532i Dual Port 10GbE Multifunctio	
Local Area Connection 4	LAN or High-Speed Inter	Network cable unplugged	HP NC532i Dual Port 10GbE Multifunctio	
Wizard				
New Connection Wizard	Wizard			
		F8		
•				•

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 2003 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 VC server profile for the NIC MAC addresses to verify which NIC is which.

Figure 2-12 Windows 2003 Extra Network Connections – Disabled.

Ele Edit View Favorites Ioo				
🔇 Back 🔻 🕤 🔻 🧊 🔎 Search	🏷 Folders 🔊 🌶 🗙 🍤 [0+	100	100 m
Address 🔕 Network Connections	1			🔁 G0
Name	Туре	Status	Device Name	Phone #
LAN or High-Speed Internet				
Local Area Connection 5	LAN or High-Speed Inter	Connected	HP NC532i Dual Port 10GbE Multifunctio	
Local Area Connection 8	LAN or High-Speed Inter	Disabled	HP NC532i Dual Port 10GbE Multifunctio	
Local Area Connection 3	LAN or High-Speed Inter	Disabled	HP NC532i Dual Port 10GbE Multifunctio	
Local Area Connection	LAN or High-Speed Inter	Connected	HP NC532i Dual Port 10GbE Multifunctio	
Local Area Connection 7	LAN or High-Speed Inter	Disabled	HP NC532i Dual Port 10GbE Multifunctio	
Local Area Connection 6	LAN or High-Speed Inter	Disabled	HP NC532i Dual Port 10GbE Multifunctio	
Local Area Connection 2	LAN or High-Speed Inter	Disabled	HP NC532i Dual Port 10GbE Multifunctio	
Local Area Connection 4	LAN or High-Speed Inter	Disabled	HP NC532i Dual Port 10GbE Multifunctio	
Wizard				
New Connection Wizard	Wizard			
	L.			
	-			
4				

Connection		
Status:		Connecte
Duration:		00:11:2
Speed:		(10.0 Gbp
Activity	~	
	Sent — 🕎] — Receive
Bytes:	12,630	3,81

Figure 2-13 Windows 2003 Network Connections (2 Connections).

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 within Flex-10, it will be displayed in Windows 2003 as a 2Gb NIC. Windows 2008 does not have this limitation.

Figure 2-14 Windows 2003 Device Manager shows all 8 NICs.

Note: This is the case no matter how many NICs are actually configured and in use.



Windows 2008 Networking Configuration Example

The following graphics show a Windows 2008 server with TWO Flex-10 NICs configured as single NICs, at FULL 10Gb speed. You will also notice that he server currently believes there are 8 NICs within this server. However, only TWO NICs are currently configured within Virtual Connect Flex-10.

Figure 2-15 Windows 2008 Network Connections (2 Connections Active).

Network Connections				<u>_ ×</u>
Control Panel - Network	Connections	🔻 🛃 Search		2
File Edit View Tools Advanced Help	1			
🕘 Organize 👻 📗 Views 👻				(?
ame	▼ Status	▼ Device Name ▼	Connectivity	
LAN or High-Speed Internet (8)				
Local Area Connection	vaolab.net	HP NC532i Dual Port 10GbE M	Access to Local only	
Local Area Connection 2	vaolab.net	HP NC532i Dual Port 10GbE M	Access to Local only	
Local Area Connection 3	Network cable unplugged	HP NC532i Dual Port 10GbE M		
Local Area Connection 4	Network cable unplugged	HP NC532i Dual Port 10GbE M		
Local Area Connection 5	Network cable unplugged	HP NC532i Dual Port 10GbE M		
Local Area Connection 6	Network cable unplugged	HP NC532i Dual Port 10GbE M		
Local Area Connection 7	Network cable unplugged	HP NC532i Dual Port 10GbE M		
Local Area Connection 8	Network cable unplugged	HP NC532i Dual Port 10GbE M		
	4			
🎽 Start 🛛 🛃 💻 🖉 🕎 Network	k Connections		🖉 🕁 👮 🕼	7:32 P

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 VC server profile for the NIC MAC addresses to verify which NIC is which.

Network Connections			
Control Pa	nel 🔹 Network Connections	👻 🚱 Search	
File Edit View Tools Ad	dvanced Help		
🕒 Organize 💌 📗 Views	 Enable this network device 	Diagnose this connection Image: Plagnose this connection with the second	(2)
Name	- Status	Device Name V Connectivity	-
LAN or High-Speed Interne		Device Name [*] Connectivity	
Local Area Connection	vaolab.net	HP NC532i Dual Port 10GbE M Access to Local only	ł.
Local Area Connection 2	vaolab.net	HP NC532i Dual Port 10GbE M Access to Local only	F
Local Area Connection 3	Disabled Disabled	HP NC532i Dual Port 10GbE M	
Local Area Connection 4 Local Area Connection 5	Disabled	HP NC532i Dual Port 10GbE M HP NC532i Dual Port 10GbE M	
Local Area Connection 5	Disabled	HP NC532 Dual Port 10GbE M HP NC532 Dual Port 10GbE M	
Local Area Connection 6	Disabled		
	Disabled	HP NC532i Dual Port 10GbE M HP NC532i Dual Port 10GbE M	
Local Area Connection 8	Disabled	HP NC532 Dual Port 10GbE M	
41		R	
			<u>·</u>
💐 Start 📗 🚠 📃	Network Connections	🖉 🖓 🐲 🕡	👍 7:34 PM

Figure 2-16 Windows 2008 Extra Network Connections – Disabled.

Figure 2-17 Windows 2003 Network Connections (2 Connections).

Connection —		
IPv4 Connec	tivity:	Local
IPv6 Connec		Local
Media State:		Enabled
Duration:		00:27:19
Speed:		10.0 Gbps
Details		
	Sent —	Received
Activity	Sent —	Received

NIC Teaming

If higher availability is desired, NIC teaming in Flex-10 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. You would typically TEAM a NIC from Bay 1 to Bay 2 for example.

NIC teaming functions the same in both Windows 2003 and Windows 2008. The graphics below are from Windows 2003.

Highlight both NICs and then select Team, then click OK, the team will be created.

	10GbE Multifunction BL-c Adapter #3	/0 Bay 1 Port 2 / 1	Teaming Setup
(1) HP NC532i Dual Port	10GbE Multifunction BL-c Adapter #4	//0 Bay 2 Port 2 / 1	<u>T</u> eam <u>D</u> issolve
			⊻LAN(802.1Q)
R			
			<u>S</u> ave
	erties of an item at any time by Double- s.	Clicking on it or	Properties
electing and, then, Clicking <u>P</u> ropertie			

Figure 2-18 View - Teaming GUI.

Figure 2-19 View – Network Connections – NIC Team #1.

HP Network Configuration Utility Properties	? ×
Ethernet Devices iSCSI Devices	
HP NICs:	
HP Network Team #1	Team Team
[5] HP NC532i Dual Port 10GbE Multifunction BL-c Adapter #3 I/O Bay 1 Port 2 / 1	
[1] HP NC532i Dual Port 10GbE Multifunction BL-c Adapter #4 I/O Bay 2 Port 2 / 1	Drop
	<u>VLAN(802.10)</u>
	Save
Make a selection. You may view properties of an item at any time by Double-Clicking on it or Selecting and, then, Clicking <u>P</u> roperties.	Properties
Help License Manager Enable UID 🔽 Display Tray Icon	
	OK Cancel

Figure 2-20 View - Network Connections - NIC Team #1 - Windows.

Network Connections					_ & ×
<u>File Edit View Favorites</u>	Tools 4	Adva <u>n</u> ced <u>H</u> elp			
🔾 Back 🝷 🕥 🝷 🇊 🔎 Se	arch 🌔	Folders 🛛 🔝 🎲 🗙 🏹 📑	H.		
Address 💽 Network Connection	ıs				💌 ラ Go
Name		Туре	Status	Device Name	Phone # or Host Addres
Connected					
🕹 Local Area Connection		LAN or High-Speed Inter	Connected	HP NC532i Dual Port 10G	
🕹 Local Area Connection 5 🔄 🔤		LAN or High-Speed Inter	<u>Connected</u>	HP NC532i Dual Port 10G	
Local Area Connection 9	\mathbb{R}	LAN or High-Speed Inter	Connected	HP Network Team #1	>
Disabled					
Local Area Connection 2		LAN or High-Speed Inter	Disabled	HP NC532i Dual Port 10G	
🕹 Local Area Connection 3		LAN or High-Speed Inter	Disabled	HP NC532i Dual Port 10G	
🕹 Local Area Connection 4		LAN or High-Speed Inter	Disabled	HP NC532i Dual Port 10G	
🕹 Local Area Connection 6		LAN or High-Speed Inter	Disabled	HP NC532i Dual Port 10G	
🕹 Local Area Connection 7		LAN or High-Speed Inter	Disabled	HP NC532i Dual Port 10G	
Local Area Connection 8		LAN or High-Speed Inter	Disabled	HP NC532i Dual Port 10G	

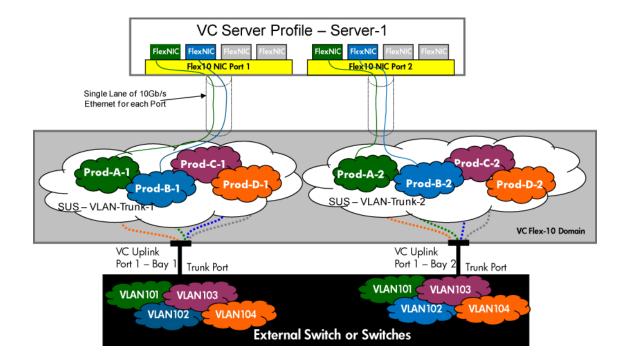
 \setminus

Adding additional NICs to an existing server Profile

What has been shown and discussed to this point is standard Virtual Connect functionality. We will now go into more of the specific Flex-10 features by providing additional NICs to the Windows server, without adding additional server hardware.

The server must be powered off in order to add NICs to the profile, however; editing of the profile, changing network connections, link speed etc., can be done with the server running.

Figure 2-21 Server Blade profile was initially configured with only TWO NICs. We have now added TWO additional Flex-10 NICs and connected them to PROD-B-1 and PROD-B-2 respectively.



Editing a Server Profile

We will edit server profile Server-1 and add TWO additional NICs to the server.

Each server NIC will connect to a specific network.

- On the main VC menu, select Server Profile Server-1
- Under Ethernet Network Connections, click the Add Network Connection button twice
- Two additional Network connections will appear
- Under the Network Name column, select PROD-B-1 and RROD-B-2
- Under the Port Speed Settings column, select a speed for each NIC
- Set the NIC speeds as follows;
 - NIC1 (port LOM1:a) Auto or Preferred
 - NIC2 (port LOM2:a) Auto or Preferred
 - NIC3 (port LOM1:b) Set to Custom 7.5Gb
 - NIC4 (port LOM2:b) Set to Custom 7.5Gb
- By setting NICs 3 & 4 to 7.5Gb, and leaving NICs 1 & 2 as Auto/Preferred, they will be assigned the remaining 2.5Gb of bandwidth each
- Optionally, you can add up to a total of 8 NIC ports and then assigned the speeds accordingly
- Scroll to the bottom of the profile, Click Apply
- If the server is off, power it back on, the view the server from the iLO or OA consoles and not the additional NICs

Defining a Server Profile via CLI

The following command(s) can be copied and pasted into an SSH based CLI session with Virtual Connect # Provision and configure TWO additional NICs for Profile Server-1, Set speed to custom, 7.5Gb add enet-connection Server-1 pxe=Disabled Network=PROD-B-1 SpeedType=Custom Speed=7500 add enet-connection Server-1 pxe=Disabled Network=PROD-B-2 SpeedType=Custom Speed=7500

Alternatively, not setting a Custom speed on the additional NICs would result in ALL NICs being configured for 5Gb per NIC.

Provision and configure TWO additional NICs for Profile Server-1 and leave the speeds set to the default, all configured NICs would get an equal speed add enet-connection Server-1 pxe=Disabled Network=PROD-B-1 add enet-connection Server-1 pxe=Disabled Network=PROD-B-2

Note: the script may run faster if the profile is not assigned to a server bay. Optionally, you could

un-assign the profile, make the changes, and then reassign the profile.

Figure 2-22 Setting the Network connection Port Speed.

Define 🔻	· Configure → Tools → Help →						
Edit \$	Server Profile: Server-1						
Profile							
Profi	le Name Status er-1 OK	Serial Number (Lo VCX0000000		JUID (Logical) 3-7419-4ddc-9bbf-c0952b	4004b9		
Etherne	t Network Connections (Physical ports)		Custom Port Speed	I D	3		
Port	Network Name	Select the custom p	ort speed for this netwo	ork	vc	Mapping	Delete
1	PROD-A-1	Selected Speed 7	5 Gb		17-A4-77-04-	LOM:1-a => Bay	×
2	PROD-A-2				17-A4-77-04-	LOM:2-a => Bay	X
3	PROD-B-1				17-A4-77-04-	LOM:1-b => Bay	×
4	PROD-B-2		ок	Cancel	17-A4-77-04-	LOM:2-b => Bay 2	×
	Add Network Connection						
Assign	Profile to Server Bay				_		
Por	wer Server Bay Assign	ment	SN	Model	Status	UID	
	Off C7000_1: Bay 1 (ProLiant BL495c G5)	Select Location 👻	USE841FTYW	ProLiant BL495c G5	🛇 ок		
Dele	ete Copy Profile			Clear Apply	y Cance	el	

Figure 2-23 Server NIC speed and LOM Mappings.

file											
Profi	île Name	Status	Serial Nun	nber (Logica	al)	Server UUID	(Logical)				
Serv	ver-1	🛇 ок	VCX000000	00		0b1e4063-74f	9-4ddc-9bbf-(:0952k	o4004b9		
erne	et Network Connections (Phy	ysical ports)									
Port	Network Name		Status	Port Spee Setting	d	Allocated Bandwidth	PXE		MAC	Mapping	Delet
1	PROD-A-1		🚽 🛇 ок	Preferred	•	2.5 Gb	Enabled	•	00-17-A4-77-04- 00	LOM:1-a => Bay 1	X
2	PROD-A-2		🚽 📀 ок	Preferred	•	2.5 Gb	Disabled	•	00-17-A4-77-04- 02	LOM:2-a => Bay 2	X
3	PROD-B-1		🚽 📀ок	Custom	- 8	7.5 Gb	Disabled	•	00-17-A4-77-04- 04	LOM:1-b => Bay 1	×
4	PROD-B-2		🚽 📀ок	Custom	- 8	7.5 Gb	Disabled	•	00-17-A4-77-04- 06	LOM:2-b => Bay 2	х
	Add Network Connection										
sign	Profile to Server Bay										
Po	wer Ser	ver Bay Assignm	ant		SI		Mode	1	Status	UID	
- FU	Off C7000_1: Bay 1 (ProLi		elect Locat	ion – II ^s	SE841FT		Liant BL495c		Status OK		

Summary

Initially the Virtual Connect server profile was created with only TWO 10Gb NICs configured and applied to Enclosure Bay 1. Without installing any additional hardware, the profile was later edited and two additional NICs were added, the initial NICs had their speed set down to 2.5Gb each and the newly added NICs were set with a link speed of 7.5Gb.

It was shown how those NICs could be created within both the GUI and VC CLI. We also discussed how those additional NICs could be configured for specific link speeds, between 100Mb and 10Gb per NIC.

When the blade occupying enclosure Bay 1 is powered up, it will have 4 physical NICs connected to networks, PROD-A-1, PROD-A-2, PROD-B-1 and PROD-B-2. If additional NICs are required, simply go to the Virtual Connect profile and add the required number of NICs, configure them for the appropriate networks, speed and apply the profile. Verify the configuration change through the OA, HP Virtual Connect Enterprise Manager (VCEM) and/or ILO.

Result

The following graphics provide an example of a Windows 2003/2008 server with 4 NICs configured and connected to the VC Networks as discussed earlier. NIC Teaming examples are also provided.

Network Connections				×
<u>ile E</u> dit <u>V</u> iew F <u>a</u> vorites <u>T</u> oo				
🗿 Back 👻 🕥 👻 🧊 🔁 Search	🌔 Folders 🛛 🗟 🎯 🗙 🏹 🗄	⊡ ~		
Address 💊 Network Connections				💌 🔁 Go
Name	Туре	Status	Device Name	Phone # or Host Addre
Connected				
Local Area Connection 8	LAN or High-Speed Inter	Connected	HP NC532i Dual Port 10G	
🕹 Local Area Connection	LAN or High-Speed Inter	Connected	HP NC532i Dual Port 10G	
🕹 Local Area Connection 5	LAN or High-Speed Inter	Connected	HP NC532i Dual Port 10G	
Local Area Connection 4	LAN or High-Speed Inter	Connected	HP NC532i Dual Port 10G	
Disabled				
Local Area Connection 2	LAN or High-Speed Inter	Disabled	HP NC532i Dual Port 10G	
🚣 Local Area Connection 6	LAN or High-Speed Inter	Disabled	HP NC532i Dual Port 10G	
🚣 Local Area Connection 7	LAN or High-Speed Inter	Disabled	HP NC532i Dual Port 10G	
🕹 Local Area Connection 3	LAN or High-Speed Inter	Disabled	HP NC532i Dual Port 10G	
Wizard				
😼 New Connection Wizard	Wizard			
•				<u></u>
ಶ Start 🛛 😰 🥭 👘 📢 Net	work Connections			2 🎘 🔁 5:38 PM

Figure 2-24 Windows 2003 Network Connections (4 Active Connections).

Figure 2-25 Windows 2003 Network Connections NIC Speed.

🚣 Local Area Connection Status	🚣 Local Area Connection 8 Status 🛛 🤶 🗙
General Support	General Support
Connection Status: Connected Duration: <u>00:02:13</u>	Connection Status: Connected Duration: 00:02:09
Speed:	Speed: 7.0 Gbps
Activity Sent — Received	Activity Sent — Received
Bytes: 5,824 3,900	Bytes: 530 768
Properties Disable	Properties Disable

Note: Even though the Profile is set to 2.5Gb and 7.5Gb respectively, Windows 2003 does not display values correctly. Windows 2008 displays the correct values.

Network Connections				
Control Panel	I ▼ Network Connections	🔻 🐼 Search		
File Edit View Tools Adva	anced Help			
🕛 Organize 💌 📗 Views 💌				(?)
Name	✓ Status	- Device Name	- Connectivity	- 1
Access to Local only (4)				
Local Area Connection 4	vaolab.net	HP NC532i Dual Port 10GbE M.	Access to Local only	F
Local Area Connection	vaolab.net	HP NC532i Dual Port 10GbE M.	Access to Local only	F
Local Area Connection 2	vaolab.net	HP NC532i Dual Port 10GbE M.	Access to Local only	F
Local Area Connection 3	vaolab.net	HP NC532i Dual Port 10GbE M.	Access to Local only	F
Unspecified (4)				
Local Area Connection 5	Disabled	HP NC532i Dual Port 10GbE M.		
Local Area Connection 6	Disabled	HP NC532i Dual Port 10GbE M.		
Local Area Connection 7	Disabled	HP NC532i Dual Port 10GbE M.		
Local Area Connection 8	Disabled	HP NC532i Dual Port 10GbE M.		
		\searrow		
		45		
•				Þ
灯 Start 🛛 🚠 📃	💱 Network and Sharing Ce 🛛 🙀 🛚	etwork Connections	🖉 ପ୍ର 穿 🗊 🕼	8:10 PM

Figure 2-26 Windows 2008 Network Connections (4 Active Connections).

Figure 2-27 Windows 2008 Network Connections NIC Speed.

General	1	General	
Connection		Connection	
IPv4 Connectivity:	Local	IPv4 Connectivity:	Local
IPv6 Connectivity:	Local	IPv6 Connectivity:	Local
Media State:	Enabled	Media State:	Enabled
Duration:	00:06:52	Duration:	00:01:22
Speed:	2.5 Gbps	Speed:	(7.5 Gbps
Activity		Activity	
Activity Sent	Received	Activity Sent	Received
	Received 3,024		Received
Sent —	all all	Sent —	

Note: Windows 2008 displays the correct link speed values

Scenario 2:2 - Flex-10 - VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS) and Mapped VLANs - Windows 2008 Hyper-V

Overview

This scenario discusses the Flex-10 features provided in Virtual Connect. For an overview of Flex-10, please refer to the following technology brief. HP Flex-10 technology brief;

http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01608922/c01608922.pdf

Virtual Connect Flex-10 provides the ability to either present the 10Gb server NICs as single 10Gb NICs, or divide each NIC into as many as 4 "physical function" NICs per NIC port. These physical function NICs look to the server hardware and OS as physical NICs, have their own MAC address and can be configured at speeds from 100Mb to 10Gb.

As shown in earlier scenarios, VLAN access can be handled in two different ways. Virtual Connect can either pass VLAN/Non-VLAN traffic untouched to the host (Tunneling Mode) or Virtual Connect can handle all VLAN tagging (Server Mapped VLANs). Each has their advantages as discussed in the Introduction to Virtual Connect section, earlier in this document.

This scenario, using Map VLAN Tags, will focus on the Virtual Connect Flex-10 technology. In this scenario we have two 10Gb uplinks configured with multiple VLANs. We will configure a Windows 2008R2 Hyper-V server with 4 NICs, 2 per NIC port, configured at various speeds. Some NICs will be connected to a specific VLAN, so frames will be presented without tags, the other will be configured with multiple networks/VLANs, were frames will be presented with tags. We will also show how the speed of each NIC can be varied from speeds ranging between 100Mb to 10Gb.

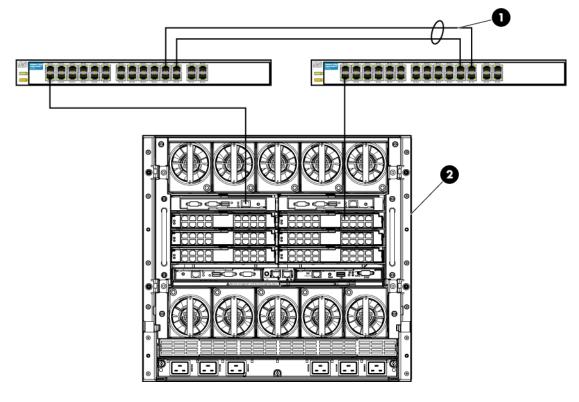
	Management	Production	Management	Production			
	NIC #1	NIC #2	NIC #3	NIC #4			
Traditional 1Gb technology	1Gb	1Gb	1Gb	1Gb			
Virtual Connect Flex- 10	2.5Gb	7.5Gb	2.5Gb	7.5Gb			

Table 2-1 Flex-1	0 NIC – Optimized	for a Virtualization
------------------	-------------------	----------------------

Requirements

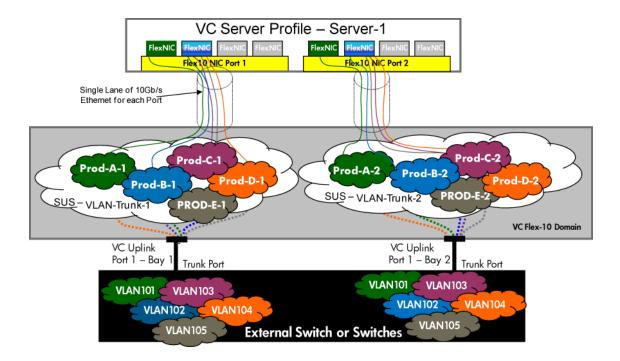
In order to implement this scenario, an HP BladeSystem c7000 enclosure with one of more Blade G6 servers with 10Gb NICs and TWO Virtual Connect Flex-10 Ethernet modules, installed in Bays 1 & 2 are required. In addition, we will require ONE or TWO external Network switches. As Virtual Connect does not appear to the network as a switch and is transparent to the network, any standard managed switch will work with Virtual Connect.

Figure 2-28 Physical View; Shows one 10Gb Ethernet uplink from Ports 1 on Module 1 to Port 1 on the first network switch and one 10Gb uplink from Port 1 on Module 2 to Port 1 on the second network switch.



ltem	Description
1	Switch Cross Connect
2	c7000 Enclosure, rear view

Figure 2-29 Server Blade profile with TWO Flex-10 NICs configured. Each NIC is connected to a vNet (PROD-A-1 and PROD-A-2), the additional NICs are connected to other networks, which are also 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 X1 on VC module 1 and Port X1 on VC module 2, creating an Active/Active uplink.



Installation and configuration

Switch configuration

Appendices A and B provide a summary of the commands required to configure the switch in either a Cisco IOS or a ProCurve network infrastructure. The configuration information provided in the appendices assumes the following information:

 The switch ports are configured as TRUNK ports to support VLANs 101, 102, 103, 104 and 105. All frames will be forwarding to VC with VLAN tags.

Note: when adding the additional uplinks to the SUS, the switch ports connected to Virtual Connect will need to be configured for LACP and configured for the same Link Aggregation Group.

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 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 can 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 (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 Map VLAN Tags via GUI (Ethernet settings)

Note: Flex-10 has also provided additional controls when configuring VC for mapped VLAN tags (Multiple Networks over a single link) support. These features provide the ability to set a Custom or Preferred network speed value for each NIC. These are VC domain settings and when configured will limit the maximum configurable speed of a NIC.

Enable Map VLAN Tags within Virtual Connect

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Map VLAN Tags
- Select Fast MAC Cache Fail-over with a refresh of 5
- Optionally, select a preferred/Maximum link speed
- Select Apply

Configuring the VC Module for Map VLAN Tags via CLI (Ethernet settings)

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

Set Advanced Ethernet Settings to "Map VLAN Tags" and set "Force server connections" to disabled

set enet-vlan vlantagcontrol=map sharedservervlanid=false

set mac-cache Enabled=True Refresh=5

Note: Do not set a Preferred or Max speed for this scenario. This example is provided for reference only. For the purpose of this scenario, we will not be configuring the custom values for Preferred Link or Maximum Connection speeds. However, the CLI commands are provided below for reference.

Selecting the Set a Customer value for Preferred Link Connection Speed and/or Set a Customer value for Maximum Link Connection Speed, Sets the respective speed for all connections using multiple networks to 500Mb and maximum connection speed to 2.5Gb.

Set Advanced Ethernet Settings to a Preferred speed of 500Mb and a Max Speed of 2500Mb set enet-vlan PrefSpeedType=Custom PrefSpeed=500 MaxSpeedType=Custom MaxSpeed=2500

Figure 2-30 Ethernet Settings.

Define 🔻 Configure 👻 Tools 👻 Help 👻	
Ethernet Settings	
MAC Addresses Port Monitoring Advanced Settings	
Server VLAN Tagging Support	
O Tunnel VLAN Tags	?
Map VLAN Tags	
\square Force server connections to use the same VLAN mappings as shared uplink sets	?

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

Connect Port X1 of VC module 1 to Port 1 on switch 1 Create a SUS named "VLAN-Trunk-1" and connect it to Flex-10 Port X1 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;
 - a. Enclosure 1, Bay 1, Port X1
- Add Networks as follows;
 - a. PROD-A-1 = VLAN ID=101
 - **b.** PROD-B-1 = VLAN ID=102
 - **c.** PROD-C-1 = VLAN ID=103
 - d. PROD-D-1 = VLAN ID=104
 - e. PROD-E-1 = VLAN ID=105
- Enable Smartlink on ALL Networks
- Click Apply

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

Connect Port X1 of VC module 2 to Port 1 on switch 2 Create a SUS named "VLAN-Trunk-2" and connect it to Flex-10 Port X1 on Module 2

- On the Virtual Connect Home page, select Define, Shared Uplink Set
- Insert Uplink Set Name as VLAN-Trunk-2
- Select Add Port, then add the following port;
 - a. Enclosure 1, Bay 2, Port X1
- Add Networks as follows;
 - a. PROD-A-2 = VLAN ID=101
 - **b.** PROD-B-2 = VLAN ID=102
 - c. PROD-C-2 = VLAN ID=103
 - d. PROD-D-2 = VLAN ID=104

e. PROD-E-2 = VLAN ID=105

- Enable Smartlink on ALL Networks
- Click Apply

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:X1 Uplinkset=VLAN-Trunk-1 speed=auto

Create Networks Prod-A-1 through Prod-D-1 for Shared Uplink Set "VLAN-Trunk-1" add network PROD-A-1 uplinkset=VLAN-Trunk-1 VLanID=101 Set Network PROD-A-1 SmartLink=Enabled add network PROD-B-1 uplinkset=VLAN-Trunk-1 VLanID=102 Set Network PROD-C-1 uplinkset=VLAN-Trunk-1 VLanID=103 Set Network PROD-C-1 SmartLink=Enabled add network PROD-C-1 uplinkset=VLAN-Trunk-1 VLanID=104 Set Network PROD-D-1 uplinkset=VLAN-Trunk-1 VLanID=104 Set Network PROD-D-1 SmartLink=Enabled add network PROD-D-1 SmartLink=Enabled set Network PROD-E-1 uplinkset=VLAN-Trunk-1 VLanID=105 Set Network PROD-E-1 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:X1 Uplinkset=VLAN-Trunk-2 speed=auto

Create Networks Prod-A-2 through Prod-D-2 for Shared Uplink Set "VLAN-Trunk-2" add network PROD-A-2 uplinkset=VLAN-Trunk-2 VLanID=101 Set Network PROD-A-2 SmartLink=Enabled add network PROD-B-2 uplinkset=VLAN-Trunk-2 VLanID=102 Set Network PROD-B-2 SmartLink=Enabled add network PROD-C-2 uplinkset=VLAN-Trunk-2 VLanID=103 Set Network PROD-C-2 SmartLink=Enabled add network PROD-D-2 uplinkset=VLAN-Trunk-2 VLanID=104 Set Network PROD-D-2 uplinkset=VLAN-Trunk-2 VLanID=104 Set Network PROD-D-2 SmartLink=Enabled add network PROD-D-2 SmartLink=Enabled set Network PROD-D-2 SmartLink=Enabled

Note: It is important to point out at this time, if you are familiar with VC scripting, or have existing VC scripts that you had used on Virtual Connect 1:10 modules, and may want to use with Flex-10, the numbering of the Flex-10 external ports is different than with early modules of VC. VC-E and VC-F uplinks ports are numbered as Ports 1, 2, 3 etc., however; Flex-10 ports are referenced as X1, X2, X3 etc., plus some of the ports are shared, IE the CX4 is shared with SFP+ port X1, both are configured as X1, but only one is usable at a time. If a CX-4 cable is connected the SFP+ port will become disable, the same is true

for Ports X7 & X8, which are the internal cross connect ports, the cross connects will disconnect, if an SFP+ module is plugged in Ports X7 or X8.

Figure 2-31 Define a Shared Uplink Set (VLAN-Trunk-1) and add VLANs.

	link Set:	VLAN-TTU	1114-1							
iernet Shared Extern	al Uplink Set									
Uplink Set Name				Status	PID					
VLAN-Trunk-1				Øc	ж					
ernal Uplink Ports										
	Port Role	Port Status			Connector Type	Connected To	PID	Speed/	Duplex	Delete
Port	TORCINOIC									
C7000_1: Bay 1: Port X	1 NA	OK Link	ed/Active	10 Gb	CX4	00:12:79:4a:d8:00 (1)	Auto	_	×
C7000_1: Bay 1: Port X	1 NA	OK Link	ed/Active	10 Gb	CX4	00:12:79:4a:d8:00 (1)	Auto	•	X
C7000_1: Bay 1: Port X Add Port - Connection Mode: Auto	1 NA	OK Link		10 Gb	CX4 Private Network ?)	Auto	•	X
C7000_1: Bay 1: Port X Add Port - Connection Mode: Auto sociated Networks (1 NA	OK Link		rt Link	Private Network) ()	Auto	<u> </u>	X
C7000_1: Bay 1: Port X Add Port - Connection Mode: Auto sociated Networks (Network Name	VLAN ID	OK Link ? Native ?	Smail ?	rt Link	Private Network	c Advanced			•	X
C7000_1: Bay 1: Port X Add Port - Connection Mode: Auto Sociated Networks (Network Name PROD-A-1	VLAN tagged) VLAN tagged) 101	OK Link ? Native ?	Smail ?	rt Link	Private Network ?	Advanced		X	<u> </u>	X
C7000_1: Bay 1: Port X Add Port - Connection Mode: Auto sociated Networks (Network Name PROD-A-1 PROD-B-1	1 NA 2 ? 2 ? 2 ? 2 ? 2 ? 2 ? 2 ? 2 ? 2 ? 2 ?	OK Link ? Native ?	Smail ? R	rt Link	Private Network ?	Advanced		x x	×	X

Note: The "Connected to" field in the graphic above displays the MAC address and port number of the switch this uplink is connected to. This information is provided through LLDP discover and is not available in all switch products. This information can be very helpful when determining which switches and ports VC is connected to.

```
Figure 2-32 Active / Active SUS.
```

hared	Uplink Sets						
External C	connections Associated	d Networks					
hared Upl	link Set	Port Status		Connector Type	Uplink Po	ort	
ihared Upl OK	link Set	Port Status	10 Gb	Connector Type CX4	Uplink Po	ort C7000_1: Bay 1: Port X1	

Summary Note: In this scenario we have created two independent Share Uplink Sets (SUS), each originating from the opposite VC-Modules, by doing so we provide the ability to create separate and redundant connections out of VC. 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 of these uplink ports to the same SUS, however, this would have provided an Active/ Standby uplink scenario, example below.

Figure 2-32 Example of an Active / Standby SUS.

Define 👻 Configure 👻 Tools 👻 Help	*					
Shared Uplink Sets						₽?
External Connections Associated N	etworks					
Shared Uplink Set	Port Status		Connector Type	Uplink Po	rt	
OK 💿 VLAN-Trunk-1	OK Linked/Active	10 Gb	CX4	🕗 ок	C7000_1: Bay 1: Port X1	
	OK Linked/Standby	10 Gb	CX4	📀 ок	C7000_1: Bay 2: Port X1	

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 "Server-1"
- In the Network Port 1 drop down box, select PROD-A-1, configure the speed as custom at 2.5Gb
- In the Network Port 2 drop down box, select PROD-A-2, configure the speed as custom at 2.5Gb
- In the Network Port 3 drop down box, select Multiple Networks, configure the speed as Auto
 Configure Multiple Networks for PROD-C-1, PROD-D-1 and PROD-E-1
- In the Network Port 4 drop down box, select Multiple Networks, configure the speed as Auto
 Configure Multiple Networks for PROD-C-2, PROD-D-2 and PROD-E-2
- In the Assign Profile to Server Bay box, locate the Select Location drop down and select Bay 1, then apply

Note: you should now have a server profile assigned to Bay 1, with 4 Server NICs connected to the various networks. NICs 3&4 should have a link speed of 7.5Gb

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 Server-1 add profile Server-1 -nodefaultenetconn add enet-connection Server-1 pxe=Enabled Network=PROD-A-1 SpeedType=Custom Speed=2500 add enet-connection Server-1 pxe=Disabled Network=PROD-A-2 SpeedType=Custom Speed=2500 add enet-connection Server-1 pxe=Disabled add server-port-map Server-1:3 PROD-C-1 VLanId=102 add server-port-map Server-1:3 PROD-C-1 VLanId=103 add server-port-map Server-1:3 PROD-D-1 VLanId=104 add server-port-map Server-1:3 PROD-E-1 VLanId=105 add enet-connection Server-1 pxe=Disabled add server-port-map Server-1:4 PROD-C-2 VLanId=102 add server-port-map Server-1:4 PROD-C-2 VLanId=103 add server-port-map Server-1:4 PROD-D-2 VLanId=104 add server-port-map Server-1:4 PROD-E-2 VLanId=105 Assign profile Server-1 enc0:1

Figure 2-33 Define a Server Profile with 4 NICs.

Prof Serv	īle Name	Status	Serial		(Logical)		ver UUID (Log if2e6-169f-47e	ical) 3-8c61-22c5c9a9	5721		
erne	et Network Connections (Physi	cal ports)									
Port	Network Name			Status	Port Speed Setting		Allocated Bandwidth	PXE	MAC	Mapping	Delet
1	PROD-A-1		•	🛇 ок	Custom	•	2.5 Gb	Enabled 💌	00-17-A4-77-04- 00	LOM:1-a => Bay 1	×
2	PROD-A-2		-	🛇 ок	Custom	- 😒	2.5 Gb	Disabled 💌	00-17-A4-77-04- 02	LOM:2-a ≕> Bay 2	Х
3	Multiple Networks		- 🕥	🛇 ок	Auto	•	7.5 Gb	Disabled 💌	00-17-A4-77-04- 04	LOM:1-b => Bay 1	X
4	Multiple Networks		- 😒	🕗 ок	Auto	-	7.5 Gb	Disabled 💌	00-17-A4-77-04- 06	LOM:2-b ≕> Bay2	х
	Add Network Connection										
		•									
sign	Profile to Server Bay										
Ро		Bay Assignm				SN		Model		סונ	
	Off C7000_1: Bay 1 (ProLiant G5)	BL495c	Select L	ocation ¬	USE841	FTYW	ProLiant	BL495c G5	🛛 🛇 ок 🛛 🤅		

Server NIC Speed and LOM Mappings

We will now focus more of the specific Flex-10 features.

Note the "Allocated Bandwidth" and the LOM "Mapping" settings in the following graphic. Flex-10 based NICs have the ability of being configured as a Single 10Gb NIC or divided into as many as FOUR (4) physical NICs. It is important to note the LOM mappings when configuring which NIC will be connected to which network, as a NIC on a specific LOM can connect to a network only once. (IE, NIC LOM:1-a can be assigned to Prod-101-1, no other NIC on LOM:1 can be assigned to Prod-101-1). This is discussed in further details in the Flex-10 technology brief mentioned earlier in this document.

As additional NICs are added to a profile that is assigned to a server with a 10Gb Flex-NIC, the assignment will alternate between LOM:1-x and LOM:2-x. The first NIC will be LOM:1-a, the second will be LOM:2-a, then LOM:1-b, LOM:2-b etc. to a max of 4 NICs per LOM.

Also, note that if additional NICs are required, this server has only 6 NICs configured, we could ADD two more NICs to this server without adding additional hardware. As of Virtual Connect firmware 2.30, Virtual Connect will provide the ability to add/remove or reconfigure the server NICs, including NIC speed, while the server is running.

ofile											
Profil	e Name	Status	Serial I	Number	(Logical)	Server UU	IID (Log	jical)			
Serve	r-1	🕗 ок	VCX000	00000		c6f5f2e6-1	69f-47e	3-8c61-22c5c9a	95721		
ernet	Network Connections (Physi										
	Network Connections (Frigs)	cal ports)									
	Network Connections (Flys)	cal ports)									
		cal ports)									
Port	Network Name	cal ports)			Port Speed Setting		ated	PXE	MAC	Mapping	Delet
Port 1					Setting		width	PXE Enabled		Mapping LOM:1-a => Bay 1	Delet
1	Network Name		•	⊘ок	Setting	Øant ∑ 2.5 G	bwidth		00-17-A4-77-04-/	LOM:1-a =>	
	Network Name PROD-A-1		•	⊘ок ⊘ок	Setting Custom	6anc ≦ 2.5 G ≦ 2.5 G	b b	Enabled 💌	00-17-A4-77-04- 00 00-17-A4-77-04- 02	LOM:1-a => Bay 1 LOM:2-a =>	×

Figure 2-34 Server NIC speed and LOM Mappings.

Figure 2-35	Adjusting	the NIC	speed.
-------------	-----------	---------	--------

dit S	Server Profile: Server-	.1"					
ofile							
Profil	le Name	Status	Serial Number (Logical)	Server UUID (Logical)			
Serve	er-1	🛇 ок	VCX0000000	c6f5f2e6-169f-47e3-8c61-22	2c5c9a95721		
ernet	t Network Connections (Physica	l ports)	Custom	Port Speed	×		
		l ports)	Custom Select the custom port speed f		MAC	Mapping	Delet
Port		l ports)		or this network			Delet
Port I	Network Name	l ports)	Select the custom port speed f	or this network	MAC 00-17-A4-77-04-	LOM:1-a => Bay 1	
Port 1 2	Network Name PROD-A-1	I ports)	Select the custom port speed f	or this network	MAC 00-17-A4-77-04- 00 00-17-A4-77-04-	LOM:1-a => Bay 1 LOM:2-a => Bay 2	

Figure 2-36 Configuring Multiple Networks.

file							
Profile Name Server-1	Force same VLAN	Server VLAN nappings as Shared Upli	l Tag to vNet Mappings nk Sets ?			×	
ernet Network Connectio	vNet Name		Server VLAN Id	Untagged ?	Delete		
	PROD-B-1	🔹 📀ок	102		Х		
Port Network Name	PROD-C-1	💽 📀 ок	103		Х	oping	Delete
PROD-A-1	PROD-D-1	💽 📀 ок	104		Х	/t:1-a =>	X
PROD-A-2	PROD-E-1	💽 📀 ок	105		х	1 /:2-a =>	X
Multiple Networks						2 1:1-b =>	X
4 Multiple Networks						1:2-b =>	х
	Add Mapping	Copy From	n ?			2	
Add Network Connec							

Scenario 2:2 - Flex-10 - VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS) and Mapped VLANs - Windows 2008 Hyper-V 132

Summary

This profile will present NIC 1 to network "PROD-A-1" & NIC 2 to network PROD-A-2 which are mapped to VLAN 101 (management network); frames for VLAN 101 will be passed to NICs 1&2 untagged. NICs 3&4 are connected to "Multiple Networks" (Production VLANs), PROD-B-1 – PROD-E-1 and PROD-B-2 – PROD-E-2, which are mapped to VLANs 102 – 105; frames will be passed to NICs 3&4 will be tagged.

If additional NICs are required, simply add the NICs to the server profile, this configuration will support up to 8 NICs without adding additional hardware. If the performance demands of a NIC change, the speed of a NIC could be adjusted up or down

When the blade occupying enclosure Bay 1 is powered up, it will have 4 physical NICs connected to networks, PROD-A-1, PROD-A-2, PROD-B-1 and PROD-B-2. If additional NICs are required, simply go to the virtual connect profile and add the required number of NICs, configure them for the appropriate networks, speed and apply the profile. Verify the configuration change through the OA, VCEM and/or ILO.

In order for Hyper-v to provide network redundancy Windows NIC teaming will be utilized. It is important to note that the Hyper-V role should be installed BEFORE the HP ProLiant Network teaming Software is installed.

Result

The following graphics provide an example of a Windows 2008R2 server with 4 NICs configured and connected to the VC Networks as discussed earlier. The Disabled network connections are the 4 remaining and un-configured FlexNICs.

This configuration has provided us with 4 NICs total. Two of the NICs are configured for a 2.5Gb link, this will be connected to the management network. The last two NICs are configured for 7.5Gb link and will be used to support several VLANs.

In order to provide network redundancy each of these NIC pairs will be teamed using the HP ProLiant Network Teaming Software.

As Windows 2008R2 network adapter enumeration order is not clear, will need to determine with NIC is connected to which VC module/port. In order to provide NIC teaming redundancy, we want to team NIC a NIC connect to the VC module in Bay 1 with a NIC connected to the VC module in Bay 2. The simplest way to determine which NIC is which, is by locating the MAC address of each NIC.

Open the Network Connections screen in Windows 2008R2, as in the following graphic. You can see that four of the NICs are disconnected, this can be disabled in this interface as they are unused FlexNICs.

The remaining NICs should be identified by their MAC address. Rename each Connection with a name that can be referred to later when building the NIC teams.

Organize 🔻 Disable this netw	ork device Diagnose this connection	Rename this connection View status o	of this connection »	
Name	Status -	Device Name	Connectivity	Network Category
🖣 Local Area Connection	Unidentified network	HP NC532i Dual Port 10GbE Multifu	No network access	Public network
Local Area Connection 2	Unidentified network	HP NC532i Dual Port 10GbE Multifu	No network access	Public network
Local Area Connection 7	Unidentified network	HP NC532i Dual Port 10GbE Multifu	No Internet access	Public network
Local Area Connection 8	Unidentified network	HP NC532i Dual Port 10GbE Multifu	No Internet access	Public network
🚇 Local Area Connection 3	Network cable unplugged	HP NC532i Dual Port 10GbE Multifu		
🚇 Local Area Connection 4	Network cable unplugged	HP NC532i Dual Port 10GbE Multifu		
📮 Local Area Connection 5	Network cable unplugged	HP NC532i Dual Port 10GbE Multifu		
🚚 Local Area Connection 6	Network cable unplugged	HP NC532i Dual Port 10GbE Multifu		

Figure 2-37 Windows 2008 Network Connections (4 Active Connections).

Figure 2-38 Windows 2008R2 Network Connections NIC Speed.

Local Area Connection 7 Sta	tus X	Local Area Connection Status	×
General		General	
Connection		Connection	
IPv4 Connectivity:	No Internet access	IPv4 Connectivity:	No network access
IPv6 Connectivity:	No Internet access	IPv6 Connectivity:	No network access
Media State:	Enabled	Media State:	Enabled
Duration:	00:14:27	Duration:	00:07:50
Speed:	2.5 Gbps	Speed:	7.5 Gbps
Details		Details	
Activity		Activity	
Sent —	Received	Sent —	Received
Bytes: 1,19	0 1,522	Packets: 513	0
🛞 Properties 🛛 🛞 Disable	Diagnose	Properties Disable	Diagnose
	Close		Close

Note: Windows 2008R2 displays the correct link speed values

Network Connections				
🗲 🕞 🗢 😰 🔹 Control Panel	 Network and Internet + N 	etwork Connections 👻	 Search Network Con 	nections
Organize 🔻 Disable this netwo	rk device Diagnose this cor	nnection Rename this connection Vie	status of this connection »	:= - 🗔 📀
Name -	Status	Device Name	Connectivity	Network Category
🏺 NIC 4	Unidentified network	HP NC532i Dual Port 10GbE Multifu	No network access	Public network
🖣 NIC 3	Unidentified network	HP NC532i Dual Port 10GbE Multifu	No network access	Public network
🖗 NIC 2	Unidentified network	HP NC532i Dual Port 10GbE Multifu	No Internet access	Public network
📱 NIC 1	Unidentified network	HP NC532i Dual Port 10GbE Multifu	No Internet access	Public network
Local Area Connection 6	Disabled	HP NC532i Dual Port 10GbE Multifu		
Local Area Connection 5	Disabled	HP NC532i Dual Port 10GbE Multifu		
Local Area Connection 4	Disabled	HP NC532i Dual Port 10GbE Multifu		
Local Area Connection 3	Disabled	HP NC532i Dual Port 10GbE Multifu		

Figure 2-39 Windows 2008 Network Connections (4 Active Connections – Renamed).

Ensure that the Hyper-V role has been installed and configured, then install the latest version of the HP ProLiant Network Teaming Software and run the utility. 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 before creating the team.

Configuring NIC teaming

To create the NIC team for the Management network, Select NIC 1 and NIC 2, click TEAM, Click on the TEAM name and rename it to Management, then save the TEAM. Click on the remaining two NICs and team these separately and rename this team to Production. Click OK.

Figure 2-40 HP ProLiant Network Configuration Utility.

IP Network Configuration Utility Properties	? ×
Ethemet Devices iSCSI Devices	
HP NICs: (NIC 2) HP NC532i Dual Port 10GbE Multifunction BL-c Adapter #8 I/O Bay 2 Port 9 / 1) (NIC 4) HP NC532i Dual Port 10GbE Multifunction BL-c Adapter #2 I/O Bay 2 Port 9 / 2 (NIC 3) HP NC532i Dual Port 10GbE Multifunction BL-c Adapter I/O Bay 1 Port 9 / 2 (NIC 1) HP NC532i Dual Port 10GbE Multifunction BL-c Adapter #7 I/O Bay 1 Port 9 / 1	Teaming Setup Team Dissolve
×	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.	Properties
Help License Manager Enable UID 🗹 Display Tray Icon	OK Cancel

Figure 2-41 HP ProLiant Network Configuration Utility with both teams created.

HP Network Configuration Utility Properties	<u>? ×</u>
Ethemet Devices iSCSI Devices	
HP NICs: (NIC 2) HP NC532i Dual Port 10GbE Multifunction BL-c Adapter #81/0 Bay 2 Port (NIC 1) HP NC532i Dual Port 10GbE Multifunction BL-c Adapter #71/0 Bay 1 Port Production (NIC 4) HP NC532i Dual Port 10GbE Multifunction BL-c Adapter #21/0 Bay 2 Port (NIC 3) HP NC532i Dual Port 10GbE Multifunction BL-c Adapter I/0 Bay 1 Port 9	Teaming Setup Team Dissolve VLAN(802.1Q)
Make another selection or Click Dissolve to break-up the selected adapter team. Click Properties to view properties of the team. Click VLAN to manage VLAN connections.	Save Properties
Help License Manager Enable UID 🔽 Display Tray Icon	
0	K Cancel

Creating the VLANs within NIC Teaming

Highlight the Production NIC team and click the VLAN (802.1Q) button on the right and create a VLAN for each VLAN that this NIC team will support.

Figure 2-42 HP ProLiant Network Configuration Utility VLAN configurations for Production Team.

Team Properties	×
Teaming Controls Settings VLAN Information Statistics Team Utilization	
Production	
Ethemet VLAN Connections	
VLAN Id VLAN Name IP Address IPv6 Address 102 VLAN 102 103 VLAN 103 104 VLAN 104 105 VLAN 105	
Add Edit Remove Properties Default/Native VLAN Id 102	
Default/Native VLAN Tag	
Receive Path Validation VLAN Id 102	
OK Cancel He	lp

Creating the Hyper-V Virtual Network

Run the Hyper-V Manager, open the Virtual Network Manager and create a new External Virtual Network for each VLAN that was created within the NIC team, enable the VLAN ID check box and enter the VLAN ID for this VLAN. Click Apply.

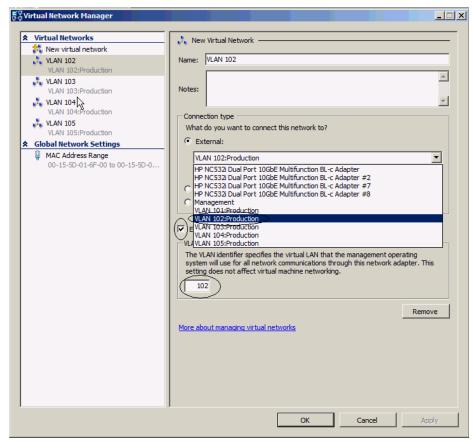


Figure 2-43 Hyper-V Virtual Network Manager.

Assigning a Virtualization Manager to a Network/VLAN

Run the Hyper-V Manager and select HP Insight Virtualization Manager software that requires a network connection to be made. Select Setting for that Virtualization Manager, click the Network Adapter, under the Network drop down box, select the appropriate VLAN (VLAN 102), enable virtual LAN identification and enter the appropriate VLAN ID for this system and apply the settings.

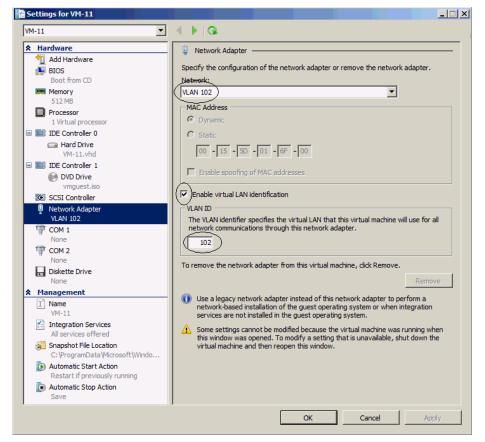


Figure 2-44 Configure Virtualization Manager network settings.

Once this Virtualization Manager is powered on, the management NIC team would be connected to the management network through NIC 1 & 2. The Production VLANs network will present the Virtualization Manager with a connection that the VLAN as configured. Frames will be handed to the Virtualization Manager without tags. As the Production VLANs network is based on a NIC team, as is the management connection to this server, in the event of a module or uplink failure, the NIC team would manage path failover to the alternate NIC.

Verify that the Guest is connected to the correct VLAN

Open a console to the Virtualization Manager and verify that it is in the correct VLAN.

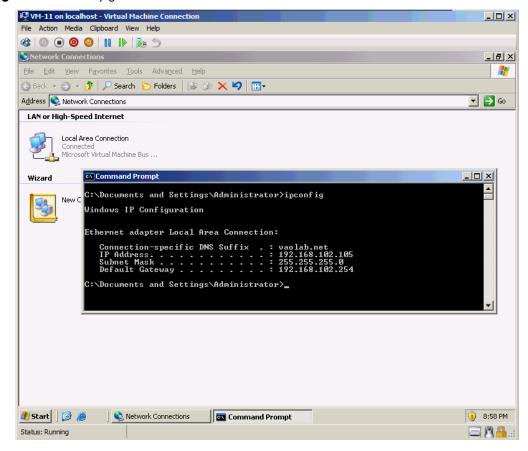


Figure 2-45 Verify guest VM received an IP address for the correct VLAN.

Scenario 2:3 - Flex-10 - VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS) and Mapped VLANs - ESX 4

Overview

This scenario discusses the Flex-10 features provided in Virtual Connect. For an overview of Flex-10, please refer to the following technology brief. HP Flex-10 technology brief;

http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01608922/c01608922.pdf

Virtual Connect Flex-10 provides the ability to either present the 10Gb server NICs as single 10Gb NICs, or divide each NIC into as many as 4 "physical function" NICs per NIC port. These physical function NICs look to the server hardware and OS as physical NICs, have their own MAC address and can be configured at speeds from 100Mb to 10Gb.

As shown in earlier scenarios, VLAN access can be handled in two different ways. Virtual Connect can either pass VLAN/Non-VLAN traffic untouched to the host (Tunneling Mode) or Virtual Connect can handle all VLAN tagging (Server Mapped VLANs). Each has their advantages as discussed in the Introduction to Virtual Connect section, earlier in this document.

This scenario, using Map VLAN Tags, will focus more on the Virtual Connect Flex-10 technology. In this scenario we have two10Gb uplinks configured with multiple VLANs. We will configure a VMware ESX server with SIX NICs, 3 per NIC port, configured at various speed. Some NICs will be connected to specific VLANs, so frames will be presented without tags, others will be configured with multiple networks, were frames will be presented with tags. We will also show how the speed of each NIC can be varied from speeds ranging between 100Mb to 10Gb.

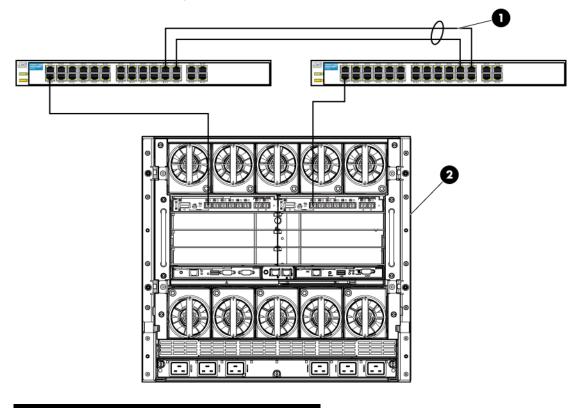
	Console	VMotion	Production	Console	VMotion	Production
	NIC #1	NIC #2	NIC #3	NIC #4	NIC #5	NIC #6
Traditional 1Gb technology	1Gb	1Gb	1Gb	1Gb	1Gb	1Gb
Virtual Connect Flex- 10	500Mb	2.5Gb	7Gb	500Mb	2.5Gb	7Gb

|--|

Requirements

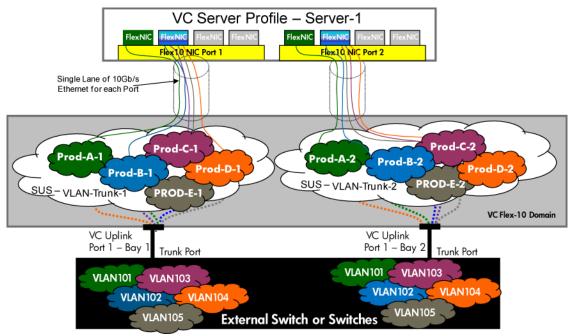
In order to implement this scenario, an HP BladeSystem c7000 enclosure with one of more Blade G6 servers with 10Gb NICs and TWO Virtual Connect Flex-10 Ethernet modules, installed in Bays 1& 2 are required. In addition, we will require ONE or TWO external Network switches. As Virtual Connect does not appear to the network as a switch and is transparent to the network, any standard managed switch will work with Virtual Connect.

Figure 2-46 Physical View; Shows one 10Gb Ethernet uplink from Ports 1 on Module 1 to Port 1 on the first network switch and one 10Gb uplink from Port 1 on Module 2 to Port 1 on the second network switch.



ltem	Description
1	Switch Cross Connect
2	c7000 Enclosure, rear view

Figure 2-47 Server Blade profile with TWO Flex-10 NICs configured. Each NIC is connected to a vNet (PROD-A-1 and PROD-A-2), the additional NICs are connected to other networks, which are also 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 X1 on VC module 1 and Port X1 on VC module 2, creating an Active/Active uplink.



Installation and configuration

Switch configuration

Appendices A and B provide a summary of the commands required to configure the switch in either a Cisco IOS or a ProCurve network infrastructure. The configuration information provided in the appendices assumes the following information:

- The switch ports are configured as TRUNK ports to support VLANs 101, 102, 103, 104 and 105. All frames will be forwarding to VC with VLAN tags.
- When adding the additional uplinks to the SUS, the switch ports connected to Virtual Connect will need to be configured for LACP and configured for the same Link Aggregation Group.

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 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 can 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 (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 Map VLAN Tags via GUI (Ethernet settings)

Note: Flex-10 has also provided additional controls when configuring VC for mapped VLAN tags (Multiple Networks over a single link) support. These features provide the ability to set a Custom or Preferred network speed value for each NIC. These are VC domain settings and when configured will limit the maximum configurable speed of a NIC.

Enable Map VLAN Tags within Virtual Connect

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Map VLAN Tags
- Select Fast MAC Cache Fail-over with a refresh of 5
- Optionally, select a preferred/Maximum link speed
- Select Apply

Configuring the VC Module for Map VLAN Tags via CLI (Ethernet settings)

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

Set Advanced Ethernet Settings to "Map VLAN Tags" and set "Force server connections" to disabled

set enet-vlan vlantagcontrol=map sharedservervlanid=false

set mac-cache Enabled=True Refresh=5

Note: Do not set a Preferred or Max speed for this scenario. This example is provided for reference only. For the purpose of this scenario, we will not be configuring the custom values for Preferred Link or Maximum Connection speeds. However, the CLI commands are provided below for reference.

Selecting the Set a Customer value for Preferred Link Connection Speed and/or Set a Customer value for Maximum Link Connection Speed, Sets the respective speed for all connections using multiple networks to 500Mb and maximum connection speed to 2.5Gb.

Set Advanced Ethernet Settings to a Preferred speed of 500Mb and a Max Speed of 2500Mb

set enet-vlan PrefSpeedType=Custom PrefSpeed=500 MaxSpeedType=Custom MaxSpeed=2500

Figure 2-48 Ethernet Settings.

hernet Settings	
AC Addresses Port Monitorin	g Advanced Settings
er VLAN Tagging Support	
C Tunnel VLAN Tags	
Map VLAN Tags	
	e the same VLAN mappings as shared uplink sets 👔

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

Connect Port X1 of VC module 1 to Port 1 on switch 1

Create a SUS named "VLAN-Trunk-1" and connect it to Flex-10 Port X1 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;
 - a. Enclosure 1, Bay 1, Port X1
- Add Networks as follows;
 - a. PROD-A-1 = VLAN ID=101
 - **b.** PROD-B-1 = VLAN ID=102
 - c. PROD-C-1 = VLAN ID=103
 - d. PROD-D-1 = VLAN ID=104
 - e. PROD-E-1 = VLAN ID=105
- Enable SmartLink on ALL Networks
- Click Apply

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

Connect Port X1 of VC module 2 to Port 1 on switch 2 Create a SUS named "VLAN-Trunk-2" and connect it to Flex-10 port X1 on Module 2

- On the Virtual Connect Home page, select Define, Shared Uplink Set
- Insert Uplink Set Name as VLAN-Trunk-2
- Select Add Port, then add the following port;
 - a. Enclosure 1, Bay 2, Port X1
- Add Networks as follows;
 - a. PROD-A-2 = VLAN ID=101
 - **b.** PROD-B-2 = VLAN ID=102
 - **c.** PROD-C-2 = VLAN ID=103
 - d. PROD-D-2 = VLAN ID=104
 - e. PROD-E-2 = VLAN ID=105
- Enable SmartLink on ALL Networks
- Click Apply

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:X1 Uplinkset=VLAN-Trunk-1 speed=auto

Create Networks Prod-A-1 through Prod-D-1 for Shared Uplink Set "VLAN-Trunk-1" add network PROD-A-1 uplinkset=VLAN-Trunk-1 VLanID=101 Set Network PROD-A-1 SmartLink=Enabled add network PROD-B-1 uplinkset=VLAN-Trunk-1 VLanID=102 Set Network PROD-C-1 uplinkset=VLAN-Trunk-1 VLanID=103 Set Network PROD-C-1 SmartLink=Enabled add network PROD-C-1 smartLink=Enabled add network PROD-D-1 uplinkset=VLAN-Trunk-1 VLanID=104 Set Network PROD-D-1 SmartLink=Enabled add network PROD-D-1 SmartLink=Enabled set Network PROD-D-1 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:X1 Uplinkset=VLAN-Trunk-2 speed=auto

Create Networks Prod-A-2 through Prod-D-2 for Shared Uplink Set "VLAN-Trunk-2" add network PROD-A-2 uplinkset=VLAN-Trunk-2 VLanID=101 Set Network PROD-A-2 SmartLink=Enabled add network PROD-B-2 uplinkset=VLAN-Trunk-2 VLanID=102 Set Network PROD-C-2 uplinkset=VLAN-Trunk-2 VLanID=103 Set Network PROD-C-2 SmartLink=Enabled add network PROD-C-2 uplinkset=VLAN-Trunk-2 VLanID=104 Set Network PROD-D-2 uplinkset=VLAN-Trunk-2 VLanID=104 Set Network PROD-D-2 SmartLink=Enabled add network PROD-D-2 SmartLink=Enabled Set Network PROD-D-2 SmartLink=Enabled

Note: It is important to point out at this time, if you are familiar with VC scripting, or have existing VC scripts that you had used on Virtual Connect 1:10 modules, and may want to use with Flex-10, the numbering of the Flex-10 external ports is different than with early modules of VC. VC-E and VC-F uplinks ports are numbered as Ports 1, 2, 3 etc., however; Flex-10 ports are referenced as X1, X2, X3 etc., plus some of the ports are shared, IE the CX4 is shared with SFP+ Port X1, both are configured as X1, but only one is usable at a time. If a CX-4 cable is connected the SFP+ port will become disable, the same is true for Ports X7 & X8, which are the internal cross connect ports, the cross connects will disconnect, if an SFP+ module is plugged in Ports X7 or X8.

Figure 2-49 Define a Shared Uplink Set (VLAN-Trunk-1) and add VLANs.

dit Shared U	plink Set:	VLAN-Trunk	-1						
nernet Shared Exter	nal Uplink Set								
Uplink Set Name			Status	PID					
VLAN-Trunk-1			0 0	ж					
ternal Uplink Ports									
	Port Role	Port Status		Connector Type	Connected To	PID	Speed/D)uplex	Delete
Port	FULLKOIE								
C7000_1: Bay 1: Port Add Port 👻	X1 NA	OK Linked	l/Active 10 Gb	CX4	00:12:79:4a:d8:00 (1		Auto		×
C7000_1: Bay 1: Port Add Port Connection Mode: At	X1 NA	OK Linked	MActive 10 Gb	CX4	00:12:79:4ard8:00 (1		Auto	•	×
C7000_1: Bay 1: Port Add Port Connection Mode: A	X1 NA	OK Linked	Smart Link	CX4 Private Networ ?			Auto		X
C7000_1: Bay 1: Port Add Port - Connection Mode: A Sociated Networks Network Name	X1 NA to ? ?	OK Linked		Private Networ			Auto		X
C7000_1: Bay 1: Port Add Port Connection Mode: At	X1 NA to T ? (VLAN tagged) VLAN ID	OK Linked ? Native ?	Smart Link	Private Networ ?	k Advanced				X
C7000_1: Bay 1: Port Add Port Connection Mode: A Sociated Networks Network Name PROD-A-1	X1 NA to T ? (VLAN tagged) VLAN ID 101	OK Linked ? Native ?	Smart Link	Private Networ ?	k Advanced		x		X
C7000_1: Bay 1: Port Add Port Connection Mode: A Sociated Networks Network Name PROD-A-1 PROD-B-1	X1 NA to (VLAN tagged) VLAN ID 101 102	 OK Linked Pative ? F 	Smart Link ? 	Private Networ ?	k Advanced		x		X

Note: The "*Connected to*" field in the graphic above displays the MAC address and port number of the switch this uplink is connected to. This information is provided through LLDP discover and is not available in all switch products. This information can be very helpful when determining which switches and ports VC is connected to.

Figure 2-50 Active / Active SUS.

hared	Uplink Sets						L
	•						_
xternal (Connections Associated	d Networks					
hared Up	olink Set	Port Status	\sim	Connector Type	Uplink P	ort	
	blink Set	Port Status	10 Gb	Connector Type CX4	Uplink P	ort C7000_1: Bay 1: Port X1	

Summary Note: In this scenario we have created two independent Share Uplink Sets (SUS), each originating from the opposite VC-Modules, by doing so we provide the ability to create separate and redundant connections out of VC. 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 of these uplink ports to the same SUS, however, this would have provided an Active/ Standby uplink scenario.

Figure 2-51 Exam	ole of an Active / Standb	y SUS.				
Define 👻 Configure 👻 Tools 👻 Help	•					
Shared Uplink Sets						L ?
External Connections Associated No.	etworks					
Shared Uplink Set	Port Status		Connector Type	Uplink Po	rt	
OK 💿 VLAN-Trunk-1	OK Linked/Active	10 Gb	CX4	🛇 ок	C7000_1: Bay 1: Port X1	
	OK Linked/Standby	10 Gb	CX4	🕗 ок	C7000_1: Bay 2: Port X1	

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 "Server-1"
- In the Network Port 1 drop down box, select PROD-A-1, configure the speed as custom at 500Mb
- In the Network Port 2 drop down box, select PROD-A-2, configure the speed as custom at 500Mb
- In the Network Port 3 drop down box, select PROD-B-1, configure the speed as custom at 2.5Gb
- In the Network Port 4 drop down box, select PROD-B-2, configure the speed as custom at 2.5Gb
- In the Network Port 5 drop down box, select Multiple Networks, configure the speed as Auto
 Configure Multiple Networks for PROD-C-1, PROD-D-1 and PROD-E-1
- In the Network Port 6 drop down box, select Multiple Networks, configure the speed as Auto
 Configure Multiple Networks for PROD-C-2, PROD-D-2 and PROD-E-2
- In the Assign Profile to Server Bay box, locate the Select Location drop down and select Bay 1, then apply

Note: you should now have a server profile assigned to Bay 1, with 6 Server NICs connected to the various networks. NICs 5&6 should have a link speed of 7.5Gb

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 Server-1
       add profile Server-1 -nodefaultenetconn
       add enet-connection Server-1 pxe=Enabled Network=PROD-A-1 SpeedType=Custom Speed=500
       add enet-connection Server-1 pxe=Disabled Network=PROD-A-2 SpeedType=Custom Speed=500
       add enet-connection Server-1 pxe=Disabled Network=PROD-B-1 SpeedType=Custom
       Speed=2500
       add enet-connection Server-1 pxe=Disabled Network=PROD-B-2 SpeedType=Custom
       Speed=2500
       add enet-connection Server-1 pxe=Disabled
       add server-port-map Server-1:5 PROD-C-1 VLanId=103
       add server-port-map Server-1:5 PROD-D-1 VLanId=104
       add server-port-map Server-1:5 PROD-E-1 VLanId=105
       add enet-connection Server-1 pxe=Disabled
       add server-port-map Server-1:6 PROD-C-2 VLanId=103
       add server-port-map Server-1:6 PROD-D-2 VLanId=104
       add server-port-map Server-1:6 PROD-E-2 VLanId=105
       Assign profile Server-1 enc0:1
```

Figure 2-52 Define a Server Profile with 6 NICs.

	le Name	Status	and designeetings		(Logical)	and the second second	er UUID (Logi	001020500				
þerve	er-1	Ок	VCXOD	00000		6f09	75b4-e343-48e	2-ae7b-b5b6	599cct	5dd4		
ernet	t Network Connections (Phy	rsical ports)										
Port	Network Name			Status	Port Speed Setting	i	Allocated Bandwidth	PXE		MAC	Mapping	Delete
1	PROD-A-1		•	Оок	Custom	- 🕥	500 Mb	Enabled	•	00-17-A4-77-04- 00	LOM:1-a => Bay 1	×
2	PROD-A-2		•	⊘ок	Custom	•	500 Mb	Disabled	•	00-17-A4-77-04- 02	LOM:2-a ≕> Bay 2	×
3	PROD-B-1		•	Øók	Custom	·	2.5 Gb	Disabled	•	00-17-A4-77-04- 04	LOM:1-b => Bay 1	X
4	PROD-B-2		•	Øок	Custom	•	2.5 Gb	Disabled	•	00-17-A4-77-04- 06	LOM:2-b => Bay 2	X
5	Multiple Networks		• 🔊	Øок	Preferred	-	7 Gb	Disabled		00-17-A4-77-04- 08	LOM:1-c => Bay 1	X
3	Multiple Networks		•	Оок	Preferred	•	7 Gb	Disabled	•	00-17-A4-77-04- 0A	LOM:2-c => Bay 2	х
	Add Network Connection											
Pov		er Bay Assignn				SN		Model		Status I	JID	

Server NIC Speed and LOM Mappings

We will now focus more of the specific Flex-10 features.

Note the "Allocated Bandwidth" and the LOM "Mapping" settings in the following graphic. Flex-10 based NICs have the ability of being configured as a Single 10Gb NIC or divided into as many as FOUR (4) physical NICs. It is important to note the LOM mappings when configuring which NIC will be connected to which network, as a NIC on a specific LOM can connect to a network only once. (IE, NIC LOM:1-a can be assigned to Prod-101-1, no other NIC on LOM:1 can be assigned to Prod-101-1) This is discussed in further details in the Flex-10 technology brief mentioned earlier in this document.

As additional NICs are added to a profile that is assigned to a server with a 10Gb Flex-NIC, the assignment will alternate between LOM:1-x and LOM:2-x. The first NIC will be LOM:1-a, the second will be LOM:2-a, then LOM:1-b, LOM:2-b etc. to a max of 4 NICs per LOM.

Also, note that if additional NICs are required, this server has only 6 NICs configured, we could ADD two more NICs to this server without adding additional hardware. As of Virtual Connect firmware 2.30, Virtual Connect will provide the ability to add/remove or reconfigure the server NICs, including NIC speed, while the server is running.

Profi	le Name	Status	Serial	Number	(Logical)	Serv	er UVID (Logi	ical)			
Berver-1				VCX0000000		6f0975b4-e343-48e2-ae7b-b5b699cc5dd4					
Port 1	Network Name PROD-A-1		•	Status	Port Speed Setting Custom	- 🔊/	Allocated Dandwidth 500 Mb	PXE	MAC 00-17-A4-77-04-/	Mapping LOM:1-a =>	Delet
1 2	PROD-A-1		_ ন	©ок		- ১১/ ন 🖬	500 Mb	Enabled	00-17-A4-77-04- 00 00-17-A4-77-04-	LOM:1-a => Bay 1 LOM:2-a =>	X
						-1	2.5 Gb		02 00-17-A4-77-04-	Bay2 LOM:1-b =>	X
	PROD-B-1		-	Ок	Custom	-	2.5 G0	Disabled 💌	04-17-A4-77-04-	Bay 1	- A:
3	PROD-B-2		•	Ок	Custom	J	2.5 Gb	Disabled 💌	00-17-A4-77-04- 06	LOM:2-b => Bay 2	×
	F			Ок	Preferred	-	7 Gb /	Disabled 💌		LOM:1-c =>	×
3 4 5	Multiple Networks		- 🔊	on	Interest of	- \		,	08 }	Bay1 /	

Figure 2-53 Server NIC speed and LOM Mappings.

dit S	Server Profile: Server-	1					
ofile							
Profi	le Name	Status	Serial Number (Logical)	Server UUID (Logical)			
Server-1			VCX0000000				
ernet	t Network Connections (Physical	ports)					
			Custon	1 Port Speed	×		
Port	Network Name		Select the custom <u>port speed</u>	for this network	МАС	Mapping	Delet
1	PROD-A-1		Selected Speed 2.5 G	\	00-17-A4-77-04- 00	LOM:1-a => Bay 1	×
2	PROD-A-2			/	00-17-A4-77-04- 02	LOM:2-a => Bay 2	×
3	PROD-B-1				00-17-A4-77-04- 04	LOM:1-b => Bay 1	×
1	PROD-B-2				00-17-A4-77-04- 06	LOM:2-b => Bay 2	×
	Multiple Networks			OK Cancel	00-17-A4-77-04- 08	LOM:1-c => Bay 1	X
5	Multiple Networks				00-17-A4-77-04- 0A	LOM:2-c =>	×

Figure 2-55 Configuring Multiple Networks.

Profi Serv	ile Name er-1			Forver Will (Lea I Tag to vNet Mappings			×	
		Force same VLAN	mappings as Shared Uplir	nk Sets ?				
erne	t Network Connection	vNet Name		Server VLAN Id	Untagged ?	Delete		
Port	Network Name	PROD-C-1	💽 🛇 ок	103		X	oping	Delet
011		PROD-D-1	🚽 🖉 ок	104		X		
	PROD-A-1	PROD-E-1	🚽 🖉ок	105		×	/ :1-a => 1	X
	PROD-A-2						1:2-a => 2	×
	PROD-B-1						/:1-b => 1	X
	PROD-B-2						/t:2-b => 2	X
	Multiple Networks	Add Mapping	Copy Fron	n ?			/:1-c =>	X
	Multiple Networks						1:2-c => 2	X

Summary

This profile will present NIC 1 to network "PROD-A-1" & NIC 2 to network PROD-A-2 which are mapped to VLAN 101; frames for VLAN 101 will be passed to NICs 1&2 untagged. NICs 3&4 are connected to PROD-B-1 & PROD-B-2, which are mapped to VLAN 102; frames for VLAN 102 will be passed to NICs 3&4 untagged.

NICs 5&6 are connected to "Multiple Networks", PROD-C-1 – PROD-E-1 and PROD-C-2 – PROD-E-2, which are mapped to VLANs 103 – 104; frames will be passed to NICs 5&6 will be tagged.

If additional NICs are required, simply add the NICs to the server profile, this configuration will support up to 8 NICs without adding additional hardware. If the performance demands of a NIC change, the speed of a NIC could be adjusted up or down.

Result

VMware ESX Configuration Example

The following graphics show an ESX server with two Flex-10 NICs configured as 6 NICs. NICs speeds are also configured accordingly and connected to vSwitches, with port groups to present the VLANs accordingly.

When configuring the vSwitches for ESX, you will notice that 8 NICs actually already exist, however, NICs 7&8 (vmnic6 & vmnic7) are shown as down, as they were not configured within the VC profile. If we need an additional NIC, we simply add it within the Profile, set the speed and apply the profile, the server will need to be powered down to add or remove NICs. However, if the NICs were preprovisioned within the profile, VC firmware 2.30 added the ability to dynamically, change network connections and link speed, without first powering the server off. Once added/connected to a network, the NICs will be available to be assigned to a vSwitch. Also, note vmnics 6&7 which were not provisioned within the profile and show link down.

Connection Type Network Access Connection Settings Summary	Select which virtual switch will handle the network traffic for this connection. You may also create a new virtual switch using the unclaimed network adapters listed below. Image: Create a virtual switch Speed Networks Image: Create a virtual switch Speed None Image: Create a virtual switch Speed Networks Image: Create a virtual switch Speed Networks Image: Create a virtual switch Speed Networks Image: Virtual Sol Full 192.168.1.192-192.168.1.254 Sol Full Image: Virtual Machine Network Image: Virtual Machine Network Image: Virtual Machine Network Image: Virtual Machine Network Image: Virtual Machine Network Image: Virtual Machine Network Image: Virtual Machine Network Image: Virtual Machine Network

Figure 2-56 Configuring ESX 4 vSwitch.

ESX 4 Networking Configuration Example

The following graphics show an ESX 4 server with two Flex-10 NICs configured as six NICs.

Hardware	View: Virtual Switch Distributed V	irtual Switch	
Health Status	Networking		Refre
Processors			
Memory	Interal contration of the log	Remove Properties	
Storage	Virtual Switch: vSwitch0	•	
 Networking 	- Service Console Port	Physical Adapters	
Storage Adapters	Service Console		
Network Adapters	VSWID : 192.100.1.31		
Advanced Settings			
-	J Virtual Switch: vSwitch1	Remove Properties	
Software			
Licensed Features	🖓 🖓 VMotion	🖢 🖕 🕳 🎫 vmnic3 2500 Full 🖓 🖓	
Time Configuration	vmk0 : 192.168.2.101	umnic2 2500 Full 🖓	
DNS and Routing			
Virtual Machine Startup/Shutdown		Deserve Dura subia s	
Virtual Machine Swapfile Location	Virtual Switch: vSwitch2	Remove Properties	
Security Profile	Virtual Machine Port Group	Physical Adapters	
System Resource Allocation	· · · · · · · · · · · · · · · · · · ·		
Advanced Settings	VLAN ID: 103	vmnic5 7000 Full 🖓	
Advanced Settings	Virtual Machine Port Group		
	· · · · · · · · · · · · · · · · · · ·		
	VLAN ID: 104		
	-Virtual Machine Port Group		
	VLAN 105		

Figure 2-57 vSwitch Configuration the ESX Host with 6 NICs.

VMWARE ESX Host Networking configuration Example

When configuring the ESX virtual switch, add virtual networks for each VLAN this ESX host will support.

S Network Adapters		vSwitch Properties	
onfiguration	Summary		
vSwitch	56 Ports Virtual Machine	Number of Ports:	56
VLAN 103 VLAN 104	Virtual Machine	- Default Policies	
VLAN 105	Virtual Machine	Security	
		Promiscuous Mode:	Reject
		MAC Address Changes:	Accept
		Forged Transmits:	Accept
			Ассерс
		Traffic Shaping	
		Average Bandwidth:	
		Peak Bandwidth:	-
		Burst Size:	
		Failover and Load Balancing	
		Load Balancing:	Port ID
		Network Failure Detection:	Beacon Probing
		Notify Switches:	Yes
		Failback:	Yes
		Active Adapters:	vmnic4, vmnic5
		Standby Adapters:	None
Add	Edit Remove	Unused Adapters:	None

Figure 2-58 Configuring the ESX vSwitch for Multiple Networks / VLANs.

Note: That vSwitch2 has two NICs configured to redundantly, support VLANs 103, 104 and 105.

Note: If implementing ESX 3.5 on Flex-10, first review VMWARE KB 1007982 and ensure Network Failure Detection is set to Beacon Probing.

When configuring the guest NIC simply chose which VLAN this guest will reside on.

Note: If implementing ESX 4.0 on Flex-10 ensure that ESX driver version 1.52 is installed, also ensure that NIC firmware 5.2.7 is also installed.

W2K3 - Virtual Machine Propert	ies	_ C
wZXS = Vircual Practilite Proper ardware Show All Devices ardware Memory CPUs Video card VMCI device Floppy drive 1 CD/DVD Drive 1 Network adapter 1 SCSI controller 8 Hard disk 1	Add Remove Summary 1024 MB 1 Video card Restricted Client Device VLAN 102 TST Logic Parallel Virtual Disk	Virtual Machine Version Device Status Connected Connect at power on Adapter Type Current adapter: VMXNET 3 MAC Address Addomatic Manual Network Connection Network Label VLAN 102 VLAN 102 VLAN 102 VLAN 103 VLAN 103 VLAN 103 VLAN 104 Port ID: Port ID:
Help		OK Cancel

Figure 2-59 Selection of the Virtual Network (VLAN) as required.

Scenario 2:4 - Flex-10 - VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS) and Tunneled VLANs - ESX 4

Overview

This scenario discusses the Flex-10 features provided in Virtual Connect. For an overview of Flex-10, please refer to the following technology brief. HP Flex-10 technology brief; http://h20000.www2.hp.com/bc/docs/support/Support/Manual/c01608922/c01608922.pdf

Virtual Connect Flex-10 provides the ability to either present the 10Gb server NICs as single 10Gb NICs, or divide each NIC into as many as 4 "physical function" NICs per NIC port. These physical function NICs look to the server hardware and OS as physical NICs, have their own MAC address and can be configured at speeds from 100Mb to 10Gb.

As shown in earlier scenarios, VLAN access can be handled in two different ways. Virtual Connect can either pass VLAN/Non-VLAN traffic untouched to the host (Tunneling Mode) or Virtual Connect can handle all VLAN tagging (Server Mapped VLANs). Each has their advantages as discussed in the Introduction to Virtual Connect section, earlier in this document.

This scenario, using Tunneled VLAN Tags, will focus on how Virtual Connect can be sued to manage hundreds of VLANs. In this scenario we have two10Gb uplinks configured with a mix of VLAN connection types. We will configure a VMware ESX server with EIGHT NICs, 4 per NIC port, configured at various speed. Some NICs will be connected to specific VLANs, so frames will be presented without tags, others will be connected to a vNet where hundreds of VLANs are presented with tags. We will also show how the speed of each NIC can be varied from speeds ranging between 100Mb to 10Gb.

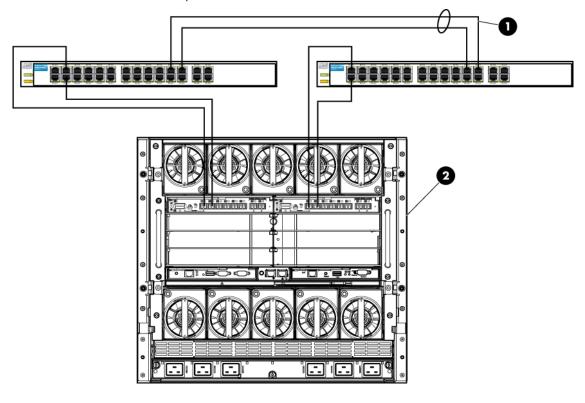
							•	
	Console	VMotion	iSCSI	Production	Console	VMotion	Production	iSCSI
	NIC #1	NIC #2	NIC #3	NIC #4	NIC #5	NIC #6	NIC #7	NIC #8
Traditional 1Gb technology	1Gb	1Gb	1Gb	1Gb	1Gb	1Gb	1Gb	1Gb
Virtual Connect Flex-10	100Mb	2Gb	4Gb	3.9Gb	100Mb	2Gb	4Gb	3.9Gb

Table 2-3 Flex-10 NIC – Optimization for a VMWARE ESX implementa
--

Requirements

In order to implement this scenario, an HP BladeSystem c7000 enclosure with one of more Blade G6 servers with 10Gb NICs and TWO Virtual Connect Flex-10 Ethernet modules, installed in 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.

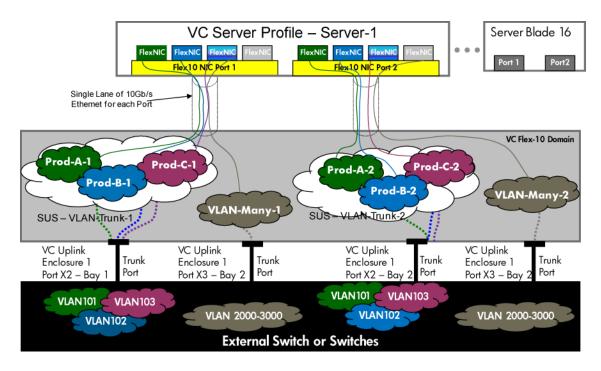
Figure 2-60 Physical View; Shows one 10Gb Ethernet uplink from Ports 1 on Module 1 to Port 1 on the first network switch and one 10Gb uplink from Port 1 on Module 2 to Port 1 on the second network switch.



ltem	Description
1	Switch Cross Connect
2	c7000 Enclosure, rear view

Figure 2-61 Server Blade profile with TWO Flex-10 NICs configured. Each FlexNIC will connect to a different network. Both Shared Uplinks Sets and vNets are used.

VLAN-Trunk-1 and VLAN-Trunk-2 respectively connect to Port X1 on Bays 1&2, were VLAN-Many-1 and VLAN-Many-2 are connected to Port X2 on Bays 1&2 of the Flex-10 modules.



Installation and configuration

Switch configuration

Appendices A and B provide a summary of the commands required to configure the switch in either a Cisco IOS or a ProCurve network infrastructure. The configuration information provided in the appendices assumes the following information:

- The switch ports are configured as TRUNK ports. Part1 of each network switch is configured to support VLANs 101, 102, and 103. Port 2 of each network switch is configured to support VLANs 2000 through 3000. All frames will be forwarding to VC with VLAN tags.
- If adding additional uplinks to the SUS or vnet, the switch ports connected to Virtual Connect will need to be configured for LACP and configured for the same Link Aggregation Group.

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 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 can 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 (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 Tunnel VLAN Tags via GUI (Ethernet settings)

Note: Flex-10 has also provided additional controls when configuring VC for mapped VLAN tags (Multiple Networks over a single link) support. These features provide the ability to set a Custom or Preferred network speed value for each NIC. These are VC domain settings and when configured will limit the maximum configurable speed of a NIC.

Enable Tunnel VLAN Tags within Virtual Connect

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Tunnel VLAN Tags
- Select Fast MAC Cache Fail-over with a refresh of 5
- Optionally, select a preferred/Maximum link speed
- Select Apply

Configuring the VC Module for VLAN Tunneling 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 "Tunnel VLAN Tags" and Enable Fast MAC cache fail-over set enet-vlan vlantagcontrol=Tunnel set mac-cacheEnabled=True Refresh=5

Note: Do not set a Preferred or Max speed for this scenario. This example is provided for reference only. For the purpose of this scenario, we will not be configuring the custom values for Preferred Link or Maximum Connection speeds. However, the CLI commands are provided below for reference.

Selecting the Set a Customer value for Preferred Link Connection Speed and/or Set a Customer value for Maximum Link Connection Speed, Sets the respective speed for all connections using multiple networks to 500Mb and maximum connection speed to 2.5Gb.

Set Advanced Ethernet Settings to a Preferred speed of 500Mb and a Max Speed of 2500Mb set enet-vlan PrefSpeedType=Custom PrefSpeed=500 MaxSpeedType=Custom MaxSpeed=2500

Figure 2-62 Ethernet Settings.

Server V	LAN Tagging Support
0	Tunnel VLAN Tags
0	Map VLAN Tags
	Force server connections to use the same VLAN mappings as shared uplink sets
	the Fail-over
	Enable Fast MAC Cache Fail-over
IGMP Sno	Enable Fast MAC Cache Fail-over
IGMP Sno	Enable Fast MAC Cache Fail-over

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

Connect Port X1 of VC module 1 to Port 1 on switch 1

Create a SUS named "VLAN-Trunk-1" and connect it to Flex-10 port X1 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;

a. Enclosure 1, Bay 1, Port X1

- Add Networks as follows;
- a. PROD-A-1 = VLAN ID=101
 b. PROD-B-1 = VLAN ID=102
- c. PROD-C-1 = VLAN ID=103
- Enable SmartLink on ALL Networks
- Click Apply

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

Connect Port X1 of VC module 2 to Port 1 on switch 2

Create a SUS named "VLAN-Trunk-2" and connect it to Flex-10 Port X1 on Module 2

- On the Virtual Connect Home page, select Define, Shared Uplink Set
- Insert Uplink Set Name as VLAN-Trunk-2
- Select Add Port, then add the following port;
 - a. Enclosure 1, Bay 2, Port X1

- Add Networks as follows;
 - a. PROD-A-2 = VLAN ID=101
 - **b.** PROD-B-2 = VLAN ID=102
 - c. PROD-C-2 = VLAN ID=103
- Enable SmartLink on ALL Networks
- Click Apply

Defining two new vNets via GUI

Create a vNet and name it "VLAN-Many-1"

- On the Virtual Connect Manager screen, click Define, Ethernet Network to create a vNet
- Enter the Network Name of "VLAN-Many-1"
 - d. Select Smart Link
 - e. Select Enable VLAN Tunneling
- Select Add Port, then add the following ports;
 - a. Enclosure 1, Bay 1, Port X2
- Leave Connection Mode as Auto
- Select Apply

Create a vNet and name it "VLAN-Many-2"

- On the Virtual Connect Manager screen, click Define, Ethernet Network to create a vNet
- Enter the Network Name of "VLAN-Many-2"
 - a. Select Smart Link
 - b. Select Enable VLAN Tunneling
- Select Add Port, then add the following ports;
 - a. Enclosure 1, Bay 2, Port X2
- Leave Connection Mode as Auto
- Select Apply

Note: By creating TWO vNets we have provided a redundant path to the network. As each uplink originates from a different VC module within each vNet, both uplinks will be active. This configuration provides the ability to lose an uplink cable, network switch or even a VC module.

Note: Smart Link – In this configuration Smartlink SHOULD be enabled. Smartlink is used to turn off downlink ports within Virtual Connect if ALL available uplinks to a vNet or SUS are down. In this scenario if an upstream switch or all cables to a vNet were to fail, VC would turn off the downlink ports connect to that vNet, which would then force the NIC Teaming software to fail-over to the alternate NIC.

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:X1 Uplinkset=VLAN-Trunk-1 speed=auto

Create Networks Prod-A-1 through Prod-D-1 for Shared Uplink Set "VLAN-Trunk-1" add network PROD-A-1 uplinkset=VLAN-Trunk-1 VLanID=101 Set Network PROD-A-1 SmartLink=Enabled add network PROD-B-1 uplinkset=VLAN-Trunk-1 VLanID=102 Set Network PROD-B-1 SmartLink=Enabled add network PROD-C-1 uplinkset=VLAN-Trunk-1 VLanID=103 Set Network PROD-C-1 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:X1 Uplinkset=VLAN-Trunk-2 speed=auto

```
# Create Networks Prod-A-2 through Prod-D-2 for Shared Uplink Set "VLAN-Trunk-2"
add network PROD-A-2 uplinkset=VLAN-Trunk-2 VLanID=101
Set Network PROD-A-2 SmartLink=Enabled
add network PROD-B-2 uplinkset=VLAN-Trunk-2 VLanID=102
Set Network PROD-B-2 SmartLink=Enabled
add network PROD-C-2 uplinkset=VLAN-Trunk-2 VLanID=103
Set Network PROD-C-2 SmartLink=Enabled
```

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 "VLAN-Many" and configure uplinks as discussed above add Network VLAN-Many-1 add uplinkport enc0:1:X2 Network=VLAN-Many-1 speed=auto set network VLAN-Many-1 SmartLink=Enabled VLanTunnel=Enabled

add Network VLAN-Many-2 add uplinkport enc0:2:X2 Network=VLAN-Many-2 speed=auto set network VLAN-Many-2 SmartLink=Enabled VLanTunnel=Enabled

Note: It is important to point out at this time, if you are familiar with VC scripting, or have existing VC scripts that you had used on Virtual Connect 1:10 modules, and may want to use with Flex-10, the numbering of the Flex-10 external ports is different than with early modules of VC. VC-E and VC-F uplinks ports are numbered as Ports 1, 2, 3 etc., however; Flex-10 ports are referenced as X1, X2, X3 etc., plus some of the ports are shared, IE the CX4 is shared with SFP+ Port X1, both are configured as X1, but only one is usable at a time. If a CX-4 cable is connected the SFP+ port will become disable, the same is true for Ports X7 & X8, which are the internal cross connect ports, the cross connects will disconnect, if an SFP+ module is plugged in Ports X7 or X8.

Figure 2-63 Define a Shared Uplink Set (VLAN-Trunk-1) and add VLANs.

Uplink Set Name			St	tatus	PID					
KLAN-Trunk-1				🛇 ок						
xternal Uplink Ports										
		1								
Port	Port Role	Port Status			Connector Type CX4	Connected To	PID	Speed/D		Dele X
	1 N.A	بلغتل يتم 🧑	od (Alertive							
C7000_1: Bay 1: Port X Add Port Connection Mode: Auto		OK Link	ed/Active	10 Gb		00:12:79:4a:d8:00		Auto	•	
Add Port 🕶	o 💌 ?		ed/Active			00:12:79:44:88:00		Auto	<u> </u>	
Add Port Connection Mode: Auto	o 💌 ?		Smart		Private Networ			Auto		
Add Port Connection Mode: Auto Associated Networks (1	vLAN tagged)	?		Link		k Advanced		Auto		
Add Port Connection Mode: Auto Associated Networks (Network Name	VLAN ID	? Native ?	Smart 2	Link	Private Network					
Add Port Add Port Connection Mode: Auto Associated Networks (Network Name PROD-A-1	VLAN tagged) VLAN to	? Native ?	Smart ?	Link	Private Network ?	k Advanced		×		

Note: The "Connected to" field in the graphic above displays the MAC address and port number of the switch this uplink is connected to. This information is provided through LLDP discover and is not available in all switch products. This information can be very helpful when determining which switches and ports VC is connected to.

Shared	d Uplink Sets						L	3
External	Connections Associated	d Networks						
Shared II	lplink Set	Port Status	Co	nnector Type	Uplink Po	art		
_	VLAN-Trunk-1	OK Linked/Active	10 Gb	CX4	Оринк Р	C7000_1: Bay 1: Port X1		1
🕗 ок 👘			(10 Gb)	CX4	🛇 ок	C7000_1: Bay 2: Port X1		4.

/ .

Summary Note: In this scenario we have created two independent Share Uplink Sets (SUS), each originating from the opposite VC-Modules, by doing so we provide the ability to create separate and redundant connections out of VC. 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 of these uplink ports to the same SUS, however, this would have provided an Active/ Standby uplink scenario.

Figure 2-65 Example of a Active / Standby SUS.

Define + Configure + Tools + Help	·				
Shared Uplink Sets					
External Connections Associated No	etworks				
Shared Uplink Set	Port Status		Connector Type	Uplink Port	
OK 💿 VLAN-Trunk-1	OK Linked/Active	10 Gb	CX4	🛇 ок С7000_1: Bay 1: Port X1	
	OK Linked/Standby	10 Gb	CX4	OK C7000_1: Bay 2: Port X1	

Figure 2-66 VLAN-Many-1 – Linked at 10Gb with both Smart Link and VLAN Tunneling Enabled.

Define 👻 Configure 👻	Tools 🔻	Help 🔻							
Edit Ethernet Ne	Edit Ethernet Network: VLAN-Many-1								
Network									
Network Name	Smar	t Link <mark>?</mark> 🛛 Private Ne	etwork ?	Enable VLAN 1	Funneling ?	Status	PID	State	
VLAN-Many-1	I (P			$\overline{\mathbf{v}}$		📀 ок		Enabled 💌	
Advanced External Uplink Ports Use Shared Uplink Set									
Port	Port Role	Port Status	C	onnector Type	Connected T	0	PID	Speed/Duplex	Delete
C7000_1: Bay 1: Port X2	NA	OK Linked/Active	10 Gb	SFP-DAC	00:23:47:4b:30	:80 (50)		Auto 💌	×
Add Port - Connection Mode: Auto	• ?				1				1
Refresh Delet	е				Clear		App	liy Can	cel

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 "Server-1"
- In the Network Port 1 drop down box, select PROD-A-1, configure the speed as custom at 100Mb
- In the Network Port 2 drop down box, select PROD-A-2, configure the speed as custom at 100Mb
- In the Network Port 3 drop down box, select PROD-B-1, configure the speed as custom at 2Gb
- In the Network Port 4 drop down box, select PROD-B-2, configure the speed as custom at 2Gb
- In the Network Port 5 drop down box, select PROD-C-1, configure the speed as custom at 4Gb
- In the Network Port 6 drop down box, select PROD-C-2, configure the speed as custom at 4Gb
- In the Network Port 7 drop down box, select VNET-Many-1, configure the speed as custom at 3.9Gb
- In the Network Port 8 drop down box, select VNET-Many-2, configure the speed as custom at 3.9Gb
- In the Assign Profile to Server Bay box, locate the Select Location drop down and select Bay 1, then apply

Note: you should now have a server profile assigned to Bay 1, with 8 Server NICs connected to the various networks.

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 Server-1

add profile Server-1 -nodefaultenetconn

add enet-connection Server-1 pxe=Enabled Network=PROD-A-1 SpeedType=Custom Speed=100 add enet-connection Server-1 pxe=Disabled Network=PROD-A-2 SpeedType=Custom Speed=2000 add enet-connection Server-1 pxe=Disabled Network=PROD-B-1 SpeedType=Custom Speed=2000 add enet-connection Server-1 pxe=Disabled Network=PROD-B-2 SpeedType=Custom Speed=2000 add enet-connection Server-1 pxe=Disabled Network=PROD-C-1 SpeedType=Custom Speed=3900 add enet-connection Server-1 pxe=Disabled Network=PROD-C-2 SpeedType=Custom Speed=3900 add enet-connection Server-1 pxe=Disabled Network=VLAN-Many-1 SpeedType=Custom Speed=4000 add enet-connection Server-1 pxe=Disabled Network=VLAN-Many-2 SpeedType=Custom Speed=4000 Assign profile Server-1 enc0:1 Figure 2-67 Define a Server Profile with 8 NICs.

ofile									
								7	
Profi	ile Name			ber (Logical)	Server UUID (Logical)			
Serv	er-1	🛇 ок 🕚	/CX000000	D	c6f5f2e6-169f-	47e3-8c61-22c5c	9a95721		
erne	t Network Connections (Physic	al ports)							
				P (A					
Port	Network Name		Status	Port Speed Setting	Allocated Bandwidth	PXE	MAC	Mapping	Delet
1	PROD-A-1	•	🛛 ОК	Custom 💌 😒	100 Mb	Enabled 💌	00-17-A4-77-04- 00	LOM:1-a => Bay 1	X
2	PROD-A-2	•	🛛 🛇 ок	Custom 💌 😒	100 Mb	Disabled 💌	00-17-A4-77-04- 02	LOM:2-a => Bay 2	X
3	PROD-B-1	•	🛛 🛇 ок	Custom 💌 😒	2 Gb	Disabled 💌	00-17-A4-77-04- 04	LOM:1-b => Bay	X
	PROD-B-2	•	🛛 🛇 ок	Custom 💌 😒	2 Gb	Disabled 💌	00-17-A4-77-04- 06	LOM:2-b => Bay 2	X
4		•	🛛 📀 ок	Custom 💌 😒	3.9 Gb	Disabled 💌	00-17-A4-77-04- 08	LOM:1-c => Bay	Х
	PROD-C-1	<u> </u>				Disabled 💌	00-17-A4-77-04-	LOM:2-c => Bay	X
5	PROD-C-1 PROD-C-2		🛛 ОК	Custom 💌 😒	3.9 Gb		ΠA		
4 5 6 7			[⊘ок [⊘ок	Custom 💌 😒	3.9 Gb	Disabled 💌	0A 00-17-A4-77-04- 0C	LOM:1-d => Bay	X

Summary

This profile is configured as follows;

- NICs 1&2 are connected to "PROD-A-1" & "PROD-A-2" (Console Network), which are mapped to VLAN 101
- NICs 3&4 are connected to "PROD-B-1" & "PROD-B-2" (VMotion Network), which are mapped to VLAN 102
- NICs 5&6 are connected to "PROD-C-1" & "PROD-C-2" (iSCSI or NFS Network), which are mapped to VLAN 103

Note: Frames for VLANs 101 through 103 will be passed to the server NICs "untagged", so the host will not be required to interpret the VLAN tag.

 NICs 7&8 are connected to "VLAN-Many-1" & "VLAN-Many-2" (Product VLANs), which are mapped to VLANs 2000 through 3000

Note: Frames for VLANs 2000 through 3000 will be passed to the server NICs "tagged", so the host will be required to interpret the VLAN tags. This is perfectly fine when connecting to a vSwitch within a virtual host, such as VMware ESX.

Result

VMware ESX Configuration Example

The following graphics show an ESX server with two Flex-10 NICs configured as 8 NICs. NICs speeds are also configured accordingly and connected to vSwitches, with port groups to present the VLANs accordingly.

When configuring the vSwitches for ESX, you will notice that 8 NICs actually already exist, as per the Virtual Connect server Profile.



onnection Type	Select which virtual switch will handle the network traffic for this connection. You may also create a new virtual switch using the unclaimed network adapters listed below.
onnection Settings ummary	Create a virtual switch Speed Networks Image: Winnic6 4000 Full 192.168.1.254-192.168.1.254 Image: Winnic7 4000 Full 192.168.1.254-192.168.1.254
	O Use vSwitch0 Speed Networks Image: Wmnic1 100 Full 192.168.1.254-192.168.1.254 Image: Wmnic0 100 Full 192.168.1.254-192.168.1.254
	O Use vSwitch1 Speed Networks Image: wmnic3 2000 Full None Image: wmnic2 2000 Full None
	C Use vSwitch2 Speed Networks Image: Winnic5 3900 Full None Image: Winnic4 3900 Full None
	Preview:
	Virtual Machine Network

ESX 4 Networking Configuration Example

The following graphics show an ESX 4 server with two Flex-10 NICs configured as six NICs.

Hardware	View: Virtual Switch Distributed V	irtual Switch	
Processors	Networking		Refresh Add Networking Propertie
Memory Storage • Networking	Virtual Switch: vSwitch0	Remove Properties	
Storage Adapters	Service Console Port	Physical Adapters	
Network Adapters	🖓 Service Console		
Advanced Settings	vswif0 : 192.168.1.31	Le 😨 vmnic0 100 Full 🖓	
Software		Remove Properties	
Licensed Features		- Physical Adapters	
Time Configuration	🖓 VMotion 🧕		
DNS and Routing	vmk0:192.168.2.101	Le 🖼 vmnic2 2000 Full 🖓	
Power Management			
Virtual Machine Startup/Shutdown	Virtual Switch: vSwitch2	Remove Properties	
Virtual Machine Swapfile Location	VMkemel Port	Physical Adapters	
Security Profile	🖓 iSCSI		
System Resource Allocation Advanced Settings	vmk1 : 192.168.3.101	Le 🔛 vmnic4 3900 Full 🖓	
	J Virtual Switch: vSwitch3	Remove Properties	
	-Virtual Machine Port Group	Physical Adapters	
	🖓 VLAN 2000	👤 🔶 🕳 📟 vmnic6 4000 Full 🖓	
	VLAN ID: 2000	🖵 🦛 vmnic7 4000 Full 🖓	
	Virtual Machine Port Group		
	VLAN 2042	-+	
	Virtual Machine Port Group		
	VLAN 2309	<u>•</u> -+	
	VLAN ID: 2309	-	

Figure 2-69 vSwitch Configuration the ESX Host with 8 NICs.

VMWARE ESX Host Networking configuration Example

When configuring the ESX virtual switch, add virtual networks for each VLAN this ESX host will support.

🛃 vSwitch3 Properties			
Ports Network Adapters			
Configuration	Summary 56 Ports	VSwitch Properties	56
VLAN 2000 VLAN 2042 VLAN 2309	Virtual Machine Virtual Machine Virtual Machine	Default Policies	
VLAN 2309 VLAN 2740 VLAN 2936	Virtual Machine	Promiscuous Mode:	Reject
VLAN 2936	Virtual Machine	MAC Address Changes:	Accept
		Forged Transmits:	Accept
		Traffic Shaping	
		Average Bandwidth:	
		Peak Bandwidth:	
		Burst Size:	-
		Failover and Load Balancing	
		Load Balancing:	Port ID
		Network Failure Detection:	Beacon Probing
		Notify Switches:	Yes
		Failback:	Yes
		Active Adapters:	vmnic6, vmnic7
		Standby Adapters:	None
Add	Edit Remove	Unused Adapters:	None

Figure 2-70 Configuring the ESX vSwitch for Multiple Networks / VLANs.

Note: That vSwitch 3 has two NICs configured to, redundantly, support VLANs 103, 104 and 105.

Note: If implementing ESX 3.5 on Flex-10, first review VMWARE KB 1007982 and ensure Network Failure Detection is set to Beacon Probing.

Note: If implementing ESX 4.0 on Flex-10 ensure that ESX driver version 1.52 is installed, also ensure that NIC firmware 5.2.7 is also installed.

When configuring the guest NIC simply chose which VLAN this guest will reside on.

Show All Devices Add Bardware Summary Iardware Summary Iardware Summary Iardware Summary Iardware Summary Iardware CPUs Iardware Restricted Iardware <	W2K3 - Virtual Machine Prope		Virt	ual Machine Version:
	ardware Options Resources Show All Devices ardware Memory CPUs Video card VMCI device Eloppy drive 1 CD/DVD Drive 1 Diverver 1 SCSI controller 0	Add Remove	Device Status Connected ✓ Connect at power on Adapter Type Current adapter: VMXNET 3 MAC Address D0:50:56:b9:18:4a ⓒ Automatic Network Connection ⓒ Network Label VLAN 2042 VLAN 2309 ♡ VLAN 2309	ual Machine Version:

Figure 2-71 Selection of the Virtual Network (VLAN) as required.

Chapter 3: Multi-Enclosure (Stacking) Scenarios

Overview

This chapter will provide sample configuration scenarios of Virtual Connect and/or Virtual Connect with Flex-10, using multiple (Stacked) HP BladeSystem c7000 enclosures, which is referred to a Multi-enclosure stacking (ME), each with two Virtual Connect Ethernet modules installed in Bays 1 and 2. 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 will also be provided.

Requirements

This chapter will utilize multiple HP BladeSystem c7000 enclosures in a Virtual Connect stacked domain configuration. The initial scenarios will each enclosure will have TWO Virtual Connect Ethernet (VC-F) modules and a half height BladeSystem server. The server will connect to the Virtual Connect models with two 1Gb NICs. NIC 1 will connect to the VC module in Bay 1 and NIC 2 will connect to the VC module in Bay 2. Enclosure 1 is externally connected to enclosure two using 10Gb CX-4 cables. The later scenario will utilize Virtual Connect Flex-10 modules in each of four enclosures, these enclosures will be externally connected using 10Gb CX-4 cables, although stacking could be implanted using the newer SFP+ twinax cables.

A pair of managed network switches should also be provided, the switches should also be trunked together.

It is assumed that a Virtual Connect Domain has been created either through the GUI or a CLI script and no VC Networks, uplink sets or Server Profiles have been created.

Scenario 3:1 – Multi-Enclosure stacking, with Multiple Simple vNets, Redundant Uplinks and LACP (2 Enclosures)

Overview

This simple configuration uses the Virtual Connect vNet using uplinks from TWO different enclosures within the stacked Virtual Connect domain, which is referred to a Multi-enclosure stacking (ME). The vNet is the simplest way to connect Virtual Connect to a network and server. In this scenario, the upstream network switches connect the vNet to a pair of ports on two of the VC modules, positioned in Bay1 of enclosure 1 and Bay 2 of enclosure 2.

As there will be a pair of uplinks from each VC module to their respective switches, LACP would need to be configured on the upstream switch ports. It is also assumed these switch ports are configured as Access ports. However, if the switch ports were configured as trunk ports, presenting multiple VLANs to the vNet, Virtual Connect would simply pass the tagged frames on to the server, unchanged with tags intact, however, the VC Domain would need to be configured in Tunneled mode and VLAN tunneling would need to be enabled for these vNets.

When configuring Virtual Connect, we can provide several ways to implement network fail-over or redundancy. One option would be to connect uplinks for a vNet from multiple VC modules; those uplinks would connect from different Virtual Connect modules within the enclosure stack 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 vNets, each with a set of uplinks configured. Each option has its advantages and disadvantages. This scenario will review use TWO separate vNets, which will provide two active paths to the network.

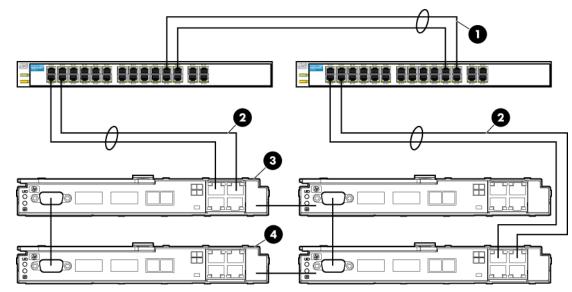
In addition, several vNets can be configured to support the required networks to the servers within the BladeSystem enclosure. These networks could be used to separate the various network traffic, such as iSCSI, backup, VMotion from production network traffic.

Requirements

In order to implement this scenario, two HP BladeSystem c7000 enclosures with one or more server blade and TWO Virtual Connect Ethernet modules, installed in 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.

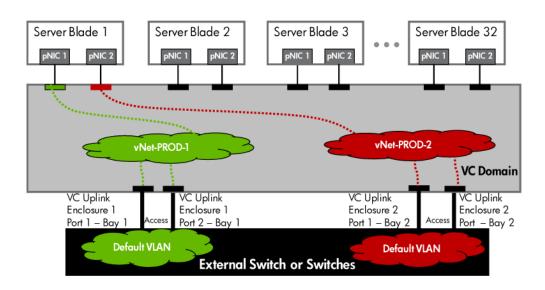
Note: In order to implement Virtual Connect enclosure stacking, the enclosure that will form the primary or initial VC Domain must be configured with either VC-F or VC Flex-10 modules in Bays 1 and 2; VC-E modules are not supported in Bays 1 and 2 of the primary VC enclosure, but VC-E modules could be used in other bays, or Bays 1&2 in other enclosures in the stack, just not the primary enclosure.

Figure 3-1 Physical View; Shows TWO Ethernet uplinks from Ports 1 and 2 on Module 1 in Enclosure 1 to Ports 1 and 2 on the first network switch and TWO uplinks from Ports 1 and 2 on Module 2 in Enclosure 2 to Ports 1 and 2 on the second network switch.



ltem	Description
1	Switch Cross Connect
2	1Gb uplinks (10Gb Uplinks could also be used)
3	Enclosure 1, rear view
4	Enclosure 2, rear view

Figure 3-2 Logical View; Shows TWO Ethernet uplinks from Ports 1 and 2 on Module 1 in Enclosure 1 to Ports 1 and 2 on the first network switch and TWO uplinks from Ports 1 and 2 on Module 2 in Enclosure 2 to Ports 1 and 2 on the second network switch, which connect to vNets vNet-PROD-1 and vNet-PROD-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 IOS or a ProCurve network infrastructure. The configuration information provided in the appendices assumes the following information:

- The switch ports are configured as ACCESS ports, either presenting the Default VLAN or a specific VLAN and will for 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. The connected host would then need to be configured to interpret those VLAN tags
- As LACP will be implemented, the ports that connect the uplinks from module 1 and module 2 will need to be configured for LACP (not Ether-channel) and be configured in their respective Ling Aggregation Groups (LAG)

This scenario assumes the switch ports are configured as an Access ports and the frames are presented to Virtual Connect as untagged.

VC CLI commands

In addition to the GUI many of the configuration settings within VC can be 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. Throughout this scenario the CLI commands to configure VC for each setting will also be provided.

Configuring the VC module

- Physically connect Port 1 of Network switch 1 to Port 1 on the VC module in Bay 1.
- Physically connect Port 1 of the second Network switch to Port 1 of the VC module in Bay 2, if you have only one network switch, connect VC Port 1 (Bay 2) to an alternate port on the same switch. This will NOT create a network loop and does not require Spanning Tree to be configured.
- Physically connect a CX-4 cable from the CX-4 port or the module in enclosure 1, Bay 1 to the CX-4 connector on enclosure 2 Bay 1
- Physically connect a CX-4 cable from the CX-4 port or the module in enclosure 1, Bay 2 to the CX-4 connector on enclosure 2 Bay 2

Configuring the VC Module for VLAN Tunneling via GUI (Ethernet settings)

Enable Tunnel VLAN Tags within Virtual Connect

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Tunnel VLAN Tags
- Select Fast MAC Cache Fail-over with a refresh of 5
- Select Apply

Configuring the VC Module for VLAN Tunneling 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 "Tunnel VLAN Tags" and, as no links are configured in standby, optionally enable Fast MAC cache fail-over

set enet-vlan vlantagcontrol=Tunnel

set mac-cache Enabled=True Refresh=5

Figure 3-3 Ethernet Settings.

er VLAN Tagging Support	
Tunnel VLAN Tags	?
C Map VLAN Tags	
Force server connections to use the same VLAN mappings	as shared uplink sets 🔋
Cache Fail-over	
Cache Fail-over Enable Fast MAC Cache Fail-over MAC Refresh Interval 5 seconds	
Enable Fast MAC Cache Fail-over	
Enable Fast MAC Cache Fail-over	
Enable Fast MAC Cache Fail-over MAC Refresh Interval 5 seconds	

Importing the Second Enclosure via GUI

2.

In order to stack Virtual Connect we need to first implement Virtual Connect, configure a Virtual Connect Domain within a HP BladeSystem c7000 enclosure, cable the enclosure together and then "import" the additional enclosures into the existing VC Domain. Up to three additional HP BladeSystem c7000 enclosures can be imported. The enclosures being imported must have no Virtual Connect domain configured, and should be considered as "bare metal". However, the Onboard Administrator (OA) must be configured and the VC modules within the enclosure must have TCP/IP addresses configured.

To import the second enclosure;

- Login to the existing Virtual Connect domain of the first enclosure and select Domain Enclosures in the left pane
- Press the "Find" button
- Enter the IP address and credentials for the OA of the enclosure you wish to import
- Select the enclosure, then press the "Import" button, this may take a few minutes to complete
- From the left pane, select Stacking Links and verify there are no stacking link errors

Importing the Second Enclosure via CLI

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

Importing an Enclosure into an existing VC Domain

Import enclosure 10.0.0.50 UserName=Administrator Password=password

Note: Type "YES" when prompted

Note: the IP Address (User name and password) is for the OA of the enclosure being imported. The Double Dense statement is can be sued if BL2x220c (Double Dense) Blades are used.

IE; Import enclosure 10.0.0.50 UserName=Administrator Password=password DoubleDense=Enable

Figure 3-4 Importing an enclosure into an existing VC Domain.

IP Virtual Connect Ma	anager						
Domain Status 📃	Define 👻 Cont	figure 👻 To	ools 👻 Help 👻				
▲ ●	Domain S	ettings					
View Legend	Domain Confi	guration	Domain IP Address	Domain Enclosures	Backup/Restore		
Elements and Events							
••		nclosure ID	Enclosure Name	Enclosure Serial Number	r Rack Name	OA IP Address	Status
HP Virtual Connect Home	E	nciosure ib	Enclosure Name		г каск магне		
🖃 Dornain Settings	er er	ncO	bsrt-enc5	USE70637L6	bsrt	10.0.0.50	IMPORTED
Domain Configuration							
Domain IP Address					Import	Delete	Find
Domain Enclosures					import	Delete	T IIIG
Backup/Restore							
Firmware Management							

Figure 3-5 Enter the IP address and credentials of for the OA of the enclosure being imported.

Define 👻 Confi	īgure ▼ Tools ▼ Help ▼	
Domain Se	ettings	
Domain Config	guration Dormain IP Address Domain Enclosures Backup/Restore	
En	Find Enclosure	: Status
ene		IMPORTED
	Warning: Once you import this remote enclosure the Onboard Administrator (OA) IP address must not change. You must either assign a static IP address or configure it appropriately via your DHCP server. Additionally, Virtual Connect creates a local user named "vcmuser" on the OA module. You should not modify the credentials for this user. Finally, you must not change the "local users" authentication setting for the OA module. Required Field* OA IP Address:* OA User Name:* OA Password:*	Find
	OK Cancel	

Figure 3-6 The figure below shows importing the enclosure.

	Settings	「ools → Help →				
onnam	oottiingo					
Domain C	onfiguration	Domain IP Address	Domain Enclosures	Backup/Restore		
	Enclosure ID	Enclosure Name	Enclosure Serial Number	Rack Name	OA IP Address	Status
Г	enc0	bsrt-enc5	USE70637L6	bsrt	10.0.0.50	IMPORTED
	enc1	bsrt-enc6	USE70637FX	bsrt	10.0.0.60	NOT-IMPORTED
				Import	Delete	Find

Figure 3-7 The enclosure is imported.

Dornain C	onfiguration	Domain IP Address	Domain Enclosures	Backup/Restore		
	_					
	Enclosure ID	Enclosure Name	Enclosure Serial Number	Rack Name	OA IP Address	Status
	enc0	bsrt-enc5	USE70637L6	bsrt	10.0.0.50	IMPORTED
	enc1	bsrt-enc6	USE70637FX	bsrt	10.0.0.60	IMPORTED
				Import	Delete	Find
				mpm		
			v the Enclosure Import Status k	a a lau a i ƙawi ƙundha a w		

Figure 3-8 VC Domain Stacking Links.

lefine 🔻 Config	ure 👻 Too	ls 🔻 Help 🔻		
Stacking Lir	ıks			
Stacking Links				
	modules are in	nterconnected and acc		. The 'Connection Status' below indicates dicates whether the VC-Enet modules wil
Connection Status:	🛇 ок	?		
Redundancy Status:	🛇 ок	?		
Enclosure		Link Speed	From Connection	To Connection
bsrt-enc5(enc0)	Link speed	From Connection	To connection
- 2011 0/100(0/100	,	10 Gb	enc0:Bay1:PortX0	enc0:Bay2:PortX0
		10 Gb	enc0:Bay1:PortX1	enc1:Bay1:PortX1
		10 Gb	enc0:Bay2:PortX1	enc1:Bay2:PortX1
bsrt-enc6(enc1))			

NOTE:

Port X0 connects to the internal link between horizontally-adjacent VC-Enet modules

Port X7 and X8 connects to the internal link between horizontally-adjacent Flex-10 enabled VC-Enet modules

Defining a new vNet via GUI

Create a vNet and name it "vNet-PROD-1"

- Login to Virtual Connect
- On the Virtual Connect Manager screen, click Define, Ethernet Network to create a vNet
- Enter the Network Name of "vNet-PROD-1"
 - a. Note; select Smart Link, but do not select Private Networks
- Select Add Port, then add the following ports;
 - a. Enclosure 1, Bay 1, Port 1
 - b. Enclosure 1, Bay 1, Port 2
- Leave Connection Mode as Auto
- Select Apply

Create a vNet and name it "vNet-PROD-2"

- Enter the Network Name of "vNet-PROD-1"
 - a. Note; select Smart Link, but do not select Private Networks
- Select Add Port, then add the following ports;
 - a. Enclosure 2, Bay 2, Port 1
 - b. Enclosure 2, Bay 2, Port 2
- Leave Connection Mode as Auto
- Select Apply

Note: By connecting TWO Uplinks from each vNet we are leveraging LACP to provide additional bandwidth. By creating TWO separate vNets, we are also providing the ability to have ALL uplinks active and then provide fail-over through the server's NICs with NIC teaming or two NICs connected to a vSwitch if a hypervisor is used. 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.

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-1" and configure uplinks as discussed above
add Network vNet-PROD-1
add uplinkport enc0:1:1 Network=vNet-PROD-1 speed=auto
add uplinkport enc0:1:2 Network=vNet-PROD-1 speed=auto
set network vNet-PROD-1 SmartLink=Enabled
```

add Network vNet-PROD-2 add uplinkport enc1:2:1 Network=vNet-PROD-2 speed=auto add uplinkport enc1:2:2 Network=vNet-PROD-2 speed=auto set network vNet-PROD-2 SmartLink=Enabled

Figure 3-9 Define Ethernet Network (vNet-PROD-1).

Note: The that the uplinks are connected to different enclosures, (enc0 and enc1)

work							
Network Name	Smart Link ?	Private Network ?	Enable VLAN Tunne	ling ? Status	PID	State	
vNet-PROD-1	V			🛇 ок	۲	Enabled 💌	
ernal Uplink Ports							
	Port Role Po	ort Status	Connector Type	Connected To	PID	Speed/Duplex	Dele
Use Shared Uplink Set		ort Status Ory Linked/Active 1 G		Connected To	PID	Speed Duplex	
Use Shared Uplink Set	NA 📀		b RJ45	Connected To	PID		Dele X
Use Shared Uplink Set Port bsrt-enc5(enc0): Bay 1: Port 1	NA 📀	OK Linked/Active G	b RJ45	Connected To	PID ©	Auto 💌	×

Figure 3-10 Define Ethernet Network (vNet-PROD-2).

Note: The uplinks are connected to different enclosures, (enc0 and enc1).

dit Ethernet Netwo	o rk: vNet-Pf	ROD-2				
twork						
Network Name	Smart Link ?	Private Network ?	Enable VLAN Tunne	ling ? Status	PID State	
vNet-PROD-2	V			🛇 ок	Enabled	
Advanced						
ernal Unlink Ports						
ternal Uplink Ports	Dort Dolo	of Photos	Connector Turce	Connected To	DID Cocod Durlou	Bal
· · ·		ort Status	Connector Type b RJ45	Connected To	PID Speed/Duplex	
Use Shared Uplink Set	NA 🤇		b RJ45	Connected To	PID Speed-Duplex Auto Auto Auto Auto Auto Auto Auto Auto Auto Auto	>
Use Shared Uplink Set Port bsrt-enc6(enc1): Bay 2: Port 1	NA 🤇	OW Linked/Active 1 G	b RJ45	Connected To	Auto	>
Use Shared Uplink Set Port bsrt-enc6(enc1): Bay 2: Port 1 bsrt-enc6(enc1): Bay 2: Port 2 Add Port	NA 🤇	OW Linked/Active 1 G	b RJ45	Connected To	Auto	>
Use Shared Uplink Set Port bsrt-enc6(enc1): Bay 2: Port 1 bsrt-enc6(enc1): Bay 2: Port 2 Add Port	NA 🤇	OW Linked/Active 1 G	b RJ45	Connected To	Auto	Dela >

Defining a Server Profile with NIC 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"

Defining a Server Profile with NIC 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"
- In the Assign the Profile to a Server Bay, select Bay 1 and apply

Defining a Server Profile with NIC 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 -nodefaultenetconn add enet-connection App-1 pxe=Enabled add enet-connection App-1 pxe=Disabled set enet-connection App-1 1 Network=vNet-PROD-1 set enet-connection App-1 2 Network=vNet-PROD-2 assign profile App-1 enc0:1 Figure 3-11 Define a Server Profile (App-1) and Assigns it to a Bay in either enclosure.

Define 👻 Config	gure 👻 Tools 👻	Help v		_		_	_		_	
Edit Server	Profile: Ap	p-1								
Profile										
Profile Name		Status	Serial Number (Logical)	Server UUI	D (Log	ical)			
App-1		Ок	VCX0000003		0b4ad962-a	cc9-4d	dd-ae76-ck	ofcaa3959aa		
Ethernet Network	Connections (Ph	ysical ports)								
			[Unass						
Port Network	k Name		Status Poi Set	Bay 2	(ProLiant BL495c G (ProLiant BL495c G (ProLiant BL495c G	¥5)		MAC	Mapping	Delete
1 vNet-PR	OD-1		- 🛇 ОК 🛛 Рге	Bay 4	(ProLiant BL495c G (ProLiant BL460c G (ProLiant BL260c G	¥6)	ed 🔻	00-17-A4-77-04-1C	Not Mapped	×
2 vNet-PR	OD-2		- 🛇 OK 🏻 Pre	Bay 6	(ProLiant BL260c G (ProLiant BL260c G (Empty)		led 💌	00-17-A4-77-04-1E	Not Mapped	×
Add Netwo	ork Connection			Bay 8	(Empty) (Empty)					
				Bay 1	0 (Empty) 1 (ProLiant BL460c	G11				
				Bay 1	2 (ProLiant BL460c 3 (ProLiant BL460c	G1)				
Assign Profile to	Server Bay			Bay 1	4 (Empty) 5 (Empty)	,				
			bsrt-enc5 🕨	Bay 1	6 (Empty)					
Power	Unassigned	Server Bay Assigr	bsrt-enc6 Select Location	1 v	SN Jnknown	Unkn	Model own	Status 2		
				_					-	
Delete	Copy Profile				0	lear	-	apply Can	el	
	- py rionio									

Summary

We created a Virtual Connect Domain within a BladeSystem c7000 enclosure, using 10Gb Ethernet cables, we then connected the VC modules from a second enclosure to this enclosure. We then extended the Virtual Connect domain (stacked) to include the second enclosure.

We created a Virtual Connect network (vNet) which provided additional bandwidth through LACP with fail-over capabilities to uplinks on a from the second enclosure. One set of uplinks are will provide active network connections while the second set of uplinks will be in standby mode to prevent any network loops.

When VC profile App-1 is applied to the server in bay1 and is powered up, it has one NIC through each module connected to "vNet-PROD", which connects to the network infrastructure through the 1Gb uplinks. These NICs could now be configured as individual NICs (figure 1-8) with their own IP address or as a pair of TEAMED NICs (figure 1-9). 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. This server profile could then be assigned to any valid server bay within the Virtual Connect stack.

As additional servers are added to the enclosure, simply create additional profiles, or copy existing profiles, configure the NICs for vNet-PROD and apply them to the appropriate server bays.

Additional enclosures could be added to the stack by following the same instructions used to add the second enclosure; up to four (4) enclosures can be stacked.

Results

The following graphic provides an example of a Windows 2003 server with TWO NICs connected to the network, each NIC has its own TCP/IP address, either or both NICs could be actively working on the network.

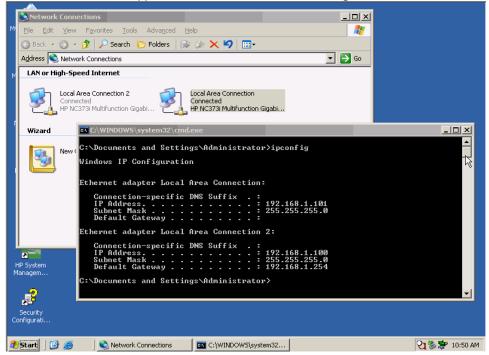


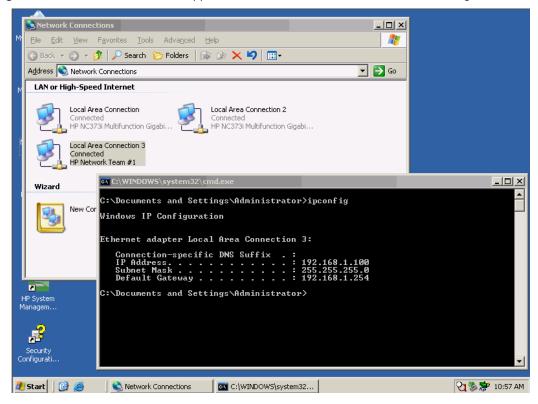
Figure 3-12 Both NICs for Profile App-1 are connected to the network through vNet-PROD.

The following graphics provide an example of a Windows 2003 server with TWO NICs teamed and connected to the network. One NIC will be active while the other is in standby. In the event of an Uplink or switch failure, VC will fail-over to the standby uplinks. IF VC were to fail, the NIC teaming software would fail-over to the standby NIC.

Figure 3-13 Team both NICs, using the HP Network Configuration Utility.

IP Network Configuration Utility Properties	<u>?</u> ×
Ethernet Devices SCSI Devices	
HP NICs:	Tanaina Calua
HP Network Team #1	Teaming Setup
[1] HP NC373i Multifunction Gigabit Server Adapter I/O Bay 1 Port 2	<u> </u>
[2] HP NC373i Multifunction Gigabit Server Adapter #2 I/O Bay 2 Port 2	Dissolve
	<u>V</u> LAN(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.	Properties
Help License Manager Enable UID 🔽 Display Tray Icon	
	OK Cancel

Figure 3-14 Both NICs for Profile App-1 are teamed and connected to the network through vNet-PROD.



Scenario 3:2 - Flex-10 with Multi-Enclosure stacking - VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS) - VMware ESX - (4 Enclosures)

Overview

This scenario discusses the Flex-10 features provided in Virtual Connect. For an overview of Flex-10, please refer to the following technology brief. HP Flex-10 technology brief;

http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01608922/c01608922.pdf

Virtual Connect Flex-10 provides the ability to either present the 10Gb server NICs as single 10Gb NICs, or divide each NIC into as many as 4 "physical function" NICs per NIC port. These physical function NICs look to the server hardware and OS as physical NICs, have their own MAC address and can be configured at speeds from 100Mb to 10Gb.

As shown in earlier scenarios, VLAN access can be handled in two different ways. Virtual Connect can either pass VLAN/Non-VLAN traffic untouched to the host (Tunneling Mode) or Virtual Connect can handle all VLAN tagging (Server Mapped VLANs). Each has their advantages as discussed in the Introduction to Virtual Connect section, earlier in this document.

This scenario, using Map VLAN Tags, will focus more on Enclosure stacking, which is referred to a Multienclosure stacking (ME), while leveraging Virtual Connect Flex-10 technology. In this scenario we have two10Gb uplinks configured with multiple VLANs. We will configure a VMware ESX server with SIX NICs, 3 per NIC port, configured at various speed. Some NICs will be connected to specific VLANs, so frames will be presented without tags, others will be configured with multiple networks, were frames will be presented with tags. We will also show how the speed of each NIC can be varied from speeds ranging between 100Mb to 10Gb.

Flex-10 technology can be provided in two ways;

- 1. Through the use the10Gb (LOM) NICs integrated on the main PCB, or;
- 2. Through the installation of a DUAL PORT 10Gb-KR mezzanine card (NC532m) in an HP BladeSystem server. The first server to provide 10Gb LOM NICs is the BL495c, which is what is being used in the following example.

The key benefit of Flex-10 is that; we now have 10Gb of network bandwidth available per NIC port with the ability to partition or divide that bandwidth into as many as four (4) independent configurable physical NICs per port. These NICs can be configured at speeds of between 100Mb and 10Gb providing the ability to tune bandwidth to the specific need, such as, management, VMotion or production networks. With current technology, all networks would be provided with the same 1Gb speed and would require independent discrete NICs. With Flex-10, we can now provide each network with the desired speed as shown in the following table.

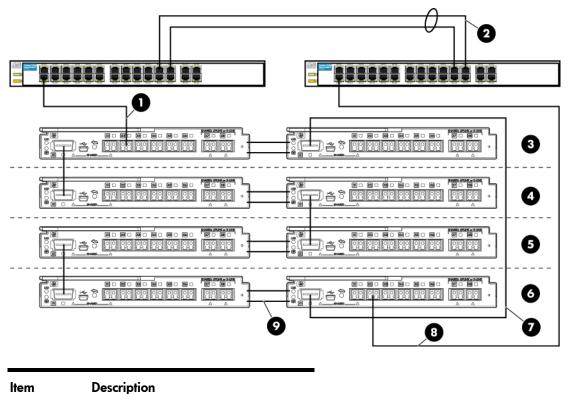
	Console	VMotion	Production	Console	VMotion	Production
	NIC #1	NIC #2	NIC #3	NIC #4	NIC #5	NIC #6
Traditional 1Gb technology	1Gb	1Gb	1Gb	1Gb	1Gb	1Gb
Virtual Connect Flex- 10	500Mb	2.5Gb	7Gb	500Mb	2.5Gb	7Gb

Table 3-1 Flex-10 NIC - Optimization for a VMWARE ESX implementation

Requirements

In order to implement this scenario, four HP BladeSystem c7000 enclosure with one of more Blade G6 servers with 10Gb NICs and TWO Virtual Connect Flex-10 Ethernet modules, installed in 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.

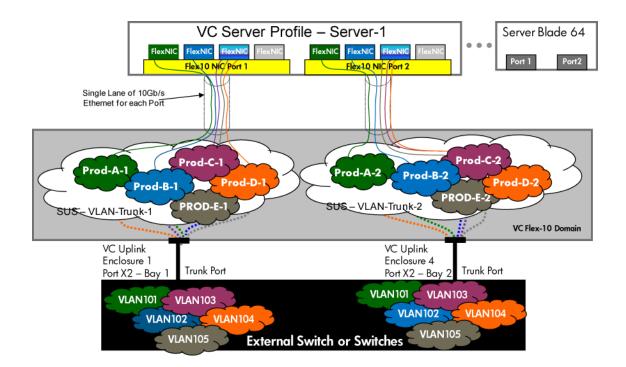
Figure 3-15 Physical View; Shows one 10Gb Ethernet uplink from Port X2 on Module 1, enclosure 1 to Port 1 on the first network switch and one 10Gb uplink from Port X2 on Module 2, enclosure 2 to Port 1 on the second network switch.



Scenario 3:2 - Flex-10 with Multi-Enclosure stacking - VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS) - VMware ESX - (4 Enclosures) 184

ltem	Description
1	10 Gb Uplink
2	Switch Cross Connect
3	Enclosure 1
4	Enclosure 2
5	Enclosure 3
6	Enclosure 4
7	External 10Gb Stacking link
8	10 Gb Uplink
9	Internal Dual 10Gb Stacking links

Figure 3-16 Server Blade profile with TWO Flex-10 NICs configured. Each NIC is connected to a Shared Uplink Set (VLAN-Trunk-1 and VLAN-Trunk-2), the additional NICs are connected to other networks, which are also part of the Shared Uplink Sets. The VLAN-Trunks are connected, at 10Gb, to a network switch, through Port X2 on VC module 1, enclosure 1 and Port X2 on VC module 2, enclosure 4, creating an Active/Active uplink.



Installation and configuration

Switch configuration

Appendices A and B provide a summary of the commands required to configure the switch in either a Cisco IOS or a ProCurve network infrastructure. The configuration information provided in the appendices assumes the following information:

- The switch ports are configured as TRUNK ports to support VLANs 101, 102, 103, 104 and 105. All frames will be forwarding to VC with VLAN tags.
- When adding the additional uplinks to the SUS, the switch ports connected to Virtual Connect will need to be configured for LACP and configured for the same Link Aggregation Group.

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 the VC Module for Map VLAN Tags via GUI (Ethernet settings)

Flex-10 has also provided additional controls when configuring VC for mapped VLAN tags (Multiple Networks over a single link) support. These features provide the ability to set a Custom or Preferred network speed value for each NIC. These are VC domain wide settings and when configured will limit the maximum configurable speed of a NIC.

Enable Map VLAN Tags within Virtual Connect

- On the Virtual Connect Manager screen, Left pane, click Ethernet Settings, Advanced Settings
- Select Map VLAN Tags
- Optionally, select a preferred/Maximum link speed
- Select Apply

Configuring the VC Module for Map VLAN Tags 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 "Map VLAN Tags" and Enable Fast MAC cache fail-over set enet-vlan vlantagcontrol=Map

Note: Do not set a Preferred or Max speed for this scenario. This example is provided for reference only. For the purpose of this scenario, we will not be configuring the custom values for Preferred Link or Maximum Connection speeds. However, the CLI commands are provided below for reference.

Selecting the Set a Customer value for Preferred Link Connection Speed and/or Set a Customer value for Maximum Link Connection Speed, Sets the respective speed for all connections using multiple networks to 500Mb and maximum connection speed to 2.5Gb.

Optionally

Set Advanced Ethernet Settings to a Preferred speed of 500Mb and a Max Speed of 2500Mb

set enet-vlan PrefSpeedType=Custom PrefSpeed=500 MaxSpeedType=Custom MaxSpeed=2500

Figure 3-17 Ethernet Settings.

Define ▼ Configure ▼ Tools ▼ Help ▼	
Ethernet Settings	
MAC Addresses Port Monitoring Advanced Settings	
Server VLAN Tagging Support	
C Tunnel VLAN Tags	?
Map VLAN Tags	
Force server connections to use the same VLAN mappings as shared uplin	koete ?

Importing the Second (and additional) Enclosure(s) via GUI

In order to stack Virtual Connect we need to first implement Virtual Connect, configure a Virtual Connect Domain within a HP BladeSystem c7000 enclosure, cable the enclosure together and then "import" the additional enclosures into the existing VC Domain. Up to three additional HP BladeSystem c7000 enclosures can be imported. The enclosures being imported must have no Virtual Connect domain configured, and should be considered as "bare metal". However, the Onboard Administrator (OA) must be configured and the VC modules within the enclosure must have TCP/IP addresses configured.

To import the second enclosure;

- Login to the existing Virtual Connect domain of the first enclosure and select Domain Enclosures in the left pane
- Press the "Find" button
- Enter the IP address and credentials for the OA of the enclosure you wish to import
- Select the enclosure, then press the "Import" button, this may take a few minutes to complete
- From the left pane, select Stacking Links and verify there are no stacking link errors

If additional enclosures need to be imported, press the Find button again and follow the steps above for each additional enclosure.

Importing the Second Enclosure via CLI

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

Importing an Enclosure into an existing VC Domain

Import enclosure 10.0.0.50 UserName=Administrator Password=password DoubleDense=False

Note: the IP Address (User name and password) is for the OA of the enclosure being imported. The Double Dense statement is optional if double dense blades are not used.

Importing multiple Enclosures via CLI

The following command can be copied and pasted into an SSH based CLI session with Virtual Connect. # Importing an Enclosure into an existing VC Domain (See note below) Note: when importing additional enclosures through the CLI, each of the import Enclosure statements below must be executed individually and cannot be part of a larger script. When run, each command will ask for a "yes" to confirm the enclosure importation, once the enclosure has been found.

Import enclosure 10.0.0.60 UserName=Administrator Password=password Import enclosure 10.0.0.30 UserName=Administrator Password=password Import enclosure 10.0.0.40 UserName=Administrator Password=password

Figure 3-18 Importing an enclosure into an existing VC Domain.

MP Virtual Connect Ma	nager						
Domain Status 📃	Define 🔻	Configure 👻 T	ools 👻 Help 👻				
▲ Domain Status 0 2 4 0 2	Domair	n Settings					
View Legend	Dornain (Configuration	Domain IP Address	Domain Enclosures	Backup/Restore		
Elements and Events							
**							
HP Virtual Connect Home		Enclosure ID	Enclosure Name	Enclosure Serial Numbe	r Rack Name	OA IP Address	Status
🖃 Domain Settings		enc0	bsrt-enc5	USE70637L6	bsrt	10.0.0.50	IMPORTED
Domain Configuration							
Domain IP Address					Import	Delete	Find
Domain Enclosures					impore	DOIDIN	T IIIG
Backup/Restore							
Firmware Management							

Figure 3-19 Enter the IP address and credentials of for the OA of the enclosure being imported.

Define 👻 Config	gure 👻 Tools 👻 Help 👻	
Domain Se	ttings	
Domain Config	uration Domain IP Address Domain Enclosures Backup/Restore	
	Find Enclosure	Chatura
En	To manage the connectivity for this enclosure, Virtual Connect will need to communicate with the Onboard Administrator. Please enter the Administrator user name and password for the remote Onboard Administrator. Warning: Once you import this remote enclosure the Onboard Administrator (OA) IP address must not change. You must either assign a static IP address or configure it appropriately via your DHCP server. Additionally, Virtual Connect creates a local user named "xornuser" on the OA module. You should not modify the credentials for this user. Finally, you must not change the "local users" authentication setting for the OA module. Required Field* OA IP Address:*	Status IMPORTED Find
	OK Cancel	

Figure 3-20 Importing the enclosure.

Domain IP Addres	ss Domain Enclosures	Backup/Restore		
re ID 🔰 Enclosure Name	e Enclosure Serial Number	Rack Name	OA IP Address	Status
bsrt-enc5	USE70637L6	bsrt	10.0.0.50	IMPORTED
bsrt-enc6	USE70637FX	bsrt	10.0.0.60	NOT-IMPORTED
		Import	Delete	Find
	bsrt-enc5	bsrt-enc5 USE70637L6	bsrt-enc5 USE70637L6 bsrt	bsrt-enc5 USE70637L6 bsrt 10.0.0.50 bsrt-enc6 USE70637FX bsrt 10.0.0.60

Figure 3-21 Importing additional enclosures.

2

bsrt-enc4

лпантс	Configuration	Domain IP Address	Domain Enclosures	Backup/Restore		
	Enclosure ID	Enclosure Name	Enclosure Serial Numbe	r Rack Name	OA IP Address	Status
Г	enc0	bsrt-enc5	USE70637L6	bsrt	10.0.0.50	IMPORTED
	enc1	bsrt-enc6	USE70637FX	bsrt	10.0.0.60	IMPORTED
	enc2	bsrt-enc3	1Z34AB789012	bsrt	10.0.0.30	IMPORTED
	enc3	bsrt-enc4	0012MAH15F	bsrt	10.0.0.40	IMPORTED
				Import	Delete	Find
			v the Enclosure Import Status			

2

3

1

Figure 3-22 VC Domain Stacking Links.

efine 🔻	Configu	re v To	ols 👻 Help 👻		
tacki	ng Lin	ks			
Stackin	g Links				
hether al	ll VC-Enet m	nodules are			The 'Connection Status' below indicates dicates whether the VC-Enet modules w
onnectior	n Status:	🛇 ок	?		
edundano	cy Status:	🛇 ок	?		
Enclosu	re		Link Speed	From Connection	To Connection
bsrt-e	nc5(enc0)				
			10 Gb	enc0:Bay1:PortX0	
					enc0:Bay2:PortX0
			10 Gb	enc0:Bay1:PortX1	encu:Bay2:PortXU enc1:Bay1:PortX1
			10 Gb 10 Gb	•	•
🗖 bsrt-e	nc6(enc1)			enc0:Bay1:PortX1	enc1:Bay1:PortX1
- bsrt-e	nc6(enc1)			enc0:Bay1:PortX1	enc1:Bay1:PortX1
📑 bsrt-e	nc6(enc1)		10 Gb	enc0:Bay1:PortX1 enc0:Bay2:PortX1	enc1:Bay1:PortX1 enc3:Bay2:PortX1
	nc6(enc1) nc3(enc2)		10 Gb	enc0:Bay1:PortX1 enc0:Bay2:PortX1 enc1:Bay1:PortX0	enc1:Bay1:PortX1 enc3:Bay2:PortX1 enc1:Bay2:PortX0
			10 Gb	enc0:Bay1:PortX1 enc0:Bay2:PortX1 enc1:Bay1:PortX0	enc1:Bay1:PortX1 enc3:Bay2:PortX1 enc1:Bay2:PortX0
			10 Gb 10 Gb 10 Gb 10 Gb	enc0:Bay1:PortX1 enc0:Bay2:PortX1 enc1:Bay1:PortX0 enc1:Bay2:PortX1	enc1:Bay1:PortX1 enc3:Bay2:PortX1 enc1:Bay2:PortX0 enc2:Bay2:PortX1
🗖 bsrt-e			10 Gb 10 Gb 10 Gb 10 Gb	enc0:Bay1:PortX1 enc0:Bay2:PortX1 enc1:Bay1:PortX0 enc1:Bay2:PortX1 enc2:Bay1:PortX0	enc1:Bay1:PortX1 enc3:Bay2:PortX1 enc1:Bay2:PortX0 enc2:Bay2:PortX1 enc2:Bay2:PortX0

NOTE:

Port X0 connects to the internal link between horizontally-adjacent VC-Enet modules.

Port X7 and X8 connects to the internal link between horizontally-adjacent Flex-10 enabled VC-Enet modules.

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

Connect Port X2 of VC module 1, enclosure 1 to Port 1 on switch 1

Create a SUS named "VLAN-Trunk-1" and connect it to Flex-10 Port X2 on Module 1, enclosure 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;
 - a. Enclosure 1, Bay 1, Port X2
- Add Networks as follows;
 - a. PROD-A-1 = VLAN ID=101
 - **b.** PROD-B-1 = VLAN ID=102
 - c. PROD-C-1 = VLAN ID=103
 - d. PROD-D-1 = VLAN ID=104
 - e. PROD-E-1 = VLAN ID=105
- Enable Smart Link on each network
- Click Apply

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

Connect Port X2 of VC module 2m enclosure 4 to Port 1 on switch 2

Create a SUS named "VLAN-Trunk-2" and connect it to Flex-10 Port X2 on Module 2, enclosure 4

- On the Virtual Connect Home page, select Define, Shared Uplink Set
- Insert Uplink Set Name as VLAN-Trunk-2
- Select Add Port, then add the following port;
 - a. Enclosure 4, Bay 2, Port X2
- Add Networks as follows;
 - a. PROD-A-2 = VLAN ID=101
 - **b.** PROD-B-2 = VLAN ID=102
 - c. PROD-C-2 = VLAN ID=103
 - d. PROD-D-2 = VLAN ID=104
 - e. PROD-E-2 = VLAN ID=105
- Enable Smart Link on each network
- Click Apply

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

Note: This uplink will connect from Enclosure 1, Bay 1

Create Shared Uplink Set "VLAN-Trunk-1" and configure uplinks add uplinkset VLAN-Trunk-1

add uplinkport enc0:1:X2 Uplinkset=VLAN-Trunk-1 speed=auto

Create Networks Prod-A-1 through Prod-D-1 for Shared Uplink Set "VLAN-Trunk-1" add network PROD-A-1 uplinkset=VLAN-Trunk-1 VLanID=101 set network PROD-A-1 SmartLink=Enabled add network PROD-B-1 uplinkset=VLAN-Trunk-1 VLanID=102 set network PROD-B-1 SmartLink=Enabled add network PROD-C-1 uplinkset=VLAN-Trunk-1 VLanID=103 set network PROD-C-1 SmartLink=Enabled add network PROD-D-1 uplinkset=VLAN-Trunk-1 VLanID=104 set network PROD-D-1 uplinkset=VLAN-Trunk-1 VLanID=104 set network PROD-D-1 SmartLink=Enabled add network PROD-E-1 SmartLink=Enabled

The following script can be used to create the Second Shared Uplink Set (VLAN-Trunk-2) Note: This uplink will connect from Enclosure 3, Bay 2 # Create Shared Uplink Set "VLAN-Trunk-2" and configure uplinks add uplinkset VLAN-Trunk-2 add uplinkport enc3:2:X2 Uplinkset=VLAN-Trunk-2 speed=auto

Create Networks Prod-A-2 through Prod-D-2 for Shared Uplink Set "VLAN-Trunk-2" add network PROD-A-2 uplinkset=VLAN-Trunk-2 VLanID=101 set network PROD-B-2 SmartLink=Enabled add network PROD-B-2 uplinkset=VLAN-Trunk-2 VLanID=102 set network PROD-C-2 uplinkset=VLAN-Trunk-2 VLanID=103 set network PROD-C-2 SmartLink=Enabled add network PROD-C-2 SmartLink=Enabled add network PROD-D-2 uplinkset=VLAN-Trunk-2 VLanID=104 set network PROD-D-2 SmartLink=Enabled add network PROD-D-2 SmartLink=Enabled set network PROD-D-2 SmartLink=Enabled add network PROD-E-2 uplinkset=VLAN-Trunk-2 VLanID=105 set network PROD-E-2 SmartLink=Enabled

Note: It is important to point out at this time, if you are familiar with VC scripting, or have existing VC scripts that you had used on Virtual Connect 1:10 modules, and may want to use with Flex-10, the numbering of the Flex-10 external ports is different than with early modules of VC. VC-E and VC-F uplinks ports are numbered as Ports 1, 2, 3 etc., however; Flex-10 ports are referenced as X1, X2, X3 etc., plus some of the ports are shared, IE the CX4 is shared with SFP+ Port X1, both are configured as X1, but only one is usable at a time. If a CX-4 cable is connected the SFP+ port will become disable, the same is true for Ports X7 & X8, which are the internal cross connect ports, the cross connects will disconnect, if an SFP+ module is plugged in Ports X7 or X8.

Figure 3-23 Define a Shared Uplink Set (VLAN-Trunk-1) and add VLANs.

nernet Shared Externa	al Uplink Set									
Uplink Set Name			s	itatus	PID					
VLAN-Trunk-1				🕗 Oł	< 🔘					
ternal Uplink Ports										
Port	Port Role	Port Stat			Connector Type	Connected To	PID	Speed/D	uplex	Dele
C7000_1: Bay 1: Port X Add Port Connection Mode: Auto	1 NA		Linked/Active		CX4	00:12:79:4a:d8:00 ()	Auto	•	×
Add Port 👻	1 NA	⊘ок L)		_	×
Add Port	1 NA	⊘ок L	inked/Active			00:12:79:4a:d8:00 ())		_	×
Add Port Connection Mode: Auto Sociated Networks (1	1 NA	⊘ок L	inked/Active	10 Gb t Link	CX4 Private Network	00:12:79:4a:d8:00 (_	×
Add Port - Connection Mode: Auto sociated Networks (1 Network Name	1 NA 0 VLAN tagged) VLAN ID	⊘ок Ц ? Native	inked/Active	10 Gb t Link	CX4 Private Network ?	00:12:79:4a:d8:00 (Auto	_	
Add Port - Connection Mode: Auto sociated Networks (1 Network Name PROD-A-1	VLAN ID	Pok L	inked/Active	10 Gb	CX4 Private Network ?	00:12:79:4a:d8:00 (*		Auto	_	×
Add Port Add Port Add Port Add Add Port Add Add Add Add Add Add Add Ad	1 NA 	Pok L	? Smar ? V V V V	t Link	CX4 Private Network ?	00:12:79:4a:d8:00 (Advanced		Auto X X	_	×

Note: The "Connected to" field in the graphic above displays the MAC address and port number of the switch this uplink is connected to. This information is provided through LLDP discover and is not available in all switch products. This information can be very helpful when determining which switches and ports VC is connected to.

Figure 3-24 Active / Active SUS.

hared	d Uplink	c Sets							L
F4									
External	Connectio	ns Associated	d Networks						
	l Connectio	ns Associated	d Networks Port Status		C(nnector Type	Uplink P	ort	
	lplink Set	NS Associated		Linked/Active	10 Gb	nnector Type CX4	Uplink P	ort C7000_1: Bay 1: Port X1	

Define Uplink Set

Note: In this scenario we have created two independent Share Uplink Sets (SUS), each originating from the opposite VC-Modules, by doing so we provide the ability to create separate and redundant connections out of VC. 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 of these uplink ports to the same SUS, however, this would have provided an Active/ Standby uplink scenario.

Figure 3-25	Example of a Active /	/ Standby SUS.
-------------	-----------------------	----------------

Define 👻 Configure 👻 Tools 👻 He	lp ▼							
Shared Uplink Sets								
External Connections Associated	Networks							
Shared Uplink Set	Port Status		Connector Type	Uplink Po	rt			
OK 💿 VLAN-Trunk-1	OK Linked/Active	10 Gb	CX4	🛇 ок	C7000_1: Bay 1: Port X1			
Ŭ	OK Linked/Standby	10 Gb	CX4	🛇 ок	C7000_1: Bay 2: Port X1			

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 "Server-1"
- In the Network Port 1 drop down box, select PROD-A-1, configure the speed as custom at 500Mb
- In the Network Port 2 drop down box, select PROD-A-2, configure the speed as custom at 500Mb
- In the Network Port 3 drop down box, select PROD-B-1, configure the speed as custom at 2.5Gb
- In the Network Port 4 drop down box, select PROD-B-2, configure the speed as custom at 2.5Gb
- In the Network Port 5 drop down box, select Multiple Networks, configure the speed as Auto
 - Configure Multiple Networks for PROD-C-1, PROD-D-1 and PROD-E-1
- In the Network Port 6 drop down box, select Multiple Networks, configure the speed as Auto
 - Configure Multiple Networks for PROD-C-2, PROD-D-2 and PROD-E-2
- In the Assign Profile to Server Bay box, locate the Select Location drop down and select Bay 1, then apply

Note: you should now have a server profile assigned to Bay 1, with 6 Server NICs connected to the various networks. NICs 5&6 should have a link speed of 7.5Gb

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 Server-1 add profile Server-1 -nodefaultenetconn add enet-connection Server-1 pxe=Enabled Network=PROD-A-1 SpeedType=Custom Speed=500 add enet-connection Server-1 pxe=Disabled Network=PROD-A-2 SpeedType=Custom Speed=500 add enet-connection Server-1 pxe=Disabled Network=PROD-B-1 SpeedType=Custom Speed=2500 add enet-connection Server-1 pxe=Disabled Network=PROD-B-2 SpeedType=Custom Speed=2500 add enet-connection Server-1 pxe=Disabled add server-port-map Server-1:5 PROD-C-1 VLanId=103 add server-port-map Server-1:5 PROD-D-1 VLanId=104 add server-port-map Server-1:5 PROD-E-1 VLanId=105 add enet-connection Server-1 pxe=Disabled add server-port-map Server-1:6 PROD-C-2 VLanId=103 add server-port-map Server-1:6 PROD-D-2 VLanId=104 add server-port-map Server-1:6 PROD-E-2 VLanId=105 Assign profile Server-1 enc0:1

Figure 3-26 Define a Server Profile with 6 NICs.

Profi	le Name	Status	Serial	Number	r (Logical)	Serv	er UVID (Logi	ical)				
þerve	er-1	Ок	VCX00	00000		6f09	75b4-e343-48e	2-ae7b-b5b6	i99cc5	5dd4		
erne	t Network Connections (Phy	sical ports)										
Port	Network Name			Status	Port Speed Setting	Ì	Allocated Bandwidth	PXE		MAC	Mapping	Delet
1	PROD-A-1		•	Оок	Custom	•	500 Mb	Enabled	•	00-17-A4-77-04- 00	LOM:1-a => Bay 1	×
2	PROD-A-2		•	Ок	Custom	•	500 Mb	Disabled	•	00-17-A4-77-04- 02	LOM:2-a => Bay 2	×
3	PROD-B-1		-	Øок	Custom	•	2.5 Gb	Disabled	•	00-17-A4-77-04- 04	LOM:1-b => Bay 1	X
4	PROD-B-2		•	Ок	Custom	- 🕥	2.5 Gb	Disabled	•	00-17-A4-77-04- 06	LOM:2-b => Bay 2	×
5	Multiple Networks		- 🔊	Ок	Preferred	-	7 Gb	Disabled	•	00-17-A4-77-04- 08	LOM:1-c => Bay 1	\times
6	Multiple Networks		- 🔊	Ок	Preferred	-	7 Gb	Disabled	•	00-17-A4-77-04- 0A	LOM:2-c => Bay 2	х
ł	Add Network Connection											

Alternatively, the profile could be assigned to any server bay within the enclosure stack.

Create Server Profile Server-1 to the 4th enclosure, bay 11

Figure 3-27 Assign the server Profile to Enclosure 3, slot 11.

лt 3	Server Profile: Server	-1										
file												
Profi	ile Name	Status	Serial	Numb	er (Logical)	Ser	ver UL	JID (Logi	ical)			
Serv	er-1	🛇 ок	VCX00	00000		6f09	75b4-e	∋343-48e	2-ae7b-b5b699c	c5dd4		
erne	t Network Connections (Physica	l ports)										
Deet	Network Name			Statu	s Port Spee		0110	cated	PXE	MAC	Manaina	Dele
Port				Statu	s Port Spee	1		cated dwidth	PXE	MAC	Mapping	
1	Console		•	Ок	Custom	- 🕥	500	Mb	Enabled	00-17-A4-77-04- 00	LOM:1-a => Bay1	X
2	Console		•	Ок	Custom	- 🕥	500	Mb	Disabled 💌	00-17-A4-77-04- 02	LOM:2-a => Bay 2	×
3	PROD-B-1		•	Ок	Custom	- 🕥	2.5 (Эb	Disabled 💌	00-17-A4-77-04-	LOM:1-b => Bay 1	X
4	PROD-B-2		•	0	Unassigned Bay 1 (ProLiant	BL480c G	:1)	łb	Disabled 💌	00-17-A4-77-04- 06	,	X
5	Multiple Networks		- 🕥	0	Bay 2 (Empty) Bay 3 (ProLiant	BL460c G	1)		Disabled 💌	00-17-A4-77-04- 08		X
6	Multiple Networks		- 🕥	0	Bay 4 (Empty) Bay 5 (Empty) Bay 6 (Empty)				Disabled 💌	00-17-A4-77-04- 0A		х
	Add Network Connection				Bay 7 (Empty) Bay 8 (Empty)						20, 2	
	Add HELWORK CONNECTION				Bay 9 (Covered							
					Bay 10 (Empty) Bay 11 (ProLian		G1)					
					Bay 12 (Empty) Bay 13 (Empty)			1				
sign	Profile to Server Bay	Г			Bay 14 (Empty)							
			bsrt-end bsrt-end		Bay 15 (Empty) Bay 16 (Empty)							
			bsrt-end		Day To (Empty)			J				

Server NIC Speed and LOM Mappings

We will now focus more of the specific Flex-10 features.

Note the "Allocated Bandwidth" and the LOM "Mapping" settings in the following graphic. Flex-10 based NICs have the ability of being configured as a Single 10Gb NIC or divided into as many as FOUR (4) physical NICs. It is important to note the LOM mappings when configuring which NIC will be connected to which network, as a NIC on a specific LOM can connect to a network only once. (IE, NIC LOM:1-a can be assigned to Prod-101-1, no other NIC on LOM:1 can be assigned to Prod-101-1) This is discussed in further details in the Flex-10 technology brief mentioned earlier in this document.

As additional NICs are added to a profile that is assigned to a server with a 10Gb Flex-NIC, the assignment will alternate between LOM:1-x and LOM:2-x. The first NIC will be LOM:1-a, the second will be LOM:2-a, then LOM:1-b, LOM:2-b etc. to a max of 4 NICs per LOM.

Also, note that if additional NICs are required, this server has only 6 NICs configured, we could ADD two more NICs to this server without adding additional hardware. As of Virtual Connect firmware 2.30, Virtual Connect will provide the ability to add/remove or reconfigure the server NICs, including NIC speed, while the server is running.

Define 👻 Configure 👻 Tools 👻 Edit Server Profile: Server-1 Profile Profile I Server UUID (Logical) Serial Num 6f0975b4-e343-48e2-ae7b-b5b699cc5dd4 Server-1 OK VCX0000000 Ethernet Network Connections (Physical ports) ▼ 00-17-A4-77-04-PROD-A-1 -Ок 💽 🕥 500 Mł LOM:1-a Custom Enabled Bay 1 LOM:2-a = 2 PROD-A-2 -Ок Custom - 😒 500 Mb -00-17-A4-77-04 Disabled Bay 2 3 PROD-B-1 -Ок Custom -2.5 Gb Disabled -00-17-A4-77-0 LOM:1-b => Bay 1 00-17-A4-77-0 PROD-B-2 OK Custom 2.5 Gb LOM:2-b => • - 8 Disabled -Bay 2 5 Multiple Networks 💽 🔛 🖉 ок Preferred 💌 7 Gb -00-17-A4-77-04 LOM:1-c => Disabled Bay 1 💌 🕥 🖉 OK 🛛 Preferred 💌 Multiple Networks Gh Disabled -00-17-A4-77-04 LOM:2-c = X Bay 2

Figure 3-28 Server NIC speed and LOM Mappings.

Figure 3-29 Adjusting the NIC speed.

r er Profile : Server	-1 Status OK	Serial Number (Logical) VCX0000000	Server UUID (Logical) 6f0975b4-843-4862-ae7b-b5b6				
			01001004-0040-4002-0070-0000	99cc5dd4			
ork Connections (Physica	l ports)						
		Custom	Port Speed	×			
vork Name		Select the custom port speed fo	r this network	MAC		Mapping	Delet
D-A-1				00-17-A4			×
D-A-2			•	00-17-A4 02			×
D-B-1				00-17-A4 04			
D-B-2				00-17-A4			×
ple Networks			OK Cancel	00-17-A4			
ple Networks				00-17-A4 0A			Х
	D-A-1 D-A-2 D-B-1 D-B-2 D-B-2	D-A-1 D-A-2 D-B-1 D-B-2 D-B-2 Dele Networks	ork Name Select the custom part speed for 0-A-1 Selected Speed 2.5 Gb 0-A-2 Selected Speed 2.5 Gb 0-B-1 Selected Speed 2.5 Gb 0-B-2 Selected Speed 2.5 Gb	D-A-1 Select the custom port speed for this network D-A-2 D-B-1 D-B-2 OK	Select the custom port speed for this network MAC 0-A-1 Select the custom port speed for this network 00-17-A 0-A-2 Selected Speed [2.5] Gb 00-17-A 0-B-1 O-B-2 00-17-A 00-17-A 0-B-2 OK Cancel 00-17-A 0-B-2 OK Cancel 00-17-A 0-B-1 OK Cancel 00-17-A	Select the custom port speed for this network MAC 0-A-1 Select the custom port speed for this network 0-17-A4-77-04 - 10 0-A-2 Select de Speed 2.5 Gb 0-017-A4-77-04 - 10 0-B-1 0-17-A4-77-04 - 10 00-17-A4-77-04 - 10 0-B-2 0-17-A4-77-04 - 10 00-17-A4-77-04 - 10 0-17-A4-77-04 - 10 00-17-A4-77-04 - 10 00-17-A4-77-04 - 10 0-17-A4-77-04 - 10 00-17-A4-77-04 - 10 00-17-A4-77-04 - 10 0-17-A4-77-04 - 10 00-17-A4-77-04 - 10 00-17-A4-77-04 - 10	MAC Mapping 0-A-1 Select the custom port speed for this network 0-4/-7

Figure 3-30 Configuring Multiple Networks.

ofile									
Profi Serve	e Name er-1	Etatua E			Former WID (Los)	inati	Þ	5	
erne	t Network Connection	Force same VLA	l mappings as S	Shared Upli					
		vNet Name		-	Server VLAN Id	Untagged ?	Delete		
Port	Network Name	PROD-C-1	_	Ок			X	oping	Delet
1	PROD-A-1	PROD-D-1	_	Ок	,			/t:1-a =>	X
	PROD-A-1	PROD-E-1	-	Ок	105		×	1	
2	PROD-A-2							/1:2-a => :2	\times
3	PROD-B-1							/:1-b =>	
4	PROD-B-2							1:2-b =>	×
5	Multiple Networks	Add Mappir	ng (Copy Fron	n ?			1:1-c =>	
6	Multiple Networks							1:2-c =>	X

Summary

This profile will present NIC 1 to network "PROD-A-1" & NIC 2 to network PROD-A-2 which are mapped to VLAN 101; frames for VLAN 101 will be passed to NICs 1&2 untagged. NICs 3&4 are connected to PROD-B-1 & PROD-B-2, which are mapped to VLAN 102; frames for VLAN 102 will be passed to NICs 3&4 untagged.

NICs 5&6 are connected to "Multiple Networks", PROD-C-1 – PROD-E-1 and PROD-C-2 – PROD-E-2, which are mapped to VLANs 103 – 104; frames will be passed to NICs 5&6 will be tagged.

If additional NICs are required, simply add the NICs to the server profile, this configuration will support up to 8 NICs without adding additional hardware. If the performance demands of a NIC change, the speed of a NIC could be adjusted up or down.

Result

VMware ESX Configuration Example

The following graphics show an ESX server with two Flex-10 NICs configured as 6 NICs. NICs speeds are also configured accordingly and connected to vSwitches, with port groups to present the VLANs accordingly.

When configuring the vSwitches for ESX, you will notice that 8 NICs actually already exist, however, NICs 7&8 (vmnic6 & vmnic7) are shown as down, as they were not configured within the VC profile. If we need an additional NIC, we simply add it within the Profile, set the speed and apply the profile, the server will need to be powered down to add or remove NICs. However, if the NICs were preprovisioned within the profile, VC firmware 2.30 added the ability to dynamically, change network connections and link speed, without first powering the server off. Once added/connected to a network, the NICs will be available to be assigned to a vSwitch.

Figure 3-31 Configuring ESX 4 vSwitch.

	Eax visionen with o rates configured.
🚰 Add Network Wizard	
Virtual Machines - Networ Virtual machines reach ne	rk Access etworks through uplink adapters attached to virtual switches.
Connection Type Network Access Connection Settings Summary	Select which virtual switch will handle the network traffic for this connection. You may also create a new virtual switch using the unclaimed network adapters listed below. Create a virtual switch Speed Network's wincics 7000 Full None wincics down None Use vSwitch0 Speed Network's winci 500 Full 192.168.1.192-192.168.1.254 Preview: Vitual Machine Port Group Physical Adapters Virtual Machine Network Physical Adapters virtual Machine Network with set of the se
Help	≤Back Next ≥ Cancel

ESX Vswitch with 6 NICs configured.

ESX 4 Networking Configuration Example

The following graphics show an ESX 4 server with two Flex-10 NICs configured as six NICs.

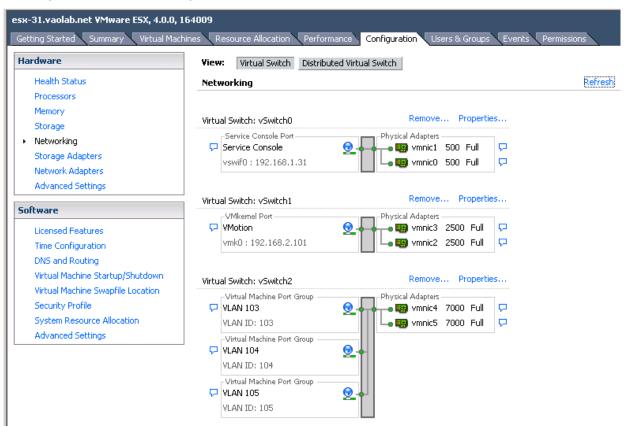


Figure 3-32 vSwitch Configuration the ESX Host with 6 NICs.

VMWARE ESX Host Networking configuration Example

When configuring the ESX virtual switch, add virtual networks for each VLAN this ESX host will support.

ts Network Adap	oters			
Configuration	Summary	VSwitch Properties		
vSwitch	56 Ports	Number of Ports:	56	
VLAN 103	Virtual Machine Virtual Machine	Default Policies		
QVLAN 105	Virtual Machine	Security		
		Promiscuous Mode:	Reject	
		MAC Address Changes:	Accept	
		Forged Transmits:	Accept	
		Traffic Shaping		
		Average Bandwidth:		
		Peak Bandwidth:		
		Burst Size:		
		Failover and Load Balancing		
		Load Balancing:	Port ID	
		Network Failure Detection:	Beacon Probing	
		Notify Switches:	Yes	
		Failback:	Yes	
		Active Adapters:	vmnic4, vmnic5	
		Standby Adapters:	None	
Add	Edit Remove	Unused Adapters:	None	
			Close	Help

Figure 3-33 Configuring the ESX vSwitch for Multiple Networks / VLANs.

Note: That vSwitch 3 has two NICs configured to, redundantly, support VLANs 103, 104 and 105.

Note: If implementing ESX 3.5 on Flex-10, first review VMWARE KB 1007982 and ensure Network Failure Detection is set to Beacon Probing.

Note: If implementing ESX 4.0 on Flex-10 ensure that ESX driver version 1.52 is installed, also ensure that NIC firmware 5.2.7 is also installed.

When configuring the guest NIC simply chose which VLAN this guest will reside on.

ardware Options Resources Add Remove Device St tardware Summary OC4 MB Adapter 1 Wideo card Video card Current a WMCI device Restricted Adapter 1 CIDENT Device MAC Add COUDVD Drive 1 Client Device MAC Add MAC Add MAC Add Courrent a MAC Add MAC Add Current a MAC Add MAC Add Current a MAC Add MAC Ad	ected ect at power on Type
Hard disk 1 Virtual Disk	ress natic C Manual Connection ork Label 102 103

Figure 3-34 Selection of the Virtual Network (VLAN) as required.

Appendix A: Scenario-based Cisco command line reference

All of the following commands in this appendix assume an unaltered factory default configuration before execution of the switch commands.

Scenario 1-1 & 1-2 – Cisco IOS command line configuration (Simple vNet with Active/Standby Uplinks)

Connect to the Cisco switch servicing the VC-Enet uplink ports and enter the following IOS 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
#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 # this is an access port, is this required?	#sp portf tr	Enable portfast on Port 1
#exit	#exit	Remove focus from 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 1a
 Scenario 1 (Part 1) - Cisco IOS command line configuration

Simple vNet with Active/Standby Uplinks and Link Aggregation 802.3ad (LACP) - Windows

Connect to the Cisco switch servicing the VC-Enet uplink ports and enter the following IOS 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
#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
#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 # this is an access port, is this required?	#sp portf tr	Enable portfast on Port 1
#exit	#ex	Remove focus from Port 1
#interface gigabitethernet0/2	#int gi0/2	Focus on Port 2
#switchport mode access	#sw mo ac	Set port 2 for Single VLAN mode
#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
#switchport access vlan 1	#sw ac vl 1	Allow Port 2 access to VLAN 1
#spanning-tree portfast trunk # this is an access port, is this required?	#sp portf tr	Enable portfast on Port 2
#exit	#exit	Remove focus from Port 2
#exit	#exit	Exit config mode
#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
#show vlan brief	#sh vl br	Display all VLANs
#show interface gigabitethernet0/2 status	#sh int gi1/0/2 status	Display the status of Port 2

 Table 1b
 Scenario 1 (Part 2) - Cisco IOS command line configuration

Command	Shortcut	Description
#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 1b Scenario 1 (Part 2) - Cisco IOS command line configuration

Scenario 1-3 – Cisco IOS command line configuration (Multiple Simple Networks Providing Redundancy and Link Aggregation 802.3ad (LACP))

Connect to the Cisco switch servicing the VC-Enet uplink ports and enter the following IOS 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
#interface gigabitethernet0/1	#int gi0/1	Focus on Port 1
#switchport trunk allowed vlan 101- 104	#sw tr ac vl 101-104	Configure port for VLANs 101 through 104
#switchport mode trunk	#sw mo tr	Enable trunking on Port 1
#channel-protocol lacp	#channel-p l	Configure port 20 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 gigabitethernet0/2	#int gi0/2	Focus on Port 2
#switchport trunk allowed vlan 101- 104	#sw tr ac vl 101-104	Configure Port 2 for VLANs 101 through 104
#switchport mode trunk	#sw mo tr	Enable trunking on Port 2
#channel-protocol lacp	#channel-p l	Configure Port 21 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
#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 4
 Scenario 1-3 - Cisco IOS command line configuration (802.1Q, 802.3ad)

Scenario 1-4 through 1-6 – Cisco IOS command line configuration (Multiple Simple Networks Providing Redundancy and Link Aggregation 802.3ad (LACP))

Connect to the Cisco switch servicing the VC-Enet uplink ports and enter the following IOS commands.

NOTE: If two switches are being used, issue the same commands on the second switch.

Command Shortcut Description >enable Privilege mode >en Configure via terminal #configure terminal #config t #interface gigabitethernet0/1 Focus on Port 1 #int qi0/1#switchport trunk allowed vlan 101- #sw tr al vl 101-104 Configure port for VLANs 101 104 through 104 #switchport mode trunk #sw mo tr Enable trunking on Port 1 #channel-protocol lacp #channel-p | Configure port 20 for 802.3ad LACP #channel-group 10 mode active #channel-g 10 mo ac Enable channel group 10 Enable portfast on Port 1 #spanning-tree portfast trunk #sp portf tr #exit #ex Remove focus from Port 1 Focus on Port 2 #interface gigabitethernet0/2 #int gi0/2#switchport trunk allowed vlan 101- #sw tr al vl 101-104 Configure port 2 for VLANs 101 104 through 104 #switchport mode trunk Enable trunking on Port 2 #sw mo tr #channel-protocol lacp #channel-p | Configure port 21 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 #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 #sh int port-channel 10 tr Show the port channel 10 trunk trunk configuration #copy running-config startup-config #cop ru st Save the running configuration to NVRAM. Otherwise, the changes (For permanent changes only) will be lost on the next reboot.

Table 4 Scenario 1-4 – 1-6 - Cisco IOS command line configuration (802.1Q, 802.3ad)

Scenario 1-7 – Cisco IOS command line configuration (Private Networks (Simple vNet))

Connect to the Cisco switch servicing the VC-Enet uplink ports and enter the following IOS 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
#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 # this is an access port, is this required?	#sp portf tr	Enable portfast on Port 1
#exit	#exit	Remove focus from Port 1
#exit	#exit	Exit config mode
#show vlan brief	#sh vl br	Display all VLANs
#show interface gigabitethernet0/1 status	#sh int gi1/0/1 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 7
 Scenario 7 - Cisco IOS command line configuration

Scenario 2-1– Cisco IOS command line configuration (VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS))

Connect to the Cisco switch servicing the VC-Enet uplink ports and enter the following IOS 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
#interface gigabitethernet0/1	#int gi1/0/1	Focus on Port 1
#switchport trunk allowed vlan 101- 104	#sw tr al vl 101-104	Configure port for VLANs 101 through 104
#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
#exit	#ex	Exit config mode
#show vlan brief	#sh vl br	Display all VLANs
#show interface gigabitethernet0/1 status	#sh int gi1/0/1 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 4 Scenario 1-4 – 1-6 - Cisco IOS command line configuration (802.1Q)

Scenario 2-2 & 2-3 – Cisco IOS command line configuration (VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS))

Connect to the Cisco switch servicing the VC-Enet uplink ports and enter the following IOS 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
#interface gigabitethernet0/1	#int gi1/0/1	Focus on Port 1
#switchport trunk allowed vlan 101- 105	#sw tr al vl 101-105	Configure port for VLANs 101 through 105
#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
#exit	#ex	Exit config mode
#show vlan brief	#sh vl br	Display all VLANs
#show interface gigabitethernet0/1 status	#sh int gi1/0/1 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 4 Scenario 1-4 – 1-6 - Cisco IOS command line configuration (802.1Q)

Scenario 2-4 – Cisco IOS command line configuration (VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS) and vNets)

Connect to the Cisco switch servicing the VC-Enet uplink ports and enter the following IOS 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
#interface gigabitethernet0/1	#int gi1/0/1	Focus on Port 1
#switchport trunk allowed vlan 101- 103	#sw tr al vl 101-103	Configure port for VLANs 101 through 103
#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
#interface gigabitethernet0/2	#int gi1/0/2	Focus on Port 2
#switchport trunk allowed vlan 2000-3000	#sw tr ac vl 2000-3000	Configure port for VLANs 2000 through 3000
#switchport mode trunk	#sw mo tr	Enable trunking on Port 2
#spanning-tree portfast trunk	#sp portf tr	Enable portfast on Port 2
#exit	#ex	Remove focus from Port 2
#exit	#ex	Exit config mode
#show vlan brief	#sh vl br	Display all VLANs
#show interface gigabitethernet0/1 status	#sh int gi1/0/1 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 9
 Scenario 2-3 & 2-3 Cisco IOS command line configuration (802.1Q, 802.3ad)

Scenario 3-1– Cisco IOS command line configuration (Multiple Simple Networks Providing Redundancy and Link Aggregation 802.3ad (LACP))

Connect to the Cisco switch servicing the VC-Enet uplink ports and enter the following IOS 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
#interface gigabitethernet0/1	#int gi0/1	Focus on Port 1
#switchport mode access	#sw mo ac	Set Port 1 for Single VLAN mode
#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
#switchport access vlan 1	#sw ac vl 1	Allow Port 1 access to VLAN 1
#spanning-tree portfast trunk # this is an access port, is this required?	#sp portf tr	Enable portfast on Port 1
#exit	#ex	Remove focus from Port 1
>enable	>en	Privilege mode
#configure terminal	#config t	Configure via terminal
#interface gigabitethernet0/2	#int gi0/2	Focus on Port 2
#switchport mode access	#sw mo ac	Set Port 2 for Single VLAN mode
#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
#switchport access vlan 1	#sw ac vl 1	Allow Port 2 access to VLAN 1
#spanning-tree portfast trunk # this is an access port, is this required?	#sp portf tr	Enable portfast on Port 2
#exit	#ex	Remove focus from Port 2
#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 10
 Scenario 3-1 - Cisco IOS command line configuration

Scenario 3-2 – Cisco IOS command line configuration (VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS))

Connect to the Cisco switch servicing the VC-Enet uplink ports and enter the following IOS 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
#interface gigabitethernet0/1	#int gi0/1	Focus on Port 1
#switchport trunk encapsulation dot1q	#sw tr enc dot	Configure Port 1 for tagged VLANs
#switchport trunk allowed vlan 101- 105	#sw tr ac vl 101-105	Configure port for VLANs 101 through 105
#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
#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 10
 Scenario 3-2
 Cisco IOS command line configuration (802.1Q)

Appendix B: Scenario-based ProCurve command line reference

Scenario 1-1 & 1-2 – ProCurve command line configuration (Simple vNet with Active/Standby Uplinks)

Connect to the ProCurve switch servicing the VC-Enet 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	#write mem	Save the running configuration to NVRAM. Otherwise, the changes
(For permanent changes only)		will be lost on the next reboot.

 Table 1a
 Scenario 1-1 and 1-2 (Part 1) - ProCurve command line configuration (simple network)

Simple vNet with Active/Standby Uplinks and Link Aggregation 802.3ad (LACP)

Connect to the ProCurve switch servicing the VC-Enet 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 1 untagged [Ethernet] trk1	#vlan 1 untag trk1	Allow VLAN 1 on Port 1 & 2 , and set to untagged mode
#spanning-tree ethernet trk1 admin- edge-port	#span e trk1 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 vlan ports trk1 detail	# show vlan ports trk1 detail	Displays the VLAN detail for Trunk1
#show vlan 1	#sh vlan 1	Display VLAN 1 port information
#write memory	#write mem	Save the running configuration to NVRAM. Otherwise, the changes will be lost on the next reboot.
(For permanent changes only)		will be lost on the flext reboot.

 Table 1b
 Scenario 1-1 and 1-2 (Part 2) - ProCurve command line configuration (simple network)

Scenario 1-3 – ProCurve command line configuration (Multiple Simple Networks Providing Redundancy and Link Aggregation 802.3ad (LACP))

Connect to the ProCurve switch servicing the VC-Enet 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 untagged trk1	#vlan 101 untag trk1	Allow VLAN 101 on Ports 1 and 2 and configure Ports 1 and 2 for untagged VLAN mode
#vlan 102 tagged trk1	#vlan 102 tag trk1	Allow VLAN 101 on Ports 1 and 2 and configure Ports 1 and 2 for untagged VLAN mode
#vlan 103 tagged trk1	#vlan 103 tag trk1	Allow VLAN 101 on Ports 1 and 2 and configure Ports 1 and 2 for untagged VLAN mode
#vlan 104 tagged trk1	#vlan 104 tag trk1	Allow VLAN 101 on Ports 1 and 2 and configure Ports 1 and 2 for untagged VLAN mode
#spanning-tree ethernet trk1 admin- edge-port	#span e trk1 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 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 brief1-2	#sh int br1-2	Show Port 1-2 status
#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 3
 Scenario 1-3 - ProCurve command line configuration (untagged VLANs)

Scenario 1-4 through 1-6 – ProCurve command line configuration (Multiple Simple Networks Providing Redundancy and Link Aggregation 802.3ad (LACP))

Connect to the ProCurve switch servicing the VC-Enet 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 2 and configure Ports 1 and 2 for untagged VLAN mode
#vlan 102 tagged trk1	#vlan 102 tag trk1	Allow VLAN 101 on Ports 1 and 2 and configure Ports 1 and 2 for untagged VLAN mode
#vlan 103 tagged trk1	#vlan 103 tag trk1	Allow VLAN 101 on Ports 1 and 2 and configure Ports 1 and 2 for untagged VLAN mode
#vlan 104 tagged trk1	#vlan 104 tag trk1	Allow VLAN 101 on Ports 1 and 2 and configure Ports 1 and 2 for untagged VLAN mode
#spanning-tree ethernet trk1 admin- edge-port	#span e trk1 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 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 brief1-2	#sh int br1-2	Show Port 1-2 status
#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 3
 Scenario 1-3 - ProCurve command line configuration (untagged VLANs)

Scenario 1-7 – ProCurve command line configuration (Simple vNet with Active/Standby Uplinks)

Connect to the ProCurve switch servicing the VC-Enet 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 5
 Scenario 1-7 - ProCurve command line configuration (simple network)

Scenario 2-1– ProCurve command line configuration (VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS))

Connect to the ProCurve switch servicing the VC-Enet 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 101 tagged 1	#vlan 101 tag 1	Allow VLAN 101 on Port 1 and set Port 1 to tagged mode
#vlan 102 tagged 1	#vlan 102 tag 1	Add VLAN 102 on Port 1 and set Port 1 to tagged mode
#vlan 103 tagged 1	#vlan 103 tag 1	Allow VLAN 103 on Port 1 and set Port 1 to tagged mode
#vlan 104 tagged 1	#vlan 104 tag 1	Add VLAN 104 on Port 1 and set Port 1 to tagged mode
#vlan 1	#vlan 1	Set focus to VLAN 1
#no untagged 1	#no untagged 1	Disables VLAN 1 on Ports 1
#exit	#exit	Exit VLAN 1
#show vlan ports 1 detail	# show vlan ports 1 detail	Displays the VLAN detail for Port 1
#show interface brief 1	#sh int br 1	Display the status of Ports 1
#write memory	#write mem	Save the running configuration to NVRAM. Otherwise, the changes will be lost on the next reboot.
(For permanent changes only)		

 Table 6
 Scenarios 2-1 - ProCurve command line configuration (802.1Q)

Scenario 2-2 & 2-3 – ProCurve command line configuration (VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS))

Connect to the ProCurve switch servicing the VC-Enet 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 101 tagged 1	#vlan 101 tag 1	Allow VLAN 101 on Port 1 and set Port 1 to tagged mode
#vlan 102 tagged 1	#vlan 102 tag 1	Add VLAN 102 on Port 1 and set Port 1 to tagged mode
#vlan 103 tagged 1	#vlan 103 tag 1	Allow VLAN 103 on Port 1 and set Port 1 to tagged mode
#vlan 104 tagged 1	#vlan 104 tag 1	Add VLAN 104 on Port 1 and set Port 1 to tagged mode
#vlan 105 tagged 1	#vlan 105 tag 1	Add VLAN 105 on Port 1 and set Port 1 to tagged mode
#vlan 1	#vlan 1	Set focus to VLAN 1
#no untagged 1	#no untagged 1	Disables VLAN 1 on Ports 1
#exit	#exit	Exit VLAN 1
#show vlan ports 1 detail	# show vlan ports 1 detail	Displays the VLAN detail for Port 1
#show interface brief 1	#sh int br 1	Display the status of Ports 1
#write memory	#write mem	Save the running configuration to NVRAM. Otherwise, the changes
(For permanent changes only)		will be lost on the next reboot.

 Table 7
 Scenarios 2-2 through 2-3 - ProCurve command line configuration (802.1Q)

Scenario 2-4 – ProCurve command line configuration (VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS) and vNets)

Connect to the ProCurve switch servicing the VC-Enet 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 101 tagged 1	#vlan 101 tag 1	Allow VLAN 101 on Port 1 and set Port 1 to tagged mode
#vlan 102 tagged 1	#vlan 102 tag 1	Add VLAN 102 on Port 1 and set Port 1 to tagged mode
#vlan 103 tagged 1	#vlan 103 tag 1	Allow VLAN 103 on Port 1 and set Port 1 to tagged mode
Command	Shortcut	Description
#vlan 2042 tagged 2	#vlan 2000 tag 2	Add VLAN 2042 on Port 2 and set Port 1 to tagged mode
#vlan 2042 tagged 2	#vlan 2042 tag 2	Add VLAN 2042 on Port 2 and set Port 1 to tagged mode
#vlan 2309 tagged 2	#vlan 2309 tag 2	Allow VLAN 2309 on Port 2 and set Port 2 to tagged mode
#vlan 2740 tagged 2	#vlan 2740 tag 2	Add VLAN 2740 on Port 2 and set Port 2 to tagged mode
#vlan 2936 tagged 2	#vlan 2936 tag 2	Allow VLAN 2936 on Port 2 and set Port 2 to tagged mode
#vlan 1	#vlan 1	Set focus to VLAN 1
#no untagged 1-2	#no untagged 1-2	Disables VLAN 1 on Ports 1 & 2
#exit	#exit	Exit VLAN 1
#show vlan ports 1 detail	# show vlan ports 1 detail	Displays the VLAN detail for Port 1
#show vlan ports 2 detail	# show vlan ports 2 detail	Displays the VLAN detail for Port 2
#show interface brief 1-2	#sh int br 1-2	Display the status of Ports 1 & 2
#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 8
 Scenario 2-4 ProCurve command line configuration (802.1Q)

Scenario 3-1– ProCurve command line configuration (Multiple Simple Networks Providing Redundancy and Link Aggregation 802.3ad (LACP))

Connect to the ProCurve switch servicing the VC-Enet 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 1 untagged [Ethernet] trk1	#vlan 1 untag trk1	Allow VLAN 1 on Port 1 & 2 , and set to untagged mode
#spanning-tree ethernet trk1 admin- edge-port	#span e trk1 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 vlan ports trk1 detail	# show vlan ports trk1 detail	Displays the VLAN detail for Trunk 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
 Scenario 3-1 - ProCurve command line configuration (untagged VLANs)

Scenario 3-2 – ProCurve command line configuration (VLAN Tagging (802.1Q) with Multiple Shared Uplink Sets (SUS))

Connect to the ProCurve switch servicing the VC-Enet 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 101 tagged 1	#vlan 101 tag 1	Allow VLAN 101 on Port 1 and set Port 1 to tagged mode
#vlan 102 tagged 1	#vlan 102 tag 1	Add VLAN 102 on Port 1 and set Port 1 to tagged mode
#vlan 103 tagged 1	#vlan 103 tag 1	Allow VLAN 103 on Port 1 and set Port 1 to tagged mode
#vlan 104 tagged 1	#vlan 104 tag 1	Add VLAN 104 on Port 1 and set Port 1 to tagged mode
#vlan 105 tagged 1	#vlan 105 tag 1	Add VLAN 105 on Port 1 and set Port 1 to tagged mode
#vlan 1	#vlan 1	Set focus to VLAN 1
#no untagged 1	#no untagged 1	Disables VLAN 1 on Ports 1
#exit	#exit	Exit VLAN 1
#show vlan ports 1 detail	# show vlan ports 1 detail	Displays the VLAN detail for Port 1
#show interface brief 1	#sh int br 1	Display the status of Ports 1
#write memory	#write mem	Save the running configuration to NVRAM. Otherwise, the changes
(For permanent changes only)		will be lost on the next reboot.

 Table 9
 Scenarios 3-2 - ProCurve command line configuration (802.1Q)

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 oof. 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	
IEEE802.1Q	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.	
IEEE802.3ad	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; LAM on 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 Aggregation Protocol (PAgP)*	A Cisco proprietary protocol aids in the automatic creation of Fast EtherChannel links. PAgP packets are sent between Fast EtherChannel-capable ports to negotiate the forming of a channel.	
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.	

Smart Link	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.

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.

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

#Change Administrator set user Administrator password=Administrator

Set Advanced Ethernet Settings to "Map VLAN Tags" and set "Force server connections" to disabled

set enet-vlan vlantagcontrol=map sharedservervlanid=false

Set Advanced Ethernet Settings to "Tunnel VLAN Tags" set enet-vlan vlantagcontrol=tunnel

Set Advanced Ethernet Settings to a Preferred speed of 500Mb and a Max Speed of 2500Mb

set enet-vlan PrefSpeedType=Custom PrefSpeed=500 MaxSpeedType=Custom MaxSpeed=2500 #Add additional User to VCM, creates User jimbo add user jimbo password=password privileges=domain,network,server,storage

Creating Shared Uplink Sets

#Create Shared Uplink Set "Prod-Net" and configure a single uplink on VC module 1, port 2 add uplinkset Prod-Net add uplinkport enc0:1:2 Uplinkset=Prod-Net speed=auto #Add an additional uplink on port 3 to Prod-Net add uplinkport enc0:1:3 Uplinkset=Prod-Net speed=auto

#Create Shared Uplink Set "Prod-Net" and configure multiple uplinks on VC Module 1, Ports 1, 2 and 3

add uplinkset Prod-Net add uplinkport enc0:1:1 Uplinkset=Prod-Net speed=auto add uplinkport enc0:1:2 Uplinkset=Prod-Net speed=auto add uplinkport enc0:1:3 Uplinkset=Prod-Net speed=auto

Create Networks PROD-A through PROD-D, supporting VLANs 101 through 104 on Shared Uplink Set "Prod-Net"

add network VLAN_10 uplinkset=Prod-Net VLanID=10 add network VLAN_20 uplinkset=Prod-Net VLanID=20 # (optionally) Set network VLAN_20 as a "Private Network" set network VLAN20 Private=Enabled

Creating vNets

#Create vNet "Prod-Net" and configure uplinks add Network Prod-Net add uplinkport enc0:1:3 Network=Prod-Net speed=auto #Optionally enable the vNet as a Private Network set network Prod-Net Private=Enabled

Server Profiles

#Create Server Profile App-1, apply this profile to Server Slot 1 and configure NIC 1 to Multiple Networks VLAN_10 and VLAN_20 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_10 VLanId=10 add server-port-map App-1:1 VLAN_20 VLanId=20 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_10 Uplinkset=Prod-Net
add server-port-map App-1:1 VLAN_20 Uplinkset=Prod-Net

Create Server Profile App-1 – Both NICs are configured on network VLAN_20 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_20 set enet-connection App-1 2 Network=VLAN_20 assign profile App-1 enc0:2

Create Server Profile ESX-1 – Both NICs are configured on Both networks VLAN_10 and VLAN_20 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_10 VLanId=10 add server-port-map ESX-1:1 VLAN_20 VLanId=20 add server-port-map ESX-1:2 VLAN_10 VLanId=10 add server-port-map ESX-1:2 VLAN_20 VLanId=20 assign profile ESX-1 enc0:1 # Create Server Profile Server-1 with Flex-10 NICs configured for specific speeds

add profile Server-1 -nodefaultenetconn

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=500

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

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-105-2 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