

# Deploying UCS

## Hints & tips from the field

T-DC3 / L2

Damien GOUJU

Specialized System Engineer DC France  
Solutions and Technologies Practice – STeP

[dgouju@cisco.com](mailto:dgouju@cisco.com)

# What is this session about?

- It's an advanced session
  - Basic UCS knowledge is a prerequisite
- A collection of hints and tips gathered from UCS deployments
- My challenge is 45 minutes, 7 subjects 😊
  - Address pools management
  - Boot from SAN
  - Service profiles: networking
  - UCS 2.0: Upgrade
  - UCS 2.0: Disjoint L2 consideration
  - UCS 2.0: iSCSI boot
  - UCS 2.0: VMFEX
- I'll be completely available for questions after the session



# A few words of introduction



# What do we see in France?

- Majority of deployments (80%+) run a mix of Hypervisors and bare-metal
  - “Standalone”, vBlock, Flex Pod
- Hypervisor is for the large part (90%) VMware’s vSphere ESXi
  - ESXi 4.1 Update 2 primarily, a little bit of ESXi 5.0
  - Microsoft’s Hyper-V comes second (and growing!)
- Bare-metal deployments consist of Windows 2008 R2 server and RHEL 5/6
  
- All types of LAN & SAN networking / Storage infrastructures

# UCS Service Profiles: A Quick Recap



# Service Profiles and Templates

- Physical blades inherit a desired configuration through a Service Profile (SP)
  - One SP can be either unassociated or associated to **one** blade
- Service Profiles specify
  - Desired boot order
  - Number of vNICs with VLANs and vHBAs
  - Where to get addresses for those vNICs/vHBAs
  - Various policies (BIOS configuration, IPMI, etc.)
- SP Templates are master templates from which SPs can be spawned
  - Either manually (from 1 to N with auto-naming)
  - Associated to a pool of servers



# Address Pools: Best practices



# UUID Pools

- UUID: global ID that is unique to a given server  
Composed of Prefix and Suffix

Best practice: don't modify the prefix

The screenshot shows the UCS Manager interface. The breadcrumb path is Servers > Pools > root > UUID Suffix Pools > Pool default. The 'Properties' section for the 'default' pool is visible, with the following details:

- Name: default
- Description: Lab UUIDs
- Prefix: D647579A-C400-11DE
- Size: 100
- Assigned: 19

The 'Actions' section includes 'Delete', 'Create a Block of UUID Suffixes', and 'Show Pool Usage'. A callout points to the 'Create a Block of UUID Suffixes' action with the text 'Default - don't change'. Another callout points to the 'Pool default' breadcrumb with the text 'default UUID pool'.

The 'Create a Block of UUID Suffixes' dialog box is open, showing the following fields:

- From: 00FF-000000000001
- Size: 512

Callouts in the dialog box identify '00FF-000000000001' as the 'Domain ID' and '512' as '512 IDs'. The dialog also has 'OK' and 'Cancel' buttons.

- **Recommendations:**

- Use root “default” pool as the global default pool for all Service Profiles
- Populate the default pool with a block of 512 IDs
- Don't alter original Prefix, this is unique to this UCS
- Optional: choose a “Domain ID” for this UCS - used later in other ID pools



# Assigning addresses to adapters

## MAC Address Pools

- Prefer pools to burnt-in values whenever possible
  - L2/MAC troubleshooting is a full time job... Please help Network team 😊
  - Pools let you control the exact allocation following your naming convention
  - Makes it easy to identify a given blade or OS type on switches
- On the VIC (M81KR, 1240...) adapter this is a must
  - VIC can instantiate N interfaces → there are no burnt-in addresses → “Insufficient resources”
- **Best practice**
  - MAC pools: create pools that are multiple of 64
  - Encode Domain/Site ID and OS Type

MAC Pool			256 MACs		
OUI			Extension ID		
00	25	B5	Domain ID	OS Type	##

# Assigning addresses to adapters

## World Wide Name Pools

- Using pools lets you communicate WWNs to SAN team ahead of deployment
  - Pre-provision LUNs for boot-from-SAN
  - Proactively perform zoning and LUN masking configuration
- One blade uses one Node WWN and as many Port WWN as there are vHBAs
- Node pool **best practice**: create one large pool that's a multiple of 16
  - Create the pool at the Root organization (you can use the default pool)
  - Zoning and masking does not use Node WWN
- Ensure node pools and port pools do not overlap



Instead, use "FF"/"00" in the 2<sup>nd</sup> high-order byte to identify node names

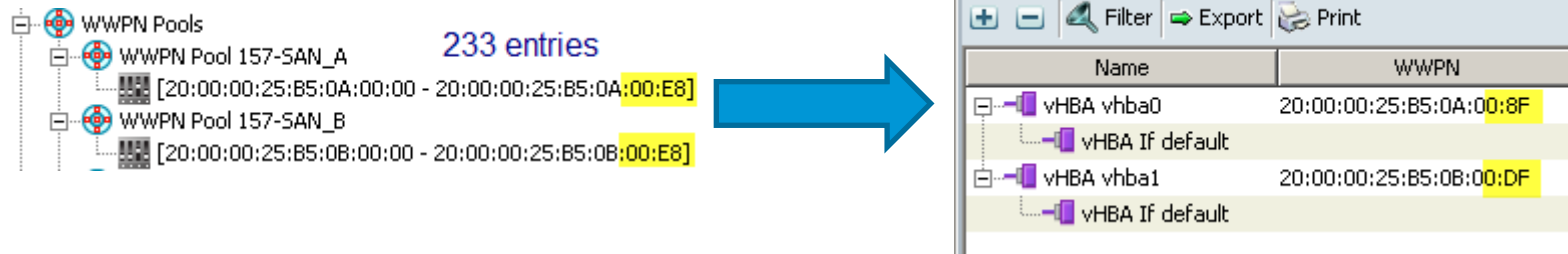
# Port WWN pools

## Best Practices

- Always create pools that are **multiple of 16** and contain **less than 128 entries**

This ensures vHBA0 (SAN A) and vHBA1 (SAN B) have the same low-order byte

- Counter-example using 233-entries pools



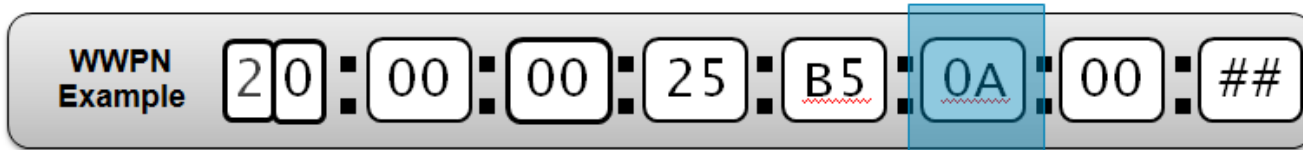
- Much better for both vHBAs to have the same low-order byte and a unique SAN Fabric identifier

Presence of “0A” or “0B” in the port WWN indicates SAN Fabric

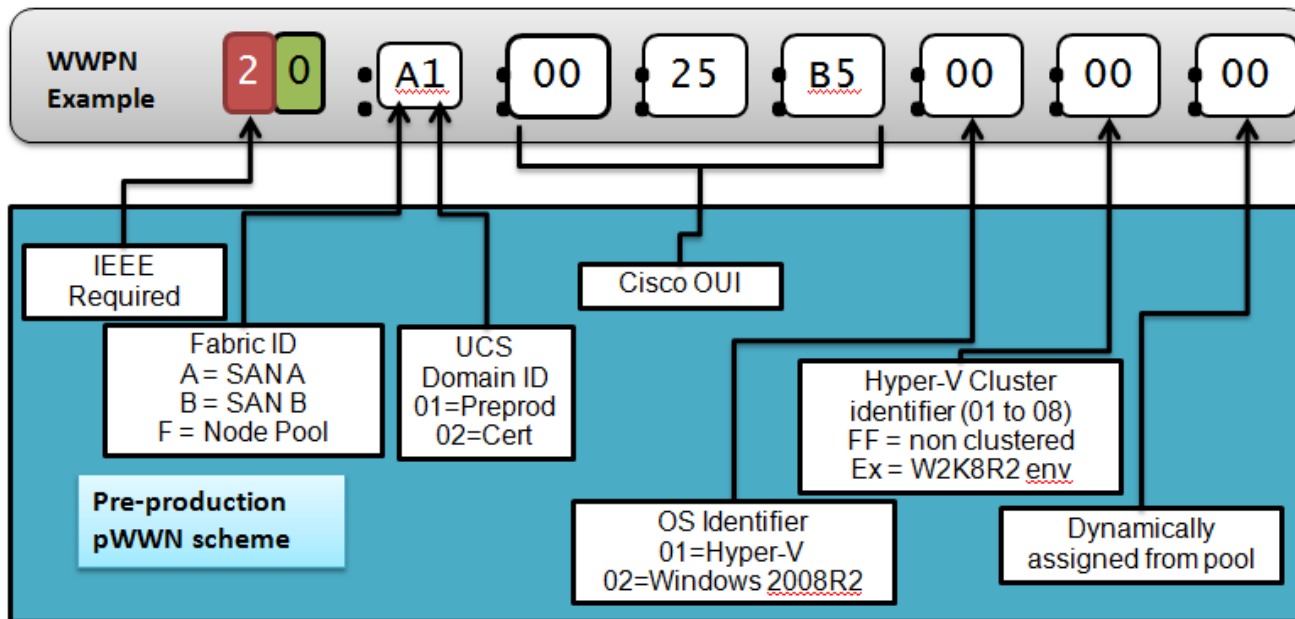
# Port WWN pools

## Suggested Design Patterns

- At the very minimum, create pools that identify the SAN Fabric



- For deployments with several OS types and multiple UCS, you could do this:



# Port pools

Use Expert setting when creating vNICs / vHBAs

**How would you like to configure SAN connectivity?**  Simple  Expert  No vHBAs  Hardware Inherited

A server is identified on a SAN by its World Wide Node Name (WWNN). Specify how the system should assign a WWNN to the server associated with this profile.

**World Wide Node Name**

WWNN Assignment:

Select WWNN assignment option.  
If nothing is selected, the WWNN will be assigned from the default pool.  
**WARNING:** The selected pool does not contain any available entities.  
You can select it, but it is recommended that you add entities to it.

Specify the virtual host bus adapters (vHBAs) that the server should use to connect to a SAN. To specify more than two vHBAs, select the Expert configuration mode.

**vHBA 0 (Fabric A)**

Name:

Select VSAN:

**WARNING:** there are not enough WWN addresses available in the default pool. This vHBA will be created with an invalid WWN address.

**vHBA 1 (Fabric B)**

Name:

Select VSAN:

**WARNING:** there are not enough WWN addresses available in the default pool. This vHBA will be created with an invalid WWN address.

Expert lets you specify port WWN pools

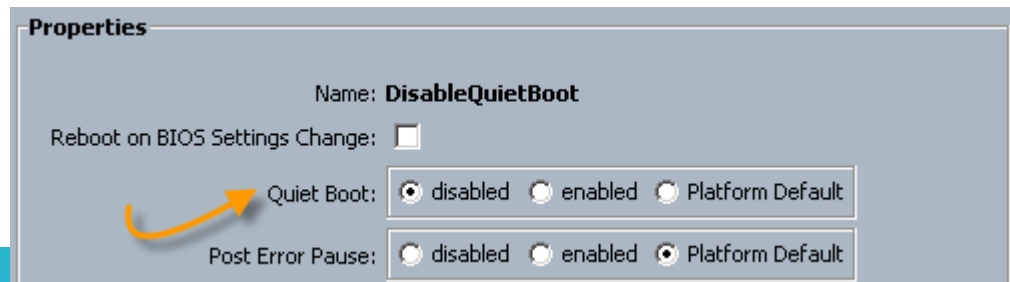
# Boot from SAN



# Tune your BIOS policy

Let the server speak up

- Boot from SAN involves several key components working hand in hand
  - Correct UCSM boot-from-SAN policy with the right target port WWNs
  - Correct SAN zoning and LUN masking are imperative
  - SAN array must present a LUN (storage groups, initiator groups, etc.)
- During your first trial a component won't work the way it's supposed to
- UCSM lets you create BIOS policies that you can attach to the Service Profile
- **Best Practice:** for Boot-from-SAN you always want **Quiet Boot disabled**



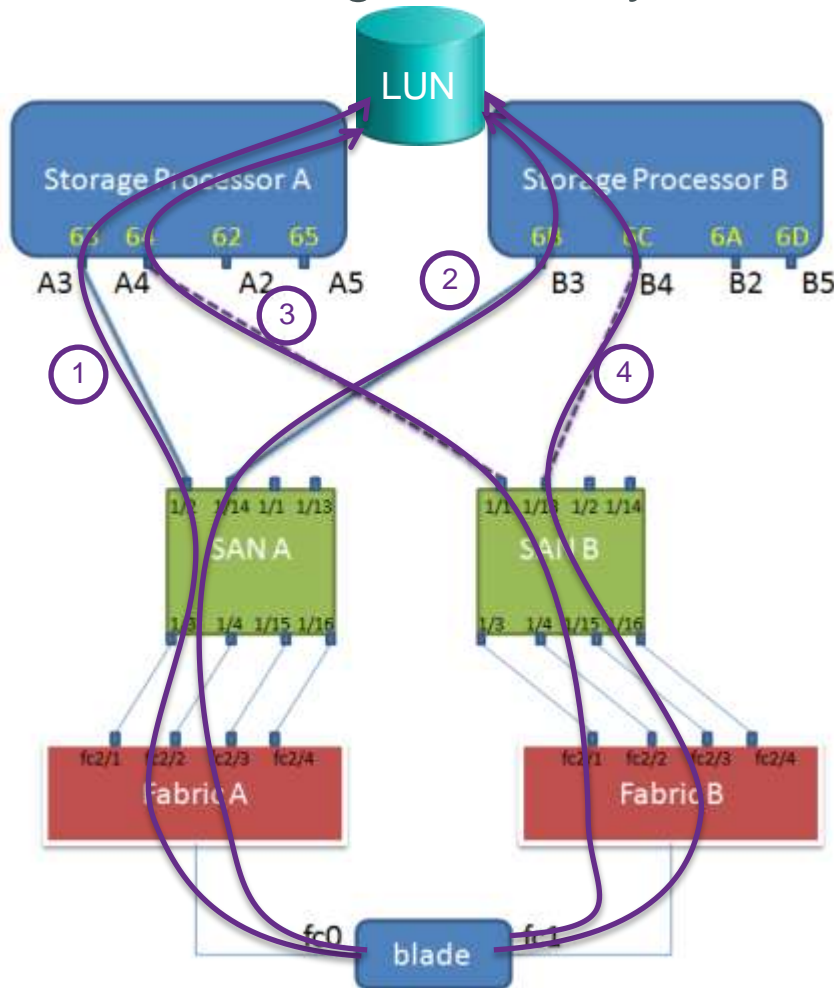
The screenshot shows the 'Properties' configuration window for a BIOS policy named 'DisableQuietBoot'. The 'Quiet Boot' setting is set to 'disabled', indicated by an orange arrow pointing to the selected radio button. Other settings include 'Reboot on BIOS Settings Change' (unchecked), 'Post Error Pause' (set to 'Platform Default'), and 'Name: DisableQuietBoot'.

Property	Value
Name	DisableQuietBoot
Reboot on BIOS Settings Change	<input type="checkbox"/>
Quiet Boot	<input checked="" type="radio"/> disabled <input type="radio"/> enabled <input type="radio"/> Platform Default
Post Error Pause	<input type="radio"/> disabled <input type="radio"/> enabled <input checked="" type="radio"/> Platform Default

# Physical topology

What yours should look like

- SAN network designers always want SAN A / SAN B isolation



Write down the array's port WWNs before configuring your Service Profile!

1. SAN Primary, target primary
2. SAN Primary, target secondary
3. SAN Secondary, target primary
4. SAN Secondary, target secondary



# Build your boot policy

One path works, but if resiliency matters ...

- UCS can boot from 4 different paths
  - You can boot with just a single target boot policy, but not ideal for resiliency
- Typically, you'll want a boot policy that goes like this:

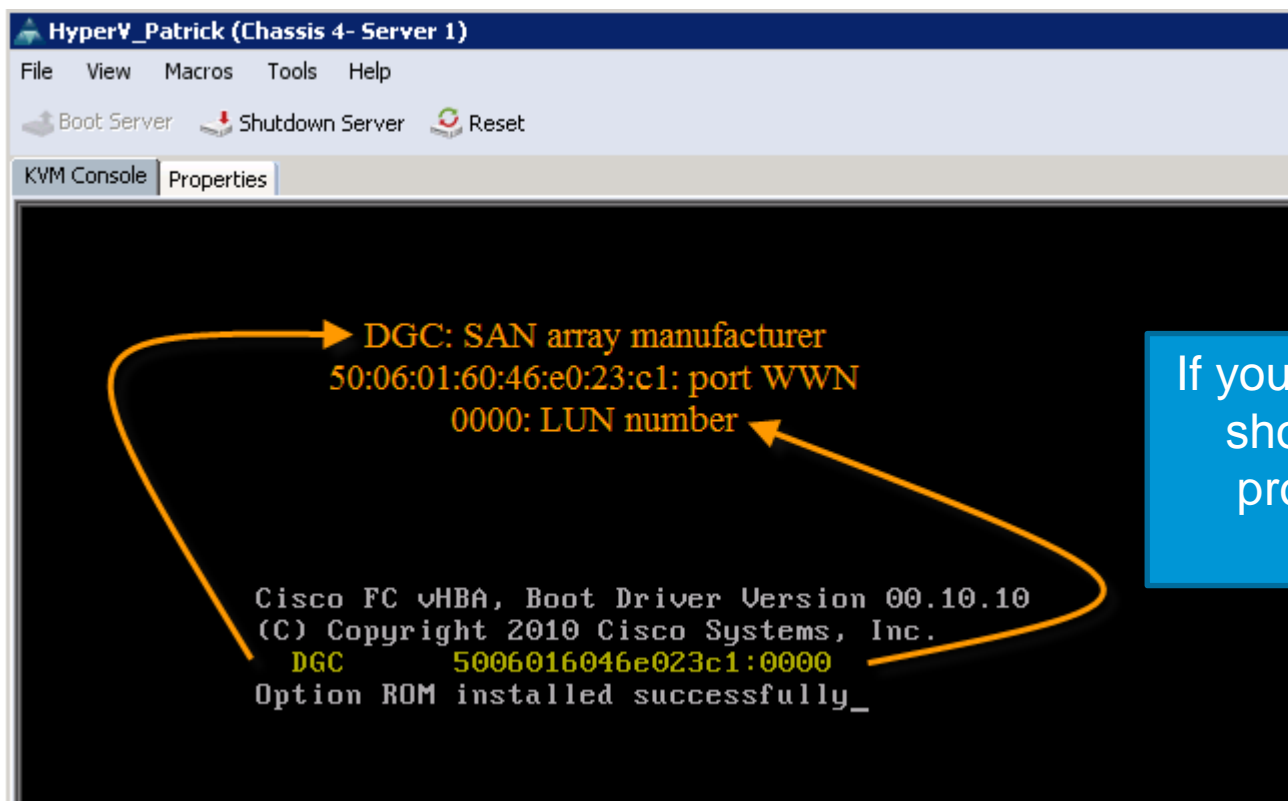
Name	Order	vNIC/vHBA	Type	Lun ID	WWN
Storage	1				
SAN primary		fc0	primary		
SAN Target primary			primary	0	50:06:01:63:46:E0:17:69
SAN Target secondary			secondary	0	50:06:01:6B:46:E0:17:69
SAN secondary		fc1	secondary		
SAN Target primary			primary	0	50:06:01:64:5C:E0:17:69
SAN Target secondary			secondary	0	50:06:01:6C:46:E0:17:69
CD-ROM	2				

- That policy says:
  - First try vHBA fc0 pWWN “63” via fc0 → Storage Processor A, port A3
  - Then try vHBA fc0 pWWN “6B” via fc0 → Storage Processor B, port B3
  - If those fail, then try fc1 (first pWWN “64” on SP A; then pWWN “6C” on SP B)
- Windows: Don't forget to append CD-ROM or PXE **after** the SAN targets

# Let's boot the server

Keep an eye out

- Associate the boot policy you just defined then boot the server
- With a M81KR adapter, this is what you'll see for each vHBA



The screenshot shows the HyperV management interface for a server named 'HyperV\_Patrick (Chassis 4- Server 1)'. The 'KVM Console' tab is active, displaying the boot output of a Cisco FC vHBA. The output text is as follows:

```
Cisco FC vHBA, Boot Driver Version 00.10.10  
(C) Copyright 2010 Cisco Systems, Inc.  
DGC      5006016046e023c1:0000  
Option ROM installed successfully_
```

Annotations in orange text with arrows point to specific parts of the output:

- An arrow points to 'DGC: SAN array manufacturer'.
- An arrow points to '50:06:01:60:46:e0:23:c1: port WWN'.
- An arrow points to '0000: LUN number'.

If you do not see the array show up here, there's probably a zoning or masking error

Note: the 4<sup>th</sup> byte here is "60" because we are booting from a different array than slide 18


# Troubleshoot

## Attach VIC firmware

Chassis / Server / Adaptor



```
UCS-6100-A# connect adapter 1/1/1
adapter 1/1/1 # connect
adapter 1/1/1 (top):1# attach-fls
adapter 1/1/1 (fls):1# vnic
-----
vnic  ecpu  type  state  lif
-----
7      1     fc    active  3
8      2     fc    active  4
```



Useful (see next slide)

# The cool command: VIC lunlist

Before driver loading

```

1 adapter 1/1/1 (fls):16# lunlist 7
2 vnic : 7 lifid: 4
3 - FLOGI State : flogi est (fc_id 0xa70a04)
4 - PLOGI Sessions
5 - WWNN 20:00:00:1f:93:00:12:9e WWPN 20:00:00:1f:93:00:12:9e fc_id 0xa70400
6 - LUN's configured (SCSI Type, Version, Vendor, Serial No.)
7 LUN ID : 0x0000000000000000 (0x0, 0x4, XIOTECH, 3BCC0114)
8 - REPORT LUNs Query Response
9 LUN ID : 0x0000000000000000
10 LUN ID : 0x0000000000000000
11 LUN ID : 0x0002000000000000
12 LUN ID : 0x0003000000000000
13 - Nameserver Query Response
14 - WWPN : 20:00:00:1f:93:00:12:9e
15 - WWPN : 20:00:00:1f:93:00:12:9f
16 - WWPN : 20:00:00:1f:93:00:12:9c
17 - WWPN : 20:00:00:1f:93:00:12:9d
    
```

Boot policy

LUN Masking

What the SAN says

LUN id mismatch

WWPN mismatch

Zoning issue



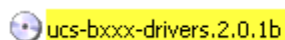
# Microsoft Windows Boot from SAN

## Checklist

- **Best practice:** ask the SAN team to present a single target pWWN for now
- Don't proceed unless you've seen the target's port WWN on the previous screen!

Your SAN team can pre-register hosts; you know the server's pWWN!

- Make sure you have the latest Cisco drivers iso image handy!



10/26/2011 2:05 PM

MagicISO Document

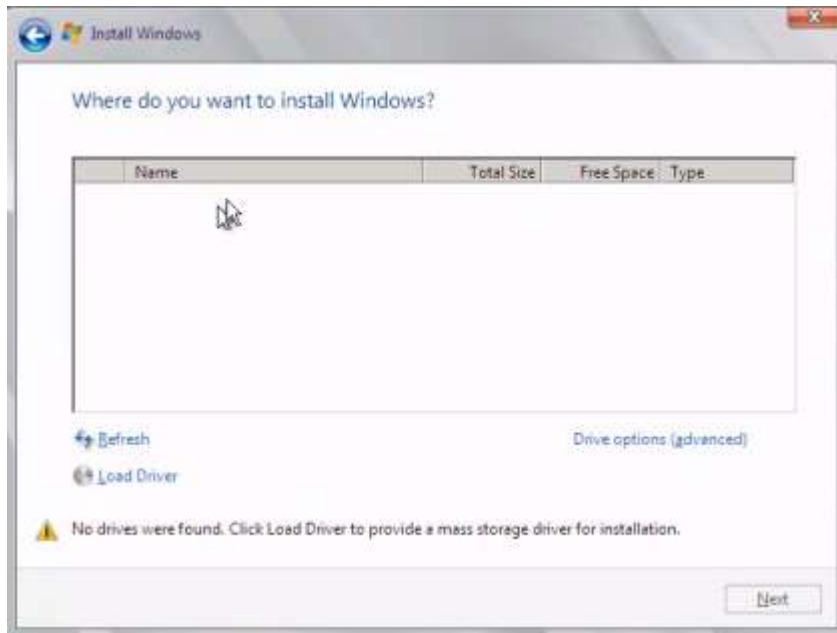
533,958 KB

- Your boot policy **must** have the SAN targets first before PXE or CD-ROM  
If you put PXE or CD-ROM first, the installer will refuse to install on the LUN!
- Mount the virtual media (or ensure PXE is working) and boot the server
- Do not press F6 to force select boot options, UCSM has taken care of that
- After a few click-next (accept EULA; select Custom Installation), you'll see a screen asking you where to install Windows

# Windows: nowhere to install!

## Drivers to the rescue

- You should now see this:



- Windows **does not** ship with built-in drivers for Cisco CNAs  
Unmap the installation ISO image and map the Cisco drivers image  
Then click “Load Driver”

# Drivers loaded

LUN appears

- Load the driver then wait a bit and the LUN will appear

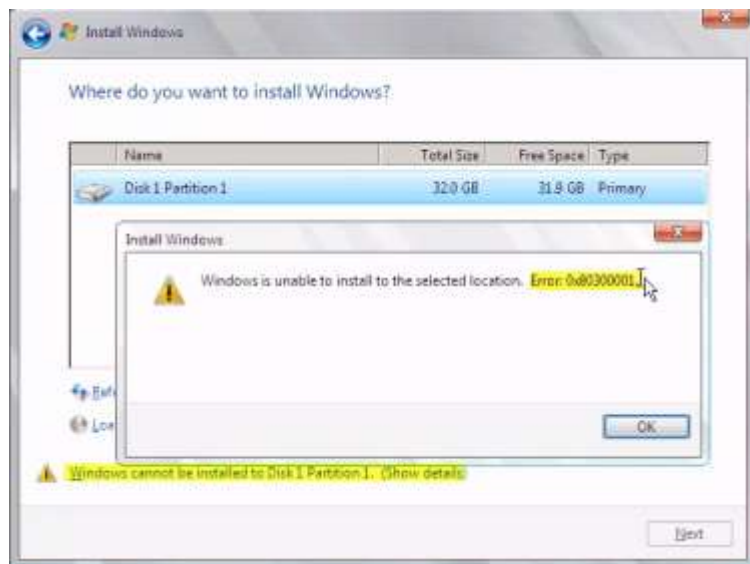


- If the LUN does not appear, check FLOGI database on SAN switches
- If FLOGI is present, check zoning
  - If it is not present, double check the VSAN membership of the vHBA
  - Don't forget to activate the new zoning configuration
- If zoning is correct, verify the host pWWN is/are registered on the array
  - Present a boot LUN (for Windows 2008 R2 typically 40GB) only to that host

# I am getting an error!

What did I do wrong?

- You're very likely going to run into this error:



- At this point, unmap the Cisco drivers ISO image and remap the Windows installation media
  - You may need to click Refresh
- The installer should now proceed



After the installation, enable MPIO (register your array with the MPIO driver) then present all available SAN paths



# VMware ESXi Boot from SAN

Easy as pie

- All ESXi versions ship with Cisco CNA drivers built-in
  - But check Cisco & VMware matrix (inbox vs async)
  - Cisco OEM image for ESXi 5.0 soon
- The installer is more forgiving than with Windows
  - You could place the virtual CD-ROM or PXE before the SAN targets and it will work
- The installer is multipath-aware
  - It is okay to present all available paths at installation time
- **Best practice:** through LUN masking only present the boot LUN while installing
  - If you data is important, do not present VMFS datastores just yet!
- Before ESXi 5.0 you only get one chance
  - If LUN masking is incorrect, the installer won't refresh and you'll have to reboot
  - The ESXi 5.0 installer introduces a proper refresh function which will save you a lot of time

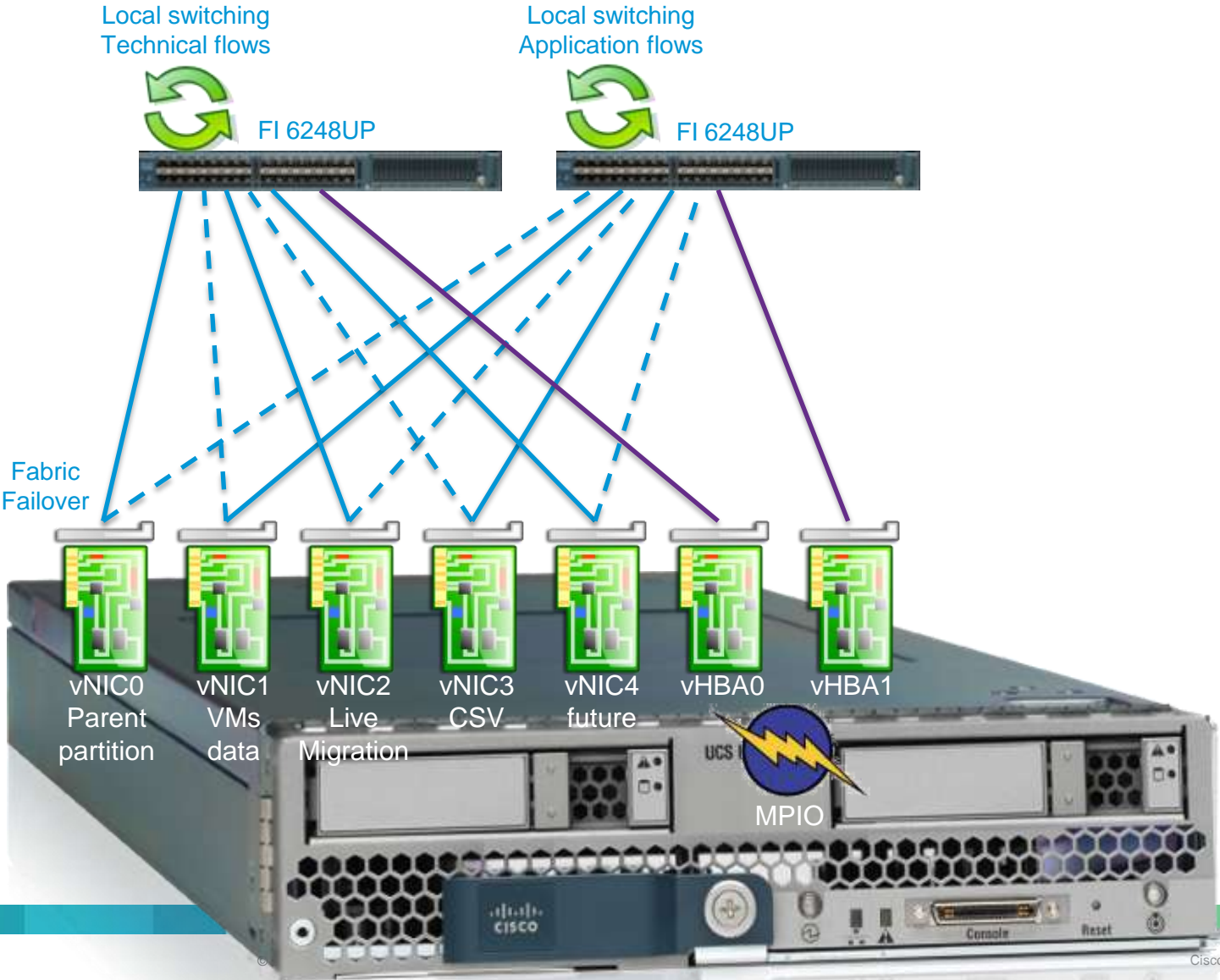
# Recommended Service Profile Network Designs



# What's a Service Profile design?

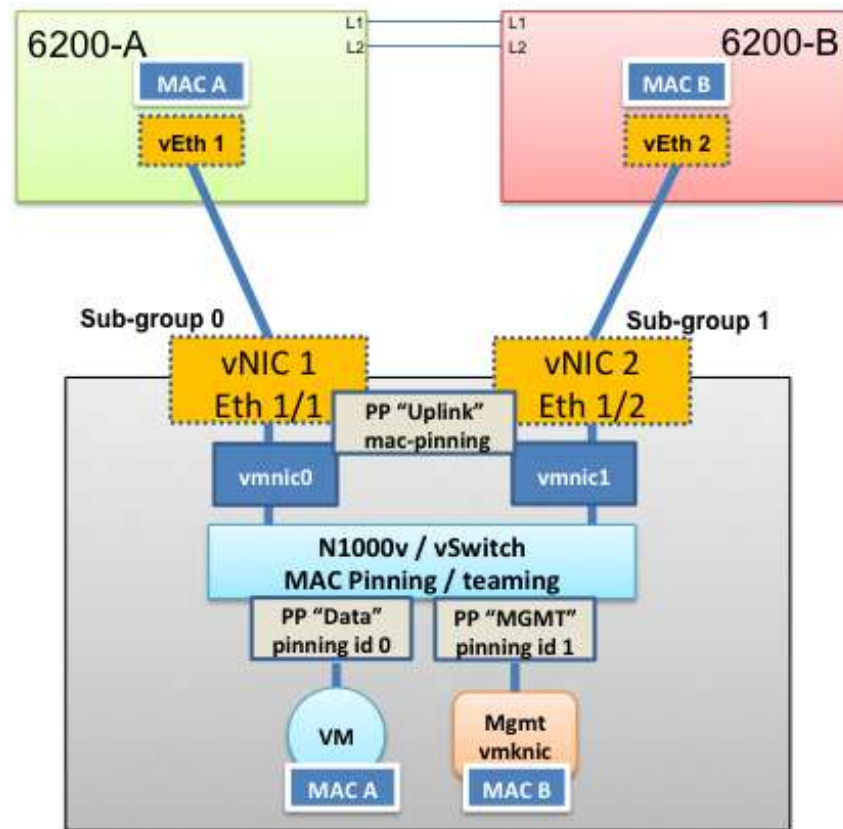
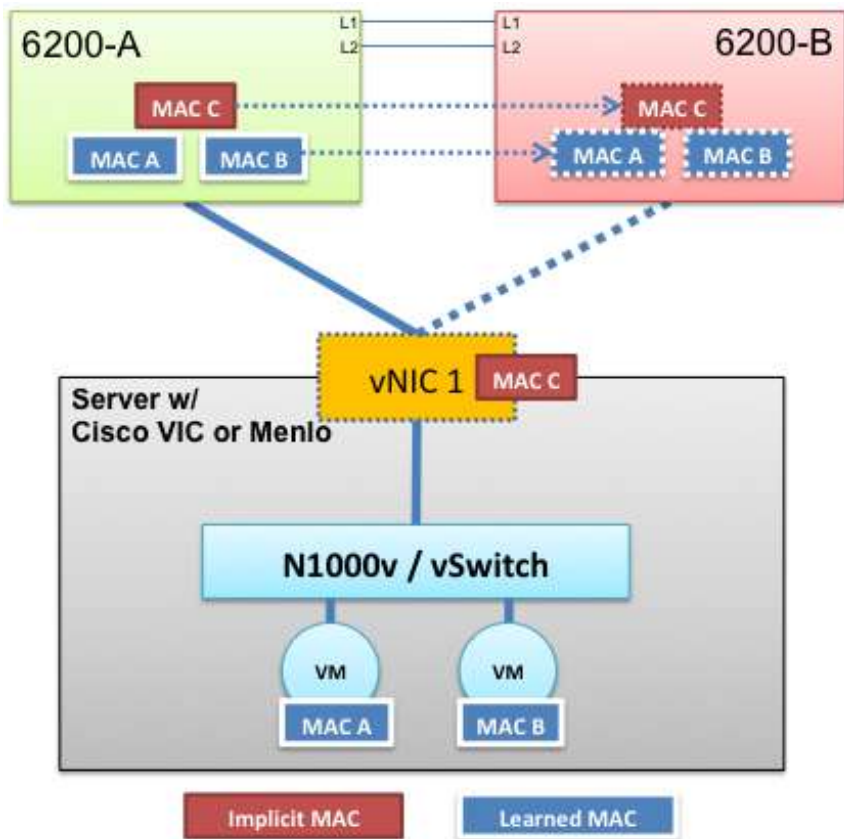
- Question: “how many vHBAs and vNICs should I assign to my Windows profile? How about ESXi?”
  - If you don't have a Cisco VIC adapter, the answer is simple: 2 plus 2!  
We're going to focus on VIC use cases
- For bare-metal deployments: the answer is “it depends”
  - Consult the application owner(s)
  - Empirical observation: typically 4 to 6 vNICs; 0 to 2 vHBAs
- For ESXi: most of the times 6-8 vNICs and 2 vHBAs
  - Depending on Failover mode
- For Hyper-V: most of the times 5 vNICs and 2 vHBAs
  - Details in the next slides

# Sample HyperV design



# The dilemma

Fabric failover or vSwitch mac-pinning?



- + Less vNIC
- + HyperV support (KB 968703)
- + Local switching
- No load sharing
- Not supported in Eth Switch mode (since 2.0)

- + Load sharing across fabric
- + Supported in Eth Switch mode (teaming driver)
- + Traditional approach
- "Bad" HyperV support (KB 968703)
- East-West through north

# Service Profiles: OS versus UCSM view



# SP view vs UCSM view

Do they disagree?

- Problem statement

an SP instantiates 6 vNICs and 2 vHBAs

Windows 2008 R2 is installed on the blade

NIC ordering at the OS level does not match what the SP shows

- Typically encountered with Microsoft Windows OS, usually not an issue with ESXi

```
10.48.58.15 - PuTTY
~ # esxcfg-nics -l
Name      PCI          Driver      Link Speed  Duplex  MAC Address  MTU
vmnic0    0000:08:00.00 enic        Up          10000Mbps Full    00:25:b5:58:10:de 1500
vmnic1    0000:09:00.00 enic        Up          10000Mbps Full    00:25:b5:58:10:ee 1500
vmnic2    0000:0a:00.00 enic        Up          10000Mbps Full    00:25:b5:58:10:fe 1500
vmnic3    0000:0b:00.00 enic        Up          10000Mbps Full    00:25:b5:58:10:1e 1500
vmnic4    0000:0c:00.00 enic        Up          10000Mbps Full    00:25:b5:58:10:0e 1500
vmnic5    0000:0d:00.00 enic        Up          10000Mbps Full    00:25:b5:58:10:3e 1500
vmnic6    0000:0e:00.00 enic        Up          10000Mbps Full    00:25:b5:58:10:ef 1500
vmnic7    0000:0f:00.00 enic        Up          10000Mbps Full    00:25:b5:58:10:1f 1500
~ #
```

Name	MAC Address	Actual Order	Fabric ID
vNIC e1	00:25:B5:58:10:DE	1	B
vNIC e0	00:25:B5:58:10:EE	2	A
vNIC e2	00:25:B5:58:10:FE	3	A
vNIC e3	00:25:B5:58:10:1E	4	B
vNIC e4	00:25:B5:58:10:0E	5	A
vNIC e5	00:25:B5:58:10:3E	6	B
vNIC e6	00:25:B5:58:10:EF	7	A
vNIC e7	00:25:B5:58:10:1F	8	B

# What's specific to Microsoft Windows and UCS

- Two variables come in the picture:
  - Windows does not ship with built-in drivers for M81KR
  - Once you load the driver the OS decides in which order to bring up the devices
  - That order does not have a direct relation with PCI-bus addressing
- You often end up with this:

The screenshot shows the Windows Network Connections window. The table below lists network adapters with their names, status, and device names. A red curved arrow points from the 'UCS SP Order' column to the 'Windows Order' column.

Name	Status	Device Name
w1.0025B5-000119-vnic5	Unidentified network	Cisco VIC Ethernet Interface
w2.0025B5-0001C9-vnic0	Unidentified network	Cisco VIC Ethernet Interface #2
w3.0025B5-0001E9-vnic2	Unidentified network	Cisco VIC Ethernet Interface #3
w4.0025B5-0001F9-vnic3	Unidentified network	Cisco VIC Ethernet Interface #4
w5.0025B5-0001D9-vnic1	Unidentified network	Cisco VIC Ethernet Interface #5
w6.0025B5-000009-vnic4	Unidentified network	Cisco VIC Ethernet Interface #6



# How to reconcile the OS and SP view

When order matters

- First make sure the vNICs have a sequential order in the SP

## Modify vNIC/vHBA Placement

Specify how vNICs and vHBAs are placed on physical network interface cards

vNIC/vHBA Placement specifies how vNICs and vHBAs are placed on physical network interface (mezzanine) in a server hardware configuration independent way.

Select Placement:

System will perform automatic placement of vNICs and vHBAs based on PCI order.

Name	Address	Order
vNIC e0	00:25:B5:CA:FE:01	1
vNIC e1	00:25:B5:CA:FE:02	2
vNIC e2	00:25:B5:CA:FE:03	3
vNIC e3	00:25:B5:CA:FE:04	4
vHBA fc0	20:00:00:25:B5:0A:21:0F	5
vHBA fc1	20:00:00:25:B5:0B:21:0F	6

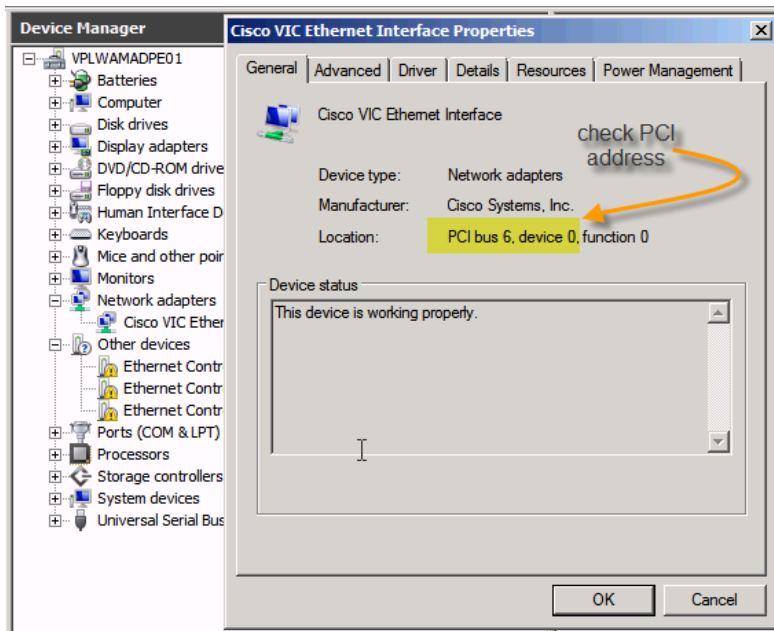
- vHBAs can appear before vNICs, it doesn't really matter
- Just ensure your vNIC order column follow the correct sequence

- Install Windows then launch the Device Manager

# Device Manager View

Identify PCI bus order of each vNIC

- **Before** installing the device drivers, right-click on each vNIC one by one



- Write down the PCI address of each vNIC
- This is where the device order in the UCS SP comes into play – the first vNIC or vHBA is usually at PCI 06

- Install the drivers sequentially following the PCI bus order you discovered

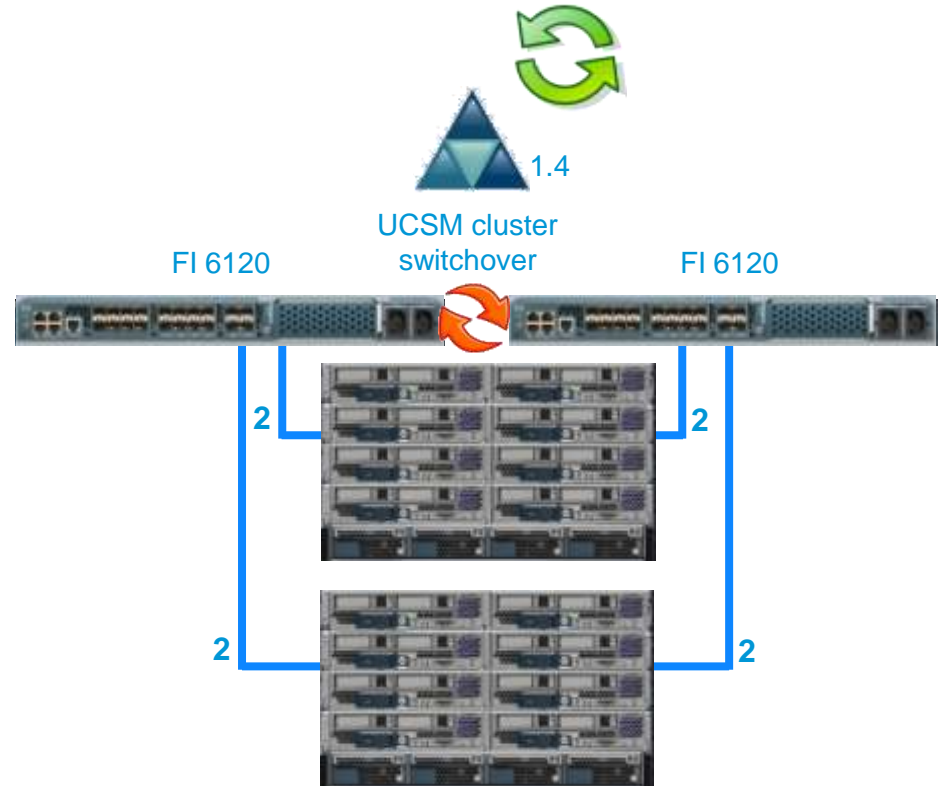
# UCS 2.0 Upgrading



# Upgrading to UCS Gen2

## Software and Hardware

- Capitola: Major announcements
  - FI with more ports, all Unified Ports
  - More VNTags for better Adapter / VMFEX scalability
  - Software features
- Gen2 hardware ships with UCSM 2.0, but Gen1 can provide the software features
- 3 major points to consider and it will be fine
  1. Strictly apply upgrade procedure
  2. Ensure that FCoE VLANs don't overlap with Ethernet VLANs
    - FCoE VLAN set for every VSAN
  3. If you upgrade FI, ensure to have the same version on Gen1 and Gen2



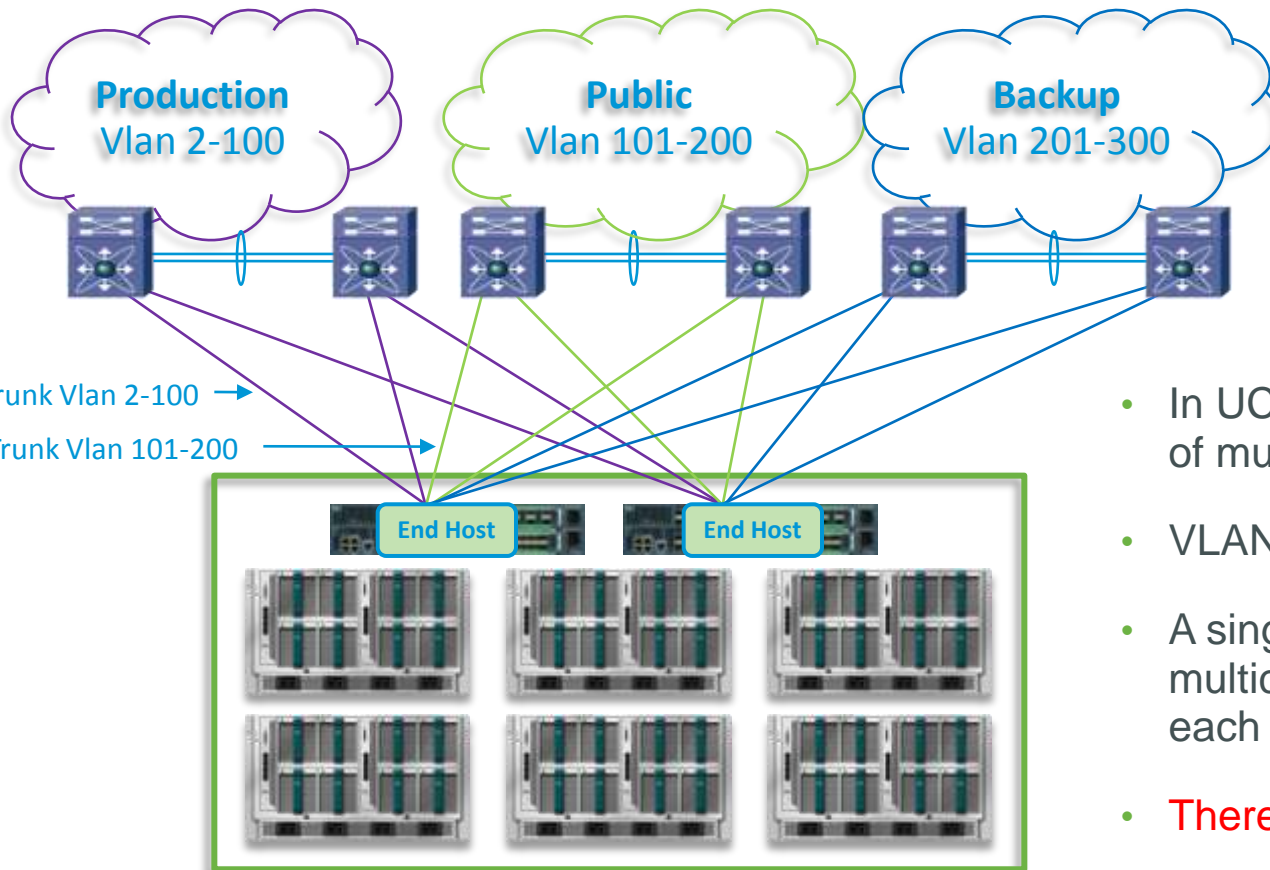
## Overview

# UCS 2.0

## Disjoint L2



# Disjoint Layer 2 Support



- In UCS 2.0, End host mode is aware of multiple L2 domains upstream
- VLANs can be filtered on uplinks
- A single uplink port designated as multicast and broadcast receiver on each VLAN.
- **There musn't be VLANs overlapping!**
- **No VLAN translation**

# Is it secured?

- VLAN-based isolation

UCS since 1.4 passed EAL4+ Common Criteria certification

<http://www.niap-ccevs.org/cc-scheme/st/vid10403/>

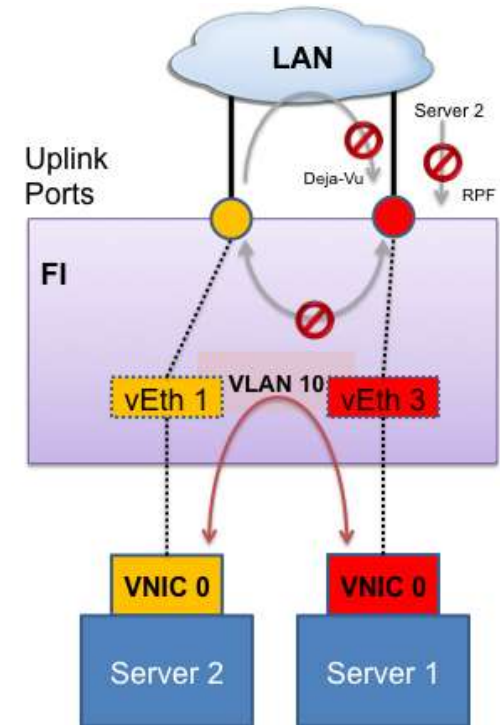
- Hardened End Host Mode forwarding scheme

Disjoint L2 only add mapping & M/B receiver

- What is the risk? What is the cost?

Then you choose 😊

Most customer keep exposed / not exposed  
physical separation

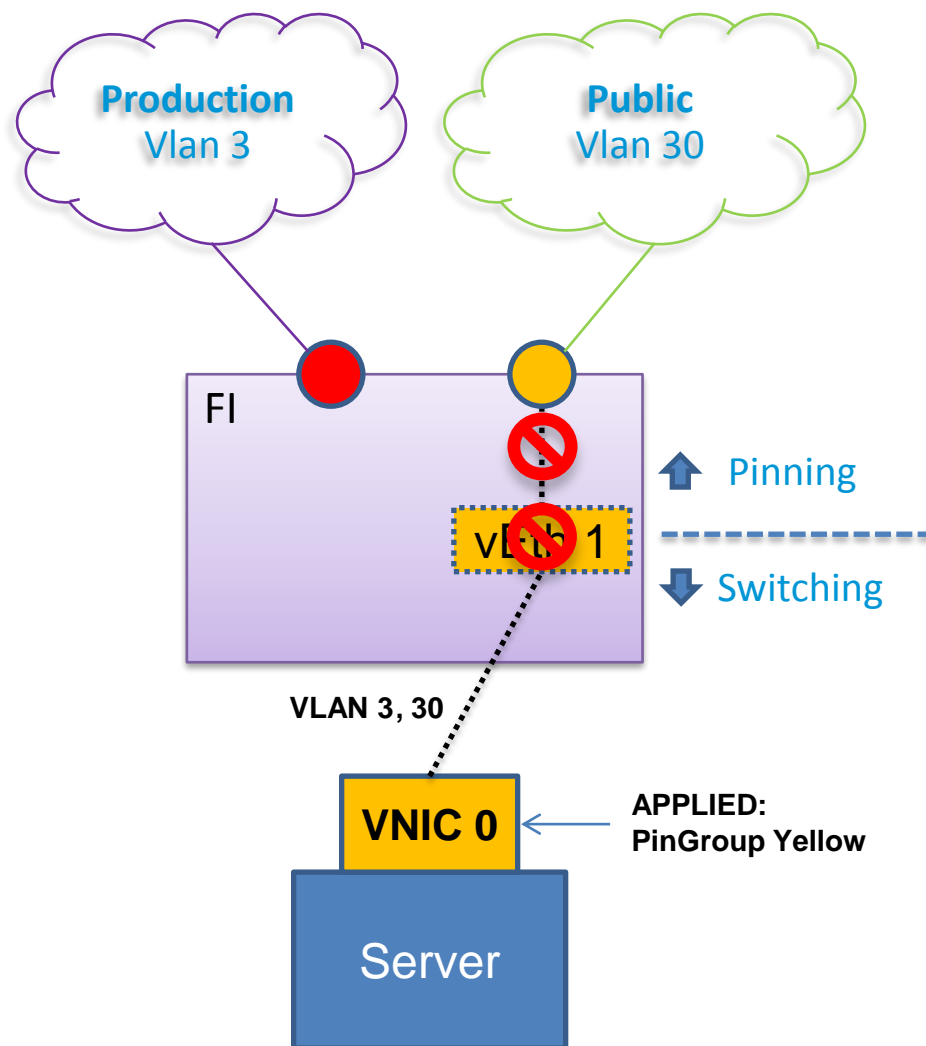


# Considerations

- By default, everything is everywhere
  - Every uplink carry all VLANs
  - New uplinks will carry all VLANs
  - New VLANs will be carried on all uplinks
  - Removing VLAN from ALL its member uplinks will make it be carried by all uplinks

- vNIC is still pinned to uplinks
  - Pin groups take the lead (configuration warning)
  - vNIC can trunk VLANs from 1 domain

**So VIC is almost mandatory...**





# UCS 2.0 iSCSI Boot



# iSCSI Boot Support in UCS Manager

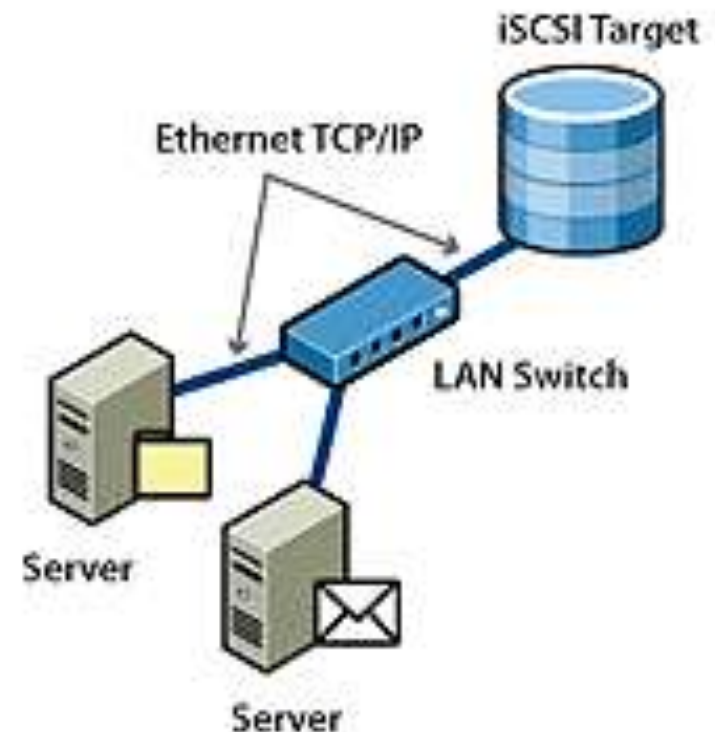
## Feature details

- Adapters
  - M81KR / VIC 1280
    - iBFT, no iSCSI offloads
  - M51KR-B
    - full offload, iSCSI HBA
- Operating System support
  - VMware
  - Windows
  - Linux Red Hat

Refer release notes for specific versions supported and UCS Configuration guide:

- Windows failure scenarios
- HBA mode during installation...

It is boot from SAN: so take care of your storage array mode of operation and failure scenarios



# Policies

Equipment Servers LAN SAN VM Admin

Filter All

Servers

- Service Profiles
  - root
- Service Profile Templates
- Policies
  - root
    - Adapter Policies
      - Eth Adapter Policy Linux
      - Eth Adapter Policy VM-FEX-KVM
      - Eth Adapter Policy VMWare
      - Eth Adapter Policy VMWarePassThru
      - Eth Adapter Policy Windows
      - Eth Adapter Policy default
      - FC Adapter Policy Linux
      - FC Adapter Policy VMWare
      - FC Adapter Policy Windows
      - FC Adapter Policy default
      - iSCSI Adapter Policy default
    - Authentication Profiles
    - BIOS Defaults
    - BIOS Policies
    - Boot Policies
    - Host Firmware Packages
    - IPMI Access Profiles
    - Local Disk Config Policies
    - Maintenance Policies

Create iSCSI Adapter Policy

**Create iSCSI Adapter Policy**

Name:

Connection Timeout:  [0-255]

LUN Busy Retry Count:  [0-60]

DHCP Timeout:  [60-300]

Enable TCP Timestamp:

HBA Mode:

Boot To Target:

These are not supported by Cisco VIC

OK Cancel

Equipment Servers LAN SAN VM Admin

Filter All

Servers

- Service Profiles
  - root
- Service Profile Templates
- Policies
  - root
    - Adapter Policies
    - Authentication Profiles
      - default
      - BIOS Defaults
      - BIOS Policies
      - Boot Policies
      - Host Firmware Packages
      - IPMI Access Profiles
      - Local Disk Config Policies
      - Maintenance Policies
      - Management Firmware Packages
      - Power Control Policies
      - Scrub Policies
      - Serial over LAN Policies

Create Authentication Profile

**Create Authentication Profile**

Name:

User ID:

Password:

Confirm Password:

Must be at least 12 characters

Note, does not say "iSCSI"

OK Cancel

Create Boot Policy

**Create Boot Policy**

Name:

Description:

Reboot on Boot Order Change:

Enforce vNIC/vHBA/iSCSI Name:

**WARNING:**  
The type (primary/secondary) does not include a boot order presence.  
The effective order of boot devices within the same device class (SAN/Storage/iSCSI) is determined by PCIe bus scan order.  
If Enforce vNIC/vHBA/iSCSI Name is selected and the vNIC/vHBA/iSCSI does not exist, a config error will be reported.  
If it is not selected, the vNIC/vHBA/iSCSI are selected if they exist, otherwise the vNIC/vHBA/iSCSI with the lowest PCIe bus scan order is used.

Local Devices

- vNICs
- vHBAs
- iSCSI vNICs

Boot Order

Name	Order	vNIC/vHBA/iSCSI	vNIC	Type	Lun ID	WWN
iSCSI	1	iccsi-eth0		Primary		
iSCSI		iccsi-eth1		Secondary		

Maximum of two iSCSI vNIC can be added

OK Cancel

# IP Address pool

**Fault Summary**

1 58 7 16

Equipment Servers LAN SAN VM Admin

Filter: All

LAN

- LAN Cloud
  - Fabric A
  - Fabric B
  - QoS System Class
  - LAN Pin Groups
  - Threshold Policies
  - VLANs
- Appliances
- Internal LAN
  - Internal Fabric A
  - Internal Fabric B
  - Threshold Policies
- Policies
- Pools
  - root
    - IP Pool (iscsi-initiator-pool)**
    - [10.29.147.62 - 10.29.147.62]
    - MAC Pools
  - Sub-Organizations
- Traffic Monitoring Sessions

Create Block of IP Addresses

### Create a Block of IP Addresses

From: 8.8.8.8 Size: 10

Subnet Mask: 255.255.255.0 Default Gateway: 8.8.8.1

Primary DNS: 0.0.0.0 Secondary DNS: 0.0.0.0

OK Cancel

# Overlay & iSCSI vNICs

**Create Service Profile (expert)**

## Unified Computing System Manager

**Networking**  
Optionally specify LAN configuration information.

Dynamic vNIC Connection Policy:

How would you like to configure LAN connectivity?  Simple  Expert  No vNICs  Hardware Teamed

Click **Add** to specify one or more vNICs that the server should use to connect to the LAN.

Name	MAC Address	Fabric ID	Native VLAN
<input checked="" type="checkbox"/> vNIC eth0	Derived	A	
<input type="checkbox"/> Network Production-10			<input type="radio"/>
<input type="checkbox"/> Network Production-20			<input type="radio"/>
<input checked="" type="checkbox"/> vNIC eth1	Derived	B	
<input type="checkbox"/> Network Dans-N5ks-iSCSI-205			<input type="radio"/>

Delete Add Modify

### Add iSCSI vNICs

Name	Overlay vNIC Name	iSCSI Adapter Policy	MAC Address
------	-------------------	----------------------	-------------

Add Delete Modify

< Prev Next > Finish Cancel

**(1) Overlay (parent) vNIC Objects. Normal Creation**

**(2) Add iSCSI vNICs with vNICs as overlay created in (1)**

**No fabric failover**

# iSCSI vNIC configuration

- 1 Object name, user preference
- 2 Overlay vNIC created in previous step. Child object, inherits some attributes
- 3 Adapter Policy previously created before SP process
- 4 VLAN, inherited from overlay vNIC, drop down list of available VLANs assigned to overlay vNIC. **MUST BE THE NATIVE VLAN with VIC**
- 5 **For VIC set to “None”** For Broadcom you can use the Standard MAC Pool
- 6 Max of 2 iSCSI vNICs per SP is allowed

The screenshot shows the 'Create iSCSI vNIC' configuration window. The window title is 'Create iSCSI vNIC'. The main title is 'Create iSCSI vNIC'. The configuration fields are:

- Name: **iscsi-eth0** (1)
- Overlay vNIC: eth0 (2)
- iSCSI Adapter Policy: cn\_iscsi (3) [Create iSCSI Adapter Policy]
- VLAN: Production-10 (4)
- iSCSI MAC Address section:
  - MAC Address Assignment: MAC-Pool(48/50) (5)
  - [Create MAC Pool]
  - The MAC address will be automatically assigned from the selected pool.

Buttons: OK, Cancel

# Define iSCSI boot parameters

**Create Service Profile (expert)**

## Unified Computing System Manager

Create Service Profile (expert)

1. ✓ Identify Service Profile
2. ✓ Storage
3. ✓ Networking
4. ✓ vNIC/vHBA Placement
5. ✓ **Server Boot Order**
6. ✓ Maintenance Policy
7. ✓ Server Assignment
8.  Operational Policies

### Server Boot Order

Optionally specify the boot policy for this service profile.

Select a boot policy.

Boot Policy: **iscsi-boot**

Name: **iscsi-boot**

Description:

Reboot on Boot Order Change: **no**

Enforce vNIC/vHBA/iSCSI Name: **yes**

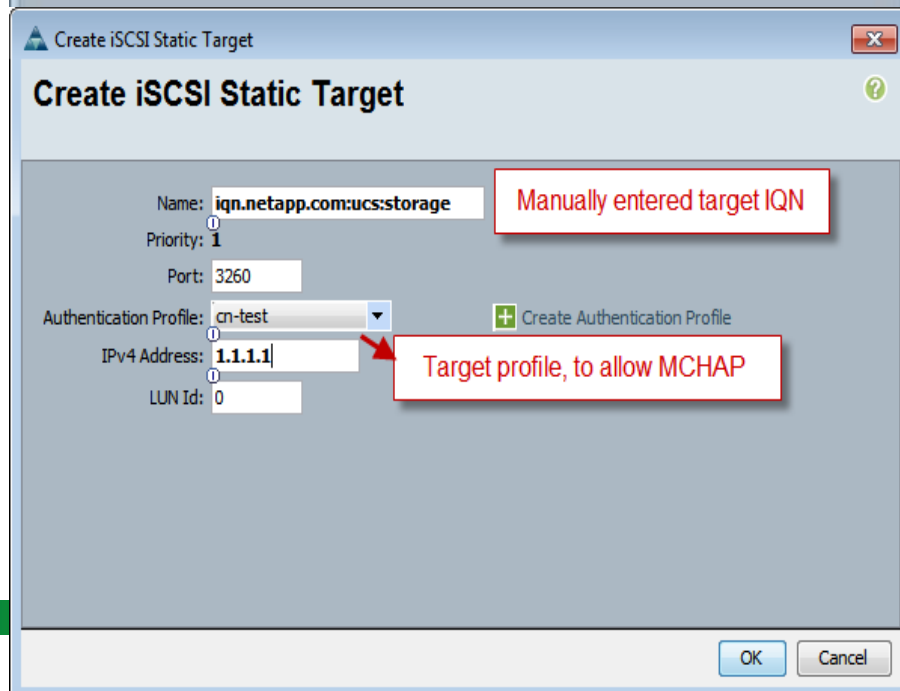
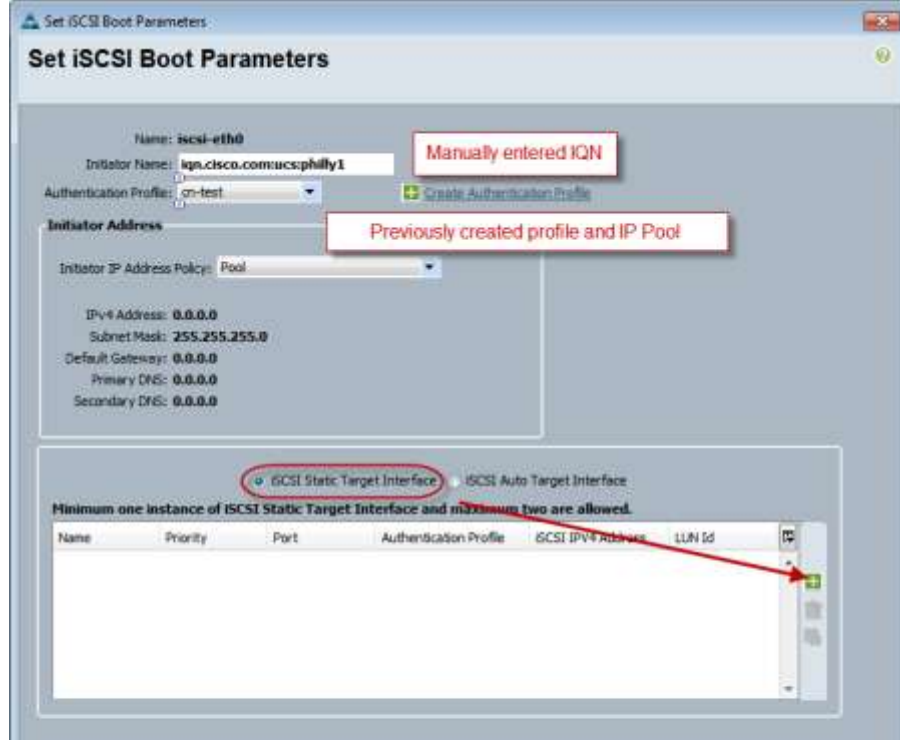
**WARNINGS:**  
The type (primary/secondary) does not indicate a boot order presence.  
The effective order of boot devices within the same device class (LAN/Storage/iSCSI) is determined by PCIe bus scan order.  
If **Enforce vNIC/vHBA/iSCSI Name** is selected and the vNIC/vHBA/iSCSI does not exist, a config error will be reported.  
If it is not selected, the vNICs/vHBAs/iSCSI are selected if they exist, otherwise the vNIC/vHBA/iSCSI with the lowest PCIe bus scan order is used.

Name	Order	vNIC/vHBA/iSCSI vNIC	Type	Lun ID	WWN
ISCSI	1				
ISCSI		iscsi-eth0	Primary		
ISCSI		iscsi-eth1	Secondary		

< Prev   Next >   Finish   Cancel

Modify Boot Parameters here

# Target modes





# iSCSI boot troubleshooting on VIC

```
UCS-6100-A# connect adapter 1/1/1
adapter 1/1/1 # connect
adapter 1/1/1 (top):1# attach-mcp
adapter 1/1/1 (mcp):1# iscsi_get_config
```

vnic iSCSI Configuration:

```
-----
vnic_id: 6
      link_state: Up

      Initiator Cfg:
      initiator_state: ISCSI_INITIATOR_READY
      initiator_error_code: ISCSI_BOOT_NIC_NO_ERROR
      vlan: 0
      dhcp status: false
      IQN: iqn.1991-11.com.cust:ucs-node1
      IP Addr: 10.20.13.179
      Subnet Mask: 255.255.255.0
      Gateway: 10.20.13.250

      Target Cfg:
      Target Idx: 0
      State: ISCSI_TARGET_READY
      Prev State: ISCSI_TARGET_DISABLED
      Target Error: ISCSI_TARGET_NO_ERROR
      IQN: iqn.1992-08.com.netapp:sn.101201005
      IP Addr: 10.20.13.151
      Port: 3260
      Boot Lun: 0
      Ping Stats: Success (9.553ms)

      Session Info:
      session_id: 0
      host_number: 0
      bus_number: 0
      target_id: 0
```

```
UCS-6100-A# connect adapter 1/1/1
adapter 1/1/1 # connect
adapter 1/1/1 (top):1# attach-mcp
adapter 1/1/1 (mcp):1# iscsi_ping
```

id	name	tgt	address	port	tcp	ping	status
----	------	-----	---------	------	-----	------	--------

6	vnic_2	0	100.65.160.181	3260	Not	issued	
6	vnic_2	1	100.65.160.181	3260	Not	issued	
7	vnic_3	0	100.65.160.145	3260	Not	issued	
7	vnic_3	1	100.65.160.145	3260	Not	issued	

```
adapter 1/1/1 (mcp):2# iscsi_ping start
```

```
adapter 1/1/1 (mcp):3# iscsi_ping
```

id	name	tgt	address	port	tcp	ping	status
----	------	-----	---------	------	-----	------	--------

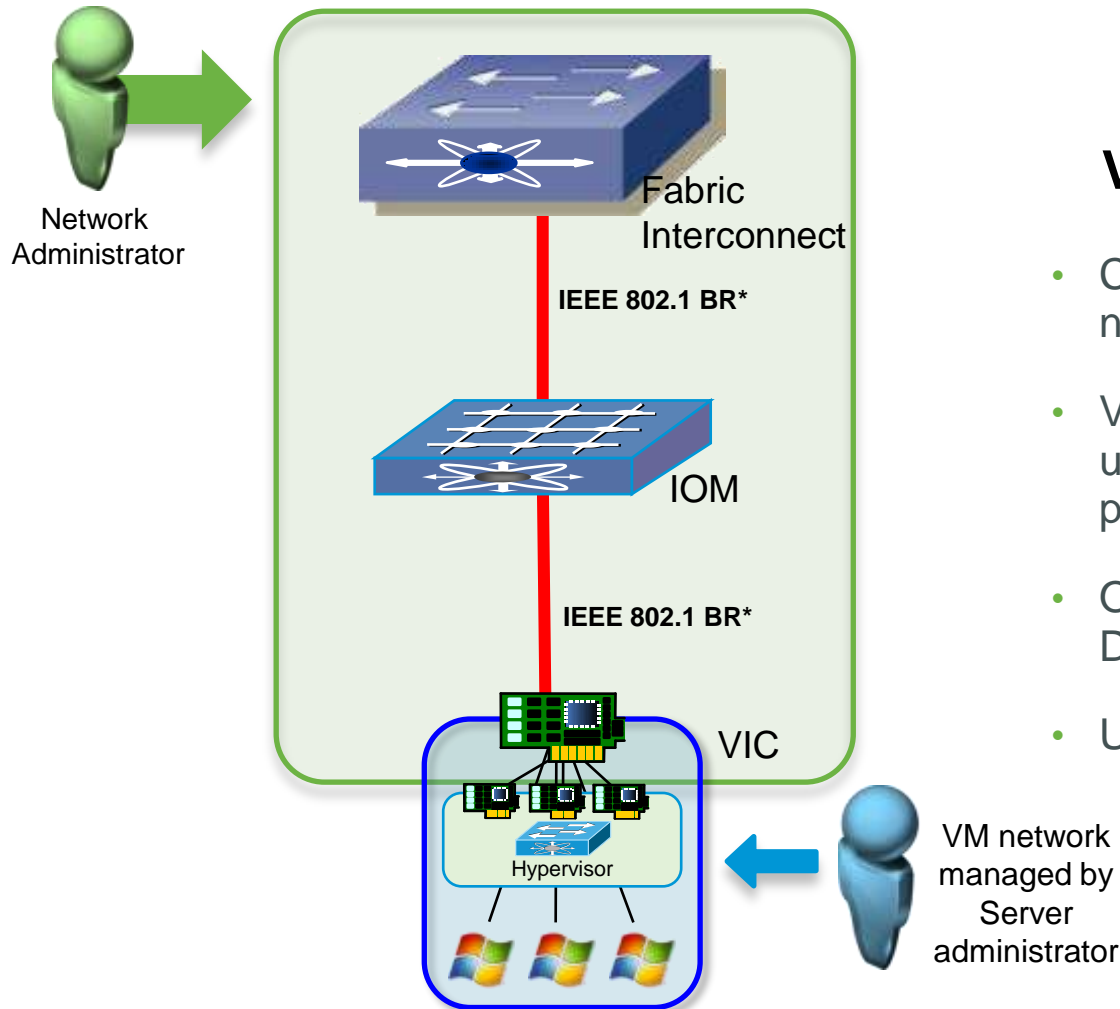
6	vnic_2	0	100.65.160.181	3260	Success	(2.740ms)	
6	vnic_2	1	100.65.160.181	3260	Success	(2.666ms)	
7	vnic_3	0	100.65.160.145	3260	Success	(2.555ms)	
7	vnic_3	1	100.65.160.145	3260	Success	(2.261ms)	

# UCS 2.0 VMFex with vMotion



# VM-FEX

## Extending the FEX Architecture to VM's



## One Network Virtual Same As Physical

- Consolidates virtual **and** physical network
- VM vNIC attached to the network using VM-FEX and gets a dedicated port on switch
- Operates in Standard (Emulated) or DirectPath I/O (UPT) Mode
- Uses Pre-standard IEEE 802.1BR

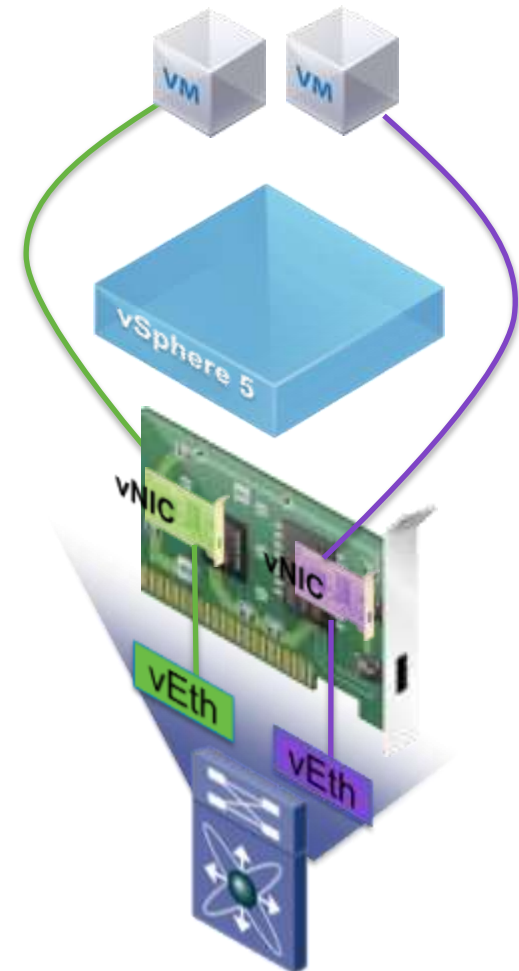
\*IEEE 802.1BR pre-standard

# DirectPath I/O with vMotion

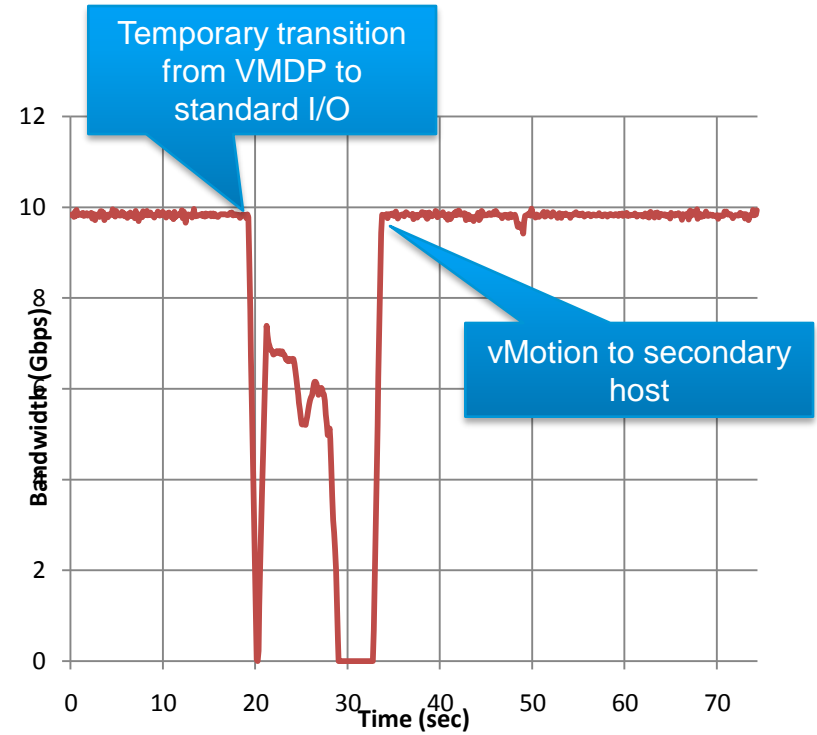
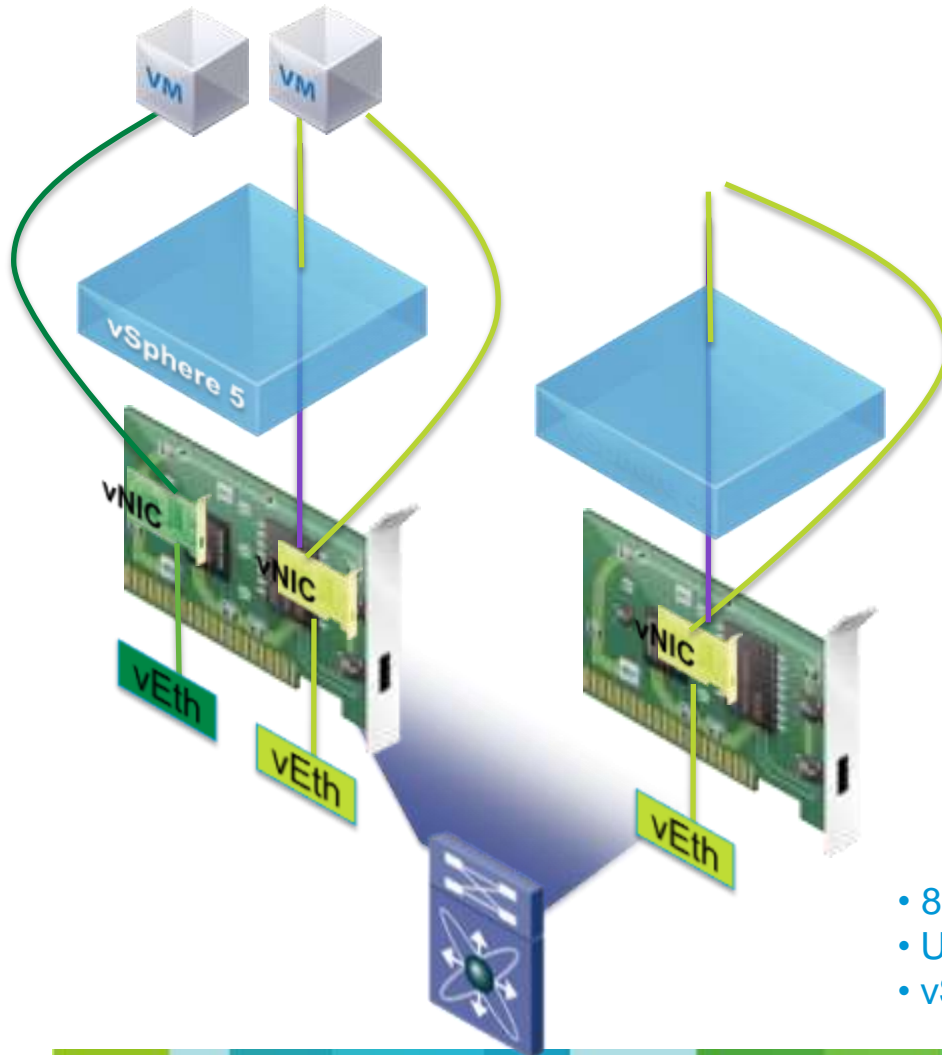
- Data traffic from VM bypasses the hypervisor
  - **Take care about OS support**
- Available in vSphere 5
- Other names it is known by
  - VM-FEX High Performance Mode
  - UPT
  - VMDirectpath Gen2
- Co-exists with standard mode – Cisco VIC required
- UCS specifically called out in vSphere 5 Networking Guide (Page 42)

*You can enable DirectPath I/O with vMotion for virtual machines in a datacenter on a [Cisco UCS](#) system that has at least one supported Cisco distributed switch.*

## DirectPath I/O with vMotion



# VMDirectPath VMotion in action



- 8GB VM, sending UDP stream using pktgen (1500MTU)
- UCS B200 blades with UCS VIC card
- vSphere 5

# DirectPath I/O

- Data traffic from VM bypasses the hypervisor
- Does not follow the vNetwork distributed switch model – PCI devices explicitly assigned
- Following features unavailable

vMotion / DRS

Suspend and resume

Record and replay

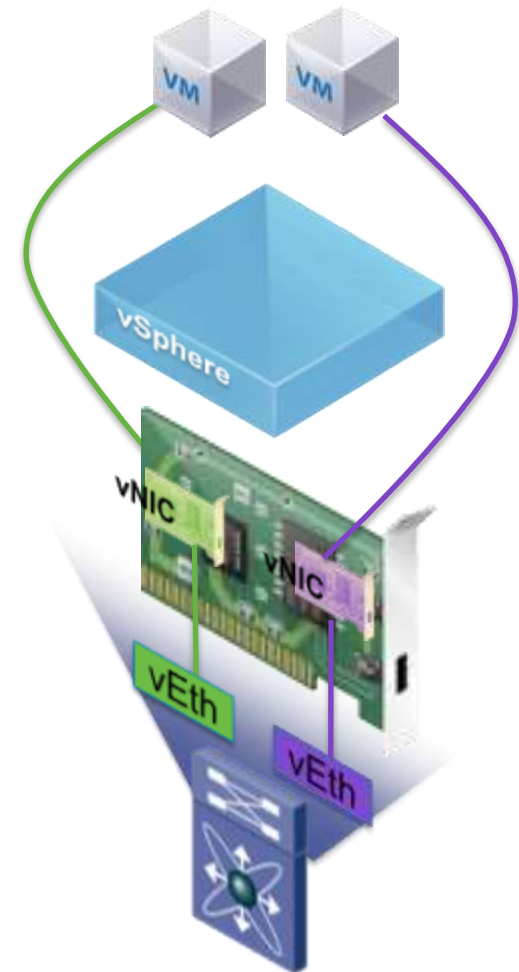
Fault tolerance

High availability

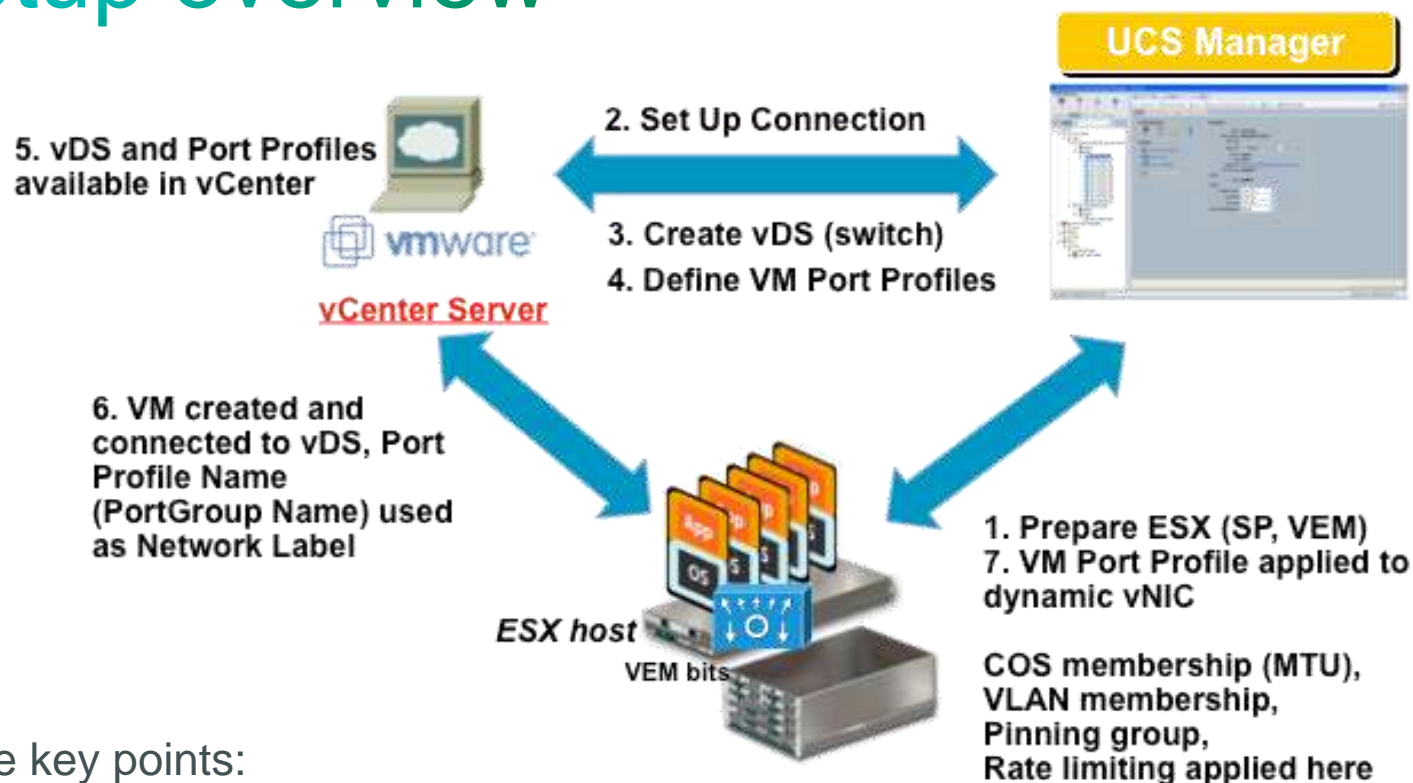
Snapshots

**Not Recommended / Tested on Cisco VIC**

## DirectPath I/O



# Setup overview



Some key points:

- Always use VEM bits from <http://your-UCSM/vmfex/vmfex.html>
- One ESX cannot be part of a N1000v and VMFEX in the same time
- If you move one ESX from one to the other, uninstall / reinstall VEM bits will make things easier (VEM keep track of VMFEX / N1kv modes)

# Why different models?

VMs DENSE ENVIRONMENTS,  
RICHER FEATURE SET  
& FLEXIBLE DEPLOYMENT

Nexus 1000V &  
Generic Adapter / Server

Nexus 1000V &  
VIC on UCS Server

**Hypervisor switch: Nexus 1000v**

HIGHER PERFORMANCES &  
BETTER I/O MANAGEMENT

UCS  
6200  
&  
VIC

UCS  
6200  
&  
VIC  
VMDirect  
Path

**Port Ext. w/VM-Fex (.1BR)**



# DirectPath I/O with vMotion

## Creating Dynamic vNICs

- Policies are to automatically provision dynamic vNICs on Servers
- Dependent on the number of Fabric Interconnect to IO Module connections  
(# IOM to FI links \* 63) – 2 on Gen2

The screenshot displays the Cisco Network Assistant interface. On the left, a tree view shows the configuration hierarchy under 'LAN' > 'Policies' > 'Dynamic vNIC Connection Policies'. The policy 'IOM\_to\_FI\_4\_Link' is selected. The right pane shows the configuration details for this policy:

- Name:** IOM\_to\_FI\_4\_Link
- Description:** (empty field)
- Naming Prefix:** dynamic-
- Number of Dynamic vNICs:** 48
- Adapter Policy:** VMWarePassThru
- Protection:** Protected (selected), Protected Pref A, Protected Pref B

# DirectPath I/O with vMotion

## Building Service Profile

- 2 Statics – 1 to each UCS Fabric
- Change dynamic vNIC connection policy to setup dynamics
- Keep cool: Dynamic vNIC are hidden in vCenter (different PCI device ID)

The screenshot displays the vCenter configuration for a Service Profile. The left pane shows the Service Profiles tree with various profiles listed. The right pane shows the configuration for the selected profile, specifically the Network tab. The Dynamic vNIC Connection Policy is configured with the name **IOM\_to\_FI\_4\_Link**, which is circled in red. The policy is set to **org-root/dynamic-con-IOM\_to\_FI\_4\_Link** and has **48** dynamic vNICs. The vNIC/vHBA Placement Policy is set to **Nothing Selected**.

The vNICs table below shows the configuration for the dynamic vNICs. The table has columns for Name, MAC Address, Desired Order, Actual Order, Fabric ID, and Description. The first two rows, vNIC eth1 and vNIC eth0, are circled in red. The remaining rows are dynamic vNICs with names like vNIC dynamic-prot-048, vNIC dynamic-prot-047, etc.

Name	MAC Address	Desired Order	Actual Order	Fabric ID	Desi
vNIC eth1	00:25:B5:00:00:68	2	2	B	Any
vNIC eth0	00:25:B5:00:00:58	1	1	A	Any
vNIC dynamic-prot-048	Derived	51	50	B A	Any
vNIC dynamic-prot-047	Derived	50	49	A B	Any
vNIC dynamic-prot-046	Derived	49	48	B A	Any
vNIC dynamic-prot-045	Derived	48	47	A B	Any
vNIC dynamic-prot-044	Derived	47	46	B A	Any
vNIC dynamic-prot-043	Derived	46	45	A B	Any
vNIC dynamic-prot-042	Derived	45	44	B A	Any
vNIC dynamic-prot-041	Derived	44	43	A B	Any
vNIC dynamic-prot-040	Derived	43	42	B A	Any
vNIC dynamic-prot-039	Derived	42	41	A B	Any
vNIC dynamic-prot-038	Derived	41	40	B A	Any

# DirectPath I/O with vMotion

## Configure port-profile

The screenshot shows the NCA interface for configuring a Port Profile named 'vMotion'. The breadcrumb path is '>> All > Port Profiles > Port Profile vMotion'. The 'General' tab is selected. In the 'Actions' panel, there are three options: 'Create Profile Client', 'Modify VLANs', and 'Delete'. The 'Properties' panel shows the following configuration:

- Name: **vMotion**
- Description: [Empty text field]
- QoS Policy: <not set>
- Network Control Policy: <not set>
- Max Ports: 64
- Host Network IO Performance:  None  High Performance
- Pin Group: <not set>

A red box highlights the 'Host Network IO Performance' section, and a blue arrow points from a callout box to the 'High Performance' radio button. The callout box contains the text: 'Turns on DirectPath I/O for a port profile'.

You can / should use VM FEX for all your interfaces (VMs, vmk...)

# DirectPath I/O with vMotion

## Communication with Manager

- Same Plug-in Method used in Nexus 1000v
- 8 Separate managers today

The screenshot shows the UCS Manager interface with the 'vCenters' tab selected. The left sidebar shows a tree view with 'MEVC' expanded, containing 'UCSTMELAB' and 'PTS\_Switches'. Under 'UCSTMELAB', there is a 'Datacenter UCS\_DVS\_1' folder containing several profiles: Profile Mgmt\_VLAN\_2, Profile Service\_Console, Profile VM\_Kernel, Profile VM\_Production\_178, Profile VM\_VLAN\_6, Profile VM\_VLAN\_7, Profile deleted-pg-UCS\_DVS\_1, Profile iSCSI\_Network, and Profile uplink-pg-UCS\_DVS\_1. The main panel shows the 'Actions' section with options: Export vCenter Extension, Export Multiple vCenter Extensions, Modify Extension Key, Configure vCenter, and Configure VMware Integration. To the right, a text box explains that vCenter extension files are required for secure communication between vCenter and UCSM, and provides instructions for vCenter version 4.0 Update 1 and later, and vCenter version 4.0. Below this, the 'Extension Key' is displayed as 'Cisco-UCSM-c6a3d588-d8a6-11de-b92'.

The screenshot shows the UCS Manager interface with the 'Folders' tab selected. The left sidebar shows a tree view with 'vCenter UCSTMELAB' expanded, containing 'Datacenter UCSTMELAB', 'Folder PTS\_Switches', and 'UCS\_DVS\_1'. Under 'UCS\_DVS\_1', there are several profiles: Profile Mgmt\_VLAN\_2, Profile Service\_Console, Profile VM\_Kernel, Profile VM\_Production\_178, Profile VM\_VLAN\_6, Profile VM\_VLAN\_7, Profile deleted-pg-UCS\_DVS\_1, Profile iSCSI\_Network, and Profile uplink-pg-UCS\_DVS\_1. The main panel shows the 'Properties' section with the following details: Name: UCSTMELAB, Description: (empty), Hostname (or IP Address): 172.25.177.227, and Key: Cisco-UCSM-c6a3d588-d8a6-11de-b92. The 'Actions' section on the left includes: Create Datacenter, Create Folder, and Delete.

# DirectPath I/O with vMotion

## Configuration in VCenter

**Create New Virtual Machine** Virtual Machine Version: 8

**Network**  
Which network connections will be used by the virtual machine?

[Configuration](#)  
[Name and Location](#)  
[Storage](#)  
[Virtual Machine Version](#)  
[Guest Operating System](#)  
[CPUs](#)  
[Memory](#)  
**Network**  
SCSI Controller  
Select a Disk  
Ready to Complete

**Create Network Connections**

How many NICs do you want to connect? 1

	Network	Adapter	Connect at Power On
NIC 1:	Normal (Pass1)	VMXNET 3	<input checked="" type="checkbox"/>

Select port profile on Cisco DVS

VMXNET3 required for DirectPath I/O

# DirectPath I/O with vMotion

## Configuration in VCenter

The screenshot shows the 'Resources' tab in the VMware vCenter interface for a virtual machine. The left pane shows the 'Memory' setting at 4096 MB. The right pane, 'Resource Allocation', shows the following configuration:

- Reserve all guest memory (All locked)
- Shares: Normal, 40960
- Reservation: 4096 MB
- Limit: 58483 MB
- Unlimited

# DirectPath I/O Status

The screenshot displays the 'rhel - Virtual Machine Properties' window. The 'Hardware' tab is selected, showing a list of hardware components and their summaries. The 'Network adapter 1' is highlighted. On the right, the 'Device Status' section shows 'Connected' and 'Connect at power on' checked. The 'Adapter Type' is 'VMXNET 3'. The 'MAC Address' is '00:50:56:9a:30:40'. The 'DirectPath I/O Gen. 2' section shows 'Status: Active' with an information icon. The 'Network Connection' section shows 'Network label: Normal (Pass1)' and 'Port: 1566'. A 'Switch to advanced settings' link is visible at the bottom right.

Hardware	Summary
Memory	4096 MB
CPUs	2
Video card	Video card
VMCI device	Restricted
SCSI controller 0	LSI Logic Parallel
Hard disk 1	Virtual Disk
CD/DVD drive 1	Client Device
<b>Network adapter 1</b>	<b>Normal (Pass1), Port: 1...</b>
Floppy drive 1	Client Device

Virtual Machine Version: 8

Device Status

- Connected
- Connect at power on

Adapter Type

Current adapter: VMXNET 3

MAC Address

00:50:56:9a:30:40

Automatic  Manual

DirectPath I/O Gen. 2

Status: Active ⓘ

Network Connection

Network label:

Normal (Pass1)

Port: 1566

[Switch to advanced settings](#)

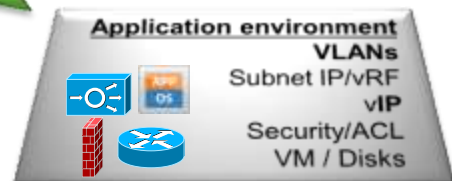
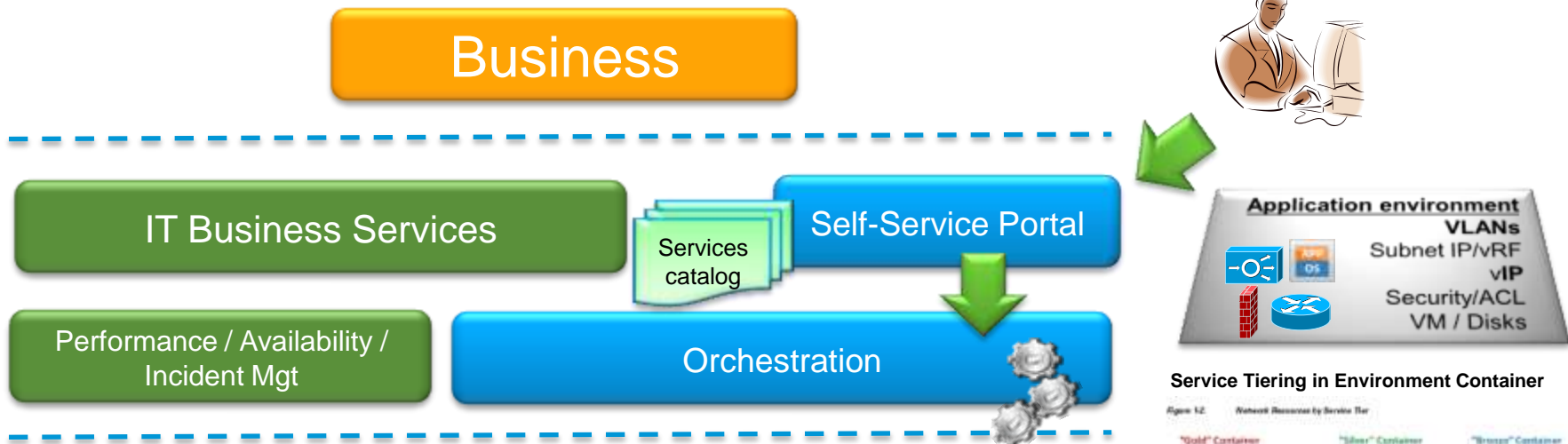
# Customers' new subject of interest



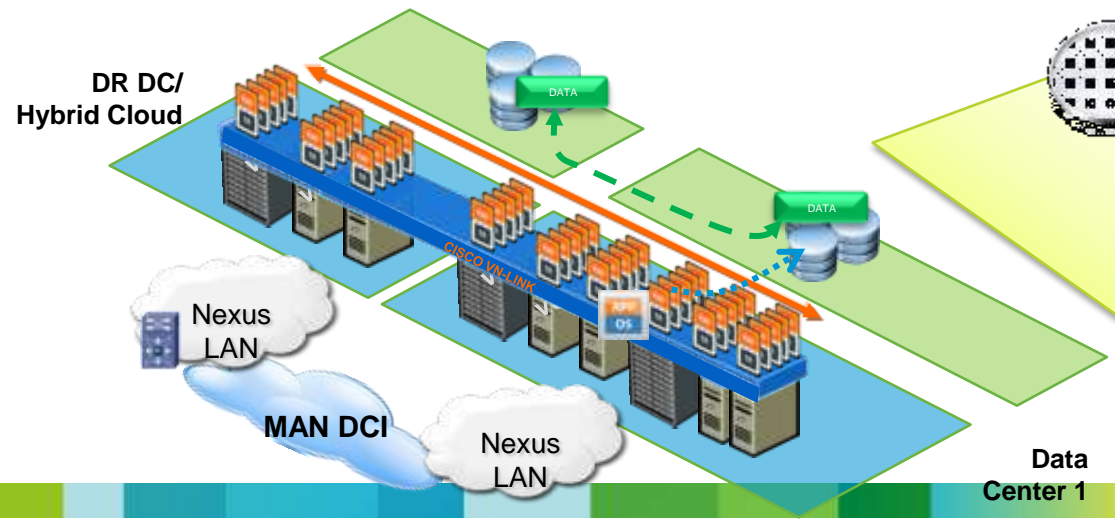
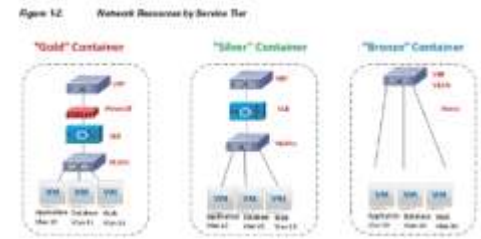


# Cloud-ready platform

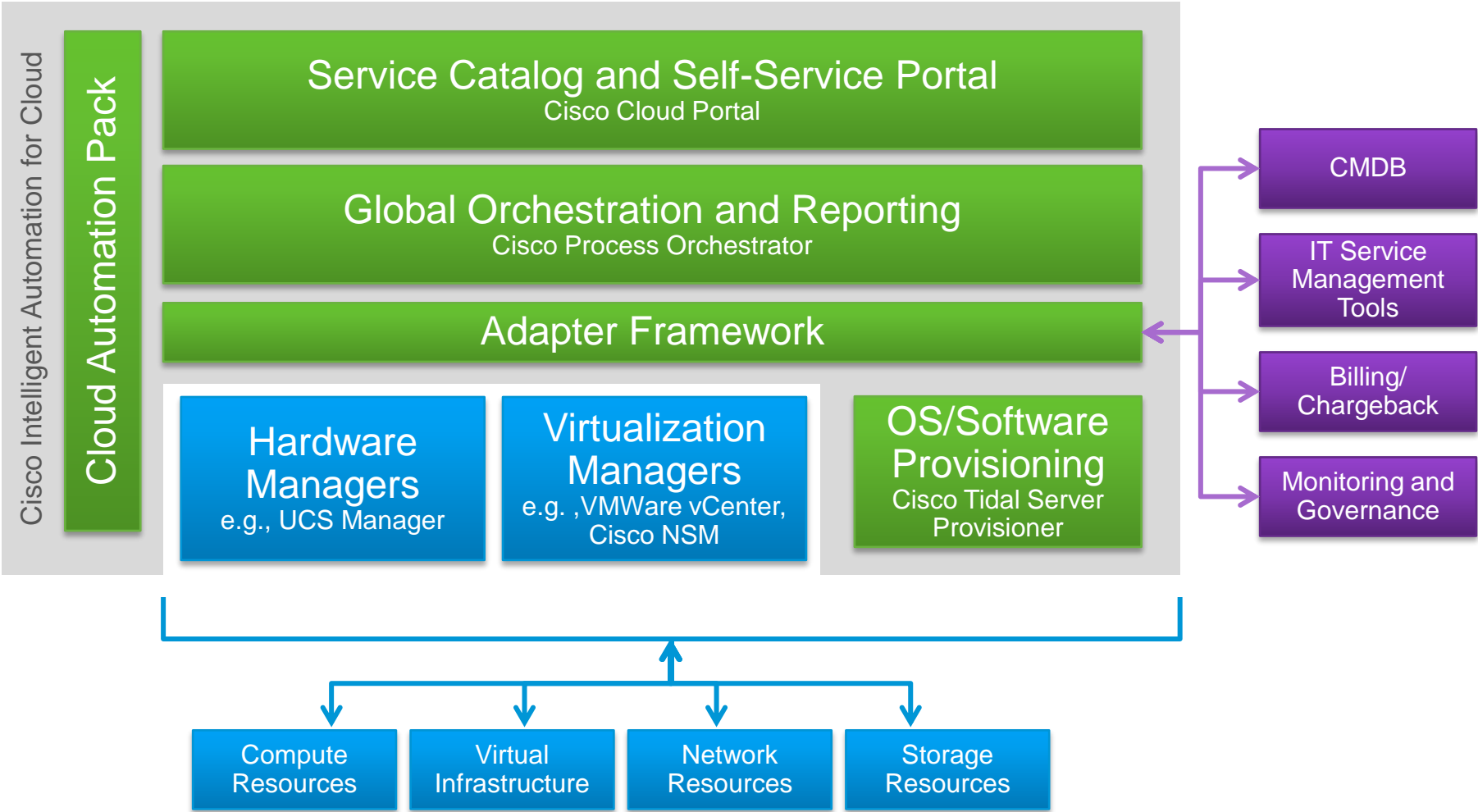
On-demand/Self provisioning, Elastic, Pay-per-use, Secure



Service Tiering in Environment Container



# Cisco Intelligent Automation for Cloud



# Useful links

- UCS B-Series documentation roadmap  
Search „UCS Roadmap“ on cisco.com
  
- Cisco Developer Network
  - UCS Manager Emulator
  - UCS Dashboard
  - goUCS
  - <http://developer.cisco.com/web/unifiedcomputing/home>

# Otázky a odpovědi

- Twitter [www.twitter.com/CiscoCZ](http://www.twitter.com/CiscoCZ)
- Talk2Cisco [www.talk2cisco.cz/dotazy](http://www.talk2cisco.cz/dotazy)
- SMS 721 994 600
  
- Zveme Vás na **Ptali jste se...** v sále **LEO**
  - 1.den 17:45 – 18:30
  - 2.den 16:30 – 17:00

**Prosíme, ohodnot'te  
tuto přednášku.**

