

Project Olympus Universal Motherboard

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Microsoft Cloud + Enterprise

Motherboard Goals

Optimized for Microsoft Partners

- One motherboard for all platforms
- Enable flexibility for future technologies
- Optimize for data center support

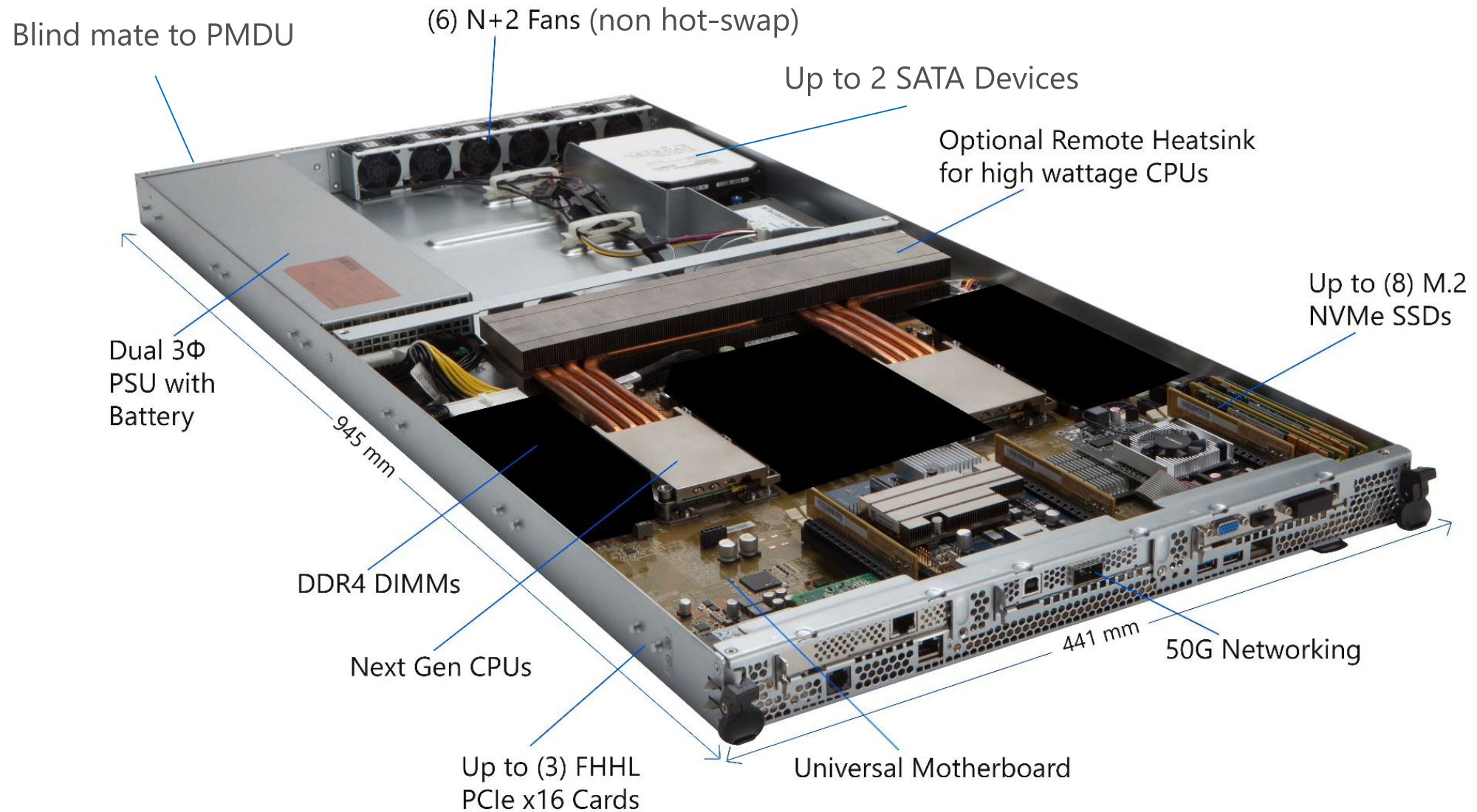
Optimized for OCP Partners

- Incorporate feedback from OCP partners
- Enable OCP technology

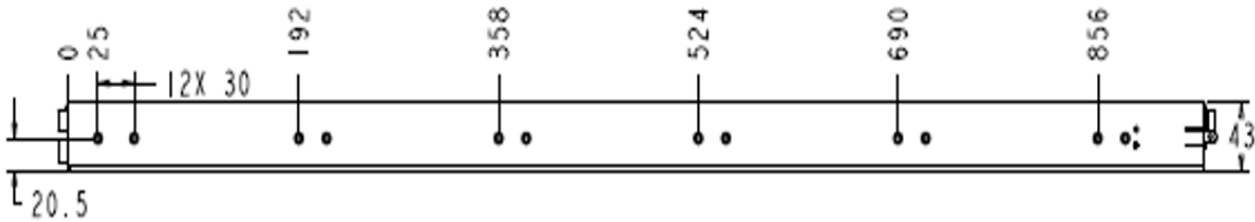
Cost Reduction across full lifecycle

- Lower solution costs

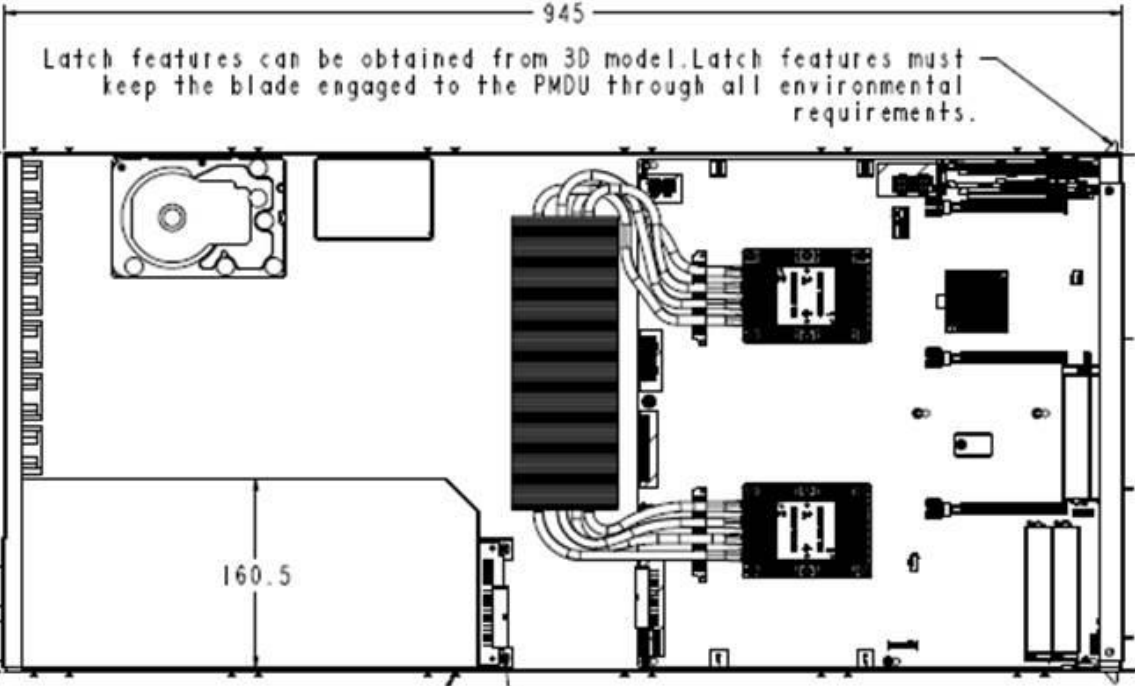
Server Assembly



Server and Motherboard Dimensions



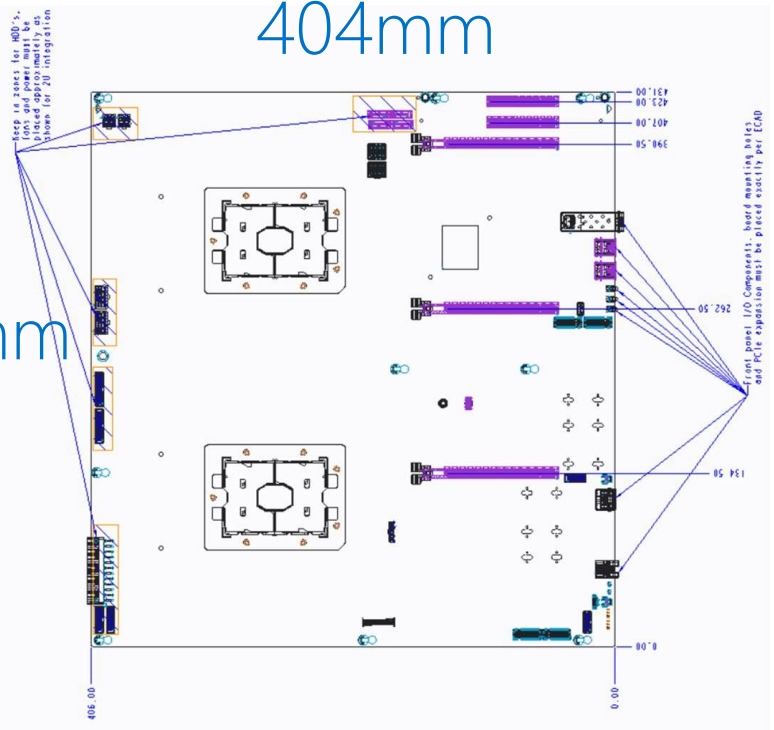
945mm



441mm

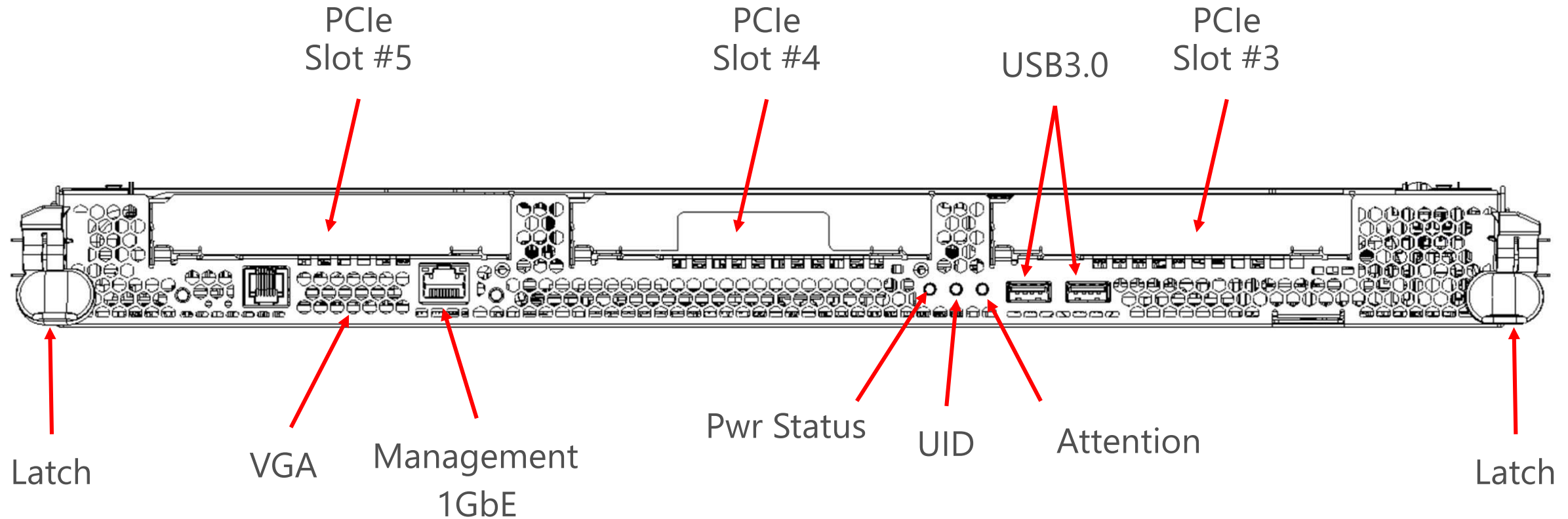
T-nut geometry can be obtained from 3D model. Pull out force >50lbs required, per nut

PSU mounting features and location can be obtained from 3D model. PSU-blade interface is critical to blind mate to PMDU



431mm

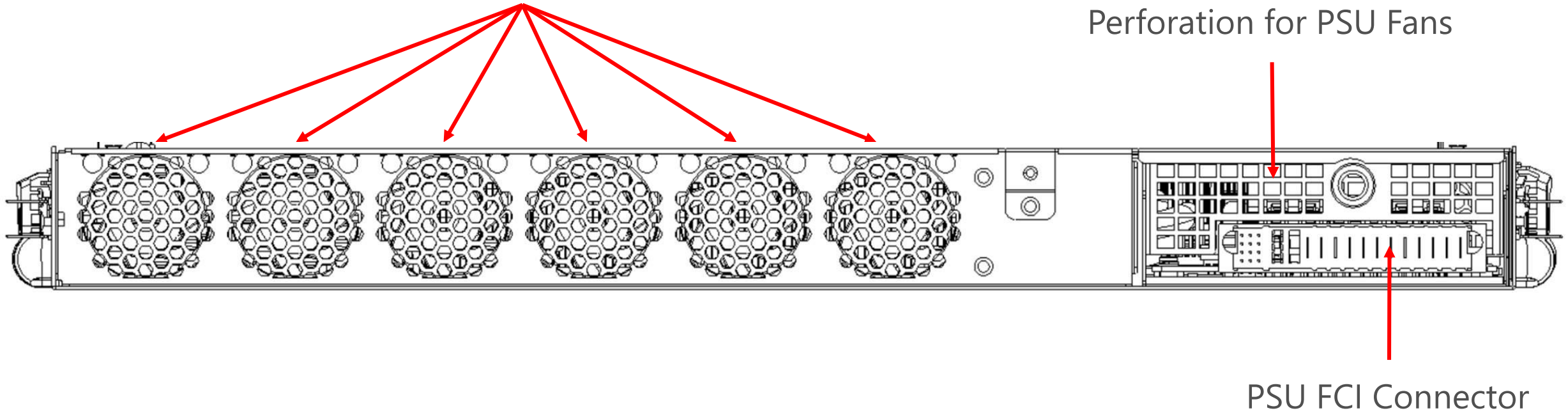
Front Panel



Rear Panel

FANs 1-6

Perforation for PSU Fans



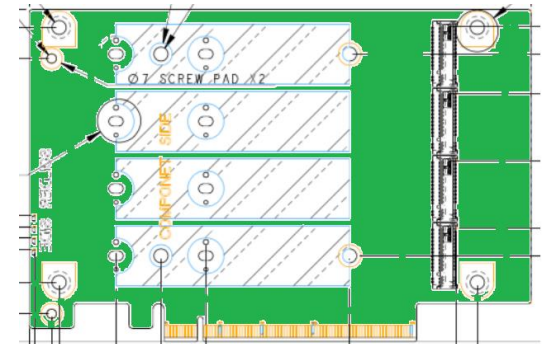
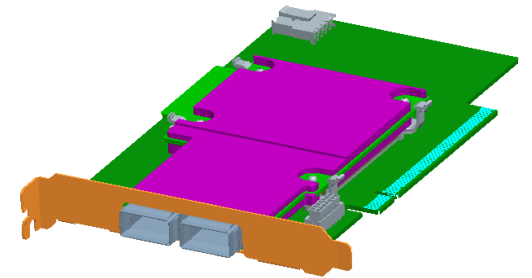
OCP Support

Changes driven by OCP Feedback from March 2016 Summit

- Management support for VGA and NCSI via BOM population changes
 - ASPEED BMC AST2400 with PCIe x1
 - VGA and NCSI cable connectors
 - Support verified and consistent with Facebook servers
- Creation of NIC Mezz Adapter with NCSI cable header

OCP Collaboration – Quad M.2 Carrier

- Supports 4 M.2s (per carrier)
- Enables configuration with up to 16 M.2s in 1U
 - 16TB NVMe flash today, soon 32TB or more



https://github.com/opencomputeproject/Project_Olympus

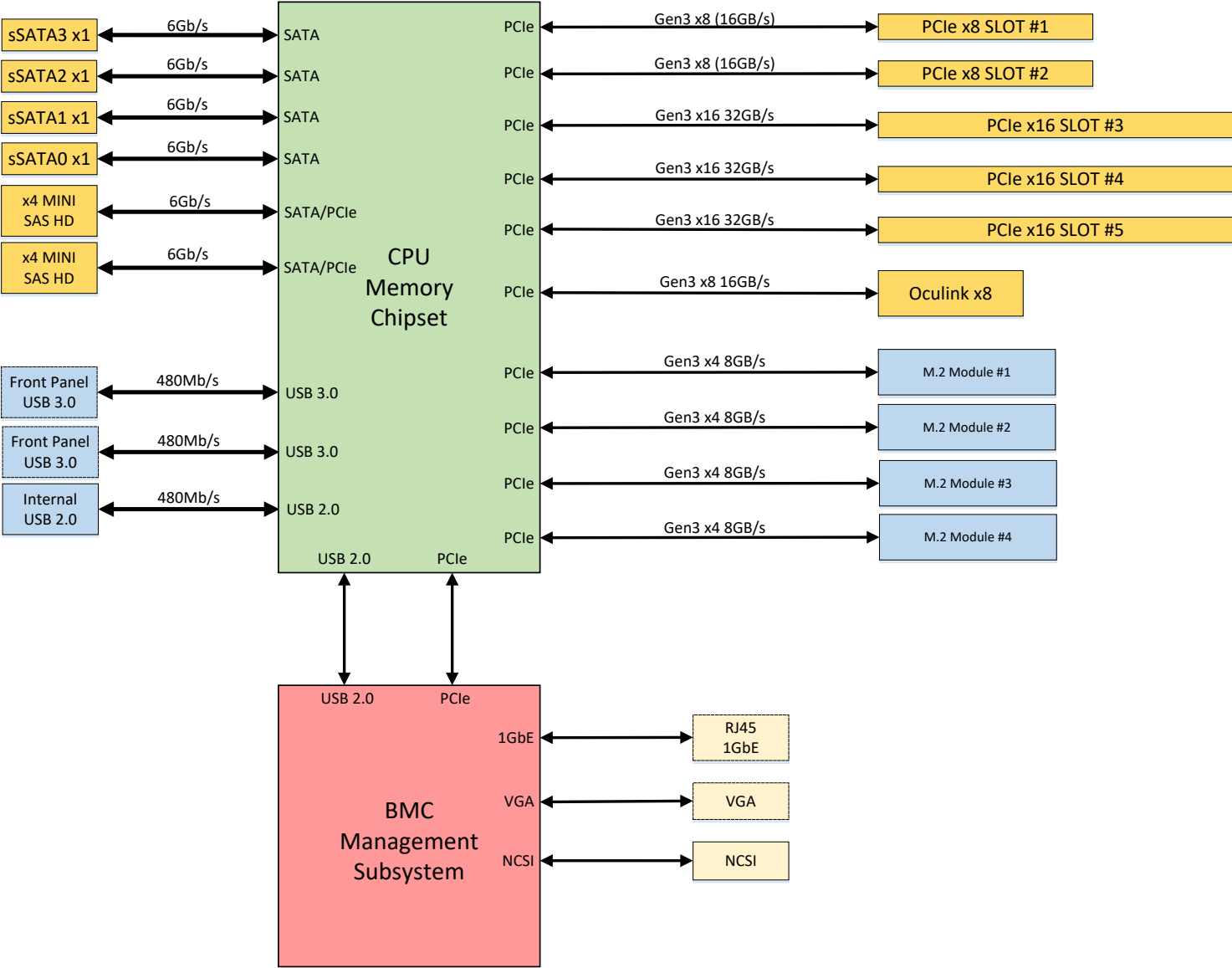
System Block Diagram

Processors

- Up to 2 CPUs

Memory

- Up to 32 DIMMs



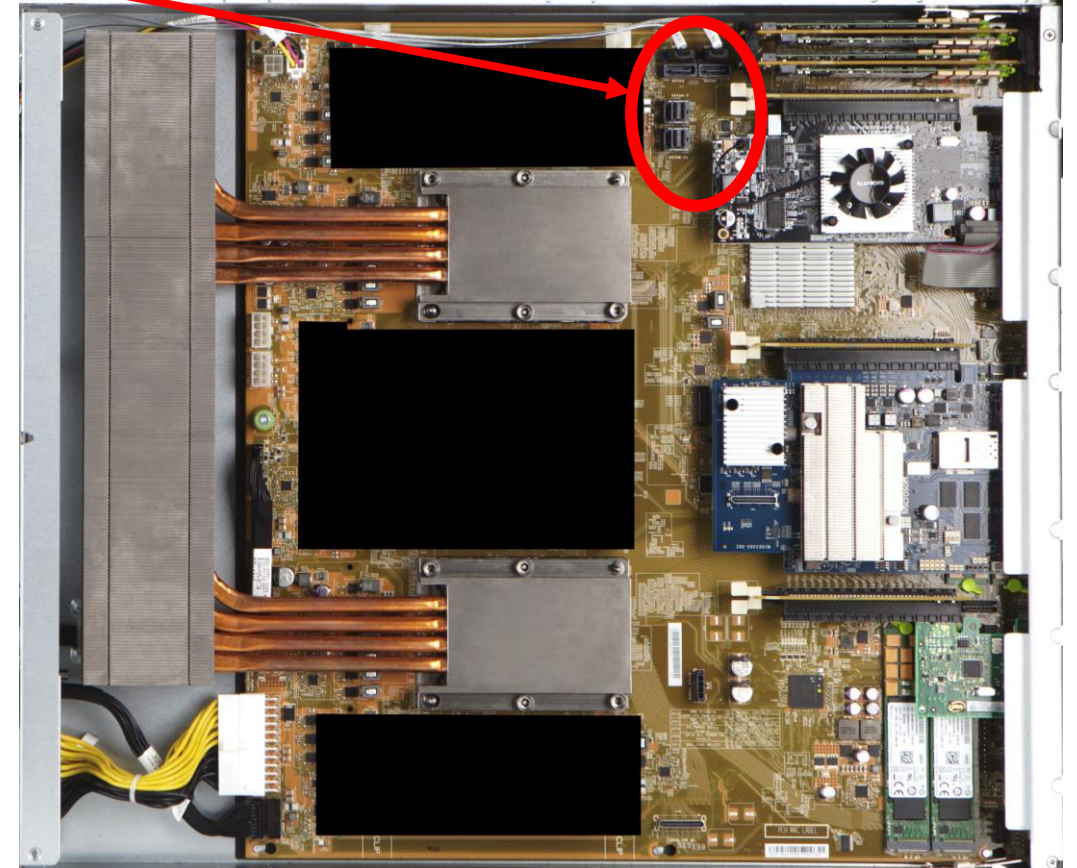
SATA Storage

Support for up to 12 SATA Storage Devices

- 4 x 1 SATA Connectors
- 8 SATA via 2 x 4 Mini-SAS HD Connectors

Typical Use Case

- 2 or less SATA storage devices in 1U
- 2U Expansion for up to 12 devices
- x8 Expansion (SATA/PCIe)



PCIe

Slots 1/2

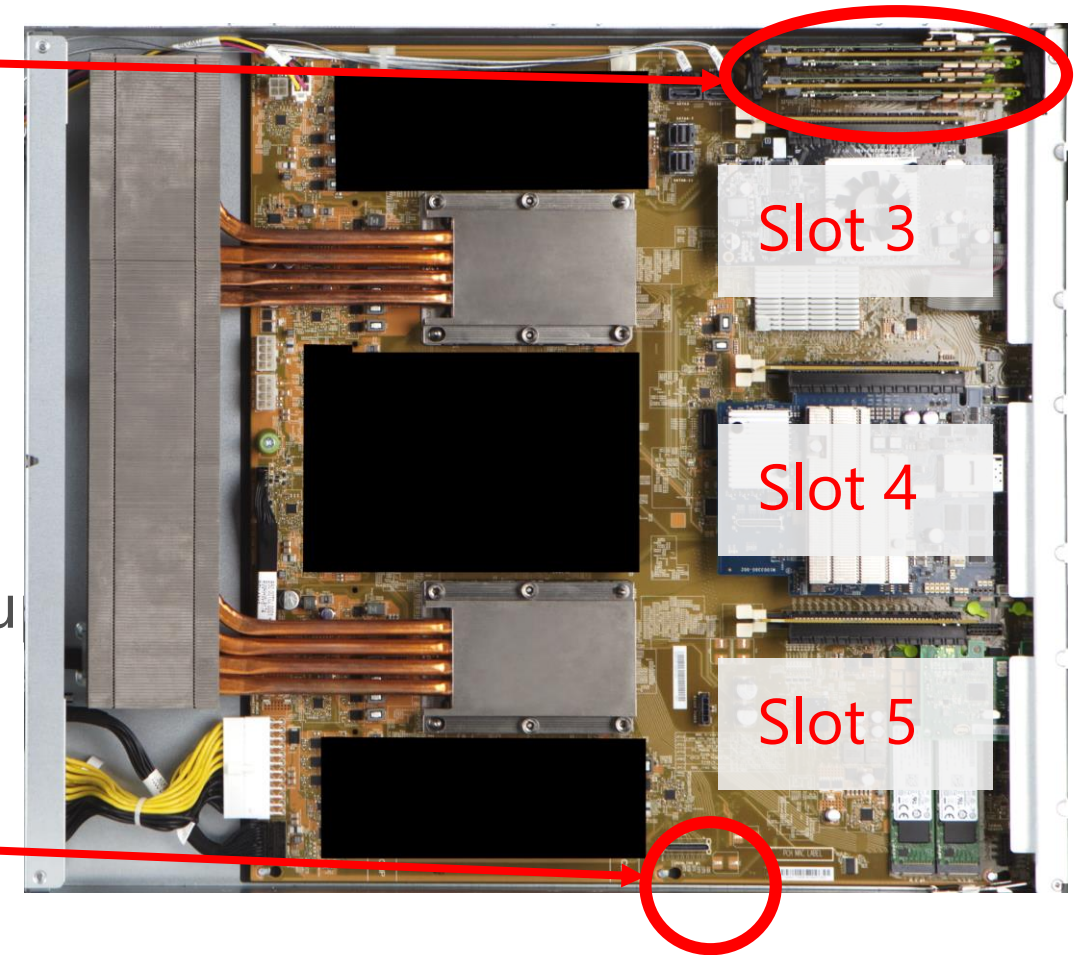
- Supports PCIe x8 M.2 Riser (passive)
- Leveraged PCIe standard pinout
- Electrically supports standard PCIe x8

Slots 3/4/5

- Supports passive PCIe x16 Riser
- Full-Height, Half-Length in 1U (FHHL)
- Slot 4 targeted for SmartNIC FPGA Card su

Oculink x8

- Supports Slot #4 SmartNIC FPGA Card



M.2 Support

Support for up to 16 M.2 Modules

M.2 Riser (2 x 2)

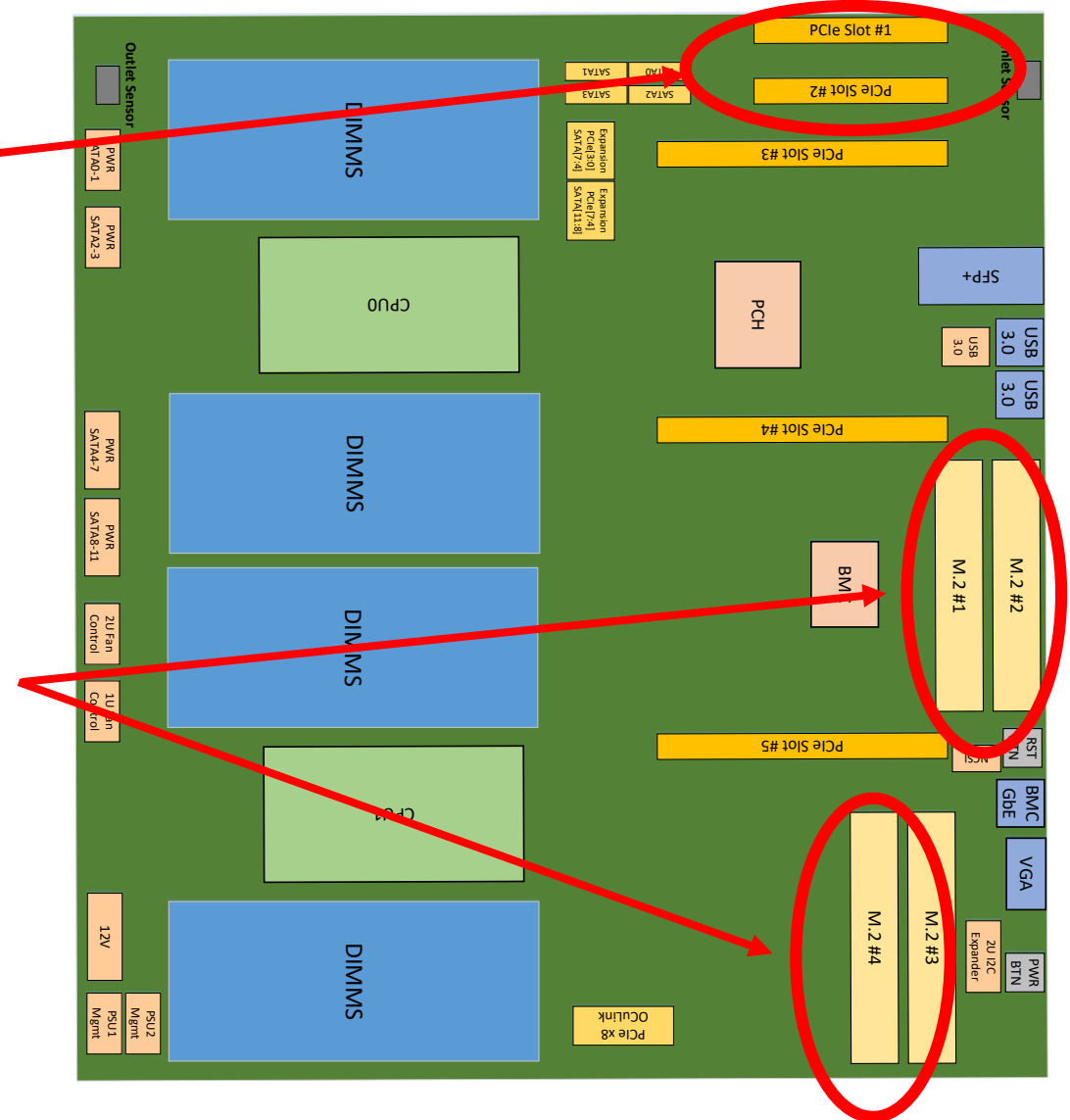
- Custom passive riser
- Supports 2 M.2's
- PCIe x8 form factor
- x8 Expansion (SATA/PCIe)

Onboard (4)

- Up to 4 M.2's with connectors directly soldered to motherboard

OCP M.2 Expansion Module (2 x 4)

- PCIe FHHL
- Supports 4 M.2 Modules



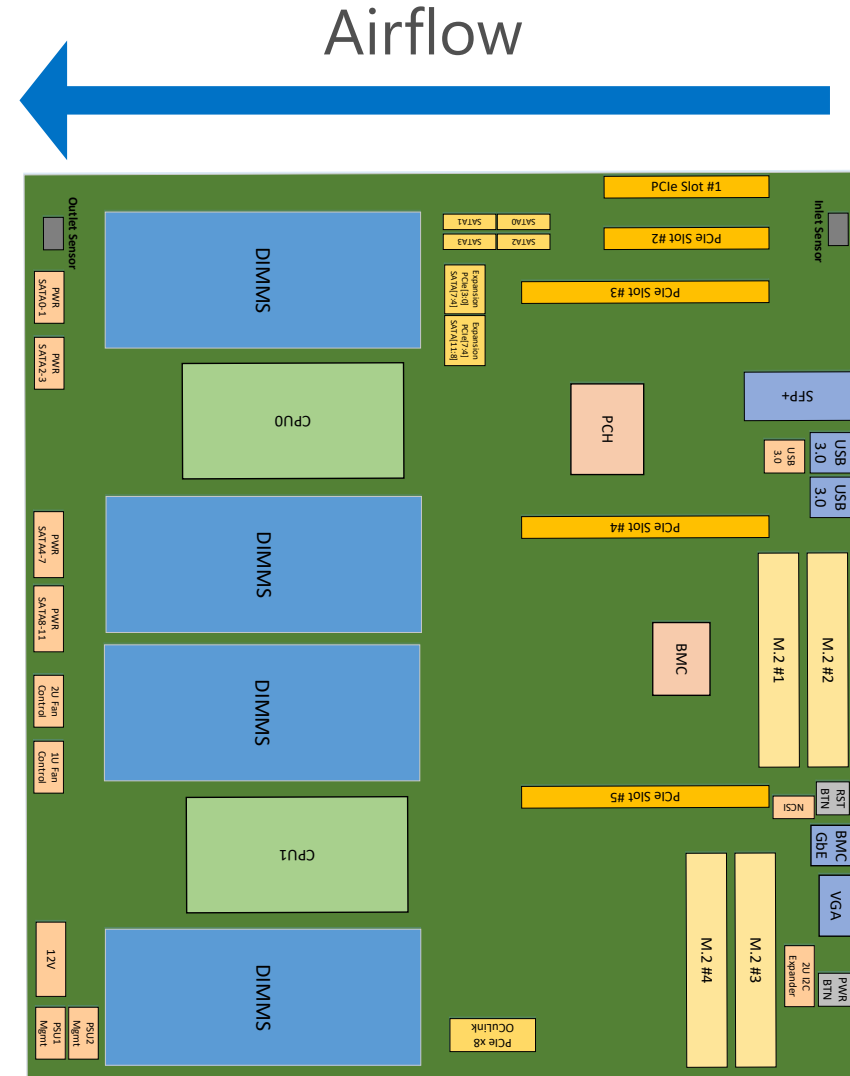
Motherboard Layout

Spread-core Design

- Dual CPUs, over 200W

Typical Use Cases

- Front I/O, front-to-back airflow
- 1U Server
- 2U Server with upper 1U supporting up to 12 HDDs
- 2U Server with upper 1U supporting PCIe expansion such as GPUs or M.2 Flash



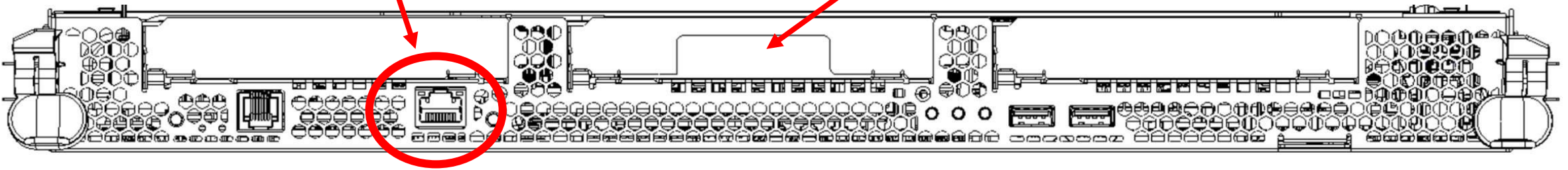
Management Ethernet

1GbE (OOB)

- BMC supports out of band GbE
- Front cabled

Alternate In-Band

- Uses PCIe OCP Mezz Carrier
- Enables use of OCP NIC Mezz
- Cabled NCSI



Management

BMC

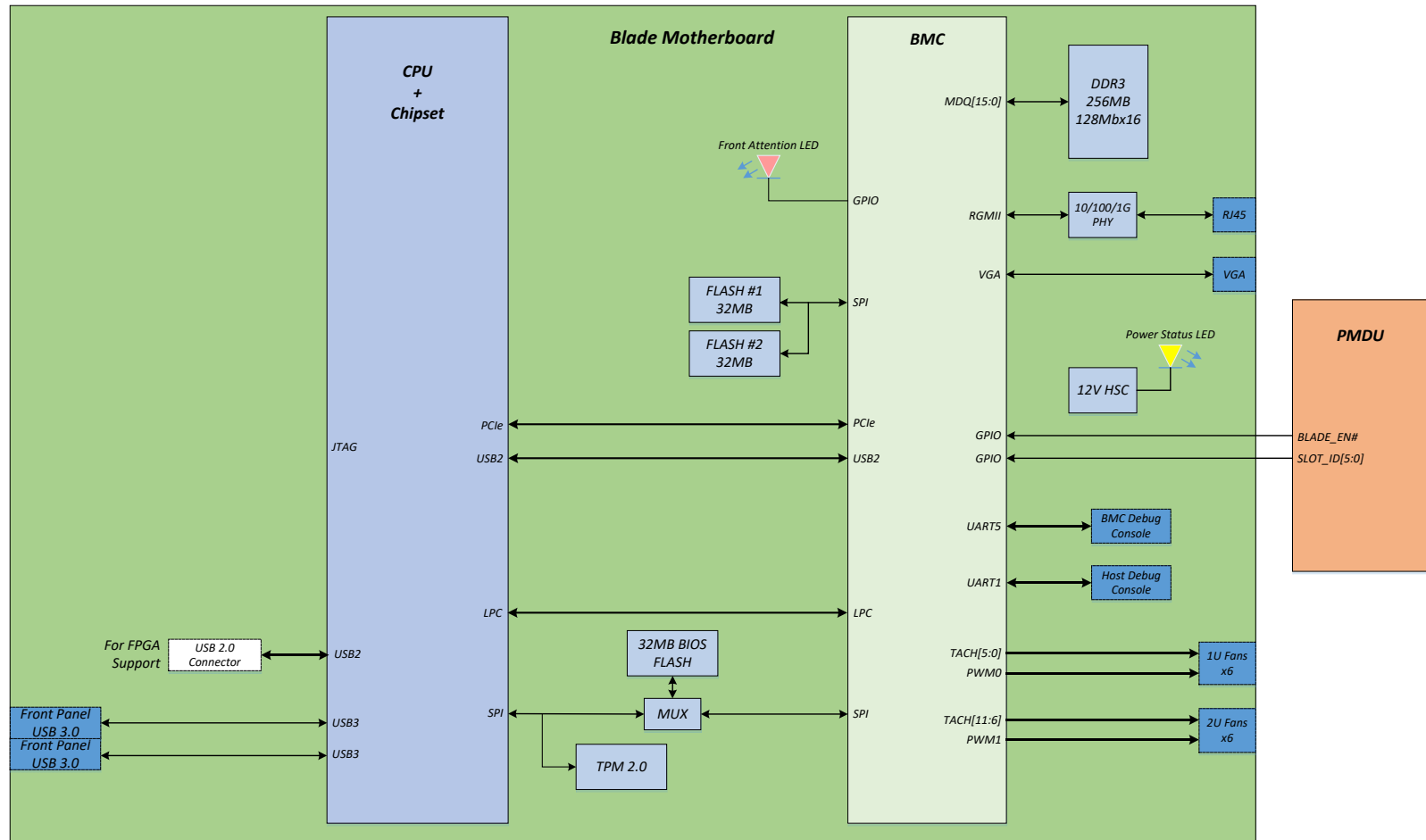
- ASPEED 1250/2400
- 2GbDDR3
- 32MB Boot Flash (Dual)
- 32MB BIOS Flash
- KVM (USB+VGA)
- 1GbE Mgmt Network

Fan Control

- Six zones, 12 fans
- Based on sensor temps

Security

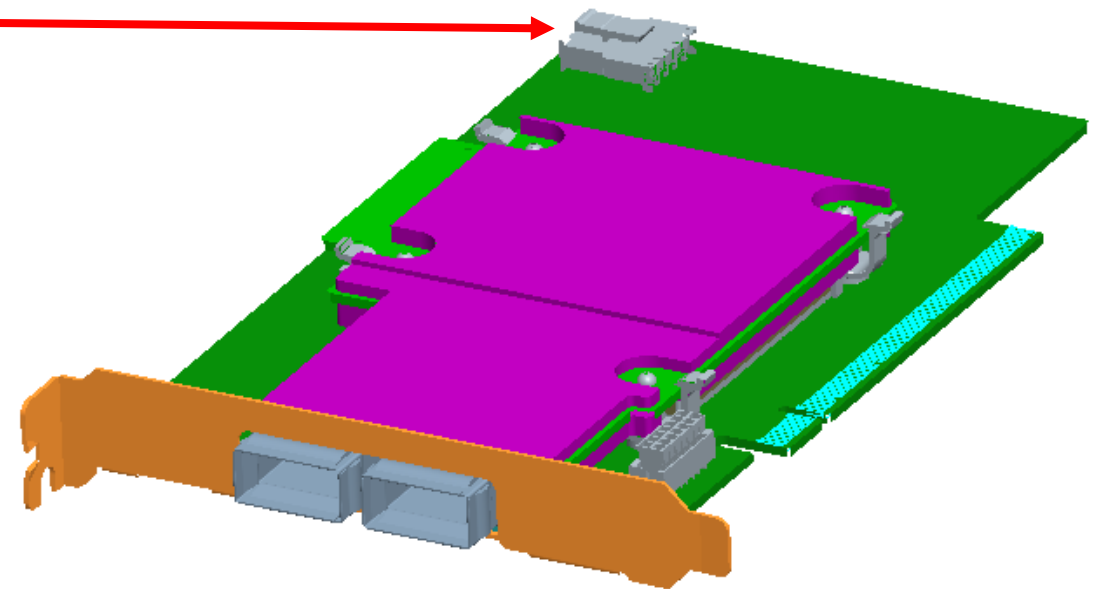
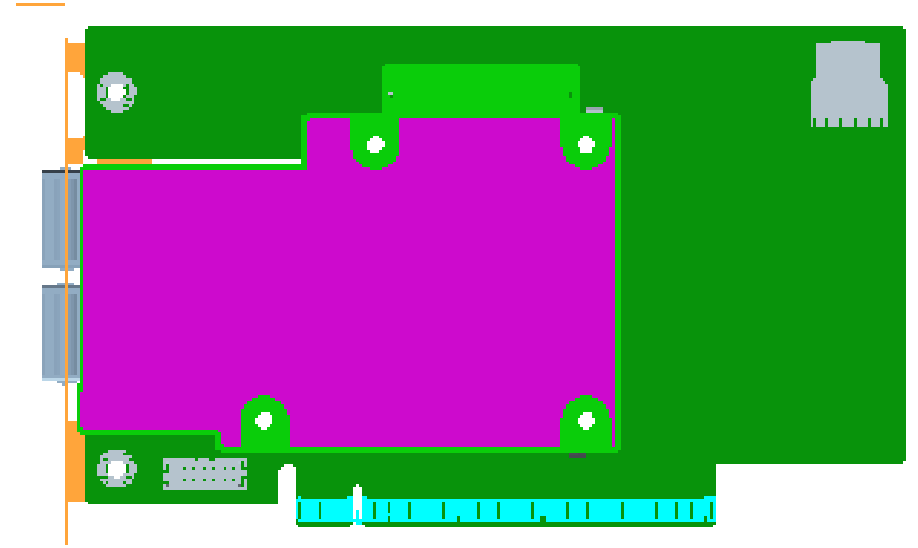
- TPM 2.0



OCP Mezz Adapter

Enables In-Band Management Ethernet

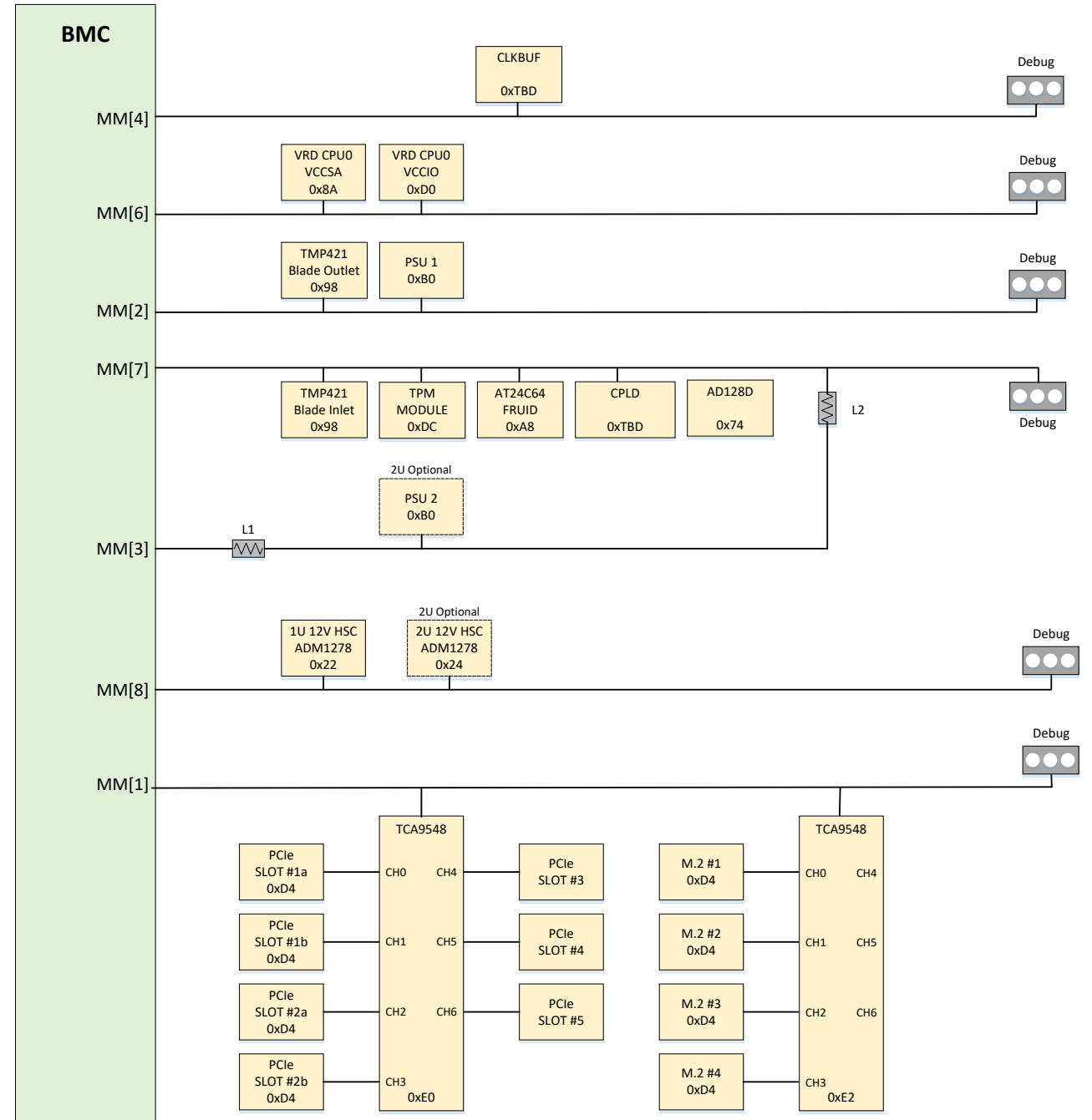
- FHHL PCIe Adapter
- Supports OCP Nic Mezzanine
- Meets PCIe Mechanical Spec with Mezz installed
- Supports cabled NCSI



I2C

Primary Telemetry Monitoring

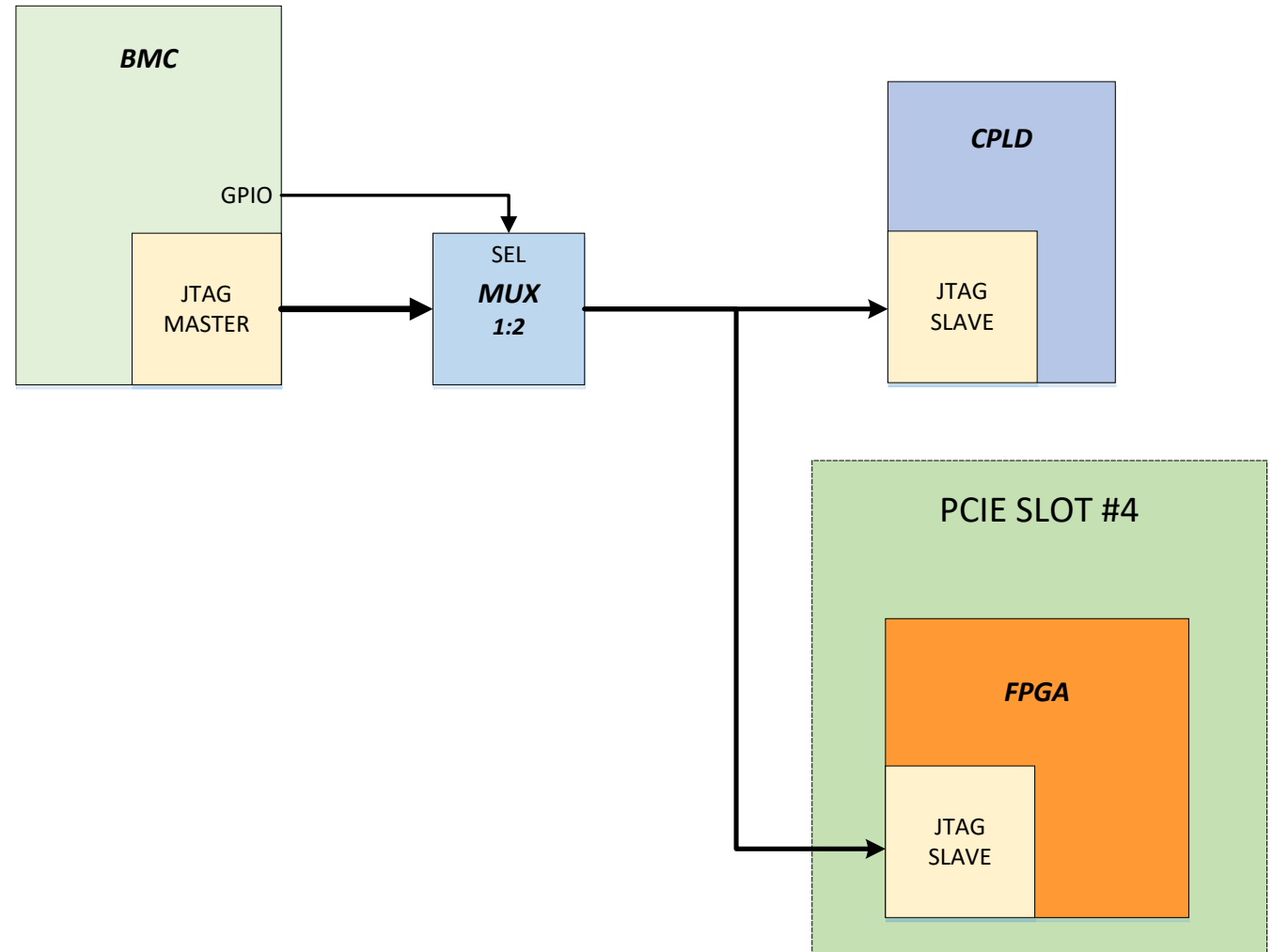
- M.2's
- PCIe Slots
- PSU (1U + 2U)
- Onboard Temp Sensors
- Voltage Regulators
- Hot Swap Controllers



Management

JTAG MASTER IN BMC

- Support for local CPLD
- Support for PCIe Slot #4
 - FPGA CArD



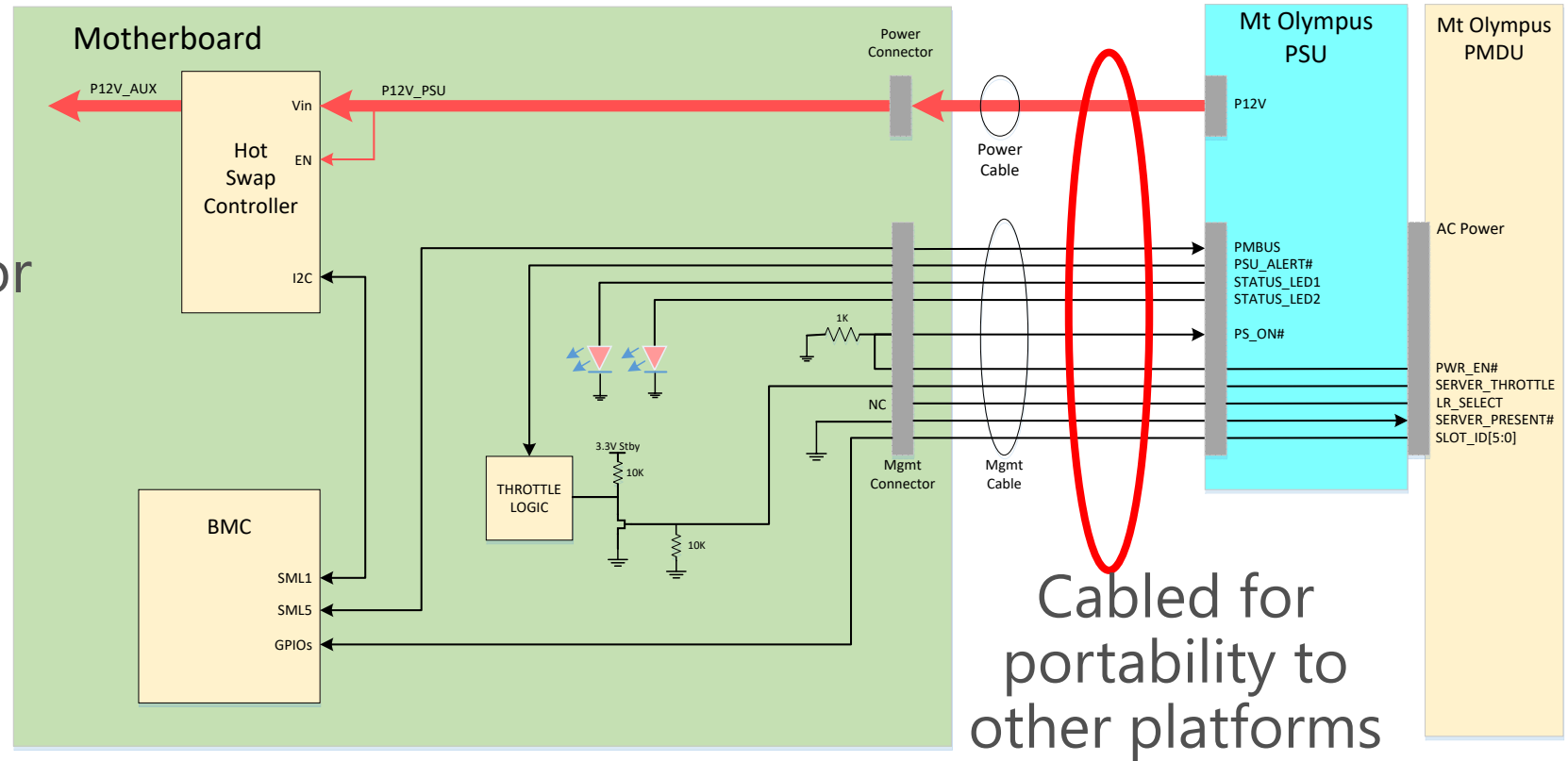
Power Management / Rack Interface

PSU

- Dual AC 3Φ Input
 - 208V, 400V, 415V
 - Internal Feed Selector
- PMBus support
- Status LEDs

Management Pass-thru

- PRESENT#
- PWR_EN#
- THROTTLE
- SLOT ID



Power Throttling

Enables more servers per rack, higher data center efficiency

- Data Center circuit breaker protection
- Protection against PSU faults

External Sources

- Rack Manager (Rack Level)
- PSU Alerts

Internal Sources

- 12V Over-current Monitor
- HSC Alerts

Supportability

Front Panel

- 2 USB 3.0 - KVM
- 10GbE
- LEDs

Internal

- Processor Debug
- 1 USB 3.0
- I2C Headers
- Standard Jumpers
- Debug LEDs (visible through front panel)

PLD Update/Recover

- BMC JTAG Host

LEDs

Front Panel

- UID – Blue LED indicating blade to be serviced
- Power Status LED – Indicates status of system and standby power
- Attention LED – Indicates server error has occurred
- GbE Activity – Indicates Management (GbE) network activity

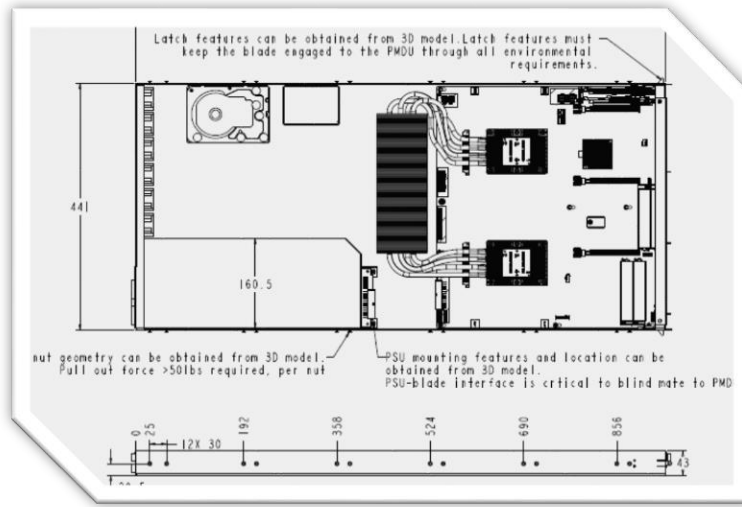
Internal

- POST Code LEDs – Indicates boot state
- Catastrophic Error LED – Indicates catastrophic error
- BMC Heartbeat – Indicates BMC is running
- PSU Status LEDs
- SATA LED – Indicates SATA storage activity

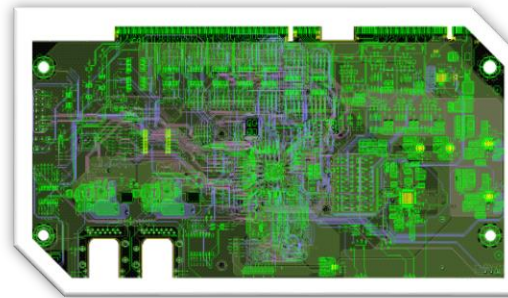
Project Olympus OCP contribution



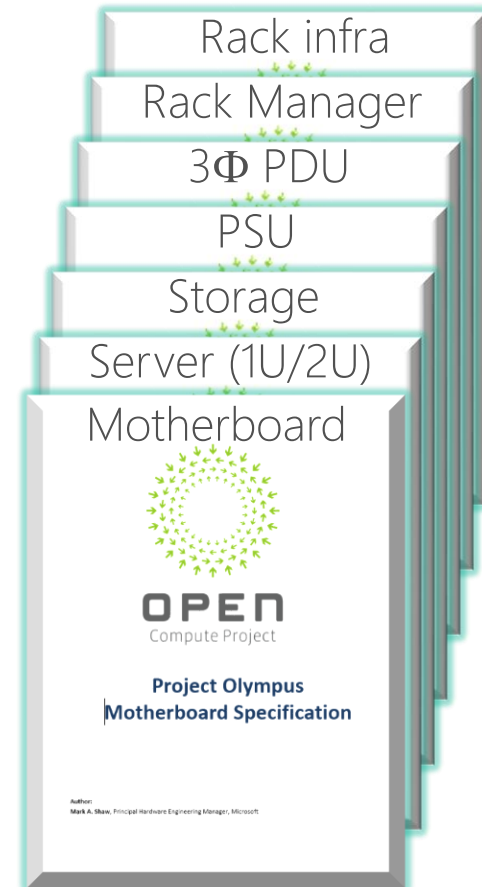
Mechanical CAD



Schematics & Board Files



Specifications



Source Code

```
/// Gets Fan speed in RPM
/// <param name="fanId">target fan Id</param>
/// <returns>Fan speed in RPM</returns>
internal FanSpeedResponse GetFanSpeed(byte fanId)
```

Available on OCP
Github page

https://github.com/opencompute/Project_Olympus