

TOMORROW starts here.



Cisco *live!*

UCS Fabric Fundamentals

BRKCOM-1001

Conor Murphy

Partner Systems Engineer

Abstract

- This session provides an introduction to UCS Fabric and Networking components. The session does not assume previous UCS familiarity and is intended as a basic introduction for server, LAN and SAN administrators. The session covers the components, their role in the providing network connectivity and basic configuration tasks for server, LAN and SAN administrators.

Complimentary UCS Sessions

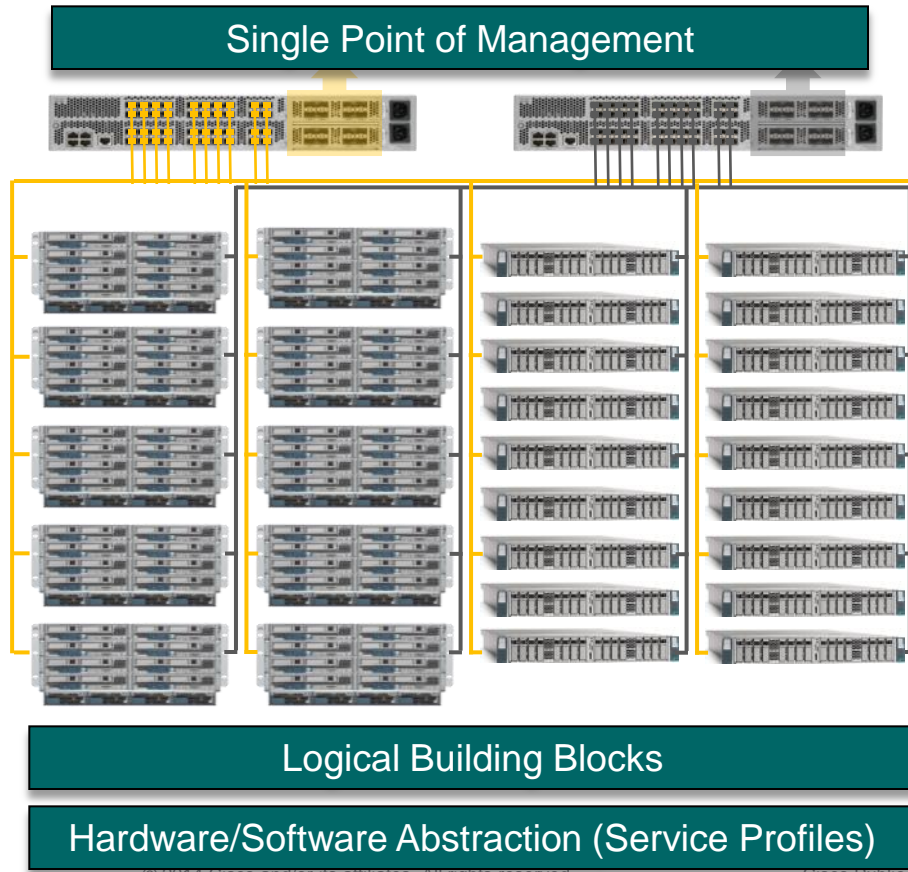
- BRKCOM-1005 - UCS Architecture Overview
- BRKCOM-2001 - UCS Management Deep Dive
- BRKCOM-2003 - UCS Networking Deep Dive
- BRKCOM 2002 – UCS Supported Storage Architectures and Best Practices*
- BRKCOM-2640 - UCS C-Series Deployment Options, Best Practice and UCSM Integration
- BRKVIR-2640 - Deployment Best Practices for vSphere and HyperV on UCS
- BRKCOM-3002 - UCS Performance Troubleshooting
- BRKCOM-2014 - Multi-UCS Management with UCS Central

*Not running Cisco Live 2014 - check out www.ciscolive.com for previous session presentations and videos

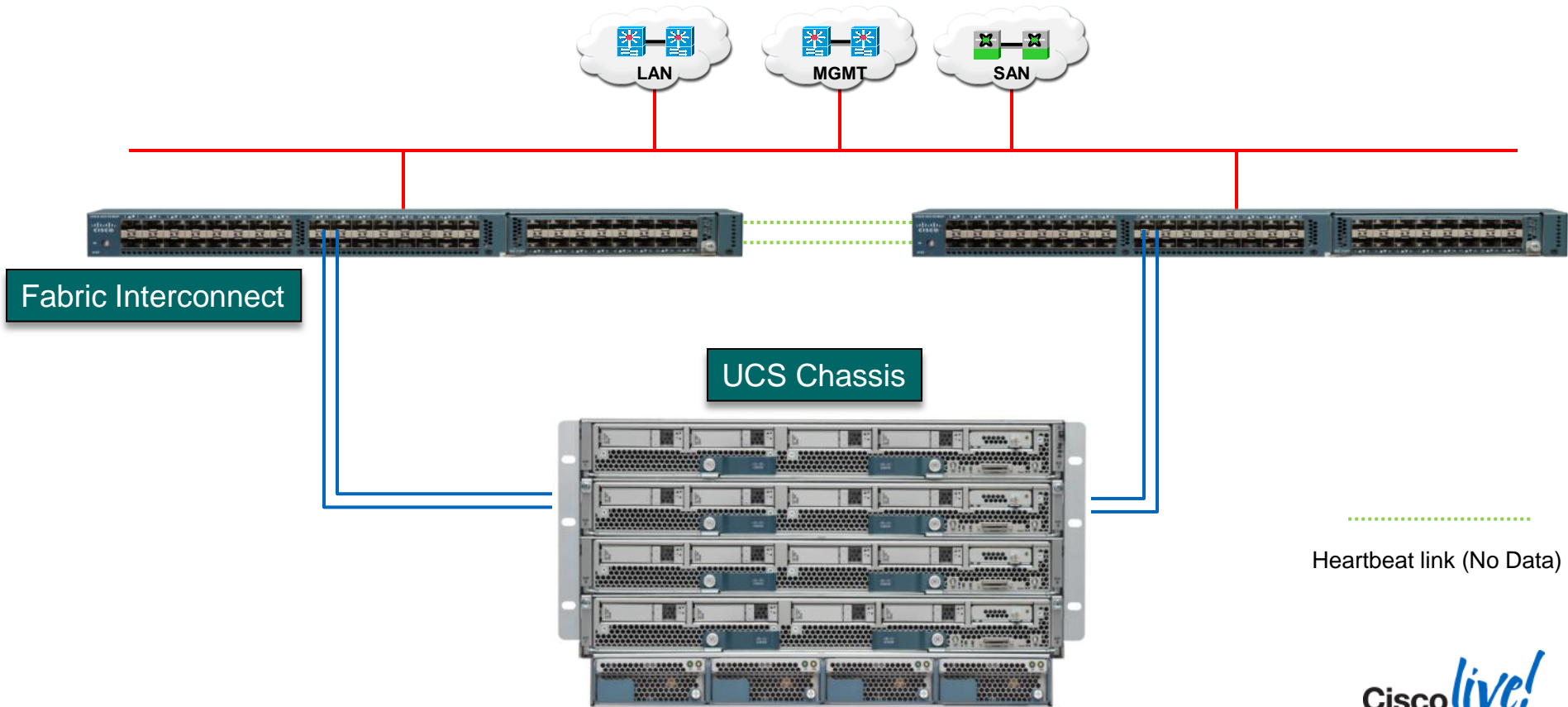
Agenda

- **UCS Overview, Hardware Components, Key Features**
- **Connectivity – Components and LAN**
 - UCS Ports Defined
 - Northbound of the Fabric Interconnect
 - Fabric Interconnect to IO Module
 - IO Module to Blade
 - Blade – Virtual Circuits
 - C-Series Rack Integration
- **Connectivity - SAN**
 - Fabric Interconnect FC/FCoE Mode of Operation and Direct Attached Storage
 - Multi-hop FCoE
- **Resources**

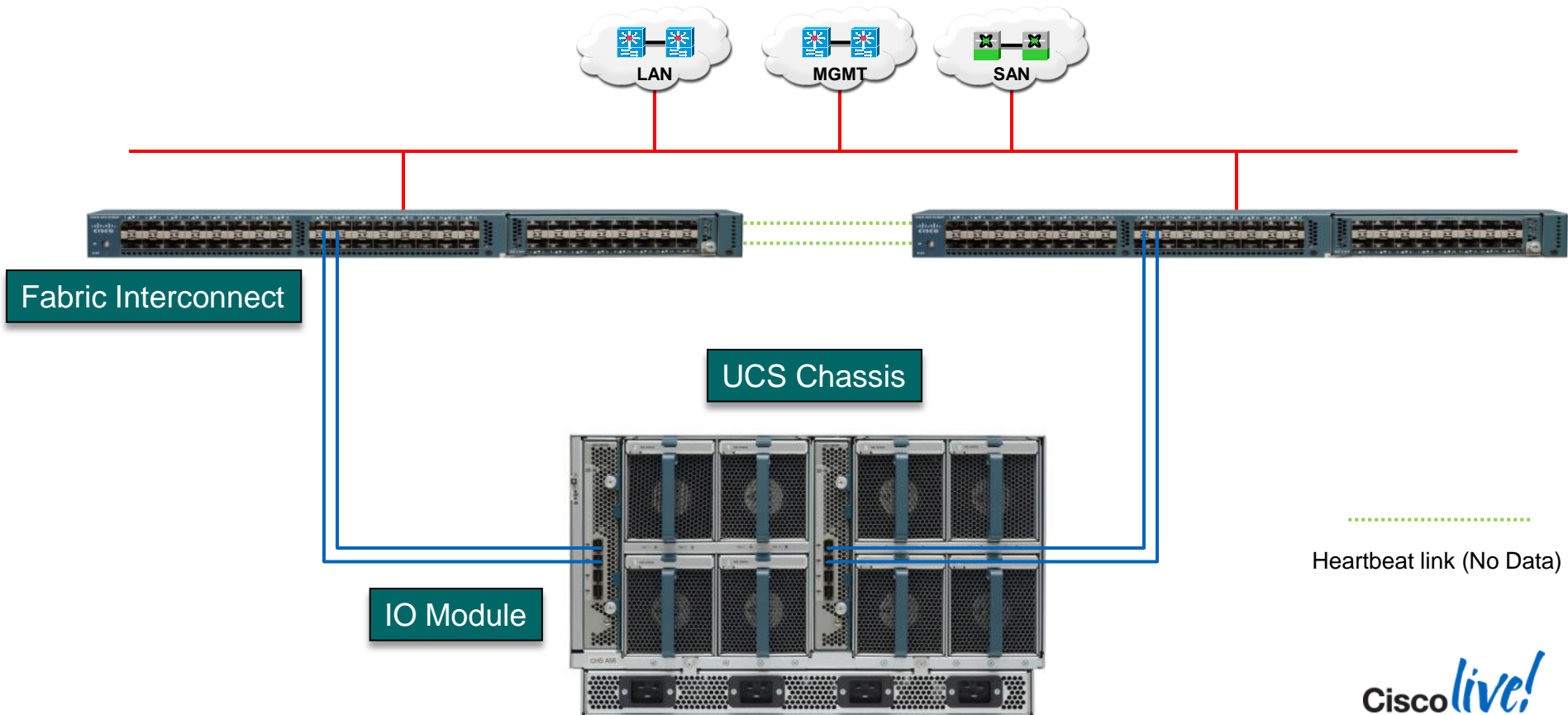
Cisco Unified Computing System (UCS)



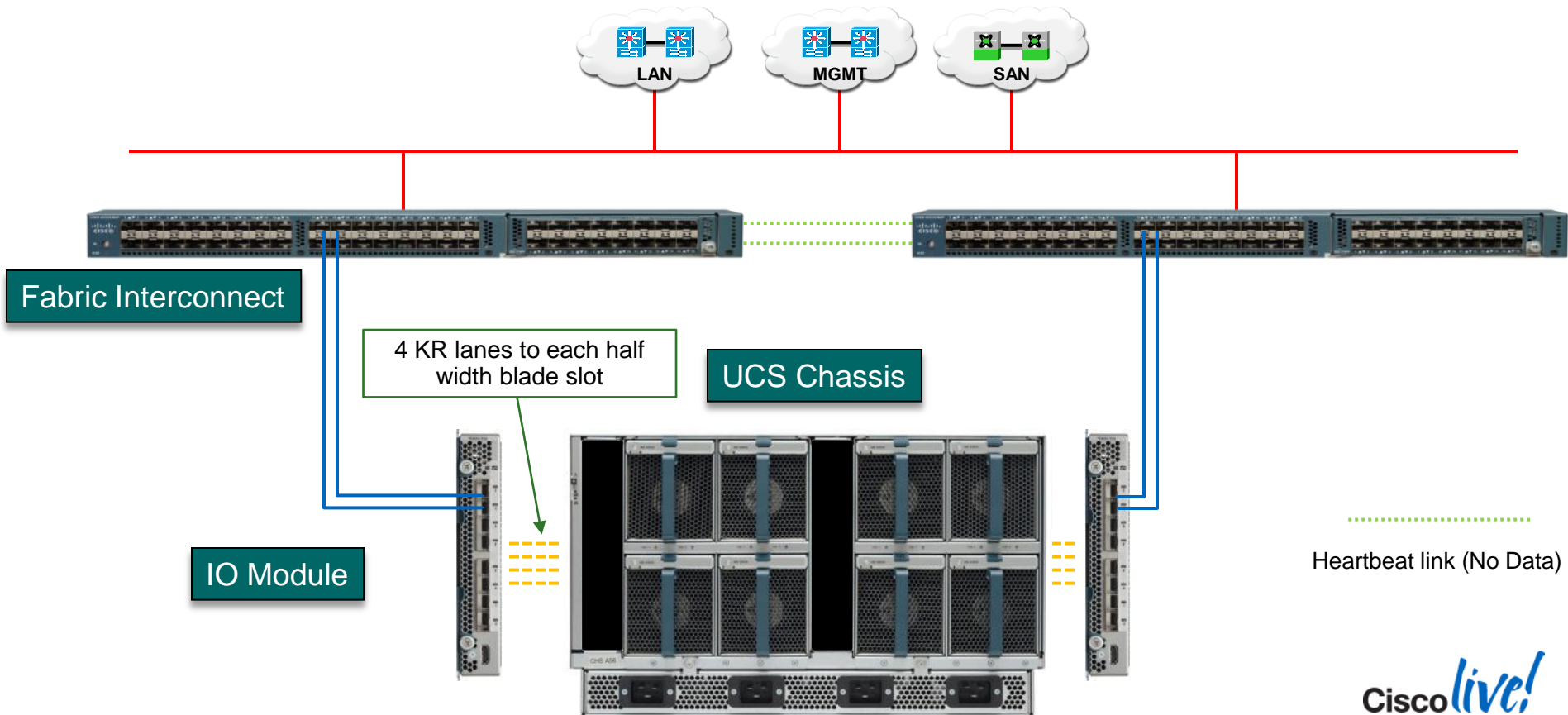
UCS Components



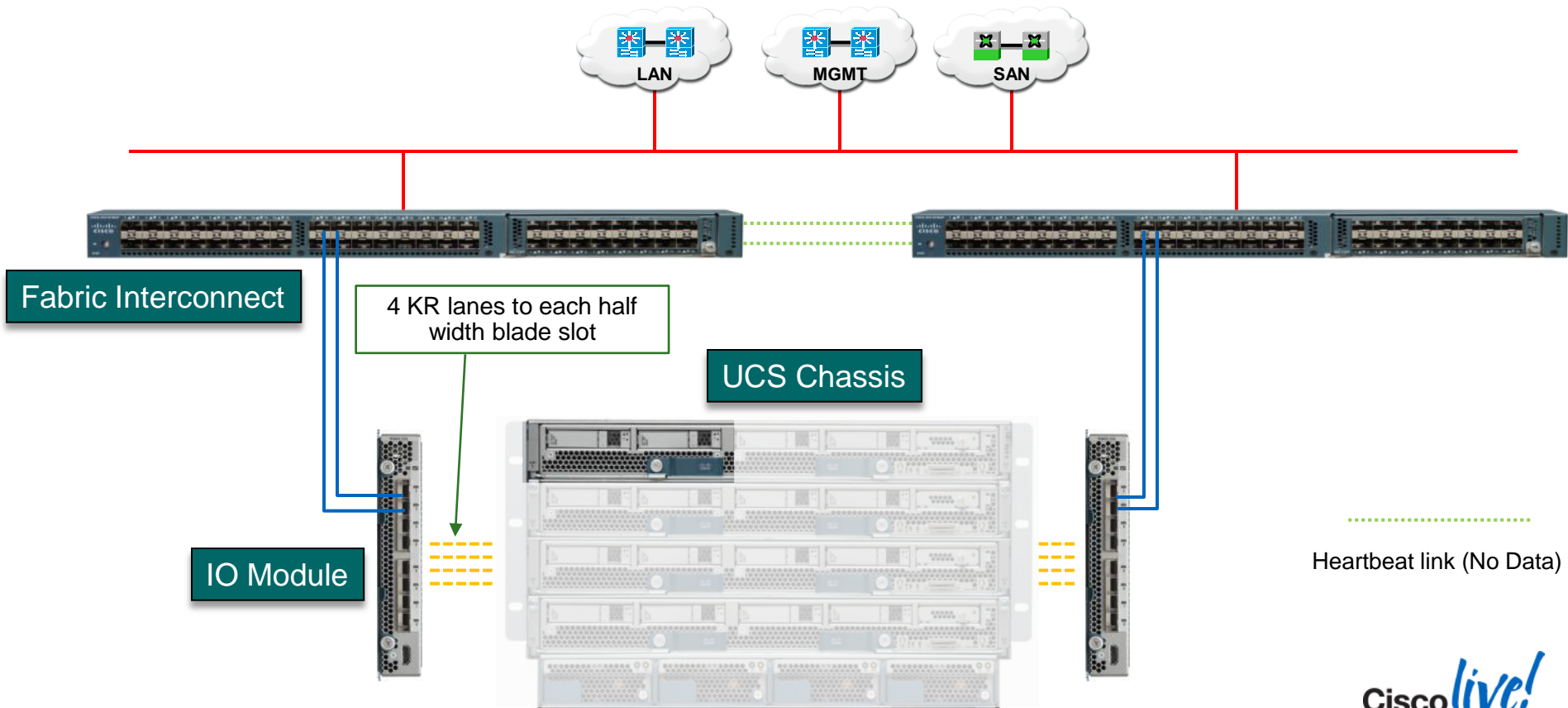
UCS Components



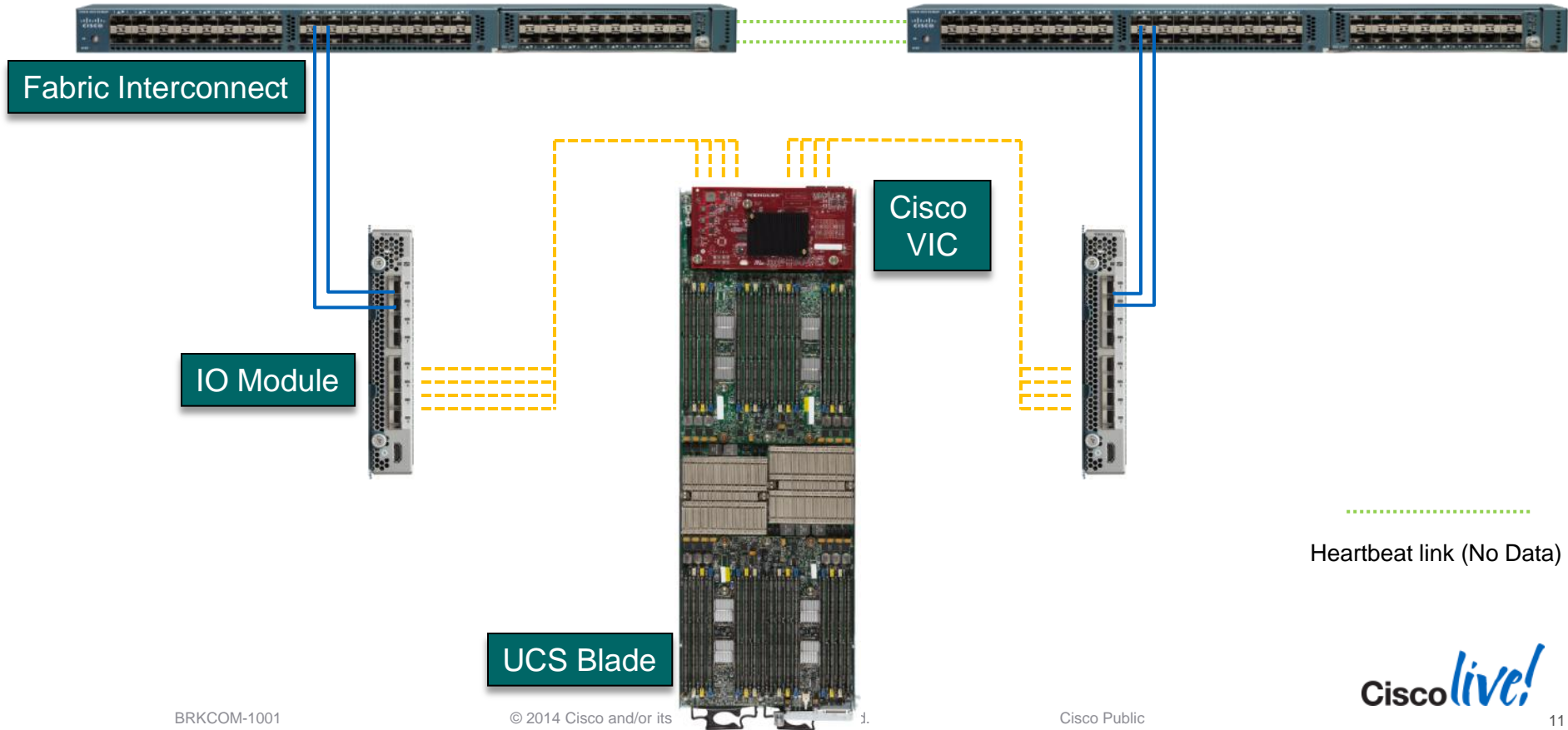
UCS Components



UCS Components



UCS Components



UCS Components

Product Names and Numbers

UCS Fabric Interconnect

UCS Fabric Interconnect – UCS 6248UP

- 1RU
- 32 unified base ports and 1 expansion slot
- Line rate – 960Gbps

UCS Fabric Interconnect – UCS 6296UP

- 2RU
- 48 unified base ports and 3 expansion slots
- Line rate – 1920 Gbps



UCS Fabric Extender

UCS IO Module (IOM) – 2204 or 2208

- 4 or 8 10GbE fabric links (to Fabric Interconnect)
- Up to 32 10GbE server links (to servers)

Nexus 2232PP

- 8 10GbE fabric links (to Fabric Interconnect)
- 32 10GbE server links (to servers)



UCS VIC Adapters

UCS VIC1240 plus Pass-through (PT) Expansion Card - Blades

- VIC1240: Up to 4 x 10 GbE
- PT: Expands VIC1240 up to 8 x 10GbE
- Up to 256 vPCIe

UCS VIC 1280 - Blades

- Up to 8 x 10GE ports
- Up to 256 vPCIe

UCS VIC 1225 - Racks

- Up to 2 x 10GE ports
- Up to 256 vPCIe



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UCS Components

UCS Blade Servers



	B22 M3	B200 M3	B230 M2	B420 M3	B440 M2
Blade Slots	1	1	1	2	2
Cores	16	16	20	32	40
DIMMs	12	24	32	48	32
Max GB	192 / 384GB	384 / 768GB	512GB	768 / 1.5TB	512GB
Disk	2 x 2.5"	2 x 2.5"	2 SSD	4 x 2.5"	4 x 2.5"
RAID	0/1	0/1	0/1	0/1/5/6	0/1/5/6
mLOM	Dual 20Gb	Dual 20Gb	No	Dual 20Gb	No
Add'l Mezz	1	1	1	2	2

UCS Components

UCS Rack Servers



	C22 M3	C24 M3	C220 M3	C240 M3	C260 M2	C420 M3	C460 M2
RU	1	2	1	2	2	2	4
Cores	16	16	16	16	20	32	40
DIMMs	12	12	16	24	64	48	64
Max GB	192GB	192GB	512GB	768GB	1TB	1,5TB	512GB
Disk	8 x 2.5" or 4 x 3.5"	24 x 2.5" or 12 x 3.5"	8 x 2.5" or 4 x 3.5"	24 x 2.5" or 12 x 3.5"	16 x 2.5" or 32 x SSD	16 x 2.5"	16 x 2.5"
LoM	2 x 1Gb	2 x 1Gb	2 x 1Gb	4 x 1Gb	2 x 1Gb + 2 x 10Gb	2 x 10Gb	2 x 1Gb + 2 x 10Gb
PCIe Slots	2 x PCIe 3.0	5 x PCIe 3.0	2 x PCIe 3.0	5 x PCIe 3.0	6 x PCIe 2.0	6 x PCIe 3.0	10 x PCIe 2.0
Internal Storage	USB Port	USB Port	USB Port FlexFlash	USB Port FlexFlash	USB Port FlexFlash	USB Port FlexFlash	eUSB

UCS Key Features

Single Point of Management and Scaling

8 Cisco UCS Blades
1 UCS Manager

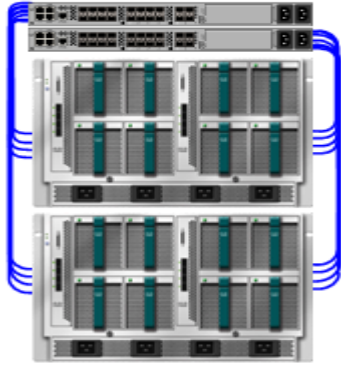
16 Cisco UCS Blades
1 UCS Manager

24 Cisco UCS Blades
1 UCS Manager

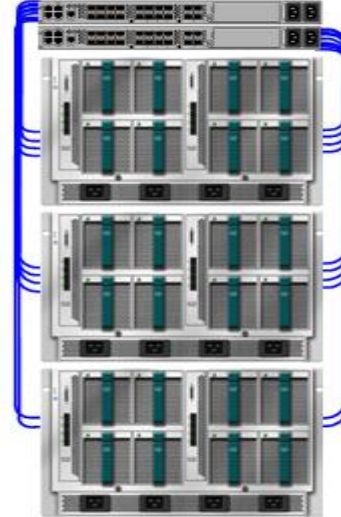
32 Cisco UCS Blades
1 UCS Manager



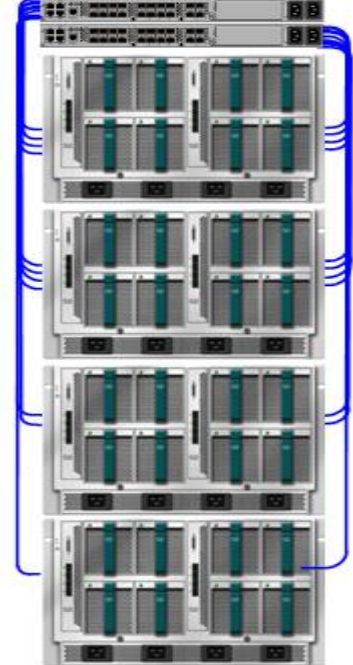
Add One UCS Blade Chassis



Add One UCS Blade Chassis

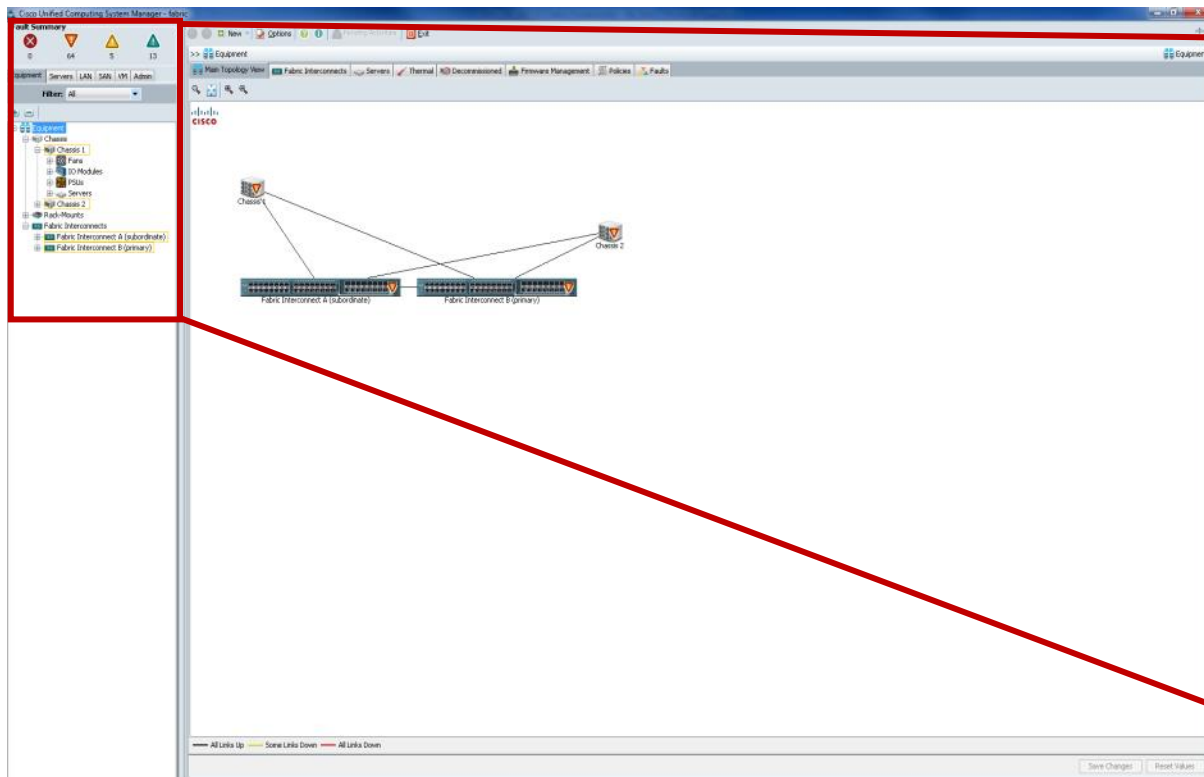


Add One UCS Blade Chassis



UCS Key Features

Single Point of Management



Fault Summary



0



64



5



13

Equipment

Servers

LAN

SAN

VM

Admin

Filter: All

Equipment

Chassis

Chassis 1

Fans

IO Modules

PSUs

Servers

Chassis 2

Rack-Mounts

Fabric Interconnects

Fabric Interconnect A (subordinate)

Fabric Interconnect B (primary)

UCS Key Features

Logical Building Blocks and Hardware/Software Abstraction



4.

Service Profile

MAC : 00:25:B5:01:00:05

WWN : 20:01:00:25:B5:01:00:05

Firmware 2.2

Boot:SAN

Service Profile

MAC : 00:25:B5:01:00:06

WWN : 20:01:00:25:B5:01:00:06

Firmware 2.2

Boot:SAN

Service Profile

MAC : 00:25:B5:01:00:07

WWN : 20:01:00:25:B5:01:00:07

Firmware 2.2

Boot:SAN

3.

Service Profile

MAC : 00:25:B5:01:00:05

WWN : 20:01:00:25:B5:01:00:05

Firmware 2.1

Boot:SAN

Service Profile

MAC : 00:25:B5:01:00:06

WWN : 20:01:00:25:B5:01:00:06

Firmware 2.1

Boot:SAN

Service Profile

MAC : 00:25:B5:01:00:07

WWN : 20:01:00:25:B5:01:00:07

Firmware 2.1

Boot:SAN

2.

Templates - Service Profile

MAC : Derived

WWN: Derived

Firmware 2.2

Boot:SAN

1.

Pools

UUID

MAC

WWNN / WWPN

Policies

Boot Devices/Order

Host F/W

QoS

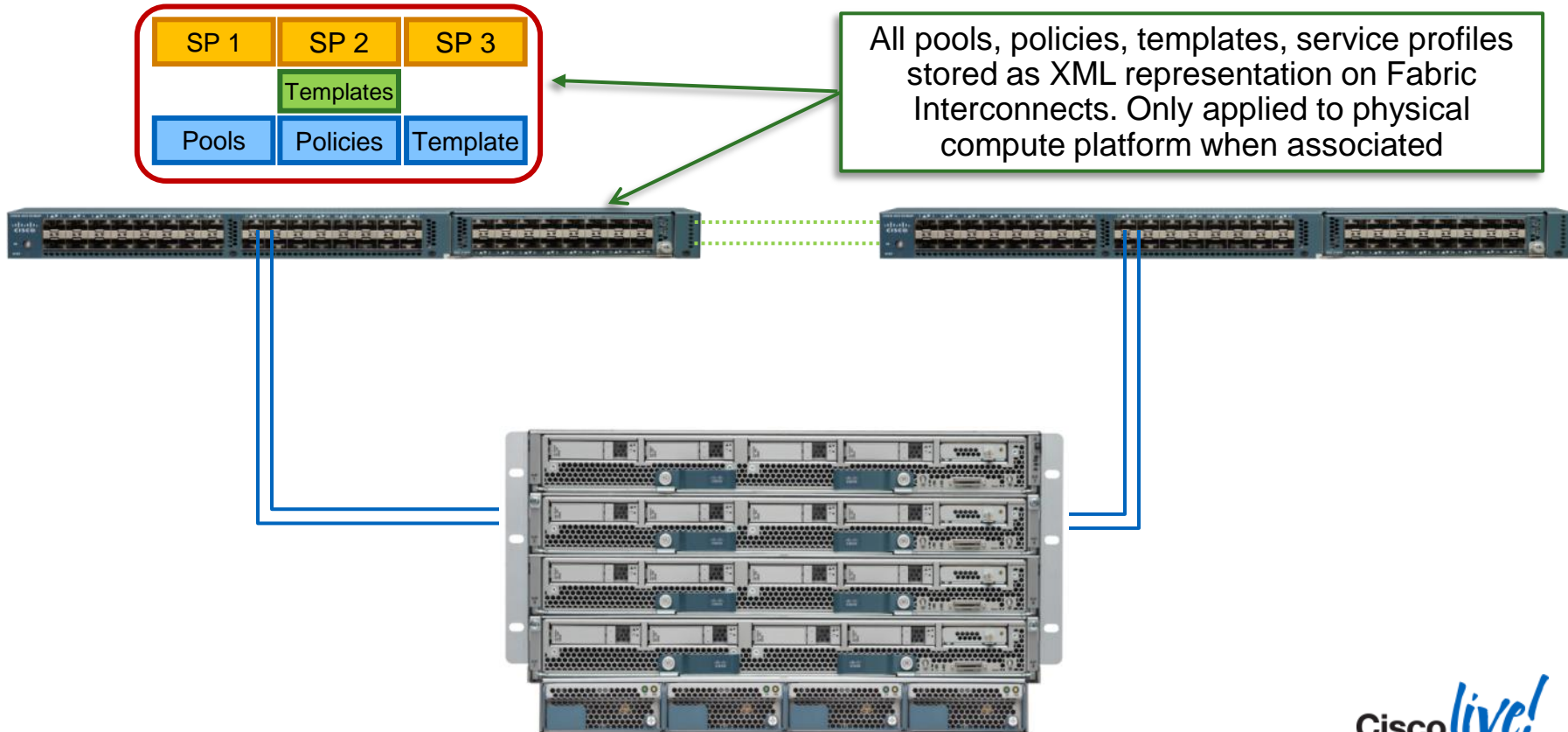
Templates

vNICs

vHBAs

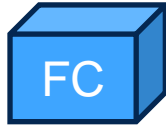
UCS Key Features

Logical Building Blocks and Hardware/Software Abstraction



UCS Key Features

Unified Ports



Native Fibre Channel



Lossless Ethernet:
1/10GbE, FCoE, iSCSI, NAS

Benefits

- Simplify switch purchase - remove ports ratio guess work
- Increase design flexibility
- Remove specific protocol bandwidth bottlenecks

Use-cases

- Flexible LAN & storage convergence based on business needs
- Service can be adjusted based on the demand for specific traffic

UCS Useful Resources

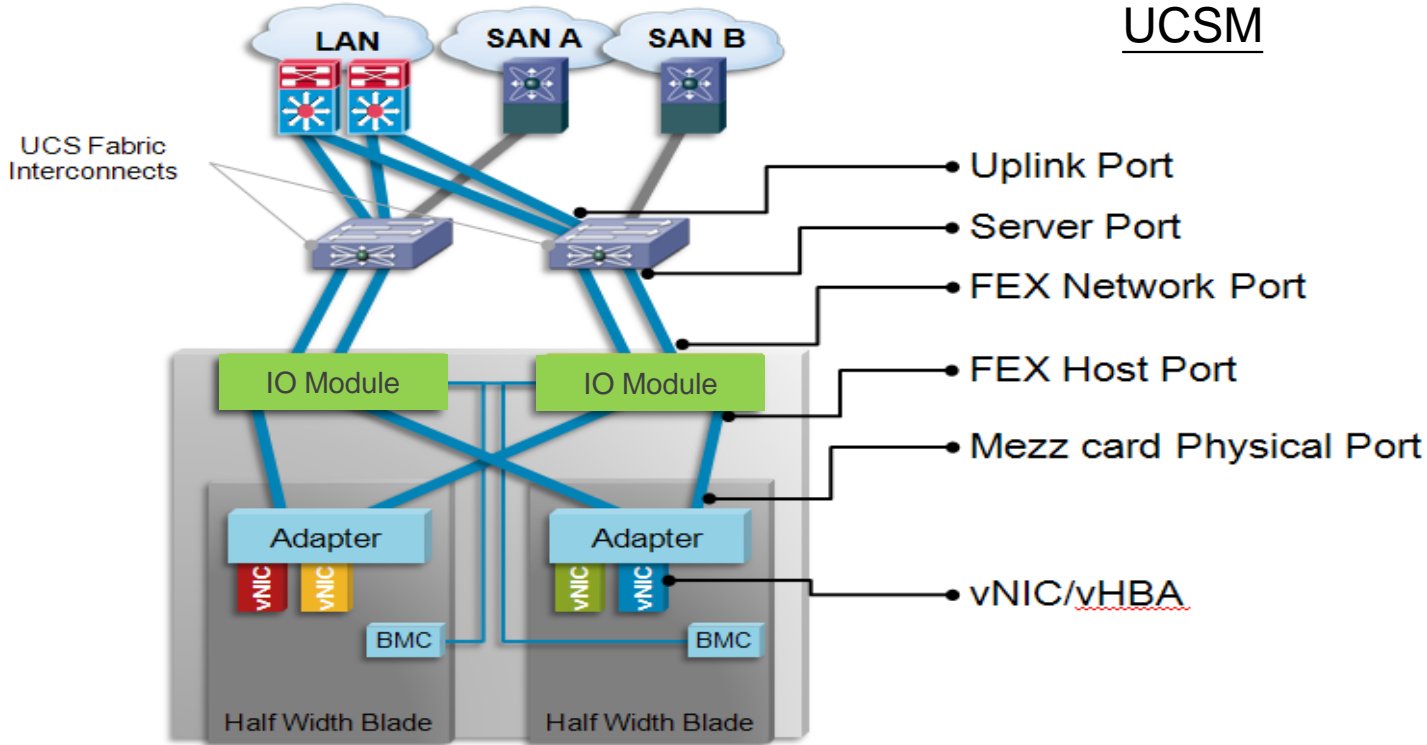
- UCS Emulator Download
- <http://developer.cisco.com/web/unifiedcomputing/ucsemulatoredownload>
- UCS Quick Start Guide
- http://www.cisco.com/en/US/prod/collateral/ps10265/ps10281/whitepaper_c11-697337.html

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Connectivity – Components and LAN

UCS Ports Defined



UCSM

NXOS

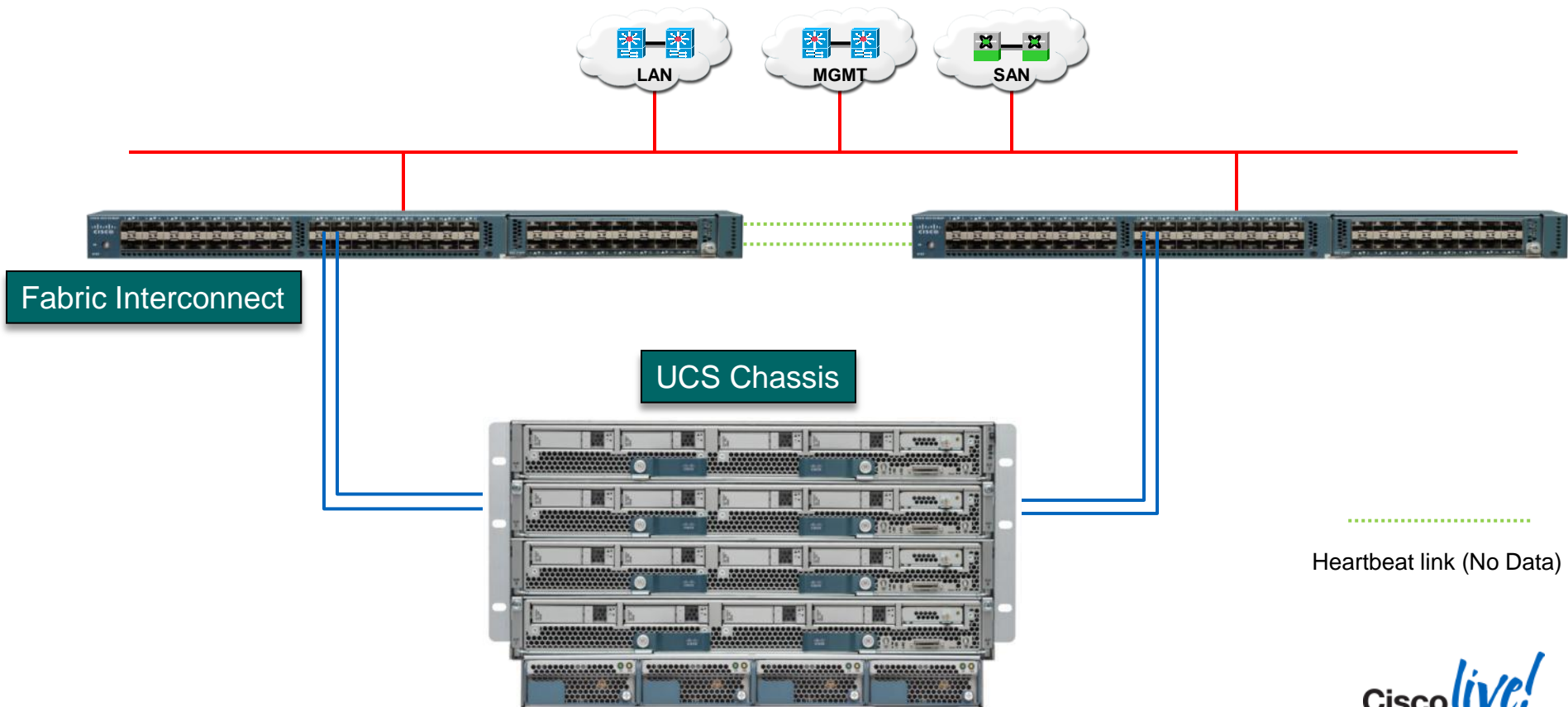
- BIF (Border)
- SIF (Server/Fabric)
- NIF (Network)
- HIF (Host)
- UIF (Uplink - DCE)
- VIF (Virtual)

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Connectivity – Components and LAN

Northbound of the Fabric Interconnect



Connectivity – Components and LAN

Northbound of the Fabric Interconnect – FI 6248UP



32 x Fixed ports: 1/10 GE or 1/2/4/8 FC

Expansion Module (GEM)

Fabric Interconnect Cluster Connectivity

Out of Band Mgmt
10/100/1000



Console

Fan Module

Fan Module

Power Entry

Power Entry

N + N Redundant Fans

N + N Power Supplies

Connectivity – Components and LAN

Northbound of the Fabric Interconnect – FI6248UP



Flexibility

Scalability

Multi-purpose

Product Features and Specs	UCS 6120XP	UCS 6140XP	UCS 6248UP	UCS 6296UP
Switch Fabric Throughput	520 Gbps	1.04 Tbps	960 Gbps	1.92 Tbps
Switch Footprint	1RU	2RU	1RU	2RU
1 Gigabit Ethernet Port Density	8	16	48	96
10 Gigabit Ethernet Port Density	26	52	48	96
8G Native FC Port Density	6	12	48	96
Port-to-Port Latency	3.2us	3.2us	2.0us	2.0us
Active # of VLANs	982	982	2000	2000

BACKWARD COMPATIBILITY

AND

FORWARD COMPATIBILITY

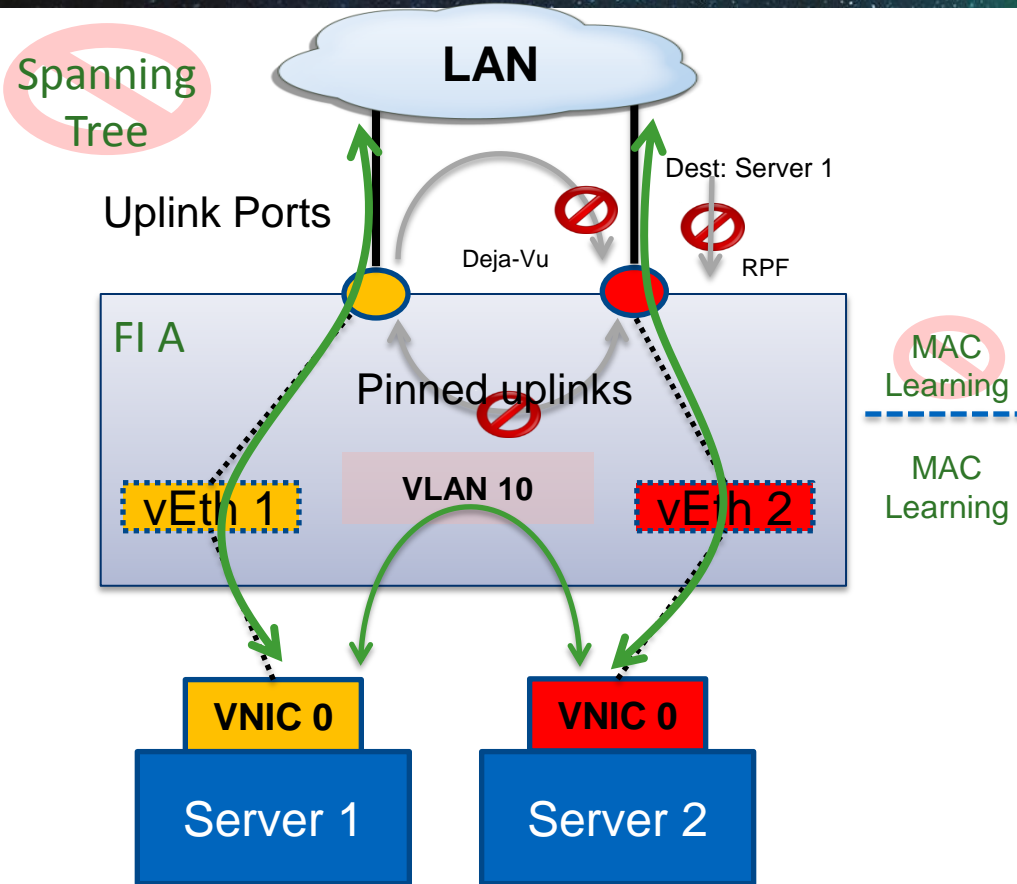
Connectivity – Components and LAN

Northbound of the Fabric Interconnect – FI Modes of Operation - LAN

- End-host mode (EHM): **Default, recommended mode**
- Switch mode

Connectivity – Components and LAN

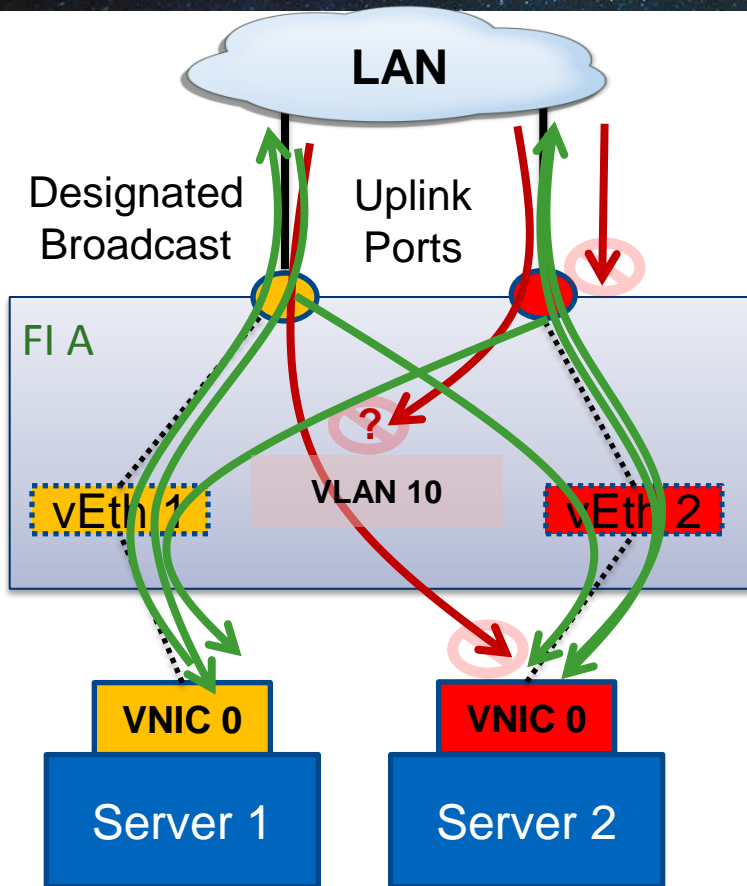
Northbound of the Fabric Interconnect – Ethernet EHM - Unicast Forwarding



- Completely transparent to the network
 - Presents as a bunch of hosts to the network
- No STP – simplifies upstream connectivity
- All uplinks ports are forwarding – never blocked
- MAC/VLAN plus policy based forwarding
 - Server pinned to uplink ports – static or dynamic
- Policies to prevent packet looping
 - déjà vu check
 - RPF
 - No uplink to uplink forwarding
- No unknown unicast or multicast
 - igmp-snooping can be disable on per-VLAN basis

Connectivity – Components and LAN

Northbound of the Fabric Interconnect – Ethernet EHM - Unicast Forwarding



From upstream to servers:

- To unknown destination - Drop
- To known destination
 - Received on servers pinned uplink - Forward to server port
 - Received on another uplink - Drop
- Broadcast
 - Received on designated broadcast link and not from own server - Forward to all servers in VLAN
 - Received on another uplink - Drop

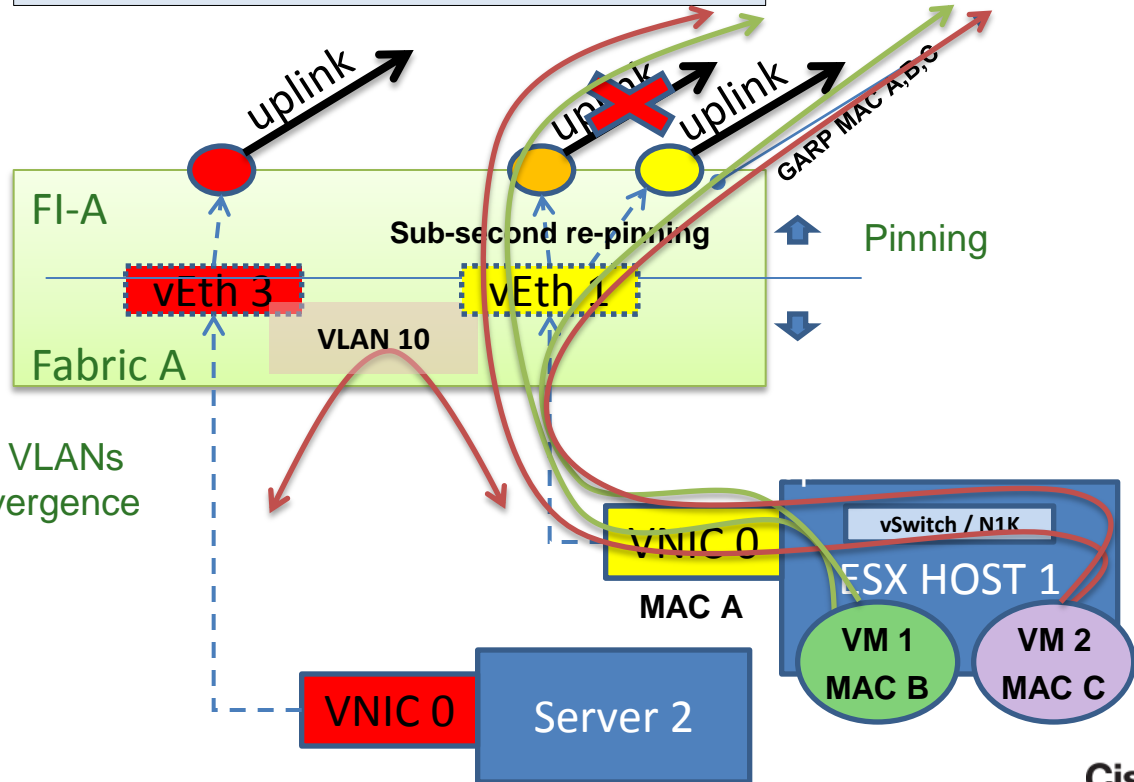
From servers to upstream:

- To unknown destination - Send out servers pinned uplink port
- To known destination - Send out servers pinned uplink port
- Broadcast
 - Send to all other servers in VLAN + pinned server uplink

Connectivity – Components and LAN

Northbound of the Fabric Interconnect – Ethernet EHM – Individual Uplinks

Dynamic re-pinning of failed uplinks

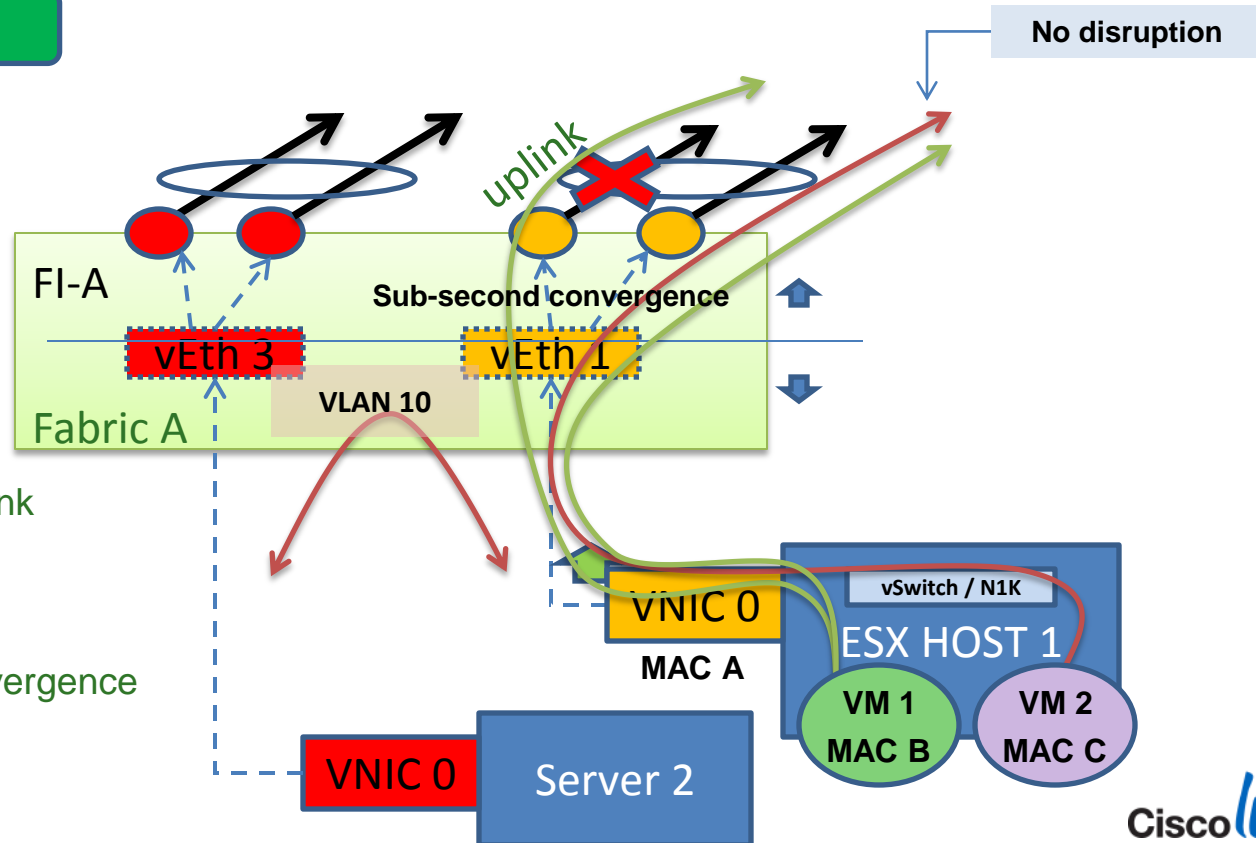


- ✓ All uplinks forwarding for all VLANs
- ✓ GARP aided upstream convergence
- ✓ No STP
- ✓ Sub-second re-pinning
- ✓ No server NIC disruption

Connectivity – Components and LAN

Northbound of the Fabric Interconnect – Ethernet EHM – Port Channel Uplinks

RECOMMENDED

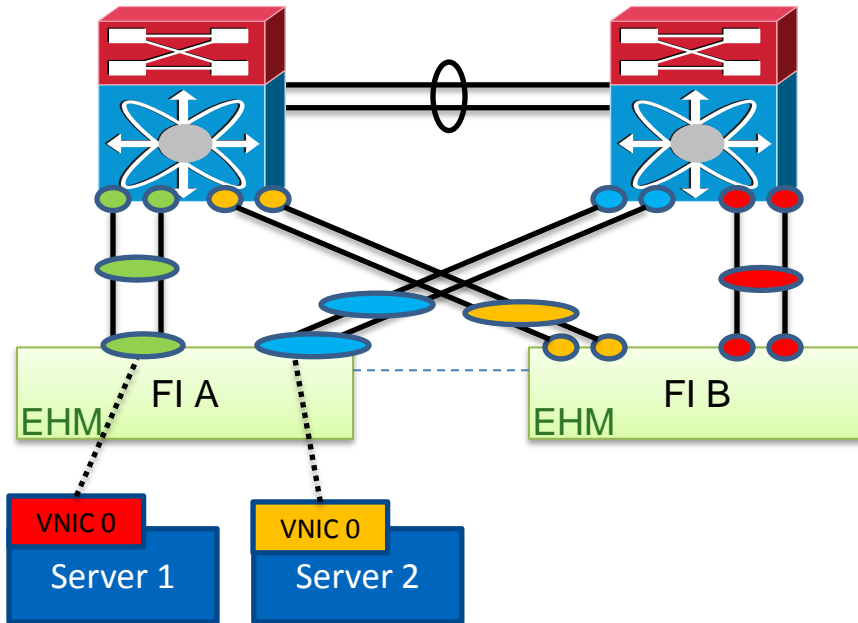


- ✓ More Bandwidth per Uplink
- ✓ Per flow uplink diversity
- ✓ No Server NIC disruption
- ✓ Fewer GARPs needed
- ✓ Faster bi-directional convergence
- ✓ Fewer moving parts

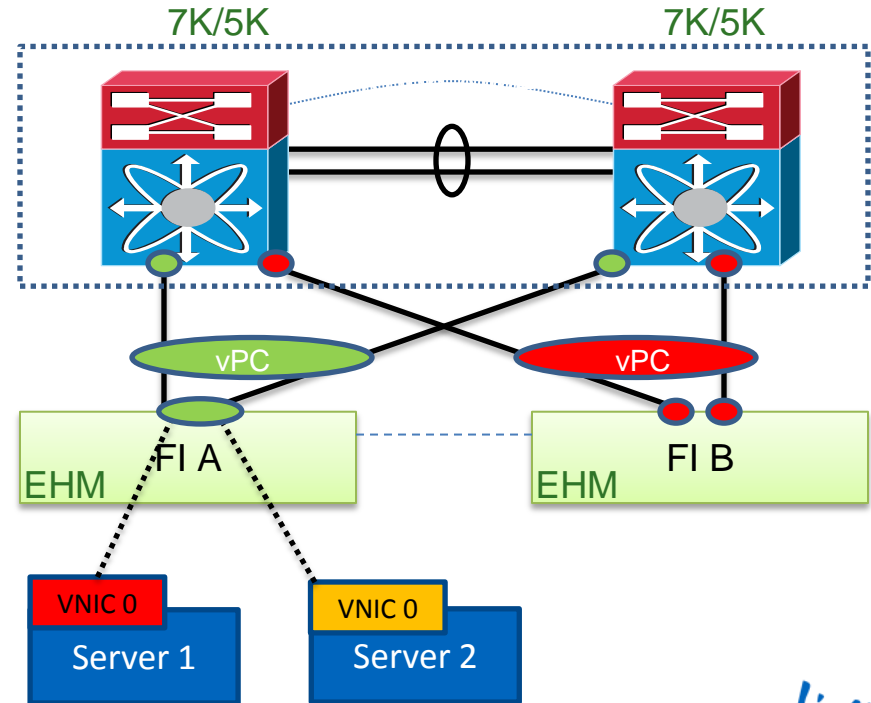
Connectivity – Components and LAN

Northbound of the Fabric Interconnect – Ethernet EHM – Upstream Connectivity

Without vPC

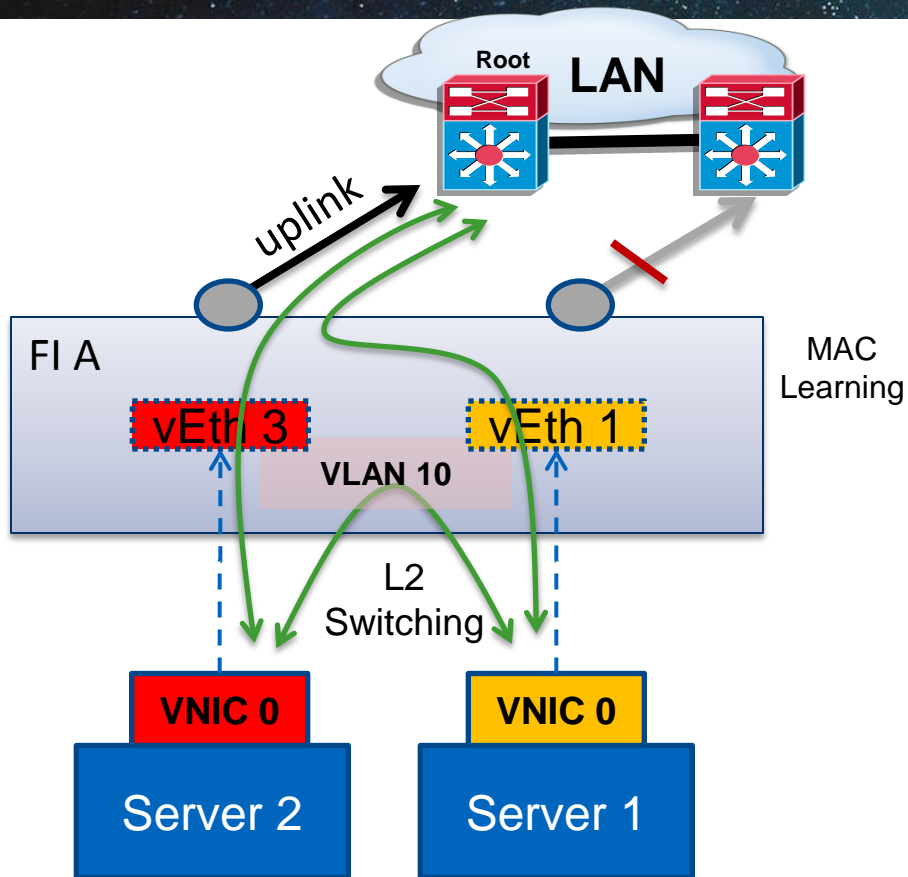


With vPC



Connectivity – Components and LAN

Northbound of the Fabric Interconnect – Ethernet Switch Mode - Overview

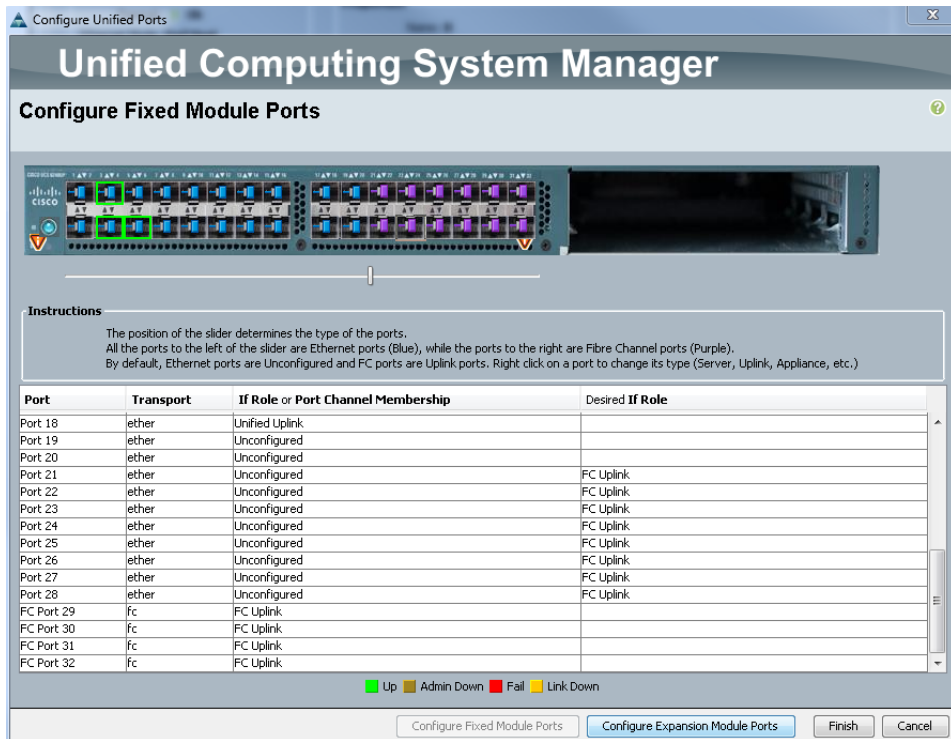


- Fabric Interconnect behaves like a normal L2 switch
- Rapid-STP+ to prevent loops
 - STP parameters are not configurable
- Server vNIC traffic follows STP forwarding states
 - Use VPC to get around blocked ports
- VTP is not supported
- MAC address learning on both uplinks and server links

Connectivity – Components and LAN

Northbound of the Fabric Interconnect – Configuring Unified Ports

Unified Ports Configuration



Unified Computing System Manager

Configure Fixed Module Ports

Instructions

The position of the slider determines the type of the ports.
All the ports to the left of the slider are Ethernet ports (Blue), while the ports to the right are Fibre Channel ports (Purple).
By default, Ethernet ports are Unconfigured and FC ports are Uplink ports. Right click on a port to change its type (Server, Uplink, Appliance, etc.)

Port	Transport	If Role or Port Channel Membership	Desired If Role
Port 18	ether	Unified Uplink	
Port 19	ether	Unconfigured	
Port 20	ether	Unconfigured	
Port 21	ether	Unconfigured	FC Uplink
Port 22	ether	Unconfigured	FC Uplink
Port 23	ether	Unconfigured	FC Uplink
Port 24	ether	Unconfigured	FC Uplink
Port 25	ether	Unconfigured	FC Uplink
Port 26	ether	Unconfigured	FC Uplink
Port 27	ether	Unconfigured	FC Uplink
Port 28	ether	Unconfigured	FC Uplink
FC Port 29	fc	FC Uplink	
FC Port 30	fc	FC Uplink	
FC Port 31	fc	FC Uplink	
FC Port 32	fc	FC Uplink	

Legend: ■ Up ■ Admin Down ■ Fail ■ Link Down

Buttons: Configure Fixed Module Ports, Configure Expansion Module Ports, Finish, Cancel

Pinning Visibility

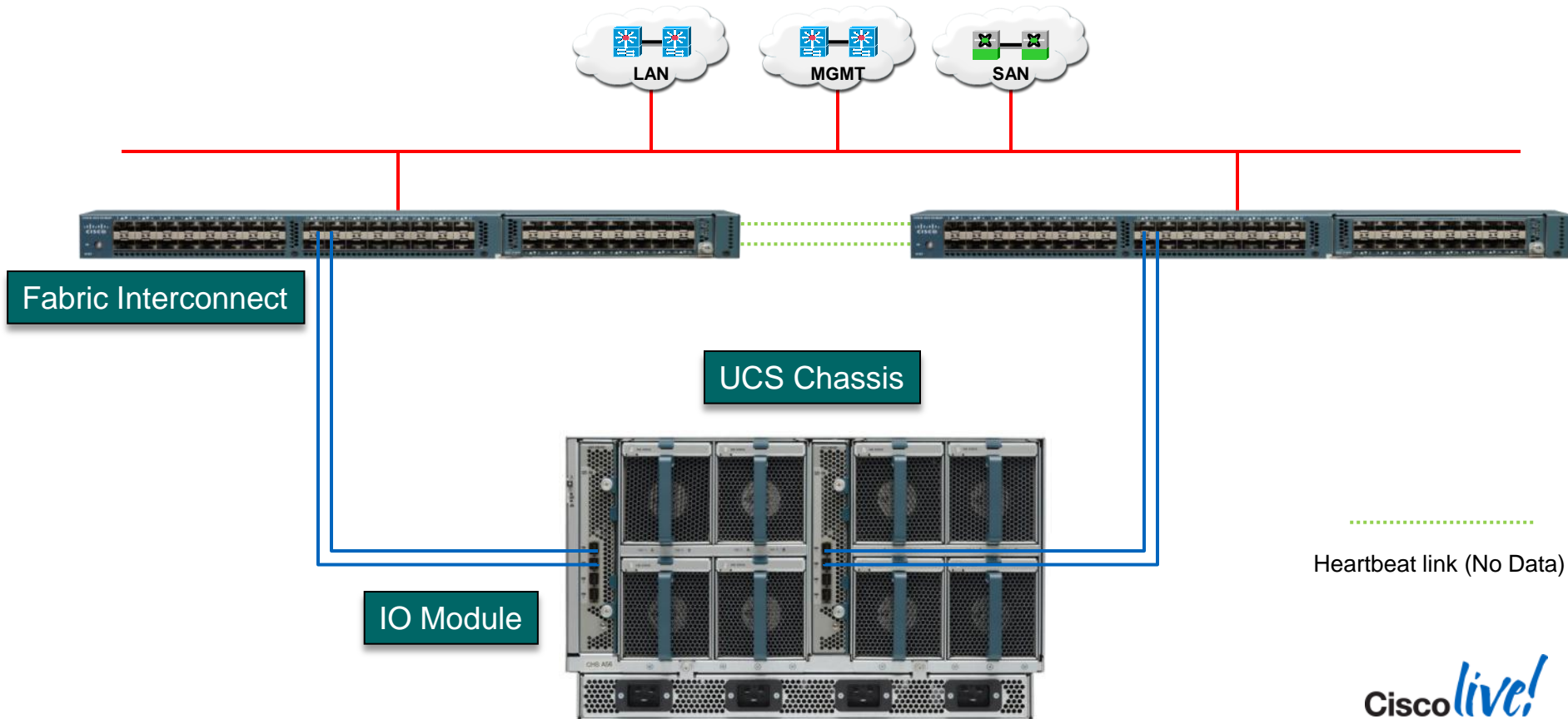
- SSH to Fabric Interconnect
- connect nxos
- show pinning border-interfaces
- show pinning server-interfaces

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Connectivity – Components and LAN

Fabric Interconnect to IO Module



Connectivity – Components and LAN

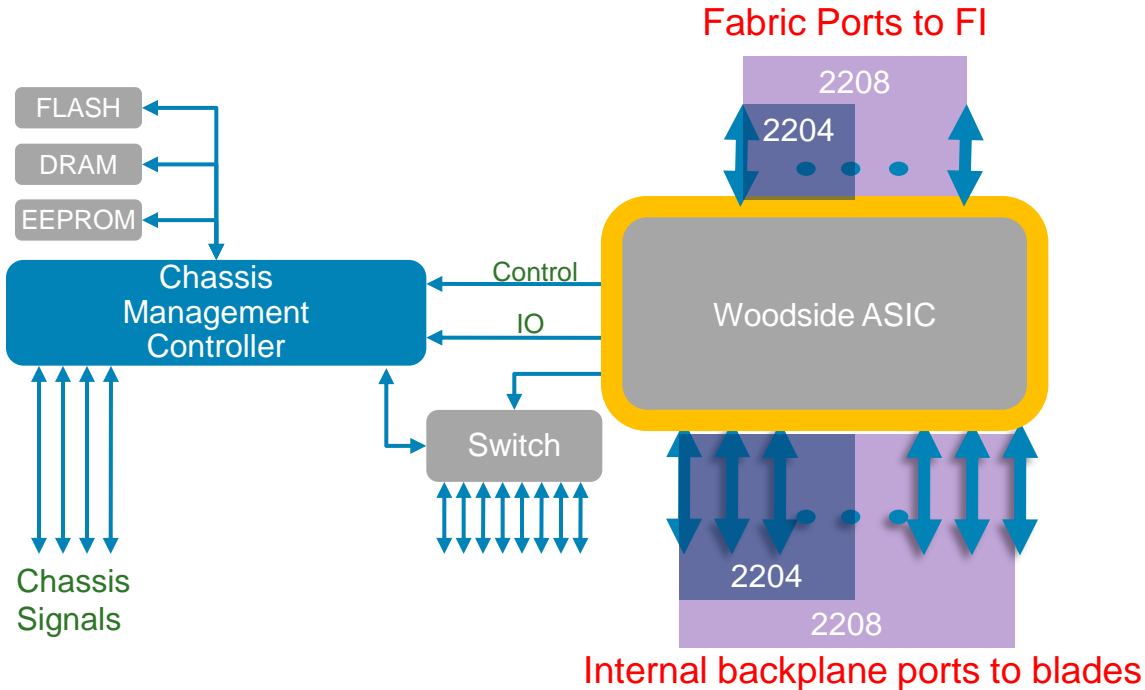
Fabric Interconnect to IO Module – IOM Overview

- A IOM (sometimes called ‘Fabric Extender’) provides
 - 1 for internal management
 - 10G-KR sever facing links (HIF)
 - Fabric links (NIF)
- 2204XP
 - 40G to the network
 - 80G to the host redundant
 - Latency lowered to 0.5us within IOM
- 2208XP
 - 80G to the network
 - 160G to the host redundant
 - Latency lowered to 0.5us within IOM



Connectivity – Components and LAN

Fabric Interconnect to IO Module – IOM Overview – 220x Architecture

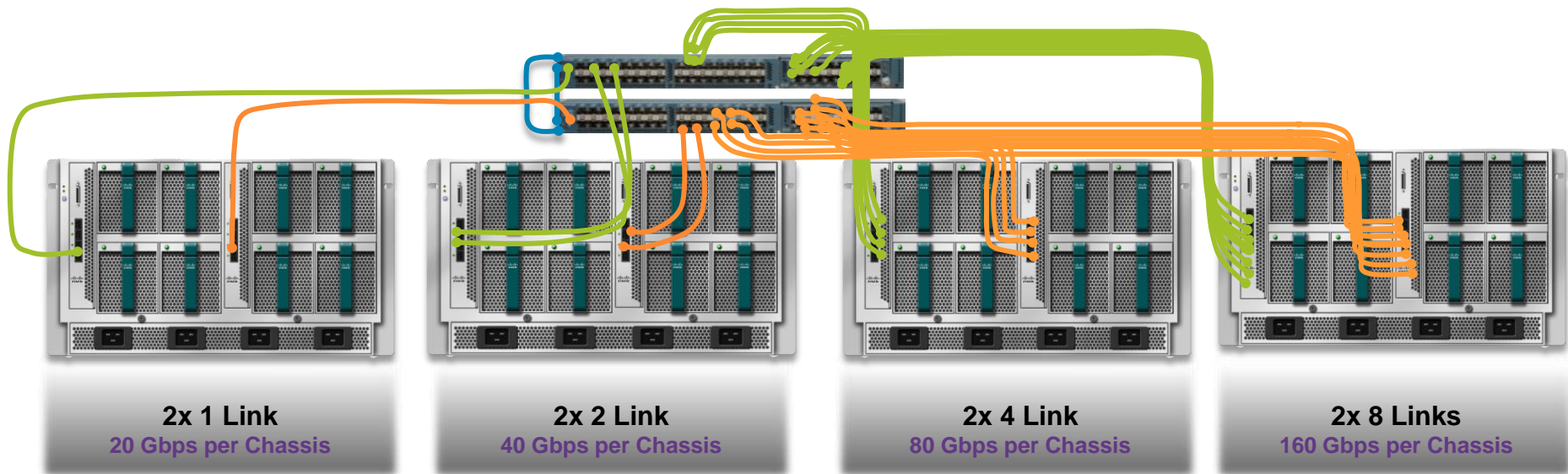


**No Local Switching – ever!
Traffic goes up to FI**

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

Connectivity – Components and LAN

Fabric Interconnect to IO Module – Cable for bandwidth, not for protocol



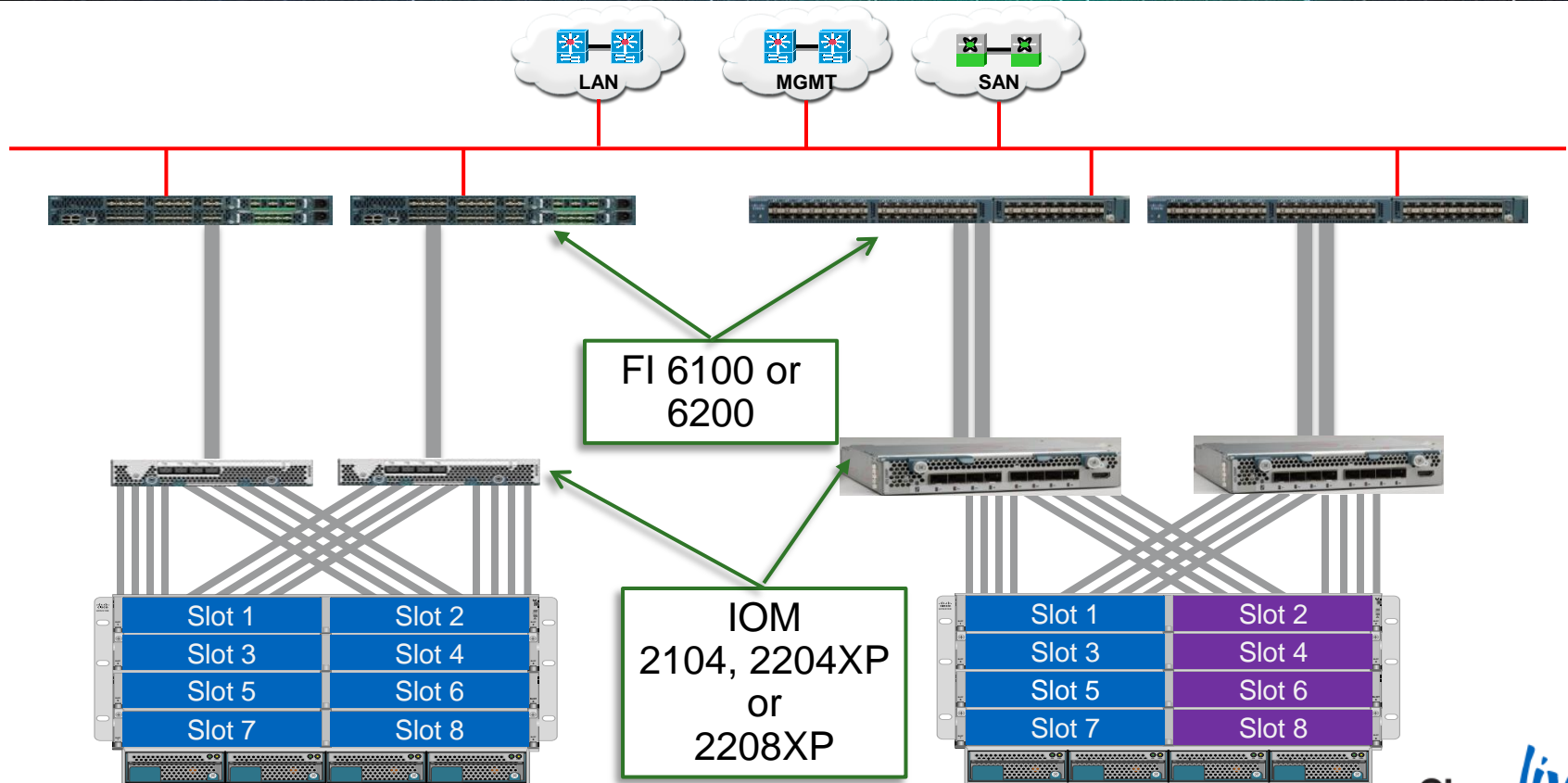
Connectivity – Components and LAN

Fabric Interconnect to IO Module – Connectivity – Modes

- Discrete Mode Pinning – 1, 2, 4, 8 links
- Port Channel

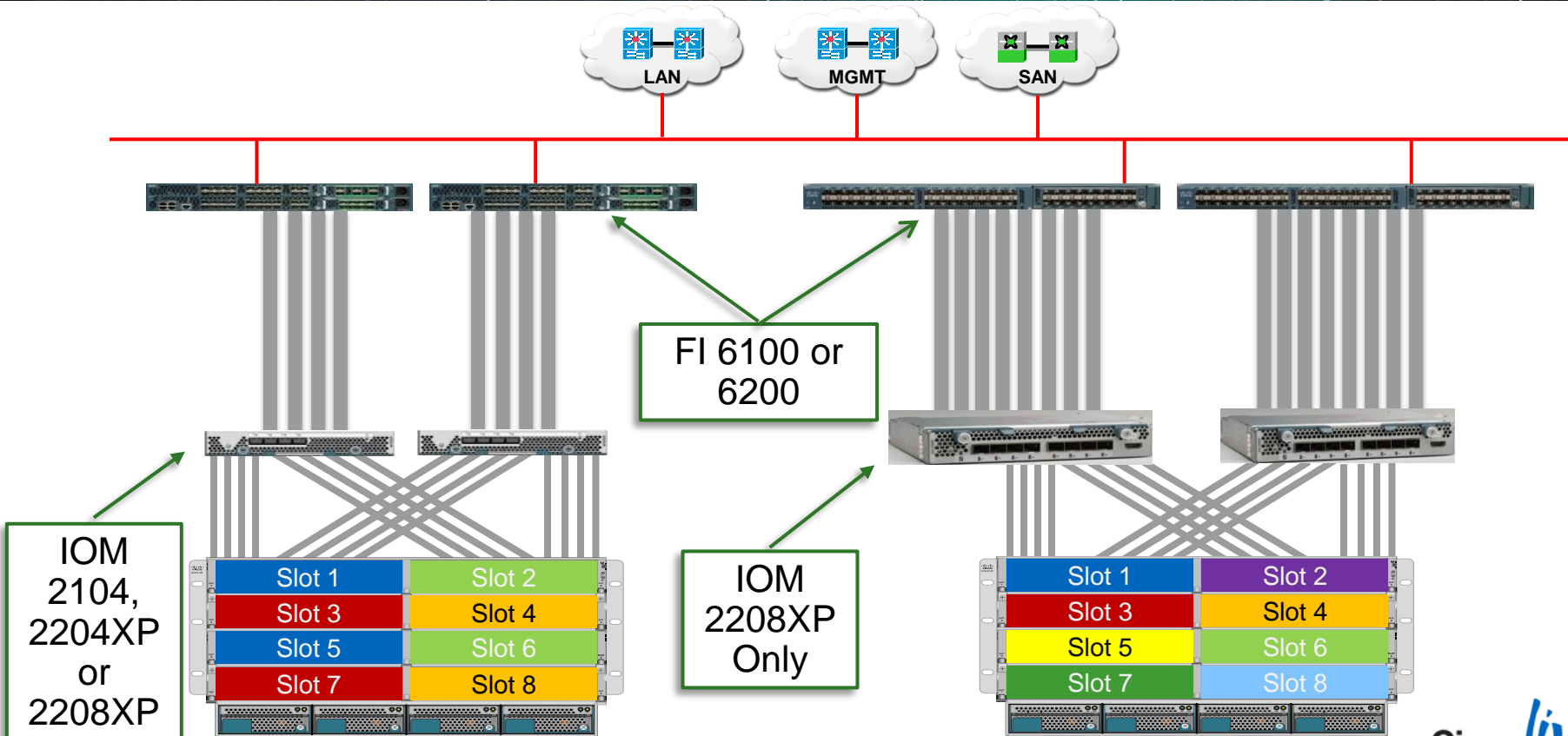
Connectivity – Components and LAN

Fabric Interconnect to IO Module – Connectivity – Pinning – 1 and 2 Links



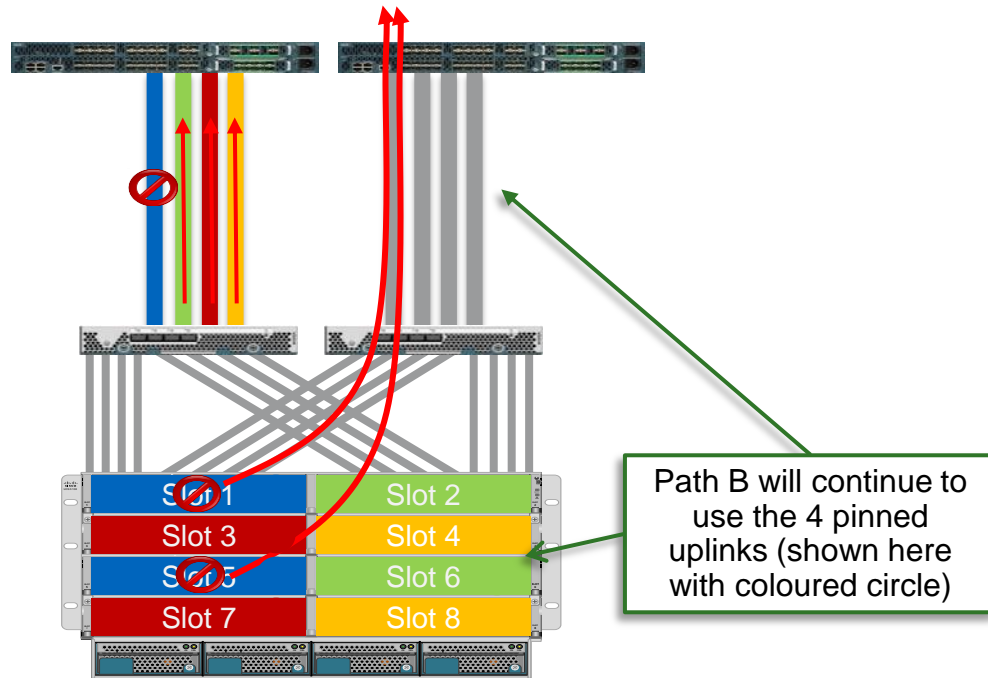
Connectivity – Components and LAN

Fabric Interconnect to IO Module – Connectivity – Pinning – 4 and 8 Links



Connectivity – Components and LAN

Fabric Interconnect to IO Module – Connectivity – IOM Link Failure



- 1. Lose connectivity on uplink mapped to IOM A for blades 1 and 5
- 2. Remaining 6 blades continue to forward traffic on 3 remaining IOM A pinned uplinks
 - Blades 1 and 5 can use blue pinned uplink on IOM B to forward traffic if redundant vNICs or Fabric Failover enabled
 - Re-acknowledge chassis (IOM A only) to dynamically re-pin 8 blades across remaining 2* uplinks

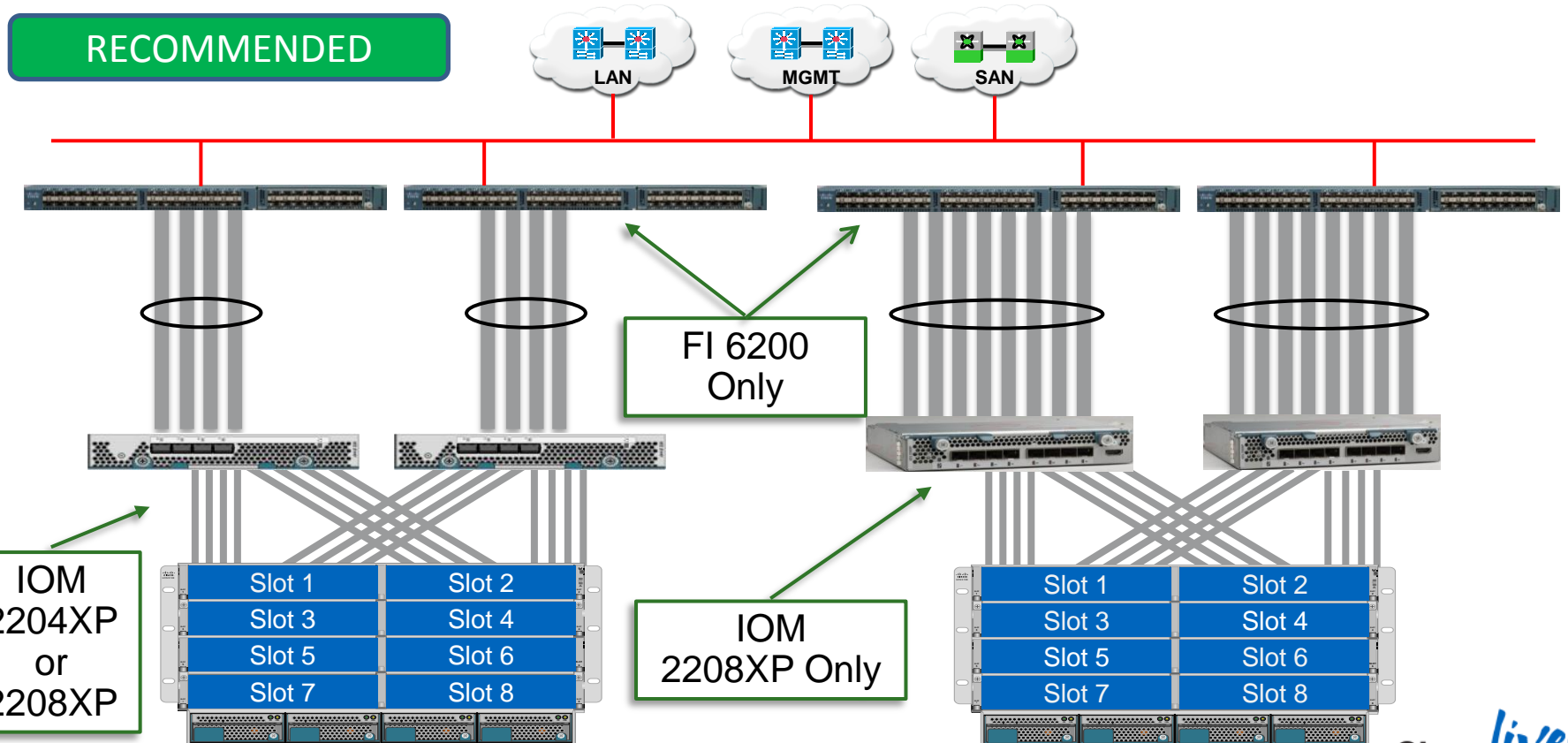
Connectivity – Components and LAN

Fabric Interconnect to IO Module – Connectivity – Modes

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Connectivity – Components and LAN

Fabric Interconnect to IO Module – Connectivity – Port Channel



Connectivity – Components and LAN

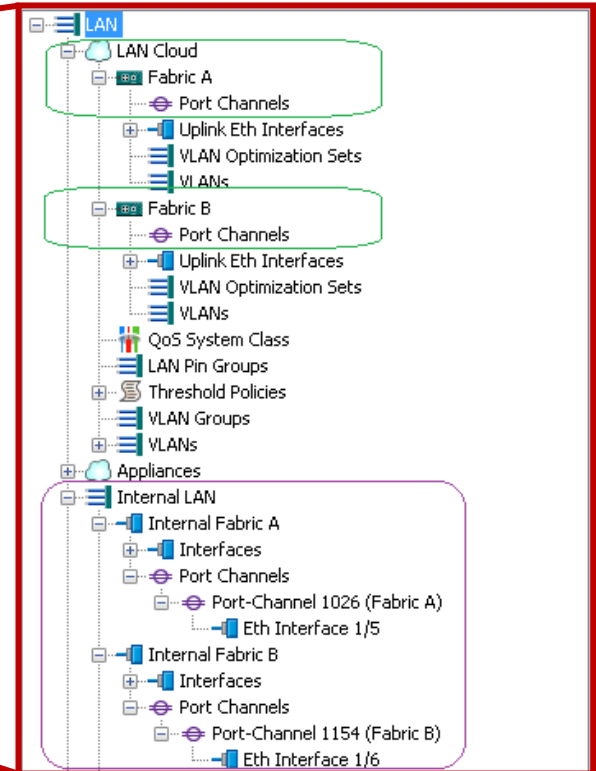
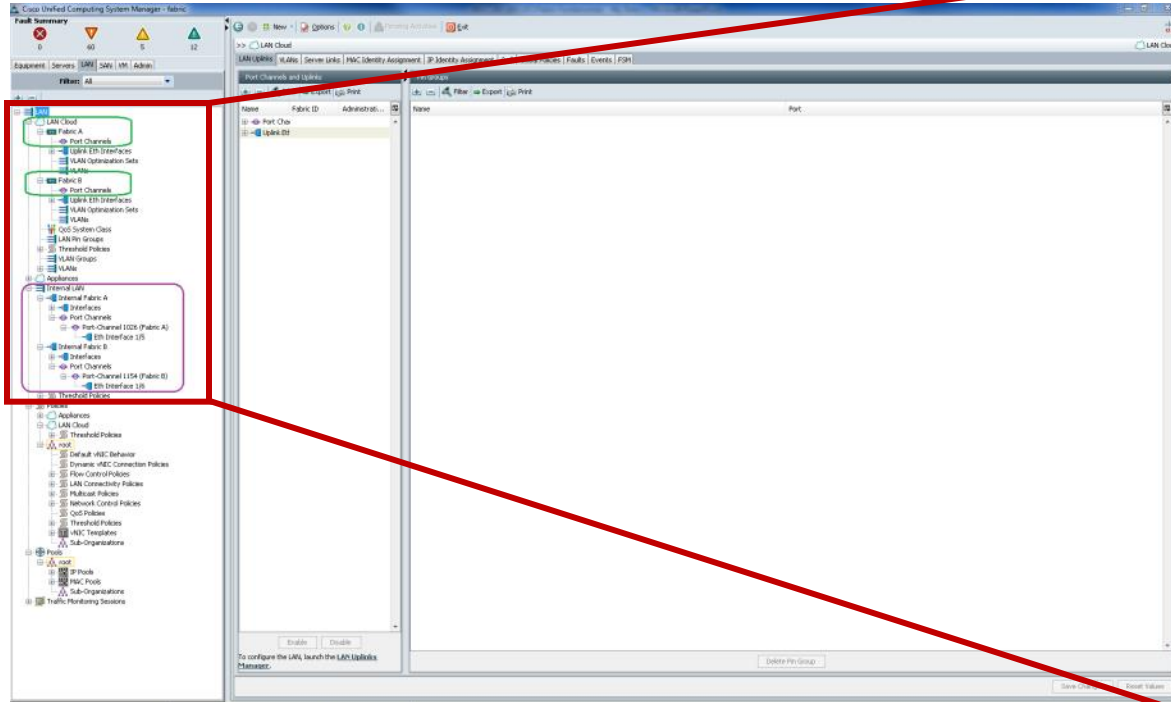
Fabric Interconnect to IO Module – Connectivity – Port Channel

- Fabric port-channel is supported only on **UCS 6200 with 2.0 and above**
- It can be enabled when UCS 6200 connected to UCS 2208/2204 IOM
- When UCS 2208 IOM is connected to UCS 6100 can take advantage of all 8 ports in discrete mode

- Discrete mode pinning will provide 10G to each blade slot
 - Use when you require traffic guarantee or path assurance
- Port channel allows each blade slot to scale above 10G

Connectivity – Components and LAN

Fabric Interconnect to IO Module – Port Channel Configuration

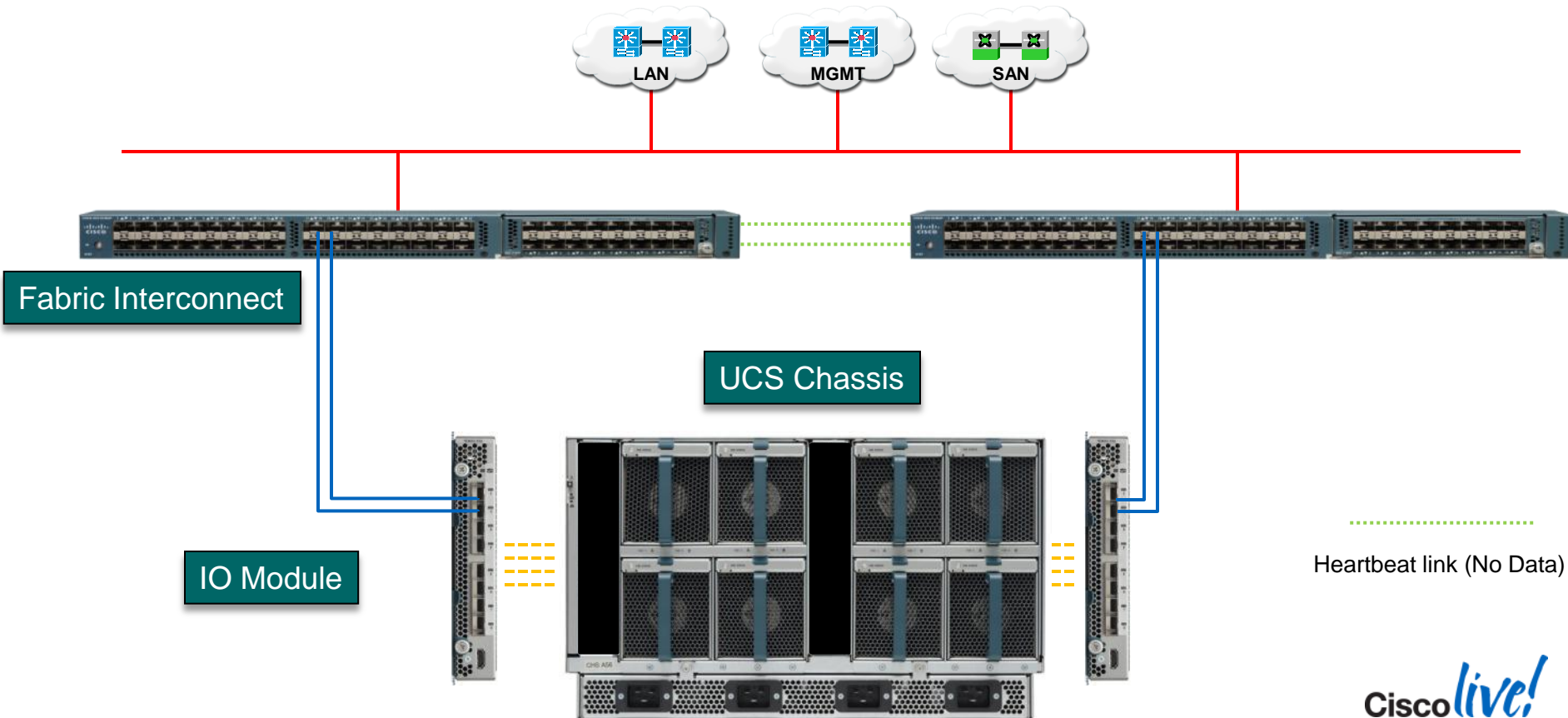


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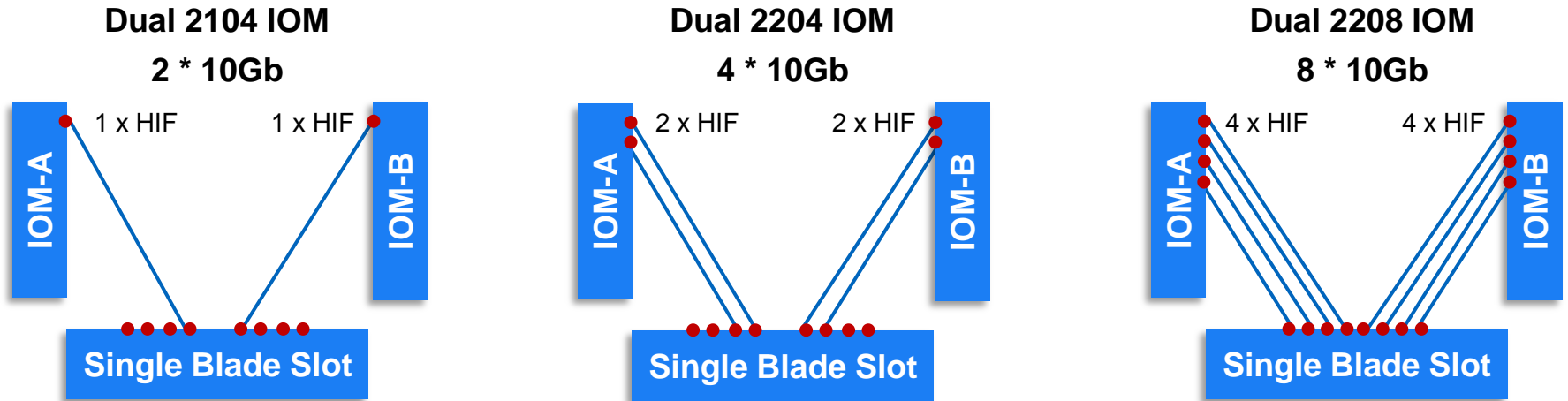
Connectivity – Components and LAN

IO Module To Blade



Connectivity – Components and LAN

IOM to Blade – IOM Model Connectivity



Single 2208 has 32 Host Interface Ports (HIFs)

Single 2208 has 4 HIF for a single blade slot

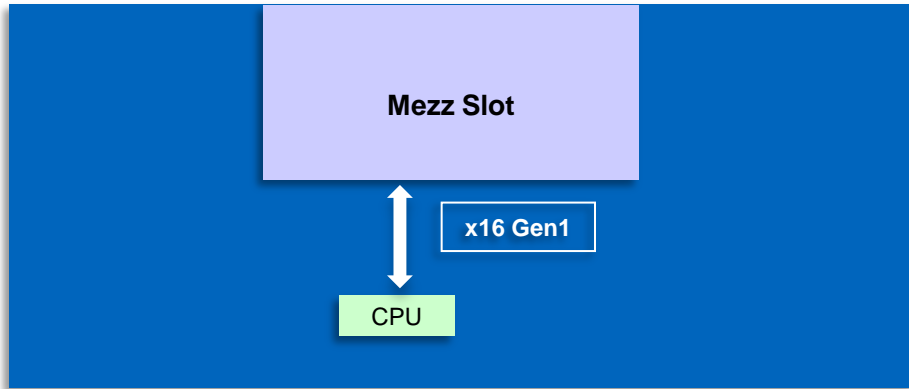
8 single blade slots per chassis

UCS 5108 Chassis contains 8 x 10Gb-KR lanes to each half-width blade slot

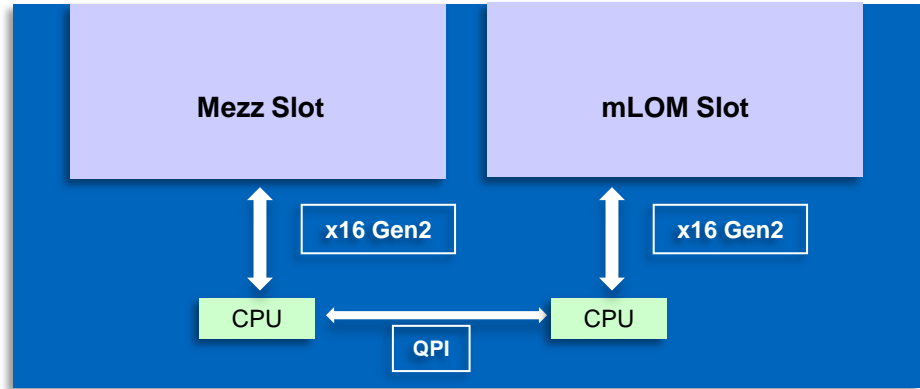
Connectivity – Components and LAN

IOM to Blade – Slots for M1/M2/M3 Blades – Half-width

M1/M2



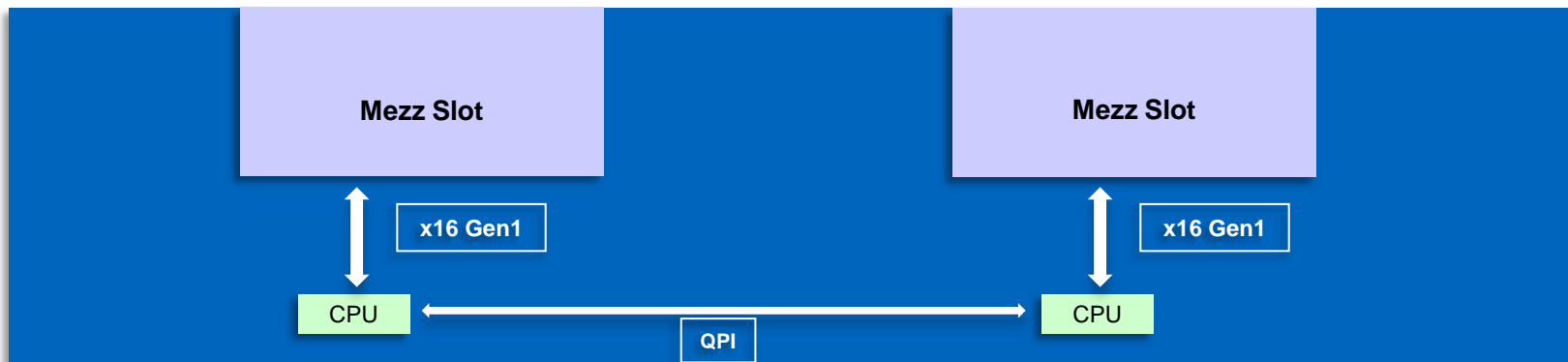
M3



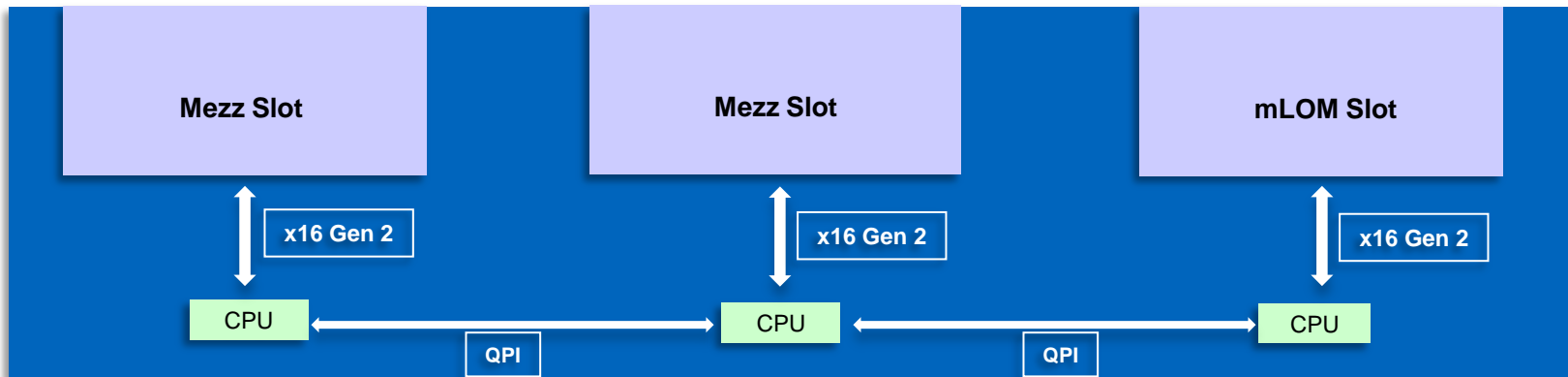
Connectivity – Components and LAN

IOM to Blade – Slots for M1/M2/M3 Blades – Full-width

M1/M2

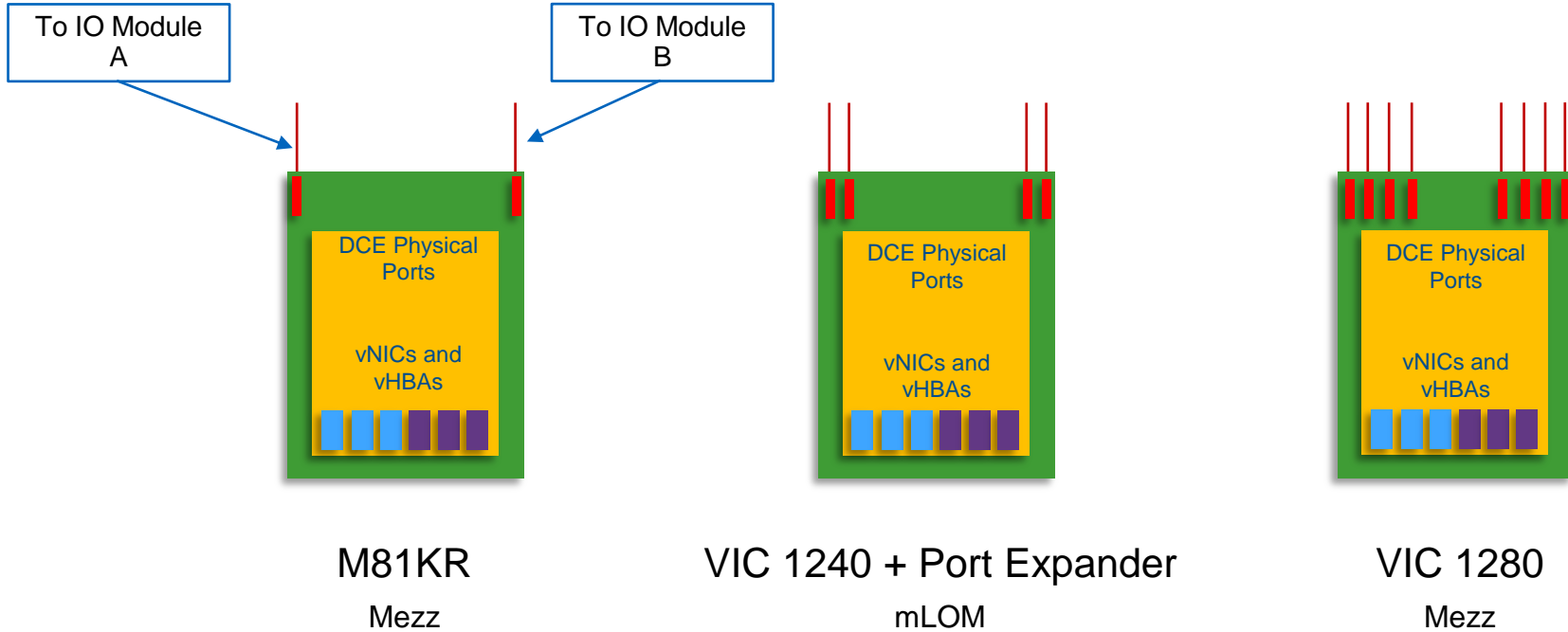


M3



Connectivity – Components and LAN

IOM to Blade – Cisco Virtual Interface Cards



Connectivity – Components and LAN

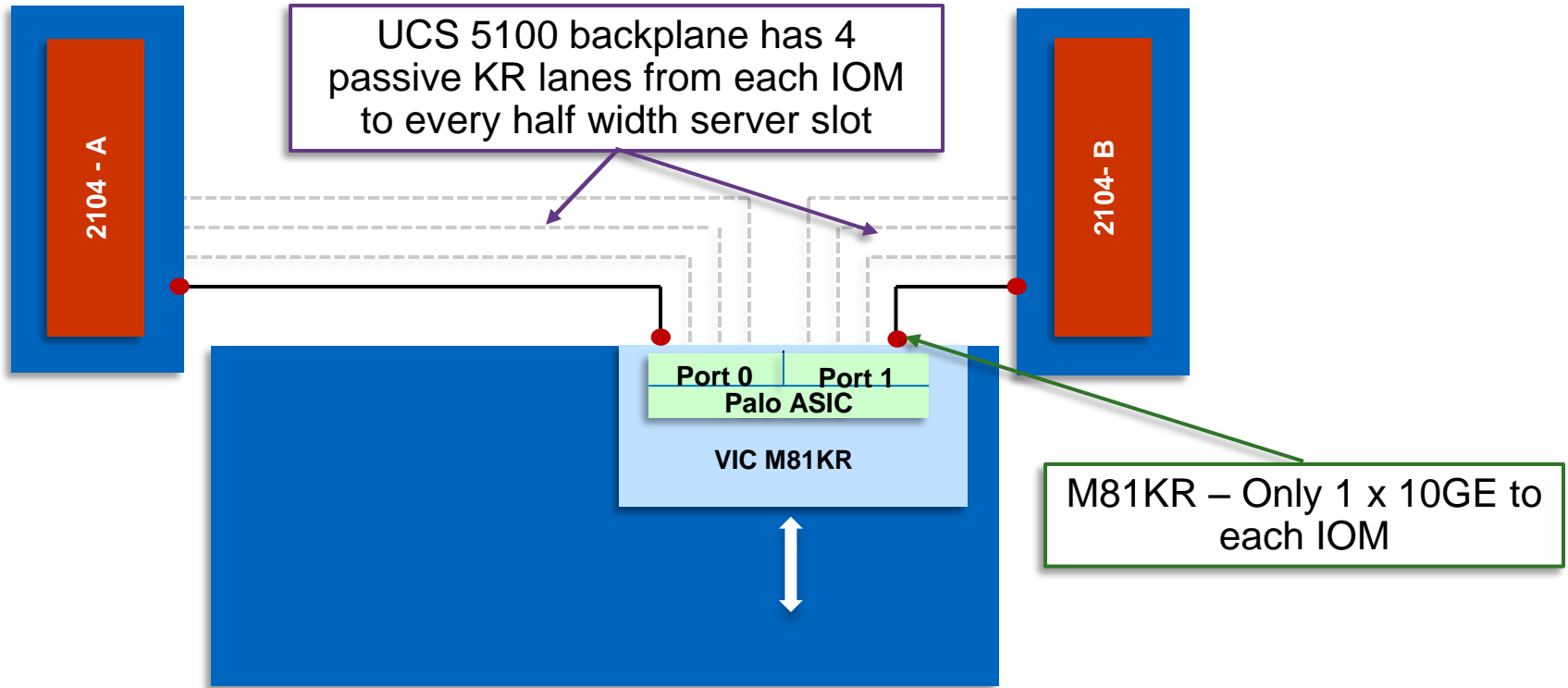
IOM To Blade – Putting It All Together

- **M1/M2 Connectivity**
 - 2104 to M81KR/VIC1280
 - 2204 to M81KR/VIC1280
- **M3 Connectivity**
 - 2204 to VIC1240
 - 2204 to VIC1240 + Port Expander
 - 2204 to VIC1240 + VIC1280

The following section discusses some half width blades with dual CPUs. For full width blades, single CPU support and remaining combinations, please refer to the HW installation guide.

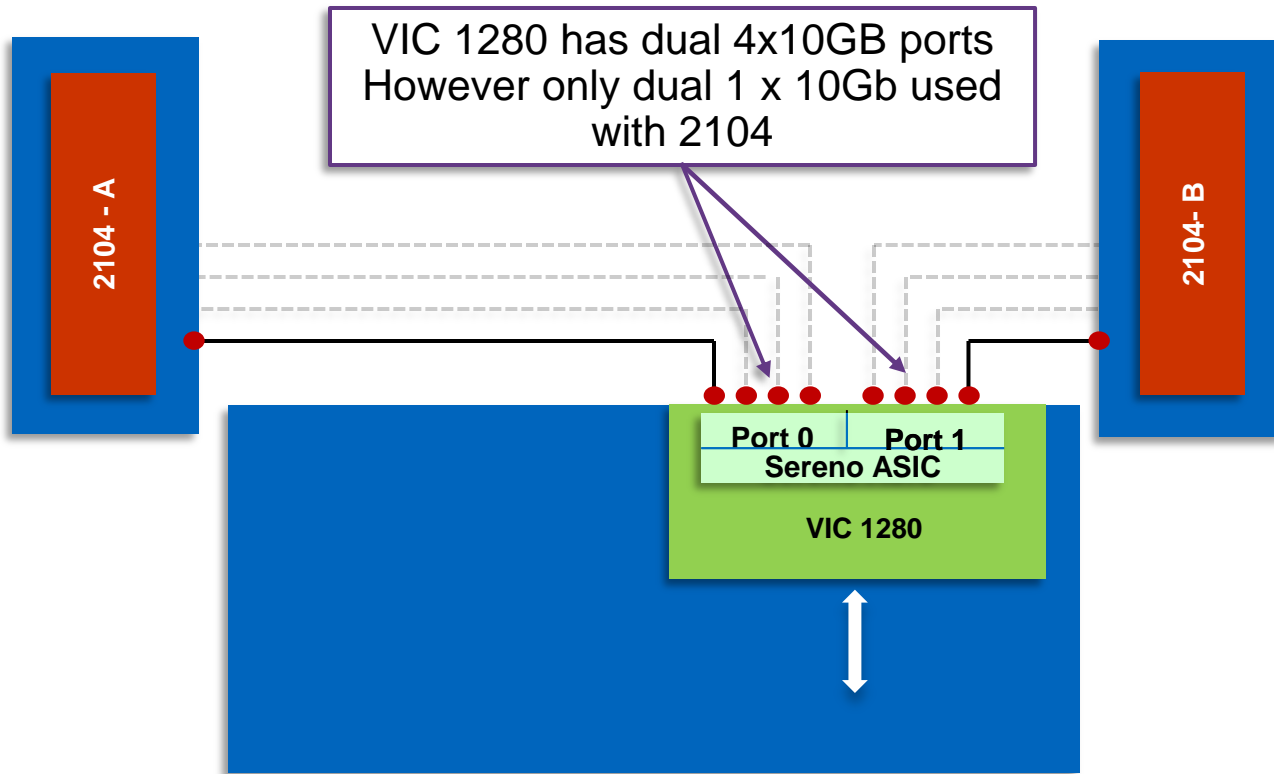
Connectivity – Components and LAN

IOM to Blade – IOM 2104 with M81KR in M1/M2 Blades



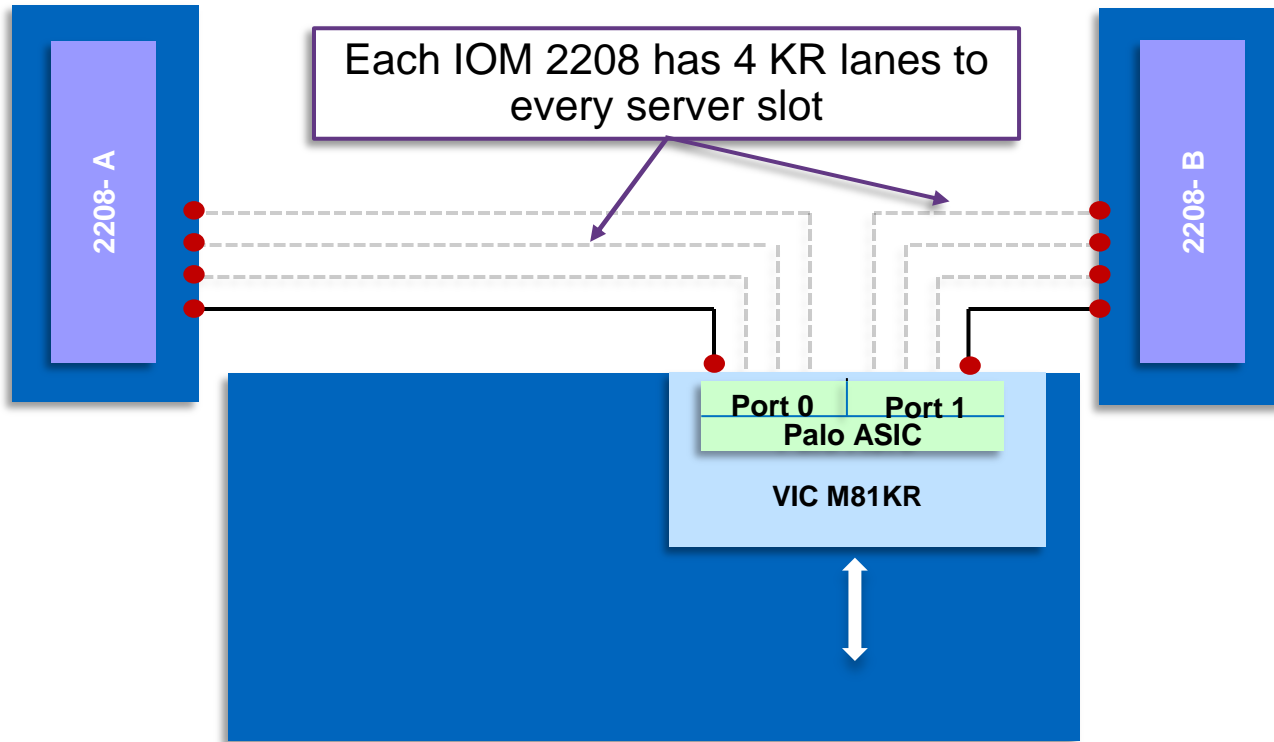
Connectivity – Components and LAN

IOM to Blade – IOM 2104 with VIC 1280 in M1/M2 Blades



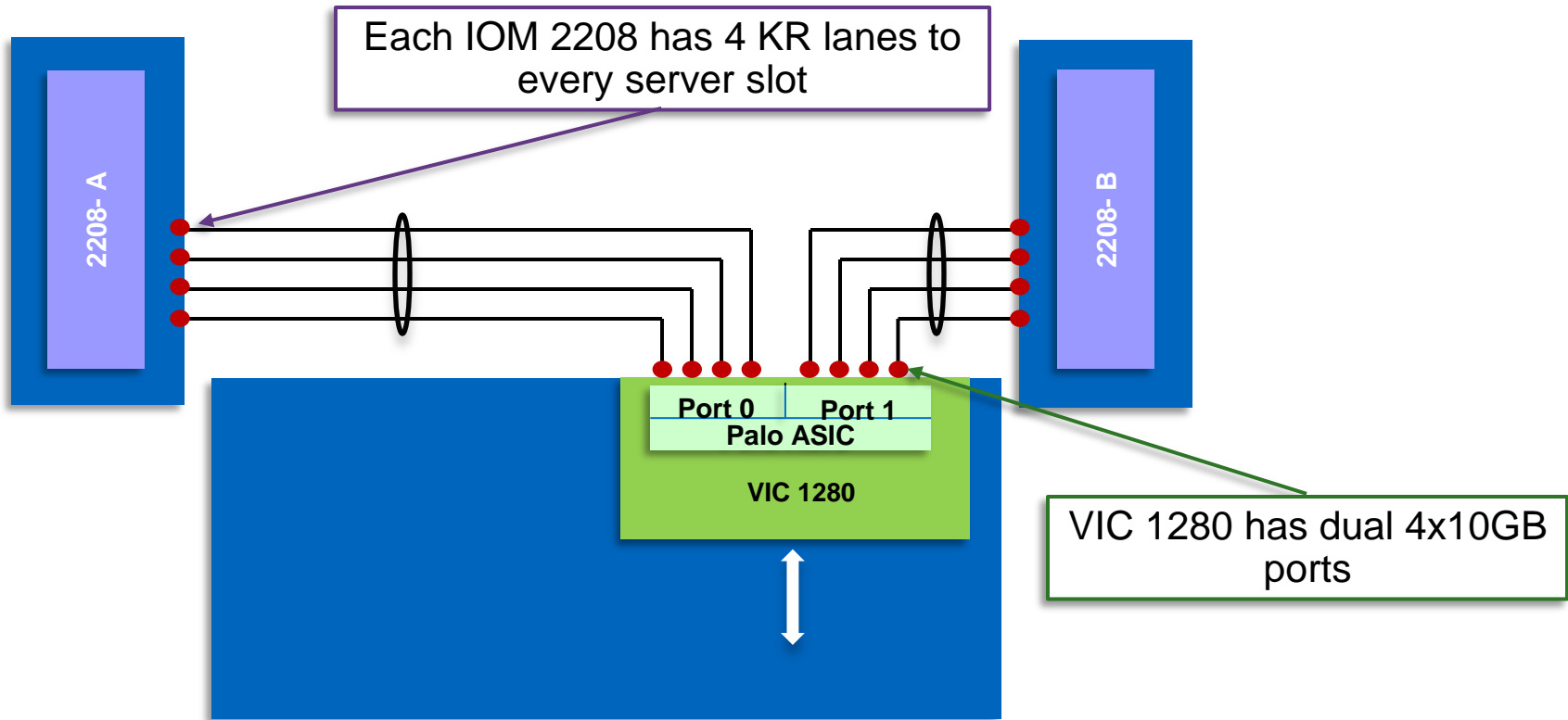
Connectivity – Components and LAN

IOM to Blade – IOM 2208 with M81KR in M1/M2 Blades



Connectivity – Components and LAN

IOM to Blade – IOM 2208 with VIC 1280 in M1/M2 Blades



Connectivity – Components and LAN

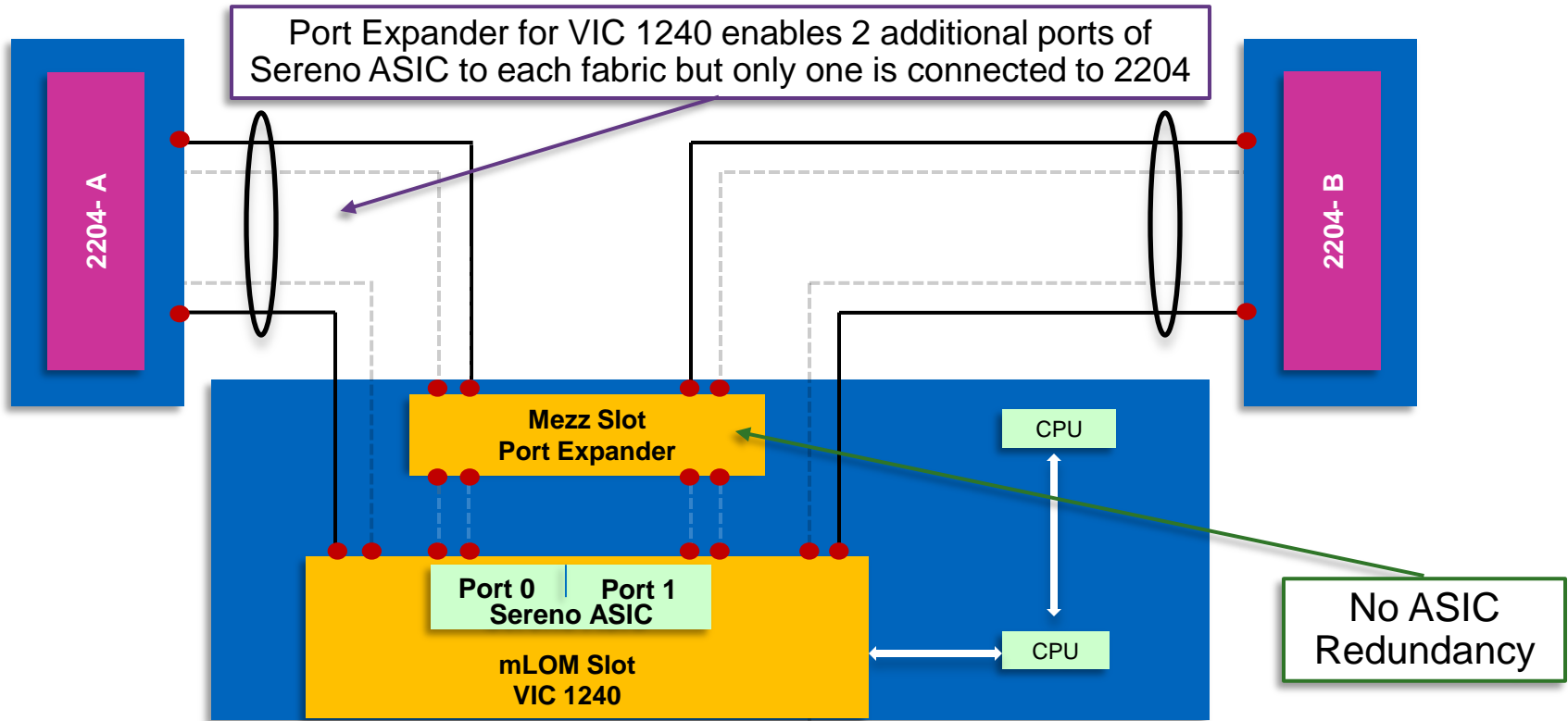
IOM To Blade – Putting It All Together

- M1/M2 Connectivity
 - 2104 to M81KR/VIC1280
 - 2208 to M81KR/VIC1280
- M3 Connectivity
 - 2208 to VIC1240
 - 2208 to VIC1240 + Port Expander
 - 2208 to VIC1240 + VIC1280

The following section discusses some half width blades with dual CPUs. For full width blades, single CPU support and remaining combinations, please refer to the HW installation guide.

Connectivity – Components and LAN

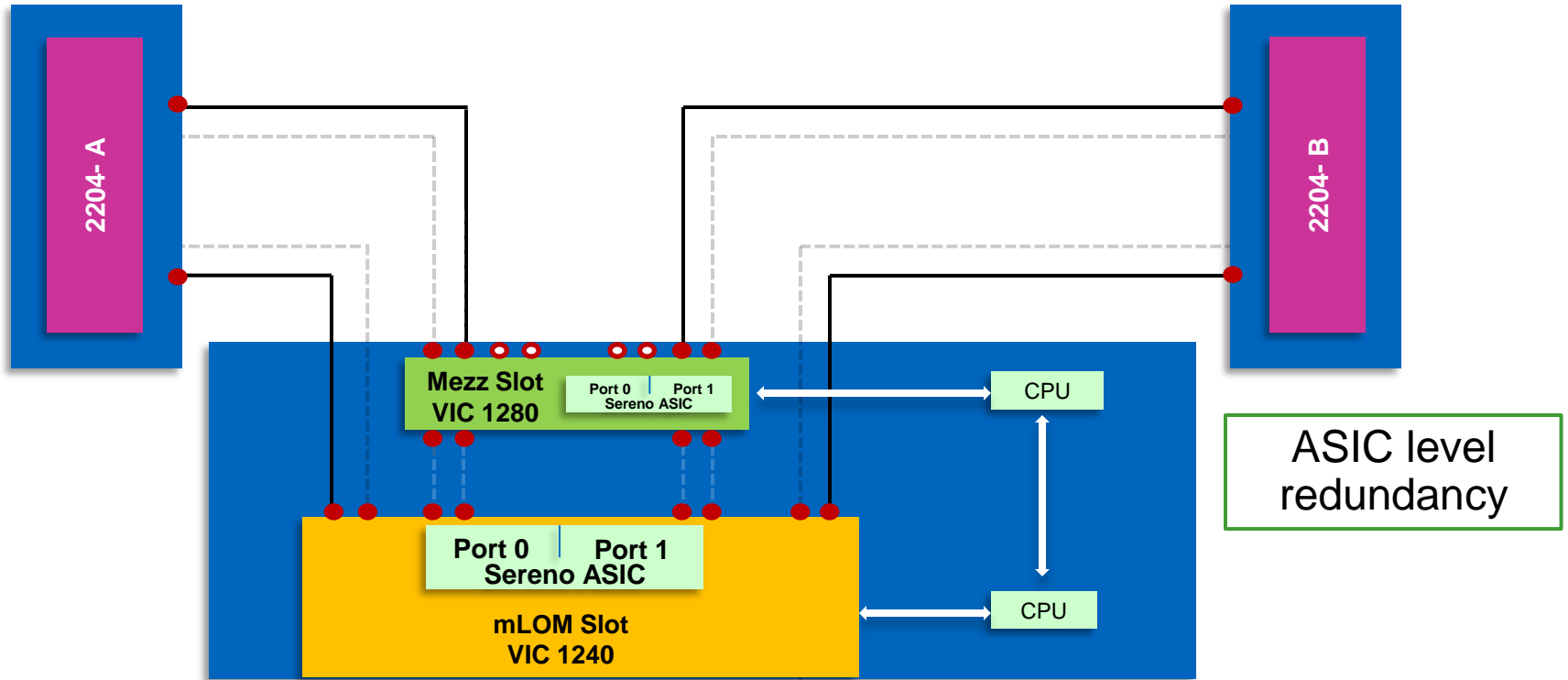
IOM to Blade – IOM 2204 with VIC1240 and Port Exp Card in B200M3



MOST POPULAR

Connectivity – Components and LAN

IOM to Blade – IOM 2204 with VIC1240 and VIC 1280 in B200M3



Connectivity – Components and LAN

IOM To Blade – Verifying NIF and HIF Connections

- Connect iom 1
- Show platform software redwood sts
- Show platform software woodside sts

```
fabric-B# connect iom 1
Attaching to FEX 1 ...
To exit type 'exit', to abort type '$.'
Bad terminal type: "xterm". Will assume vt100.
fex-1# show platform software woodside sts
Board Status Overview:
Legend:
  '   = no-connect
  X   = Failed
  -   = Disabled
  :   = Dn
  |   = Up
  [$] = SFP present
  [ ] = SFP not present
  [X] = SFP validation failed
-----

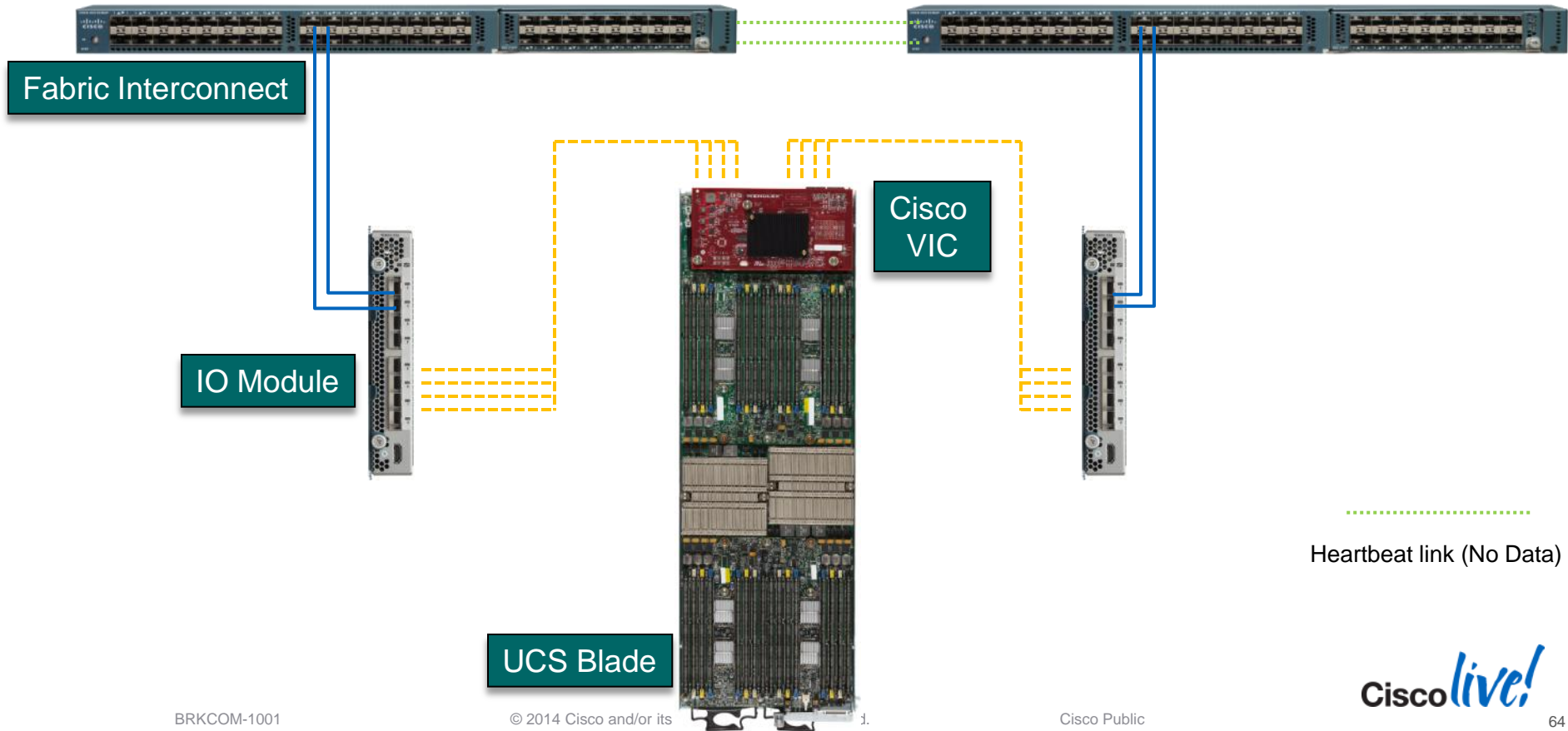
(FINAL POSITION TBD)  Uplink #:      1  2  3  4  5  6  7  8
                    Link status:  |  :  :  :  :  :
SFP:                 +-----+
                    [ ] [ $ ] [ ] [ ] [ ] [ ] [ ] [ ]
                    +-----+
                    | N  N  N  N  N  N  N  N  |
                    | I  I  I  I  I  I  I  I  |
                    | 0  1  2  3  4  5  6  7  |
                    +-----+
                    | NI (0-7) |
                    +-----+

                    |
                    +-----+-----+-----+-----+
                    | HI (0-7) | HI (8-15) | HI (16-23) | HI (24-31) |
                    +-----+-----+-----+-----+
                    | H  H  H  H  H  H  H  H  | | H  H  H  H  H  H  H  H  | | H  H  H  H  H  H  H  H  | | H  H  H  H  H  H  H  H  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
                    | I  I  I  I  I  I  I  I  | | I  I  I  I  I  I  I  I  | | I  I  I  I  I  I  I  I  | | I  I  I  I  I  I  I  I  |
                    | 0  1  2  3  4  5  6  7  | | 8  9  1  1  1  1  1  1  | | 1  1  1  2  2  2  2  | | 2  2  2  2  2  2  3  3  |
                    |  |  |  |  |  |  |  |  | | |  |  |  |  |  |  |  |  | | |  |  |  |  |  |  |  |  | | |  |  |  |  |  |  |  |  | |
                    |  |  |  |  |  |  |  |  | | | 0  1  2  3  4  5  | | 6  7  8  9  0  1  2  3  | | 4  5  6  7  8  9  0  1  |
                    +-----+-----+-----+-----+
                    | [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] | | [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] | | [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] | | [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] |
                    +-----+-----+-----+-----+
                    | - - - | - - - | - - - | - - - | | - - - | - - - | | - - - | - - - | | | | | |
                    | 3  3  3  2  2  2  2  2  | | 2  2  2  2  2  1  1  1  | | 1  1  1  1  1  1  1  9  | | 8  7  6  5  4  3  2  1  |
                    | 2  1  0  9  8  7  6  5  | | 4  3  2  1  0  9  8  7  | | 6  5  4  3  2  1  0  | |  |  |  |  |  |  |  |  | |
                    | \ \ \ \ \ \ \ \ \ \ \ \ | | \ \ \ \ \ \ \ \ \ \ \ \ | | \ \ \ \ \ \ \ \ \ \ \ \ | | \ \ \ \ \ \ \ \ \ \ \ \ |
                    | blade8 blade7 | | blade6 blade5 | | blade4 blade3 | | blade2 blade1 |
fex-1#
```

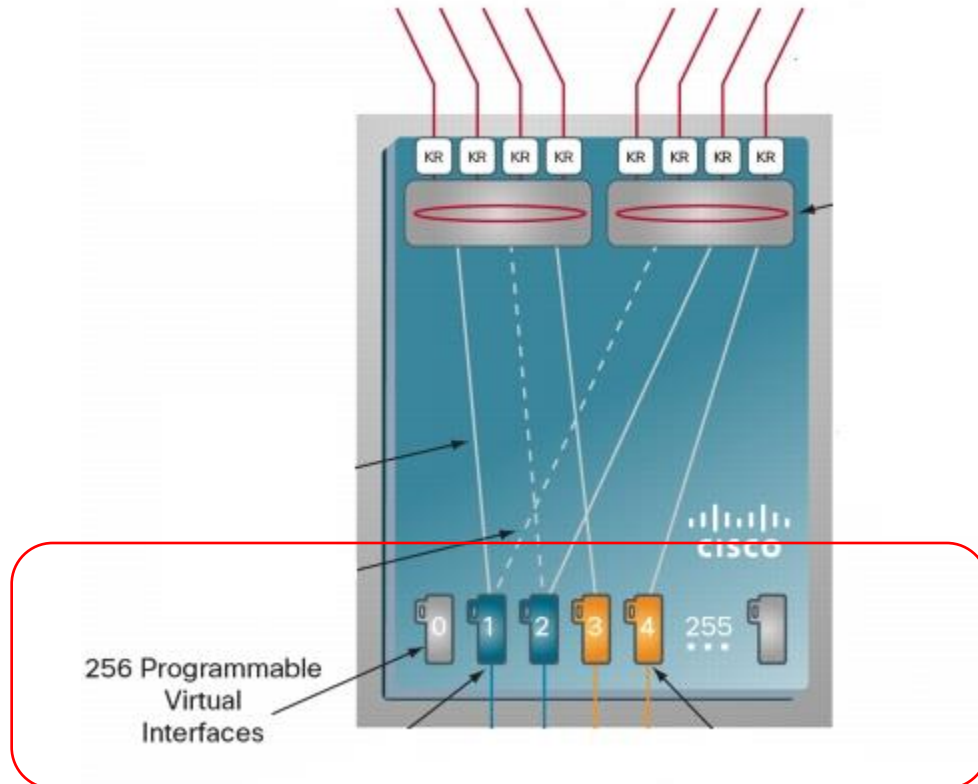
Agenda

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Connectivity – Components and LAN Blade – Virtual Circuits



Connectivity – Components and LAN Blade – Virtual Interface Card – vNICs and vHBAs



Connectivity – Components and LAN Blade – Virtual Circuits – Defining vNICs in a Service Profile

General Storage **Network** iSCSI vNICs Boot Order Virtual Machines FC Zones Policies Server Details CIMC Sessions FSM

Actions

- Change Dynamic vNIC Connection Policy
- Modify vNIC/vHBA Placement

Dynamic vNIC Connection Policy

Nothing Selected

vNIC/vHBA Placement Policy

Specific vNIC/vHBA Placement Policy

Virtual Slot	Selection Preference
1	All
2	All
3	All
4	All

LAN Connectivity Policy

LAN Connectivity Policy: <not set>

LAN Connectivity Policy Instance:

+ Create LAN Connectivity Policy

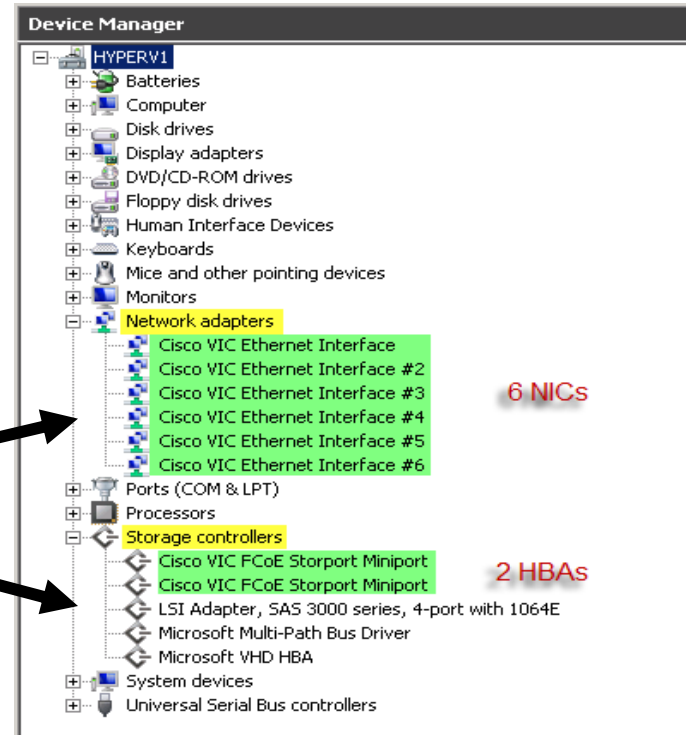
vNICs

Filter Export Print

Name	MAC Address	Fabric ID
vNIC eth0	00:25:B5:01:00:8F	A
vNIC eth1	00:25:B5:01:00:CF	B
vNIC eth2	00:25:B5:01:00:DD	A
vNIC eth3	00:25:B5:01:00:FD	B
vNIC eth4	00:25:B5:01:00:1E	A
vNIC eth5	00:25:B5:01:00:0E	B
vNIC eth6	00:25:B5:01:00:3E	A

Connectivity – Components and LAN Blade – Virtual Circuits – OS View

- Cisco VIC
- Standard drivers
- Same management
- Operating System sees:
 - N port or Dual port (depending on hardware) **10 Gigabit Ethernet adapter**
 - N port or Dual Port (depending on hardware) **Fibre Channel HBAs**



Connectivity – Components and LAN Blade – Virtual Circuits – Fabric Failover

Create vNIC

Name:

Use vNIC Template:

[+ Create vNIC Template](#)

MAC Address

MAC Address Assignment:

[+ Create MAC Pool](#)

The MAC address will be automatically assigned from the selected pool.

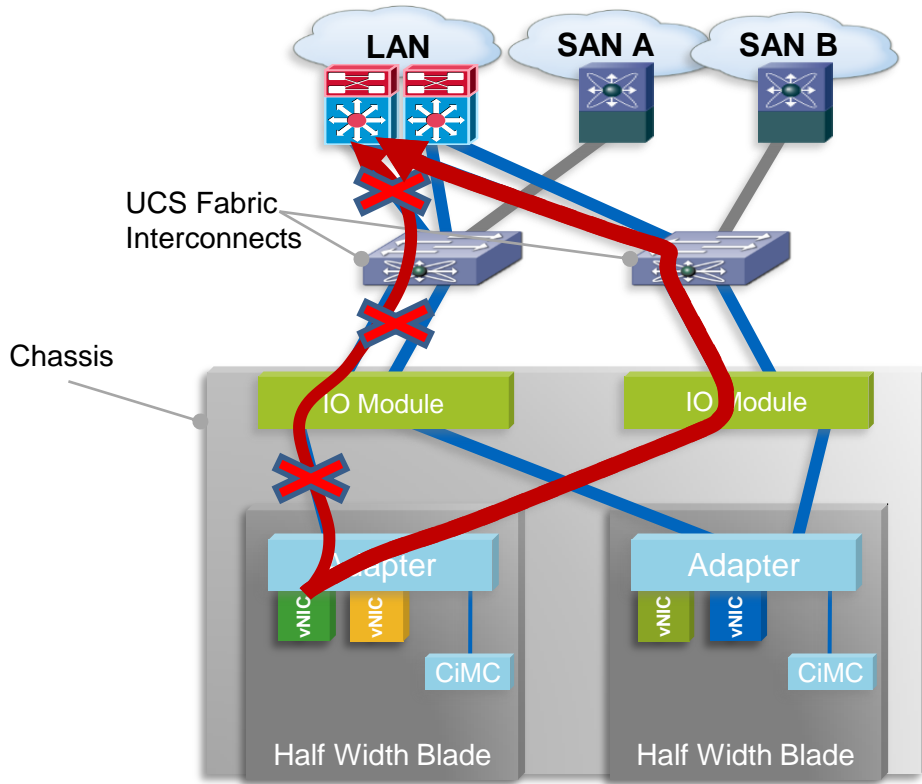
Fabric ID: Fabric A Fabric B Enable Failover

VLANs

Select	Name	Native VLAN
<input type="checkbox"/>	default	

Connectivity – Components and LAN

Blade – Virtual Circuits – Fabric Failover



Connectivity – Components and LAN Blade – Virtual Circuits – Fabric Failover

- Fabric Failover provides NIC failover capabilities
- Does not apply to HBAs

- Traditionally achieved using NIC bonding driver in the OS
- Provides failover for both unicast and multicast traffic

- Works for any OS on bare metal and hypervisors
 - Recommended when using bare metal
 - In virtualised environment it is recommended to use hypervisor teaming/failover

Connectivity – Components and LAN Blade – Virtual Circuits – Viewing Virtual Interfaces and Cables

The screenshot shows the Cisco UCS Manager interface for a service profile named 'Service Profile Lab9UCS_LOCAL_DISK1'. The 'Network' tab is selected, displaying a table of virtual circuits. Path A/1 has two virtual circuits: Virtual Circuit 1342 (vNIC eth0, FI Uplink A/1/17, Link State Up) and Virtual Circuit 1445 (vNIC eth1, FI Uplink B/1/17, Link State Up). Path B/1 also has two virtual circuits: Virtual Circuit 1342 (vNIC eth0, FI Uplink A/1/17, Link State Up) and Virtual Circuit 1445 (vNIC eth1, FI Uplink B/1/17, Link State Up).

Name	Adapter Port	FEX Host Port	FEX Network Port	FI Server Port	vNIC	FI Uplink	Link State	State Qual
Path A/1	2/1	1/1/5	2	A/1/3				
Virtual Circuit 1342					eth0	A/1/17	Up	
Path B/1	2/2	1/2/5	2	B/1/3				
Virtual Circuit 1445					eth1	B/1/17	Up	

```

Vethernet      VLAN    Type Mode    Status Reason              Speed
-----
Veth1342       1       eth trunk  up      none                  auto
Veth1446       1       eth trunk  up      none                  auto
Veth1512       1       eth trunk  down    nonParticipating     auto
Veth1514       1       eth trunk  down    nonParticipating     auto
    
```

```

Ethernet      VLAN    Type Mode    Status Reason              Speed    Port
Interface
-----
Eth1/1/1      1       eth vntag  up      none                  10G(D)  --
Eth1/1/2      1       eth access down    Administratively down 10G(D)  --
Eth1/1/3      1       eth access down    Administratively down 10G(D)  --
Eth1/1/4      1       eth access down    Administratively down 10G(D)  --
Eth1/1/5      1       eth vntag  up      none                  10G(D)  --
    
```

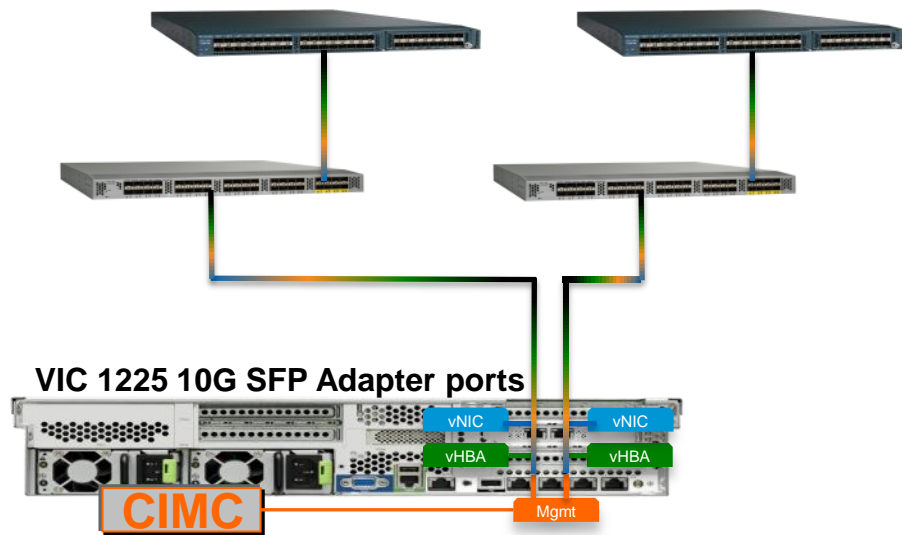
“Show interface brief”

Agenda

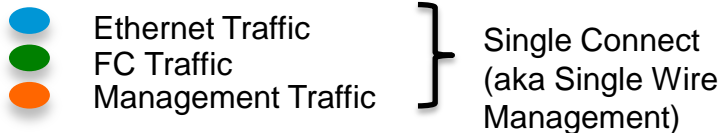
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Connectivity – Components and LAN

C-Series Rack Integration – Through FEX



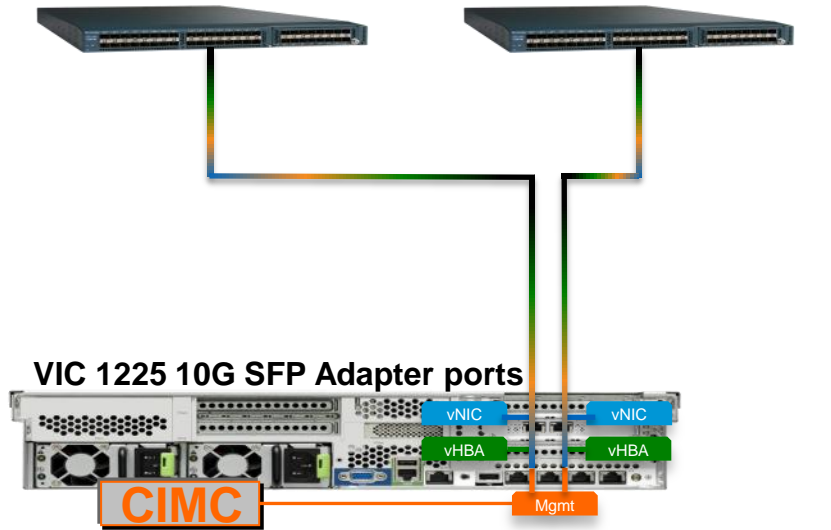
C-Series Rack Mount Server



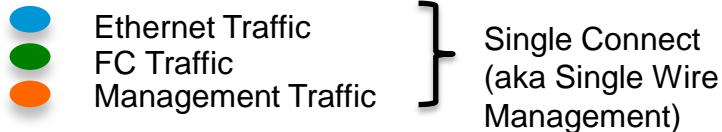
- Introduced in UCSM Version 2.1
- Reduces the need for additional cabling for management interface.
- Requires a VIC 1225 and Nexus 2232
- VIC must be installed in specific slot for standby power.
- Allows up to 32 Servers per FEX reducing infrastructure overhead.

Connectivity – Components and LAN

C-Series Rack Integration – Direct Connect



C-Series Rack Mount Server



- Introduced in UCSM Version 2.2
- Requires a VIC 1225 for Single Connect only.
 - C22 M3, C24 M3, C220 M3, C240, M3, C260 M2, C420 M3, C460 M2
- Reduces the need for additional HW component, but requires a server port license for each server.
- 120 VIFs per VIC installed in the server
- Up to 96 Servers supported with a 6296.

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Connectivity – SAN

UCS Storage Timeline and Feature Snapshot

1.4

- Appliance port (iSCSI)
- FC Port Channeling and VSAN Trunking
 - More flexibility in engineering FC traffic vs. 1 VSAN per uplink
 - Aggregate Uplinks transparent to host Multi-path drivers
 - Requires MDS or N5K to Work (both features)

2.0

- iSCSI Boot Support
 - Integrated boot policies, stateless support
 - iSCSI HBA modeling (identifiers, equipment view, etc)
 - M81KR (Palo) and Broadcom 57711 Support
- Hard Disk Drive (HDD) Monitoring without an OS agent
 - Use of LSI interfaces and exposed metrics

2.1

- Direct connect FC/FcoE
- Multi-hop FCoE
- FC Zoning
- Unified appliance port
- PCIe Flash Storage
- EMC VFCache
- Unified Appliance Port

BRKCOM 2002 – UCS Supported Storage Architectures and Best Practices

Connectivity – SAN

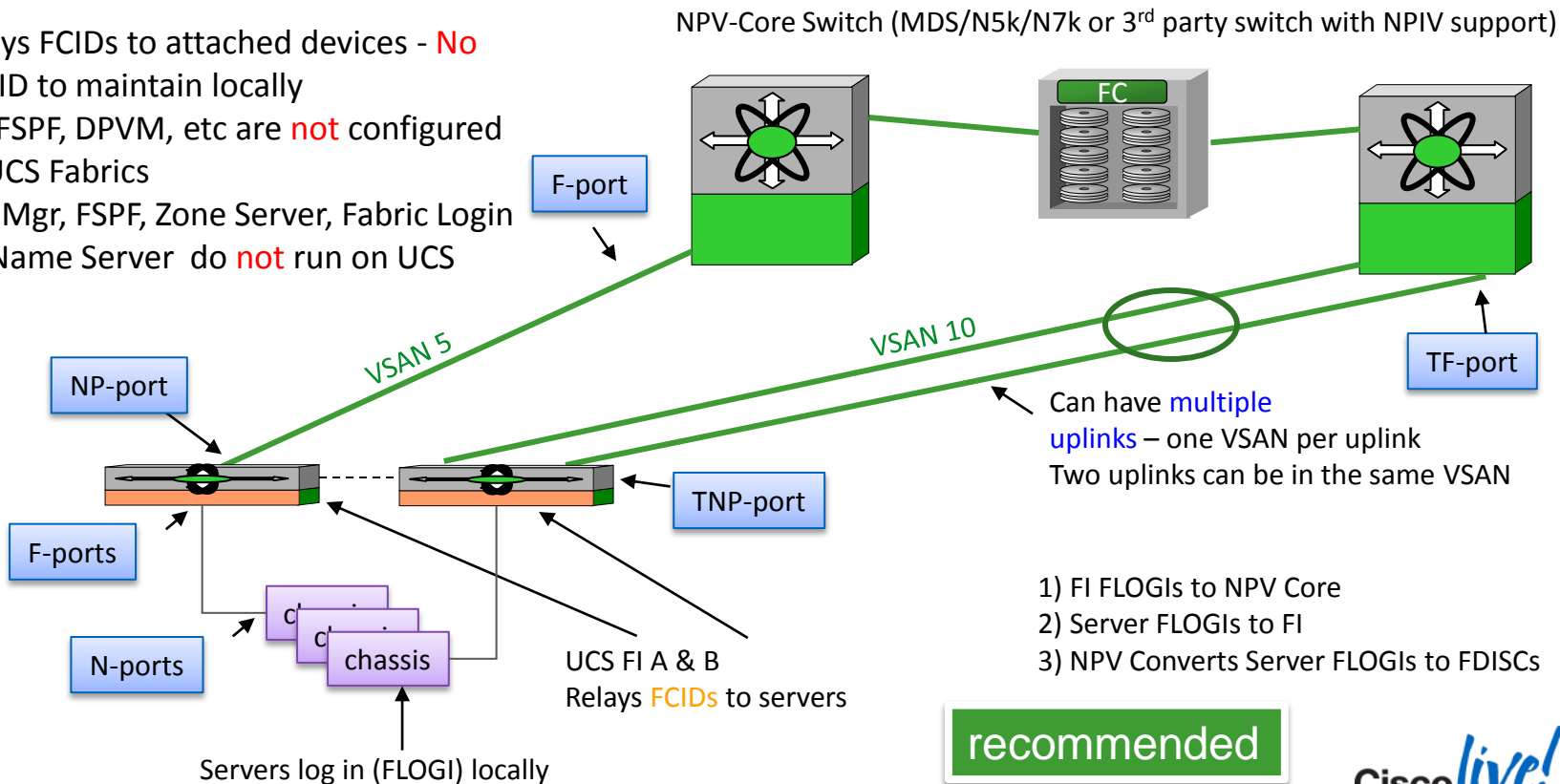
FI Modes of Operation - SAN

- N_Port Virtualisation (NPV) Mode : **Default, recommended mode**
- FC Switch mode

Connectivity – SAN

Fabric Interconnect FC/FCoE Mode of Operation – NPV (End Host Mode)

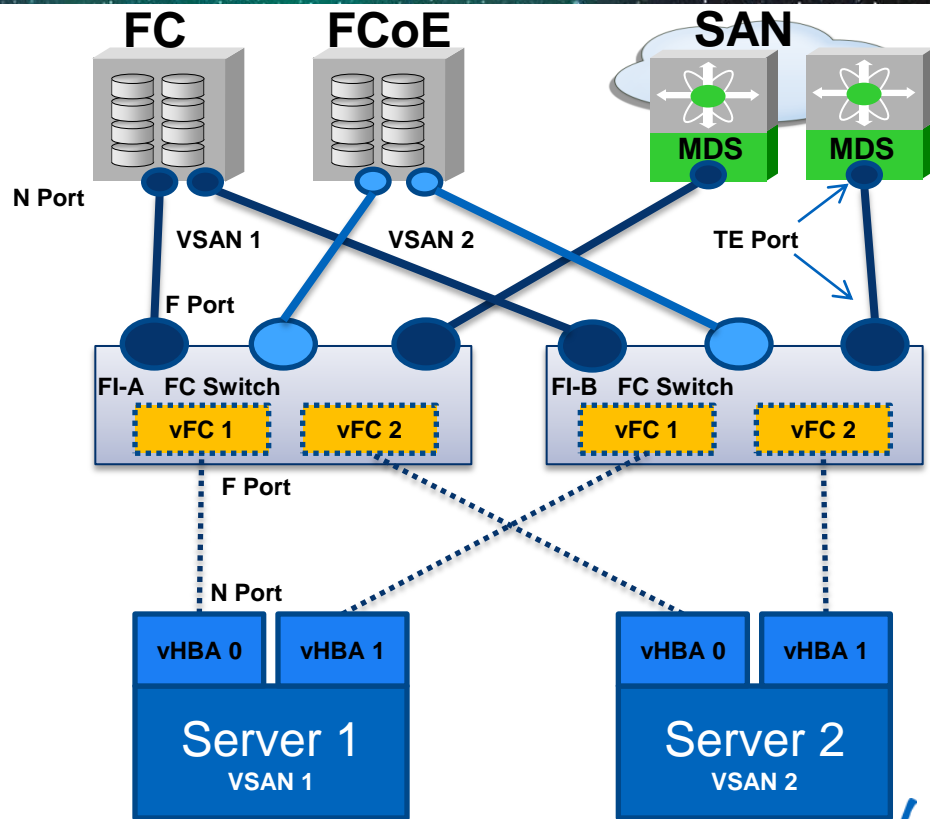
- UCS relays FCIDs to attached devices - **No** domain ID to maintain locally
- Zoning, FSPF, DPVM, etc are **not** configured on the UCS Fabrics
- Domain Mgr, FSPF, Zone Server, Fabric Login Server, Name Server do **not** run on UCS Fabrics



Connectivity – SAN

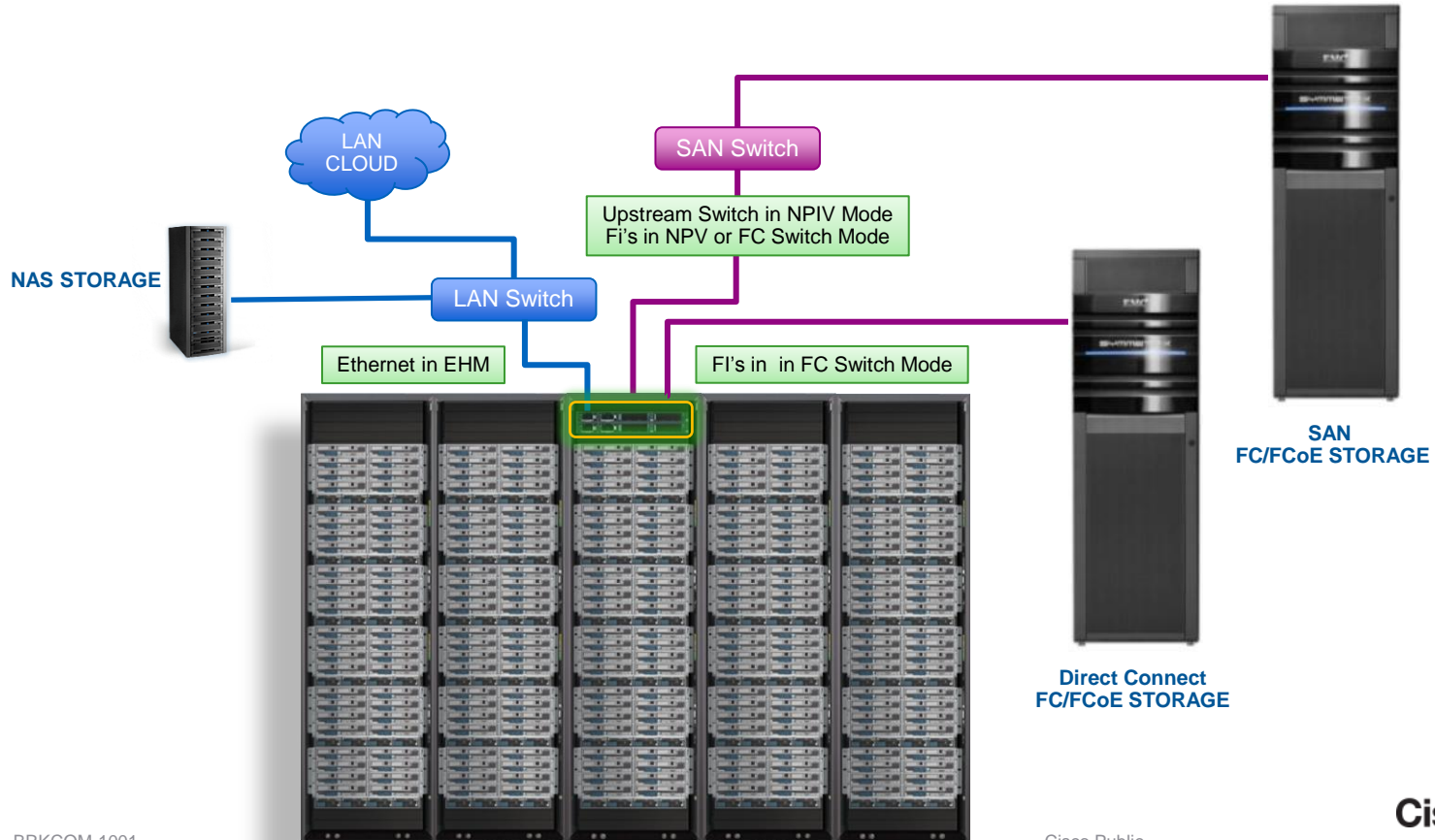
Fabric Interconnect FC/FCoE Mode of Operation – Switch Mode

- UCS Fabric Interconnect behaves like an FC fabric switch
- Storage ports can be FC or FCoE
- Local Zoning OR Upstream Zoning
 - Parallel Local and Upstream Zoning Currently NOT Supported
 - Upstream Zoning Provided by MDS/N5k
 - Fabric Interconnect uses a FC Domain ID
- Supported FC/FCoE Direct Connect Arrays
 - Check Note 5 on HCL for Updated List
- Lower cost point for small deployments (no access layer FC/FCoE switches required)



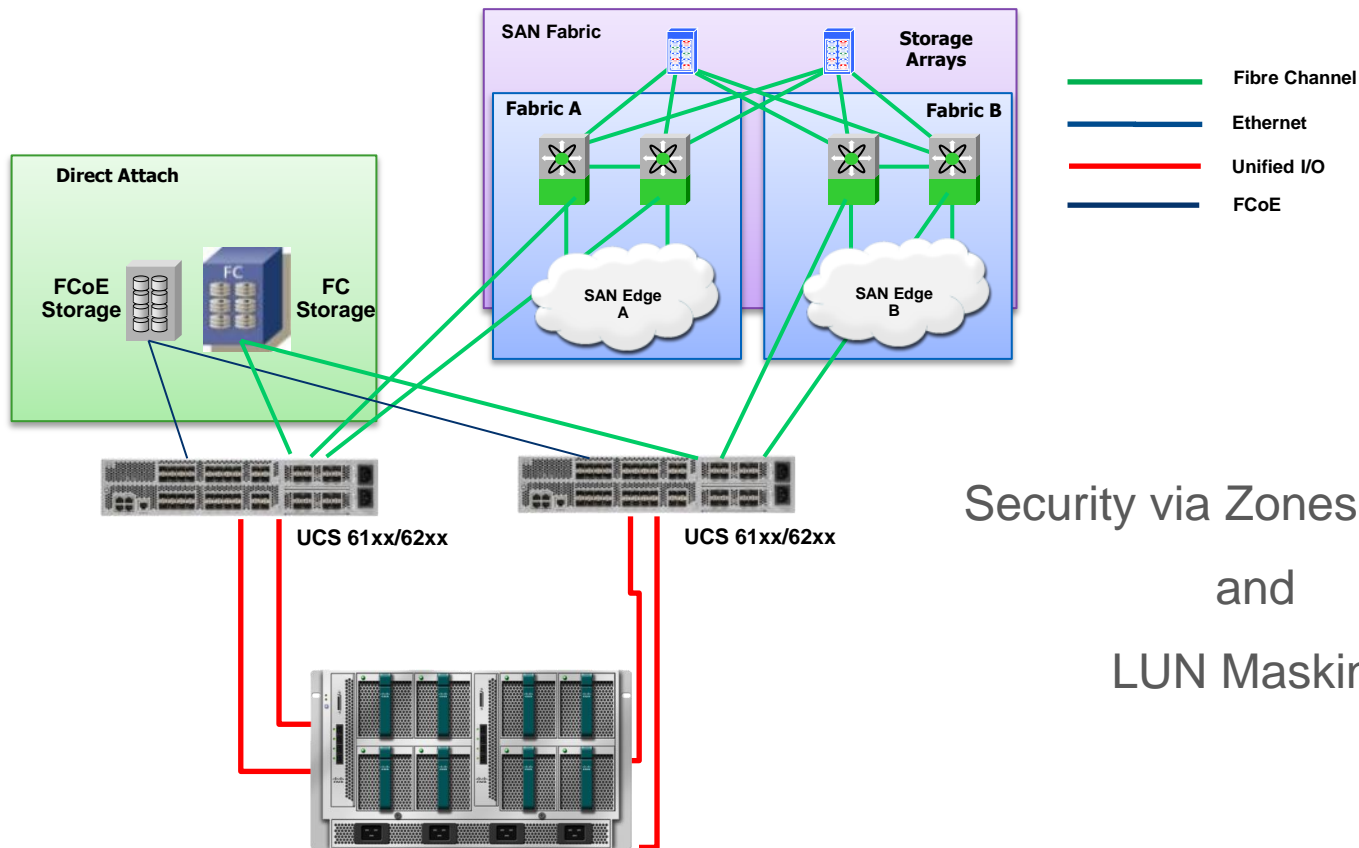
Connectivity – SAN

UCS Storage Connectivity Summary



Connectivity – SAN

Hybrid Topology with Direct-Attach and SAN

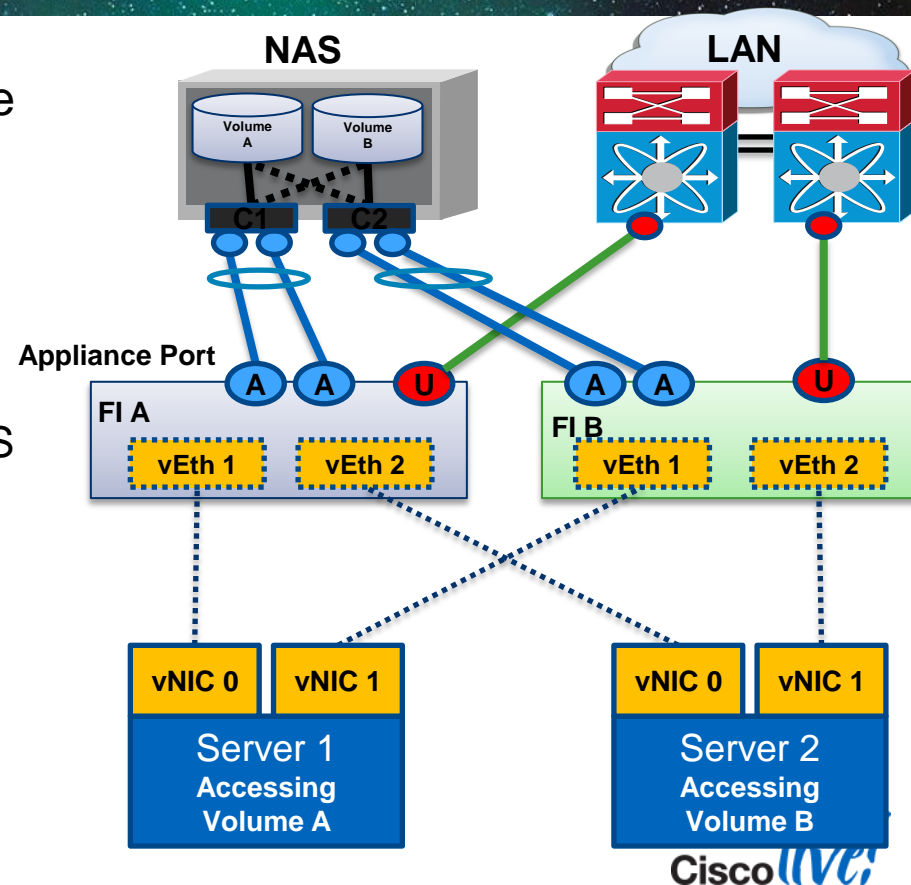


Security via Zoneset Merge
and
LUN Masking

Connectivity – SAN

NAS Direct Attached Storage

- Default (recommended) - End Host Mode
 - Superior traffic engineering
 - Easier integration into network
 - 1.4 Introduced Appliance Ports which allow direct connect NAS filers
- Options - Ethernet Switching Mode
 - As of 1.4, no need to use this mode for NAS direct connect
 - Previous releases required switching mode for direct connect NAS



Connectivity – SAN

Troubleshooting iSCSI Connectivity

If your SP and iSCSI config is correct, you will see this during POST

```
Cisco VIC iSCSI, Boot Driver Version 2.0(0.239)
(C) 2010 Cisco Systems, Inc.
0025b530300e iSCSI NETAPP :000
Option ROM installed successfully
```

If the Option ROM installation failed, connect to the iSCSI adapter to find the reason

```
cae-sj-ca1-A# conn adapter 1/8/1
adapter 1/8/1 # connect
adapter 1/8/1 (top):1# attach-mcp
adapter 1/8/1 (mcp):1# iscsi_get_config
vnic iSCSI Configuration:
```

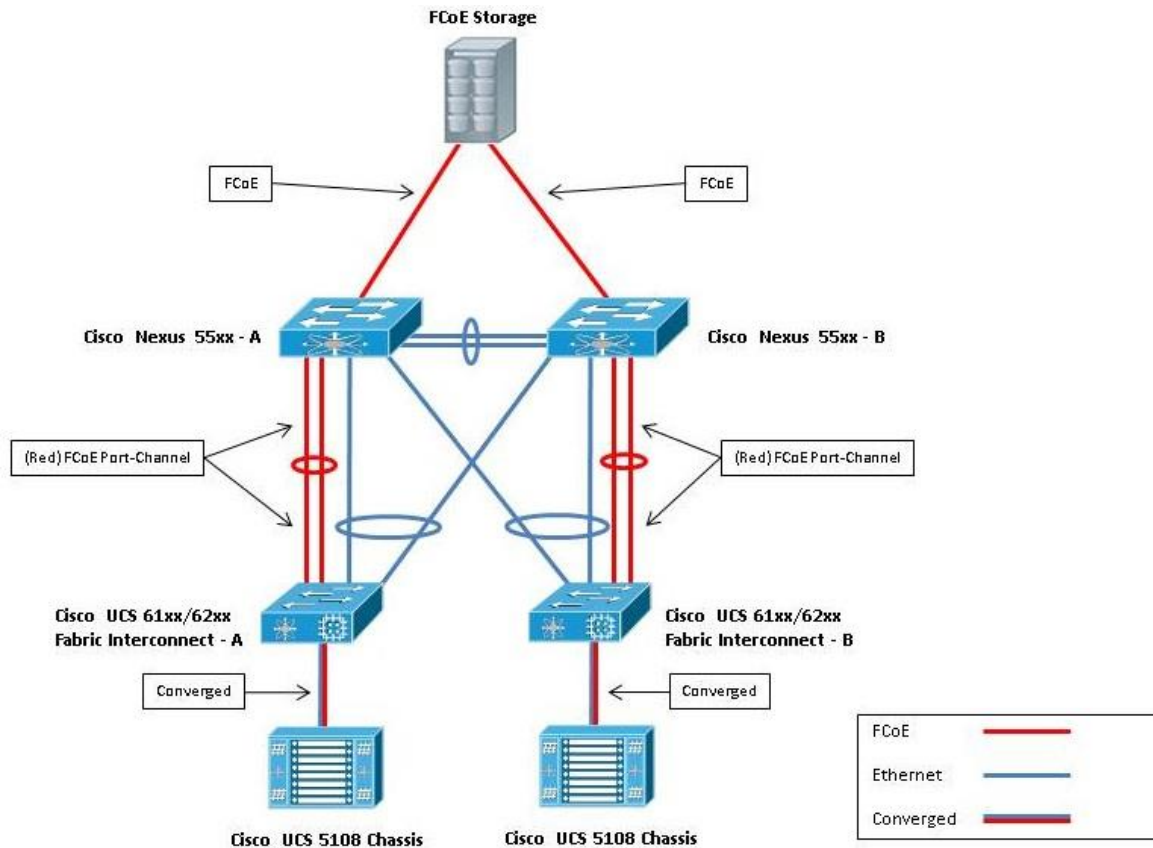
```
-----
vnic_id: 5
link_state: Up
Initiator Cfg:
initiator_state: ISCSI_INITIATOR_READY
initiator_error_code: ISCSI_BOOT_NIC_NO_ERROR
vlan: 0
dhcp status: false
IQN: eui.87654321abcdabcd
IP Addr: 172.25.183.142
Subnet Mask: 255.255.255.0
Gateway: 172.25.183.1
Target Cfg:
Target Idx: 0
State: ISCSI_TARGET_READY
Prev State: ISCSI_TARGET_DISABLED
Target Error: ISCSI_TARGET_NO_ERROR
IQN:iqn.199208.com.netapp:sn.101202278
IP Addr: 172.25.183.49
Port: 3260
Boot Lun: 0
Ping Stats: Success (9.698ms)
Session Info:
session_id: 0
host_number: 0
bus_number: 0
target_id: 0
```


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Connectivity – SAN

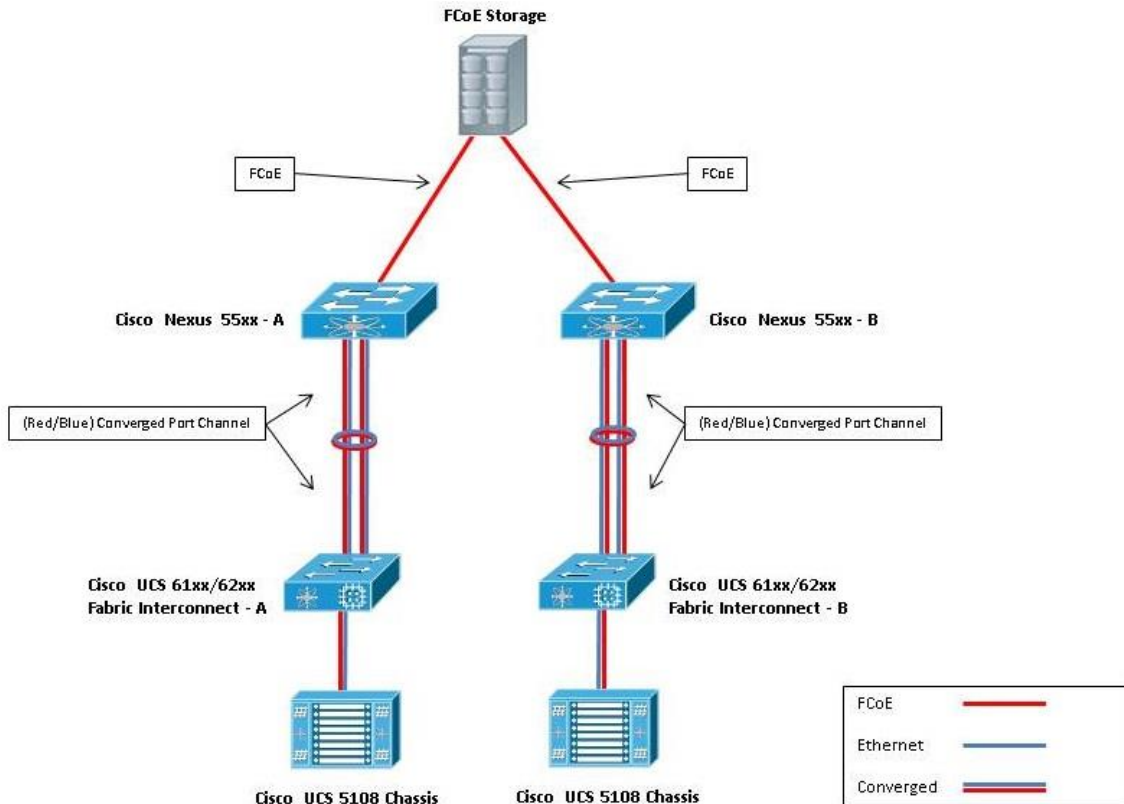
Multi-hop FCoE – UCS to 5K – FCoE Uplinks



New In 2.1

Connectivity – SAN

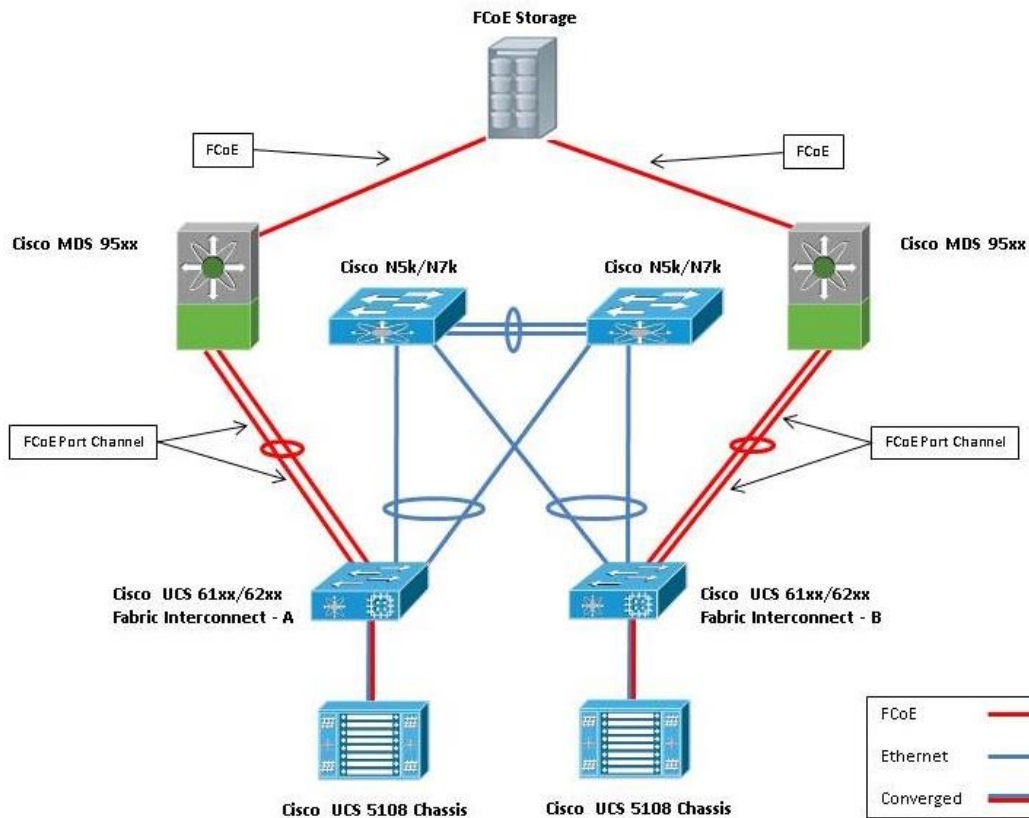
Multi-hop FCoE – UCS to 5K - Converged Uplinks



New In 2.1

Connectivity – SAN

Multi-Hop FCoE – UCS to MDS – FCoE Uplinks



New In 2.1

Connectivity – SAN

Interoperability

- Storage Best Practices

http://www.cisco.com/en/US/prod/collateral/ps10265/ps10276/whitepaper_c11-702584.html

- Storage Interoperability Matrix

<http://www.cisco.com/en/US/docs/switches/datacenter/mds9000/interoperability/matrix/Matrix8.html>

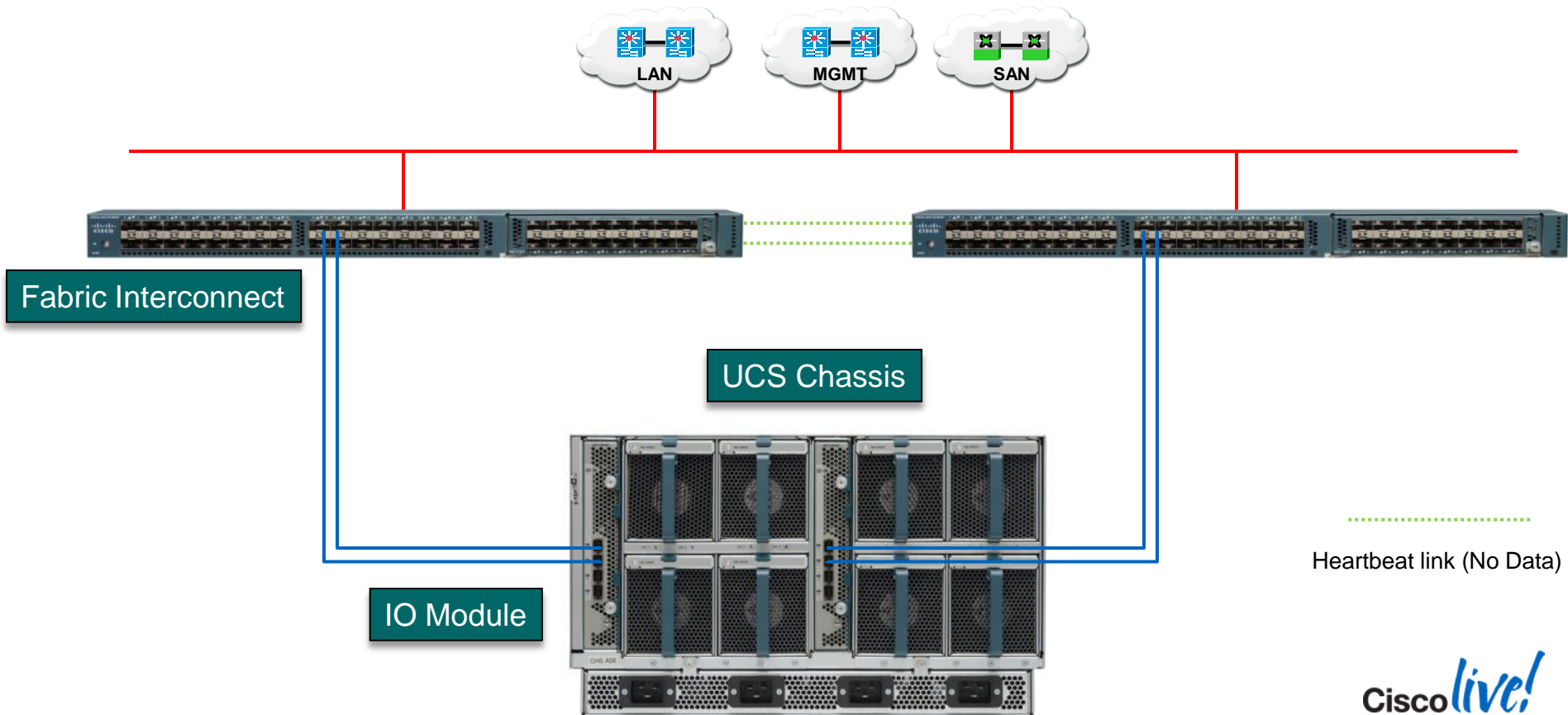
- Storage Interoperability

<http://www.cisco.com/en/US/prod/ps10265/interoperability.html#~storage>

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UCS Components - Recap



Resources – UCS 2.2 (EI Cap) Release

- Fabric scaling – VLANs, VIFs, Adapters, IGMP Groups
- IPv6 Management Support
- Uni-Directional Link Detection (UDLD) Support
- User Space NIC (usNIC) for Low Latency
- Support for Virtual Machine Queue (VMQ)
- Direct Connect C-Series to FI without FEX
- Two-factor Authentication for UCS Manager Logins
- VM-FEX for Hyper-V Management with Microsoft SCVMM
- CIMC In-band Management
- Direct KVM Access
- Server Firmware Auto Sync

- Plus many more...

UCS Manager 2.2 and its subsequent Maintenance Releases will be the last to support the Gen1 hardware, including 6100 series Fabric Interconnects, 2100 IO Modules, M1 series Servers, and M1-only adapters

- https://communities.cisco.com/community/technology/datacenter/ucs_management/blog

Resources

- UCS Platform Emulator
<http://developer.cisco.com/web/unifiedcomputing/ucsemulatoredownload>
- UCS Quick Start Guide
http://www.cisco.com/en/US/prod/collateral/ps10265/ps10281/whitepaper_c11-697337.html
- C-Series Rack Server Adapter Comparison
http://www.cisco.com/en/US/prod/ps10265/ps10493/c_series_net_adapter.html
- Cisco UCS 6100 and 6200 Series Configuration Limits for Cisco UCS Manager, Release 2.2
http://www.cisco.com/en/US/docs/unified_computing/ucs/sw/configuration_limits/2.2/b_UCS_Configuration_Limits_2_2.html
- Storage Best Practices
http://www.cisco.com/en/US/prod/collateral/ps10265/ps10276/whitepaper_c11-702584.html
- Storage Interoperability Matrix
<http://www.cisco.com/en/US/docs/switches/datacenter/mds9000/interoperability/matrix/Matrix8.html>
- Storage Interoperability
<http://www.cisco.com/en/US/prod/ps10265/interoperability.html#~storage>



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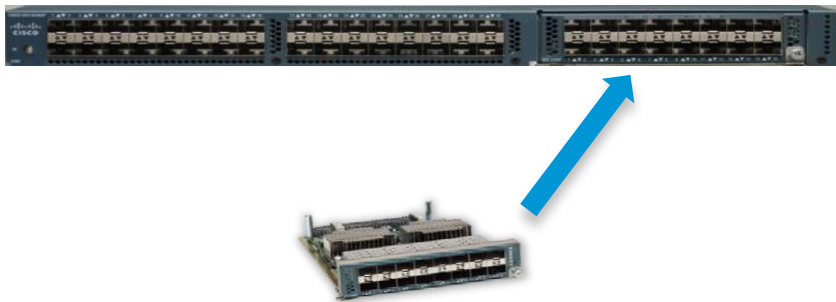
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Reference Slides

Connectivity – Components and LAN

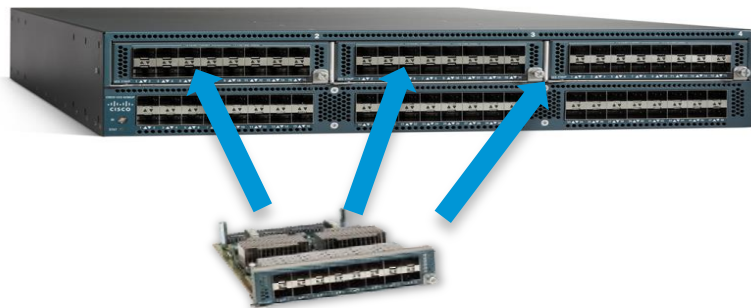
Northbound of the Fabric Interconnect – FI 6248UP



- Doubles the port density in 1RU from previous UCS Fabric Interconnect
- UCS 6248UP chassis comes with 32 fixed Unified Ports
- Chassis includes one 6200 series expansion module slot
- Dual power supplies standard for both AC and DC -48V
- Redundant front to back airflow (power = front, ports = back)
- Ethernet operations at 1/10 Gigabit Ethernet
- Fibre Channel operations at 1/2/4/8G
- Latency Lowered to 2us within Switch

Connectivity – Components and LAN

Northbound of the Fabric Interconnect – FI 6296UP



- High Density 96 Ports in 2RU
- Increased 2Tbps Switching Performance
- Flexibility to defer port usage type and number at design time rather than purchase time
- Flexibility to configure any port at Ethernet (1/10 Gigabit with SFP+) or FCoE or Native FC Ports (8/4/2/1G with FC Optics)
- All Ports usable as uplinks/ downlinks
- Latency Lowered to 2us within Switch

Connectivity – Components and LAN

Northbound of the Fabric Interconnect – FI 6248UP

- Ports on the base card or the Unified Port GEM Module can either be Ethernet or FC
- Only a continuous set of ports can be configured as Ethernet or FC
- Ethernet Ports have to be the 1st set of ports
- Port type changes take effect after next reboot of switch for Base board ports or power-off/on of the GEM for GEM unified ports.



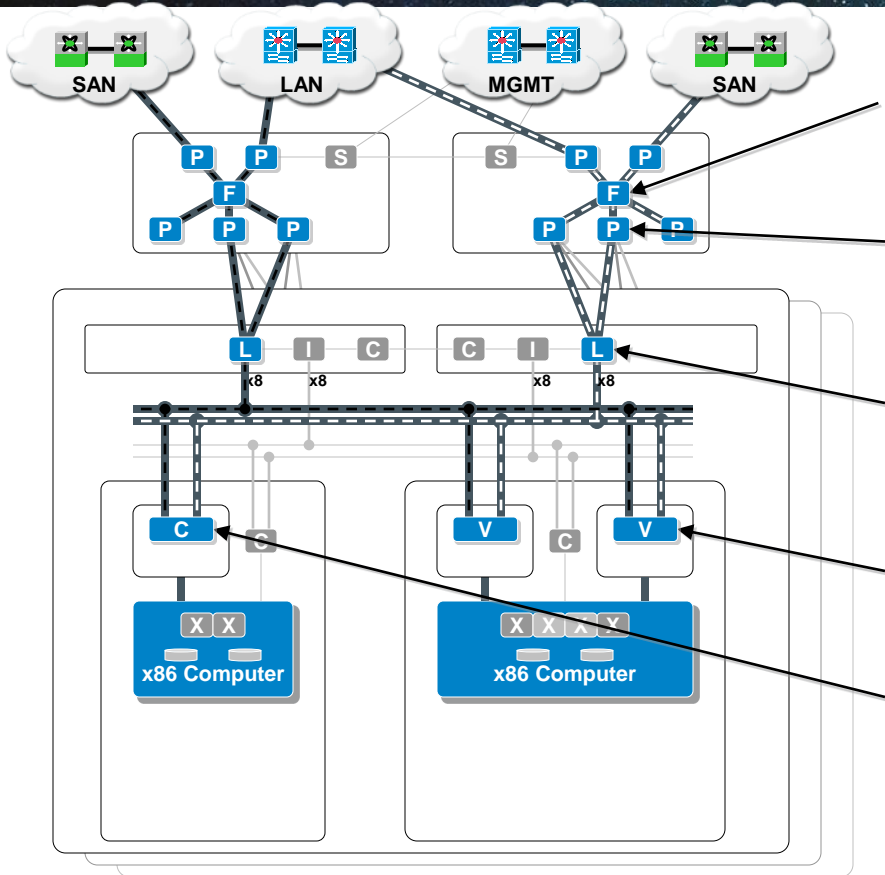
Connectivity – Components and LAN

Northbound of the Fabric Interconnect – Ethernet EHM - Unicast Forwarding

- Deja-vu Check
 - Packet with source MAC belonging to a server received on an uplink port is dropped
- RPF Check
 - Network to server unicast traffic is forwarded to the server only if it arrives on a pinned uplink port

Connectivity – Components and LAN

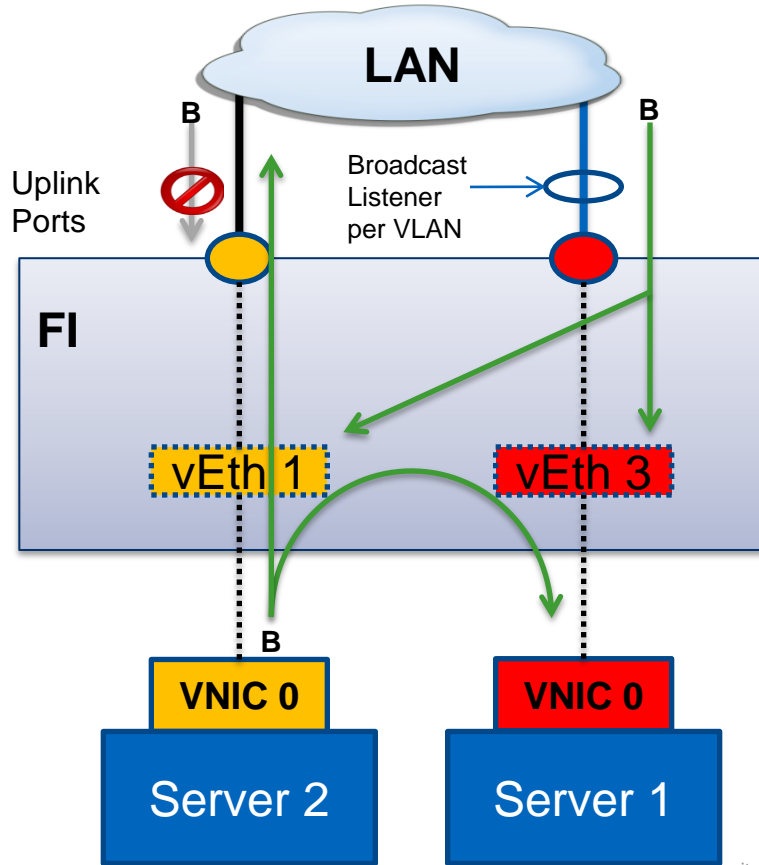
UCS Ports Defined



- Fabric ASIC : Altos/Sunnyvale
- Port ASIC : Gatos/Carmel
- FEX ASIC : Redwood/Woodside
- VIC ASIC : Palo/Sereno
- Gen-1 CNA ASIC : Menlo

Connectivity – Components and LAN

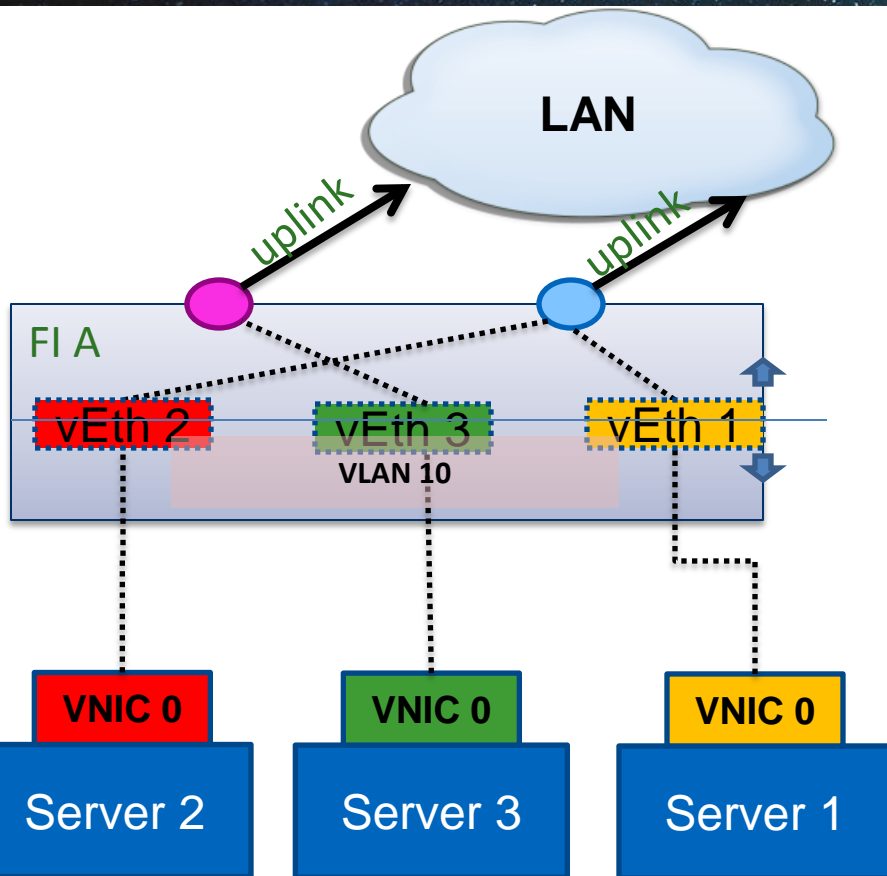
Northbound of the Fabric Interconnect – Ethernet EHM – Multicast Forwarding



- 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

Connectivity – Components and LAN

Northbound of the Fabric Interconnect – Ethernet EHM – Static Pinning



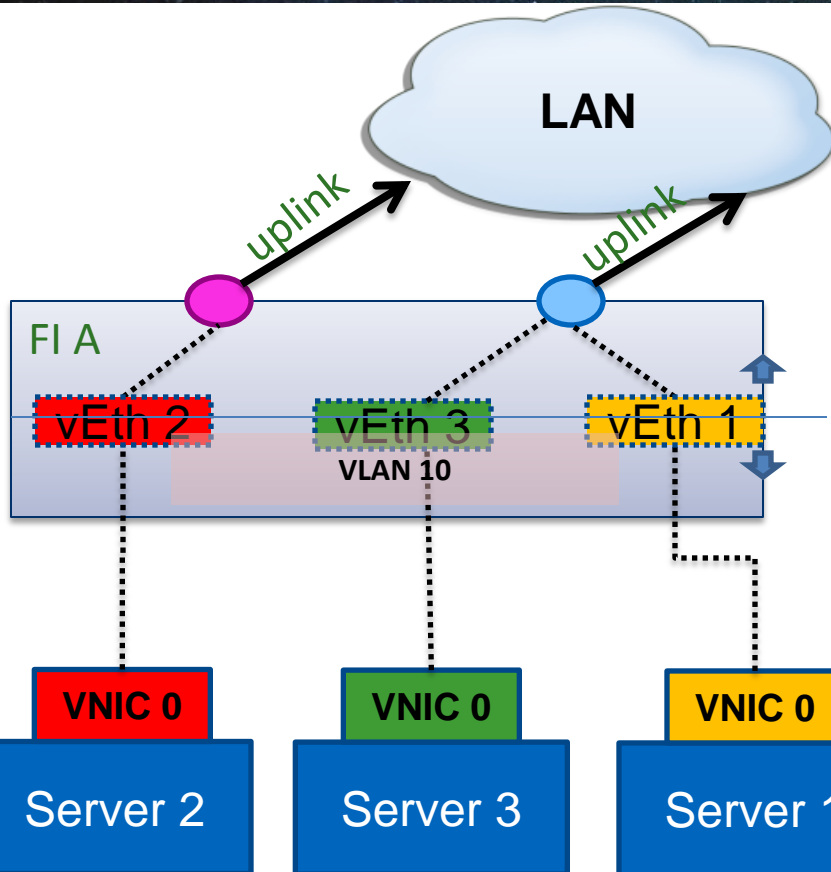
Administrator Pinning Definition

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 with in the same FI
- Static and dynamic pinning can co-exist

Connectivity – Components and LAN

Northbound of the Fabric Interconnect – Ethernet EHM – Dynamic Pinning

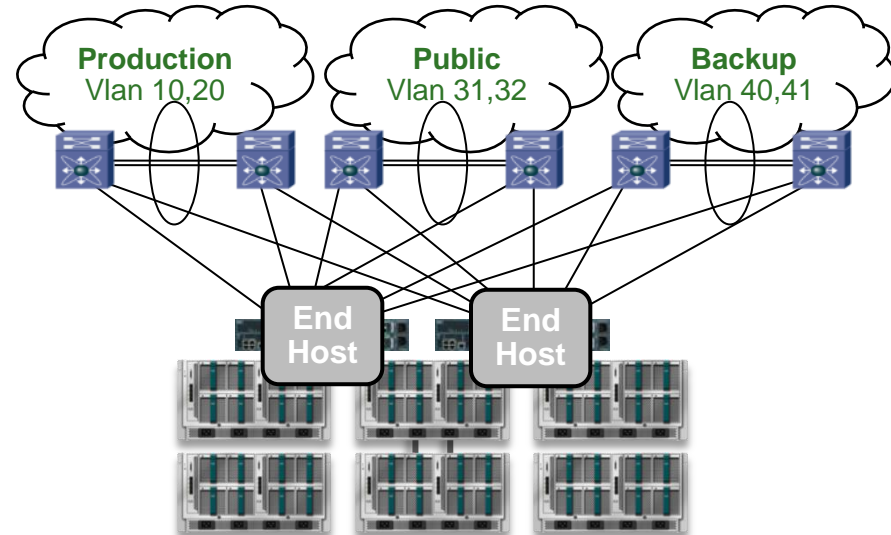


- UCSM manages the vEth pinning to the uplink
- UCSM will periodically vEth distribution and redistribute the vEths across the uplinks

Connectivity – Components and LAN

Northbound of the Fabric Interconnect – Ethernet EHM – Disjoint L2

- Ability to support multiple layer 2 disjoint networks upstream to UCS in End Host Mode
- Static or dynamic vNIC pinning based on VLAN membership of the uplink
- A VLAN can exist only in one L2 disjoint network, i.e. no overlap
- A vNIC is mutually exclusive to a L2 network upstream, i.e. a L2 network per vNIC
- More than two L2 disjoint networks supported per host with virtual interface card



Connectivity – Components and LAN

Northbound of the Fabric Interconnect – FI Configuration

Status

Overall Status: ↑ **Operable**
Thermal: ↑ **Ok**
Ethernet Mode: **End Host**
FC Mode: **End Host**

Actions

- Configure Unified Ports
- Internal Fabric Manager
- LAN Uplinks Manager
- NAS Appliance Manager
- SAN Uplinks Manager
- SAN Storage Manager
- Enable Ports
- Disable Ports
- Set Ethernet End-Host Mode
- Set Ethernet Switching Mode
- Set FC End-Host Mode
- Set FC Switching Mode

Properties

Name: **A**
Product Name: **Cisco UCS 6248UP**
Vendor: **Cisco Systems, Inc.**
Revision: **0**
Available Memory: **14.090 (GB)**

Part Details

Name: **Cisco UCS 6248UP**
Description: **Cisco UCS 6248UP 48**
Interconnect
PID: **UCS-FI-6248UP**
VID: **V01**
Part Number: **UCS-FI-6248UP**
SKU: **UCS-FI-6248UP**

LAN Uplinks Manager

- Show Navigator
- Enable
- Disable
- Configure as Server Port
- Configure as Uplink Port
- Configure as FCoE Uplink Port
- Configure as FCoE Storage Port
- Configure as Appliance Port
- Unconfigure
- Unconfigure FCoE Uplink Port
- Unconfigure Uplink Port
- Unconfigure FCoE Storage Port
- Unconfigure Appliance Port
- Unconfigure both

Local Storage Information

Access

High Availability Details

VLAN Port Count

Connectivity – Components and LAN

IOM To Blade – Adapter Comparison



Models	VIC 1280	VIC 1240	M81KR	M72KR-E CNA	M72KR-Q CNA
Vendor	Cisco	Cisco	Cisco	Emulex	QLogic
Maximum Interfaces (vNIC or vHBA)	256	256	128	4	4
Interface Type	Dynamic	Dynamic	Dynamic	Fixed	Fixed
VM-FEX	Hardware	Hardware	Hardware	Software	Software
Failover Handling	Hardware, no driver needed	Hardware, no driver needed	Hardware	Software via bonding driver	Software via bonding driver
Network Throughput	80 GB	40-80 GB	20GB	20GB	20GB
Form Factor	Mezzanine	Modular LOM	Mezzanine	Mezzanine	Mezzanine
Blade/Rack	Blade	Blade	Blade	Blade	Blade
UCS Server Compatibility	M2 (B200, B230, B440) and M3	M3	M1/M1(B200, B250, B440)	M1 and M2(B200, B250, B230, B440)	M1 and M2(B200, B250, B230, B440)

Connectivity – Components and LAN

IOM To Blade – Adapter Comparison



Models	M71KR-E CNA	M71KR-Q CNA	82598KR CI 10-GE	M61KR-I Intel CNA	M51KR-B NIC
Vendor	Emulex	QLogic	Intel	Intel	Broadcom
Maximum Interfaces (vNIC or vHBA)	4	4	2	2	2
Interface Type	Fixed	Fixed	Fixed	Fixed	Fixed
VM-FEX	Software	Software	Software	Software	Software
Failover Handling	Software via bonding driver	Software via bonding driver	Hardware, no driver needed	Hardware, no driver needed	Software via bonding driver
Network Throughput	20GB	20GB	20GB	20GB	20GB
Form Factor	Mezzanine	Mezzanine	Mezzanine	Mezzanine	Mezzanine
Blade/Rack	Blade	Blade	Blade	Blade	Blade
UCS Server Compatibility	M1 and M2(B200, B250, B440)	M1 and M2(B200, B250, B440)	M1 and M2(B200, B250)	M1 and M2(B200, B250, B440)	M1 and M2(B200, B250, B440)

Connectivity – Components and LAN

Fabric Interconnect to IO Module – IOM Failover – 4 Link Example

- What happens in a 4-link topology when you lose 1 link?
 - Servers' vNIC on that link will lose a data path.
 - The remaining 3 links will still pass traffic for the other blade servers
 - To recover the failed servers' vNIC, re-acknowledged of the chassis is required
 - Since we only support 1, 2, 4, 8 link topologies the UCS will fall back to 2 links with regards to blade to fabric port mapping.

Connectivity – Components and LAN

Fabric Interconnect to IO Module – Chassis Discovery Policy

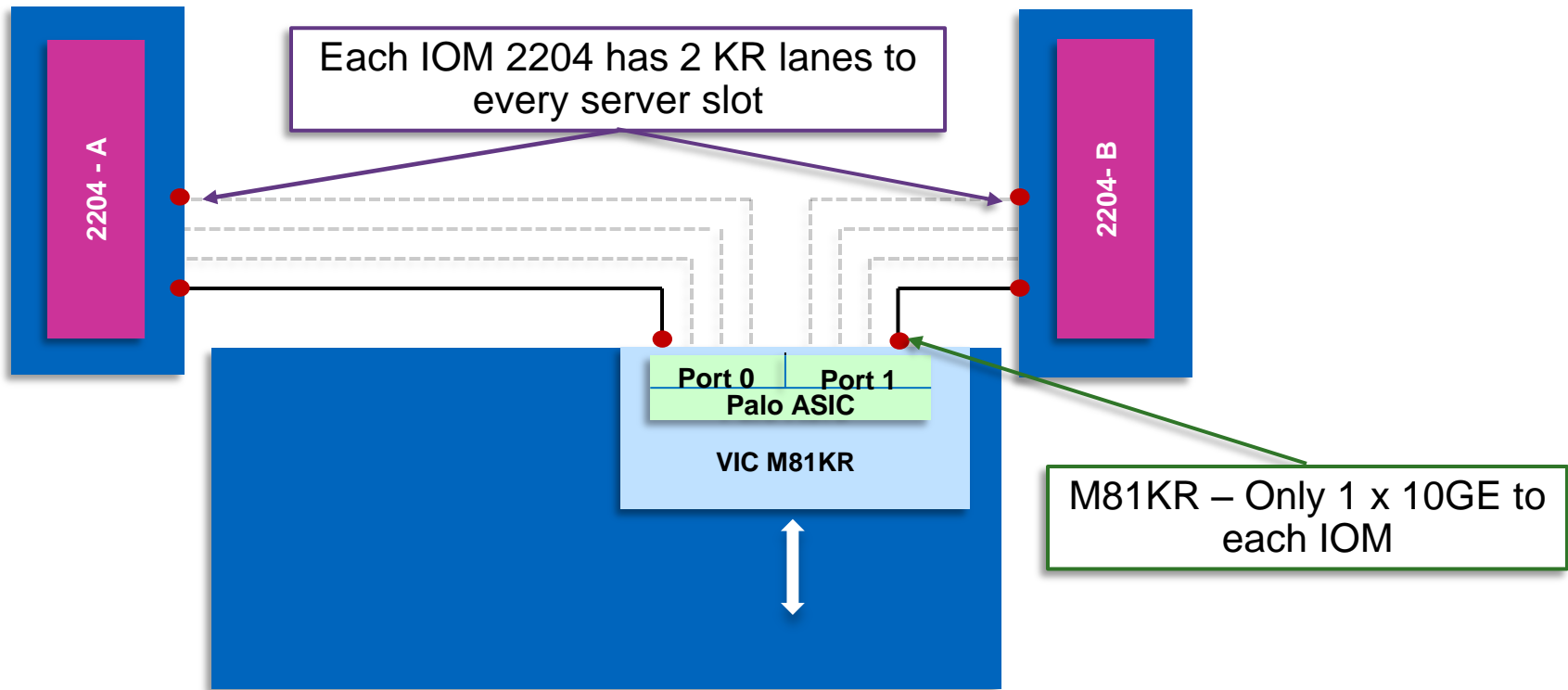
- Best practice
 - “Port Channel” – no re-acknowledge required as long as the VIFs do not decrease
 - Action 1 Link – will discover chassis’ with at least one link – additional links can also be utilised
- Policy available globally or per chassis
- In mixed IOM environments follow recommendations above

The screenshot displays the Cisco UCS Manager interface. The top navigation bar includes tabs for Equipment, Servers, LAN, SAN, VM, and Admin. Below this, a filter dropdown is set to 'All'. The left sidebar shows a tree view of the equipment hierarchy: Equipment, Chassis, Rack-Mounts, FEX, Servers, and Fabric Interconnects. The main content area is divided into several policy configuration sections:

- Global Policies:** Includes tabs for Autoconfig Policies, Server Inheritance Policies, Blade Server Discovery Policies, SEL Policy, and Power Groups.
- Chassis/FEX Discovery Policy:**
 - Action: 1 Link
 - Link Grouping Preference: None, Port Channel
- Rack Server Discovery Policy:**
 - Action: Immediate, User Acknowledged
 - Scrub Policy: <not set>

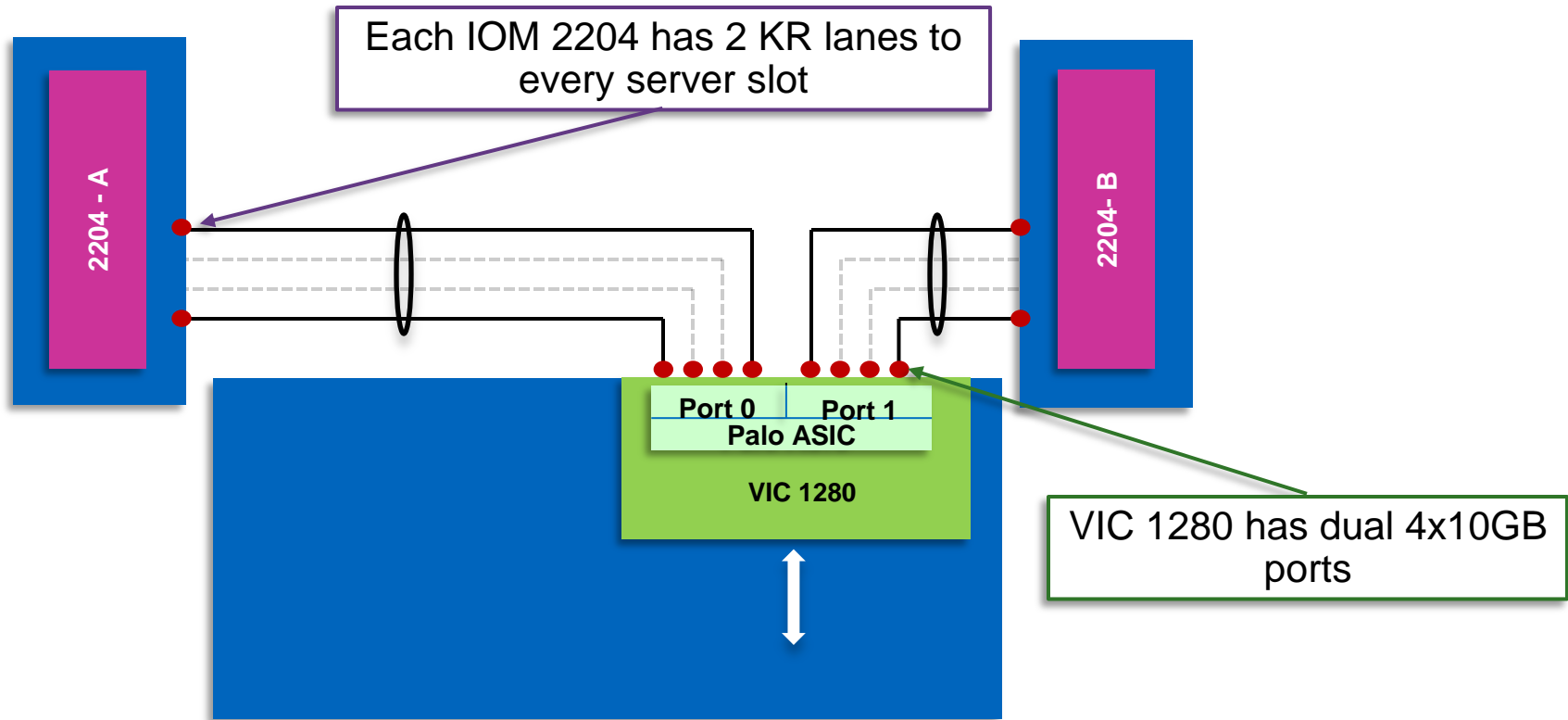
Connectivity – Components and LAN

IOM to Blade – IOM 2204 with M81KR in M1/M2 Blades



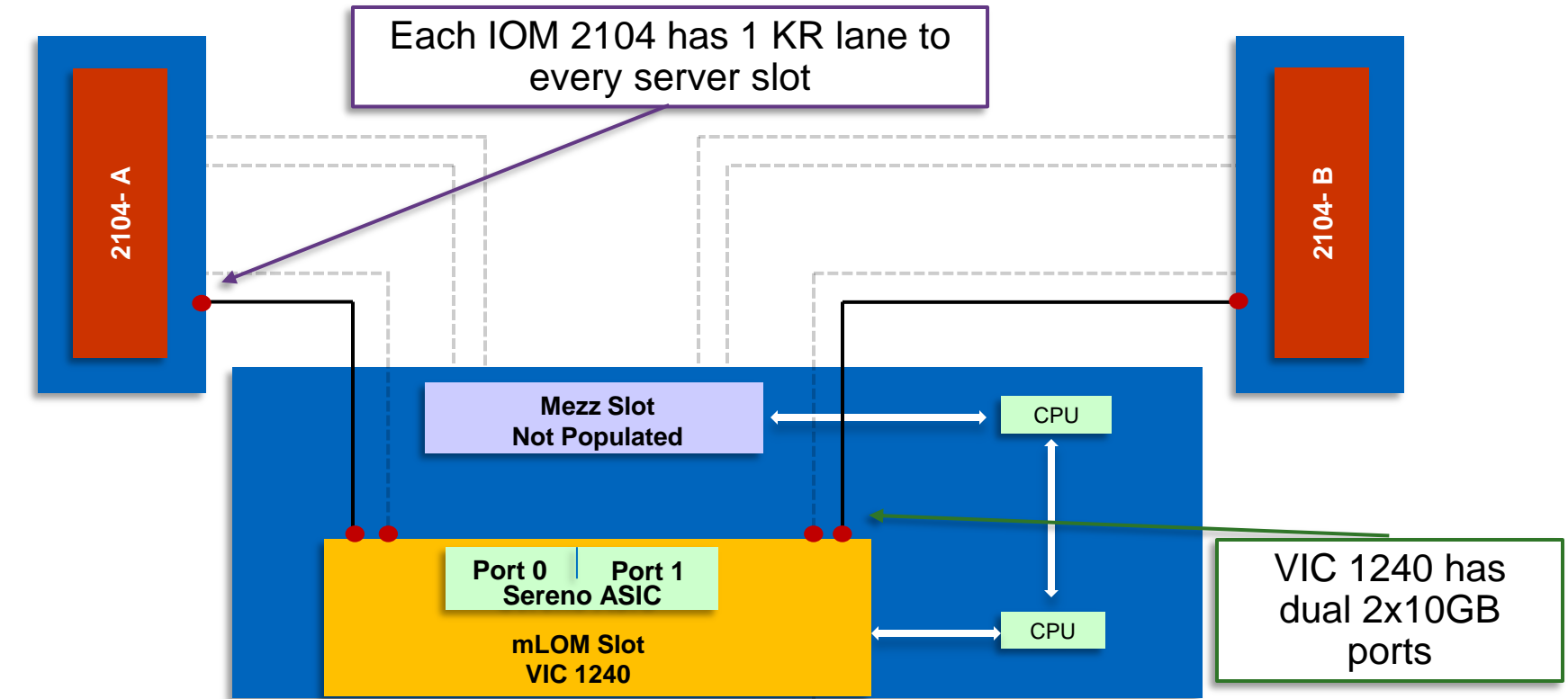
Connectivity – Components and LAN

IOM to Blade – IOM 2204 with VIC 1280 in M1/M2 Blades



Connectivity – Components and LAN

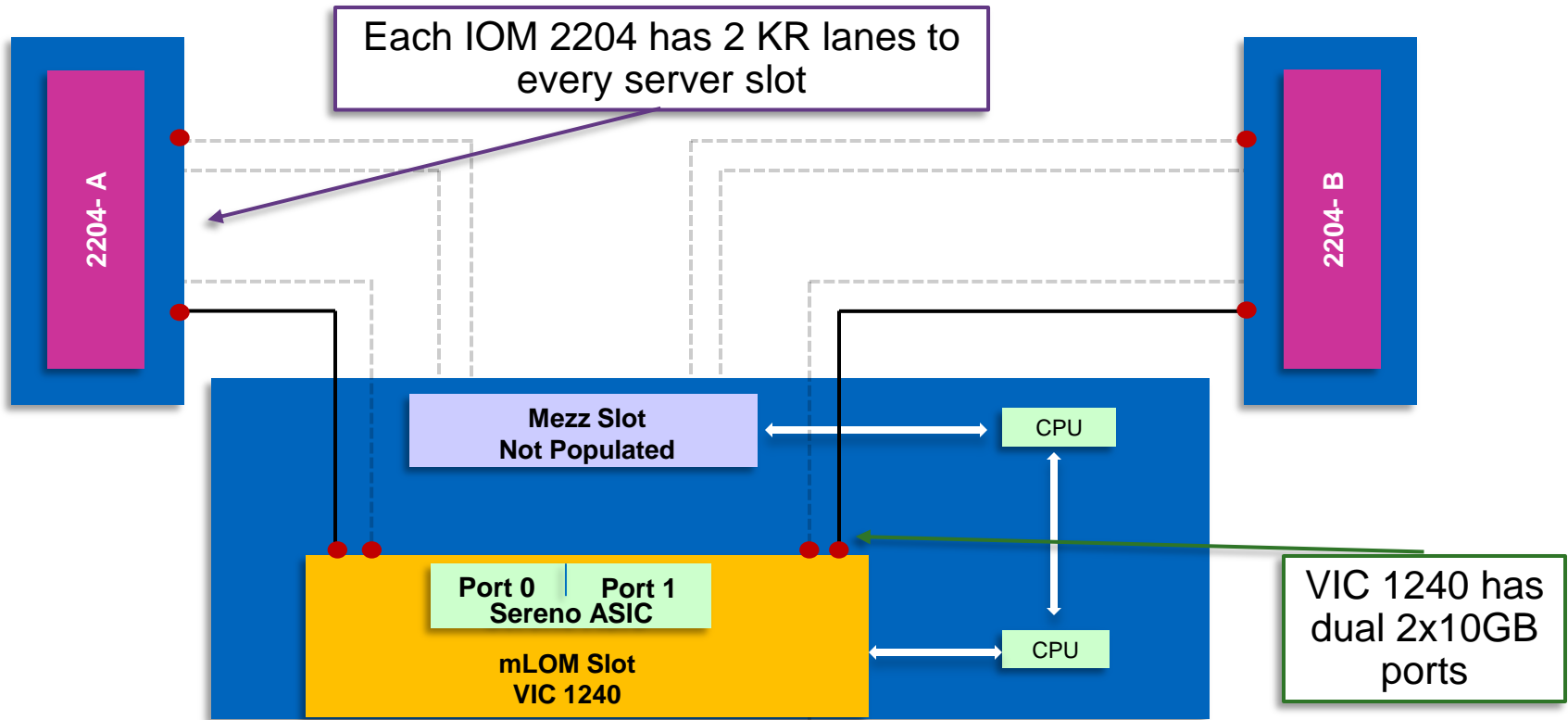
IOM to Blade – IOM 2104 with VIC1240 in B200M3



Only *valid* adapter option with IOM 2104

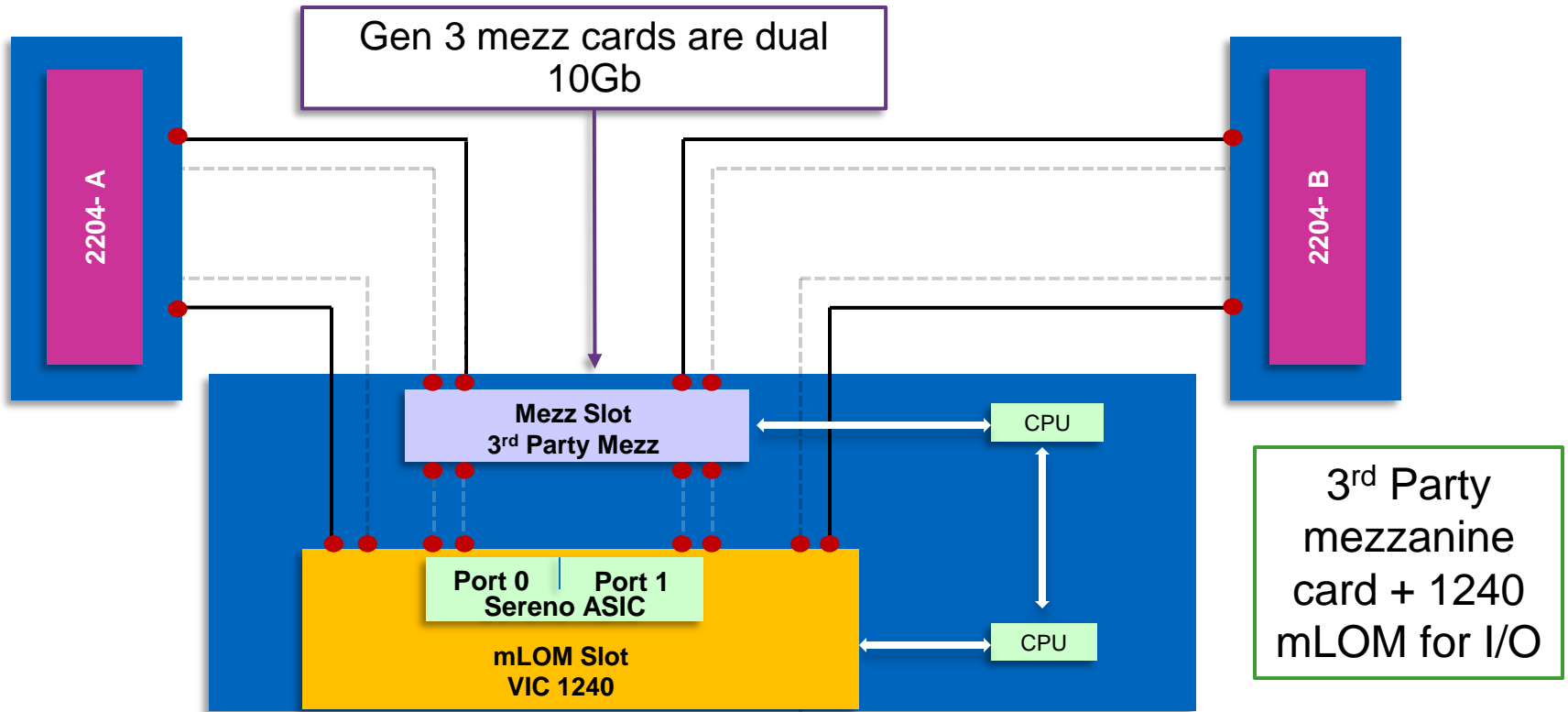
Connectivity – Components and LAN

IOM to Blade – IOM 2204 with VIC1240 in B200M3



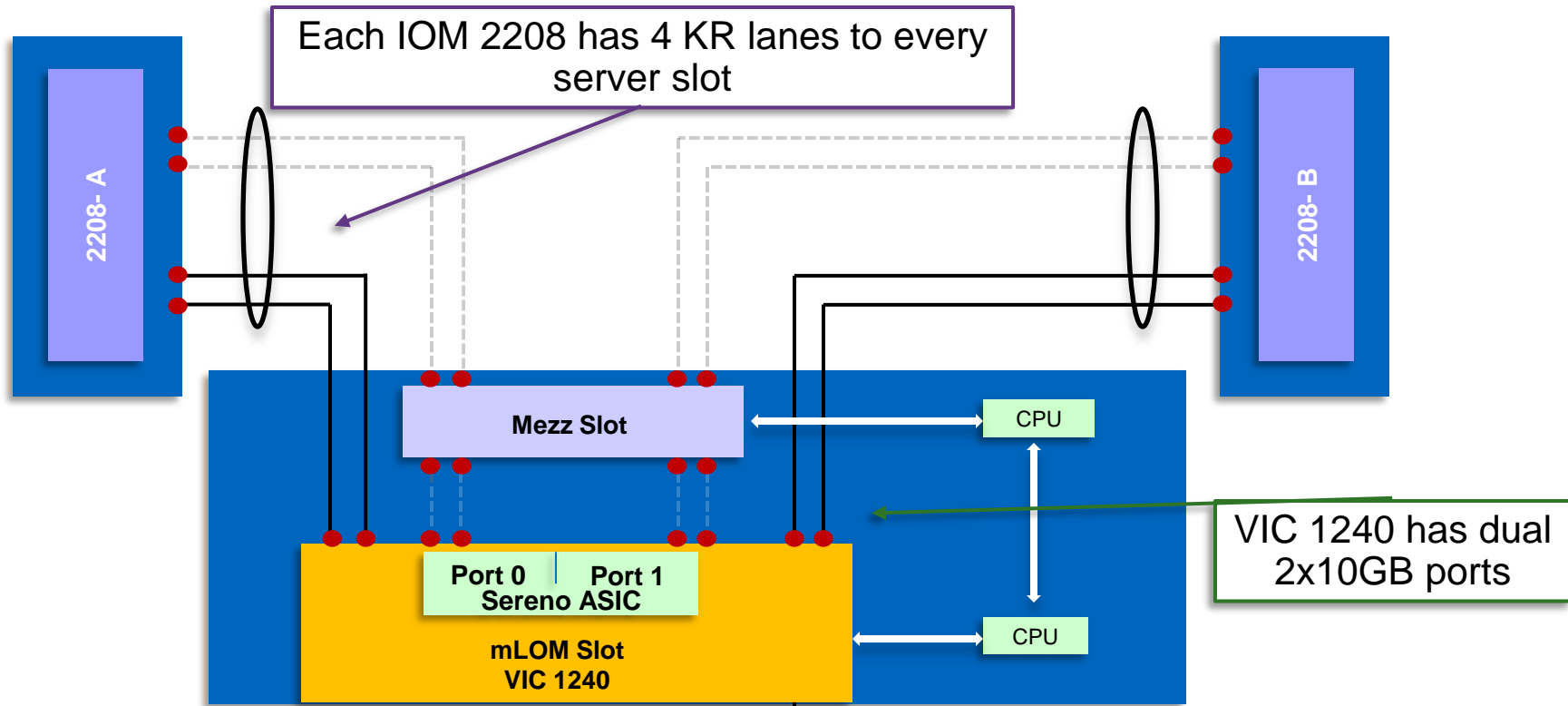
Connectivity – Components and LAN

IOM to Blade – IOM 2204 with VIC1240 and 3rd Party Mezz



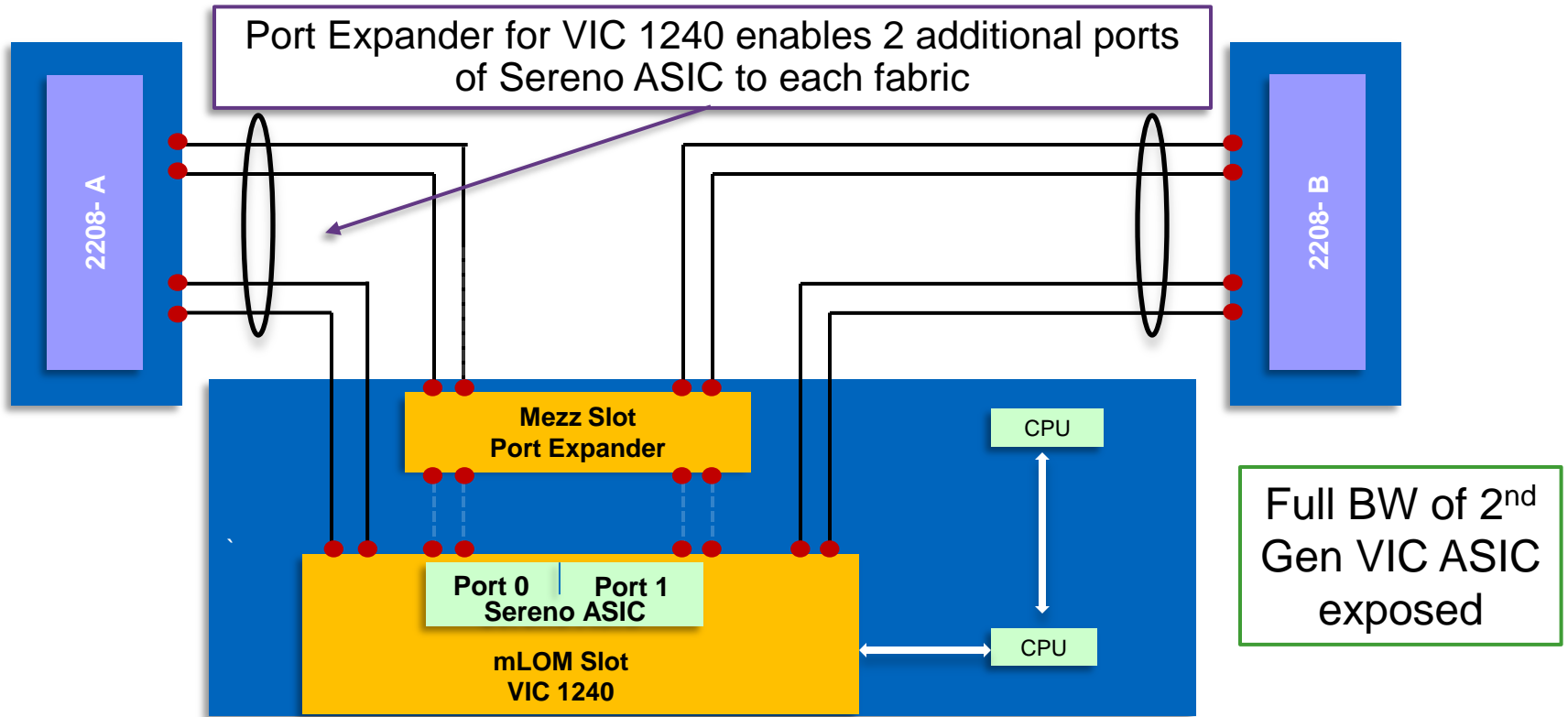
Connectivity – Components and LAN

IOM to Blade – IOM 2208 with VIC1240 in B200M3



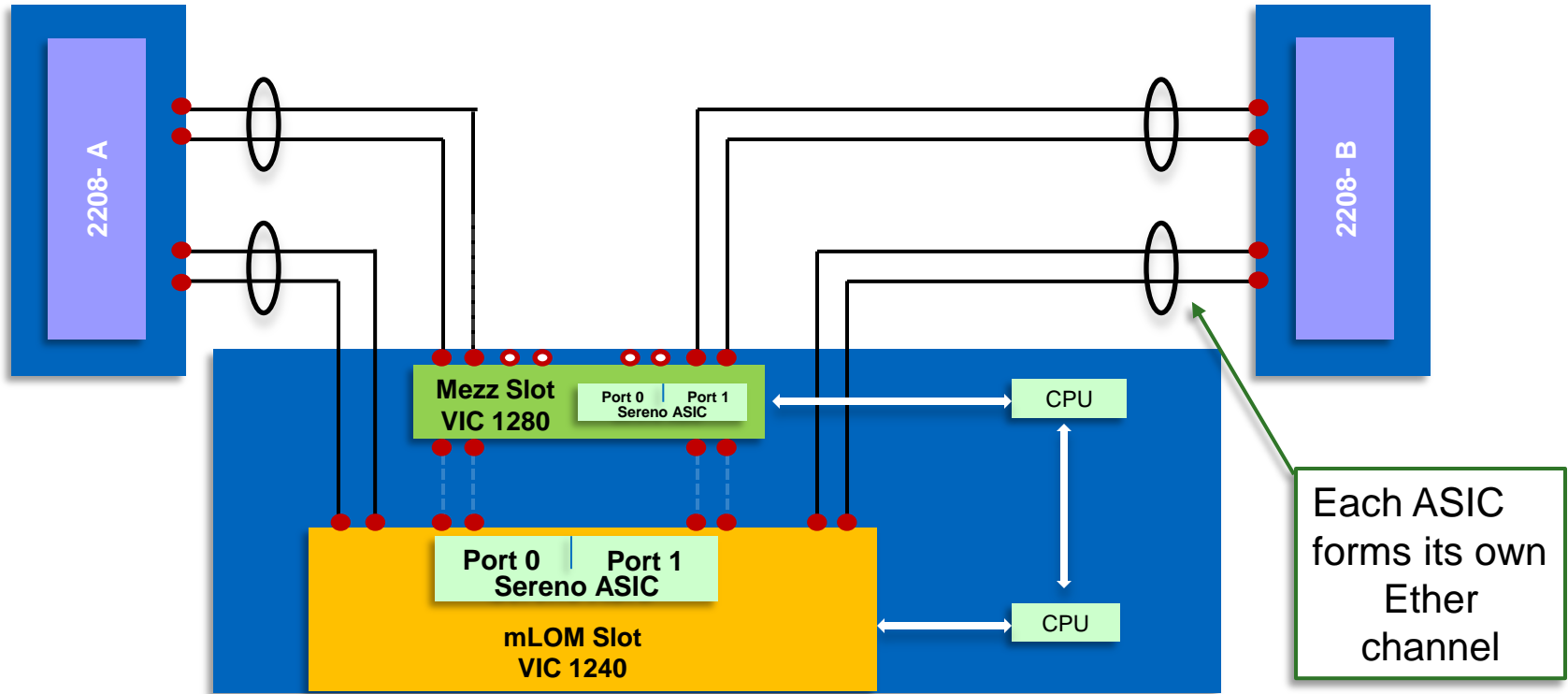
Connectivity – Components and LAN

IOM to Blade – IOM 2208 with VIC1240 and Port Exp Card in B200M3



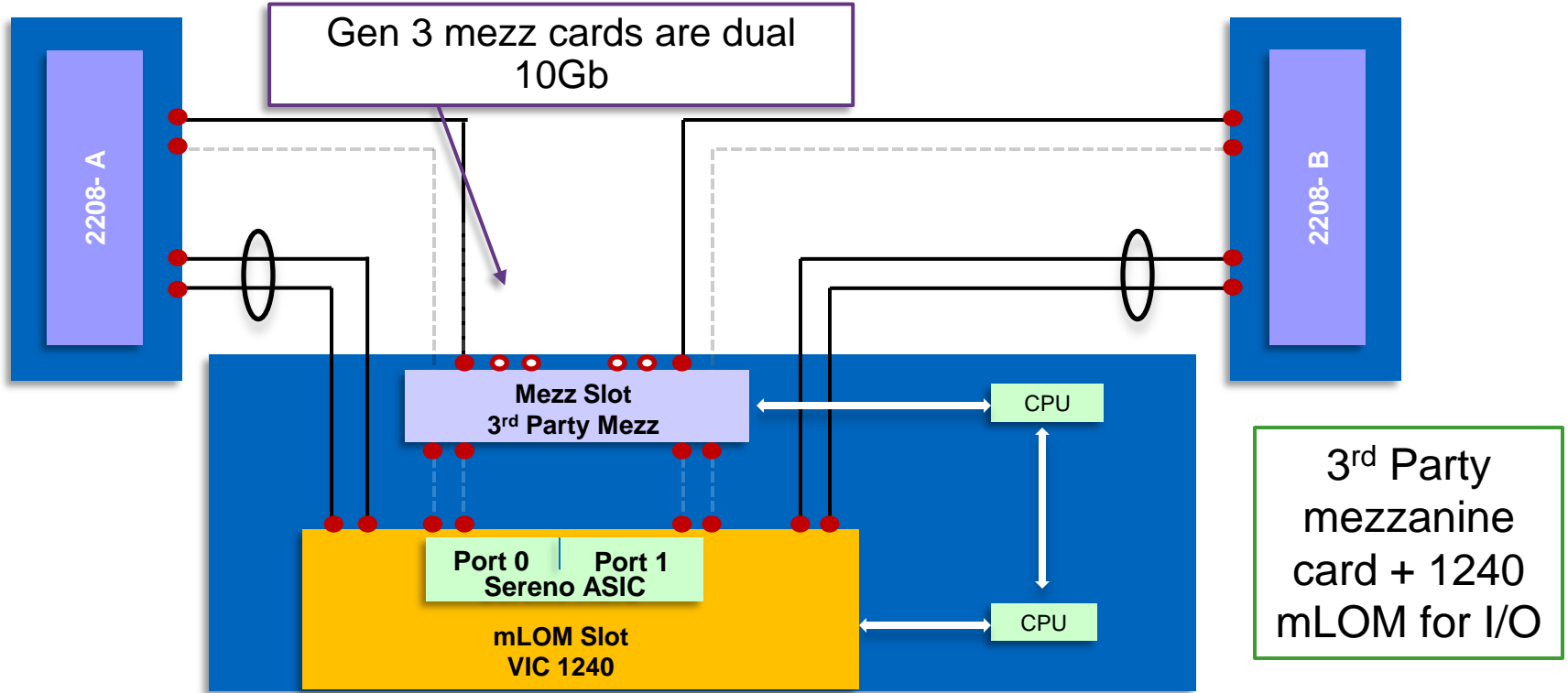
Connectivity – Components and LAN

IOM to Blade – IOM 2208 with VIC1240 and VIC 1280 in B200M3



Connectivity – Components and LAN

IOM to Blade – IOM 2208 with VIC1240 and 3rd Party Mezz in B200M3



Connectivity – Components and LAN

IOM to Blade – CPU Consideration

- In a B200 M3 configured with 1 CPU, the mezzanine card slot is not under the control of a CPU (in a B200 M3 configured with 2 CPUs, CPU 2 controls the slot).
- Therefore, the only adapter that can be placed in the mezzanine slot in a B200 M3 configured with 1 CPU is the Cisco UCS Port Expander Card for VIC 1240, and the VIC 1240 is always required to be installed in the VIC 1240 slot.

Connectivity – Components and LAN

IOM To Blade – Interop



- Mixed hardware generation between Fabric A and B is only supported during hardware upgrade.
- Mixed hardware is not production supported.

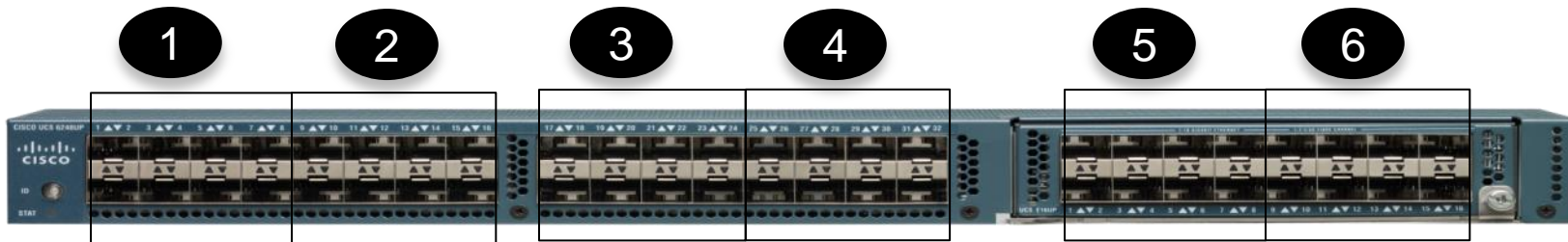
Hardware	Fabric A	Fabric B	Support
FI	6100	6200	Only during HW upgrade
IOM	2104	2208	Only during HW upgrade

Connectivity – Components and LAN Blade – Virtual Circuits – Virtual Interfaces (VIFs)

- Virtual interfaces (VIFs) help distinguish between FC and Eth interfaces
- They also identify the origin server
- VIFs are instantiated on the FI and correspond to frame-level tags assigned to blade mezz cards
- A 6-byte tag (VN-Tag) is prepended by the Cisco VIC as traffic leaves the server to identify the interface
 - VN-Tag associates frames to a VIF
- VIFs are ‘spawned off’ the server’s EthX/Y/Z interfaces

Connectivity – Components and LAN

Blade – Virtual Circuits – VIF Calculation



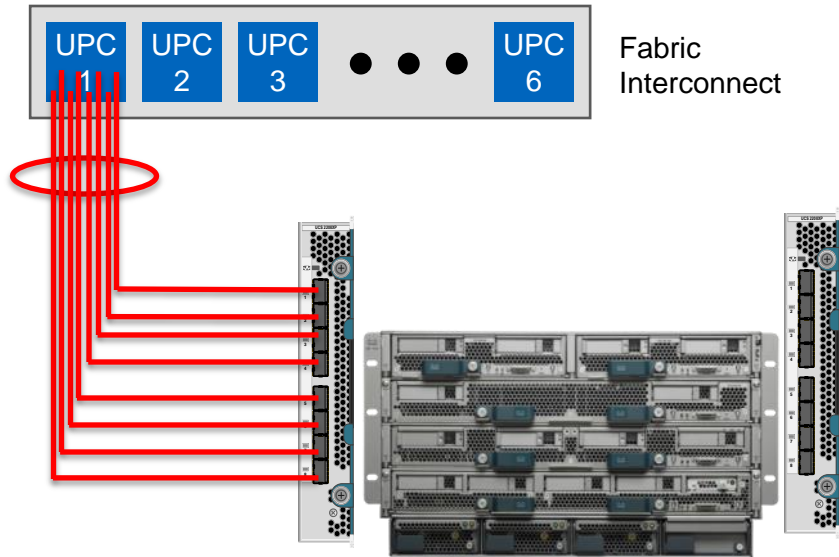
- Every 8 10GbE ports (on FI) are controlled by the same Unified Port Controller (UPC)
- Connect fabric links from IOM to the FI to the same UPC
- Virtual Interface (VIF) namespace varies, depending on number and how the fabric links are connected to the FI ports.
 - Connecting to the same UPC (a set of eight ports), Cisco UCS Manager maximizes the number of VIFs used in service profiles deployed on the servers.
 - If uplink connections are distributed across UPC, the VIF count is decreased. For example, if you connect seven (IOM) fabric links to (FI) ports 1-7, but the eighth fabric link to FI port 9, the number of available VIFs is based on 1 link – IOM port 8 to FI port 9.

Connectivity – Components and LAN Blade – Virtual Circuits – VIF Calculation

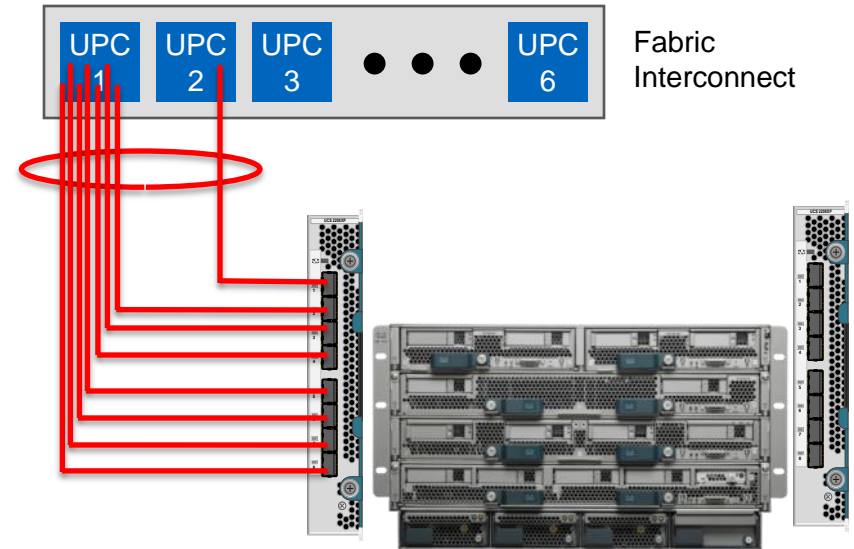
- 6100
 - $(15*n)-2$
- 6200
 - $(63*n)-2$
 - Where 'n' = number of links from IOM and FI

Connectivity – Components and LAN Blade – Virtual Circuits – VIF Calculation

Blade – Virtual Circuits – VIF Calculation



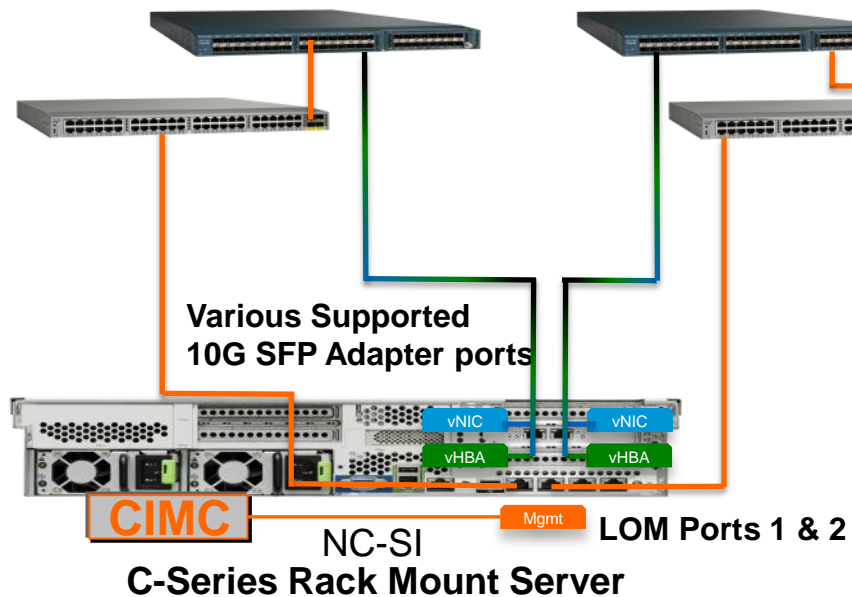
- Recommended
- Maximize number of available VIFs to the host



- Not recommended
- Minimal number of VIFs to the host

Connectivity – Components and LAN

C-Series Rack Integration – Initial Connectivity in UCSM Version 1.4



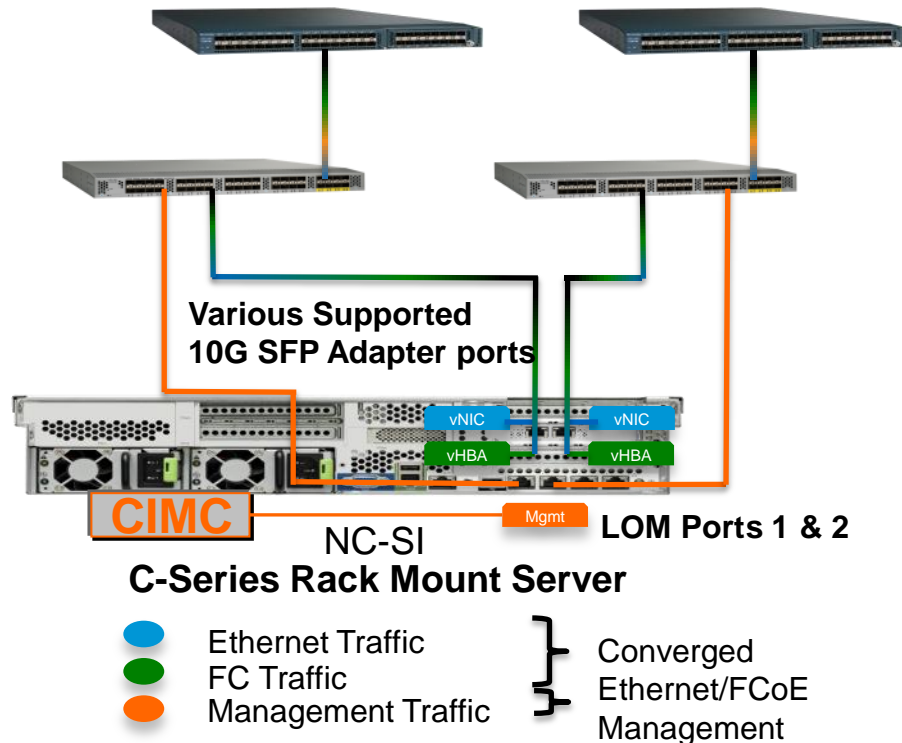
- Ethernet Traffic
- FC Traffic
- Management Traffic

} Converged
Ethernet/FCoE
Management

- Introduction of UCSM Integrated Servers
- Limited Scalability as converged infrastructure connected to FI and separate FEX was needed for management using an additional server port.
- Limited servers supported
 - C200/210
 - C250
 - C460
- Topology deprecated by release 2.0(2)

Connectivity – Components and LAN

C-Series Rack Integration – Dual Wire with FEX



- Introduced in Version 2.0(2) and replaced previous topology
- Better Scalability up to 160 C-Series servers in a UCS Domain
- 2232PP FEX provides Converged I/O to the server and Management connectivity.
 - Both must be connected to the same FEX
- Only uplinks require license ports. (up to 8 ports per FEX)
- Uplinks can be port-channelled
- Matches IOM Architecture.

Connectivity – SAN

PCIe Flash Storage

- Rack servers:
 - Joint testing and qualification with Fusion-IO
 - PCIe cards and support for cards available directly from Fusion-IO
- Blade servers
 - Fusion-IO and LSI to build PCIe flash mezzanine cards
 - For Romley-based servers
 - Will be in the standard mezzanine slot
 - mLOM slot provides standard I/O
 - Initial support for discovery and inventory
- Array Based Flash Solutions
 - EMC VFCache Available Now
 - Other Vendor Solutions Planned



Connectivity – SAN

Troubleshooting FC Connectivity

If your SP and FC config is correct, you will see this during POST

```
Cisco VIC FC, Boot Driver Version 2.0(1w)
(C) 2010 Cisco Systems, Inc.
  Promise 2602000155350f0e:0001
Option ROM installed successfully
```

If the Option ROM installation failed, connect to the FC adapter to find the reason

Using LUNLIST to Troubleshoot

```
FIELD-TME# connect adapter 3/1/1
adapter 3/1/1 # connect
adapter 3/1/1 (top):1# attach-fls

adapter 3/1/1 (fls):1# vnic
-----
vnic ecpu type state  lif
-----
7  1  fc  active 4
8  2  fc  active 5

adapter 3/1/1 (fls):2# lunlist 7
vnic : 7 lifid: 4
- FLOGI State : flogi est (fc_id 0x050a02)
- PLOGI Sessions
- WWNN 26:02:00:01:55:35:0f:0e WWPN 26:02:00:01:55:35:0f:0e
fc_id 0x050500
- LUN's configured (SCSI Type, Version, Vendor, Serial No.)
  LUN ID : 0x0001000000000000 (0x0, 0x5, Promise ,
49534520000000000000 000043B2D58130F35E1)
- REPORT LUNs Query Response
LUN ID : 0x0001000000000000
- Nameserver Query Response
- WWPN : 26:02:00:01:55:35:0f:0e
```

Connectivity – SAN

Troubleshooting SAN Connectivity – What's Logged In?

```
ucstestFI-A(nxos)# show npv flogi-table
```

```
-----  
SERVER                                                                    EXTERNAL  
INTERFACE VSAN FCID                PORT NAME                NODE NAME                INTERFACE  
-----  
vfc922      80    0x01000e 20:00:00:25:b5:01:00:bf 20:00:00:25:b5:0a:00:8f fc2/5  
vfc924      80    0x01000f 20:00:00:25:b5:01:00:df 20:00:00:25:b5:0a:00:8f fc3/5  
vfc946      80    0x01000c 20:00:00:25:b5:01:00:9f 20:00:00:25:b5:0a:00:9f fc2/5  
vfc948      80    0x01000d 20:00:00:25:b5:01:00:af 20:00:00:25:b5:0a:00:9f fc3/5  
vfc1018     80    0x010014 20:00:00:25:b5:01:00:1f 20:00:00:25:b5:0a:00:7f fc2/5  
vfc1020     80    0x010015 20:00:00:25:b5:01:00:3f 20:00:00:25:b5:0a:00:7f fc3/5  
vfc1030     80    0x010010 20:00:00:25:b5:01:00:be 20:00:00:25:b5:0a:00:4f fc2/5
```

Connectivity – SAN

Troubleshooting SAN Connectivity – What's Logged In?

```
SJ2-151-B26-A(nxos)# show flogi database
```

INTERFACE	VSAN	FCID	PORT NAME	NODE NAME
fc2/1	1	0x1601ef	50:06:01:60:3c:e0:66:90	50:06:01:60:bc:e0:66:90
vfc732	1	0x160001	20:00:00:25:b5:00:00:aa	20:00:00:25:b5:00:00:aa
vfc761	1	0x160000	20:00:00:25:b5:92:0a:0f	20:00:00:25:b5:94:00:0f

```
Total number of flogi = 3.
```

```
SJ2-151-B26-A(nxos)# show fcns database
```

```
VSAN 1:
```

FCID	TYPE	PWWN	(VENDOR)	FC4-TYPE:FEATURE
0x160000	N	20:00:00:25:b5:92:0a:0f		scsi-fcp:ini
0x160001	N	20:00:00:25:b5:00:00:aa		scsi-fcp:init
0x1601ef	N	50:06:01:60:3c:e0:66:90	(Clariion)	scsi-fcp:both

All devices logged into the 6100

All Devices in Fabric

Connectivity – SAN

Troubleshooting SAN Connectivity – Check Zoneset Merge

- Checking that the zoning configuration has been merged
- There is no GUI equivalent to `sh zoneset active`. You need to run an NXOS CLI:

```
Panther-A(nxos)# show zoneset active vsan 300
zoneset name fabric-a-panther vsan 300
  zone name ls1-netapp1-4b vsan 300
    pwnn 50:0a:09:83:97:b9:4c:e4
    pwnn 20:01:00:25:b5:71:a0:01

  zone name ls1-netapp2-4b vsan 300
    * fcid 0x170001 [pwnn 50:0a:09:83:87:b9:4c:e4]
    pwnn 20:01:00:25:b5:71:a0:01

  zone name ls2-netapp1-4b vsan 300
    pwnn 50:0a:09:83:97:b9:4c:e4
    * fcid 0x170004 [pwnn 20:01:00:25:b5:71:a0:02]
```

Connectivity – SAN

Troubleshooting SAN Connectivity – Check Zoneset Merge

- How to verify that switches were merged in the same fabric
- Principal vs. Local in domain context

```
Panther-A(nxos)# show fcdomain domain-list vsan 300
```

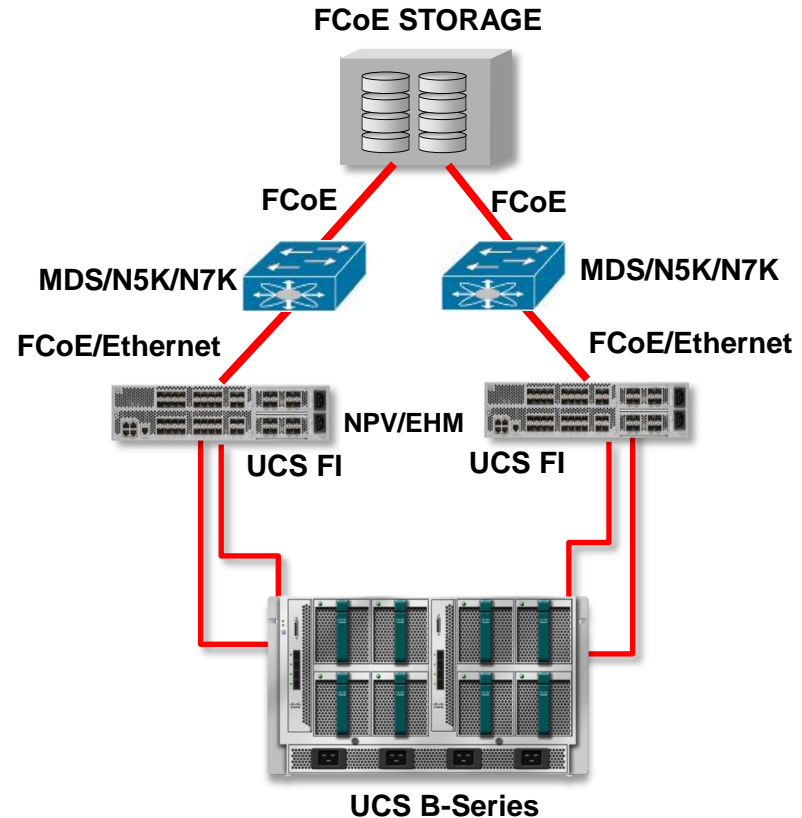
```
Number of domains: 3
```

Domain ID	WWN	
-----	-----	
0x45 (69)	21:2c:00:0d:ec:a3:9c:01	[Principal]
0x17 (23)	21:2c:00:0d:ec:d2:ce:01	[Local]
0x7f (127)	21:2c:00:0d:ec:d0:9c:81	

Connectivity – SAN

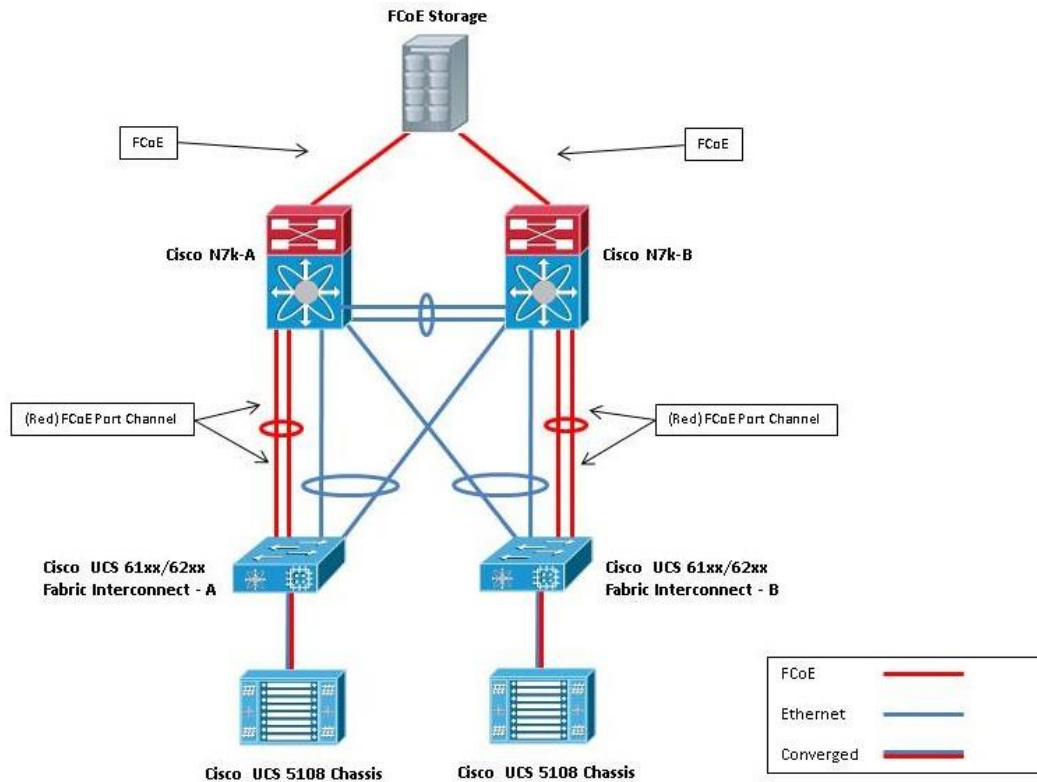
Multi-Hop FCoE

- End-to-End FCoE
- MDS, N5K, N7K FCoE Capable Switches Supported Upstream
- Fabric Interconnect in End Host Mode or Switch Mode



Connectivity – SAN

Multi-Hop FCoE – UCS to 7K – FCoE Uplinks



New In 2.1



CISCO™