UCS System Architecture
Overview

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Cisco Unified Computing System

SAN A
Any ANSI T11 Compliant SAN

LAN
Any IEEE Compliant LAN

SAN B
Any ANSI T11 Compliant SAN

One Logical Chassis to Manage 160 Servers

LAN Connectivity
SAN Connectivity
Multiple Chassis
Blade & Rack Servers
Server Identity Management
Monitoring, Troubleshooting
Cisco UCS Architecture

UCS Manager

APIs

XML API

Standard APIs

Fabric Interconnects

Compute

Fabric Extenders
Unified Management

A Single Unified System
For Blade and Rack Servers

- Integral part of UCS system
- Manages all aspects of the UCS
- Single point of management for UCS

- Open API
- Integrated Automation
- Add capacity without complexity

UCS Manager

UCS Service Profile
Unified Device Management

Network Policy
Storage Policy
Server Policy

C-Series Rack
Optimized Servers

B-Series Blade
Servers
UCS Benefits

Unified Management

Industry-leading compute without compromise

High Performance Virtual Networks

Highest Scale Unified Fabric

UCS C-series

UCS B-Series

Fabric Interconnects

Virtual Adapters

Fabric Extenders

Unified Fabric Extenders

Virtual Adapters

Fabric Interconnects
Building Blocks of Cisco UCS
An Integrated System Optimizes Data Center Efficiency

UCS Manager
• Embedded—manages entire UCS Domain

Fabric Interconnect
• 10GE unified fabric switch

Chassis IO Module
• Remote line card

Blade Server Chassis
• Flexible bay configurations

Blade and Rack Servers
• x86 industry standard
• Patented extended memory

I/O Adapters
• Choice of multiple adapters
System Component Connectivity

- **Fabric Interconnect**
  - 32 Fixed Unified Ports + 4 or 1 Expansion slots to a maximum of 48 or 96 Unified Ports

- **Chassis**
  - Upto 8 half width blades or 4 full width blades

- **Fabric Extender**
  - Host to uplink traffic engineering
  - Up to 160Gb Flexible bandwidth allocation

- **Adapter**
  - Virtualized adapter for single OS and hypervisor systems

- **Compute Blade**
Wire for Bandwidth, Not Connectivity

- Wire Once Architecture
- All links can be active all the time
- Policy-driven bandwidth allocation
- Virtual interface granularity
# Building Blocks

<table>
<thead>
<tr>
<th>Component</th>
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| **UCS Fabric Interconnects** | 6100  
6200 |
| **UCS Fabric Extenders** | Logically part of Fabric Interconnect  
Inserts into Blade Enclosure |
| **UCS Blade Server Chassis** | Flexible bay configurations  
Logically part of Fabric Interconnect |
| **UCS Blade Servers** | Different blade types  
Mix blade types within enclosure |
| **UCS Rack Servers** | Different server types  
Standalone or UCSM integrated |
| **UCS Adapters** | Three adapter options  
Mix adapters within blade |
Unified Computing System Manager

- Embedded device manager for family of UCS components
- Enables stateless computing via Service Profiles
- Efficient scale: Same effort for 1 to N blades
- APIs for integration with new and existing data center infrastructure
UCS Manager

- Single point of management for UCS system of components
  - Adapters, blades, chassis, fabric extenders, fabric interconnects

- Embedded device manager
  - Discovery, Inventory, Configuration, Monitoring, Diagnostics, Statistics Collection
  - Coordinated deployment to managed endpoints

- APIs for integration with new and existing data center infrastructure
  - SMASH-CLP, IPMI, SNMP
  - XML-based SDK for commercial & custom implementations
Multi UCS manager

- Unifies management of multi UCS domains
- Leverages UCS Manager technology
- Simplify global operations with centralized inventory, faults, logs, and server consoles

- Delivers global policies, service profiles, ID pools, and templates
- Foundation for high availability, disaster recovery, and workload mobility
- Model based API for large scale automation
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| UCS Blade Servers    | Different blade types  
|                      | Mix blade types within enclosure                                                                                                             |
| UCS Rack Servers     | Different server types  
|                      | Standalone or UCSM integrated                                                                                                               |
| UCS Adapters         | Three adapter options  
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**UCS 6248UP Fabric Interconnect**

<table>
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<th>Feature details</th>
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<tbody>
<tr>
<td>• High Density 48 ports in 1RU</td>
</tr>
<tr>
<td>• 1Tbps Switching capability</td>
</tr>
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<td>• All ports can be used as uplinks or downlinks</td>
</tr>
<tr>
<td>• All ports can be configured to support either 1Gb or 10Gb speeds</td>
</tr>
<tr>
<td>• Unified Ports</td>
</tr>
<tr>
<td>• 1 Expansion slots</td>
</tr>
<tr>
<td>• 2us Latency</td>
</tr>
<tr>
<td>• 80 PLUS Gold PSUs</td>
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**UCS 6296UP Fabric Interconnect**

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<tr>
<td>• High Density 96 ports in 2RU</td>
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<tr>
<td>• Unified Ports</td>
</tr>
<tr>
<td>• 4 Expansion slots</td>
</tr>
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Unified Ports

Dynamic Ports Allocation: Lossless Ethernet or Fibre Channel

- Convert protocol support on the same port dynamically
- All ports on UCS 6200 Series
- 16-port Expansion Module for 6248UP and 6296UP

Native Fibre Channel

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

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

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

- **UCS Manager**: Embedded in Fabric Interconnect
- **UCS Fabric Interconnects**: 6100, 6200
- **UCS Fabric Extenders**: Logically part of Fabric Interconnect
  - Inserts into Blade Enclosure
- **UCS Blade Server Chassis**: Flexible bay configurations
  - Logically part of Fabric Interconnect
- **UCS Blade Servers**: Different blade types
  - Mix blade types within enclosure
- **UCS Rack Servers**: Different server types
  - Standalone or UCSM integrated
- **UCS Adapters**: Three adapter options
  - Mix adapters within blade
UCS 2204XP I/O Module

Feature details

- Increased uplink bandwidth
  - 4 x 10 Gig network-facing ports
- Double the server-facing bandwidth
  - 16 x 10 Gig = 4 per half width slot
- Two I/O Modules per chassis
  - 40Gbps to a single half-width blade (20Gbps left and right)
  - 80Gbps to a full-width blade
- Built in chassis management
- Fully managed by UCSM
UCS 2208XP I/O Module

Feature details

- Double the uplink bandwidth
  - 8 x 10 Gig network-facing ports
- Quadruple the server-facing bandwidth
  - 32 x 10 Gig = 4 per half width slot
- Two I/O Modules per chassis
  - 80Gbps to a single half-width blade (40Gbps left and right)
  - 160Gbps to a full-width blade
- Built in Chassis Management
- Fully Managed by UCSM
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Chassis

- Up to 8 half slot blades
- Up to 4 full slot blades
- 4x power supplies, N+N grid redundant
- 8x fans included
- 2x UCS 2104 Fabric Extender
- All items hot-pluggable
UCS 5108 Blade Chassis Parts

- 2 Fabric Extenders
- 8 Fan Modules
- 4 Power Connectors
- 4 to 8 Blades
- 4 Power Supplies
- 6U, 19" Rack
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## Blade Overview

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<thead>
<tr>
<th></th>
<th>B200 M2</th>
<th>B200 M3</th>
<th>B250 M2</th>
<th>B230 M2</th>
<th>B440 M2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slots</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>CPU</td>
<td>Xeon 5600</td>
<td>E5-2600</td>
<td>Xeon 5600</td>
<td>E7-2800</td>
<td>E7-4800</td>
</tr>
<tr>
<td>Cores</td>
<td>12</td>
<td>16</td>
<td>12</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>DIMMs</td>
<td>12</td>
<td>24</td>
<td>48</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>Max GB</td>
<td>384GB</td>
<td>768GB</td>
<td>384GB</td>
<td>512GB</td>
<td>1TB</td>
</tr>
<tr>
<td>Disk</td>
<td>2 x 2.5”</td>
<td>2 x 2.5”</td>
<td>2 x 2.5”</td>
<td>2 SSD</td>
<td>4 x 2.5”</td>
</tr>
<tr>
<td>Raid</td>
<td>0/1</td>
<td>0/1</td>
<td>0/1</td>
<td>0/1</td>
<td>0/1/5/6</td>
</tr>
<tr>
<td>Integrated I/O</td>
<td>No</td>
<td>Dual 20Gb</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Mezz</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
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# Rack Mount Server Overview

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<thead>
<tr>
<th></th>
<th>C200 M2</th>
<th>C210 M2</th>
<th>C220 M3</th>
<th>C240 M3</th>
<th>C250 M2</th>
<th>C260 M2</th>
<th>C460 M2</th>
</tr>
</thead>
<tbody>
<tr>
<td>RU</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>CPU</td>
<td>Xeon 5600</td>
<td>Xeon 5600</td>
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</tr>
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<td>DIMMs</td>
<td>12</td>
<td>12</td>
<td>16</td>
<td>24</td>
<td>16</td>
<td>48</td>
<td>64</td>
</tr>
<tr>
<td>Max GB</td>
<td>384GB</td>
<td>384GB</td>
<td>512GB</td>
<td>768GB</td>
<td>384GB</td>
<td>1TB</td>
<td>1TB</td>
</tr>
<tr>
<td>Disk</td>
<td>8 x 2.5&quot; or 4 x 3.5&quot;</td>
<td>16 x 2.5&quot;</td>
<td>8 x 2.5&quot; or 4 x 3.5&quot;</td>
<td>24 x 2.5&quot; or 12 x 3.5&quot;</td>
<td>8 x 2.5&quot;</td>
<td>16 x 2.5&quot; or 32 x SSD</td>
<td>16 x 2.5&quot;</td>
</tr>
<tr>
<td>LoM</td>
<td>2 x 1Gb</td>
<td>2 x 1Gb</td>
<td>2 x 1Gb</td>
<td>4 x 1Gb</td>
<td>4 x 1Gb</td>
<td>2 x 1Gb + 2 x 10Gb</td>
<td>2 x 1Gb + 2 x 10Gb</td>
</tr>
<tr>
<td>PCIe Slots</td>
<td>2 x PCIe 2.0</td>
<td>5 x PCIe 2.0</td>
<td>2 x PCIe 3.0</td>
<td>5 x PCIe 3.0</td>
<td>5 x PCIe 2.0</td>
<td>6 x PCIe 2.0</td>
<td>10 x PCIe 2.0</td>
</tr>
<tr>
<td>Internal Storage</td>
<td>N/A</td>
<td>N/A</td>
<td>USB Port FlexFlash</td>
<td>USB Port FlexFlash</td>
<td>N/A</td>
<td>USB Port FlexFlash</td>
<td>eUSB</td>
</tr>
</tbody>
</table>
C200 M2 Rack Server

- 2 Socket
  - Intel 55xx and 56xx CPUs
- 12 DIMM slots
  - Maximum memory speed 1333MHz
- 4 x 3.5” or 8 2.5” Internal HDDs
  - SFF – SAS, SATA and SSD options
  - Battery Backed cache option
- Built in Intel ICH10 SW Raid
  - Supports RAID 0, 1, 5 and 10
- 650W PSUs
- 2 PCIe slots
- Height 1RU
- Integrated CIMC and KVM
C210 M2 Rack Server

2 Socket
   Intel 55xx and 56xx CPUs
12 DIMM slots
   Maximum memory speed 1333MHz
16 Internal HDDs
   SFF – SAS, SATA and SSD options
   Battery Backed cache option
Built in Intel ICH10 SW Raid
   Supports RAID 0, 1, 5 and 10
650W PSUs
5 PCIe slots
Height 2RU
Integrated CIMC and KVM
C220 M3 Rack Server

2 Socket
   Intel E5-2600
16 DIMM slots
   Maximum memory speed 1600MHz
8 or 4 Internal HDDs
   SFF and 3.5” – SAS, SATA and SSD options
   Battery Backed cache option
650W PSUs – Platinum Rated
2 PCIe slots
Height 1RU
Integrated CIMC and KVM
C240 M3 Rack Server

2 Socket
   Intel E5-2600
24 DIMM slots
   Maximum memory speed 1600MHz
24 or 12 Internal HDDs
   SFF and 3.5” – SAS, SATA and SSD options
   Battery Backed cache option
650W and 1200W PSUs – Platinum Rated
5 PCIe slots – GPU ready
Height 2RU
Integrated CIMC and KVM
C250 M2 Rack Server

- 2 Socket
  - Intel 55xx and 56xx CPUs
- 48 DIMM slots
  - Maximum memory speed 1333MHz
- 8 Internal HDDs
  - SFF – SAS, SATA and SSD options
  - Battery Backed cache option
- 850W PSUs
- 5 PCIe slots
- Height 2RU
- Integrated CIMC and KVM
C260 M2 Rack Server

2 Socket
   Intel E7 CPUs
32 or 64 DIMM slots
   Maximum memory speed 1066MHz
16 Internal HDDs
   SFF – SAS, SATA and SSD options
   Battery Backed cache option
1200W PSUs
Internal Flash Storage
6 PCIe slots
Height 2RU
Integrated CIMC and KVM
C460 M2 Rack Server

4 Socket
Intel E7 CPUs
64 DIMM slots
Maximum memory speed 1066MHz
12 Internal HDDs
SFF – SAS, SATA and SSD options
Battery Backed cache option
850W PSUs
Internal Flash Storage
10 PCIe slots
Height 4RU
Integrated CIMC and KVM
Building Blocks

**UCS Manager**
Embedded in Fabric Interconnect

**UCS Fabric Interconnects**
- 6100
- 6200

**UCS Fabric Extenders**
- Logically part of Fabric Interconnect
- Inserts into Blade Enclosure

**UCS Blade Server Chassis**
- Flexible bay configurations
- Logically part of Fabric Interconnect

**UCS Blade Servers**
- Different blade types
- Mix blade types within enclosure

**UCS Rack Servers**
- Different server types
- Standalone or UCSM integrated

**UCS Adapters**
- Three adapter options
- Mix adapters within blade
Adapters for B-Series M72KR-Q

- High Performance 10Gbps per port maximum throughput for high bandwidth SAN and LAN traffic
- Full hardware offload for FCoE protocol processing
- 250,000 IOPS per port deliver high I/O
- Up to 8Gb FC throughput
- Full support for TCP/IP and Ethernet with enhancements
  - Priority-based Flow Control (802.1Qbb)
  - Jumbo frames
  - Checksum offloads
  - Segmentation offloads
- Common driver for CNAs and HBAs
- Low power ~ 5W
I/O Adapters for B-Series M72KR-E

- Full 10Gbps network performance with support for both LAN and SAN traffic
- Full hardware offload for FCoE protocol processing
- PCIe Express 2.0 (x8, 5GT/s), MSI-X support
- Integrated data buffer and code space memory
- Theoretical 10Gb FC throughput
- Common driver for UCNAs and HBAs
- Support for Jumbo frames
Interface Type PCIe v2.0 (5.0GT/s)
Intel® VT-dVMDq, SR-IOV
Full support for TCP/IP and Ethernet with enhancements:
  - Priority-based Flow Control (802.1Qbb)
  - Jumbo frames
  - Checksum offloads
  - Segmentation offloads
Low power ~7W
Broadcom NetXtreme II 57711 Dual-Port 10 Gigabit Ethernet PCIe Adapter

x8 PCI Express base specifications v2.0 and v1.1

iSCSI offload

Virtual LANs (VLANs), IEEE 802.1q

IEEE 802.3x flow control

TCP, IP, UDP checksum offload - TCP segmentation

iSCSI Boot capable
Customer benefits

- 80 Gb I/O connectivity per adapter
- VM-FEX scale to 116 VM

Feature details

- Dual 4x10 Gbps port-channel to a single slot
- Host connectivity PCIe Gen2 x6
- HW Capable of 256 PCIe devices
  - OS restriction apply
- PCIe virtualization OS independent
- Single OS driver image for both VICs
- FabricFailover supported
- No user configuration required for 4x10Gb port channel
- Not limited to 10Gig bandwidth per vNIC
- Flows from each vNIC can be load balanced
3rd Party Adapters for UCS C-Series

I/O Adapters:

- **N2XX-ABPCI02** - Broadcom BCM57711, 10 GbE Dual Port NIC *(TwinAx Cable Only)*
- **N2XX-ABPCI03** - Broadcom BCM5709, GbE Quad Port GE NIC
- **N2XX-ABPCI01** - Broadcom BCM5709, GbE Dual Port GE NIC
- **UCSC-PCIE-BSFP** - Broadcom BCM57712, 10GbE Dual Port NIC
- **N2XX-AEPCI01** - Emulex OneConnect OCe10102-F FCoE CNA *(TwinAx Cable Only)*
- **N2XX-AEPCI03** - Emulex LPE 11002 4Gb Dual Channel FC HBA
- **N2XX-AEPCI05** - Emulex Lpe 12002 8Gb Dual Port FC HBA
- **N2XX-AIPCI01** - Intel Ethernet X520 10GbE Dual Port Server Adapter *(TwinAx Cable Only)*
- **N2XX-AIPCI02** - Intel Quad Port GE NIC
- **N2XX-AQPCI01** - Qlogic QLE 8152 (FCoE) 10 Gb 2-port CNA *(TwinAx Cable Only)*
- **N2XX-AQPCI03** - Qlogic 2462 4Gb Dual-Channel FC HBA
Internal Connectivity
From Chassis to Fabric Interconnect - Before

Fabric Interconnects (UCS 61XX)

IO Modules
UCS 2104

Midplane

Mezz
10Gb Mezz
x16 Gen 2

Server Blade
IOH
CPU
CPU

Blade Chassis

IO Module to 61XX Blades pinned to uplink based On Slot number
From Chassis to Fabric Interconnect - New

- 4x10 Gbps Ether channel from VIC-2 to 2208 IO Modules
- No user configuration required
- vNIC flows are 5-tuple LB across links
- Each individual flow limited to 10Gb
- Fabric Failover available
UCS Connectivity Summary
Summary

- UCS is NOT just another blade server
- Heavy focus on Management and service profile to simplify Operations
- Enormous bandwidth to eliminate I/O bottlenecks
- Strong CPUs and Large Memory to accommodate virtualization
- FEX and Adapter FEX technology for network visibility up to the Virtual Machine
- Seamless integration with existing SAN and LAN Networks
- Future FCoE up-links for multi-hop end to end FCoE connectivity
Thank you.

Please fill evaluation forms