Discover2014

It's time to build a better enterprise.
Together.

TB3306 - Tips & tricks on building VMware vSphere 5.5 with BladeSystem, Virtual Connect, & HP 3PAR StoreServ

Yury Magalif, vExpert 2014, VCP

Principal Architect – Cloud Computing

okzebra@gmail.com
yury.magalif@cdillc.com

Thank you!

- 6th Year
- Survey Ratings appreciated!
- Criticisms
- Too long
  - Reduced content
- No proof numbers/charts
  - Only 60 min – focus on practical
  - Take with a grain of salt – Use Scientific Method

Twitter Experiment:

- Please live Tweet points you find interesting, using the following hashtag:

#HPtrick

- Look for suggested tricks in the slides.
- Use this hashtag to chat with me on Twitter:

June 16, 2014 -- Monday, 2-3 pm EST

Agenda

I. Design decisions
II. Firmware Updates
III. Virtual Connect
IV. HP 3PAR StoreServ
V. VMware ESX/ESXi 5.5 (vSphere)
VI. Summary
VII. Question & Answer

I. Design Decisions

- Goal: Virtualize your Infrastructure with VMware
- Why VMware?
- Industry leader – 54% of the market per IDC

1. Why Blades & Which blades?

- Why NOT Blades – no longer a question -- Michael Jordan
- Run HP Proliant Sizer for VMware & VMware Capacity Planner analysis
- Considerations
  - VMware servers used to be beefy, for extra I/O options.
  - Now -- Flex-10/FlexFabric, can have many NICS in limited space
  - Sweet spot at 192 GB of RAM per blade
  - WS460c Gen8 Workstation Blade – 8 Nvidia GPUs, local SSDs, supports Teradici Apex 2800 mezzanine with VMware Horizon View 5.2 for Virtual Desktop GPU & PCoIP offload – can do AutoCAD
  - **#HPtrick** Use hot-swap SSD local drives for VMware Host Cache - even for boot-from-SAN blades

2. Which storage and how much?

- Choose on BOTH capacity (TB) and performance (IOPS)
- HP StorEasy (NAS & iSCSI)
  - For really, really small business
- HP MSA array (FC, SAS or iSCSI)
  - Departmental, decent small business, some midsize business
  - You will outgrow the MSA in a couple of years
  - StoreVirtual 4000 has more features

Which storage and how much, continued

- HP StoreVirtual 4000 (iSCSI and FC)
  - Mid-size to large enterprises. A very popular iSCSI/FC solution with unique software features (HA and DR in the box, consolidate local storage with VSA, VMware VAAI integration - plugin).
- 3PAR StoreServ – default option, like the EVA used to be.
  - Cheaper than P9000/XP,
  - Can direct connect to VC FlexFabric,
  - Can upgrade from EVA using “Peer Motion” technology.
- HP XP array (FC & iSCSI)
  - Super reliable, redundant, but more expensive than 3PAR.

3. iSCSI or Fibre Channel (FC)?

- iSCSI taking over the market
- Cheaper than FC, but NOT cheap
- Easier to setup for SAN newbies
- Can use some existing infrastructure
- Fast, with 10Gbit Ethernet
- Start with iSCSI, unless brokerage house or already have FC

4. Boot from SAN or local?

- Advantages
  - Easiest rip-and-replace for broken blades
  - Can do cloning, snapshots & replication of the OS drive on the array – use as imaging tool.
  - Host Cache
- Disadvantages
  - Server provisioning more complex
- Boot from SAN recommended, with SSD local drives for cache

5.1 Blade Interconnect – Virtual Connect, Comware, Procurve, Cisco OR Brocade?

- Cisco & Brocade's "dumb down" gateway modes are inferior to VC FC WWN replacement and Profiles
- Cisco's 3120X – 10Gbit Uplinks, Layer 3; HP 6125 line (Comware) – various 1/10 Gb, Layer 2/3, 6125XLG– 10/40Gbit supports FCoE, HP 6120XG (Procurve) – Layer 2, 10 Gbit; HP 1:10Gb – Layer 2/3. All have many more Ethernet features than VC Ethernet modules
- VC Ethernet Flex-10 module can program the Flex-10 & FlexFabric adapters to show multiple Physical Functions to the server as standalone PCI devices, like virtual NICs/HBAs.

5.2 Blade Interconnect – Virtual Connect, Procurve, Cisco OR Brocade?

- FlexFabric 10Gb/24 module is unique with FCoE, dual personality FC/Ethernet ports
- FlexFabric-20/40 F8 – 20Gb down, 40Gb up
- Flex-10/10D – if you do 10Gbit iSCSI to your storage & 10Gbit dual-hop FCoE & 10Gbit regular
- **#Hptrick** To get multi-hop FCoE w/Cisco Nexus 5K switch & HP Blades, use Cisco FEX for HP, model B22HP.

6.1 Recommendation -- Virtual Connect or Switches?

- Who do you want to manage VC FC and Eth modules? If Server Admin, get VC
- If you got VC Eth, get VC FC. Do not mix VC with switches.
- Do you need MAC address and WWN replacement? You need VC.

6.2 Recommendation -- Virtual Connect or Switches?

- Do you need to have many virtual, speed flexible NICs? Division of Physical adapter into many pieces? Get VC Flex-10/20
- Go with FlexFabric 20/40 F8, 10Gb/24 port or Flex-10/10D , unless price is a problem – they are the future
- Do you need Layer 3 routing, VSANs, centralized switch management? Get FC/Eth switches.

7. VMware standard vSwitches, Distributed vSwitch, Nexus 1000v, HP FlexFabric Virtual Switch 5900v, IBM DVS 5000v?

- What's the licensing cost? Standard vSwitch is least expensive, then DVS, then Nexus (most expensive for the Advanced edition, but Essential Edition is free)
- Do I have HP 5900AF Top-of-rack (ToR) access layer physical switch? Get HP FlexFabric Virtual Switch 5900v
- Do I have a Cisco department that refuses to let VM admins manage the network? Get Nexus for Data, DVS for management.
- Do I want more redundancy and less configuration for my ESX networking? Get DVS.
- IBM has DVS 5000v – almost the same as Nexus – no use

II. Firmware updates

- Goal: Fulfill Virtual Connect firmware prerequisites

Check firmware dependencies in HP SPOCK streams

Virtualization

- » SVSP
- » MS Virtual Server 2005
- » HP Virtual Machines

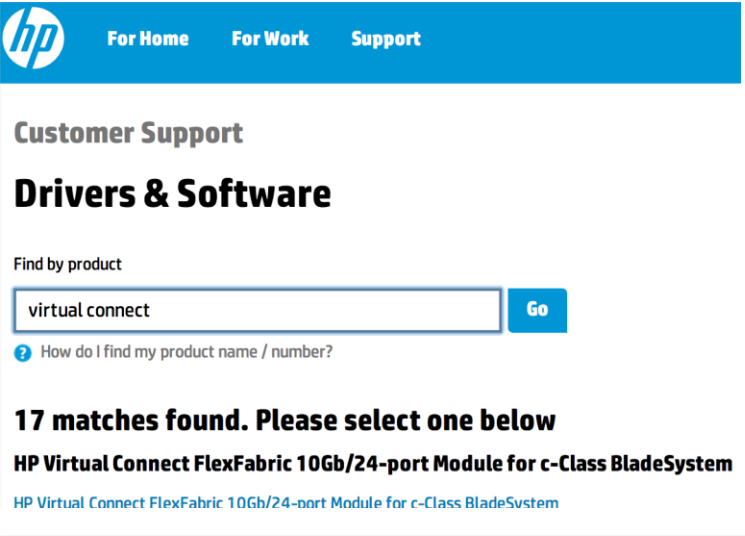
Other Hardware

- » 3PAR
- » Converged Application Solutions
- » Disk Encryption
- » External Storage
- » Host Bus Adapters
- » iSCSI / FCoE / FCIP / DM (HP)
- » JBOD
- » Mainframe Connectivity
- » Nearline Storage
- » Storage Servers (NAS)
- » StoreVirtual / LeftHand
- » Switches
- » Virtual Connect

- » Need HP passport
- » http://h20272.www2.hp.com/
- » Look for Switches and VC link on bottom left
- » Get FC, FCoE and FICON PDF files
- » Look for VC sections

HP VC Flex Fabric 10Gb/24-Port Module for c-Class BladeSystem (571956-B21)	• VC-FF firmware 4.20 is supported with NX-OS 5.2(8a), 5.2(8b), 5.2(8c), and 5.2(8d) in an HP SAN • VC-FF firmware 4.10 is supported with NX-OS 5.2(8a), 5.2(8b), 5.2(8c), and 5.2(8d) in an HP SAN • VC-FF firmware 4.01, 3.75 is supported with NX-OS 5.2(6a), 5.2(6b), 5.2(8), 5.2(8a), 5.2(8b), 5.2(8c • VC-FF firmware 3.51, 3.60, 3.70 supported with NX-OS 5.2(2d), 5.2(6a), 5.2(6b), 5.2(8), 5.2(8a), 5.2 SAN. • VC-FF firmware 3.30 supported with NX-OS 5.2(2d) in an HP SAN. • The following C-series FC switches are supported: MDS 9222i, SN8000C, MDS 9513, MDS 9509, M

Check release notes for latest VC firmware



Firmware - Blade Infrastructure

Description	Current version
* RECOMMENDED * HP BladeSystem c-Class Virtual Connect Firmware, Ethernet plus 4/8Gb 20-port and 8Gb 24-port FC Edition (American, International)	4.20 11 Apr 2014

» Release Notes for v4.20

» http://ow.ly/xxWmW

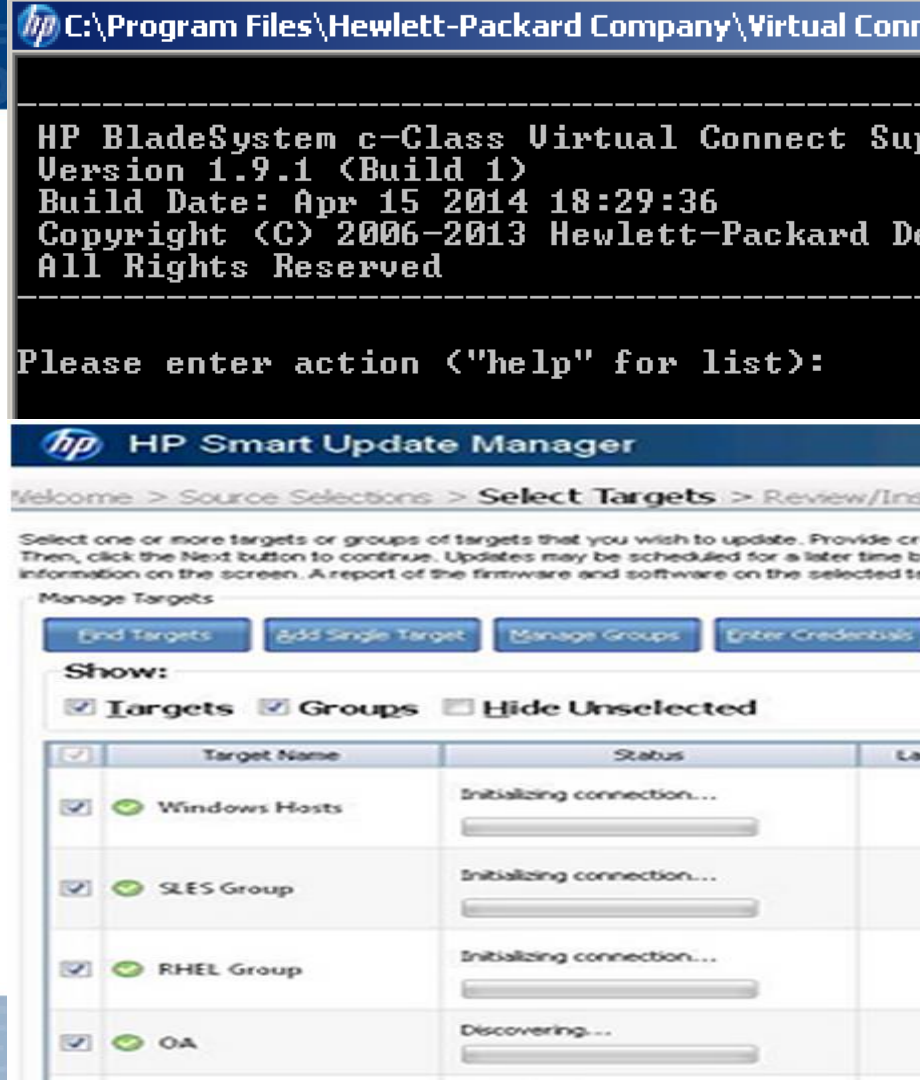
#HPtrick If there is a conflict between HP SPOCK streams and Release Notes, follow HP SPOCK

Order of Upgrade

1. External Switches
2. Onboard Administrator
3. iLOs on blades
4. Fibre card
5. NIC
6. Virtual Connect modules

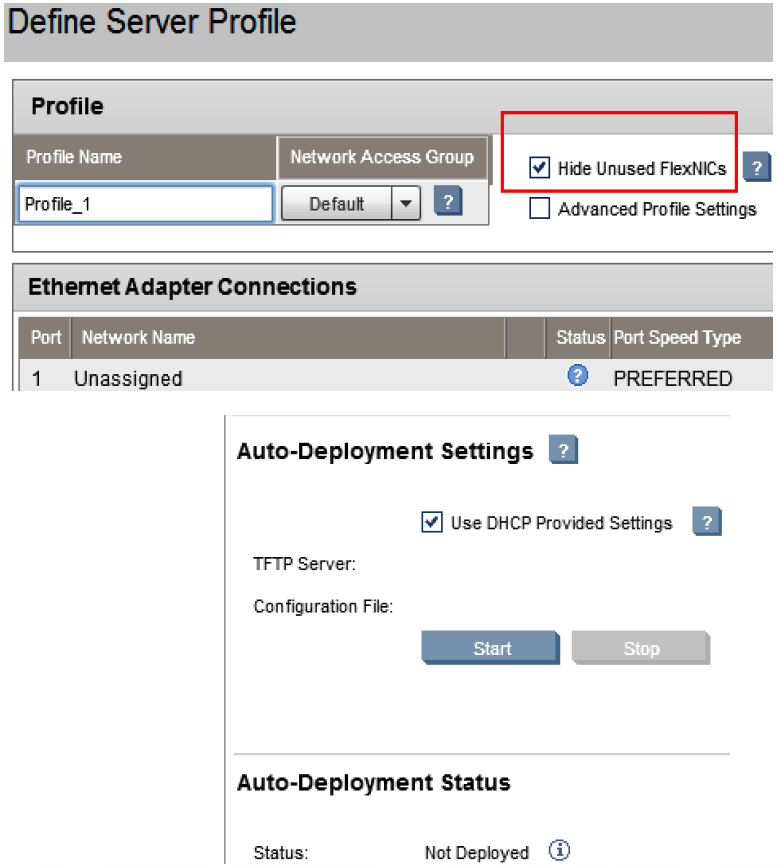
How to Upgrade

- Service Pack for ProLiant 2014.02.0(B) with HP Smart Update Manager (SUM) 6.3.1 – firmware & drivers all-in-one:
  - **http://ow.ly/xy7ss**
- Virtual Connect Support Utility (VCSU) v1.9.1
  - **http://ow.ly/xy6AY**
- Use “HP BladeSystem ProLiant Firmware Management Best Practices Implementer Guide”, get it here
  - **http://ow.ly/xy7J4**



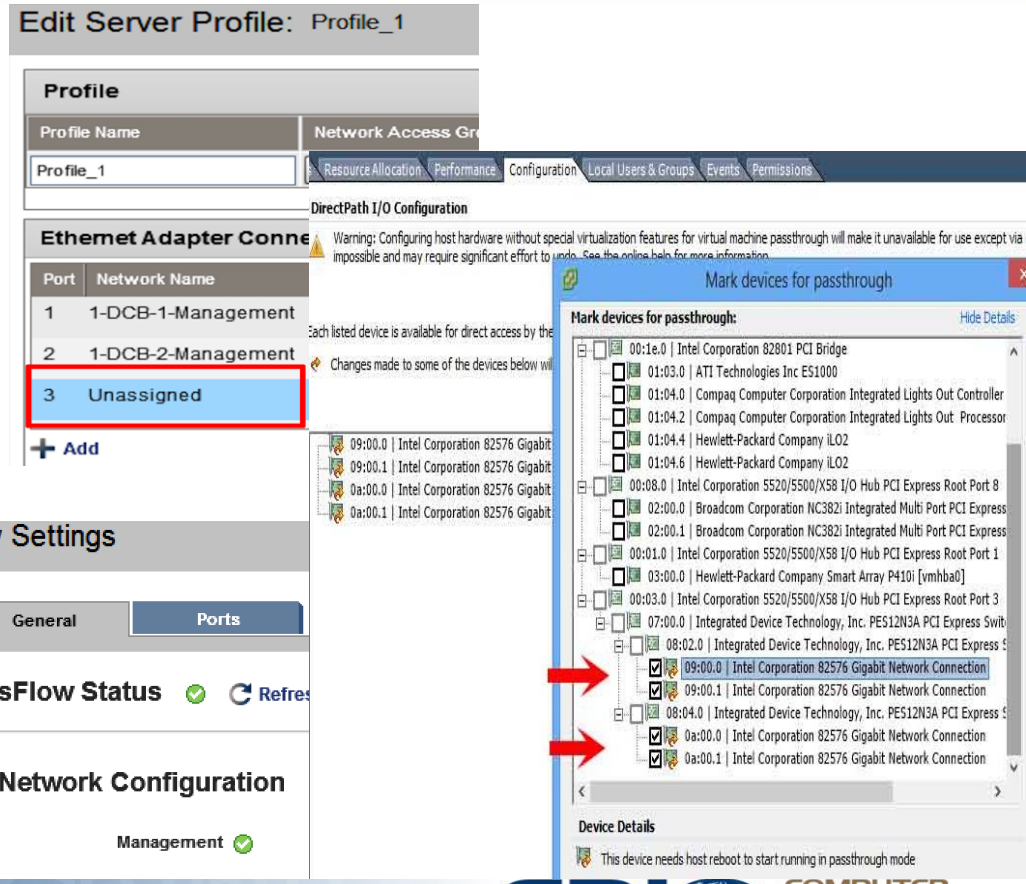
Firmware 4.10 and 4.20 – New Features 01

- Hide unused FlexNICs.
  - Requires adapter firmware from SPP 2013.02.0 or later
- Auto-deployment feature, which allows for the configuration of a VC domain from a centralized location using DHCP & TFTP

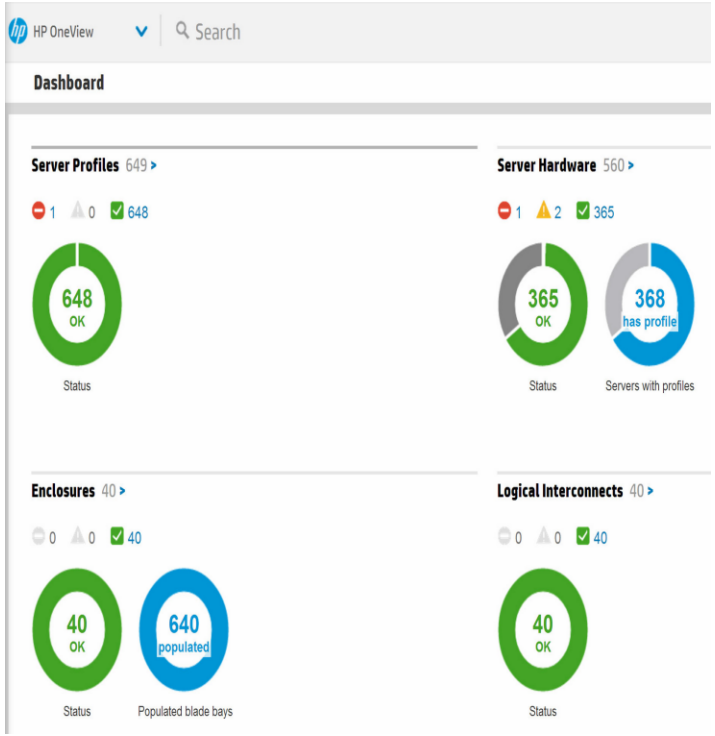


Firmware 4.10 and 4.20 – New Features 02

- For non-HP DACs & FC transceivers, the port status "Non-HP" is "Uncertified."
- Enable SR-IOV for Gen8 servers & LOMs for the HP ProLiant BL620c & BL680c G7
  - VMware KB 2038739 – Vmotion, DRS, HA – NOT SUPPORTED!
- sFlow - monitor and analyze network traffic flow in the datacenter.



HP OneView 1.05 – the future of VCM, VCEM, SIM



- Template based
- Not all VC features supported, but most important ones are
- vCenter integration
- MS SystemCenter Integration – in the future
- To try OneView – better on non-Prod – takes over Virtual Connect
  - Backup VC config before trying
- To come back to regular Virt. Conn. Managr
  - Delete enclosure in OneView
  - Power off servers
  - Run “clear vcmode” from OA CLI
  - Remove/reseat VC modules

III. Virtual Connect Design & Configuration for VMware

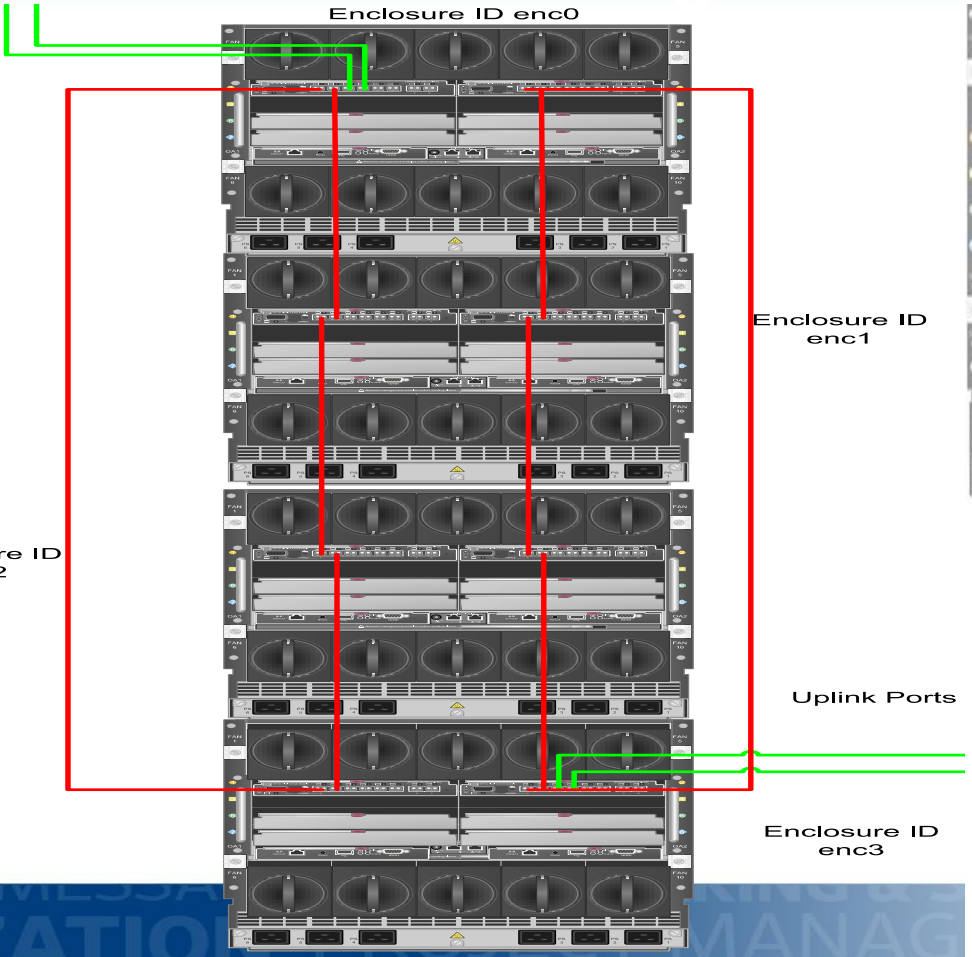
- Goals: Minimize management, get best HA, redundancy & load balancing

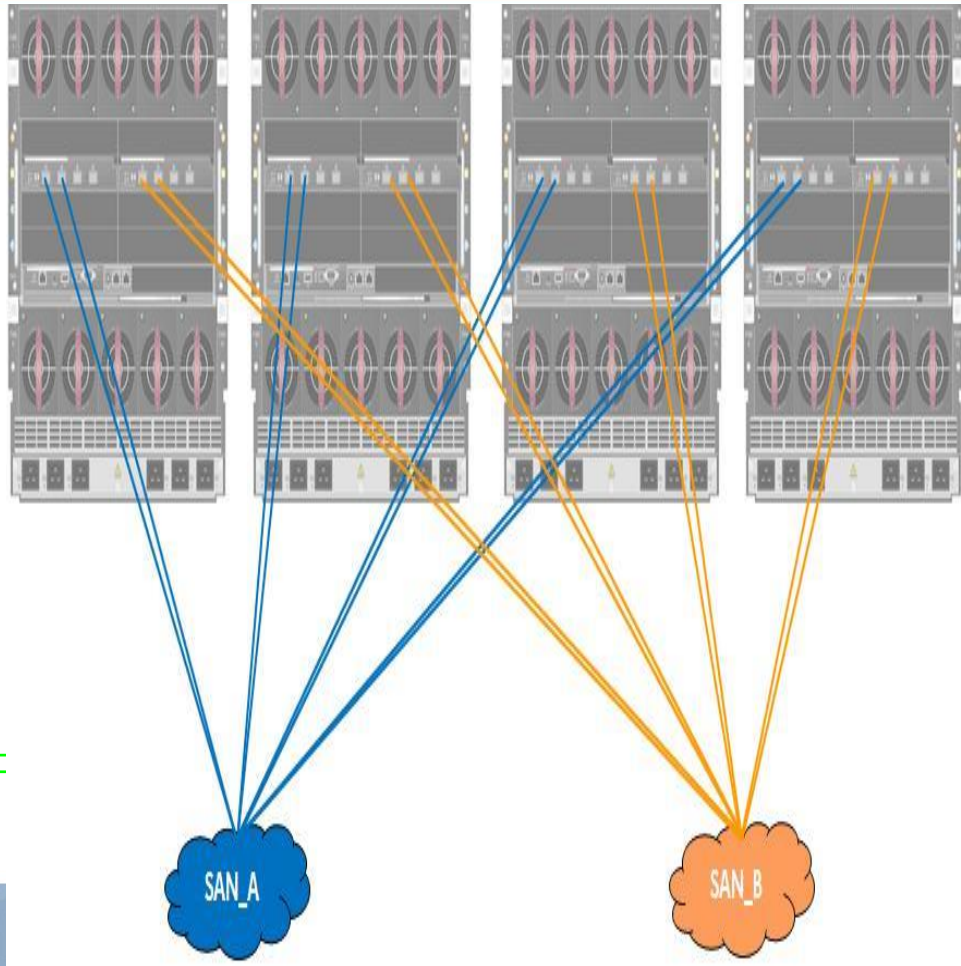
1. General design tips

- If you have multiple enclosures with VC modules, import the 2nd, 3rd & 4th enclosure into the 1st enclosure's VC domain
- Use HP Default generated values for VC Assigned MAC addresses, WWNs & Serial #s.
  - If you have multiple enclosures with 1 domain, then use the 1st range (best). If you have multiple enclosures with 1 domain per enclosure, use a different range for each enclosure (HP defined 2, 3, 4 etc.)
- Name VCnets, Shares Uplink Sets, VC fabrics, Profiles by:
  - Type, Enclosure, Bay, Where Connecting, Blade model
  - Ex. vcnet_enc01bay02_pch02, vcfab_enc01bay03_vsan3, vcnet_enc01bay02_vlan20, vcprof_enc01bay01_bl480c

4 encl. 1 VC Domain Ethernet Stacking

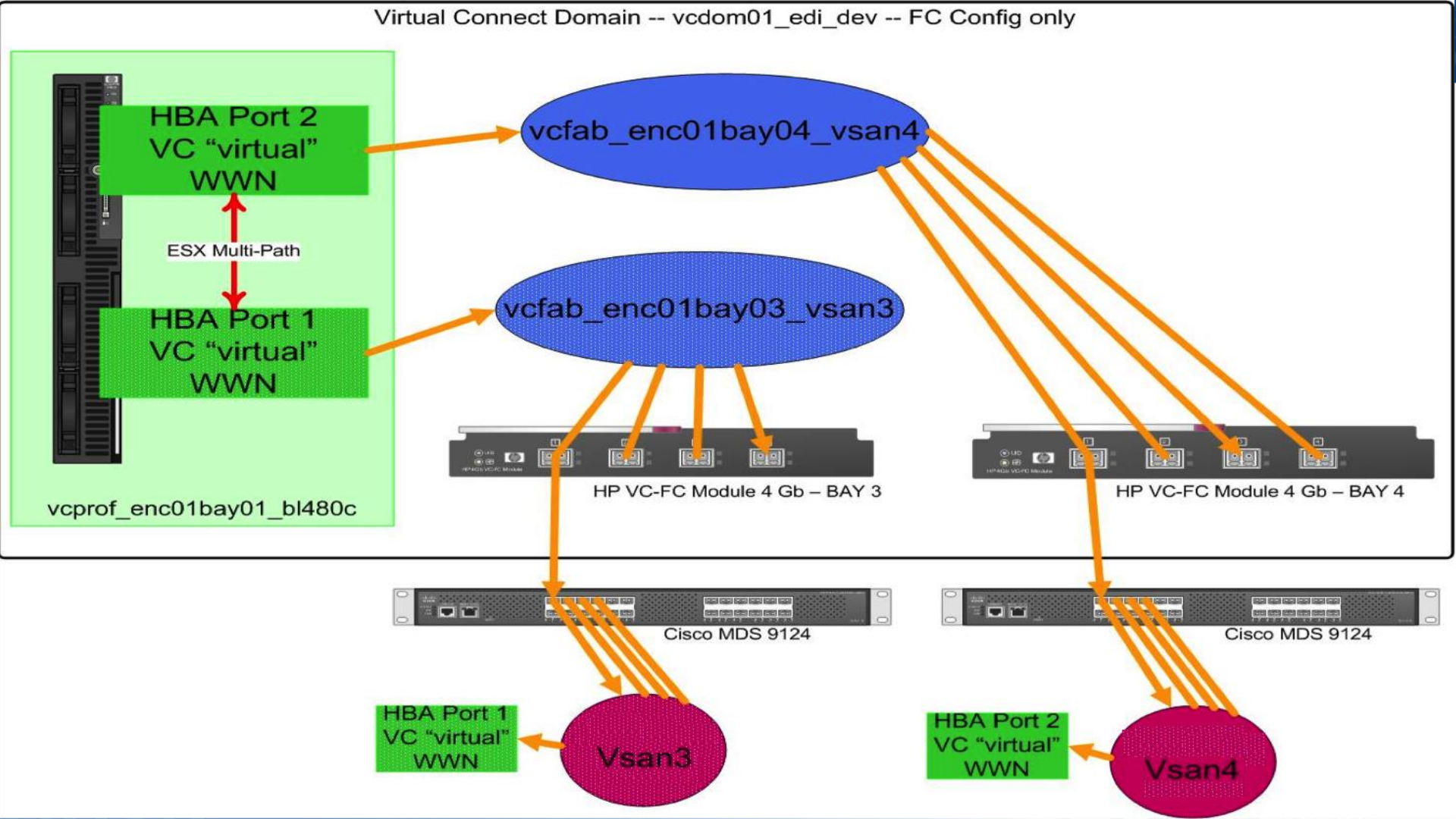
No FC Stacking



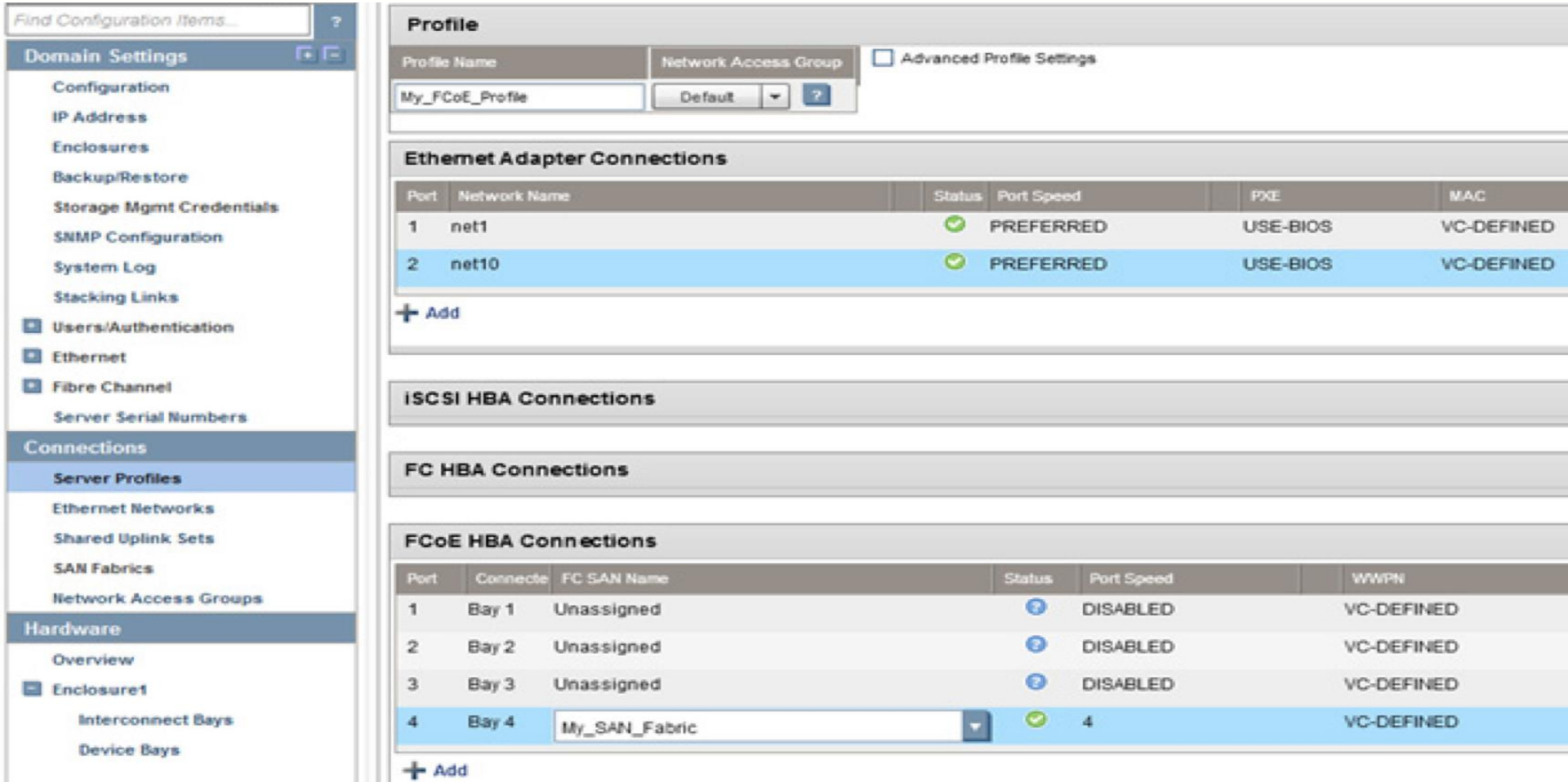


2. FC Design

- 1 VC Fabric per VC FC module/bay with 4 external connections grouped
  - For 8 Gbit 24-port, can group 8 connections, or leave some for dedicated backup network
- Each module/bay's VC fabric is plugged into a separate SAN switch, for 2 redundant SAN fabrics
- Add bandwidth by plugging in cables.
- For FCoE, can do up to 6 FlexNics and 2 FlexHBAs for integrated card (1 per chip), more for added mezzanine cards
- Can now do northbound FCoE uplinks OR separate FC connections and Ethernet

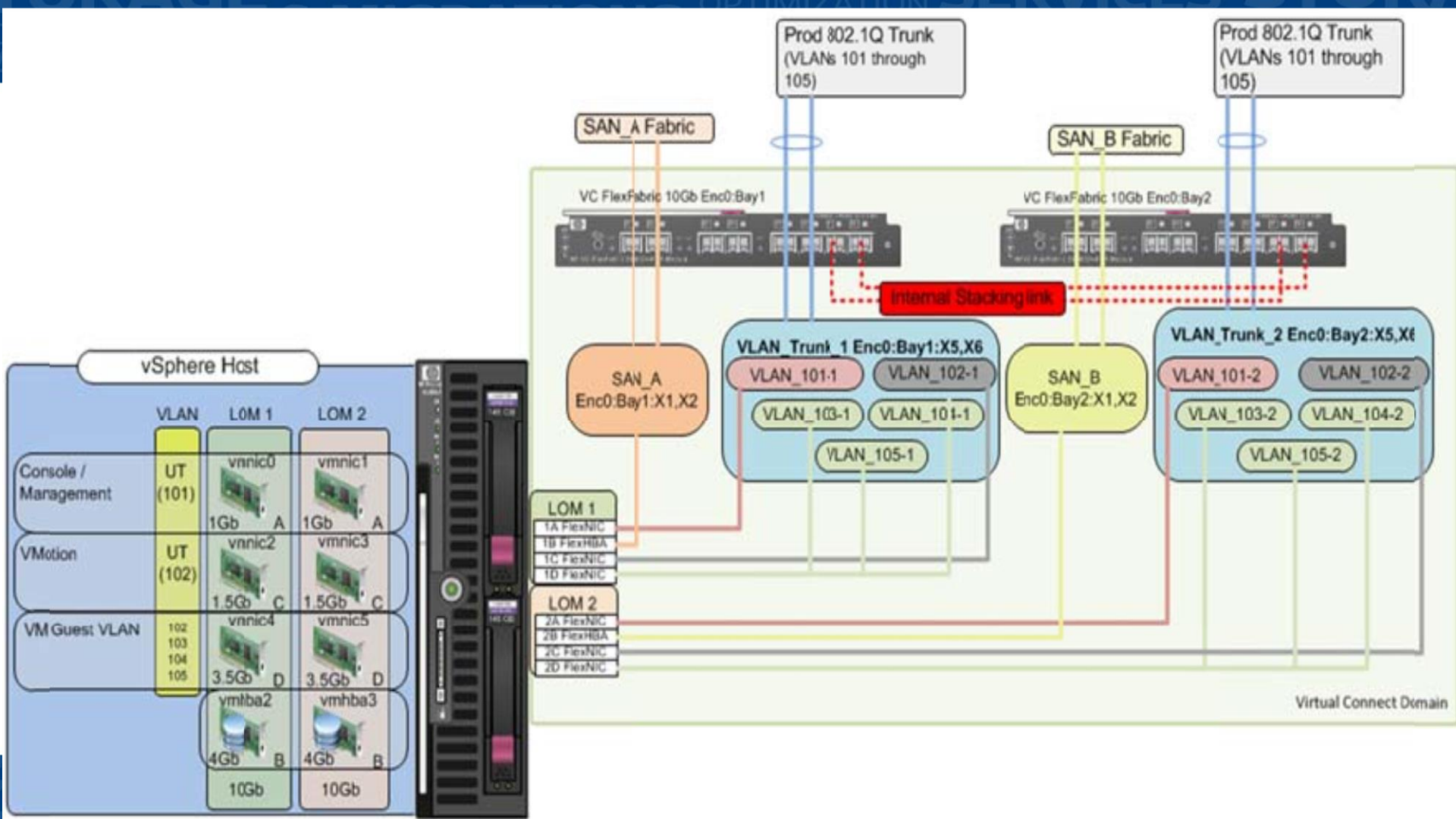

Virtual Connect Domain -- vcdom01_edi_dev -- FC Config only
HBA Port 2
VC "virtual"
WWN
ESX Multi-Path
HBA Port 1
VC "virtual"
WWN
vcprof_enc01bay01_bl480c
vcfab_enc01bay04_vsan4
vcfab_enc01bay03_vsan3
HP VC-FC Module 4 Gb – BAY 3
HP VC-FC Module 4 Gb – BAY 4
Cisco MDS 9124
Cisco MDS 9124
HBA Port 1
VC "virtual"
WWN
Vsan3
HBA Port 2
VC "virtual"
WWN
Vsan4

#HPtrick FlexFabric – must create SAN Fabric 1st, assign the uplink ports, then choose either FCoE or iSCSI – NOT both



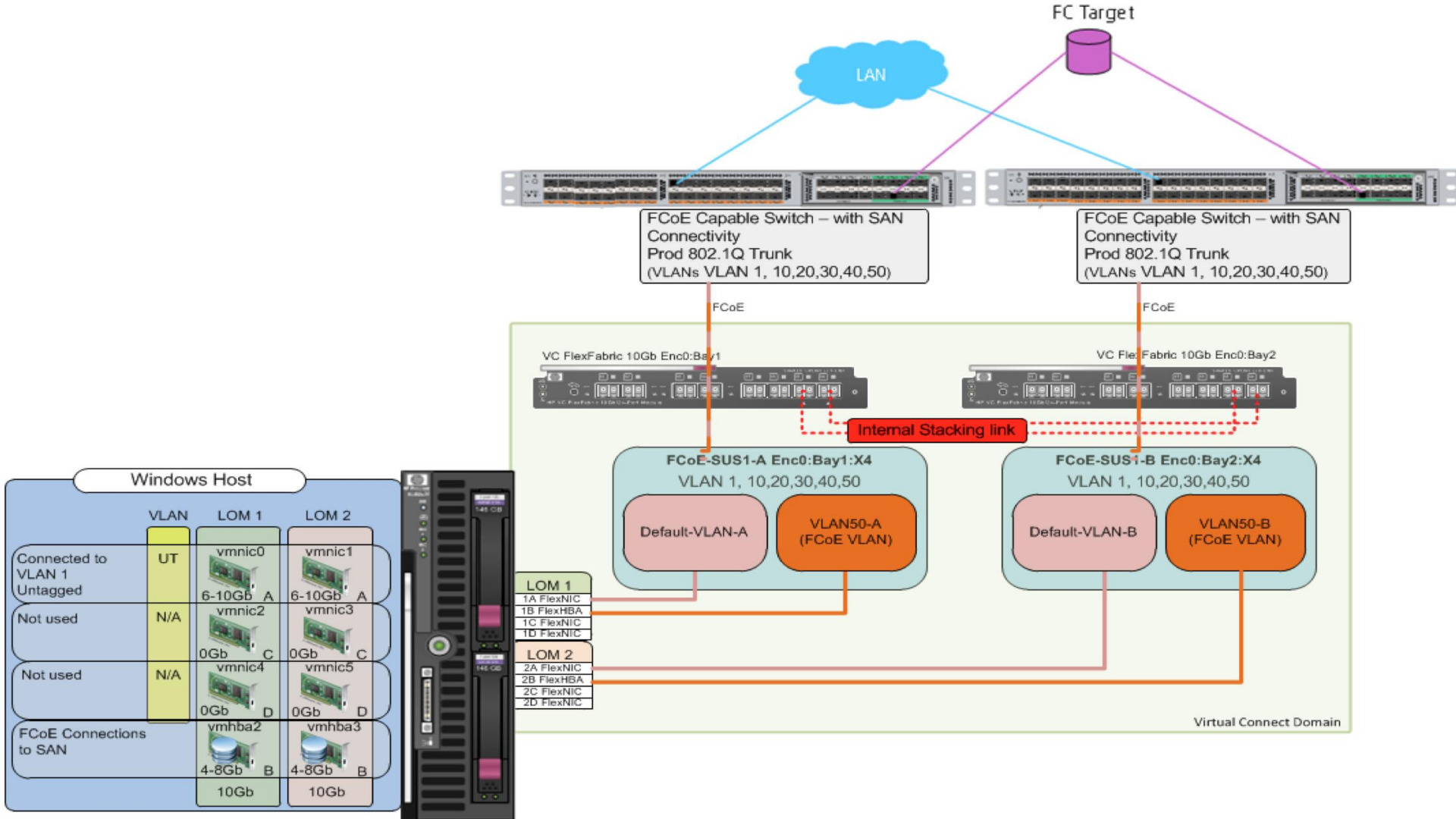
3. Ethernet design

- Choice of Tunnel/Map – no longer necessary, wizard guides you
- One VC Shared Uplink Set that contains all external ports per VC module – all ports become Active
  - Why not go across modules? Because VC will put ports in 2nd module in Standby
- Must enable
  - SmartLink on each VCnet
  - alternate between VC Shared Uplink Sets for each port in Profile,
  - enable LACP PortChannels/Aggregation
  - Virt.Port ID teaming/TLB on ESX

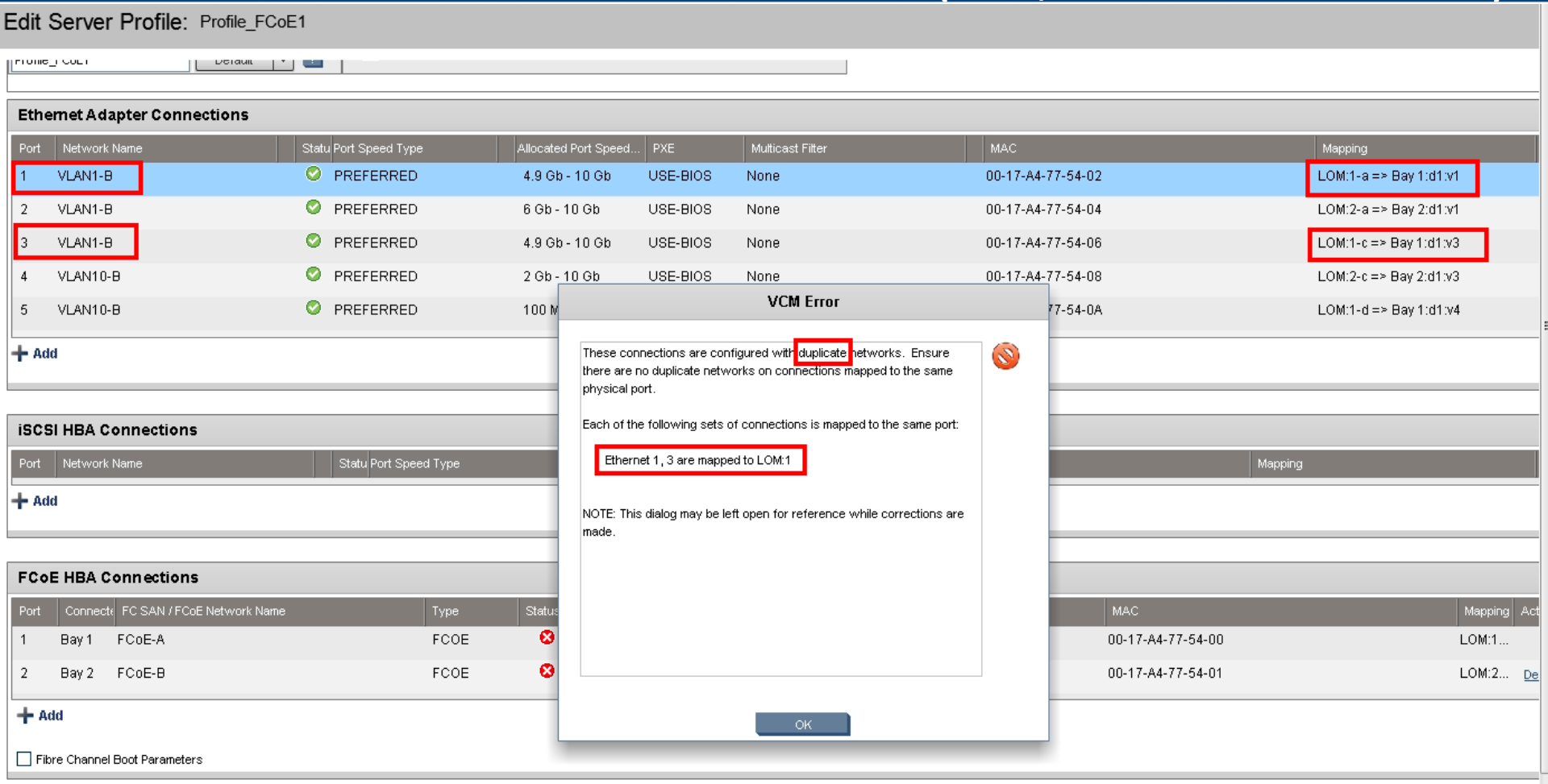

Prod 802.1Q Trunk (VLANs 101 through 105)
Prod 802.1Q Trunk (VLANs 101 through 105)
SAN_A Fabric
SAN_B Fabric
VC FlexFabric 10Gb Enc0:Bay1
VC FlexFabric 10Gb Enc0:Bay2
Internal Stacking link
SAN_A Enc0:Bay1:X1,X2
VLAN_Trunk_1 Enc0:Bay1:X5,X6
VLAN_101-1
VLAN_102-1
VLAN_103-1
VLAN_104-1
VLAN_105-1
SAN_B Enc0:Bay2:X1,X2
VLAN_Trunk_2 Enc0:Bay2:X5,X6
VLAN_101-2
VLAN_102-2
VLAN_103-2
VLAN_104-2
VLAN_105-2
LOM 1
1A FlexNIC
1B FlexHBA
1C FlexNIC
1D FlexNIC
LOM 2
2A FlexNIC
2B FlexHBA
2C FlexNIC
2D FlexNIC
Virtual Connect Domain
vSphere Host
VLAN
LOM 1
LOM 2
Console / Management
UT (101)
VMotion
UT (102)
VM Guest VLAN
102
103
104
105
vmnic0
vmnic1
vmnic2
vmnic3
vmnic4
vmnic5
1Gb A
1Gb A
1.5Gb C
1.5Gb C
3.5Gb D
3.5Gb D
vmhba2
vmhba3
4Gb B
4Gb B
10Gb
10Gb

4. FCoE design

- Converged Shared Uplink Sets (SUS) can contain both the FCoE network and non-FCoE networks
- FCoE-capable SUS must always contain ports from a single VC module
- Active/Active configuration for FCoE traffic is required
- For Multi Enclosure (ME) environments, all corresponding ports in the remote enclosures will be included in the same SUS
  - e.g. selecting enc0:bay1:X1 means bay1:X1 in all remote enclosures is also included.


FC Target
LAN
FCoE Capable Switch – with SAN Connectivity
Prod 802.1Q Trunk
(VLANs VLAN 1, 10,20,30,40,50)
FCoE Capable Switch – with SAN Connectivity
Prod 802.1Q Trunk
(VLANs VLAN 1, 10,20,30,40,50)
FCoE
FCoE
VC FlexFabric 10Gb Enc0:Bay1
VC FlexFabric 10Gb Enc0:Bay2
Internal Stacking link
FCoE-SUS1-A Enc0:Bay1:X4
VLAN 1, 10,20,30,40,50
Default-VLAN-A
VLAN50-A (FCoE VLAN)
FCoE-SUS1-B Enc0:Bay2:X4
VLAN 1, 10,20,30,40,50
Default-VLAN-B
VLAN50-B (FCoE VLAN)
Virtual Connect Domain
LOM 1
1A FlexNIC
1B FlexHBA
1C FlexNIC
1D FlexNIC
LOM 2
2A FlexNIC
2B FlexHBA
2C FlexNIC
2D FlexNIC
Windows Host
VLAN
LOM 1
LOM 2
Connected to VLAN 1 Untagged
UT
vmnic0
6-10Gb A
vmnic1
6-10Gb A
Not used
N/A
vmnic2
0Gb C
vmnic3
0Gb C
Not used
N/A
vmnic4
0Gb D
vmnic5
0Gb D
FCoE Connections to SAN
vmhba2
4-8Gb B
vmhba3
4-8Gb B
10Gb
10Gb

In the server profile, alternate between Shared Uplink Sets for each NIC port. Watch out for a limitation on same Vlan to different LOMs (Eth 1, 3 – LOM1 –VLAN1 in red)



Same Vlan to different LOMs limitation avoided (uses VLAN1A for 1, 1B for 3).

Edit Server Profile: Profile_FCoE1

Ethernet Adapter Connections

Port	Network Name	Statu	Port Speed Type	Allocated Port Speed...	PXE	Multicast Filter	MAC	Mapping
1	VLAN1-A		PREFERRED	4.9 Gb - 10 Gb	USE-BIOS	None	00-17-A4-77-54-02	LOM:1-a => Bay 1:d1:v1
2	VLAN1-B		PREFERRED	6 Gb - 10 Gb	USE-BIOS	None	00-17-A4-77-54-04	LOM:2-a => Bay 2:d1:v1
3	VLAN1-B		PREFERRED	4.9 Gb - 10 Gb	USE-BIOS	None	00-17-A4-77-54-06	LOM:1-c => Bay 1:d1:v3
4	VLAN10-B		PREFERRED	2 Gb - 10 Gb	USE-BIOS	None	00-17-A4-77-54-08	LOM:2-c => Bay 2:d1:v3
5	VLAN10-B		PREFERRED	100 Mb - 10 Gb	USE-BIOS	None	00-17-A4-77-54-0A	LOM:1-d => Bay 1:d1:v4

Add

iSCSI HBA Connections

Port	Network Name	Statu	Port Speed Type	Allocated Port Speed (Mi...	Boot Setting	MAC	Mapping

Add

FCoE HBA Connections

4. Flex10 ESX 5.5 Tips

- For a VMkernel inteface enabled with Jumbo Frame with MTU of 9000 Bytes, ensure the Virtual Connect NIC is operating at a minimum of 1Gb/s.
- For Fault Tolerance logging NICS, make sure you reserve at least 1 Gbit, separately from the internal VMotion network.
- **#HPtrick** With rollback of settings, it is safe to use VMware's Distributed vSwitch for Management & Data VMs.

IV. HP 3PAR StoreServ Configuration for VMware

- Goals: Maximize redundancy & load balancing

HP 3PAR StoreServ and vSphere ESX 5.5

- You can direct connect StoreServ 3PAR with FlexFabric modules (Flat SAN)
  - Required InForm OS v3.1.1.MU1 (or later)
  - Peer Motion will not work – requires SAN Fabric
- Monitor the “Qlen” values on the system (using System Reporter or the command statvlun –ni –rw –host <ESX host>)
  - Do not exceed these values.
- Adaptive queue depth throttling
  - Not compatible with Storage DRS.
  - Enable it for all hosts which are accessing the HP 3PAR StoreServ Storage.
- Enable Storage I/O Control
  - Adaptive queue depth throttling is not needed if Storage I/O Control is enabled.

V. VMware ESX 5.5 (vSphere) Best Practices

- Goal: Optimize VMware on Blades

1. Storage/Data Store tips

- Establish a standard LUN size that you will use. 1TB or 2TB is a common choice. Avoid monster LUNs >2TB, if possible.
- Use RDMs (Virtual) only for VM disks that exceed your standard LUN size. Only put data on RDMs, not the OS.
- Thin provision in VMware and on the storage array for maximum efficiency, but setup alerts to not oversubscribe. Exceptions – Microsoft Exchange, very high perform. apps
- Store ISOs and templates on a separate LUN
- Use Paravirtualized adapters inside VMs for ALL I/O
- **#HPTrick** Use max 10 heavy I/O, 15 medium, 20 light VMs on one LUN, **even** if you use VAAI

VI. Summary

- Make sure you spend time on design before you build the solution. With c-Class Blades, Virtual Connect, vSphere, & HP 3PAR StoreServ, planning is a must.

Thank you and Twitter chat

- I would like to thank Jack Westbrooks, Roberto Luzardo, Don Allison, Nigel Bridgeman, Shawn Wagner, Alex Kramer, Aboubacar Diare, Steve Mclean, Keenan Sugg, Doug Strain, Joanne McMenoman, and HP in general for documents & ideas, some of which I used here.
- **Chat with me on Twitter:**

June 16, 2014 -- Monday, 2-3 pm EST,

use hashtag: #HPtrick

Contact Info & Questions

Please fill out the Survey – it helps me come back.

Get the slides on my blog:

www.cdillc.com/newsroom/cloud-giraffe

Connect with me on LinkedIn: Yury Magalif

Twitter:

#HPtrick

@YuryMagalif

@CDILLC

Personal Blog: cloud-zebra.com

E-Mail Questions:

okzebra@gmail.com

yury.magalif@cdillc.com

YouTube:

www.youtube.com/user/ym640

CDI COMPUTER DESIGN & INTEGRATION LLC