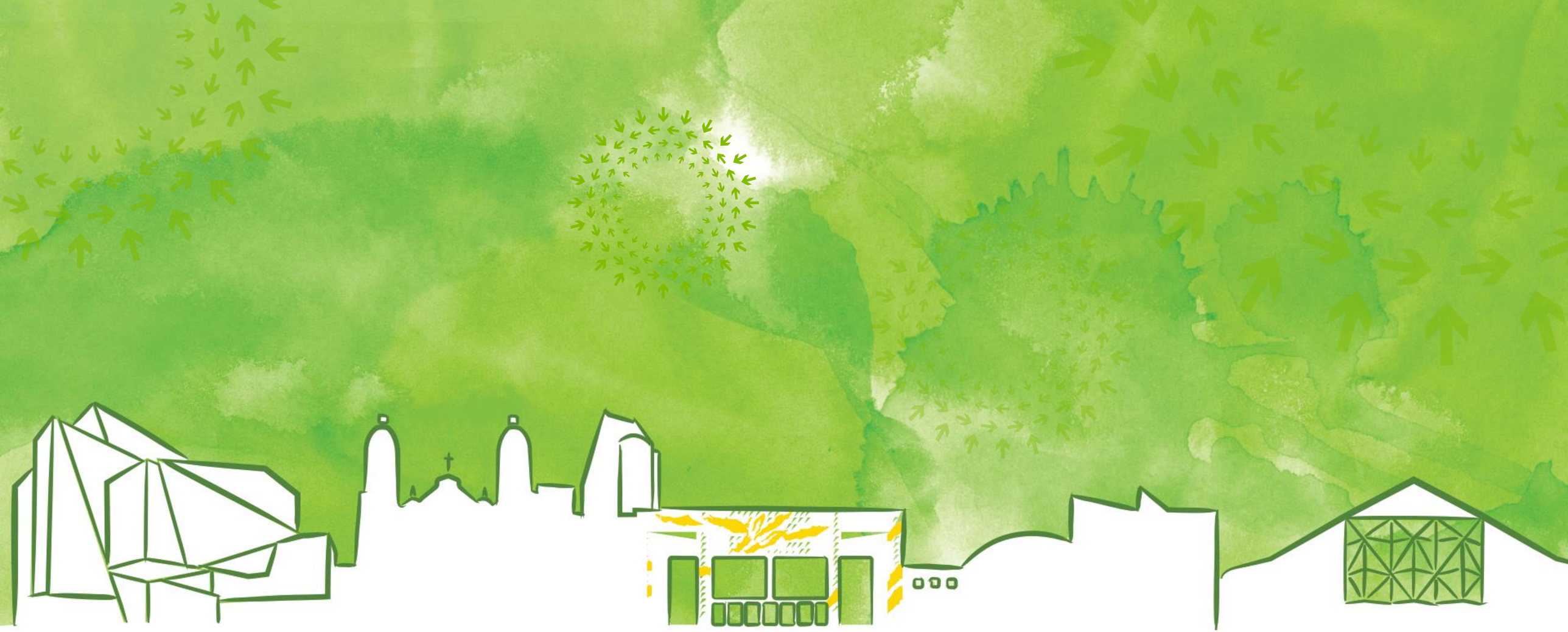

OCP U.S. SUMMIT 2016

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Open Rack Management Backplane & Shared Cooling Zone

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Content

Overview of Intel® Rack Scale Architecture Demo

Open Rack Management Backplane Connection

- Benefits of Rack Management
- Overview of Design Guide Content
- Proposal: Include Optional MBP Connector/Pin-out in Standard

Open Rack Shared Cooling Solution

- Benefits of Rack Shared Cooling
- Overview of Design Guide Content
- Proposal: Add Rack Fan Mounting Features to Standard

Overview: Intel® Rack Scale Architecture Demo

Intel® and Quanta® have developed a demo rack to showcase Intel technology and provide a software development vehicle for Intel® Rack Scale Architecture. These demos have appeared at the past two Intel® Developer forum events and at the 2015/2016 OCP summits, and are in use at multiple Intel® customer sites.

Features included in demo unit:

- 26 OU rack on casters
- Rack Management Backplane and Controller
- Two 11 OU Power Zones
- Two 8 OU Shared Cooling Zones
- 4 OU at Top-of-Rack for Switches, Optical Patch Panels, etc.

Management Backplane Connection for Open Rack

Benefits of Rack-level Management with Intel® Rack Scale Architecture

Open Rack does not currently address rack-level management. A central rack manager provides benefits such as:

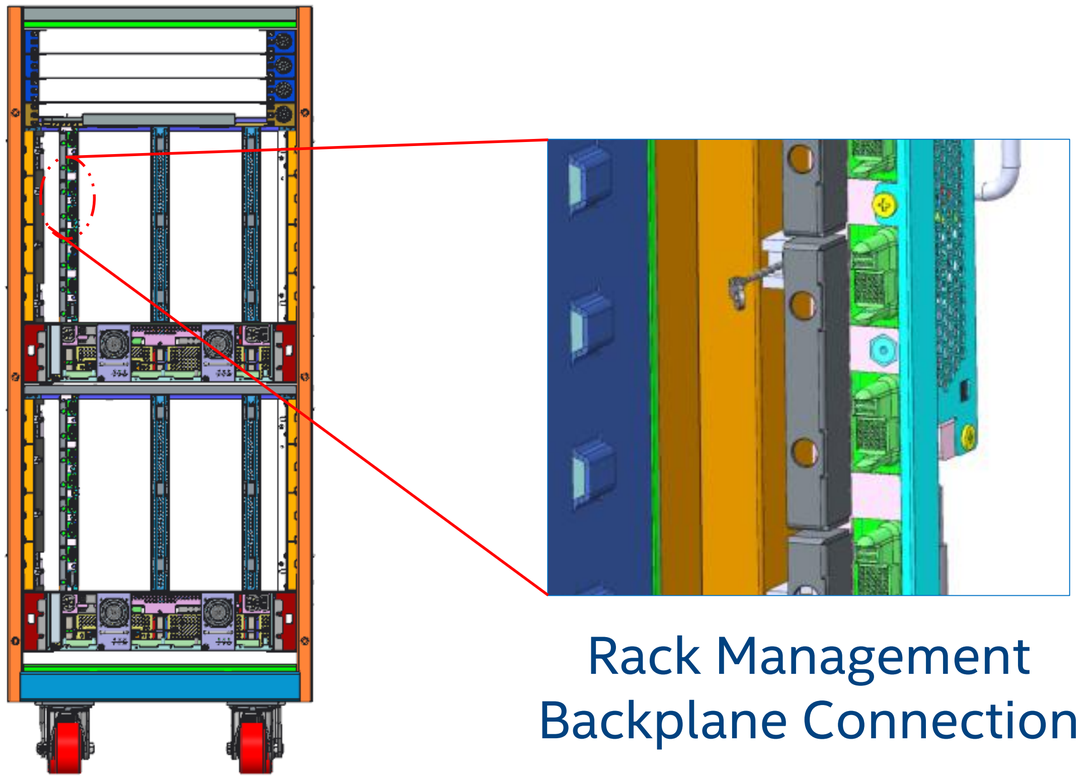
- Creation of hardware resource pools
- Standardized management interface through open API's
- Allows for easily upgradeable, modular multi-node systems
- Reduce capital costs (ex. Server utilization optimization, selective upgrade)
- Assign and balance system workloads
- Gather and monitor rack-level usage data
- Provide rack fan control and optimize rack power allocation

Vendor flexibility through management standardization

Rack Management in the Demo

Intel® and Quanta® developed a rack management system for the demo unit consisting of:

- Rack manager unit
  - Demo used mini-PC
- Management backplane(s)
  - At LH bus bar location
- Blind-mate server-backplane connection
  - Featured in design guide

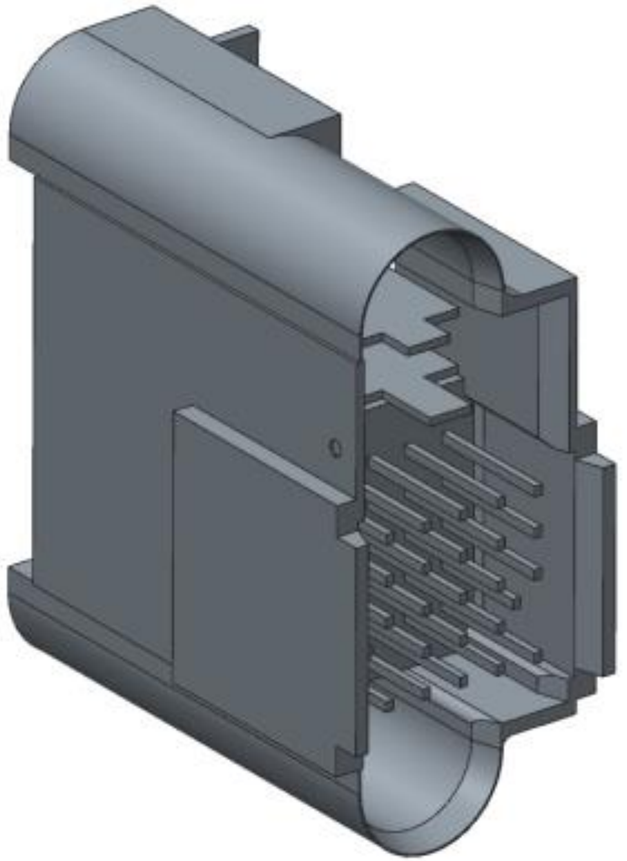


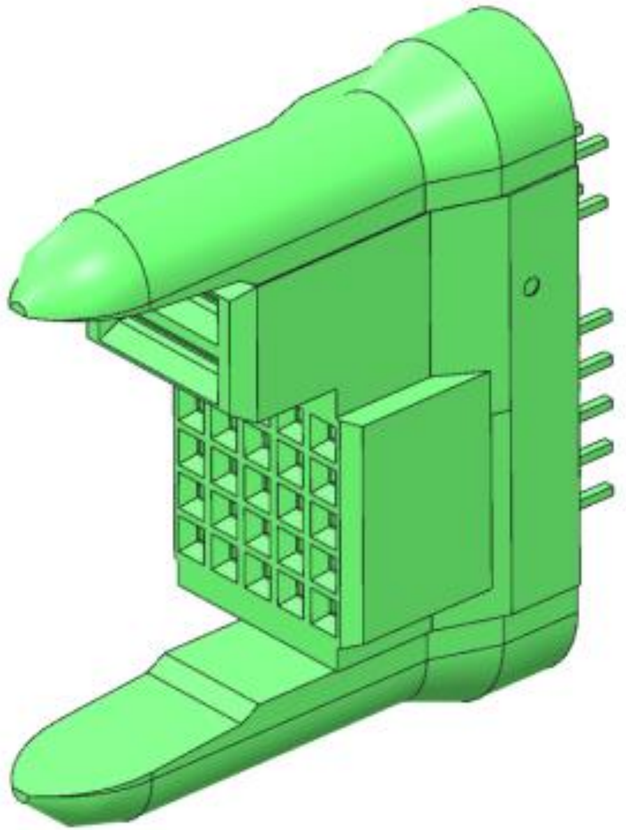
Rack Management Backplane Connection

Management Connector

Features:

- Self-aligning blind-mate connection
- 25 signal pins
- Three stages of pin engagement
- 2 power blades
- Available from FCI and TE Connectivity

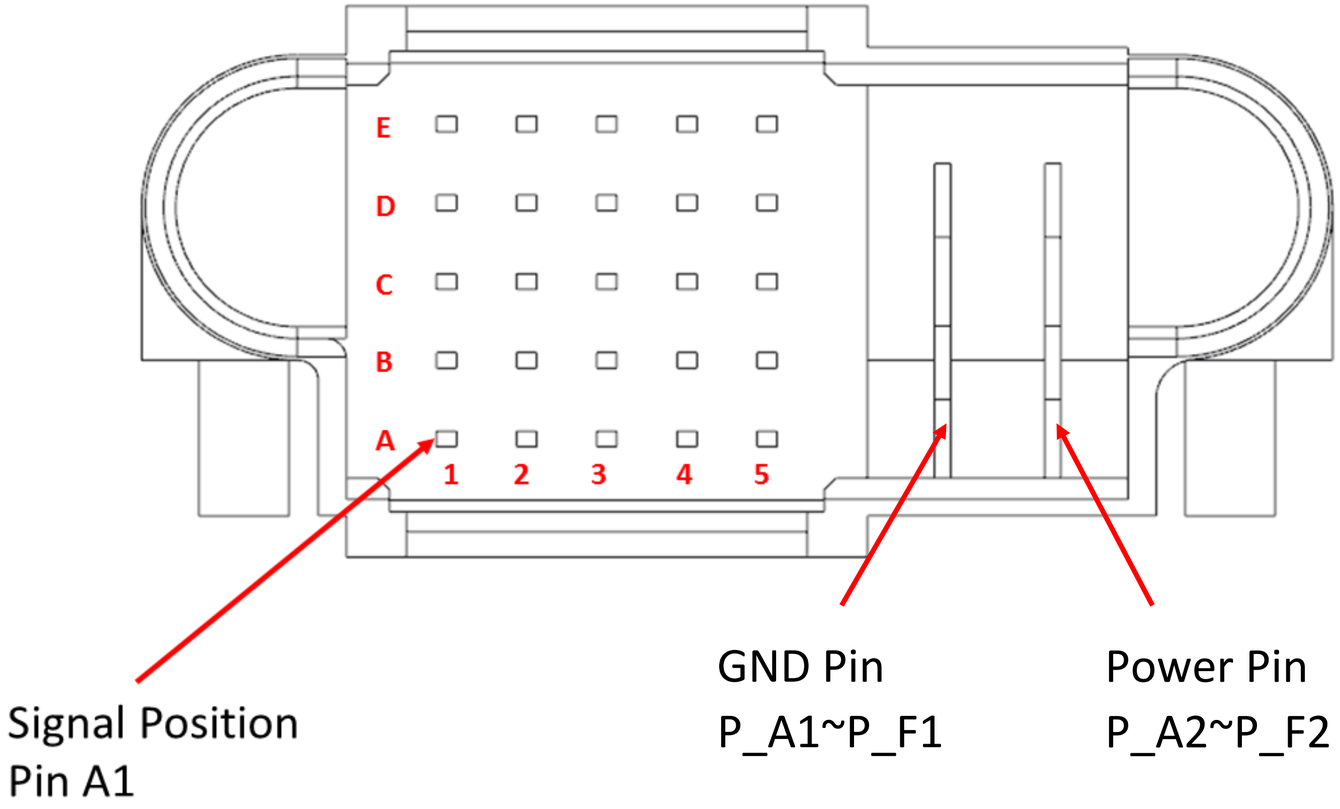




Connector Pin Out

Connector pin definitions allow for:

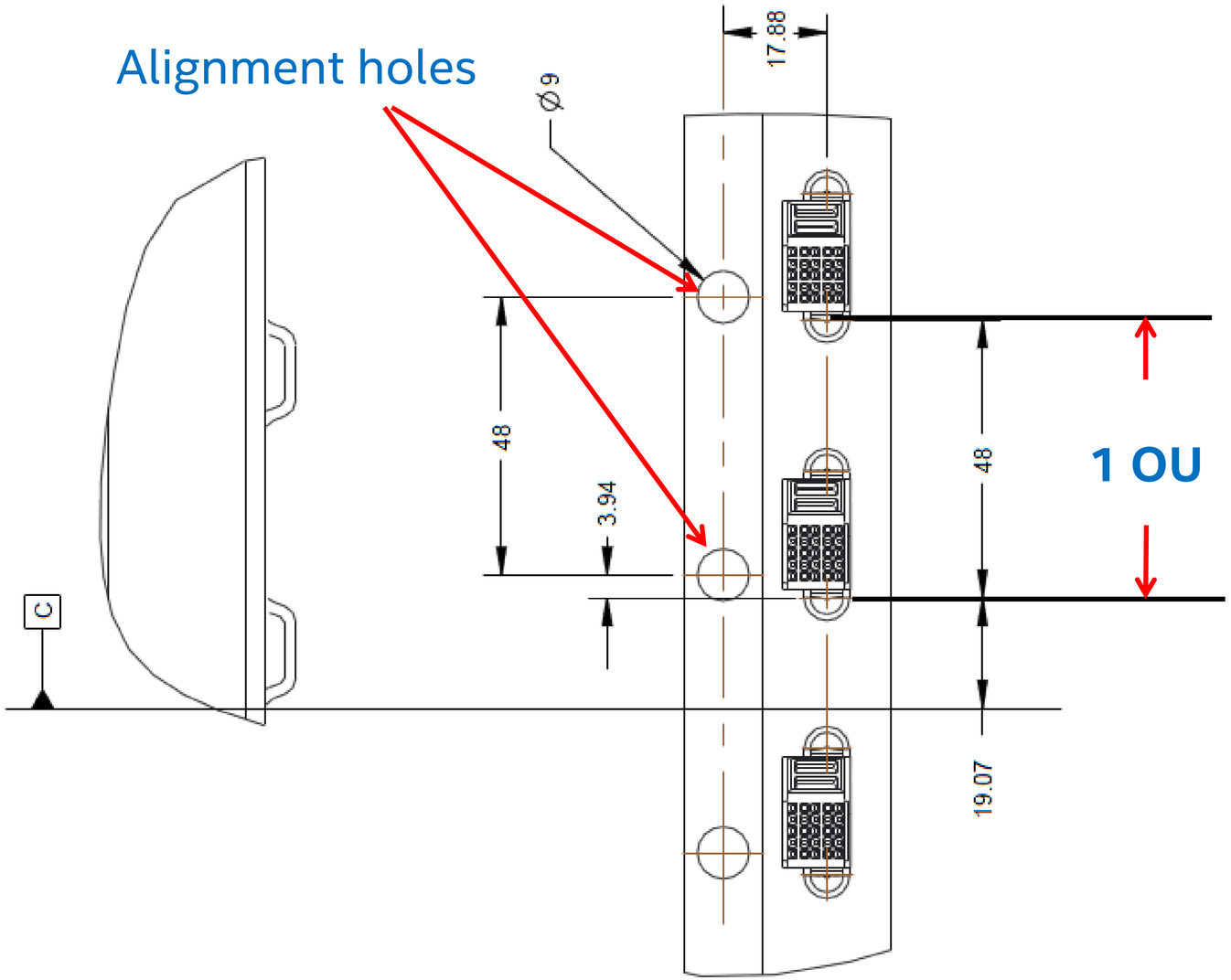
- Management Ethernet Communication
- IPMB Clock, Data buses
- UART Serial Connection
- Tray ID designation
- Critical State Power throttling
- Backplane/Tray Presence Detection
- Tray interrupt signals and resets
- 12V Power/Ground to Backplane



4 Pins have been left as reserved

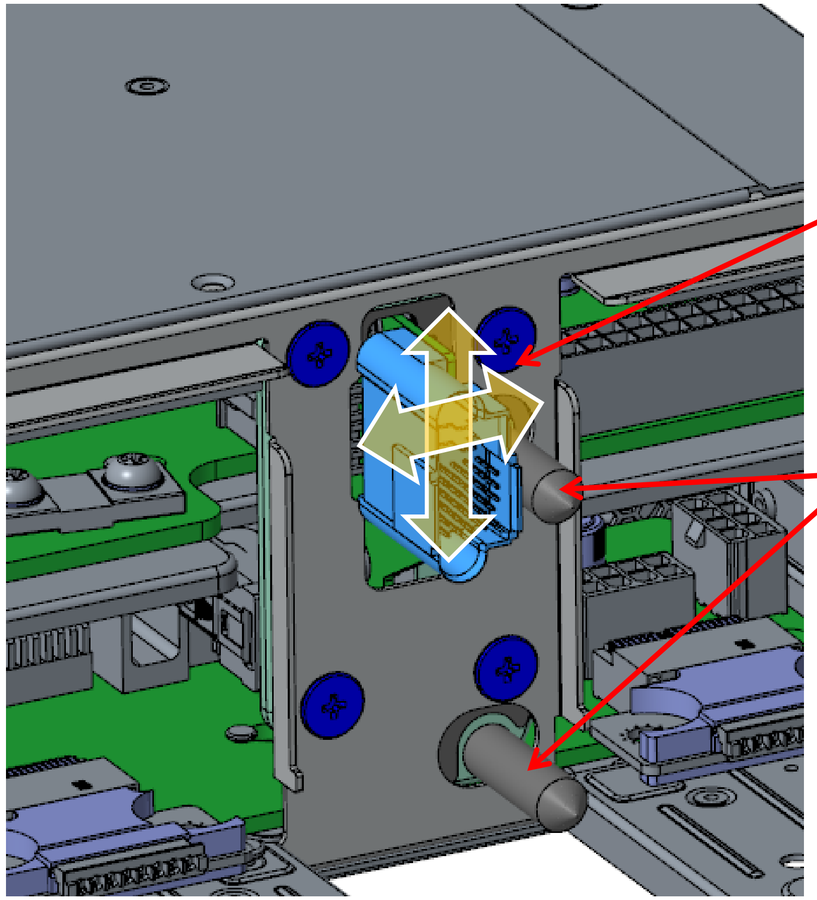
Key Mechanical Features – Backplane

- Backplane located at left-hand bus bar position
- Connections at 1 OU increments
- Alignment holes to accept pins on IT equipment



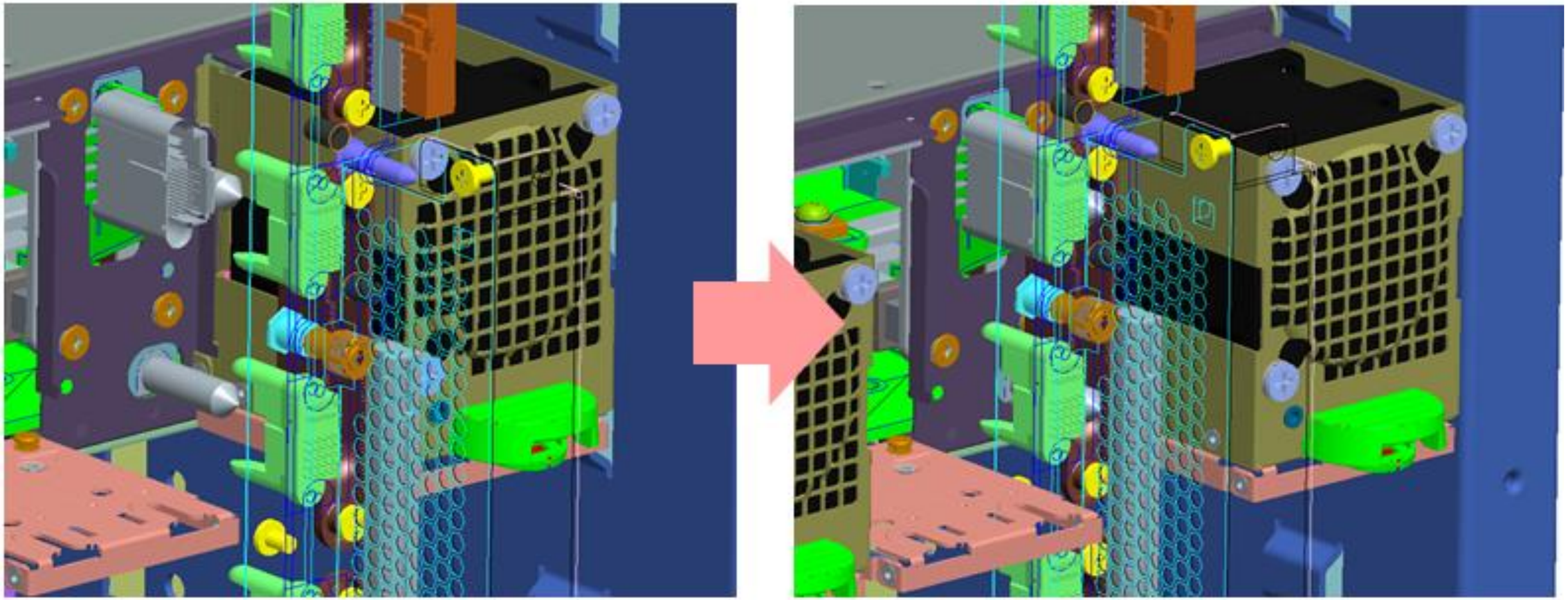
IT Equipment Design Considerations

- Coarse alignment pins serve as initial guides
- Compliant/floating mounting system on IT equipment to accommodate rack tolerances



2 OU server with single MBP header

Blind-mate Connection



Example of 2 0U server with single MBP header docking to management backplane

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Shared Cooling Solution for Open Rack

Benefits of Rack-level Cooling

Open Rack does not currently address rack-level cooling. A zone-based cooling system provides benefits such as:

- Reduce capital costs
  - Fewer fans needed per rack
  - Fans and IT equipment can be refreshed independently
- Provides rack-level cooling redundancy for IT equipment
- Increased power efficiency with larger fans
- Service fans without powering down IT equipment

Improved cost, efficiency, and serviceability

Overview – Shared Cooling Solution

Intel® and Quanta® collaborated on the design of a shared cooling zone for Open Rack. The demo utilizes rack-level fan speed control and cooled zones that included up to 16 server sleds and 4 network switches each. A design guide is in process.

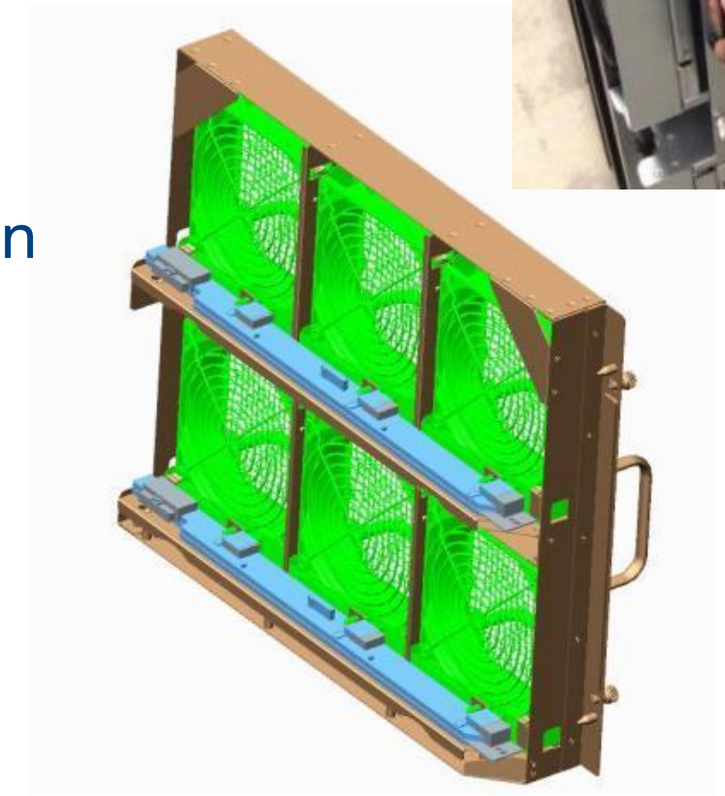
Features:

- Fan trays mounted to back of rack
- Modular, hot-pluggable fans
- (2) 8 OU sealed cooling zones

Fan Tray

Highlights:

- 2 X 3 Fan Array for 8 OU cooling zone
- 5 + 1 Fan Array provides redundancy
- Two PCBA’s for signal/power distribution
- Service door for rack maintenance
- Utilizes 12V rack power



Fan

Specs:

- 140 X 38 mm
- Hot-swappable module, snaps into fan tray
- 8-pin connection for power, PWM, tach, and status LED signals

Cooling Zone Design Considerations

Objective: To fully seal the cooling zone to prevent air leakage

Top and bottom cooling zone partitions

Foam seals at all air gaps (ex. bus bars, power shelf seam)

Added side panels to exterior of rack

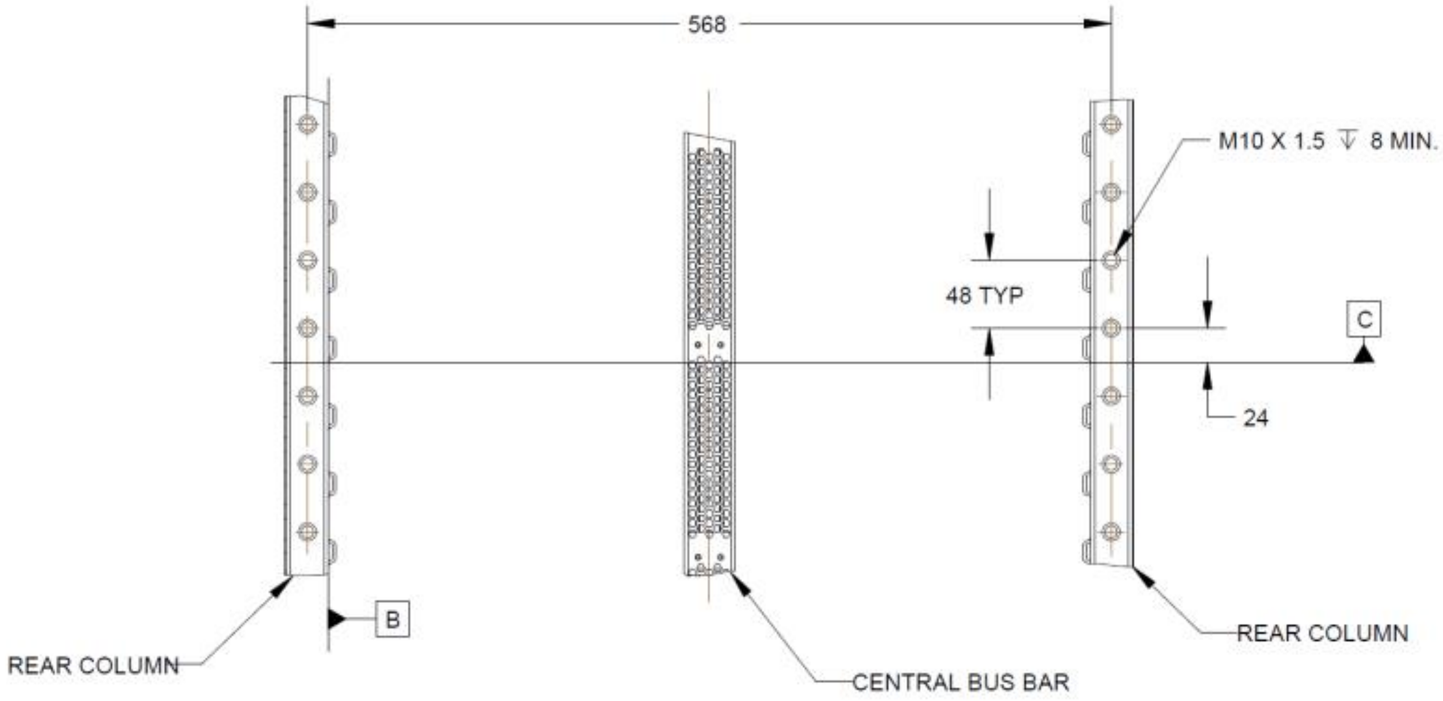
IT equipment space fillers used for open tray positions.

Shared Cooling Rack Rear Mounting Pattern Proposal

Proposal: Update standard to include mounting features on the Open Rack rear columns

- Provides attachment points for rack fans or other equipment.
- Pattern repeats regardless of rack height.
- Seeking partnership with interested parties to further align on the design

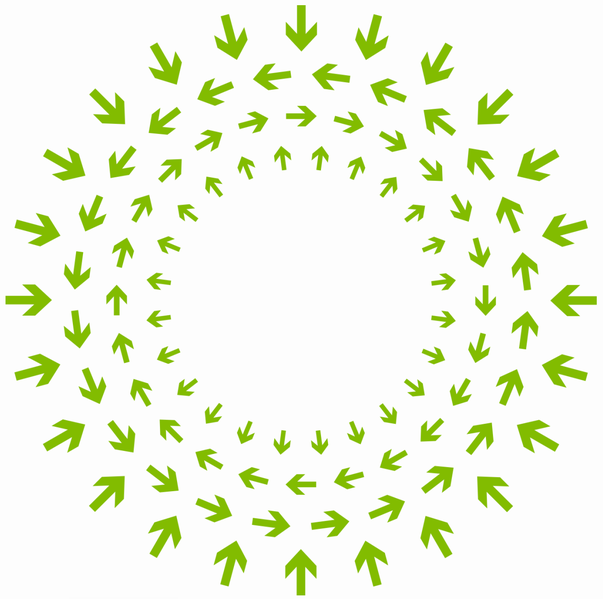
EXAMPLE:



Rack Back View

If interested…

- Visit Intel booth at OCP Summit to check out the demo rack
- Talk with me after this session
- Latest Management Backplane Connector Design Guide (Rev. 0.6) posted on Open Rack wiki page:
  - opencompute.org/wiki/Open_Rack/SpecsAndDesigns



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