OCP U.S. SUMMIT 2016  March 9-10 | San Jose, CA
Open Rack Management Backplane & Shared Cooling Zone

Ethan Long
Sr. Mechanical Engineer
Intel Data Center Group
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
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
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
Blind-mate Connection

Example of 2 0U server with single MBP header docking to management backplane
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)**
- **IT equipment space fillers used for open tray positions.**
- **Added side panels to exterior of rack**
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
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](opencompute.org/wiki/Open_Rack/SpecsAndDesigns)