



*TOMORROW
starts here.*

Cisco *live!*



UCS Networking Deep Dive

BRKCOM-2003

Michael Ciesla, Customer Support Engineer

#clmel

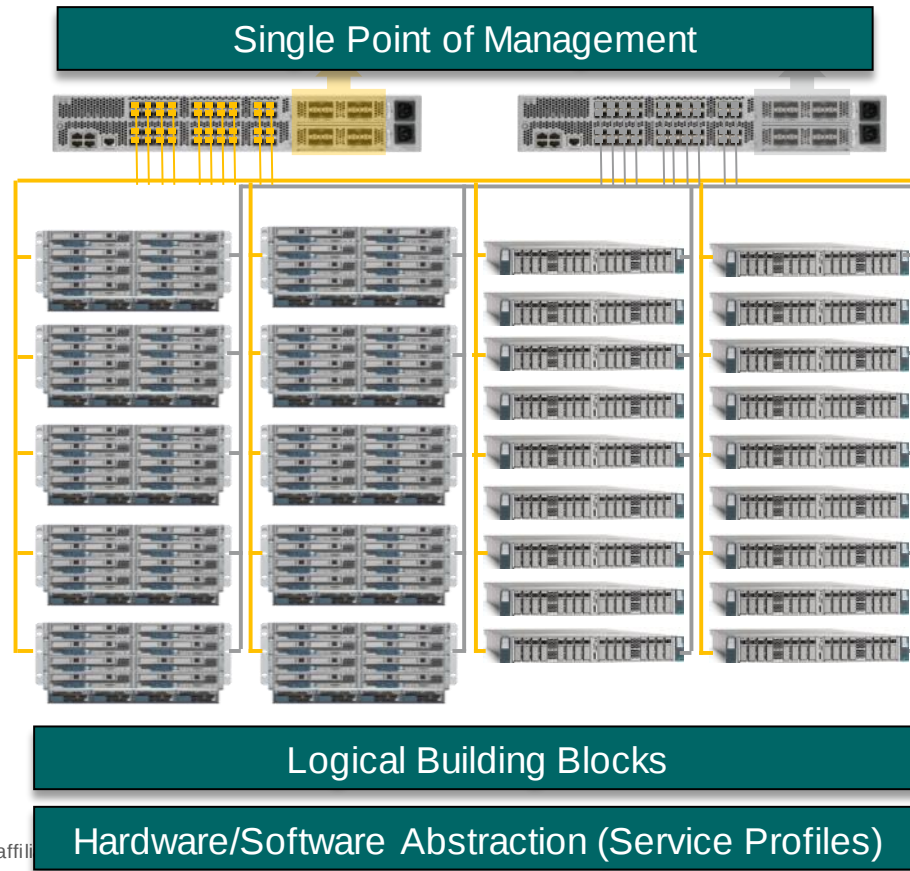
Cisco *live!*

Agenda

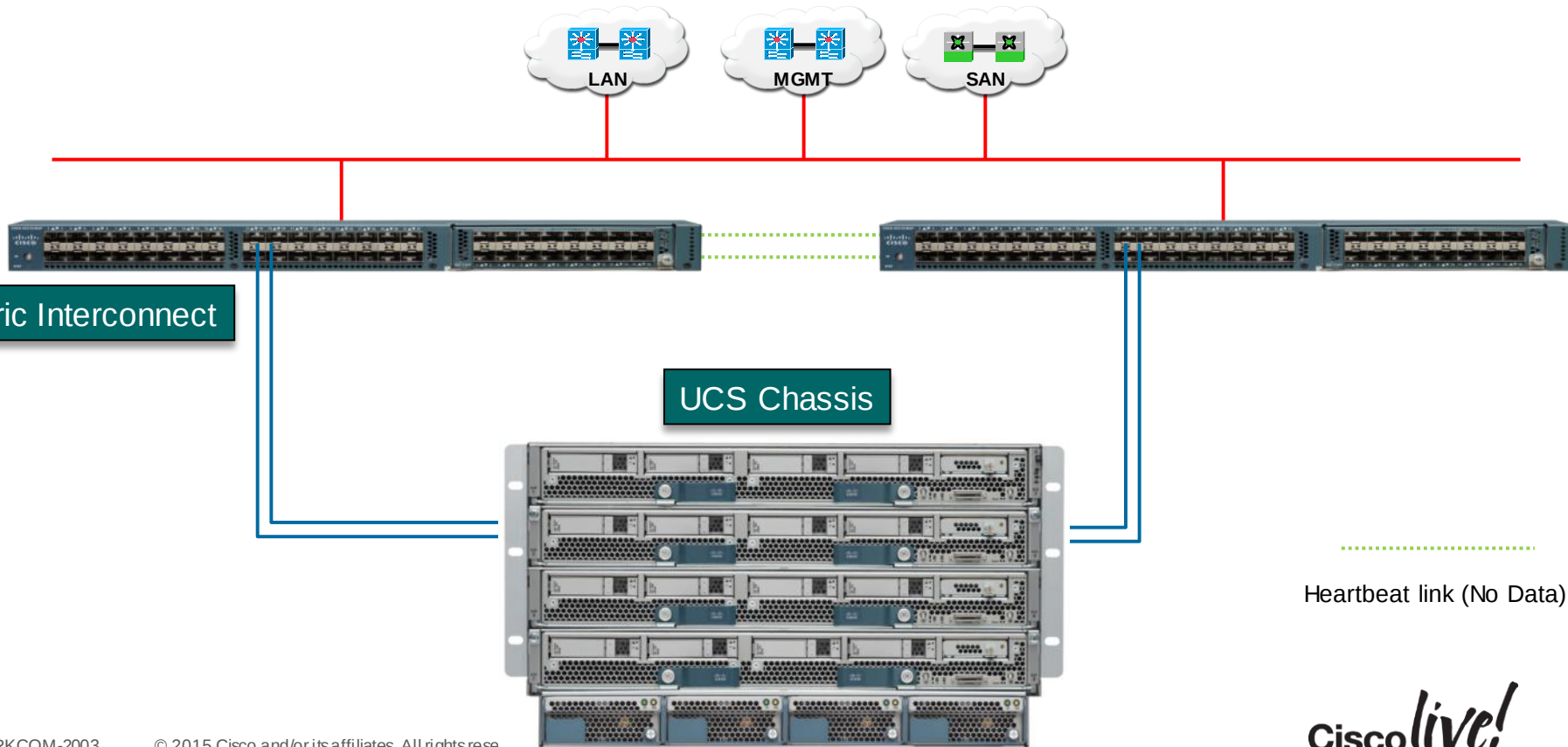
- UCS Overview
- Chassis Connectivity
- Server Connectivity
- Fabric Forwarding
- Topologies



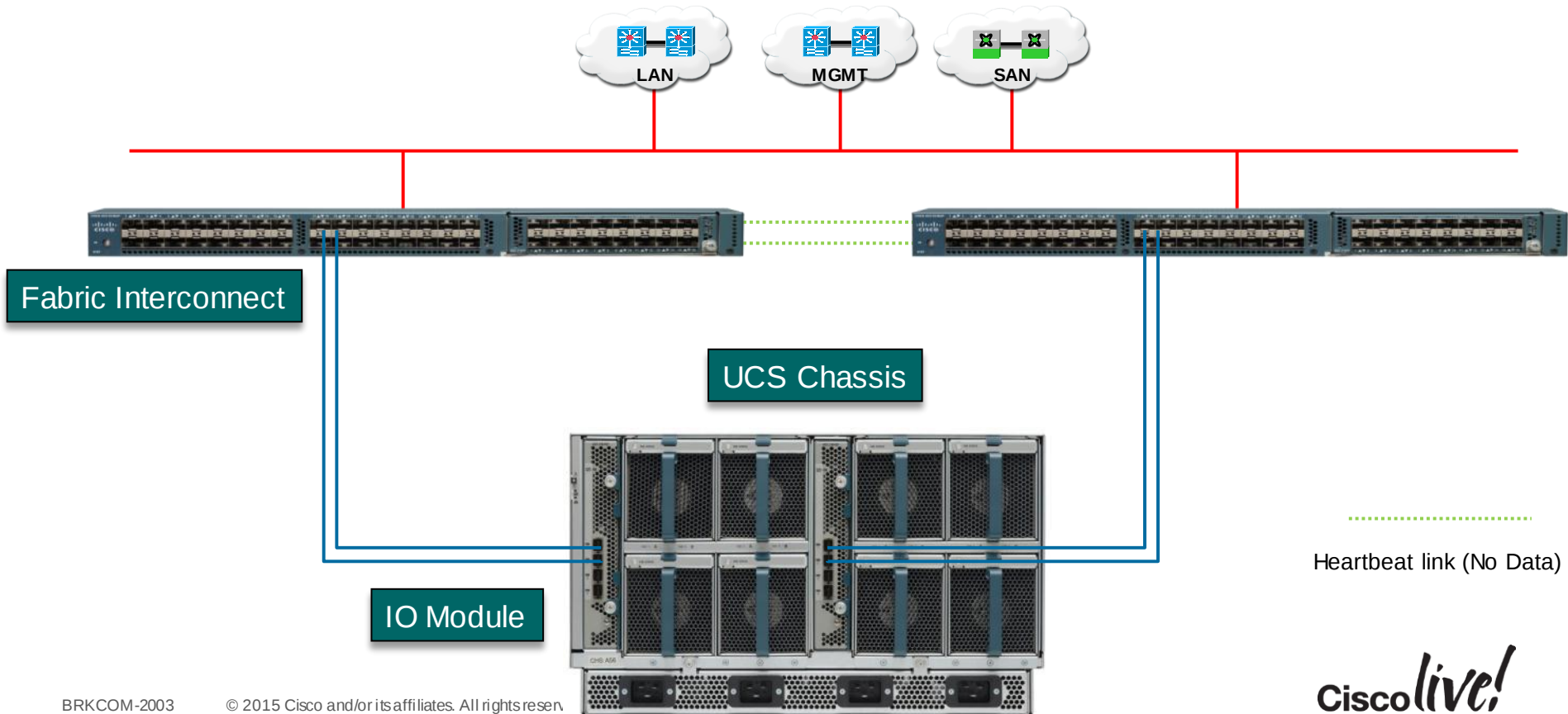
Cisco Unified Computing System (UCS)



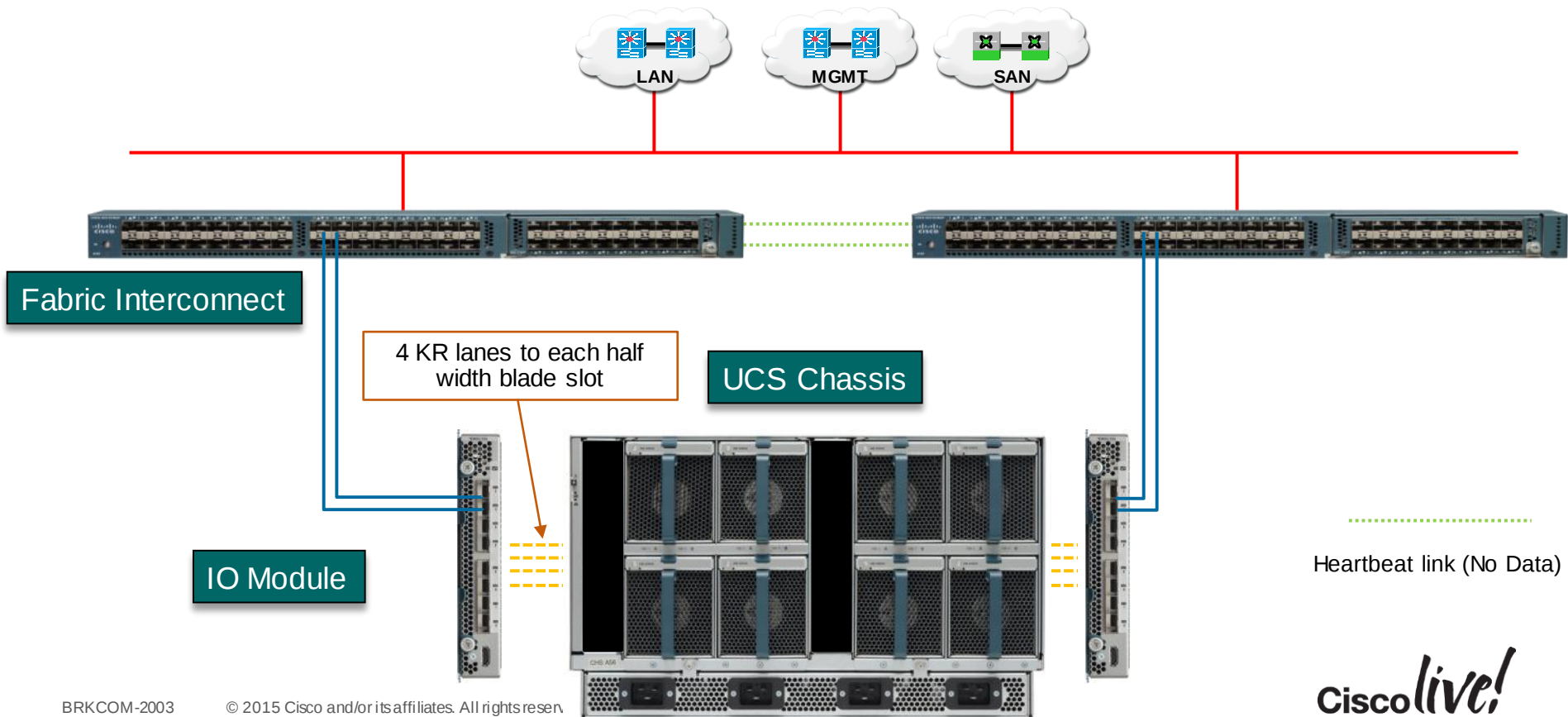
UCS Components



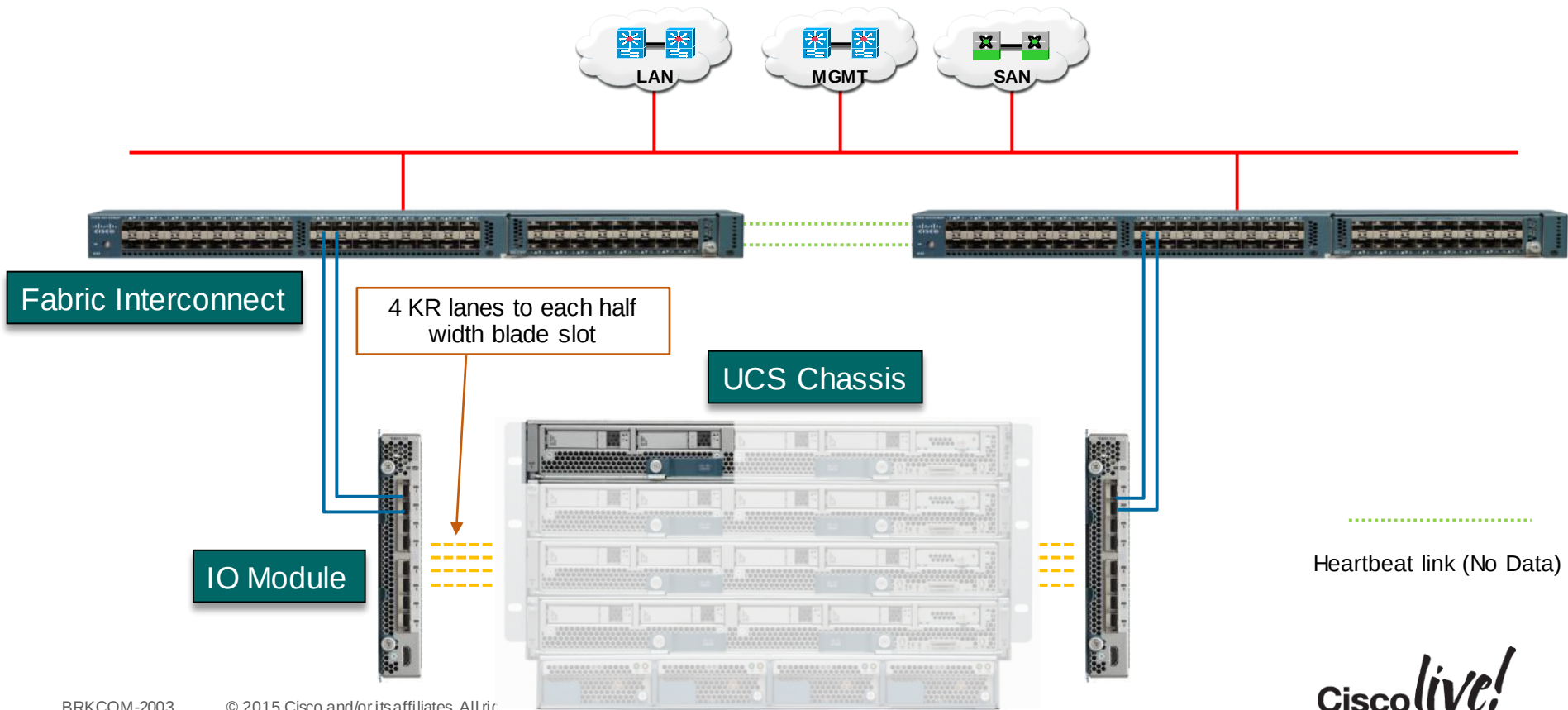
UCS Components



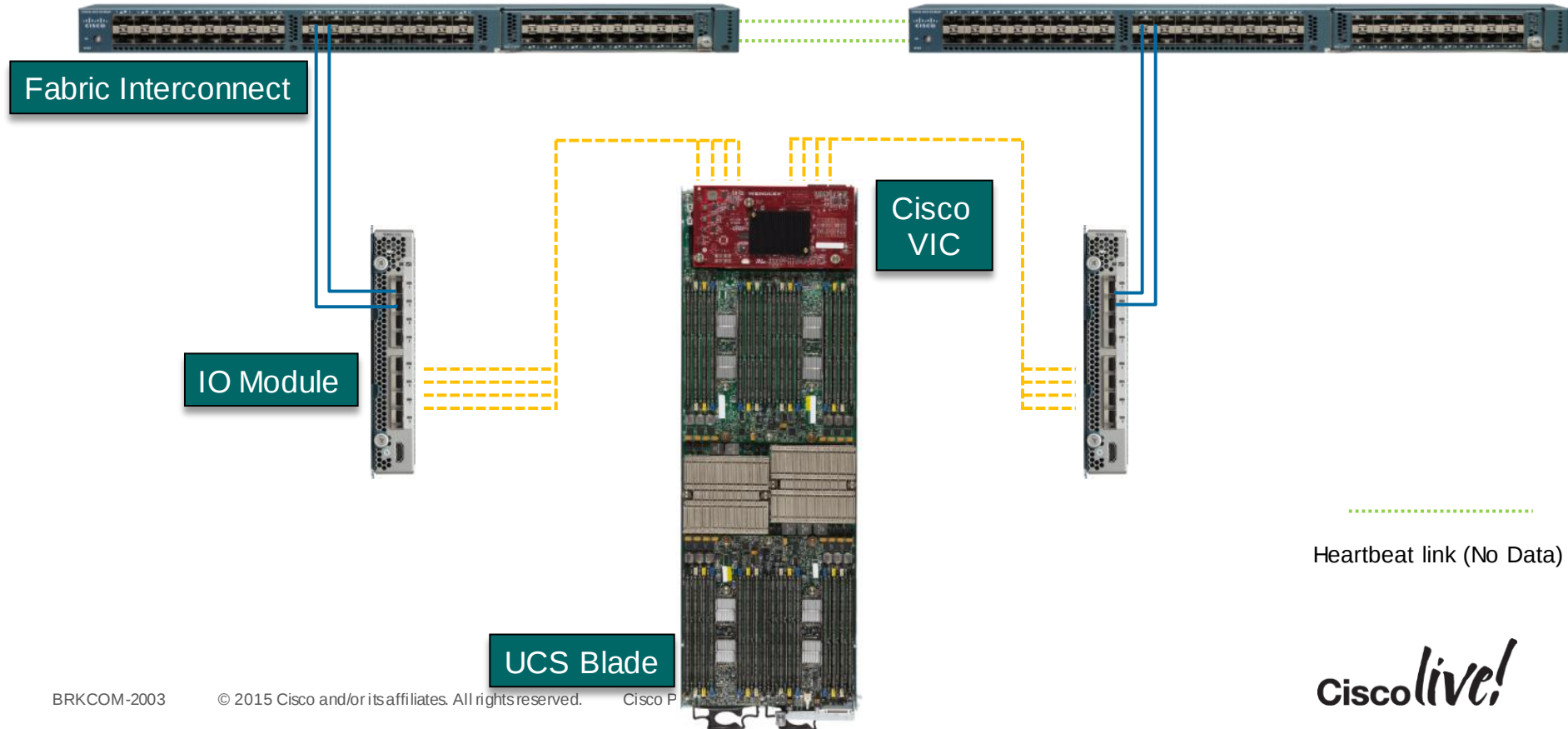
UCS Components



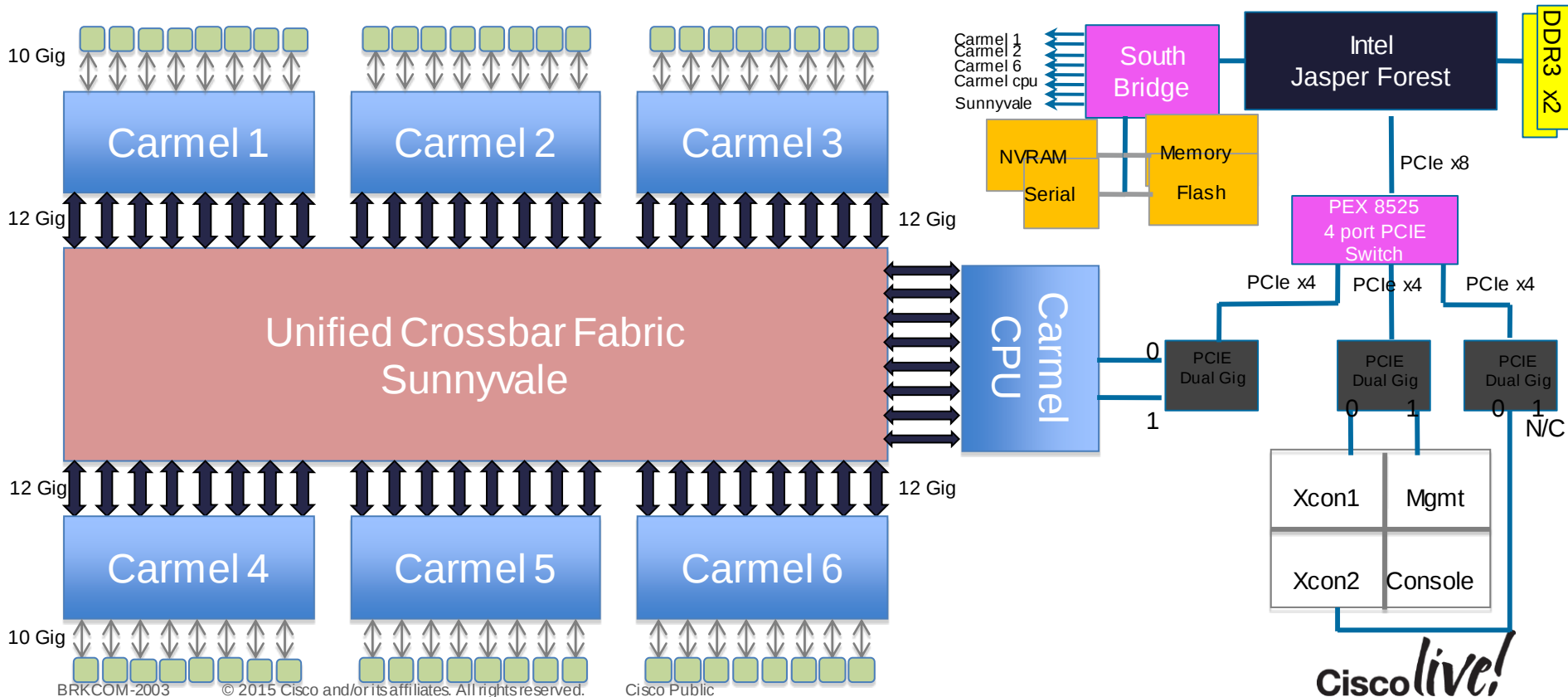
UCS Components



UCS Components



UCS 6248 Hardware Diagram



Cisco UCS 6200 Series Fabric Interconnects

Flexibility

Scalability

Multi-
purpose

Product Features and Specs	UCS 6248UP	UCS 6296UP
Switch Fabric Throughput	960 Gbps	1.92 Tbps
Switch Footprint	1RU	2RU
1 Gigabit Ethernet Port Density	48	96
10 Gigabit Ethernet Port Density	48	96
8G Native FC Port Density	48	96
Port-to-Port Latency	2.0us	2.0us
Active # of VLANs	2000	2000

UCS Mini: 6324 Fabric Interconnect

UCS B



UCS 5108 Chassis
Supports existing and future blades



IO Modules



6248 or 6296 Fabric
Fabric Interconnects

UCS Mini



UCS 5108 Chassis
Supports existing and future blades



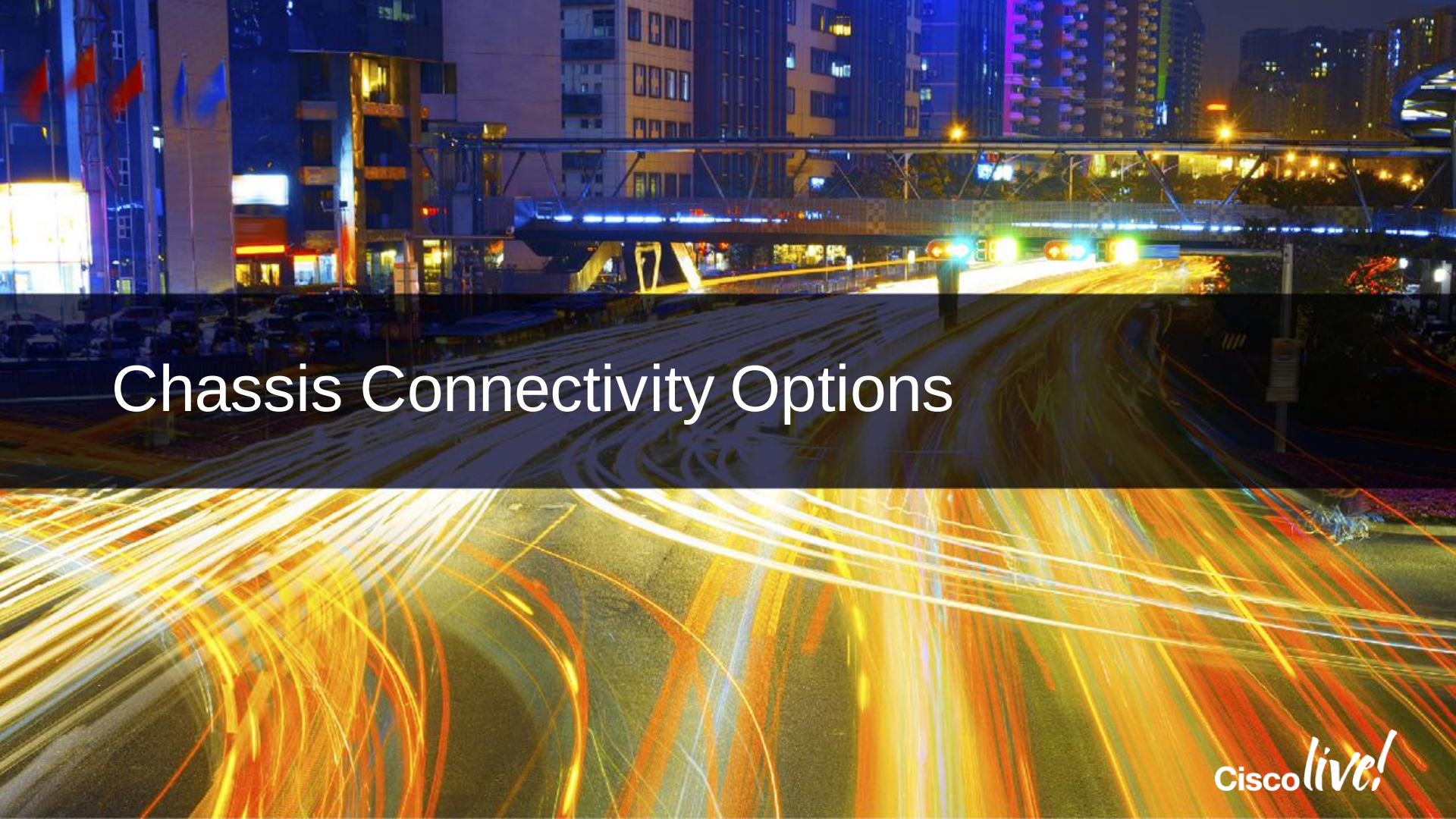
6324 Fabric Interconnect

TAC Tip: Carmel ASIC Port Mapping

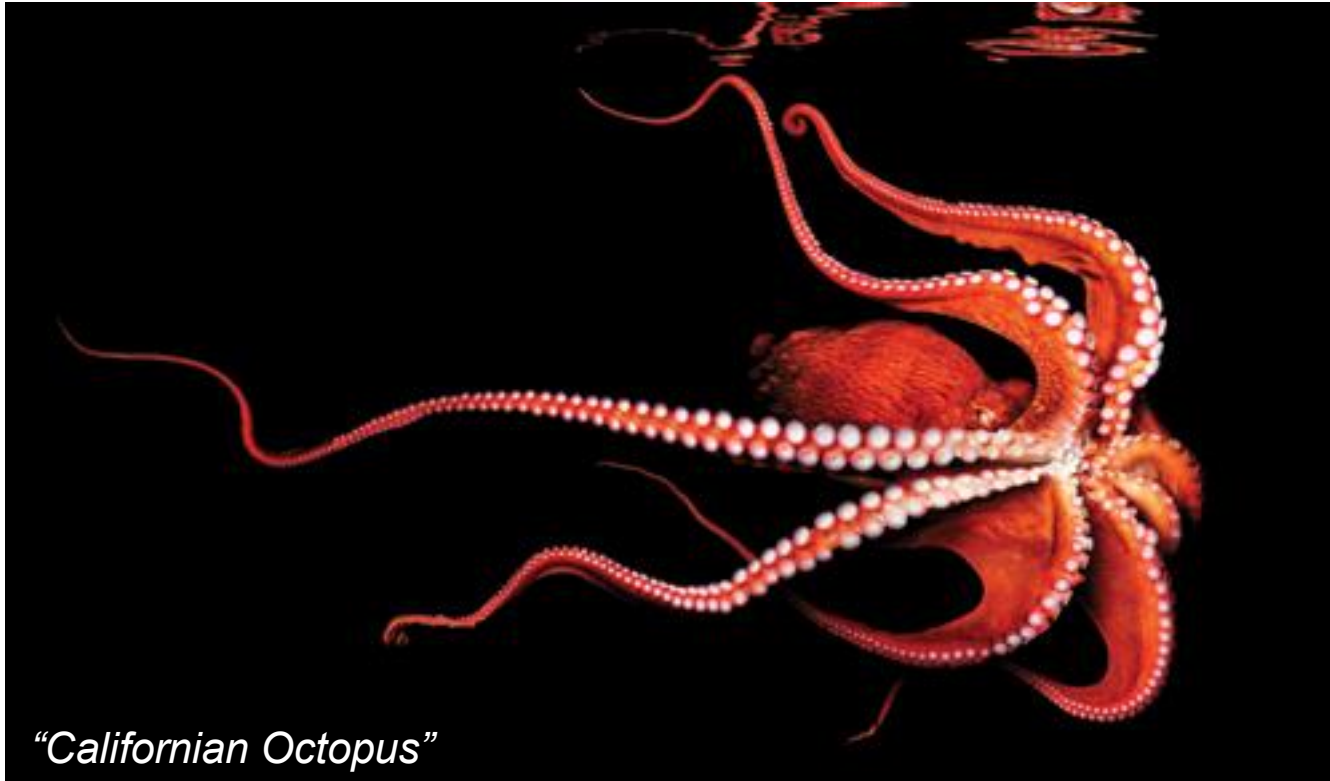
```
UCSB-2-A(nxos)# show hardware internal carmel all-ports
```

Carmel Port Info:

name	log	car	mac	flag	adm	opr	m:s:l	ipt	fab	xcar	xpt	if_index	diag	ucVer
xgb1/1	0	0	0 p b7	en	up	0:0:f 0	92	0	0	1a000000	pass	0.00		
xgb1/2	1	0	1 p b7	en	up	1:1:f 1	88	0	0	1a001000	pass	0.00		
xgb1/3	2	0	2 p b7	en	up	2:2:f 2	93	0	0	1a002000	pass	0.00		
xgb1/4	3	0	3 p b7	en	up	3:3:f 3	89	0	0	1a003000	pass	0.00		
xgb1/5	4	0	4 - b7	dis	dn	4:4:f 4	90	0	0	1a004000	pass	0.00		
xgb1/6	5	0	5 - b7	dis	dn	5:5:f 5	94	0	0	1a005000	pass	0.00		
xgb1/7	6	0	6 - b7	dis	dn	6:6:f 6	95	0	0	1a006000	pass	0.00		
xgb1/8	7	0	7 - b7	dis	dn	7:7:f 7	91	0	0	1a007000	pass	0.00		
xgb1/9	8	1	0 - b7	dis	dn	0:0:f 0	80	0	0	1a008000	pass	0.00		
xgb1/10	9	1	1 - b7	dis	dn	1:1:f 1	87	0	0	1a009000	pass	0.00		
xgb1/11	10	1	2 - b7	dis	dn	2:2:f 2	81	0	0	1a00a000	pass	0.00		
xgb1/12	11	1	3 - b7	dis	dn	3:3:f 3	86	0	0	1a00b000	pass	0.00		
xgb1/13	12	1	4 - b7	dis	dn	4:4:f 4	82	0	0	1a00c000	pass	0.00		
xgb1/14	13	1	5 - b7	dis	dn	5:5:f 5	85	0	0	1a00d000	pass	0.00		
xgb1/15	14	1	6 - b7	dis	dn	6:6:f 6	83	0	0	1a00e000	pass	0.00		
xgb1/16	15	1	7 - b7	dis	dn	7:7:f 7	84	0	0	1a00f000	pass	0.00		

A long-exposure photograph of a city street at night. The background shows tall buildings with lit windows and a pedestrian bridge. The foreground is dominated by vibrant, multi-colored light trails from moving vehicles, creating a sense of motion and energy. The text 'Chassis Connectivity Options' is overlaid in white on a dark horizontal band across the middle of the image.

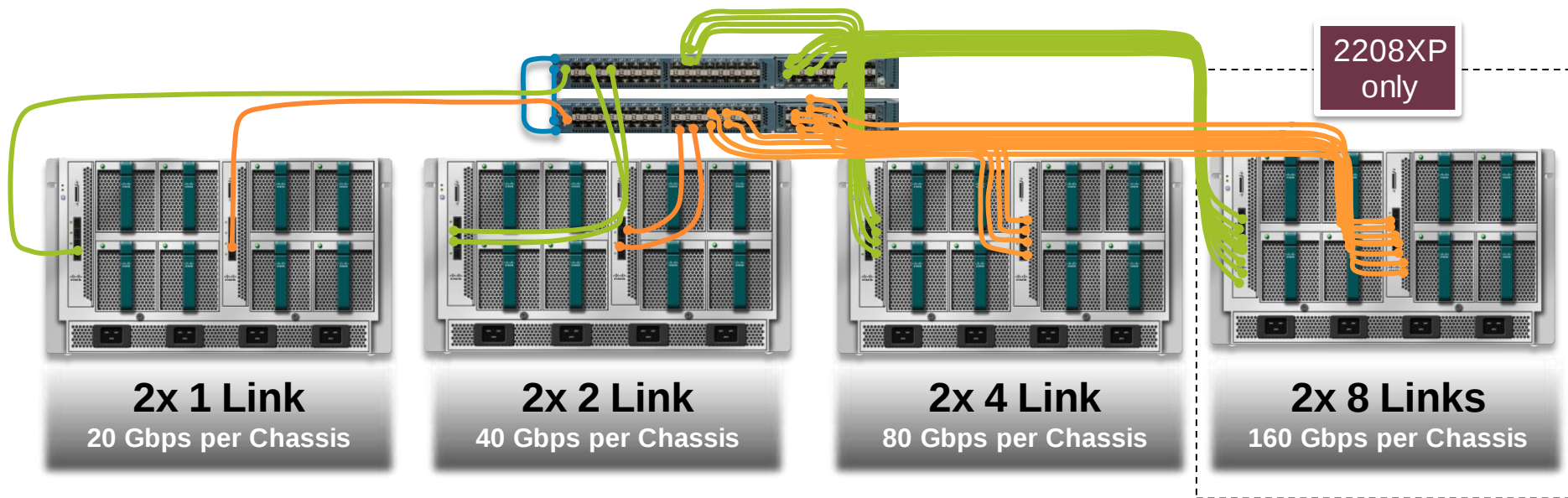
Chassis Connectivity Options



"Californian Octopus"

UCS Fabric Topologies

Chassis Bandwidth Options



UCS 2200 IO Module (FEX)

- **UCS-IOM-2204XP**



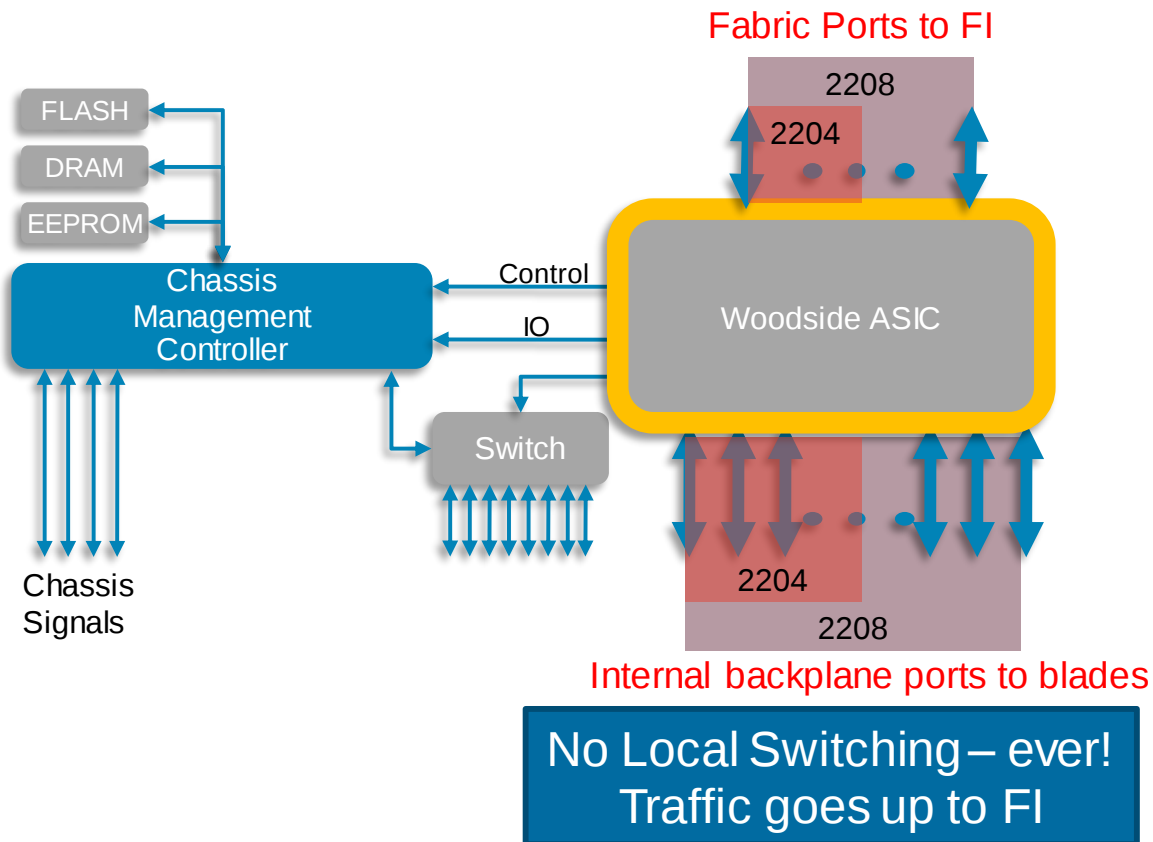
- 40G to the Network
- 160G to the Hosts
 - 2x10G Half width slot
 - 4x10G Full width slot

- **UCS-IOM-2208XP**



- 80G to the Network
- 320G to the Hosts
 - 4x10G Half width slot
 - 8x10G Full width slot

220x-XP Architecture



Feature	2204-XP	2208-XP
ASIC	Woodside	Woodside
Fabric Ports (NIF)	4	8
Host Ports (HIF)	16	32
CoS	8	8
Latency	~ 500ns	~ 500ns

NIF/HIF Interfaces

- Output from “show fex detail” of the NXOS shell

Fabric interface state:

Po1153	-	Interface Up. State: Active
Eth1/4	-	Interface Up. State: Active

Fex Port	State	Fabric Port
Eth1/1/1	Down	Po1153
Eth1/1/2	Down	None
Eth1/1/3	Up	Po1153
Eth1/1/4	Down	Po1153
Eth1/1/5	Up	Po1153
Eth1/1/6	Up	Po1153
Eth1/1/7	Up	Po1153
Eth1/1/8	Down	None
Eth1/1/9	Up	Po1153
Eth1/1/10	Down	None
Eth1/1/11	Up	Po1153
Eth1/1/12	Up	Po1153
Eth1/1/13	Up	Po1153
Eth1/1/14	Down	None
Eth1/1/15	Up	Po1153
Eth1/1/16	Down	None
Eth1/1/17	Up	Po1153

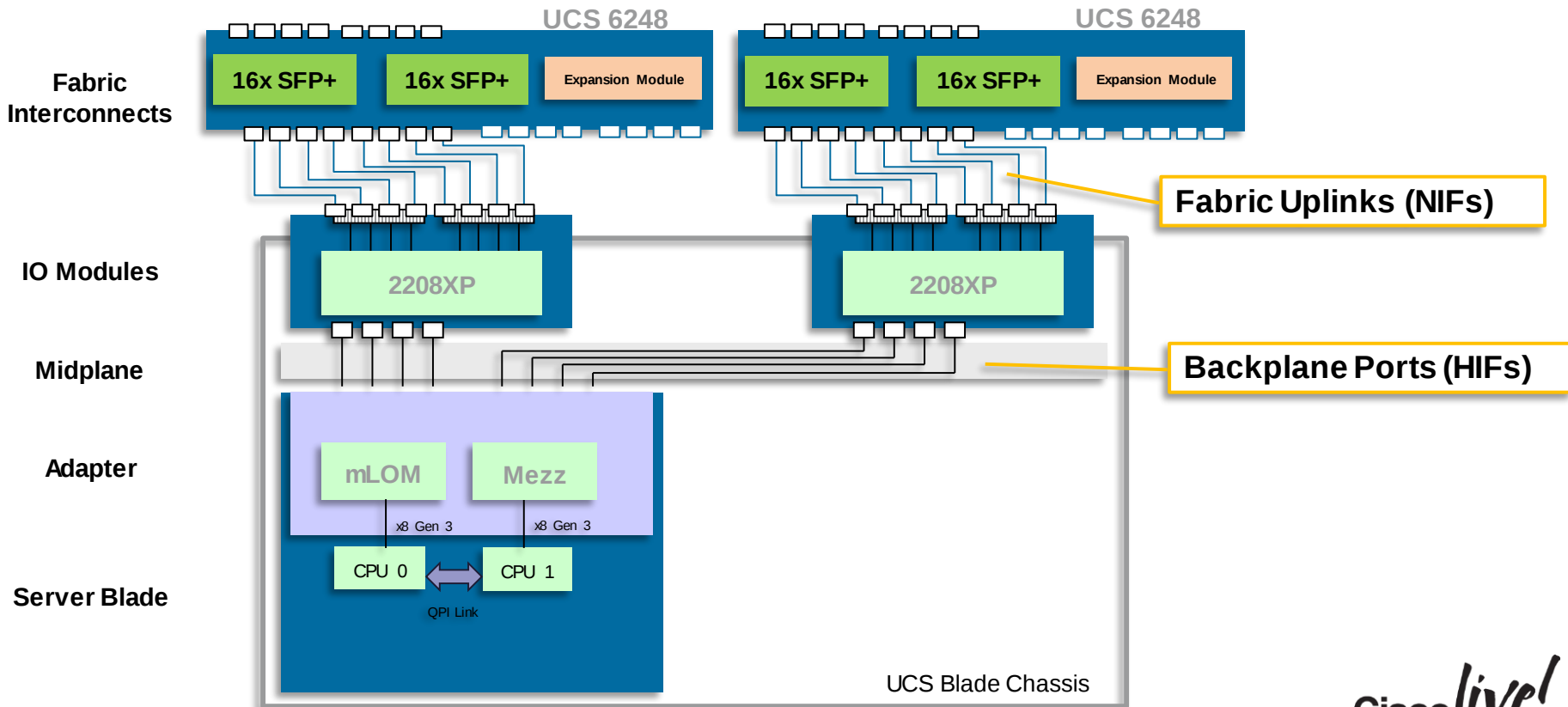
Backplane ports
connecting to
server 1/3

FI ports connecting
to the FEX

Link between the FI
and IOM/FEX
which the server
will be using

Additional interface?

UCS Internal Block Diagram



- Output from “show platform software woodside sts” of the IOM

Port # from the
FEX Port

CLI Command

- Output from “show platform software woodside rate” of the IOM

```
fex-1# sh platform software woodside rate
```

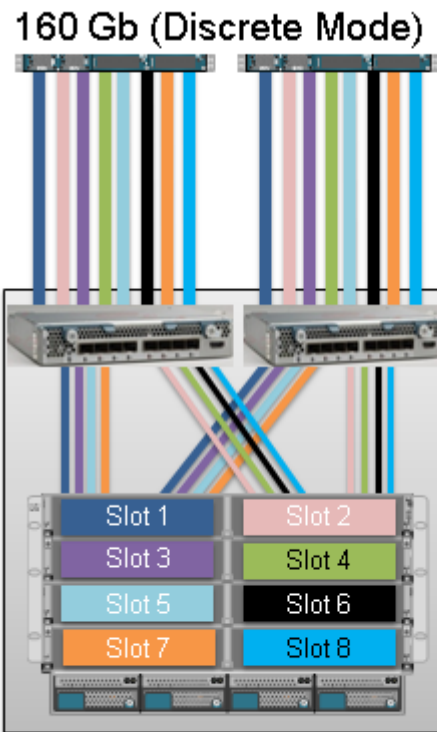
Port	Tx Packets	Tx Rate (pkts/s)	Tx Bit Rate	Rx Packets	Rx Rate (pkts/s)	Rx Bit Rate	Avg Pkt (Tx)	Avg Pkt (Rx)	Err
0-BI	25	5	5.04Kbps	14	2	3.09Kbps	106	118	
0-CI	65	13	20.20Kbps	49	9	25.44Kbps	174	304	
0-NI3	2	0	3.48Kbps	63	12	12.98Kbps	1072	108	
0-NI2	35	7	12.05Kbps	6	1	2.75Kbps	195	267	
0-NI1	3	0	3.69Kbps	14	2	4.22Kbps	750	168	
0-NI0	17	3	6.86Kbps	20	4	12.38Kbps	232	367	
0-HI31	7	1	8.00Kbps	1	0	768.00 bps	695	464	
0-HI30	5	1	1.28Kbps	1	0	200.00 bps	141	106	
0-HI23	5	1	1.22Kbps	1	0	352.00 bps	133	200	
0-HI19	13	2	2.48Kbps	1	0	1.19Kbps	99	728	
0-HI11	3	0	560.00 bps	1	0	128.00 bps	98	64	
0-HI7	4	0	616.00 bps	1	0	560.00 bps	77	332	

Blade 1

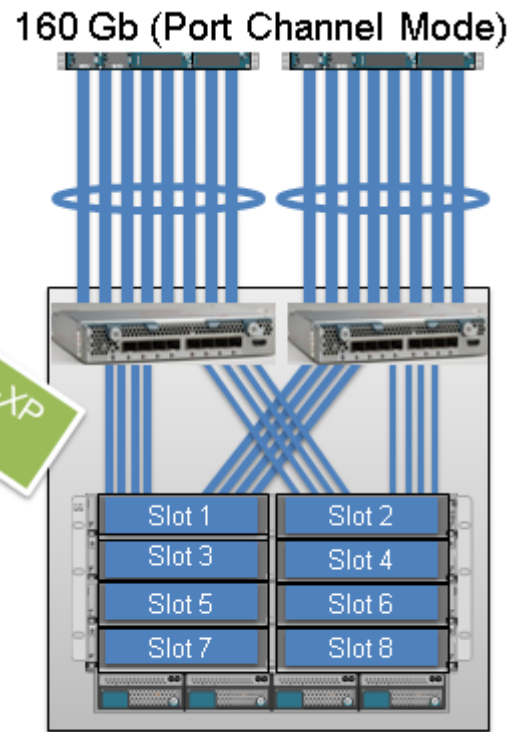


Fabric Link Connectivity

Chassis Connectivity Policy



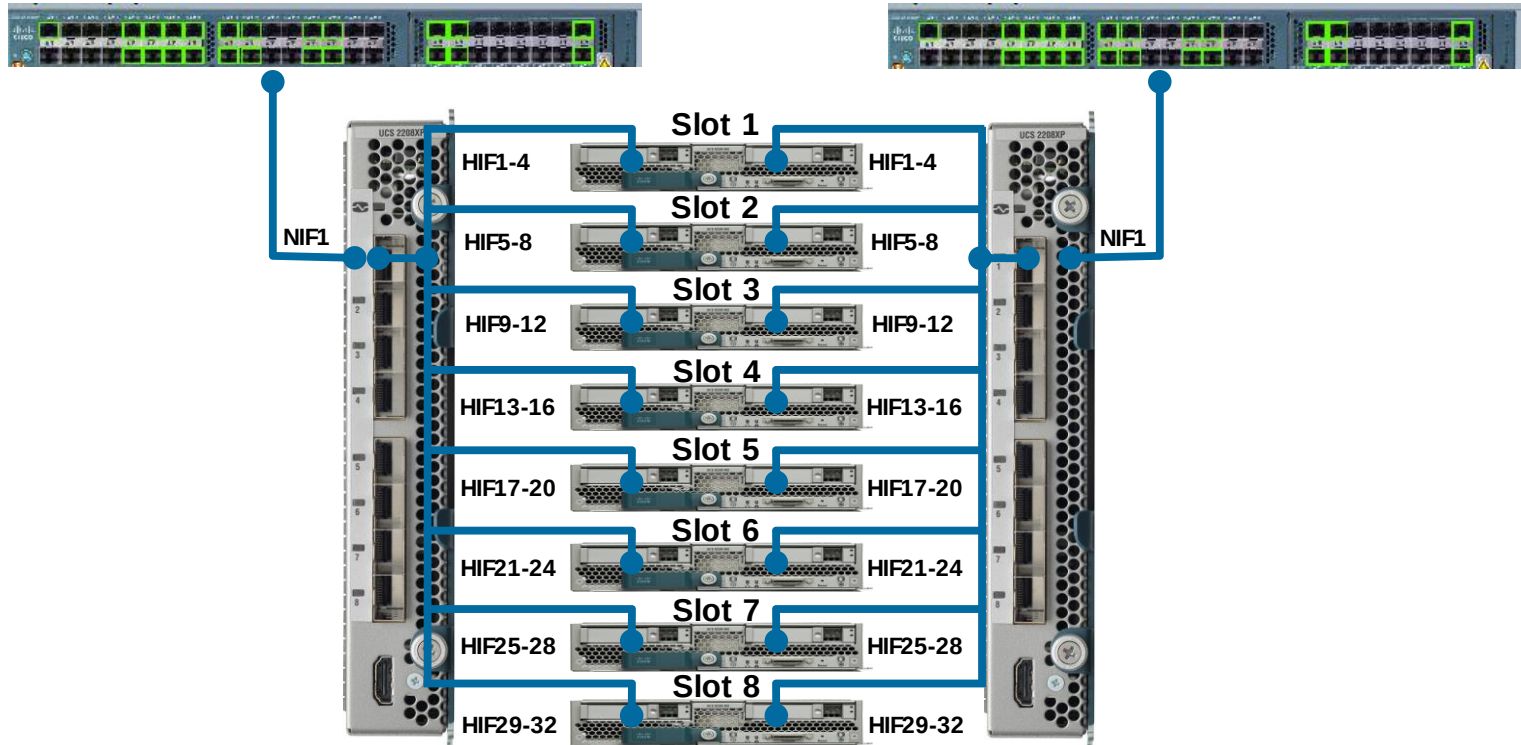
- 6100 to 2208
- 6200 to 2208



- 6200 to 2208

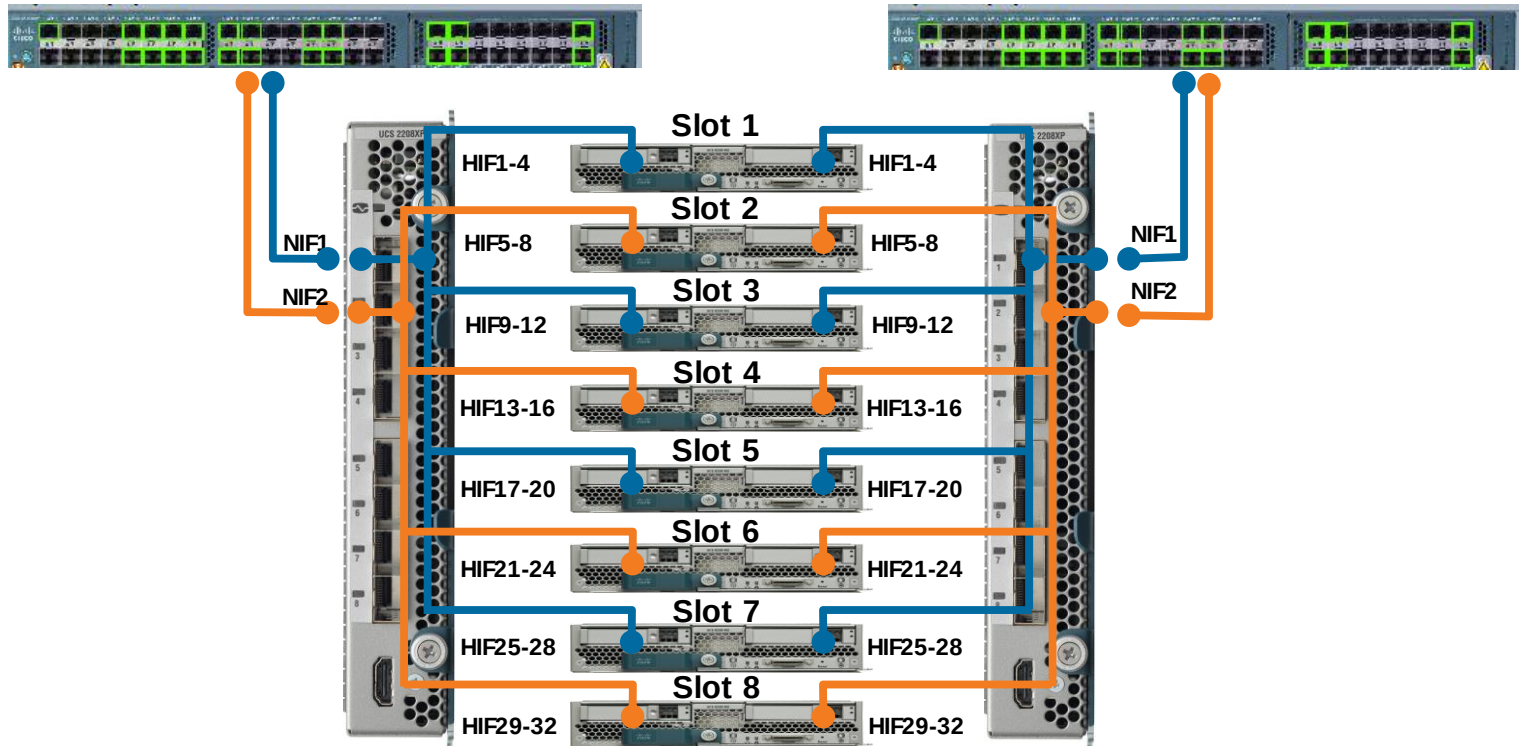
IO Module HIF to NIF Pinning

2208XP – 1 Link



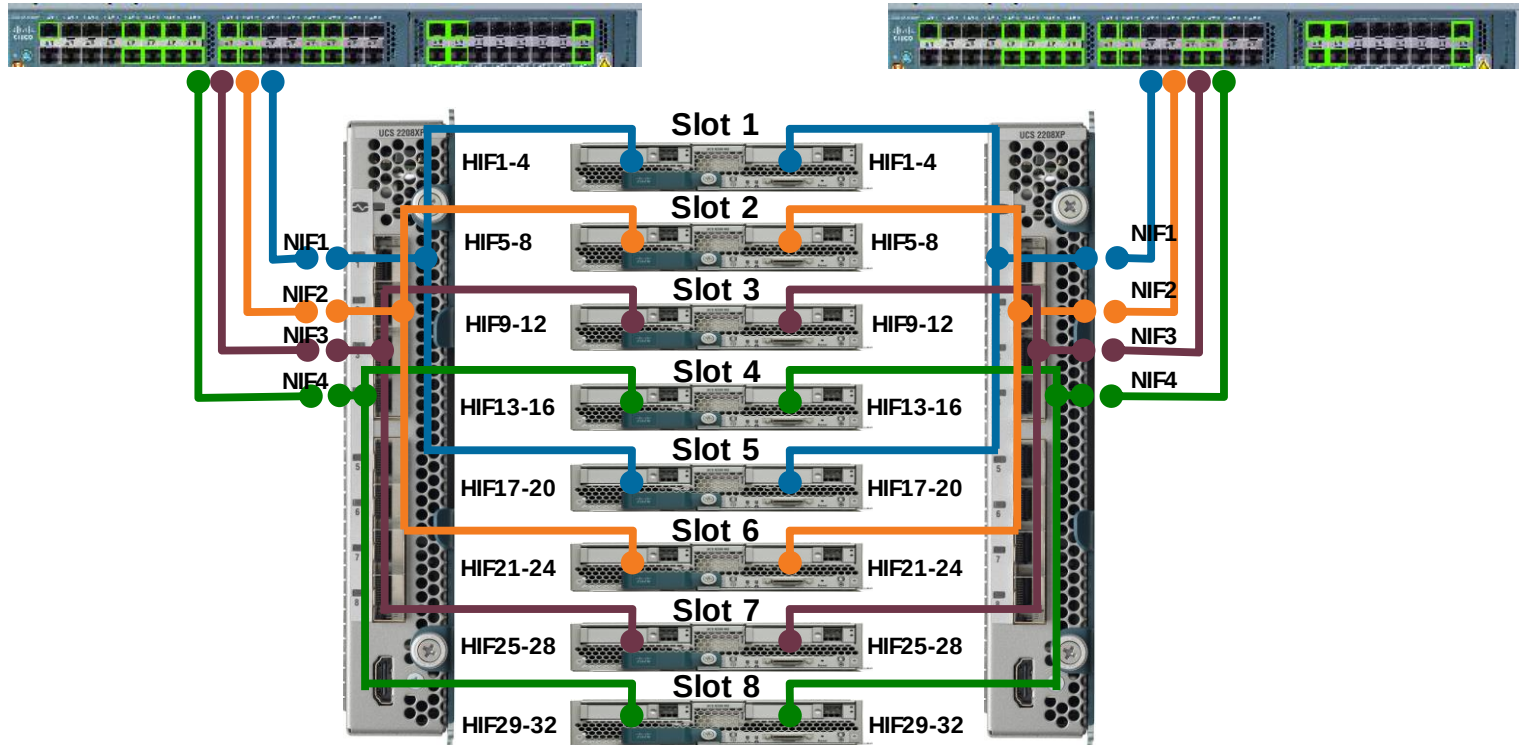
IO Module HIF to NIF Pinning

2208XP – 2 Links



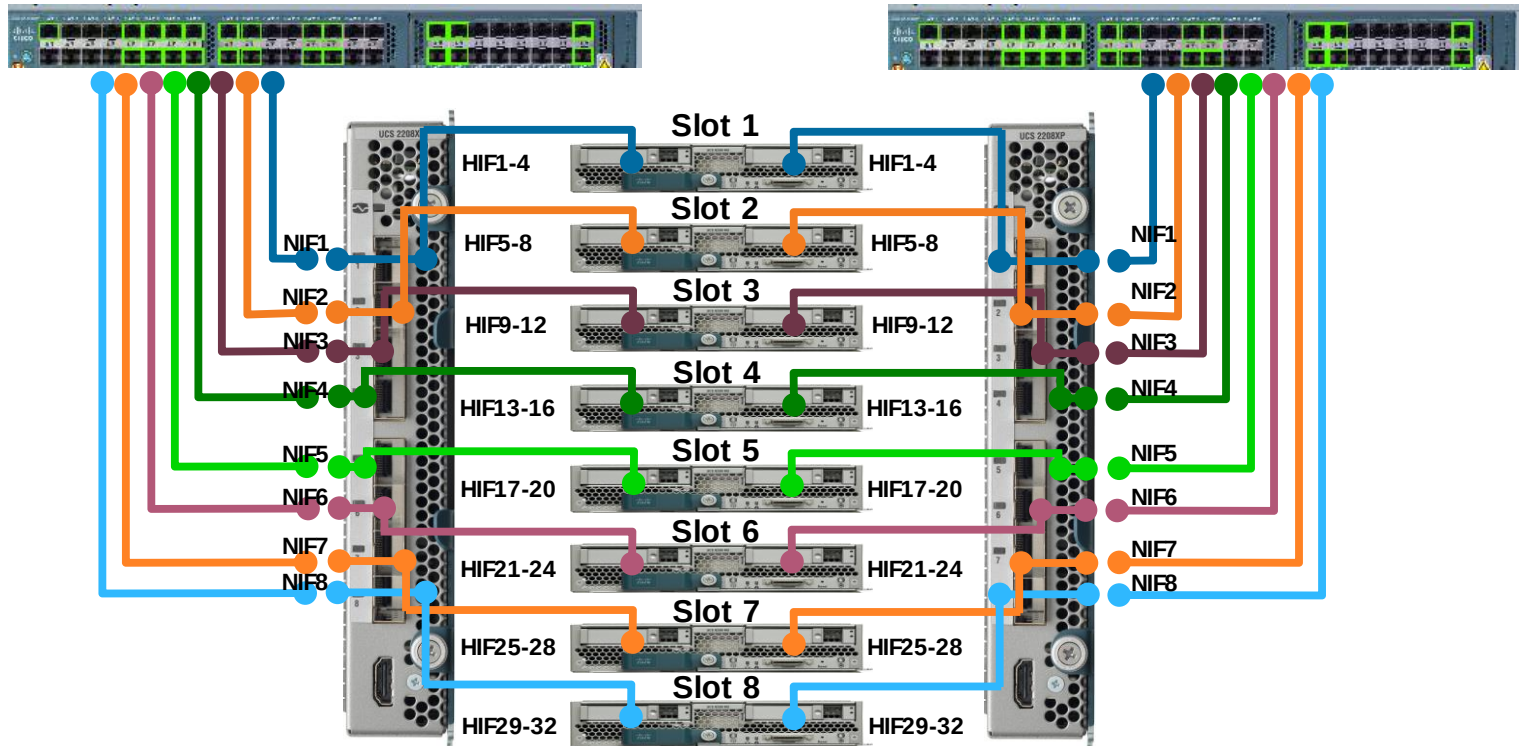
IO Module HIF to NIF Pinning

2208XP – 4 Links



IO Module HIF to NIF Pinning

2208XP – 8 Links



CLI Mapping

FEX Level command

- Output from “show fex detail” of the NXOS shell

<output truncated>

Fabric interface state:

Eth1/9 - Interface Up. State: Active
Eth1/10 - Interface Up. State: Active
Eth1/11 - Interface Up. State: Active
Eth1/12 - Interface Up. State: Active

Fex Port	State	Fabric Port
Eth3/1/1	Up	Eth1/9
Eth3/1/2	Up	Eth1/10
Eth3/1/3	Down	Eth1/11
Eth3/1/4	Up	Eth1/12
Eth3/1/5	Up	Eth1/9
Eth3/1/6	Down	None
Eth3/1/7	Down	Eth1/11
Eth3/1/8	Down	Eth1/12
Eth3/1/9	Up	Eth1/12

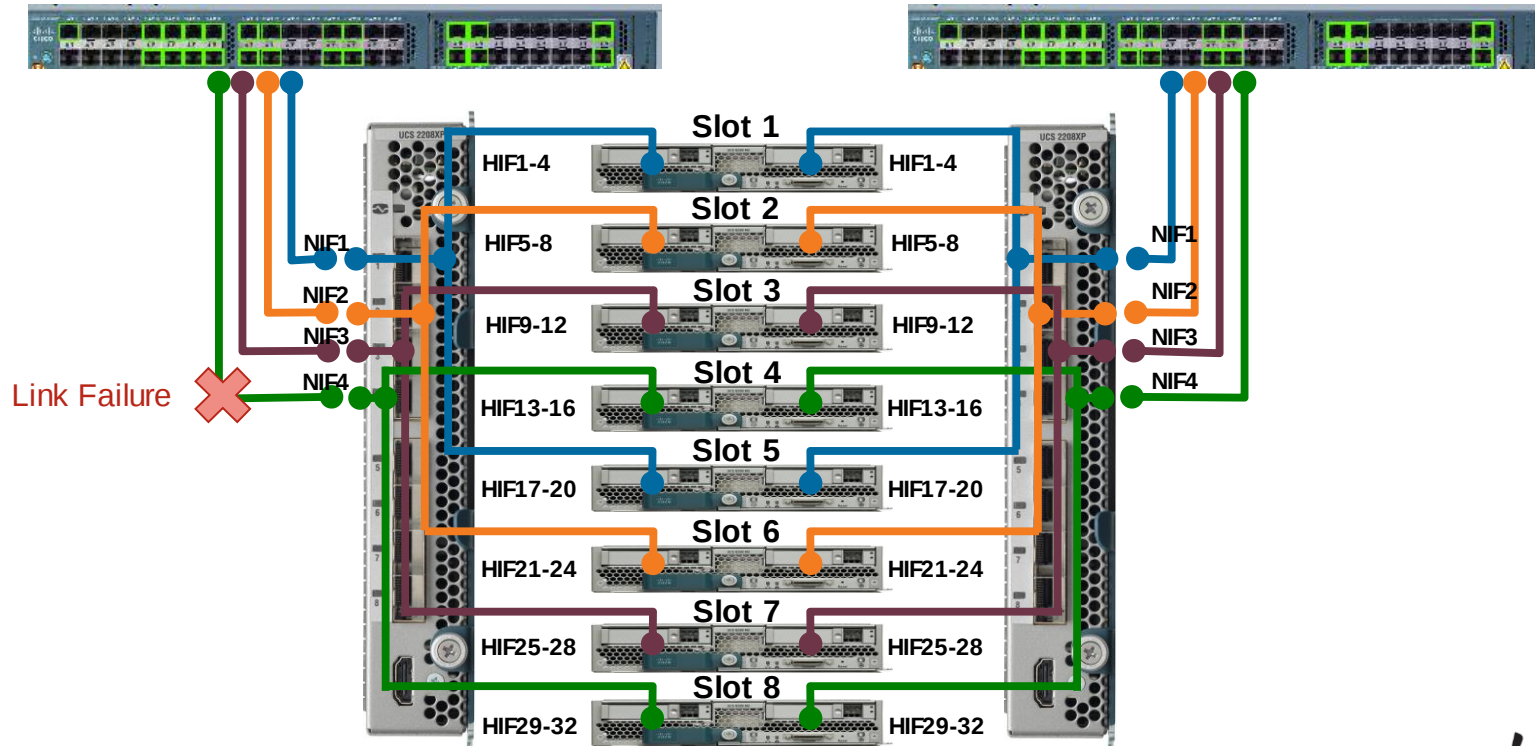
<output truncated>

Interface Level command

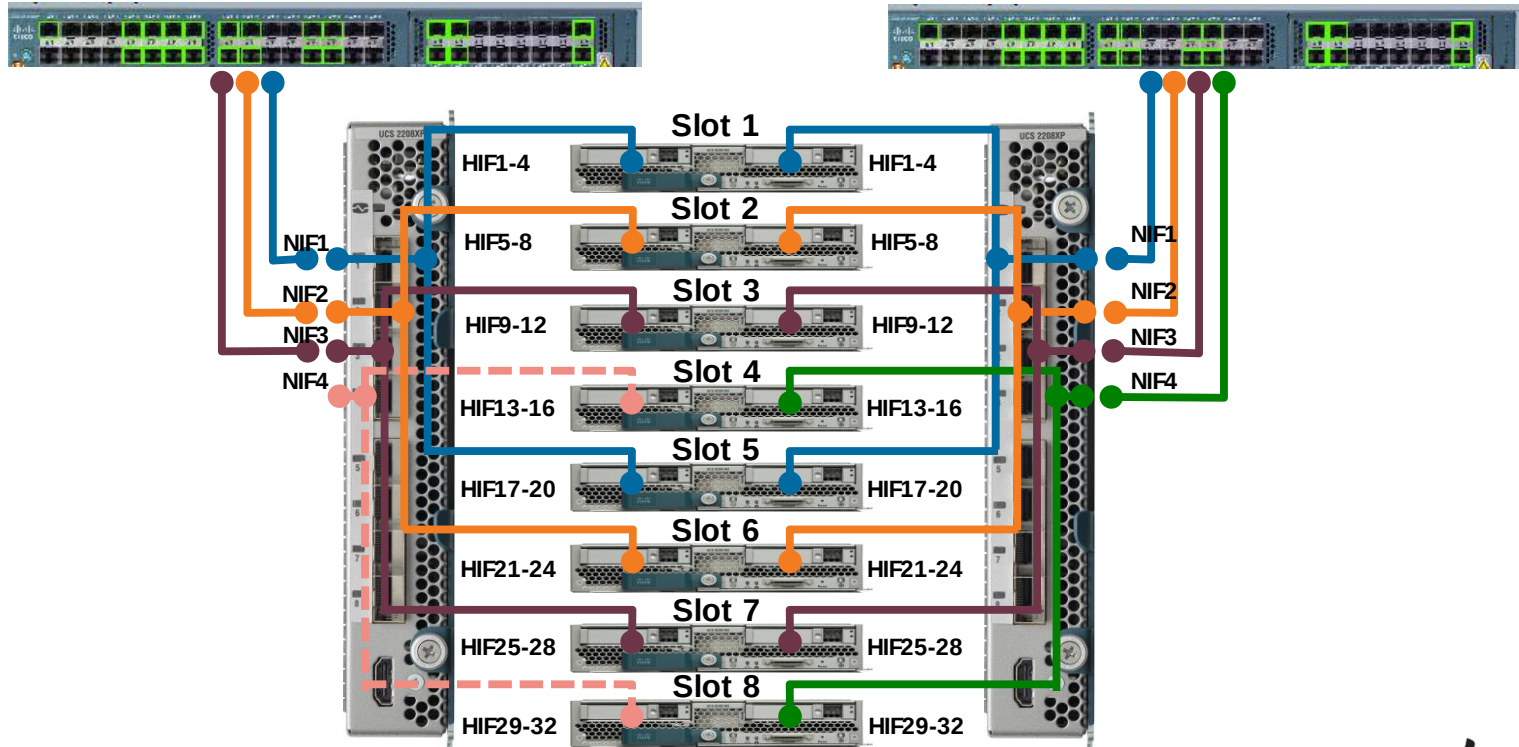
- Output from “show interface ethernet <mod/port> fex-intf

Fabric Interface	FEX Interfaces
Eth1/9	Eth3/1/1 Eth3/1/5

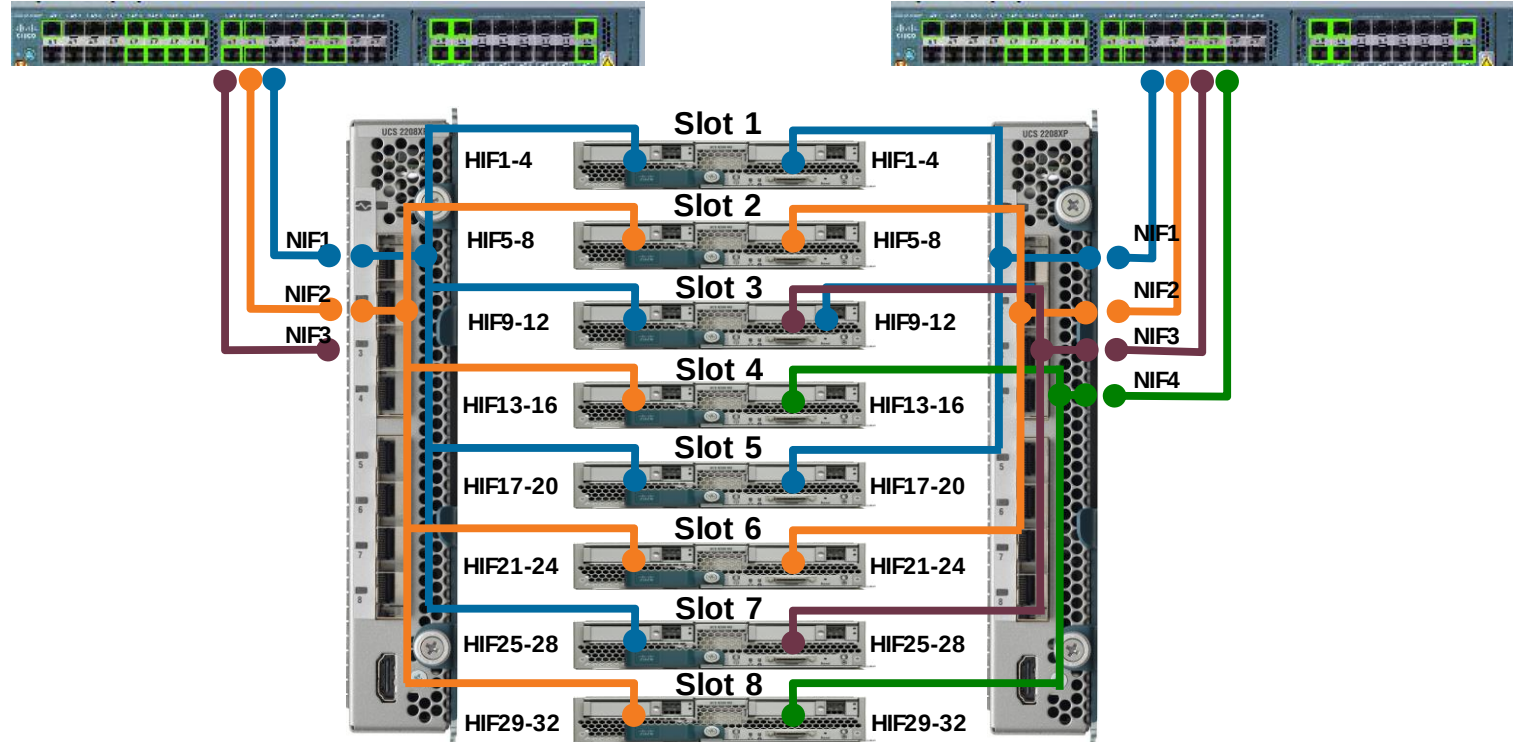
IOM Link Failure Scenario



IOM Link Failure Scenario



IOM Link Failure Scenario



Increased Bandwidth Access to Blades

4 links, Discrete - Today



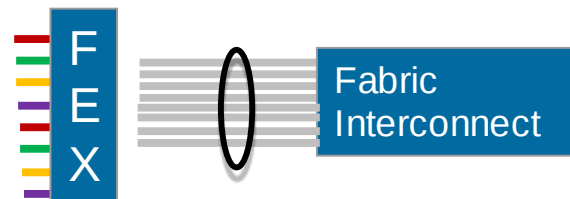
- Available bandwidth per blade – 10Gb
- Statically pinned to individual fabric links
- Deterministic Path

8 links, Discrete



- Available bandwidth per blade – 20Gb
- Statically pinned to individual fabric links
- Deterministic Path
- Guaranteed 10Gb to each blade

Up to 8 links, Port-channel



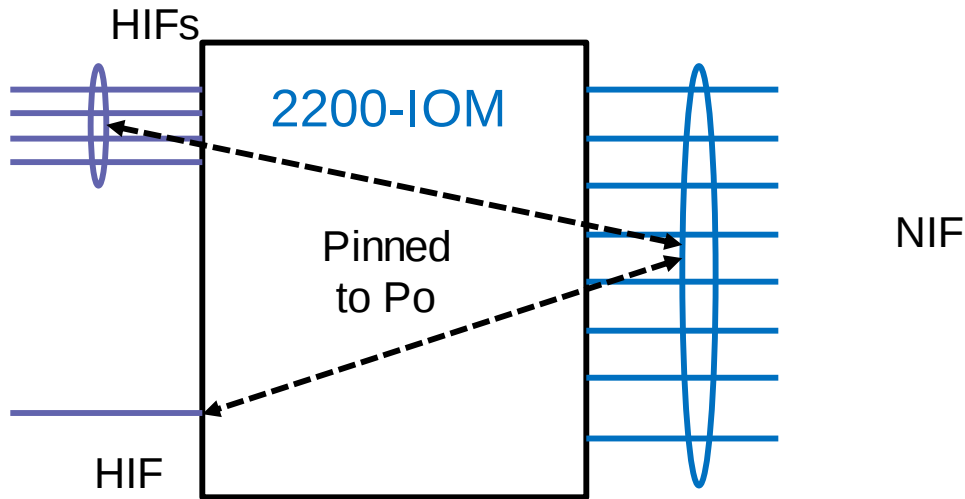
- Available bandwidth per blade – up to 160Gb
- Statically pinned to Port-channel
- Increased and shared bandwidth
- Higher Availability

Port-channel Pinning

- No slot based pinning
- No invalid link count for NIF ports (no “power of 2” rule)

VIC 1200/1300 adaptor with
DCE links in Port-Channel

Gen-1 adaptor with
single 10G link

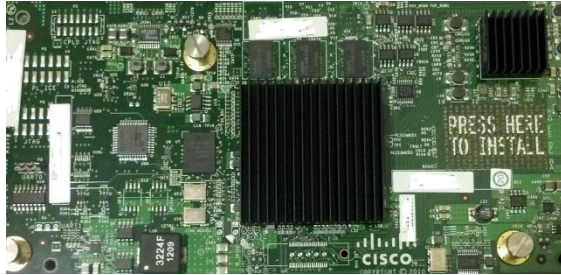




Server Connectivity

Cisco Virtual Interface Cards (VIC)

1st Gen



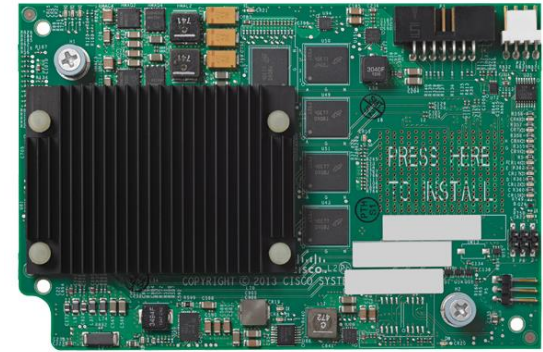
- M81KR, P81E
- 128 PCIe devices
- Dual 10Gb
- 16x PCIe Gen1

2nd Gen



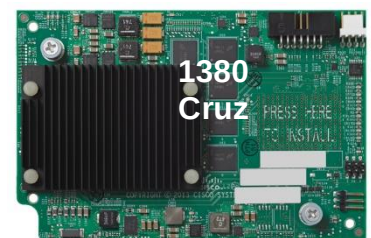
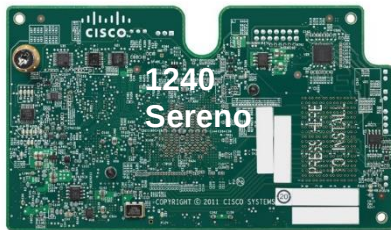
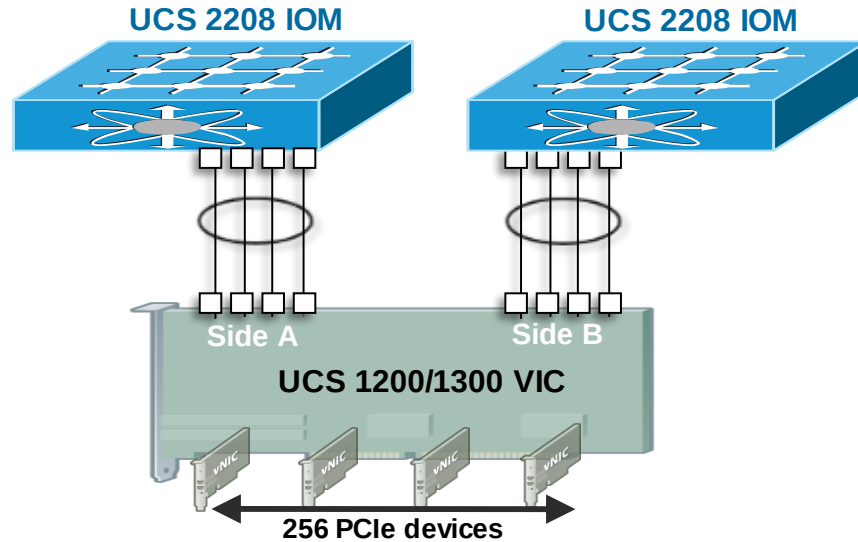
- 1240, 1280, 12xx
- 256 PCIe Device
- Dual 40Gb (4 x 10Gb)
- 16x PCIe Gen 2

3rd Gen



- 1340, 1380
- Dual 8x PCIe Gen 3
- Native 40Gb Support
- VXLAN & NVGRE
- RoCE

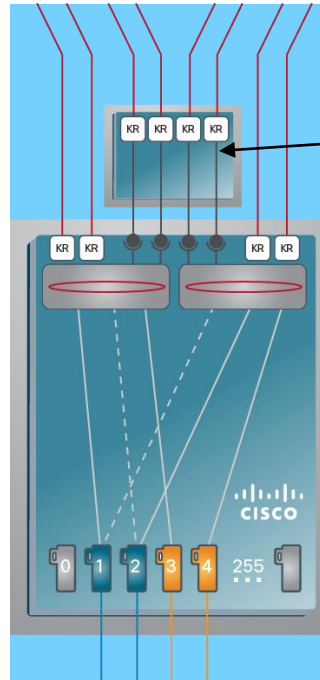
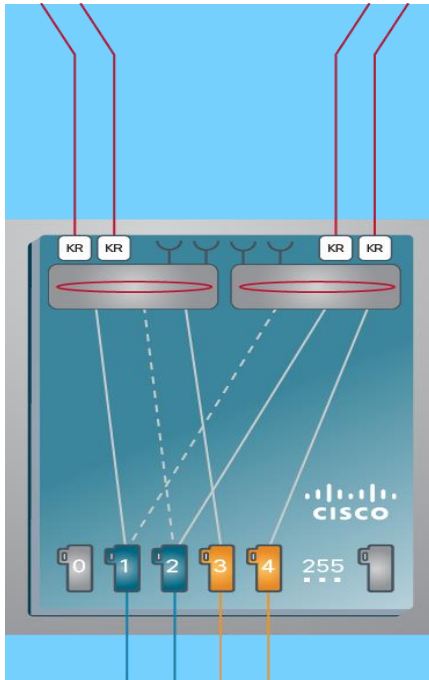
UCS Cisco 1200/1300 VIC Adapter



Cisco **Live**

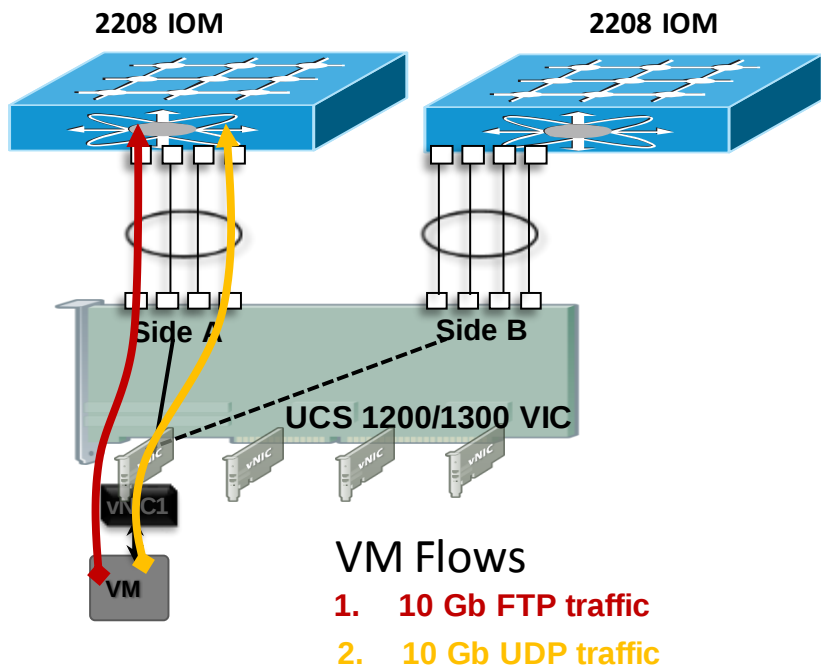
VIC 1240/1340 Plus Port Expander Card

- Base option supports dual 2x10Gb



- Option to enable all port of ASIC (Sereno)
- Fits in the Mezzanine slot of B200 M3/M4
- Port Expander has no PCIe presence
- It is a “passive connector” device

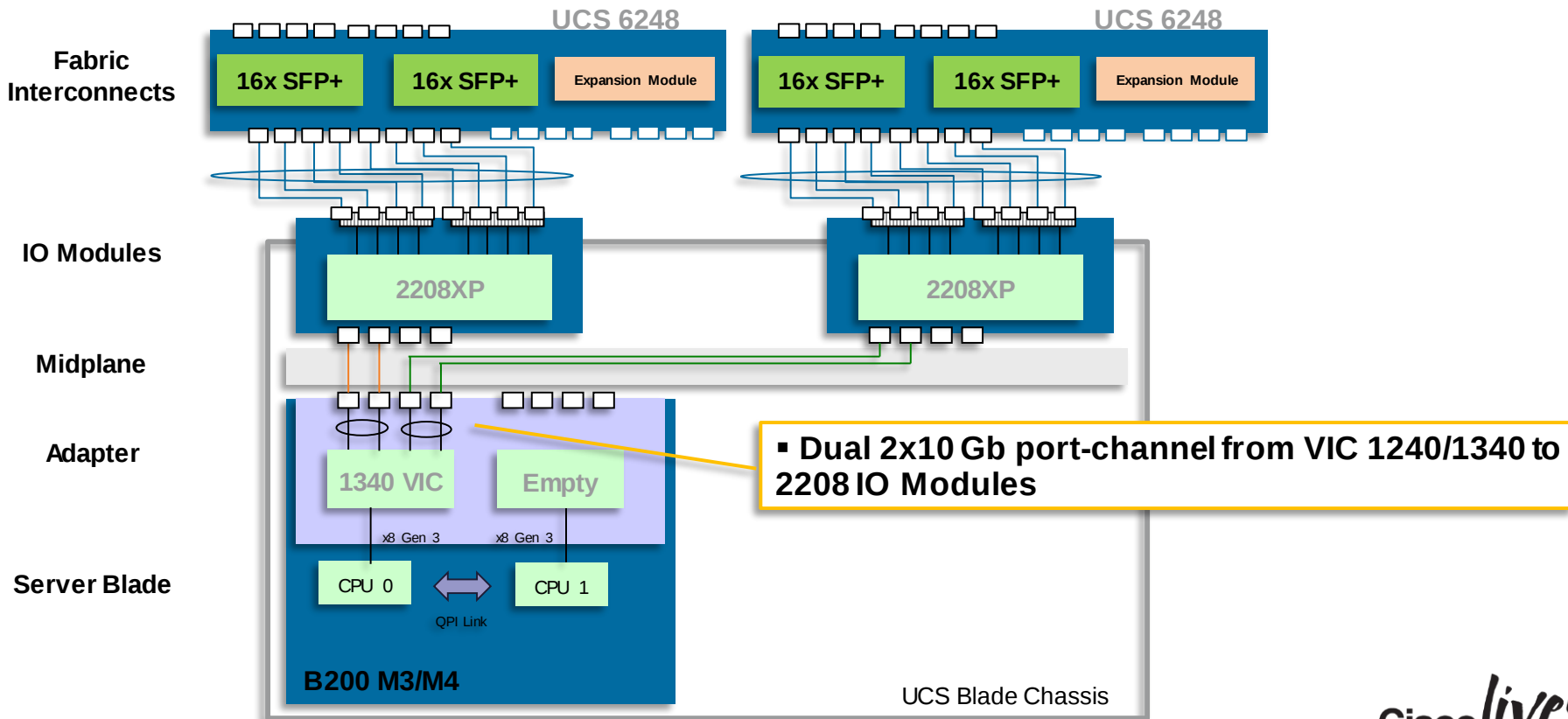
Connectivity IOM to Adapter



- Implicit Port-channel between VIC 1200/1300 and UCS 2200 IOM
- 7-Tuple Flow based hash, 10 Gbps per flow
- A vNIC is active on side A or B

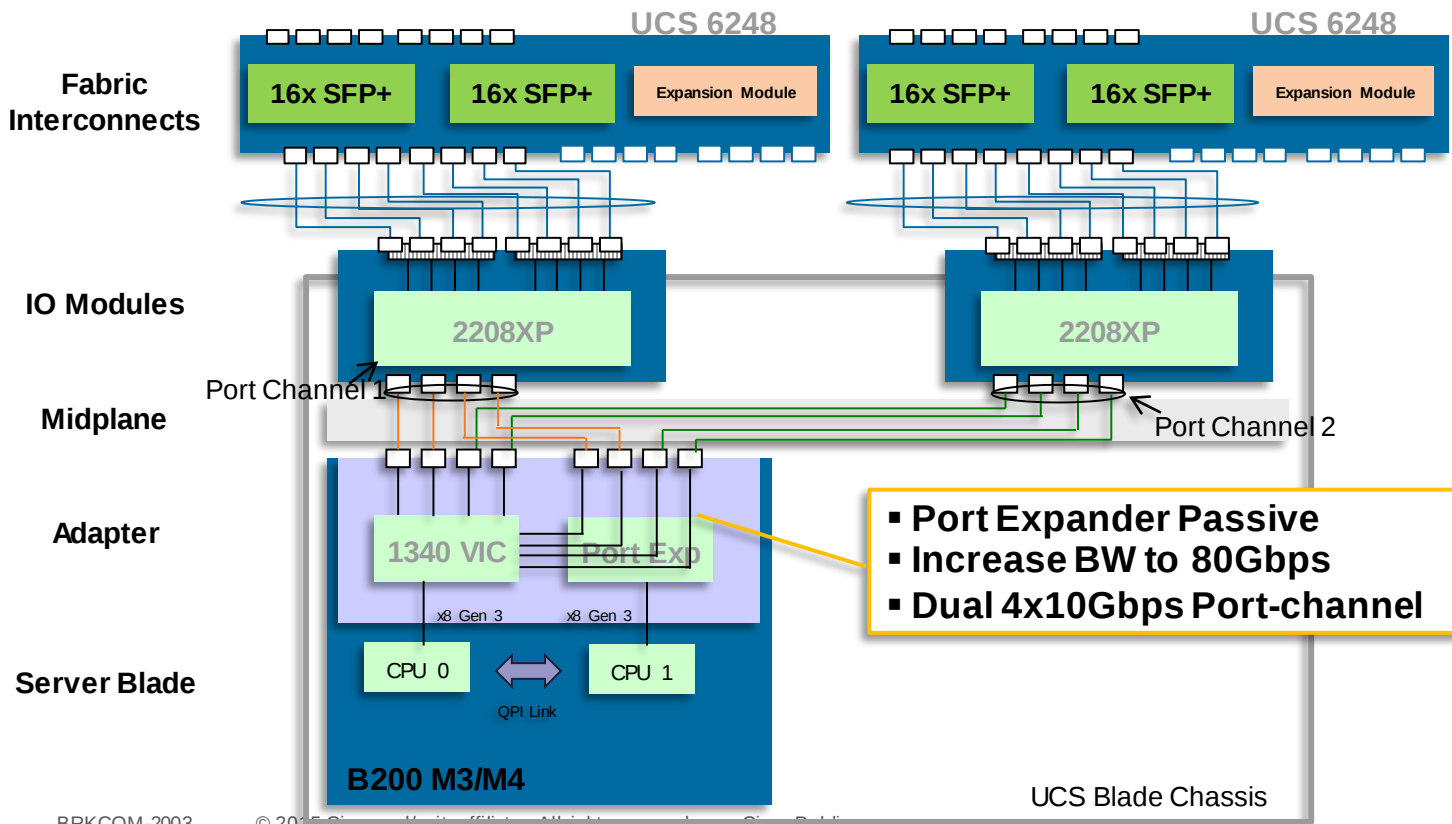
VIC 1240/1340 to IOM Connectivity

MLOM only



VIC 1240/1340 to IOM Connectivity

MLOM plus Port Expander



What Does The OS See?

The screenshot displays the Cisco Unified Computing System Manager interface. The main window shows a navigation tree on the left with 'Servers' selected. The main pane displays a 'Fault Summary' and 'Properties' for a vNIC. Two pop-up windows are open: 'Local Area Connection 2 Status' and 'Network Connection Details'.

Local Area Connection 2 Status

General

Connection

- IPv4 Connectivity: No Internet access
- IPv6 Connectivity: No Internet access
- Media State: Enabled
- Duration: 1 day 22:10:54
- Speed: 40.0 Gbps

Details...

Activity

Sent — Received

Bytes: 2,496,676 | 1,859,456

Properties Disable Diagnose

Close

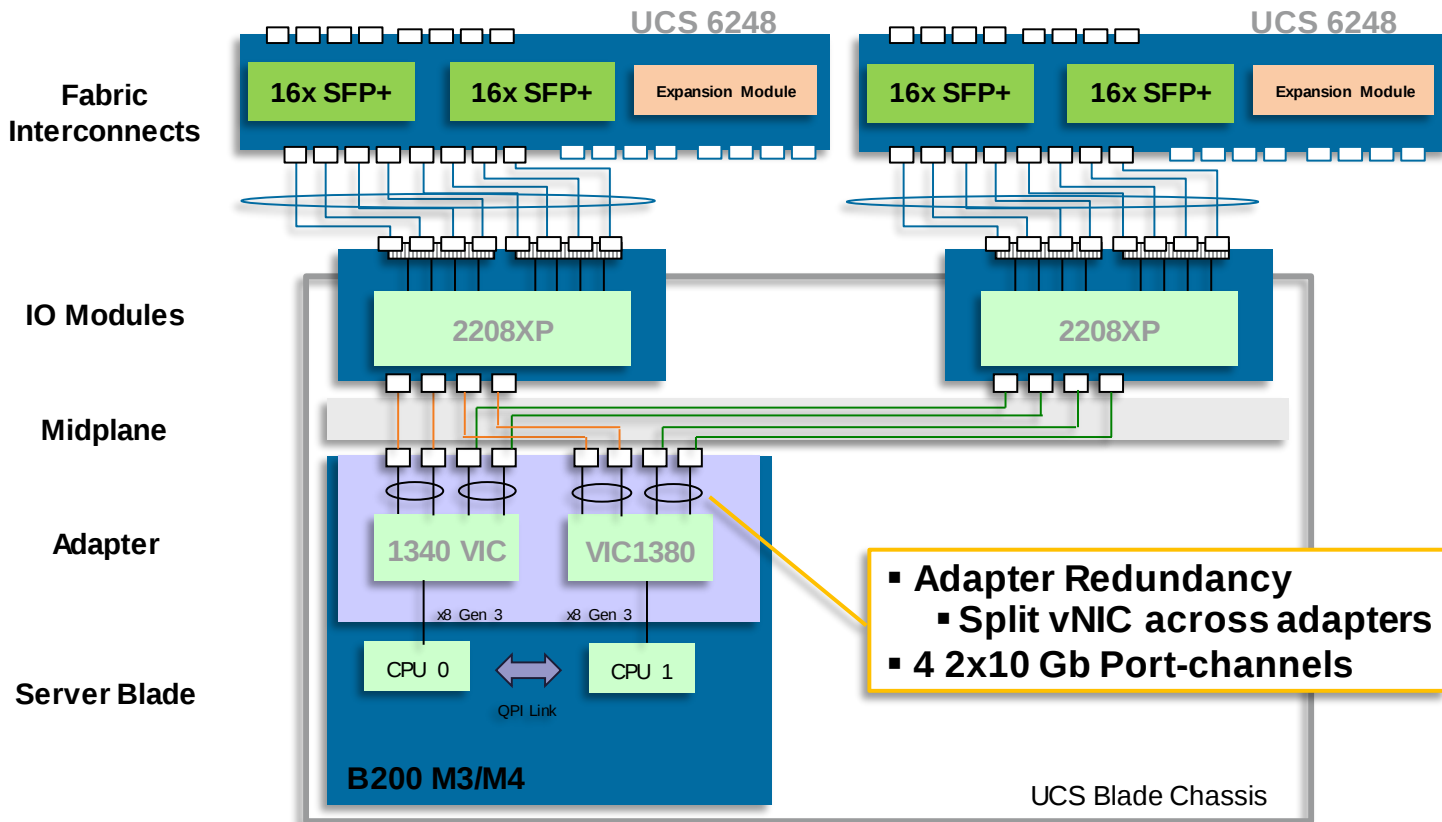
Network Connection Details

Network Connection Details:

Property	Value
Connection-specific DN...	ucslab.cisco.com
Description	Cisco VIC Ethernet Interface #2
Physical Address	00-25-B5-99-00-06
DHCP Enabled	Yes
IPv4 Address	192.168.66.100
IPv4 Subnet Mask	255.255.255.0
Lease Obtained	Tuesday, September 04, 2012 7:19:12 AM
Lease Expires	Wednesday, September 12, 2012 7:20:10 AM
IPv4 Default Gateway	
IPv4 DHCP Server	192.168.66.1
IPv4 DNS Server	192.168.66.254
IPv4 WINS Server	
NetBIOS over Tcpip En...	Yes
Link-local IPv6 Address	fe80::8127:294f:d507:2603%13
IPv6 Default Gateway	
IPv6 DNS Server	

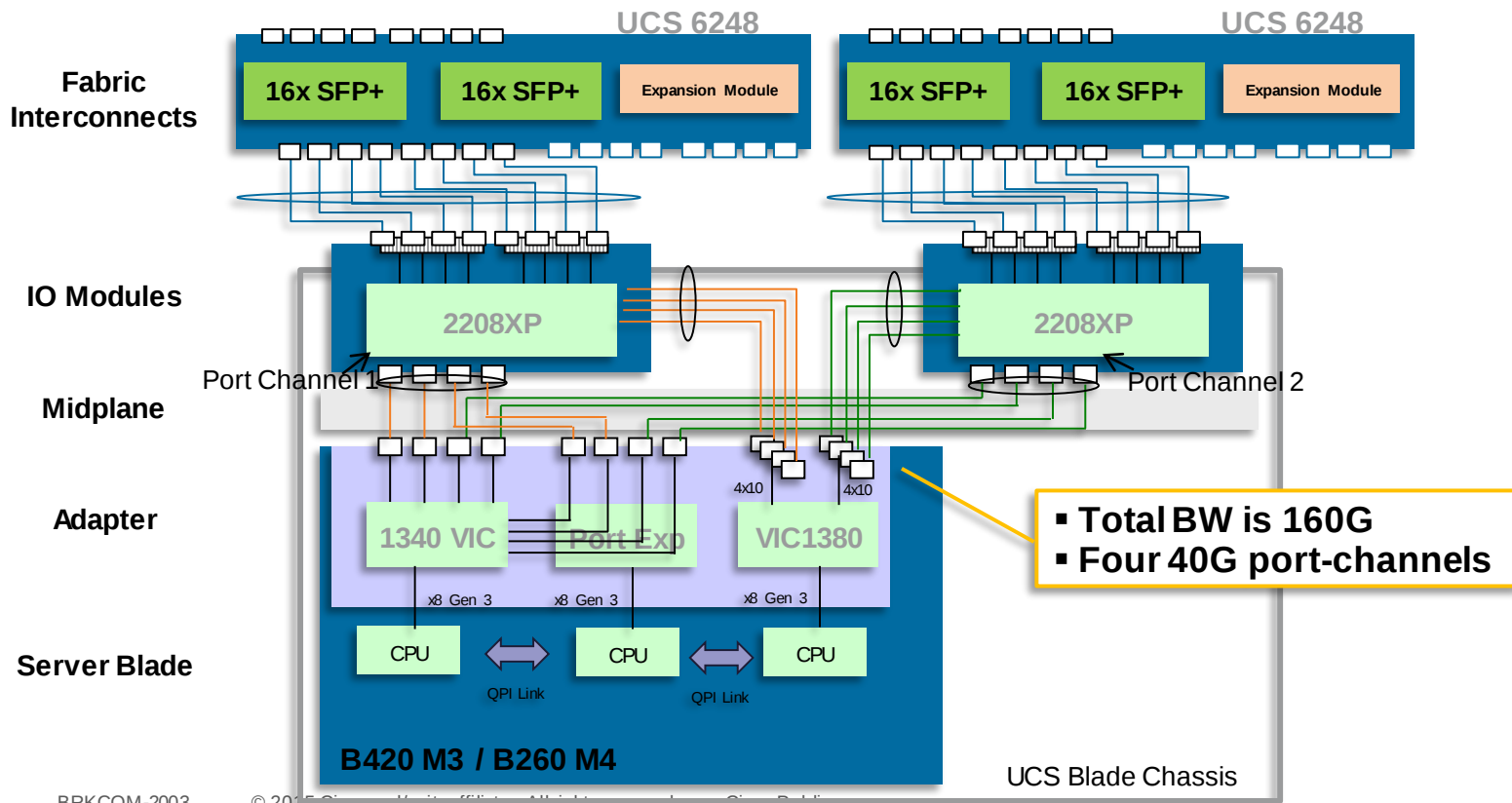
Close

VIC 1x40 & 1x80 to IOM Connectivity



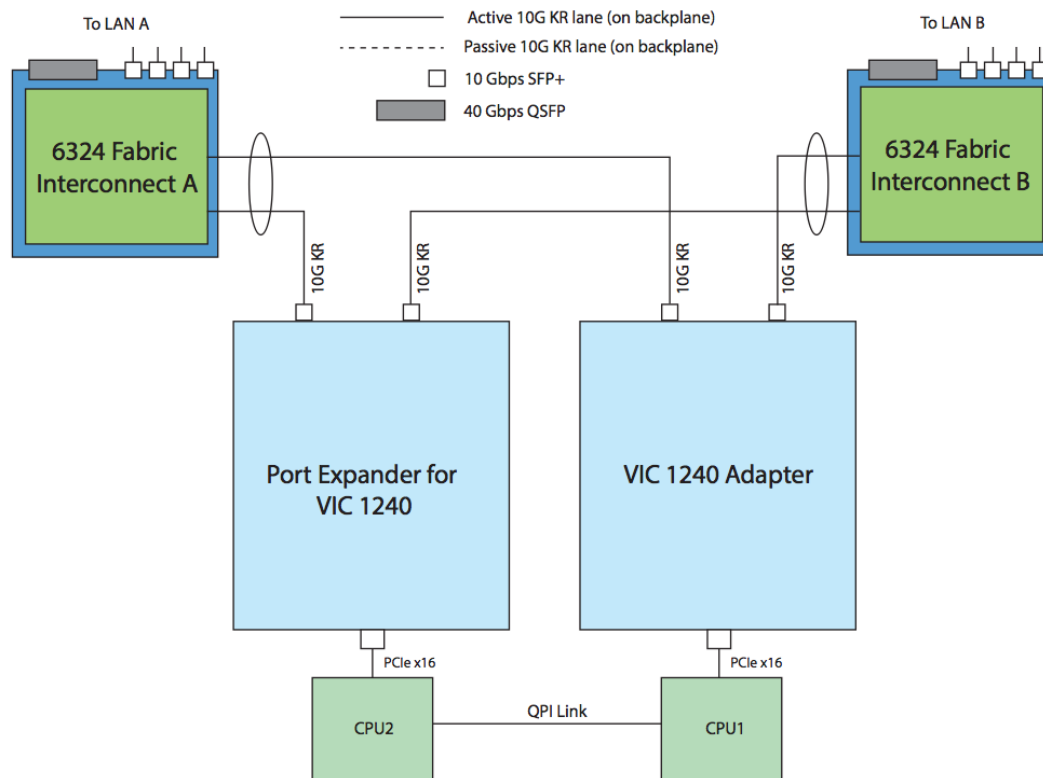
Full Width Blade to IOM Connectivity

MLOM, Port Expander, VIC1x80

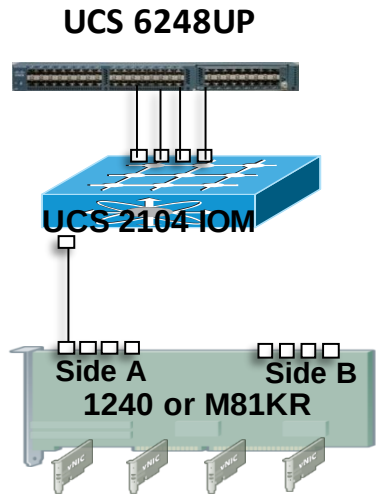


UCS Mini: Fabric to Server Connectivity

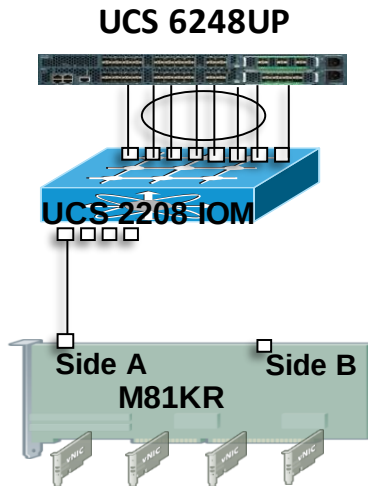
- Same server-side connectivity as the 2204XP IOM
- 20G per half width blade



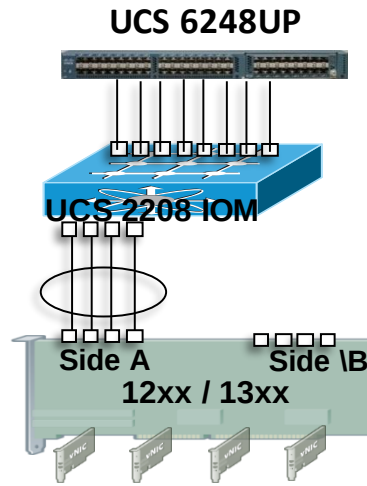
Topology Designs For Maximum Bandwidth



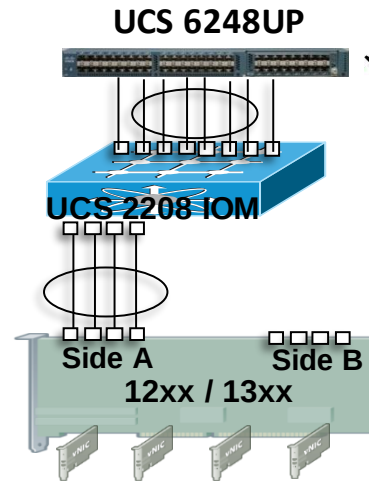
- Shared IOM uplink bandwidth of 10Gbps
- vNIC Burst up to 10Gbps



- Shared IOM uplink bandwidth of 80Gbps
- vNIC Burst up to 10Gb

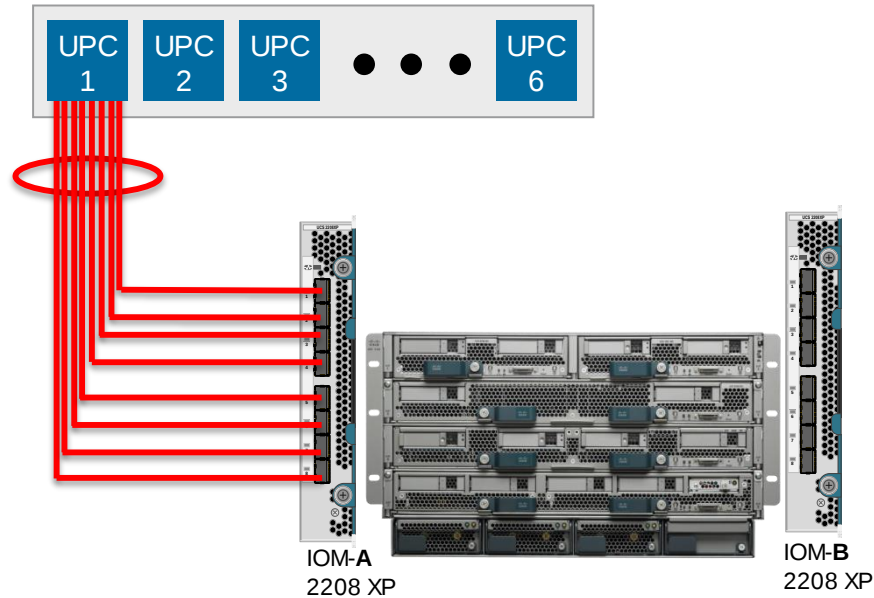


- Dedicated IOM uplink bandwidth of 10Gbps
- vNIC Burst up to 10Gbps

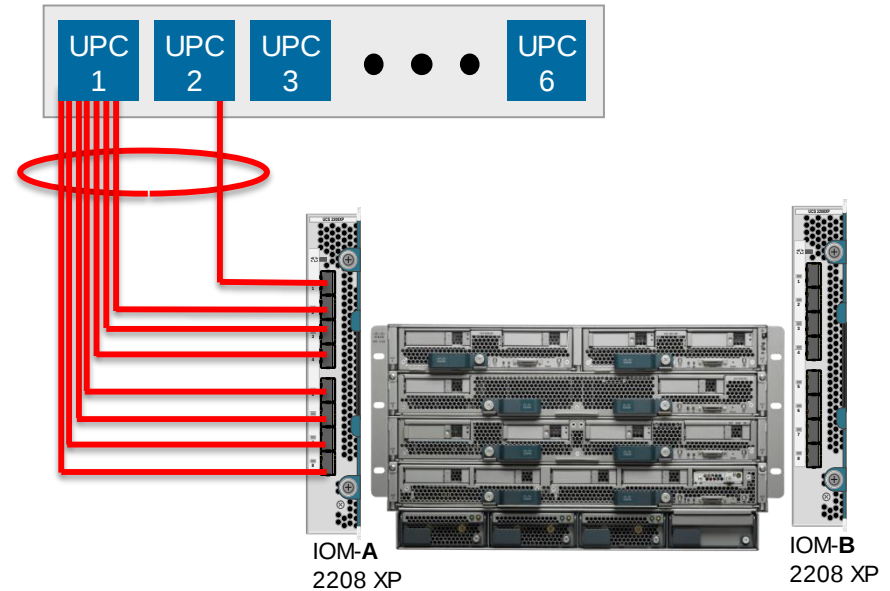


- Shared IOM uplink bandwidth of 80Gbps

Fabric Interconnect VIF Calculation



- Recommended
- Maximise number of available VIFs to the host



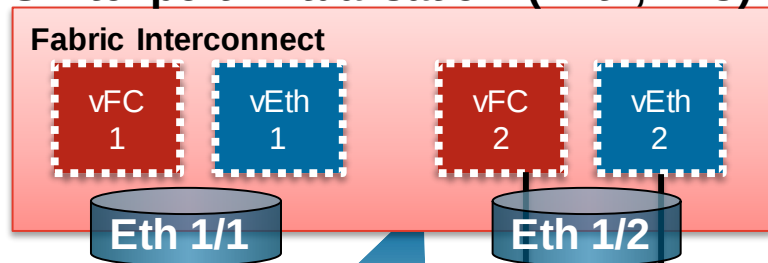
- Not recommended
- Minimal number of VIFs to the host



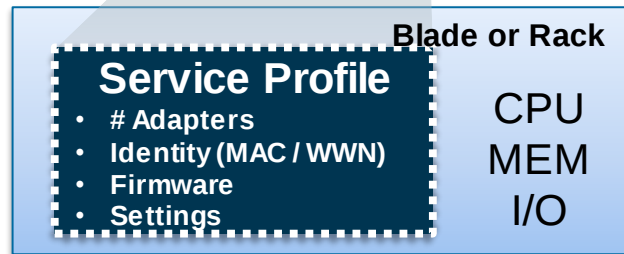
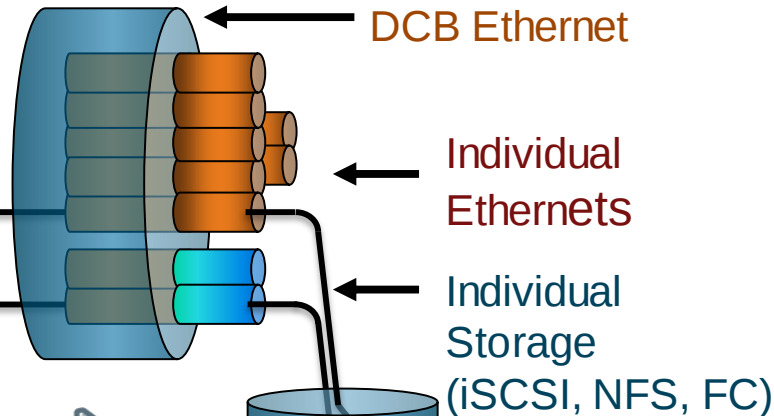
Virtual Interfaces

Cisco UCS: Infrastructure Virtualisation

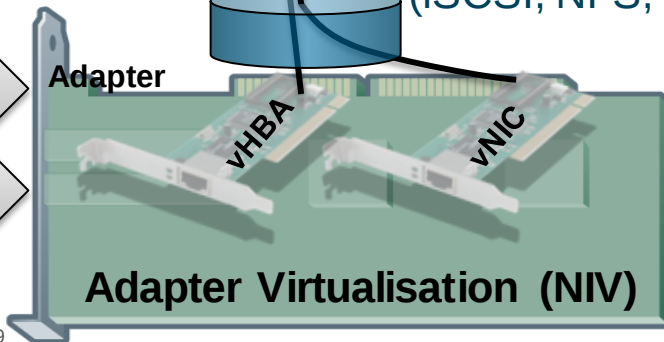
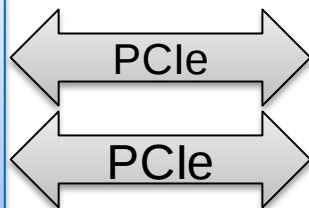
Switchport Virtualisation (vEth, vFC)



Cable Virtualisation (VNTag)

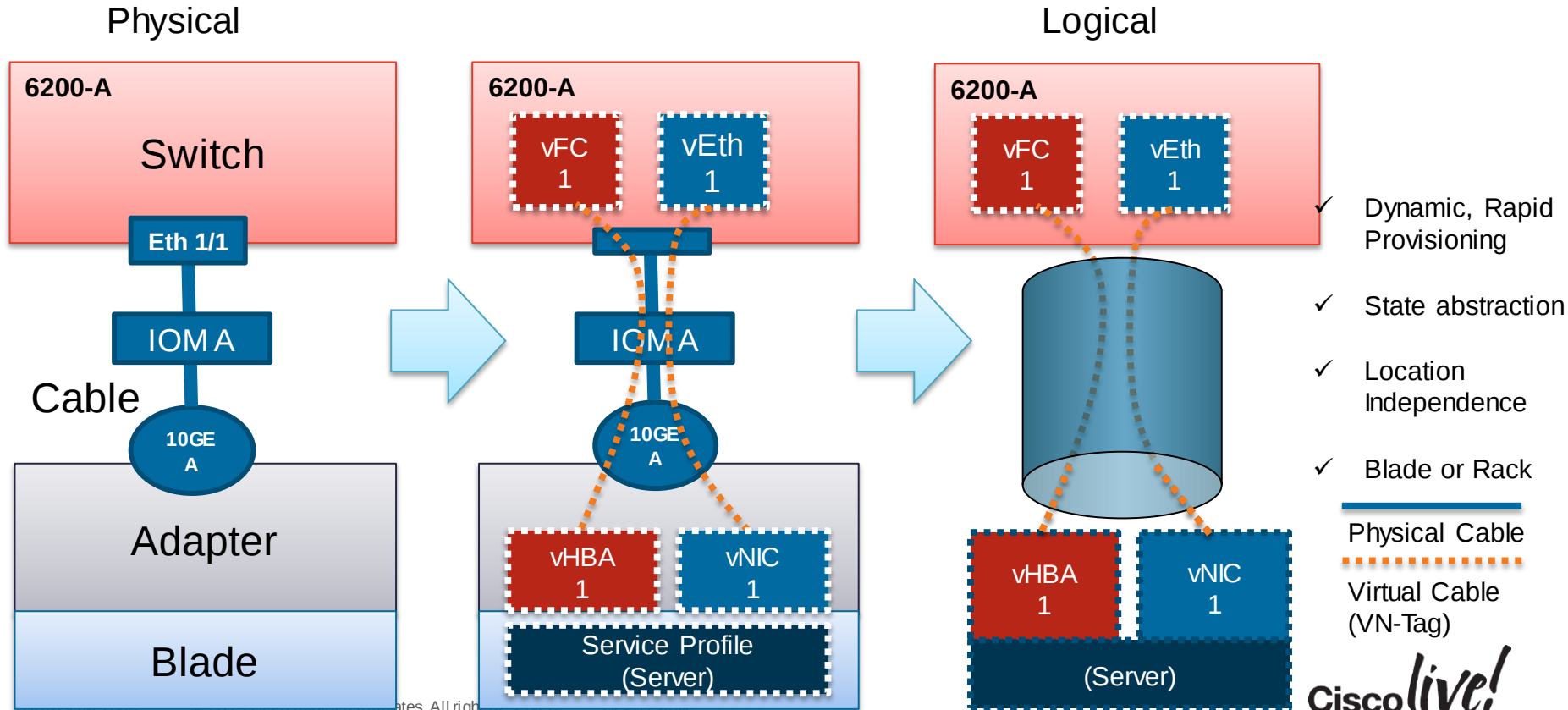


Server Abstraction



isco live!

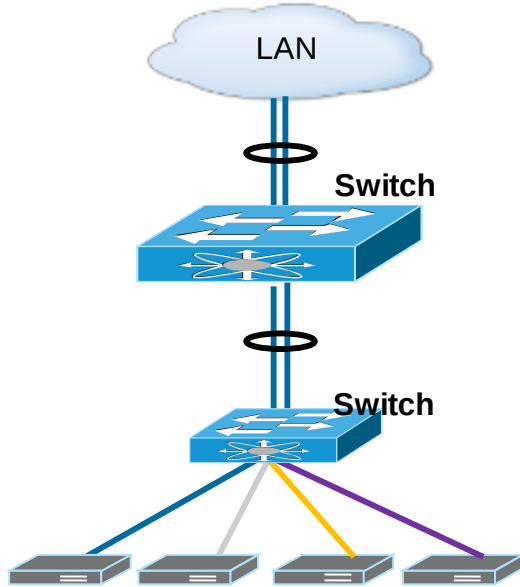
Abstracting the Logical Architecture



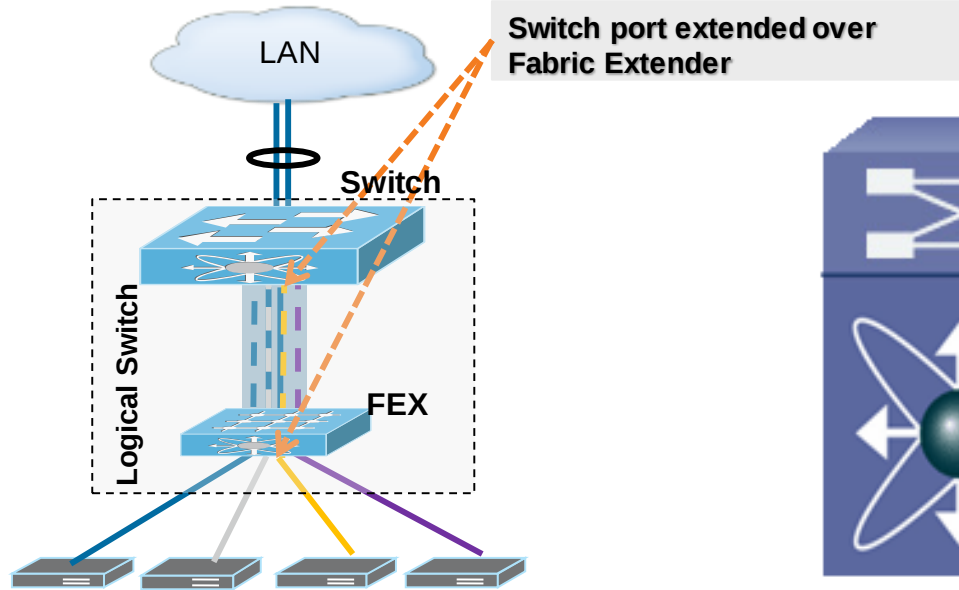
Fabric Extension (FEX) Concept

Virtualising the Network Port

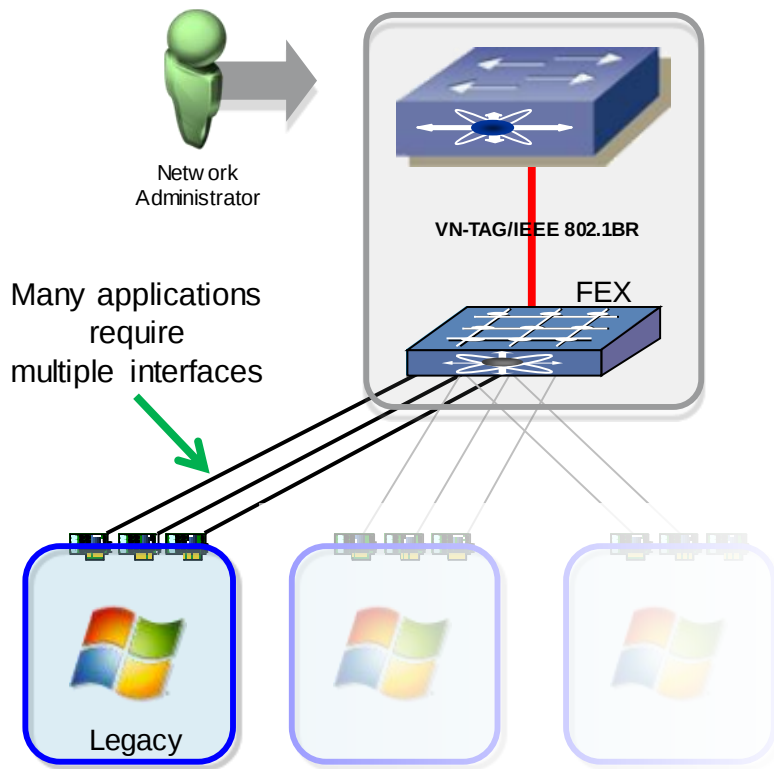
Legacy multi-tier architecture



FEX architecture

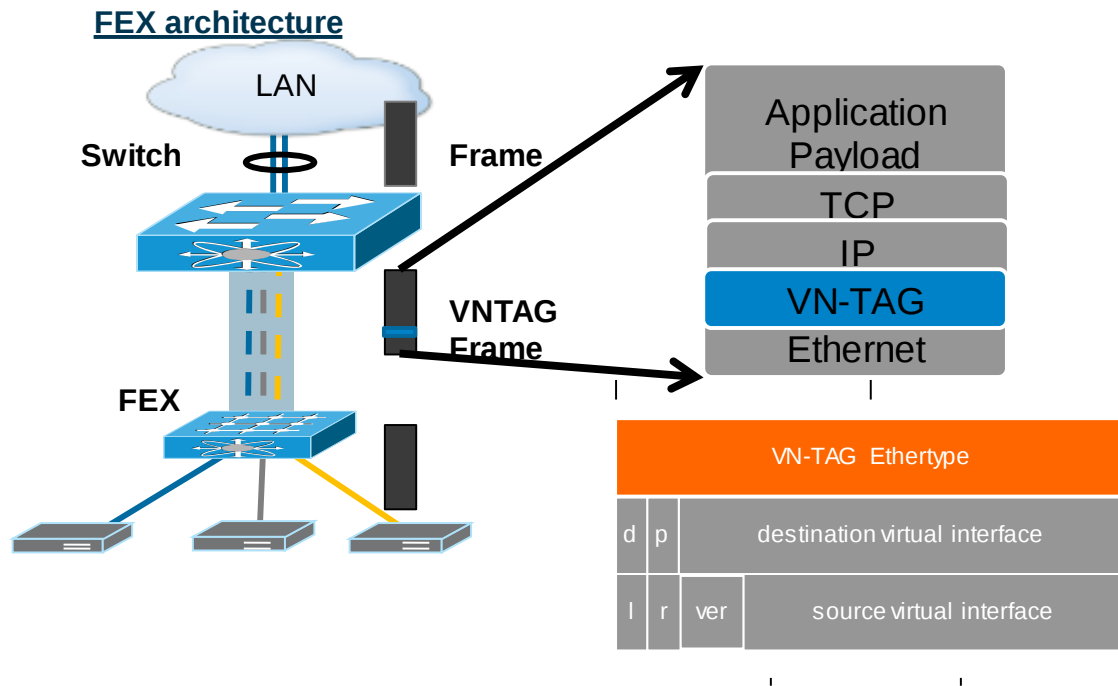


Fabric Extender Evolution

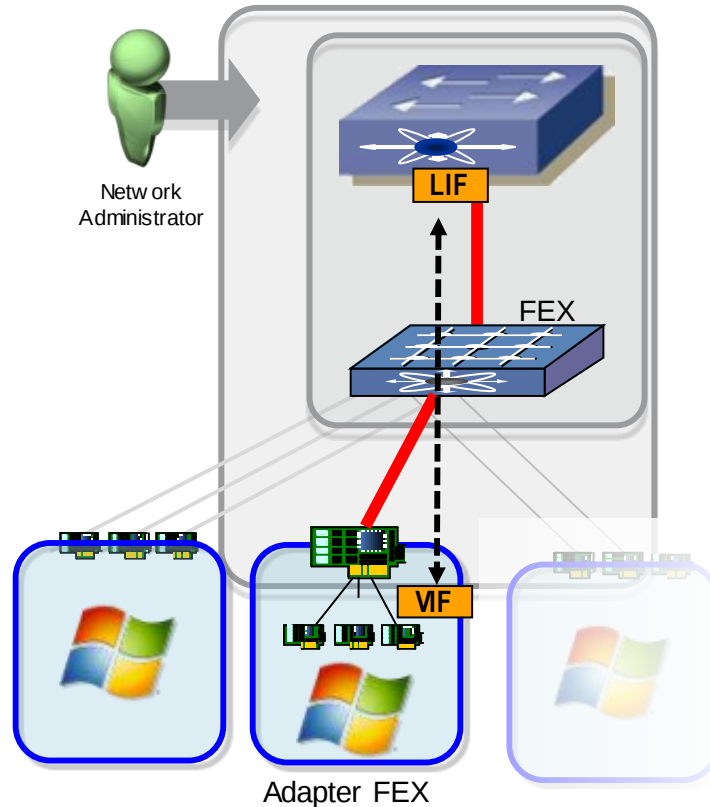


- Cisco VN-TAG is the pre-standard to IEEE 802.1BR Port Extension
- The 802.1BR Architecture provides the ability to extend the bridge (switch) interface to downstream devices

VN-TAG



Fabric Extender Evolution – Virtual Interfaces



- 802.1BR associates the Logical Interface (LIF) to a Virtual Interface (VIF)

VN-Tag at the Adapter (Mezz Card) Level

```
Hardy-the-new-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# vnic
vnic id      : internal id of vnic, use for other vnic cmds
vnic name/mac : ucsd provisioned name (-n) or mac address (-m)
vnic type     : enet=ethernet, enet_pt=dynamic ethernet, fc=fcoe
vnic bb:dd.f  : host pci bus/device/function id
vnic state    : state of vnic
lif           : internal logical if id, use for other lif/vif cmds
lif state     : state of lif
vif uif       : bound uplink 0 or 1, =:primary, -:secondary, >:current
vif ucsd      : ucsd id for this vif
vif idx       : switch id for this vif
vif vlan      : default vlan for traffic
vif state     : state of vif

-----
      v n i c                l i f                v i f
id  name      type  bb:dd.f state  lif state  uif  ucsd  idx  vlan  state
-----
  5 vnic_1      enet   08:00.0 UP    2  UP    - 0   970   860   1  UP
      =>1   969   873   1  UP
  6 vnic_2      enet   09:00.0 UP    3  UP    - 0   972   861   1  UP
      =>1   971   874   1  UP
  7 vnic_3      enet   0a:00.0 UP    4  UP    - 0   974   862   1  UP
      =>1   973   875   1  UP
adapter 1/1/1 (mcp):2#
```

Cisco Unified Computing System Manager - Hardy

Fault Summary

2 6 4 59

Equipment Servers LAN SAN VM Admin

Filter: All

Servers

Service Profiles

root

ESXi5-LocalBoot (testing vSphere 5)

Sub-Organizations

PreProduction

Sub-Organizations

cpaggen

ESXi-5.0-localboot (10.48.82.82)

iSCSI-Win2k8R2 (10.48.82.90)

iSCSI vNICs

vHBAs

vNICs

vNIC e0

Network backbone

vNIC e1

Network iSCSI-B2

Sub-Organizations

CiscoLive

vSphere5-iSCSI_Boot

Sub-Organizations

Service Profile Templates

root

Sub-Organizations

Policies

root

Adapter Policies

BIOS Defaults

BIOS Policies

Boot Policies

Host Firmware Packages

IPMI Access Profiles

Local Disk Config Policies

Maintenance Policies

Logged in as cpaggen@10.48.58.84

New Options Pending Activities Exit

Servers > Service Profiles > root > Sub-Organizations > cpaggen > Service Profile iSCSI-Win2k8R2

General Storage Network iSCSI vNICs Boot Order Virtual Machines Policies Server Details FSM VIF Paths Faults Events

Filter Export Print

Name	Adapte...	FEX Hos...	FEX Netwo...	FI Serve...	v...	FI Uplink	Lin...	Sta...
Path 1	1/1	left/2	left/2	B/1/18				
Virtual Circuit 1060					e1	B/PortChannel 2	Up	
Virtual Circuit 1066					vHBA1	B/PortChannel 77	Up	
Virtual Circuit 1079					e0	B/PortChannel 2	Up	
Virtual Circuit 9258					unpinned		Up	
Path 1	2/2	right/2	right/2	A/1/17				
Virtual Circuit 1065					vHBA0	A/PortChannel 66	Up	
Virtual Circuit 1078					e0	A/PortChannel 1	Up	
Virtual Circuit 9257					unpinned		Up	

10.48.58.84 - PuTTY

Hardy-B(nxos) # sh vifs interface e1/1/2

Interface MAX-VIFS VIFS

Eth1/1/2 60 Veth1060, Veth1079, Veth9258,

Hardy-B(nxos) # exit

Hardy-B# conn nx A

Cisco Nexus Operating System (NX-OS) Software

T&C support: <http://www.cisco.com/tac>

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<http://www.opensource.org/licenses/gpl-2.0.php> and

<http://www.opensource.org/licenses/lgpl-2.1.php>

Hardy-A(nxos) # show vifs interface e1/1/2

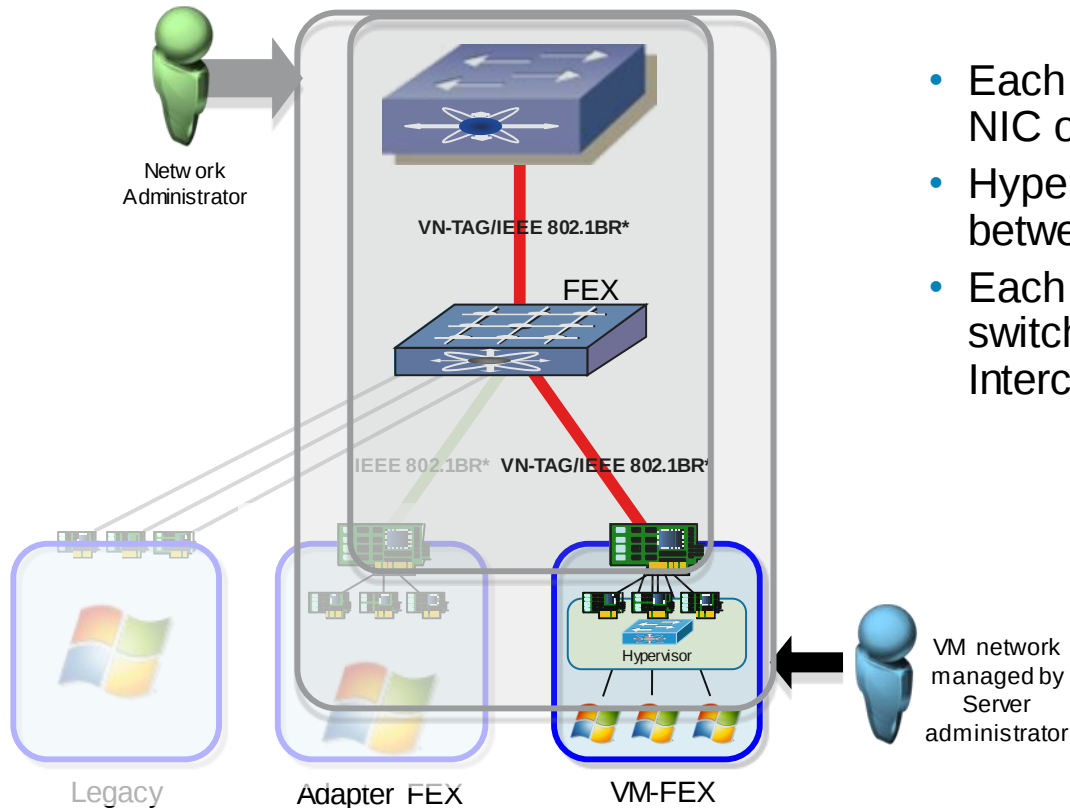
Interface MAX-VIFS VIFS

Eth1/1/2 60 Veth1078, Veth9257,

Hardy-A(nxos) #

chassis 1 slot 2

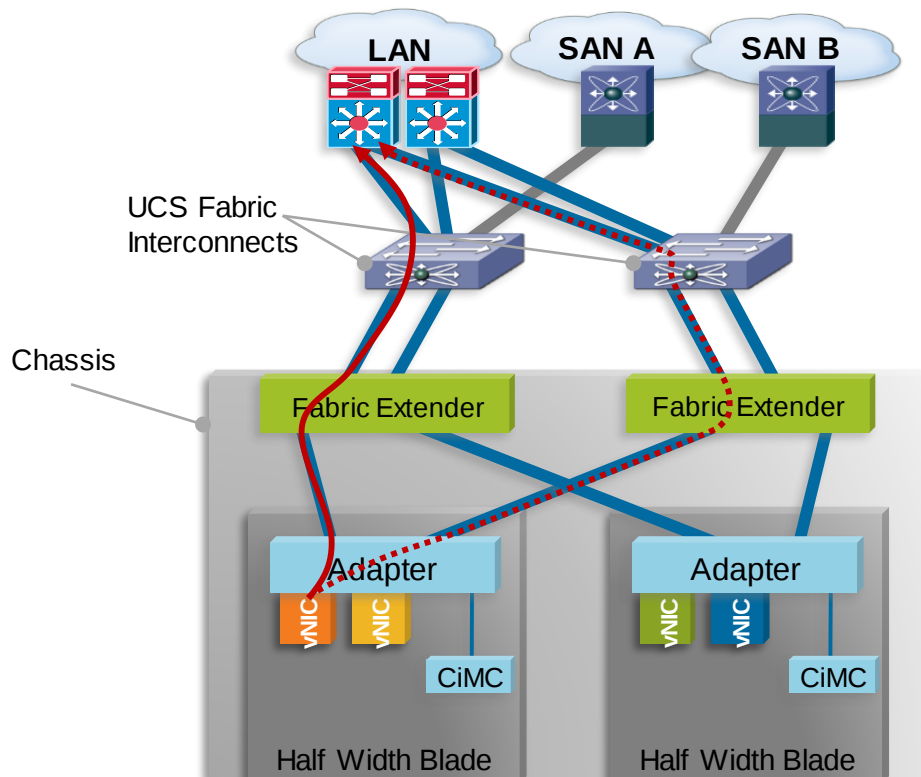
Fabric Extender Evolution (VM-FEX)



- Each VM assigned dedicated NIC on ESXi hosts PCIE bus
- Hypervisor arbitrates mapping between VM and PCI vNIC
- Each VM gets a dedicated switch port on the Fabric Interconnect

Fabric Failover

End Host Mode (only)



- Fabric provides NIC failover capabilities chosen when defining a service profile
- Traditionally done using NIC bonding driver in the OS
- Provides failover for both unicast and multicast traffic
- Works for any OS on bare metal and hypervisors

```
UCS-6200-A /chassis/server/adapter/host-eth-if # show vif
```

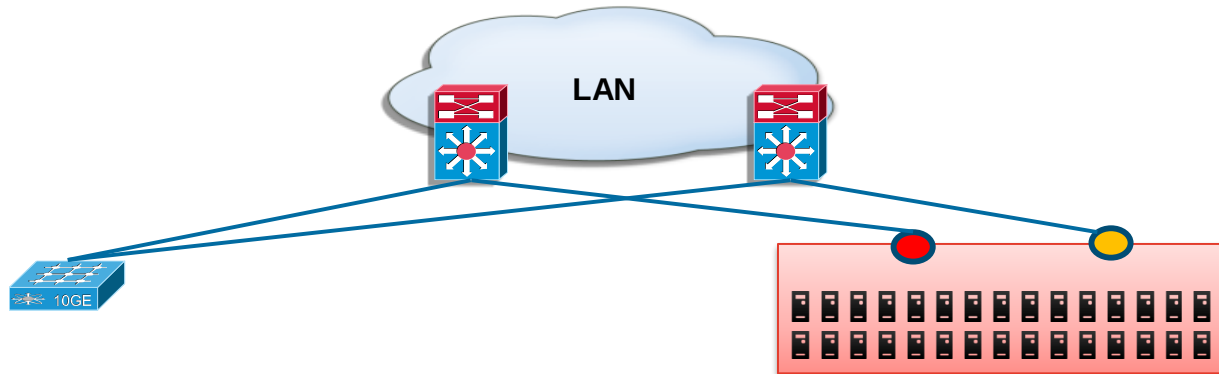
VIF:

ID	Fabric ID	Transport	Tag	Status	Oper State
1201	A	Ether	0	Allocated	Active
1202	B	Ether	0	Allocated	Passive

A long-exposure photograph of a city street at night. The background shows a multi-lane road with a pedestrian bridge and modern buildings with lit windows. The foreground is dominated by vibrant, multi-colored light trails from moving vehicles, creating a sense of motion and energy. The text 'Fabric Forwarding - Ethernet' is overlaid in the center.

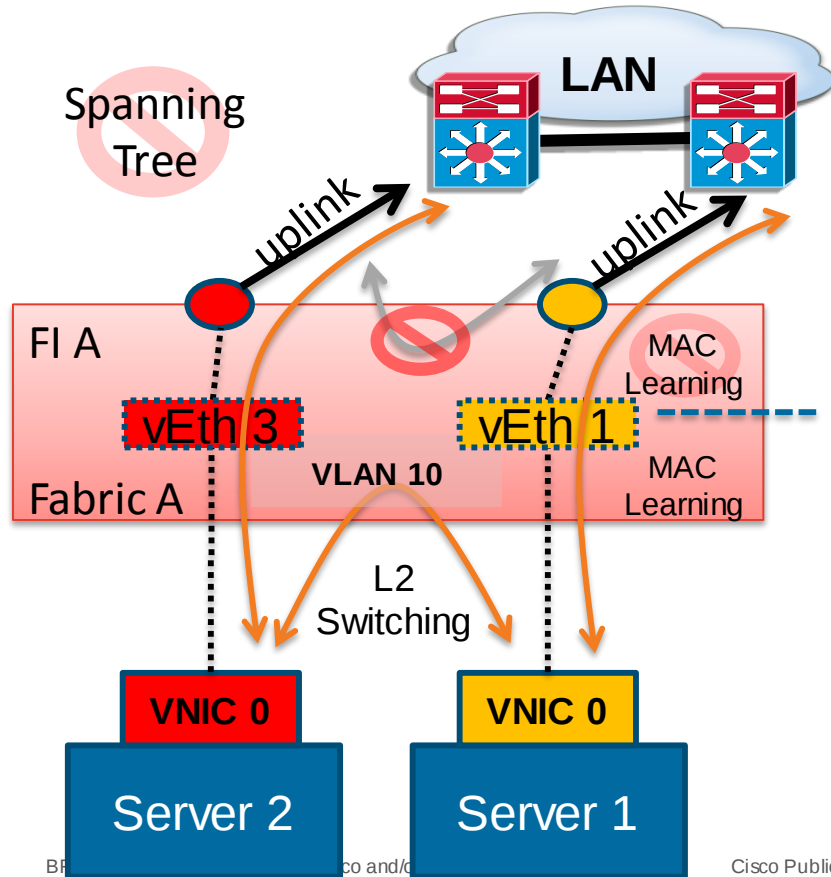
Fabric Forwarding - Ethernet

Ethernet Fabric Forwarding Mode of Operations



- Switch mode: User configurable
 - Fabric Interconnects behave like regular ethernet switches
 - STP parameters are lock
 - VLAN/Mac based forwarding
- End-host mode (EHM): Default mode
 - No spanning-tree protocol (STP)
 - Active/Active for all links and VLANs
 - Port definitions
 - Policy based forwarding
 - No unknown unicast forwarding

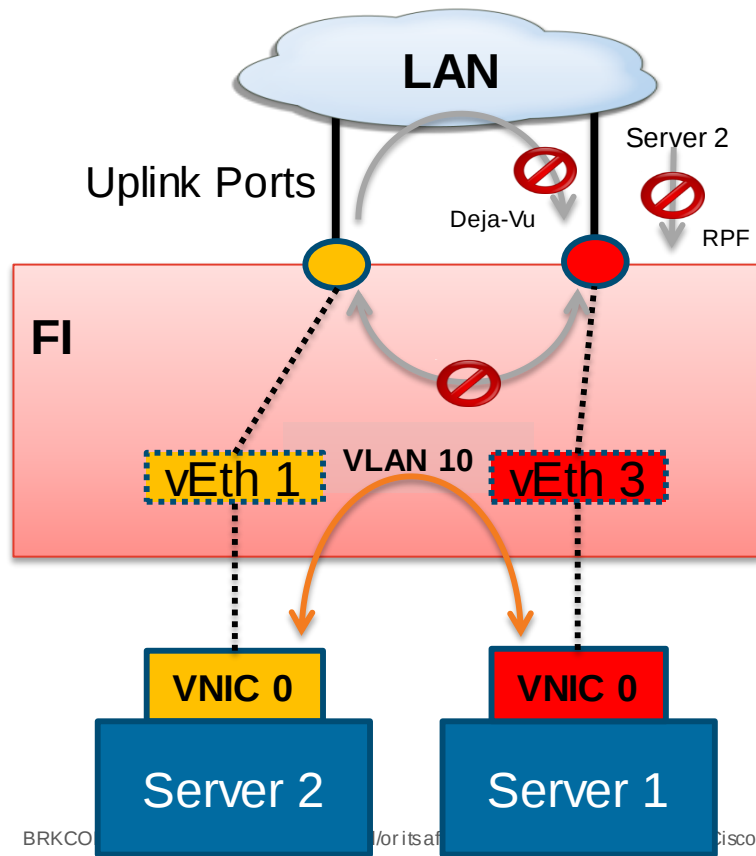
End Host Mode



- Completely transparent to the network
 - Presents itself as a bunch of hosts to the network
- No STP – simplifies upstream connectivity
- All uplinks ports are forwarding – never blocked

End Host Mode

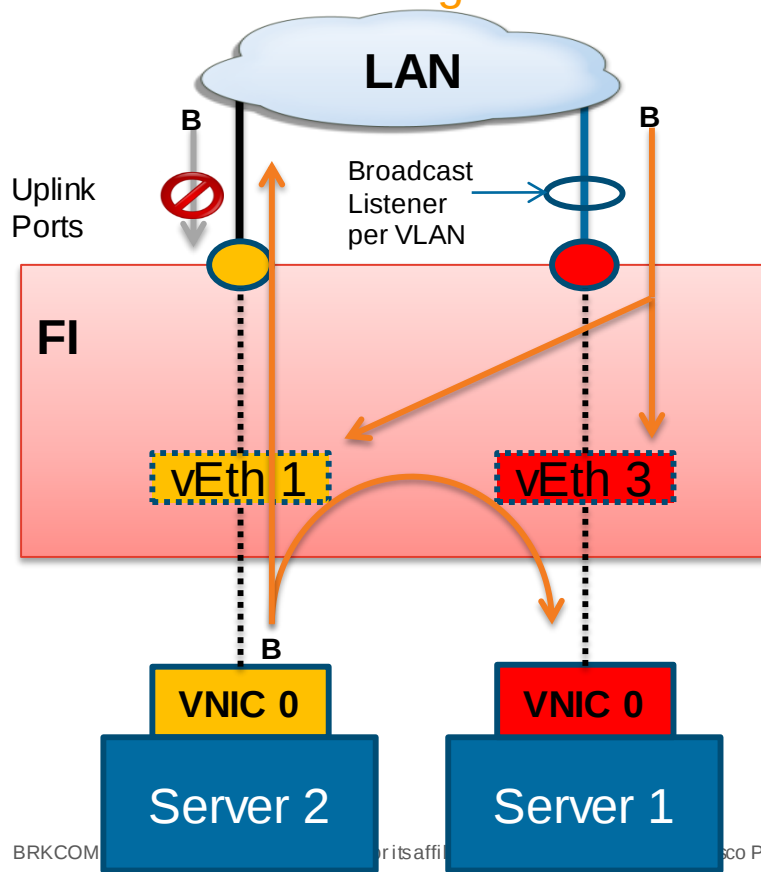
Unicast Forwarding



- MAC/VLAN plus policy based forwarding
 - Server pinned to uplink ports
- Policies to prevent packet looping
 - déjà vu check
 - RPF
 - No uplink to uplink forwarding
- No unknown unicast

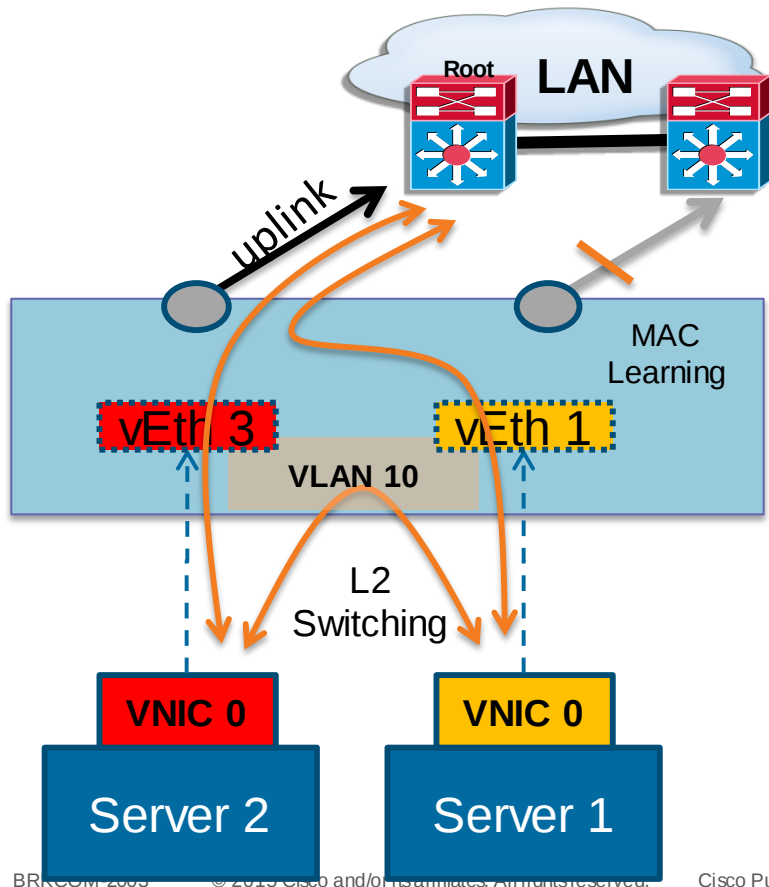
End Host Mode

Multicast Forwarding



- Broadcast traffic for a VLAN is pinned on exactly one uplink port (or port-channel) i.e., it is dropped when received on other uplinks
- Server to server multicast traffic is locally switched
- RPF and déjà vu check also applies for multicast traffic

Switch Mode

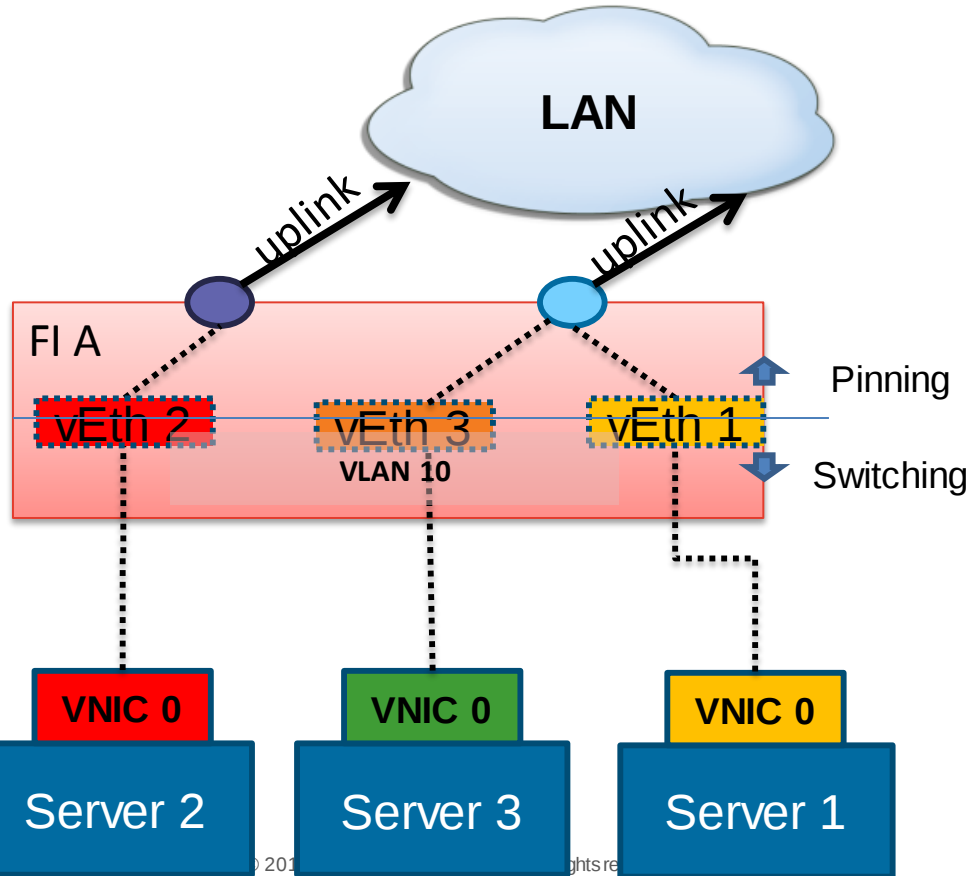


- Fabric Interconnect behaves like a normal L2 switch
- Rapid-STP+ to prevent loops
 - STP parameters are not configurable
- Server vNIC traffic follows STP forwarding states
 - Use VPC to get around blocked ports
- VTP is not supported
- MAC address learning on both uplinks and server links



Uplink Pinning

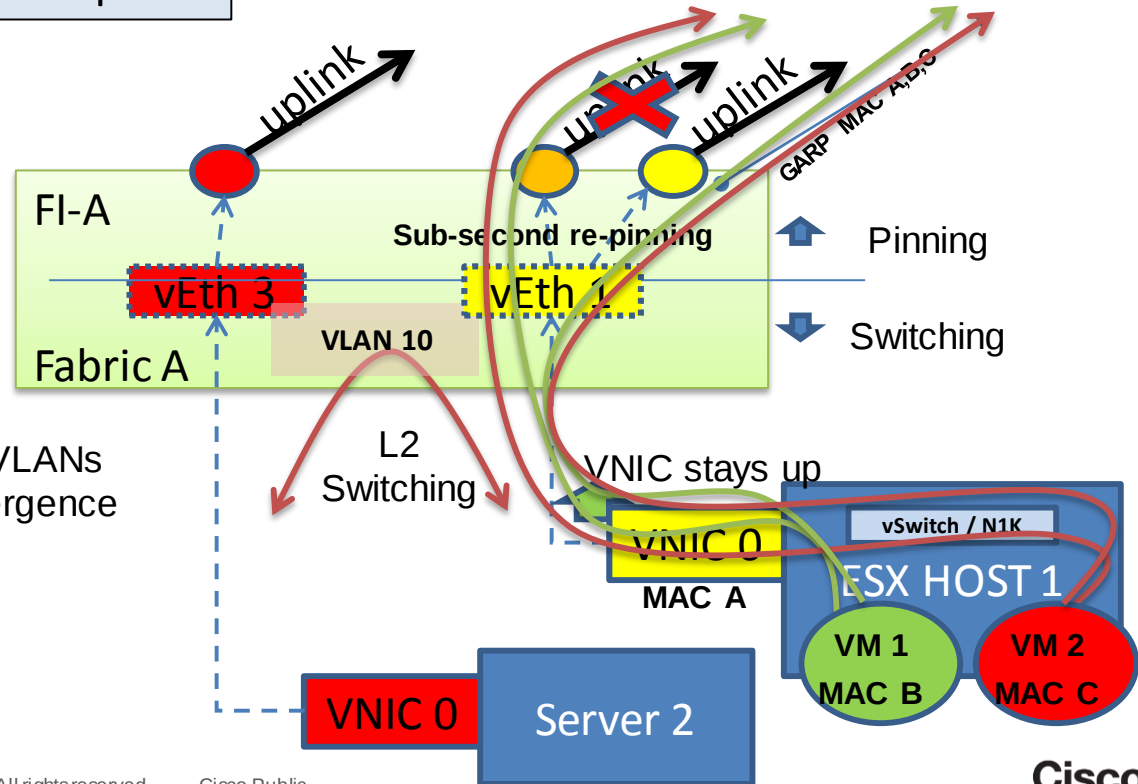
End Host Mode - Dynamic Pinning



- UCSM manages the vEth pinning to the uplink
- UCSM will periodically vEth distribution and redistribute the vEths across the uplinks

End Host Mode – Individual Uplinks

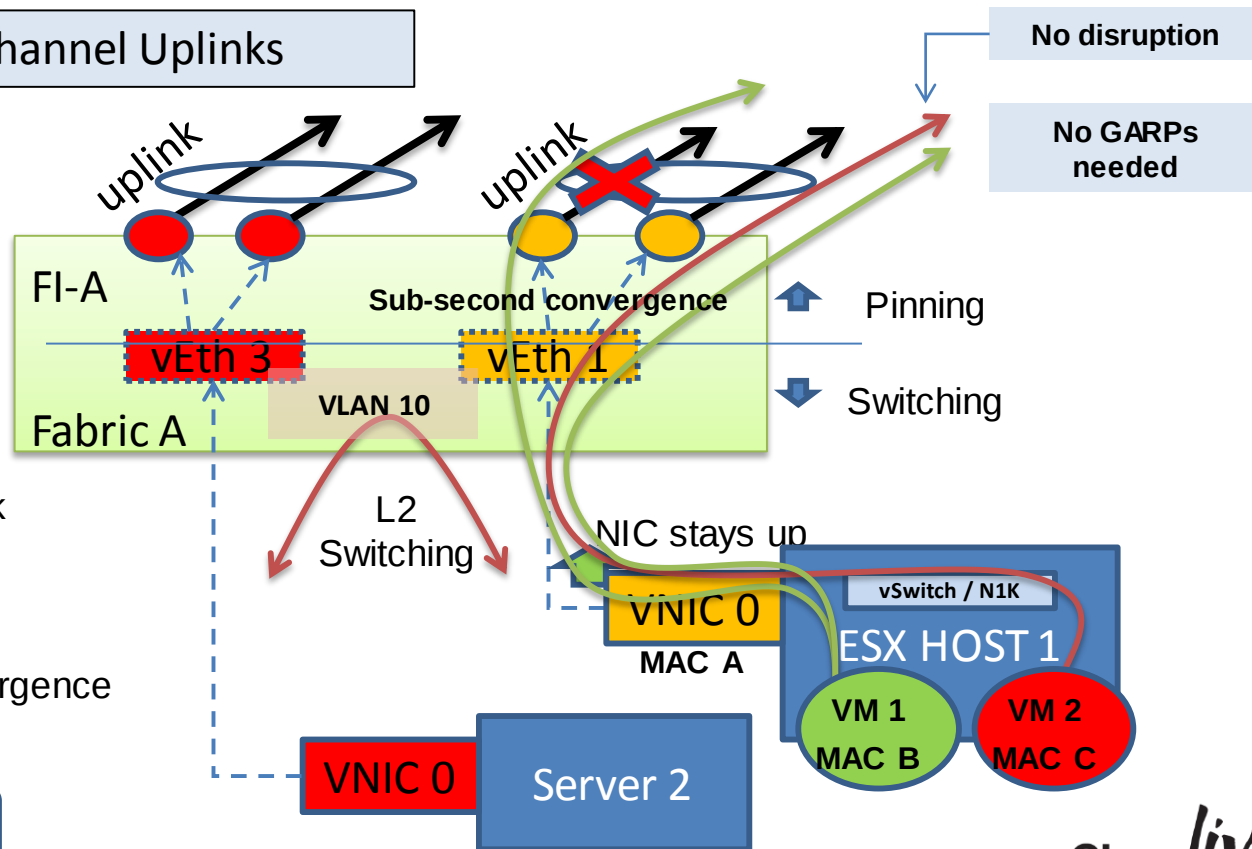
Dynamic Re-pinning of failed uplinks



- ✓ All uplinks forwarding for all VLANs
- ✓ GARP aided upstream convergence
- ✓ No STP
- ✓ Sub-second re-pinning
- ✓ No server NIC disruption

End Host Mode – Port Channel Uplinks

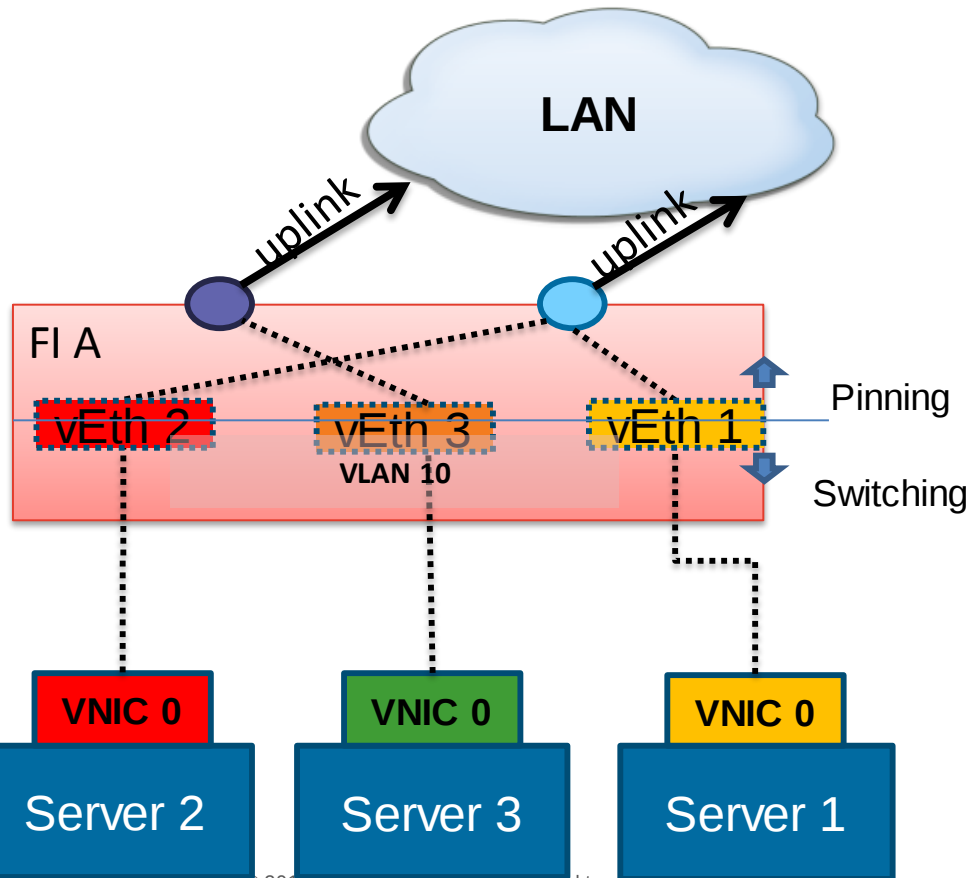
Recommended: Port Channel Uplinks



- ✓ More Bandwidth per Uplink
- ✓ Per flow uplink diversity
- ✓ No Server NIC disruption
- ✓ Fewer GARPs needed
- ✓ Faster bi-directional convergence
- ✓ Fewer moving parts

RECOMMENDED

End Host Mode – Static Pinning



Administrator Pinning Definition

vEth Interfaces	Uplink
vEth 1	Blue
vEth 2	Blue
vEth 3	Purple

- Administer controls the vEth pinning
- Deterministic traffic flow
- Pinning configuration is done under the LAN tab -> LAN Pin groups and assigned under the vNIC
- No re-pinning within the same FI
- Static and dynamic pinning can co-exist

Which uplink is the servers' vEth pinned to?

```
TME-UCS6100-A(nxos)# sh pinning border-interfaces
```

Border Interface	Status	SIFs
Po1	Active	Veth1093 Veth1094 Veth1099
Po2	Active	sup-eth2 Veth1103
Eth1/6	Down	
Eth1/7	Down	
Eth1/8	Down	

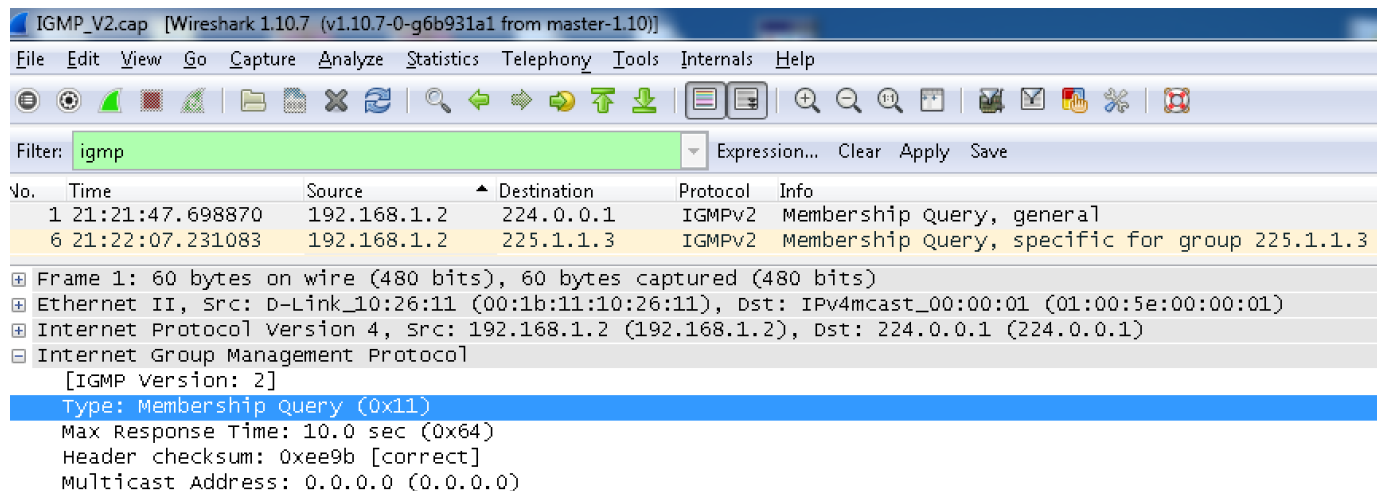
Total Interfaces : 5



Fabric Forwarding - Multicast

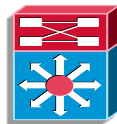
IGMP Querier?

- Three Options:
 1. Upstream IGMP Querier / PIM Router
 2. Fabric Interconnect IGMP Querier
 3. IGMP Snooping disabled

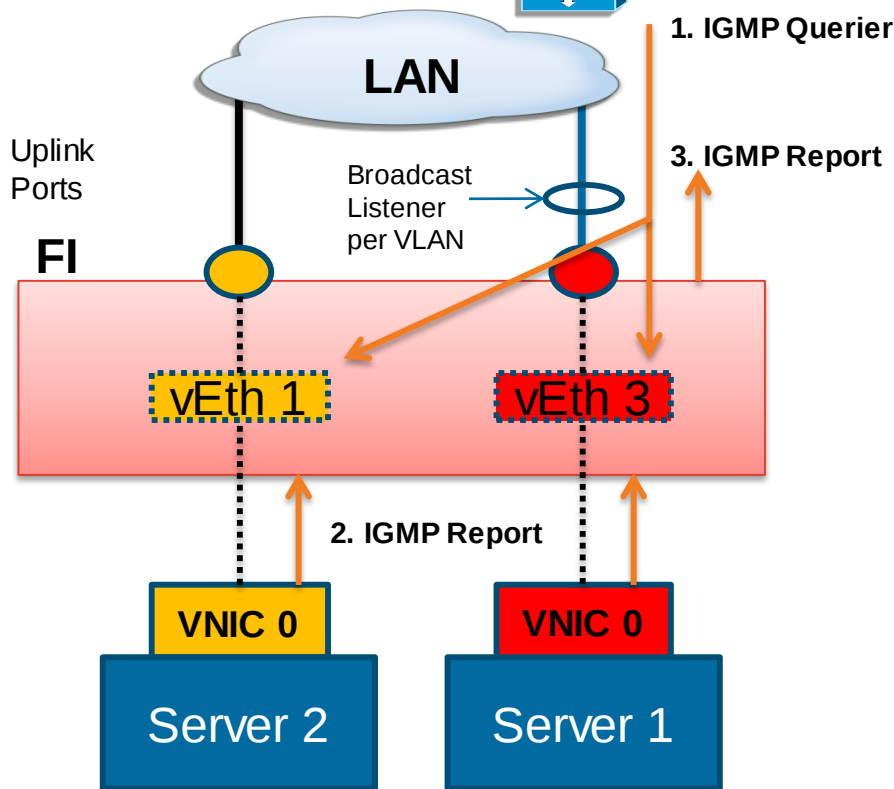


UCS Multicast

IGMP Querier Upstream



IGMP Querier / PIM Router



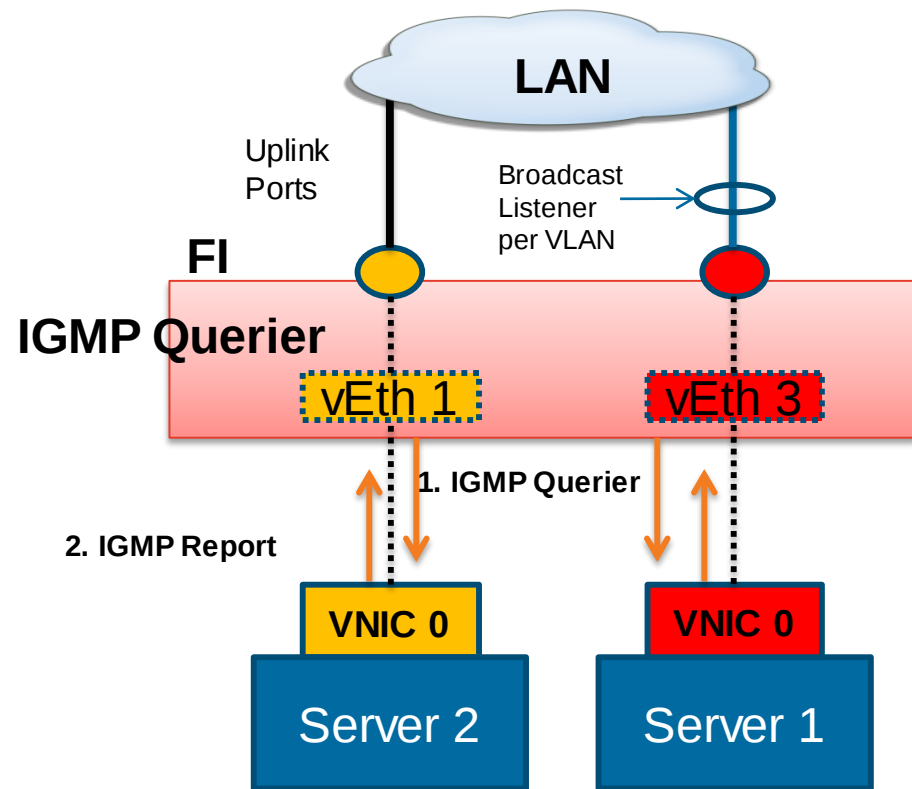
```
UCSB-2-A(nxos)# show ip igmp snooping vlan 511
IGMP Snooping information for vlan 511
  IGMP snooping enabled
  Optimised Multicast Flood (OMF) disabled
  IGMP querier present, address: 10.67.87.2, version: 3, i/f Eth1/2
  Querier interval: 125 secs
  Querier last member query interval: 1 secs
  Querier robustness: 2
  Switch-querier disabled
  IGMPv3 Explicit tracking enabled
  IGMPv2 Fast leave disabled
  IGMPv1/v2 Report suppression enabled
  IGMPv3 Report suppression disabled
  Link Local Groups suppression enabled
  Router port detection using PIM Hellos, IGMP Queries
  Number of router-ports: 1
  Number of groups: 0
  VLAN vPC function disabled
  Active ports:
    Eth1/1      Eth1/2  Veth32769      Veth32771
    Veth32772   Veth32773   Veth32774      Veth1315
```

G-pinned?

```
UCSB-2-A(nxos)# show ip igmp internal info global | grep "Vlan 511"  
  Vlan 511: G-pinned if - curr: Eth1/2; prev: Eth1/1  
  Vlan 511: Flood-pinned if - curr: Eth1/2; prev: Eth1/1  
UCSB-2-A(nxos)#
```

UCS Multicast

Internal Querier



```
UCSB-2-A(nxos)# show ip igmp snooping vlan 511
IGMP Snooping information for vlan 511
  IGMP snooping enabled
  Optimised Multicast Flood (OMF) disabled
  IGMP querier present, address: 1.1.1.1, version: 3
  Querier interval: 125 secs
  Querier last member query interval: 1 secs
  Querier robustness: 2
  Switch-querier enabled, address 1.1.1.1, currently running
  IGMPv3 Explicit tracking enabled
  IGMPv2 Fast leave disabled
  IGMPv1/v2 Report suppression enabled
  IGMPv3 Report suppression disabled
  Link Local Groups suppression enabled
  Router port detection using PIM Hellos, IGMP Queries
  Number of router-ports: 1
  Number of groups: 0
  VLAN vPC function disabled
  Active ports:
    Eth1/1      Eth1/2  Veth32769      Veth32771
    Veth32772   Veth32773   Veth32774      Veth1315
```

UCS Multicast Configuration (2.1+)

Navigation: Servers | LAN | SAN | VM | Admin

Filter: All

Tree View:

- LAN Cloud
 - Threshold Policies
 - root
 - Default vNIC Behavior
 - Dynamic vNIC Connection Policies
 - Flow Control Policies
 - LAN Connectivity Policies
 - Multicast Policies
 - IGMP_Querier
 - No_Snooping
 - default

Multicast Policies

Filter Export Print

Name	IGMP Snooping State	IGMP Snooping Querier State	IGMP Snooping Querier IPv4 Address
No_Snooping	Disabled	Disabled	0.0.0.0
IGMP_Querier	Enabled	Enabled	25.25.25.25
default	Enabled	Disabled	0.0.0.0

Navigation: Servers | LAN | SAN | VM | Admin

Filter: All

Tree View:

- VLAN 99 (99)
- VLAN DMZ-199 (199)
- VLAN PrivLAN1601 (1601)
- VLAN Pvlan1701 (1701)
- VLAN VL3025-miciesla (3025)**
- VLAN VLAN-183 (183)
- VLAN VLAN-890 (890)
- VLAN VLAN-901 (901)
- VLAN VLAN19 (19)

General | Org Permissions | VLAN Group Membership | Faults | Events

Fault Summary

0 0 0 0

Actions

- Modify VLAN Org Permissions
- Delete

Properties

Name: **VL3025-miciesla** VLAN ID: 3025

Native VLAN: No Fabric ID: Dual

Network Type: Lan If Type: Virtual

Locale: External Transport Type: Ether

Multicast Policy Name: IGMP_Querier

Multicast Policy Instance: org-root/mc-policy-default

Sharing Type: ☒ None ☐ Primary ☐ Isolated

+ Create Multicast Policy

UCS & Microsoft Network Load Balancing (NLB)

- Unicast Mode
 - Ethernet Switching mode only
 - Nexus 1000v (no mac auto-static-learn)
- Multicast Mode
- IGMP Multicast
 - Requires igmp querier

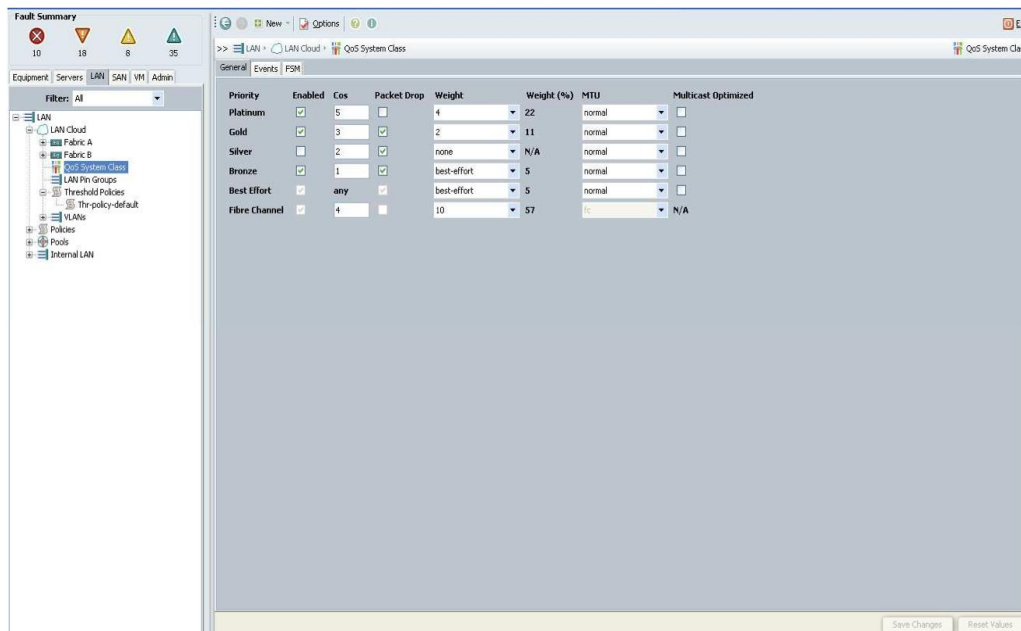
The screenshot shows the configuration page for a Network Load Balancing (NLB) cluster named 'chrisb2-nlb' with IP address 14.17.124.40. The interface has three tabs: 'Cluster IP Addresses', 'Cluster Parameters', and 'Port Rules'. The 'Cluster Parameters' tab is active. Under 'Cluster IP configuration', the following fields are visible: 'IP address' is set to 14.17.124.40, 'Subnet mask' is 255.255.255.0, 'Full Internet name' is chrisb2-nlb, and 'Network address' is 03-bf-0e-11-7c-28. Under 'Cluster operation mode', three radio buttons are present: 'Unicast', 'Multicast' (which is selected), and 'IGMP multicast'.

chrisb2-nlb(14.17.124.40) Properties	
Cluster IP Addresses	Cluster Parameters
Cluster IP configuration	
IP address:	14.17.124.40
Subnet mask:	255 . 255 . 255 . 0
Full Internet name:	chrisb2-nlb
Network address:	03-bf-0e-11-7c-28
Cluster operation mode	
☐ Unicast	
☒ Multicast	
☐ IGMP multicast	

A long-exposure photograph of a city street at night. The background shows modern buildings with lit windows and a pedestrian bridge. The foreground is dominated by vibrant, multi-colored light trails from moving vehicles, creating a sense of motion and energy. The text 'Fabric Forwarding - QoS' is overlaid in white on the left side of the image.

Fabric Forwarding - QoS

UCS Congestion Management



8 Classes: 1 FCoE, 1 best effort, 4 user-definable, 8 Classes: 2 reserved for control

UCS QoS – Marking / Classification

The screenshot displays the Cisco Unified Computing System Manager (UCSB-2) interface. The left pane shows the 'Policies' tree with 'QoS Policy Jumbo_Gold' selected. The middle pane shows the 'Properties' tab for this policy, with the 'Egress' section expanded. The right pane shows the 'Properties' tab for the 'eth0' interface, with the 'Policies' section expanded.

UCSB-2 Fault Summary:

- Equipment: 6 (Critical), 32 (Warning), 34 (Warning), 52 (Info)

QoS Policy Jumbo_Gold Properties:

- Name: Jumbo_Gold
- Owner: Local
- Priority: Gold
- Burst(Bytes): 9000
- Rate(Kbps): line-rate
- Host Control: None

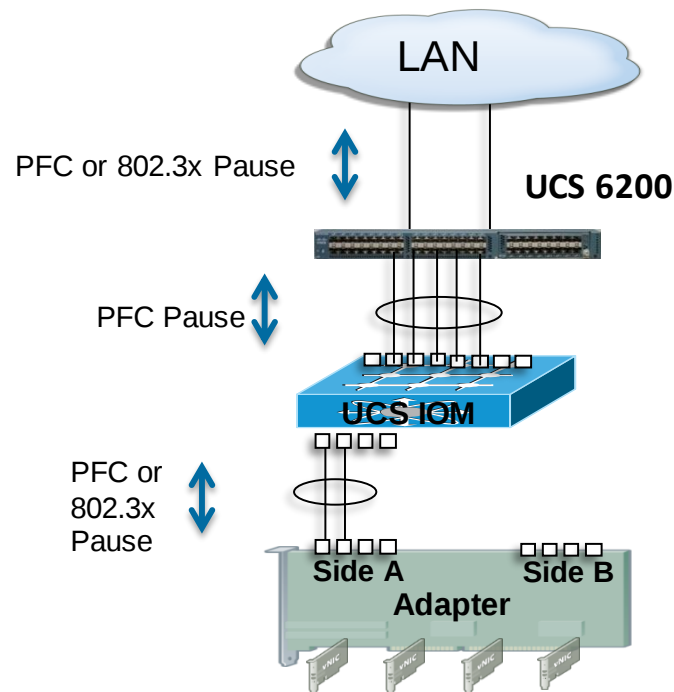
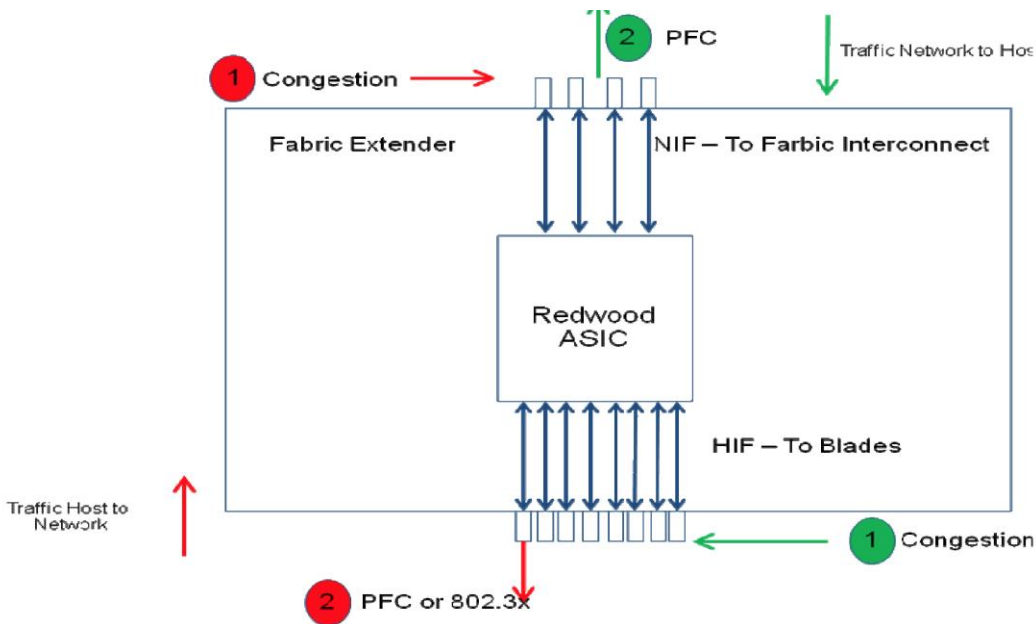
eth0 Interface Properties:

- Name: eth0
- MAC Address: Derived
- MAC Pool: default
- Fabric ID: Fabric A
- Owner: Logical
- Type: Ether
- Boot Device: Disabled
- MTU: 1500
- Operational Speed: Line Rate
- State: Not Applied

eth0 Interface Policies:

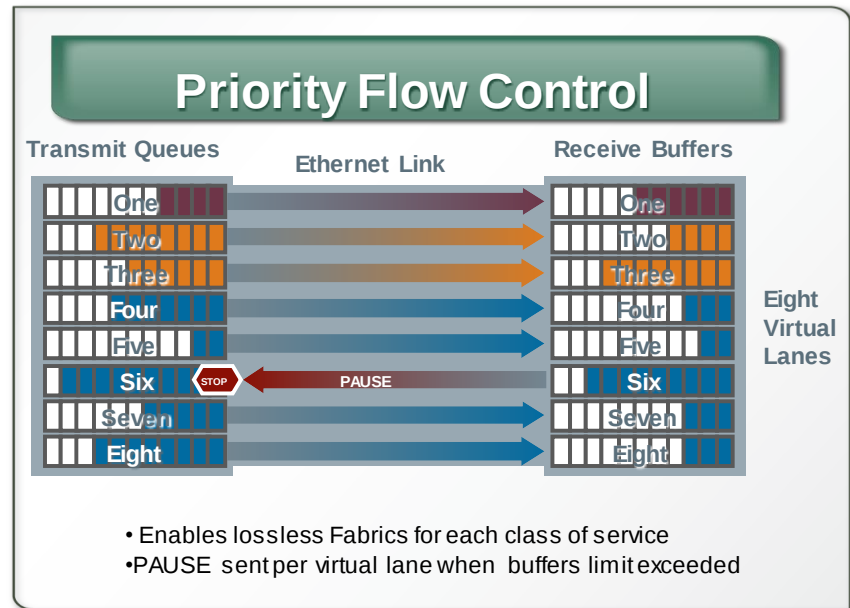
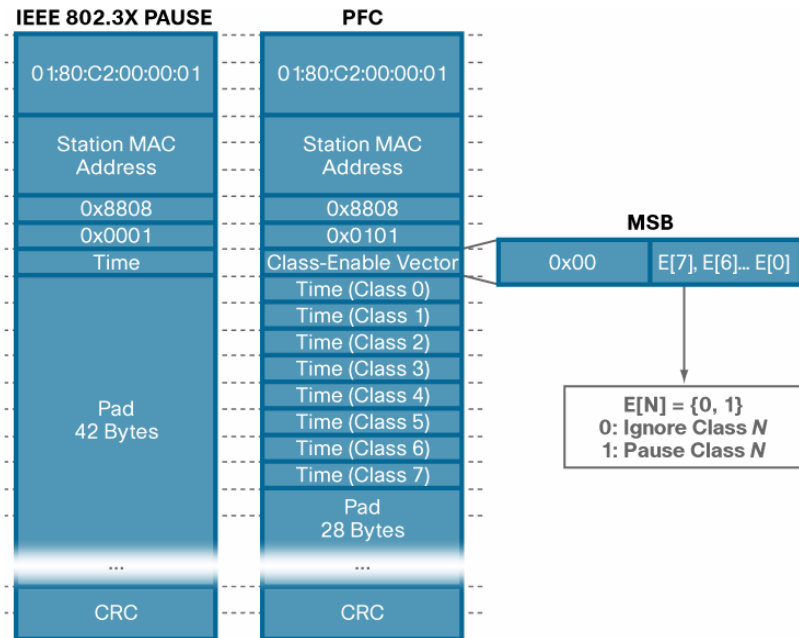
- Adapter Policy: <not set>
- Adapter Policy Instance: org-root/eth-profile-default
- QoS Policy: <not set>
- QoS Policy Instance: <not set>
- Network Control Policy: Jumbo_Gold
- Network Control Policy Instance: Jumbo_Gold
- Pin Group: bestEFort1MB

Pause!



Priority Flow Control

Classical Ethernet Pause vs. Data Centre Ethernet PFC Pause



PFC Pause: What does it look like?

The screenshot shows the Xgig TraceView application window. The main pane displays a table of network events. The selected event is a PFC Pause frame at 09:02:420.490.064. The details pane at the bottom shows the Data Link Control (DLC) and Multipoint Control Protocol (MPCP) fields.

Icon	Bookmark	mm:ss.ms_us_ns (R)	Delta Time	Port	Side A	Side B	Protoc	Summary
10 FR		00:48.811_419_191		GE Port(1,2,2)		Ether Frame	MPCP	PFC;
10 FR		00:48.812_582_759	1163.568	GE Port(1,2,2)		Ether Frame	MPCP	PFC; Pause(3) = 3355;
10 FR		00:48.812_597_276	14.518	GE Port(1,2,2)		Ether Frame	MPCP	PFC;
10 FR		00:48.812_631_584	34.307	GE Port(1,2,2)		Ether Frame	MPCP	PFC; Pause(3) = 3355;
10 FR		00:48.812_669_656	38.072	GE Port(1,2,2)		Ether Frame	MPCP	PFC;
10 FR		03:05.036_028_801	33359.145	GE Port(1,2,2)		Ether Frame	MPCP	PFC; Pause(3) = 3355;
10 FR		03:05.036_056_281	27.480	GE Port(1,2,2)		Ether Frame	MPCP	PFC;
10 FR		03:05.037_508_252	1451.970	GE Port(1,2,2)		Ether Frame	MPCP	PFC; Pause(3) = 3355;
10 FR		03:05.037_529_299	21.047	GE Port(1,2,2)		Ether Frame	MPCP	PFC;
10 FR		09:01.782_356_116	14826.817	GE Port(1,2,2)		Ether Frame	MPCP	PFC; Pause(3) = 3355;
10 FR		09:01.782_383_969	27.853	GE Port(1,2,2)		Ether Frame	MPCP	PFC;
10 FR		09:01.787_323_224	4939.255	GE Port(1,2,2)		Ether Frame	MPCP	PFC; Pause(3) = 3355;
10 FR		09:01.787_353_466	30.243	GE Port(1,2,2)		Ether Frame	MPCP	PFC;
10 FR		09:01.787_396_379	42.913	GE Port(1,2,2)		Ether Frame	MPCP	PFC; Pause(3) = 3355;
10 FR		09:01.787_418_569	22.190	GE Port(1,2,2)		Ether Frame	MPCP	PFC;
10 FR		09:01.789_124_901	1706.332	GE Port(1,2,2)		Ether Frame	MPCP	PFC; Pause(3) = 3355;
10 FR		09:01.789_141_844	16.943	GE Port(1,2,2)		Ether Frame	MPCP	PFC;
10 FR		09:02.420_490_064	11345.220	GE Port(1,2,2)		Ether Frame	MPCP	PFC; Pause(3) = 3355;
10 FR		09:02.420_529_256	39.192	GE Port(1,2,2)		Ether Frame	MPCP	PFC;
10 FR		09:02.420_563_369	34.113	GE Port(1,2,2)		Ether Frame	MPCP	PFC; Pause(3) = 3355;
10 FR		09:02.420_597_774	34.405	GE Port(1,2,2)		Ether Frame	MPCP	PFC;
10 FR		09:02.420_631_894	34.120	GE Port(1,2,2)		Ether Frame	MPCP	PFC; Pause(3) = 3355;
10 FR		09:02.420_666_319	34.425	GE Port(1,2,2)		Ether Frame	MPCP	PFC;
10 FR		09:02.420_700_434	34.115	GE Port(1,2,2)		Ether Frame	MPCP	PFC; Pause(3) = 3355;
10 FR		09:02.420_734_971	34.538	GE Port(1,2,2)		Ether Frame	MPCP	PFC;

Data Link Control (DLC)

- Destination = IEEE Std 802.3x Full Duplex PAUSE operation
- Source = Cisco Systems:69:FD:90
- EtherType = 0x8808 IEEE 802.3x Pause Frame

Multipoint Control Protocol (MPCP)

- MAC Control Opcode = 0x0101 PFC
- priority_enable_vector = 0x00FF
- Pause Time (0) = 0
- Pause Time (1) = 0
- Pause Time (2) = 0
- Pause Time (3) = 3355 us
- Pause Time (4) = 0

UCS QoS Identifying Congestion

```
UCSB-2-B(nxos)# show interface priority-flow-control
```

Port	Mode	Oper (VL bmap)	RxPPP	TxPPP
Ethernet1/1	Auto	Off	0	0
Ethernet1/2	Auto	Off	0	0
Ethernet1/3	Auto	Off	39648	3597850
Ethernet1/4	Auto	Off	46784	4069738
Ethernet1/5	Auto	Off	0	0

```
fex-1# show platform software woodside loss
```

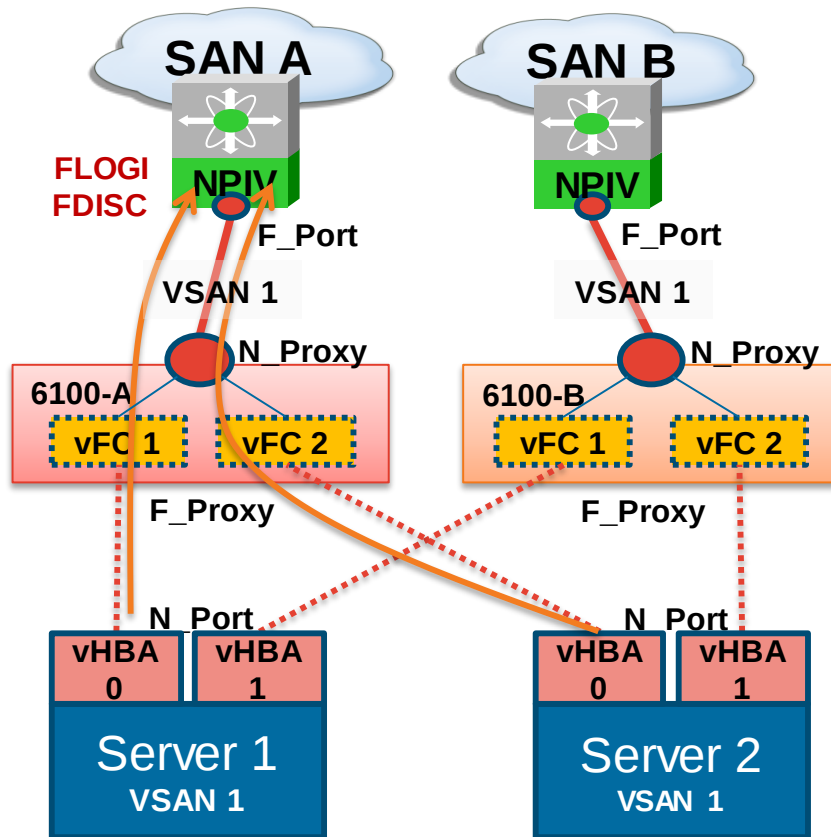
Port	Tx Pause	Rx Pause	Errors	Counters	RX SS	Tx SS	SS Total	COS	XOFF
0-NI1	0	32	0	0	0	0	0	0	0
0-HI19	26	0	0	0	0	0	0	0	0



Fabric Forwarding - Storage

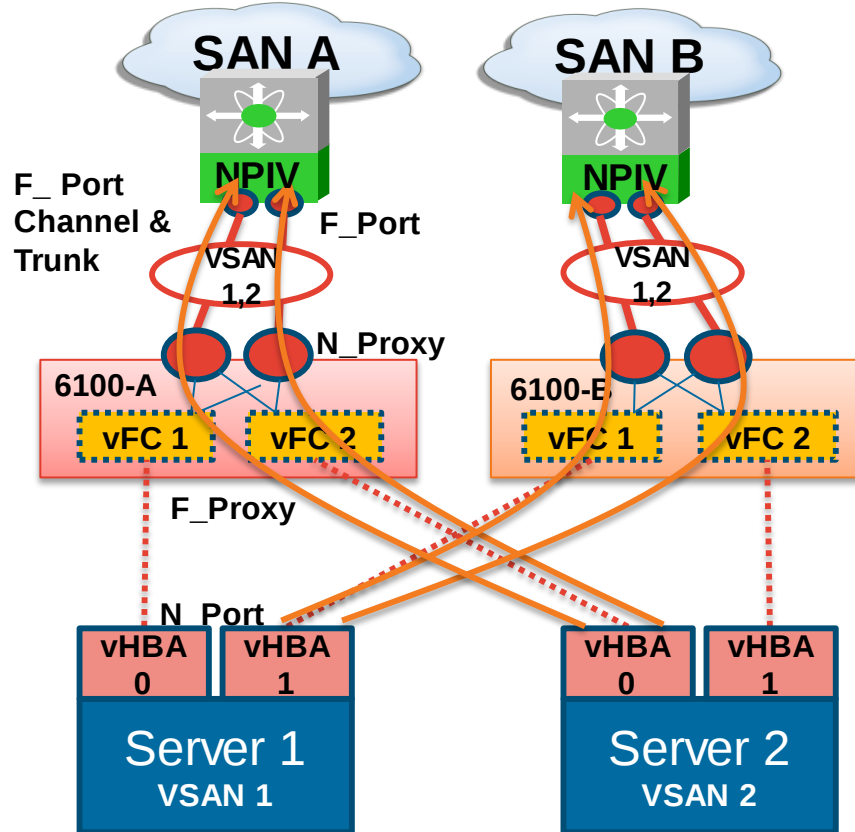
SAN “End Host” NPV Mode

N-Port Virtualisation Forwarding



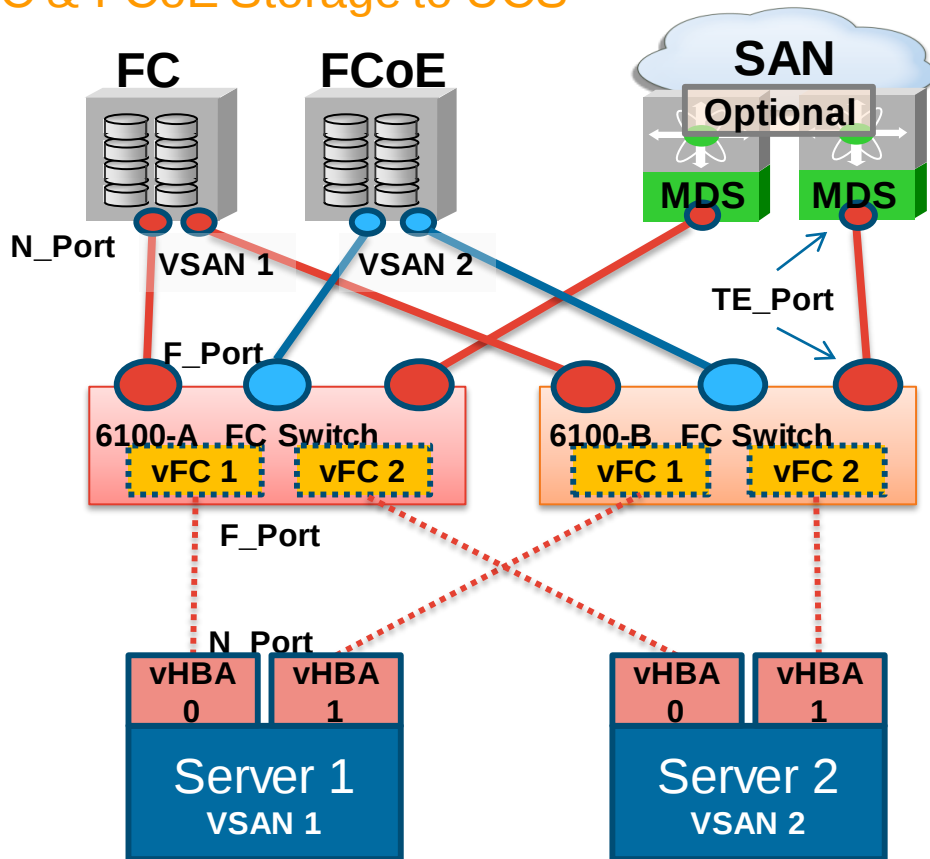
SAN “End Host” NPV Mode

N-Port Virtualisation Forwarding with MDS, Nexus 5000



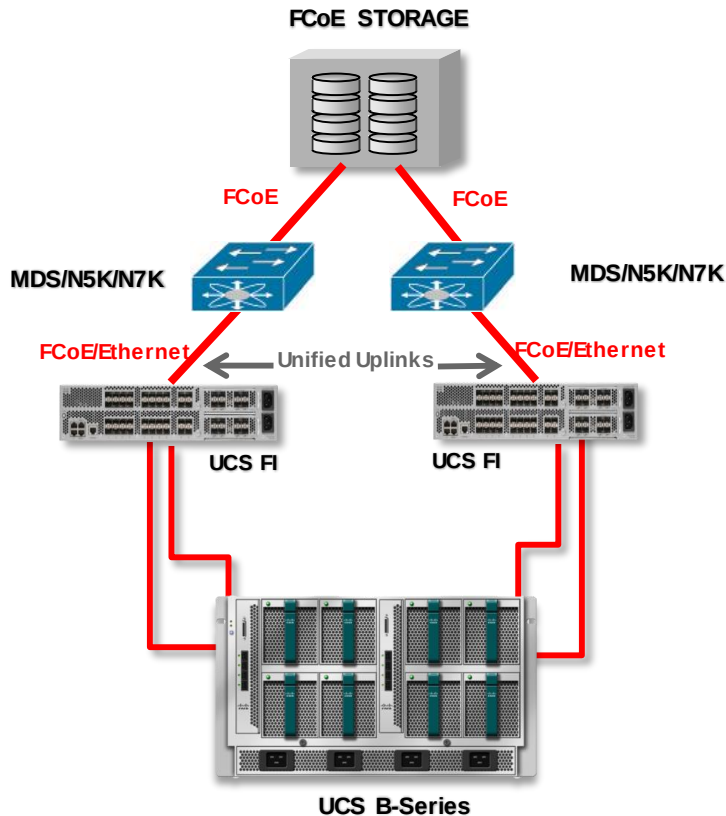
SAN FC Switch Mode

Direct Attach FC & FCoE Storage to UCS



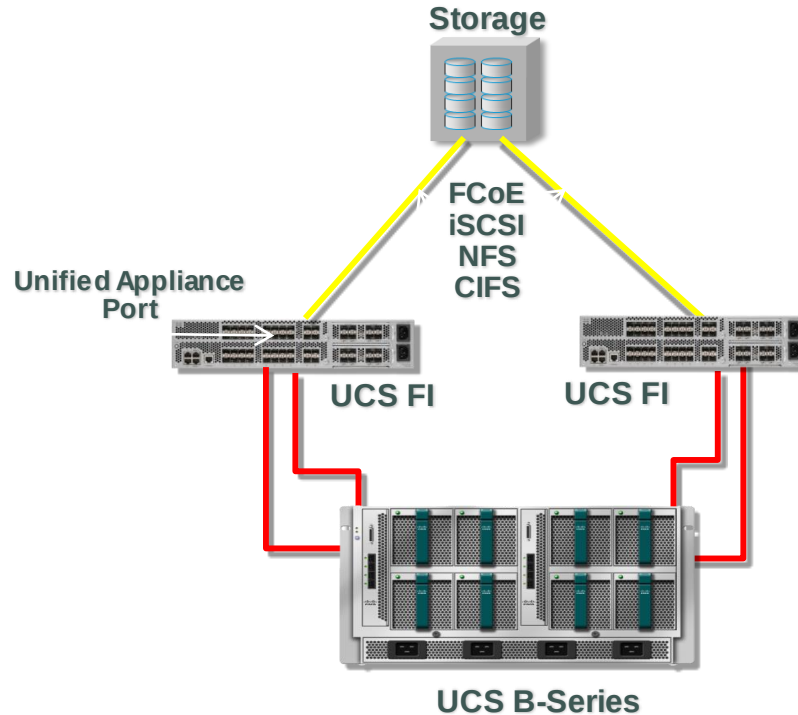
Multi-Hop FCoE

- Supports MDS, N5K & N7K
- “Unified Uplink” port type
 - VNP port type
- FI in ENM Switching Mode
 - VNP port type
- FI in FC Switching Mode
 - VE port type



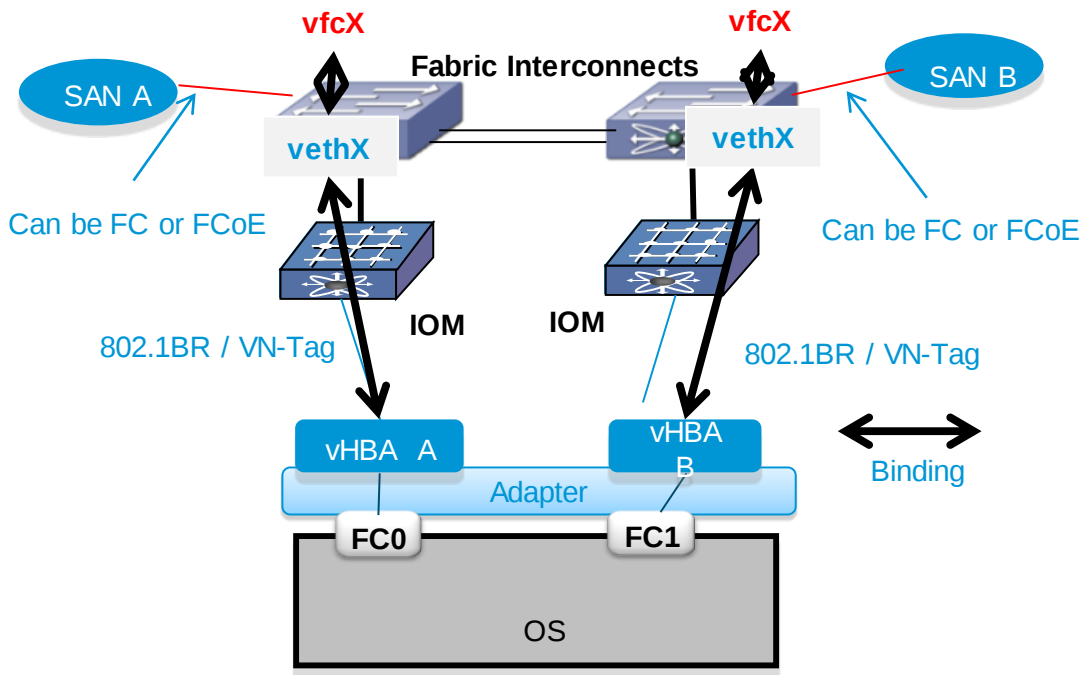
Unified Appliance Ports

Direct attach FCoE, iSCSI, NFS & CIFS storage



FCoE with Adapter FEX

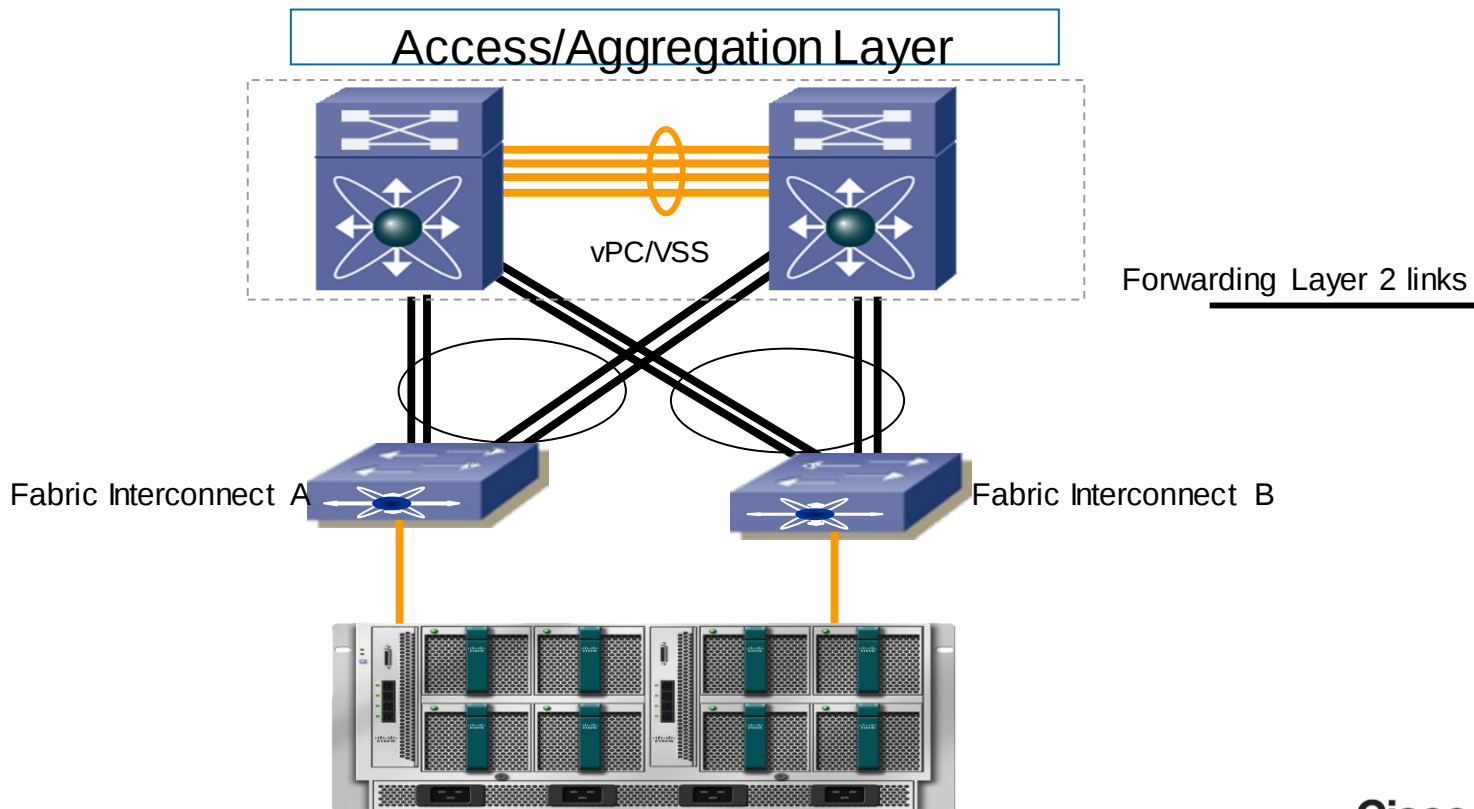
VFC interface bound to 802.1BR / VN-Tag virtual ethernet interface



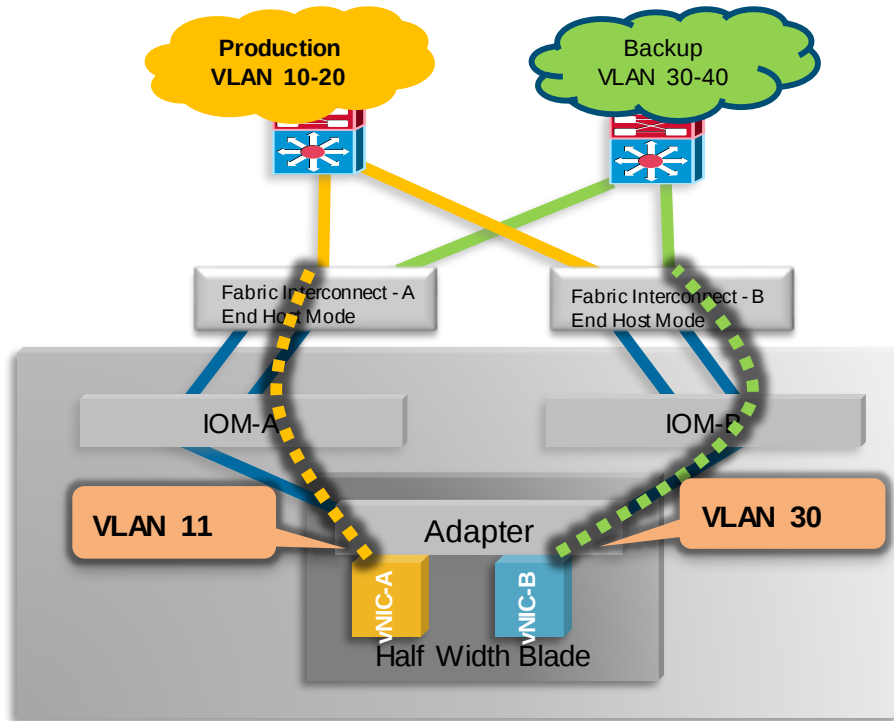


Topologies

Recommended Topology for Upstream Connectivity



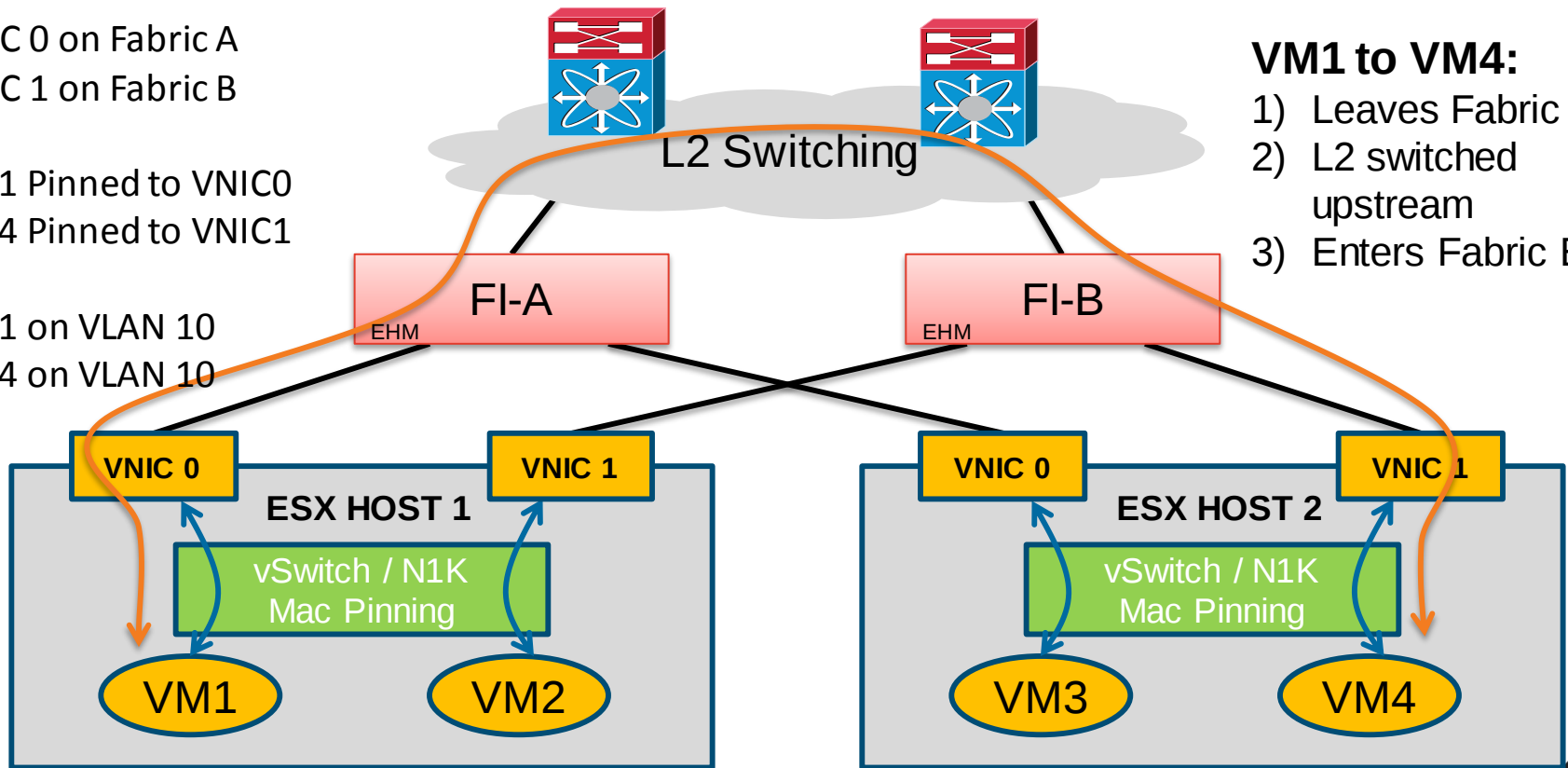
Layer 2 Disjoint Topology



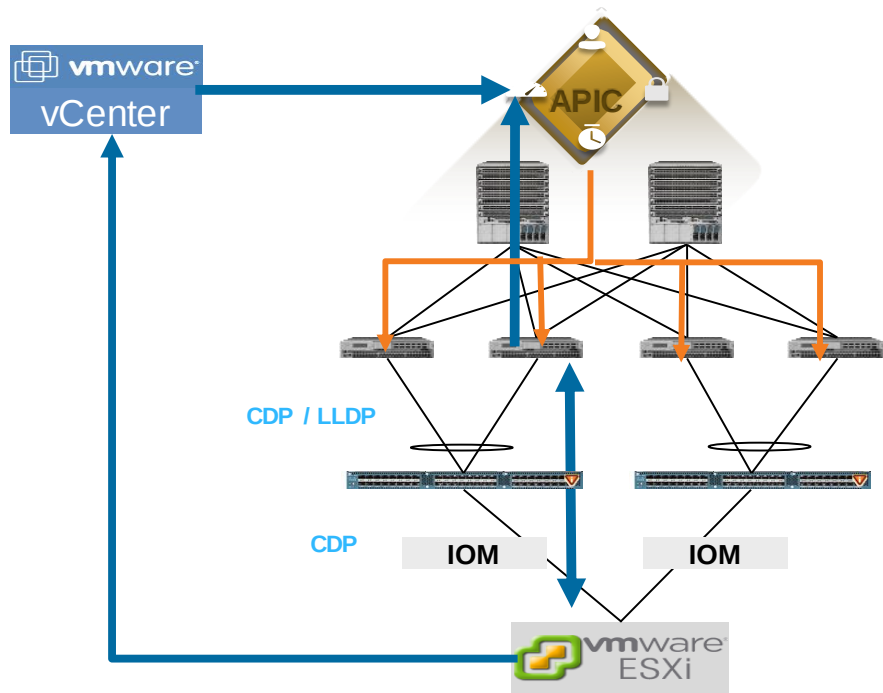
- A vNIC can only participate in one L2 network upstream
- Both dynamic and static pinning methods are supported

Inter-Fabric Traffic Example

- VNIC 0 on Fabric A
- VNIC 1 on Fabric B
- VM1 Pinned to VNIC0
- VM4 Pinned to VNIC1
- VM1 on VLAN 10
- VM4 on VLAN 10



UCS & ACI Fabric



1. FI sends CDP/LLDP to leaf, CDP to ESXi blade.
2. ESXi blade & leaf send discovery data to vCenter & APIC
3. APIC receives discovery data from vCenter
4. APIC downloads policy on all leafs providing path to the ESXi blade

A long-exposure photograph of a city street at night. The foreground is filled with vibrant, curved light trails from car headlights and taillights in shades of yellow, orange, and red. In the background, a multi-lane road leads towards a modern city skyline with illuminated buildings and a pedestrian bridge. Traffic lights are visible in the distance, showing green and yellow lights.

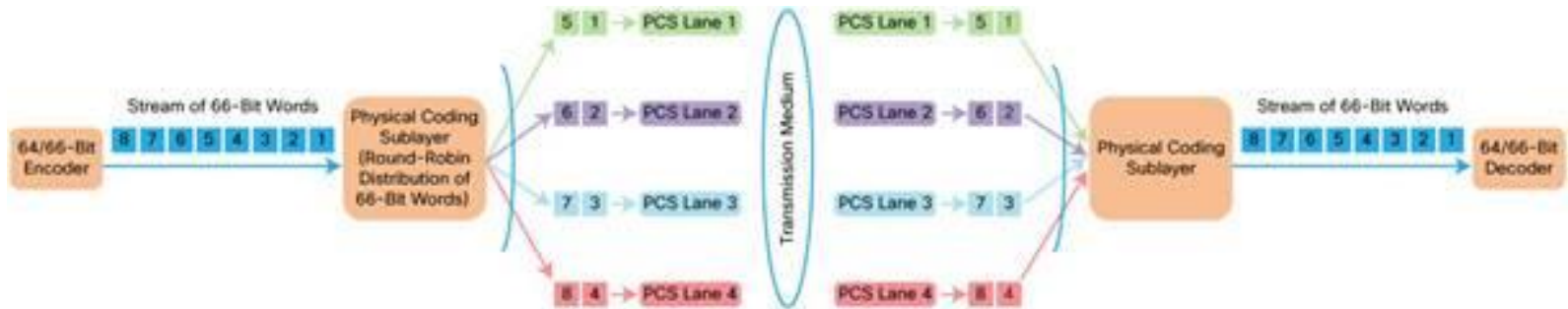
VIC 1300 New Features

Native 40 Gigabit Ethernet

10 Gb Encoding



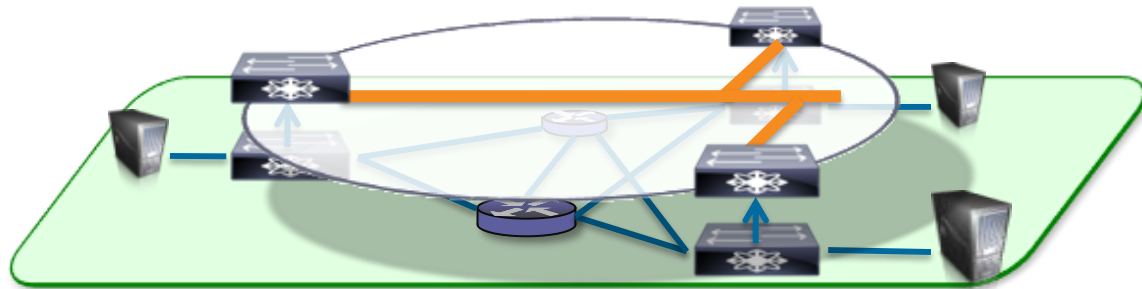
40 Gb Encoding = 4 x 10 Gb



VIC 1300 VXLAN & NVGRE Offload

Hardware based TCP segmentation & checksum verification

- Overlay encap/decap performed by hypervisors:
 - Increases CPU utilisation
 - Decrease network throughput
- Inner & outer packet hardware processing:
 - TCP segmentation
 - TCP/UDP checksum
 - IP checksum



VXLAN Performance Test

- 2 x ESXi 5.5 GA, VMware DVS
- UCS B200 M3, VIC 1380
- FI 6248, IOM 2208
- VM guest OS: RHEL6.4 64 bit, 1GB RAM, 1vCPU
- Unicast iPerf test between two VMs
 - iperf -s, iperf -c 17.1.1.1, TCP window size 23.2 KB
- Locally switch path on FI

VXLAN Offload Performance - CPU

VXLAN stateless offloads **disabled**

10.193.199.200 - PuTTY

5:45:37pm up 15 min, 519 worlds, 1 VMs, 1 vCPUs; CPU load average: 0.20, 0.07, 0.00

PCPU USED(%): 0.1 0.0 0.1 0.0 17 0.0 25 0.0 0.1 0.0 0.2 0.0 2.6 1.4 56 0.3 21 6.5 78 0.0 40 20 33 11 AVG: 13

PCPU UTIL(%): 0.3 0.2 0.3 0.1 24 0.1 33 0.1 0.2 0.1 0.4 0.1 2.3 0.7 50 0.5 18 5.8 68 0.1 33 16 30 10 AVG: 12

CORE UTIL(%): 0.4 0.3 24 33 0.2 0.4 3.0 51 23 68 49 41 AVG: 24

ID	GID	NAME	NWLD	%USED	%RUN	%SYS	%WAIT	%VMWAIT	%RDY	%IDLE	%OVRLP	%CSTP	%MLMTD	%SWPWT
5269	5269	VM2	7	168.00	57.12	103.50	642.82	0.97	0.02	42.08	0.03	0.00	0.00	0.00

10.193.199.58 - PuTTY

5:45:47pm up 16 min, 517 worlds, 1 VMs, 1 vCPUs; CPU load average: 0.20, 0.07, 0.03

PCPU USED(%): 38 0.0 0.2 0.1 0.1 0.0 0.0 0.0 2.5 0.0 0.0 0.0 2.8 0.1 42 11 34 0.1 35 1.4 89 0.0 39 0.4 AVG: 12

PCPU UTIL(%): 50 0.3 0.5 0.3 0.4 0.2 0.2 3.6 0.3 0.2 0.2 2.5 0.2 38 10 32 0.2 32 1.4 80 0.2 35 0.5 AVG: 12

CORE UTIL(%): 50 0.7 0.4 0.3 3.7 0.3 2.6 48 32 34 80 35 AVG: 24

Host 1

Host 2

VXLAN stateless offloads **enabled**

10.193.199.200 - PuTTY

5:18:39pm up 18:49, 515 worlds, 1 VMs, 1 vCPUs; CPU load average: 0.12, 0.07, 0.03

PCPU USED(%): 6.7 0.0 0.1 0.0 0.0 0.1 2.0 0.0 0.1 0.0 0.1 0.0 38 0.0 3.8 0.0 1.2 0.1 5.6 25 39 0.0 57 0.1 AVG: 7.6

PCPU UTIL(%): 11 0.1 0.1 0.0 0.1 0.4 2.2 0.1 0.1 0.1 0.1 0.1 34 0.0 3.4 0.0 1.1 0.0 5.2 23 28 0.0 55 0.2 AVG: 6.9

CORE UTIL(%): 11 0.2 0.4 2.3 0.2 0.2 34 3.5 1.2 28 28 55 AVG: 13

ID	GID	NAME	NWLD	%USED	%RUN	%SYS	%WAIT	%VMWAIT	%RDY	%IDLE	%OVRLP	%CSTP	%MLMTD	%SWPWT
5269	5269	VM2	7	168.00	57.12	103.50	642.82	0.97	0.02	42.08	0.03	0.00	0.00	0.00
350324	350324	esxtop.212507	1	1.93	2.01	0.00	97.99	-	0.00	0.00	0.00	0.00	0.00	0.00

10.193.199.58 - PuTTY

5:18:49pm up 18:49, 515 worlds, 1 VMs, 1 vCPUs; CPU load average: 0.11, 0.07, 0.02

PCPU USED(%): 0.2 0.0 0.2 0.0 0.2 0.0 6.4 0.0 0.1 0.0 0.1 0.0 19 0.1 8.4 0.0 7.8 0.0 50 0.0 67 0.1 9.4 0.1 AVG: 7.1

PCPU UTIL(%): 0.4 0.2 0.4 0.2 0.5 0.2 11 0.2 0.3 0.2 0.3 0.1 18 0.1 7.8 0.1 7.8 0.0 48 0.0 61 0.3 8.7 0.1 AVG: 7.0

CORE UTIL(%): 0.5 0.5 0.6 11 0.3 0.3 18 7.8 7.8 48 61 8.7 AVG: 13

Host 1

Host 2

VXLAN Offload Performance - Throughput

VXLAN stateless offloads **disabled**

```
[admin@netflow-traffic Desktop]$ iperf -c 17.1.1.1 -i 5
-----
Client connecting to 17.1.1.1, TCP port 5001
TCP window size: 23.2 KByte (default)
-----
[  3] local 17.1.1.2 port 56913 connected with 17.1.1.1 port 5001
[ ID] Interval           Transfer         Bandwidth
[  3]  0.0- 5.0 sec      2.40 GBytes    4.12 Gbits/sec
[  3]  5.0-10.0 sec     2.42 GBytes    4.16 Gbits/sec
[  3]  0.0-10.0 sec     4.82 GBytes    4.14 Gbits/sec
-----
```

VXLAN stateless offloads **enabled**

```
[admin@netflow-traffic Desktop]$ iperf -c 17.1.1.1 -i 5
-----
Client connecting to 17.1.1.1, TCP port 5001
TCP window size: 23.2 KByte (default)
-----
[  3] local 17.1.1.2 port 56652 connected with 17.1.1.1 port 5001
[ ID] Interval           Transfer         Bandwidth
[  3]  0.0- 5.0 sec      3.54 GBytes    6.09 Gbits/sec
[  3]  5.0-10.0 sec     3.59 GBytes    6.17 Gbits/sec
[  3]  0.0-10.0 sec     7.14 GBytes    6.13 Gbits/sec
-----
```

VXLAN Offload Configuration

The screenshot displays the Cisco UCS Manager web interface. On the left, a navigation tree shows the hierarchy: **Equipment** > **Servers** > **LAN** > **SAN** > **VM** > **Admin**. Under **VM**, the **Sub-Organizations** folder is expanded, showing **Vishnu-Org**. Under **Vishnu-Org**, the **Adapter Policies** folder is expanded, and the **Eth Adapter Policy VK-VxLAN** is selected. The main panel on the right shows the configuration for this policy. The **General** tab is active, displaying the **Properties** section with the **Name** set to **VK-VxLAN** and the **Owner** set to **Local**. The **Options** section is expanded, showing various offload settings. The **Virtual Extensible LAN** option is highlighted with a red box and is set to **Enabled**. Other options include **Transmit Checksum Offload**, **Receive Checksum Offload**, **TCP Segmentation Offload**, **TCP Large Receive Offload**, **Receive Side Scaling (RSS)**, **Accelerated Receive Flow Steering**, **Network Virtualization using Generic Routing Encapsulation**, **Failback Timeout (Seconds)** (set to 5), **Interrupt Mode** (set to MSI X), and **Interrupt Coalescing Type** (set to Min).

Equipment Servers LAN SAN VM Admin

Filter: All

- vMedia Policies
- vNIC/vHBA Placement Policies
- Sub-Organizations
 - Vishnu-Org
 - Adapter Policies
 - Eth Adapter Policy 24-vNIC
 - Eth Adapter Policy Junk
 - Eth Adapter Policy MV-VxLAN
 - Eth Adapter Policy NoVxLAN
 - Eth Adapter Policy Scale-VxLAN
 - Eth Adapter Policy VK-VxLAN
 - Eth Adapter Policy VxLAN-A
 - Eth Adapter Policy VxLAN-B
 - Eth Adapter Policy Vishnu-VxLAN
 - BIOS Policies
 - Boot Policies
 - Host Firmware Packages
 - IPMI Access Profiles
 - KVM Management Policies
 - Local Disk Config Policies
 - Maintenance Policies
 - Management Firmware Packages
 - Power Control Policies
 - Scrub Policies
 - Serial over LAN Policies
 - Server Pool Policies
 - Server Pool Policy Qualifications

Actions

- Delete
- Show Policy Usage
- Use Global

Properties

Name: VK-VxLAN

Description:

Owner: Local

Options

- Transmit Checksum Offload: ☐ Disabled ☒ Enabled
- Receive Checksum Offload: ☐ Disabled ☒ Enabled
- TCP Segmentation Offload: ☐ Disabled ☒ Enabled
- TCP Large Receive Offload: ☐ Disabled ☒ Enabled
- Receive Side Scaling (RSS): ☒ Disabled ☐ Enabled
- Accelerated Receive Flow Steering: ☒ Disabled ☐ Enabled
- Network Virtualization using Generic Routing Encapsulation: ☒ Disabled ☐ Enabled
- Virtual Extensible LAN: ☐ Disabled ☒ Enabled
- Failback Timeout (Seconds): 5 [0-600]
- Interrupt Mode: ☒ MSI X ☐ MSI ☐ IN Tx
- Interrupt Coalescing Type: ☒ Min ☐ Idle

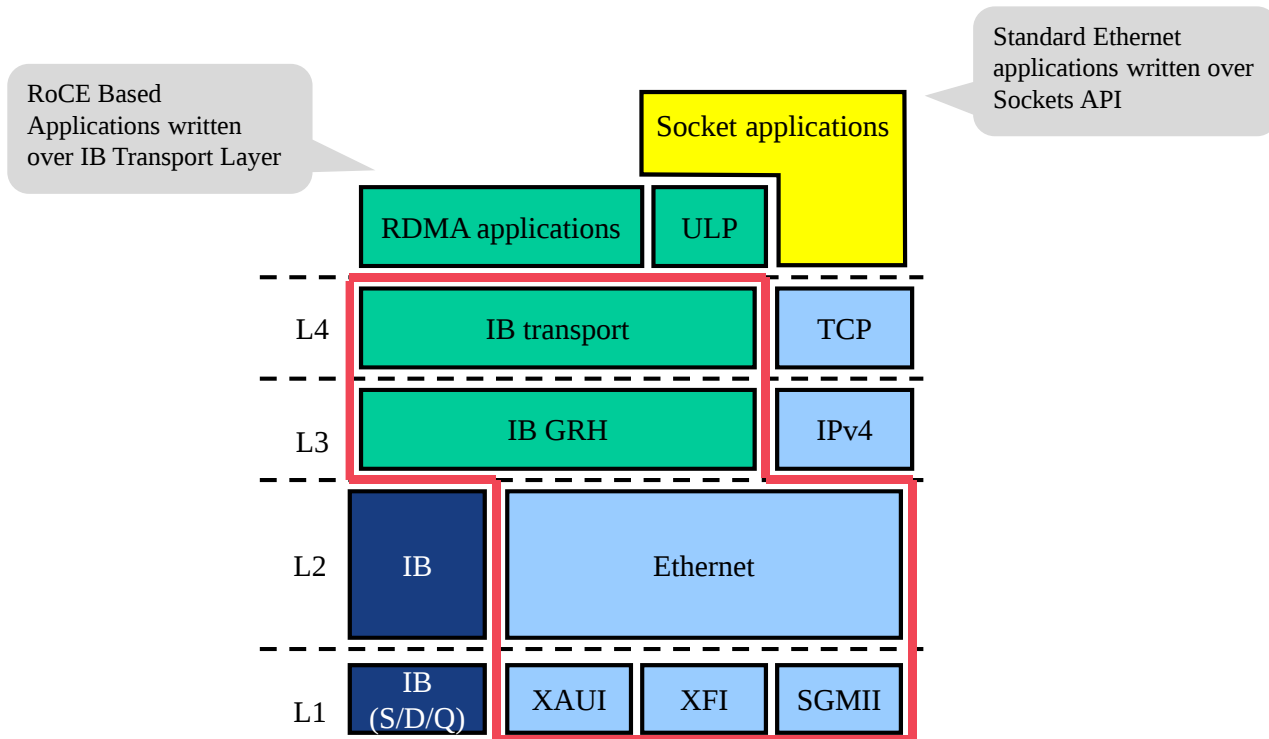
VIC 1300 RoCE Support

Remote Direct Memory Access over Converged Ethernet (RoCE)

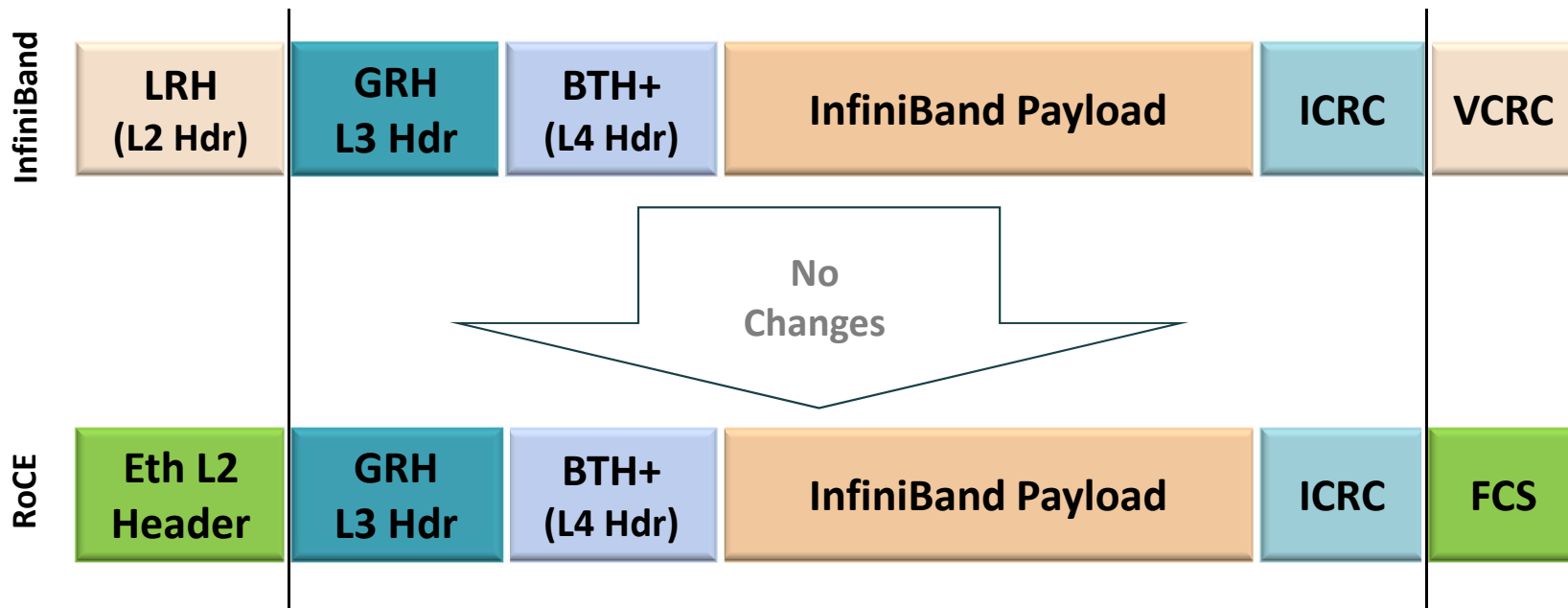
- Access remote node's memory w/o CPU interruption
- Lower latency, better CPU use
- "RoCE does for InfiniBand what FCoE did for Fibre Channel"*

* Scott Lowe - <http://blog.scottlowe.org/2010/04/20/am-i-understanding-roce-correctly>

RoCE vs InfiniBand Protocol Stack

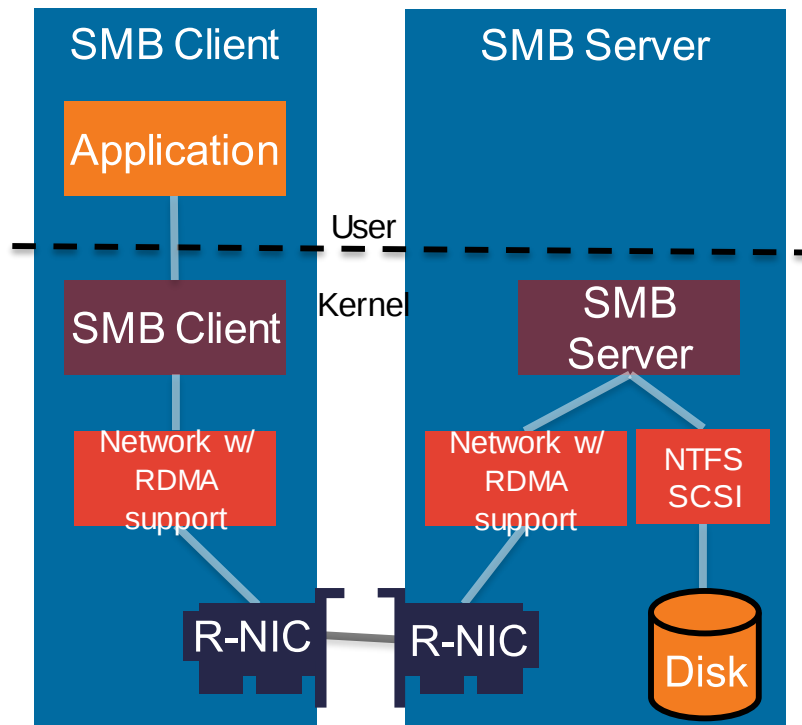


RoCE vs InfiniBand Packet Format



Microsoft SMB Direct (SMB over RMDA)

- Initial use case for RoCE is Microsoft Windows 2012 SMB Direct 3.0



Jose Barreto, Tech Ed, 2013,
<http://channel9.msdn.com/Events/TechEd/NorthAmerica/2013/MDC-B335#fbid=>

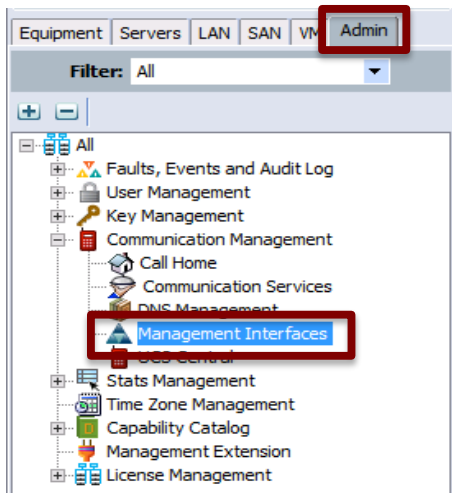
Ciscolive!

A long-exposure photograph of a city street at night. The foreground is filled with vibrant, multi-colored light trails from moving vehicles, creating a sense of motion. In the background, a pedestrian bridge spans the street, and modern buildings with lit windows and signage line the street. The overall scene is a dynamic urban environment.

New Features in 2.2

IPv6 Management Support

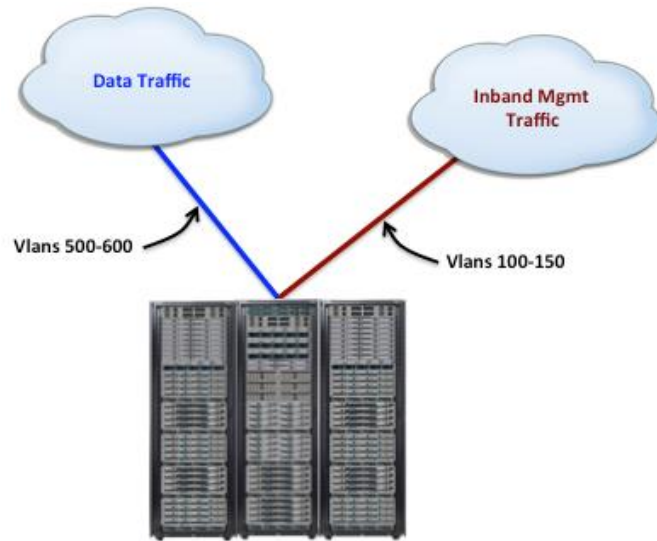
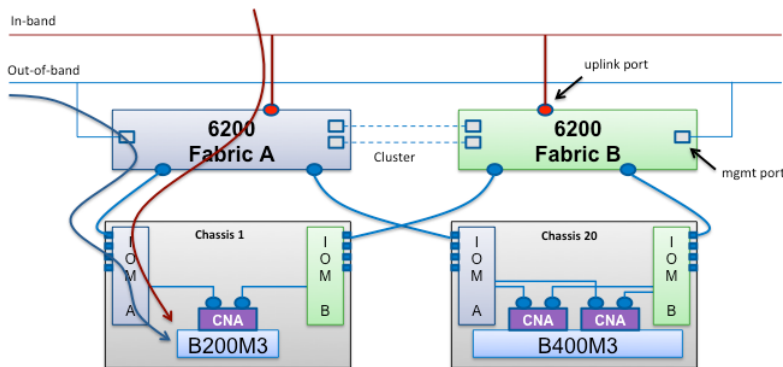
- UCS FI management can be configured with IPv6 address
 - IPv6 capable external services (i.e., NTP, SSH, TACACs, HTTP/HTTPS, etc)



A screenshot of the 'Management Interfaces' configuration page. The page has two tabs: 'Management Interfaces' and 'Management Interfaces Monitoring Policy'. The 'Management Interfaces' tab is active. The page is divided into sections: 'Virtual IP', 'Fabric Interconnect A', and 'Fabric Interconnect B'. In the 'Virtual IP' section, the 'IPv6 Address' field is highlighted with a red box. In the 'Fabric Interconnect A' section, the 'IPv6' sub-tab is highlighted with a red box, and the 'IP Address' field is highlighted with a red box. The 'Fabric Interconnect B' section is partially visible at the bottom.

Inband Management for CIMC

- Separate server management (CIMC) traffic from UCSM
 - Designating servers' CIMC into different groups
- Higher bandwidth
 - 10G vs 1G

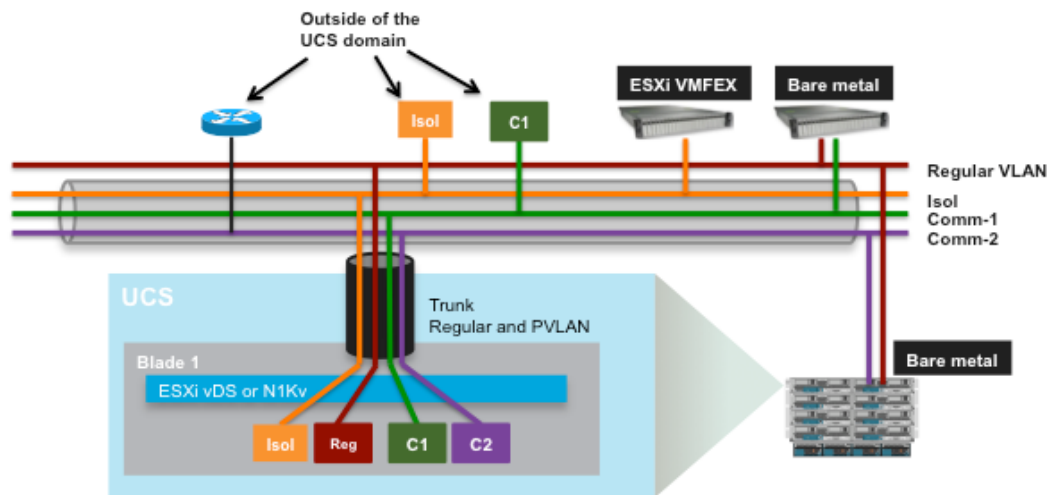


Faster and Better: Link Layer Enhancements

- Uplink ports only
- Faster link failure detection with UDLD
 - Layer 2 protocol that runs on top of the physical layer to help detect mis-wiring and uni-directional communication
 - UDLD Interval 7-90 seconds, with a detection time of 3x the interval
- LACP (pertain to uplinks only)
 - Choices between different timers, slow (30 sec) or fast (1 sec). Default is slow. Provides very fast failure detection
 - Enable suspend-individual link. Default is disable
 - Match settings of the LAN Switch

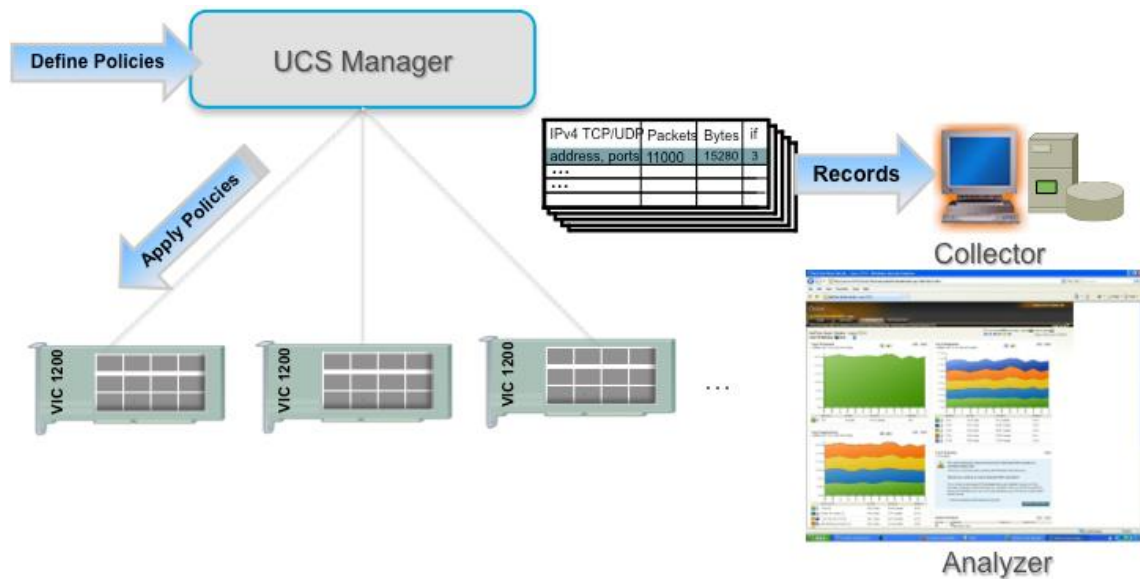
PVLAN Enhancements

- Promiscuous on Appliance Port
- Community Support
- PVLAN trunking on the vNIC (extend PVLAN to the virtual switches)



Netflow+

- Improve workload visibility
 - Capacity planning
 - Security
 - Troubleshooting



Other Sessions

- BRKCOM-1001 - UCS Fundamentals
- BRKCOM-2015 - Cisco UCS Network Performance Optimisation and Best Practices for VMware
- BRKCOM-2017 - UCS Systems Management Deep Dive with UCS Foundational Software
- BRKCOM-2601 - Hyper-Converged Computing
- BRKCOM-2602 - Next Generation Computing Architectures for Cloud Scale Applications
- BRKCOM-2640 - UCS C-Series Deployment Options, Best Practice and UCSM Integration
- BRKCOM-3002 - UCS Performance Troubleshooting
- BRKVIR-2044 - Multi-Hypervisor Networking - Compare and Contrast

A long-exposure photograph of a city street at night. The foreground is filled with vibrant, curved light trails from car headlights and taillights in shades of yellow, orange, and red. In the background, a pedestrian bridge spans the street, and tall buildings with lit windows and colorful neon signs (blue, purple, red) line the street. Traffic lights are visible in the distance.

Q & A

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