Meta 51.2T Ethernet Switch

Minipack3 and Cisco 8501

OCP GLOBAL SUMMIT | OCT 15-17, 2024
SAN JOSE, CA

NETWORKING

Meta 51.2T Ethernet Switch Minipack3 and Cisco 8501

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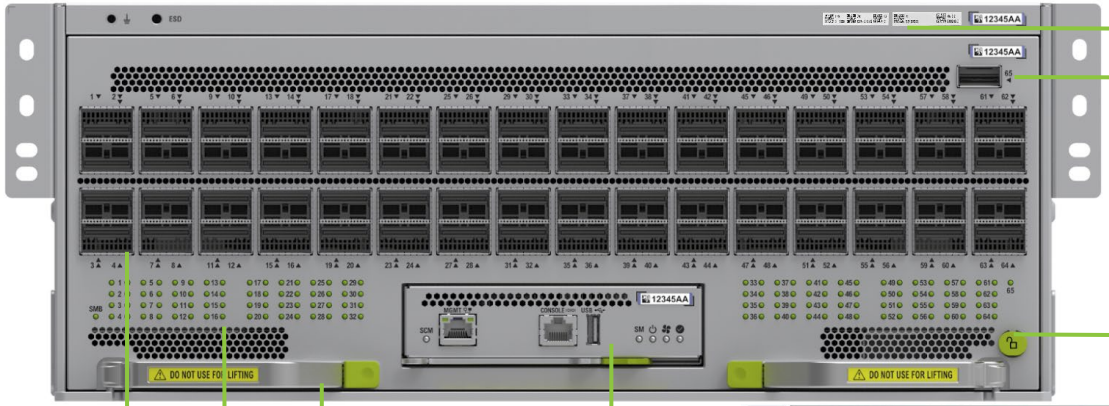
System Overview

- Meta's third-generation Minipack switch
  - Minipack3 based on Broadcom Tomahawk5 ASIC
  - Cisco 8501 based on Cisco Silicon One G200 ASIC
- Features 64x OSFP ports, 128x 400GE non-blocking switch capacity
  - Backward compatible to 200GE and 100GE standards
  - PHY-less design
- One QSFP28 management port for back-end network and TOR applications
- Intel Icelake-D CPU for network platforms
- Equipped with Meta 2x400G-FR4 OSFP optics modules
- BMC-lite control-plane architecture for efficient platform management
- PlatformManager for efficient BSP management
- PSU-agnostic design allows flexible PSU SKU deployment at Meta data centers

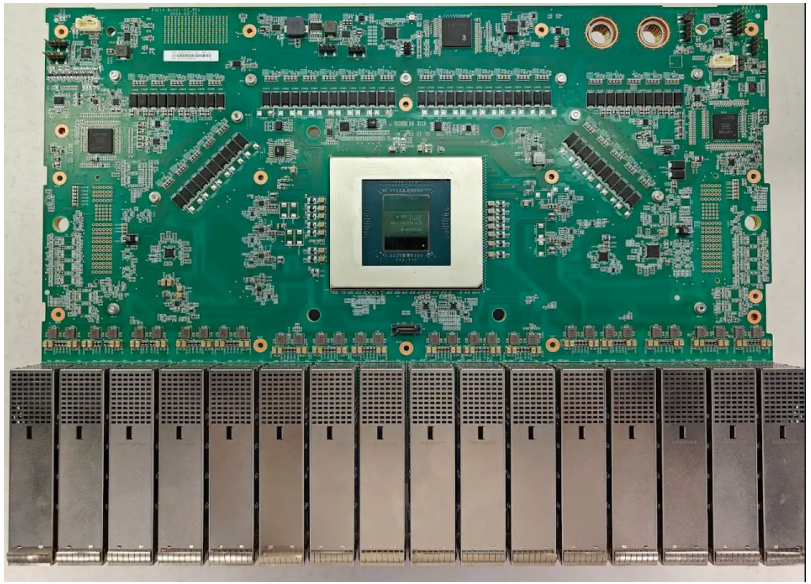
Minipack3 Chassis Design Overview

Minipack3 Front and Rear Views



Minipack3 Switch Main Board

- Broadcom Tomahawk5 51.2T switch ASIC
  - 64x 2x1 belly-to-belly OSFP user ports, PCB routing
  - 1x QSFP28 management Ethernet port, flyover cable
- Two DOM FPGAs and one SMB CPLD
  - An innovation to use Lattice Semi MachXO3 and ECP5 as OSFP low-speed host controller
- 42-layer EM892K+EM370Z
  - Single lamination, 5.6mm thickness
  - 10-layer high speed signals
  - 2UP panel
- Simple interface, open to alternative SMB designs

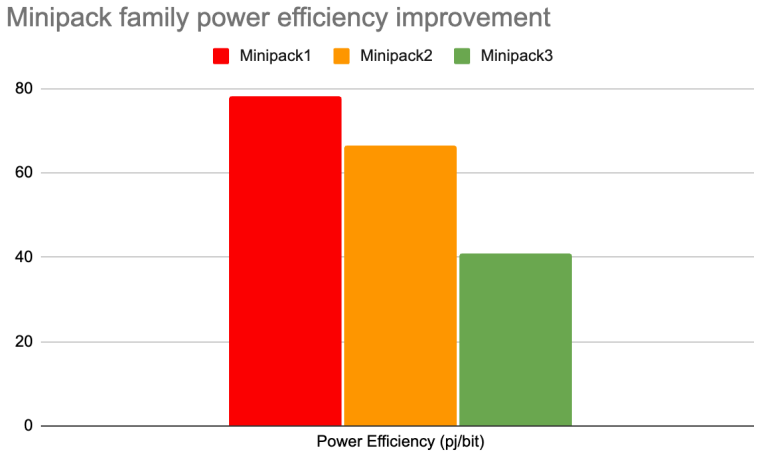


Minipack3 Supervisor Control Module

- Netlake CPU daughter-card with COM Express connectors
  - Intel IceLake-D1736 CPU (8 cores @ 2.20GHz, 12MB LLC, 55W TDP)
  - 2x 32GB DDR4 DIMM w/ ECC, 2933MT/s
  - TPM 2.0 device (soldered down)
- RunBMC Daughter-card
  - Aspeed2620, 2GB DDR4
- M.2 512GB SSD
- OOB Gigabit Ethernet switch

Minipack3 Power, Thermal and Acoustics

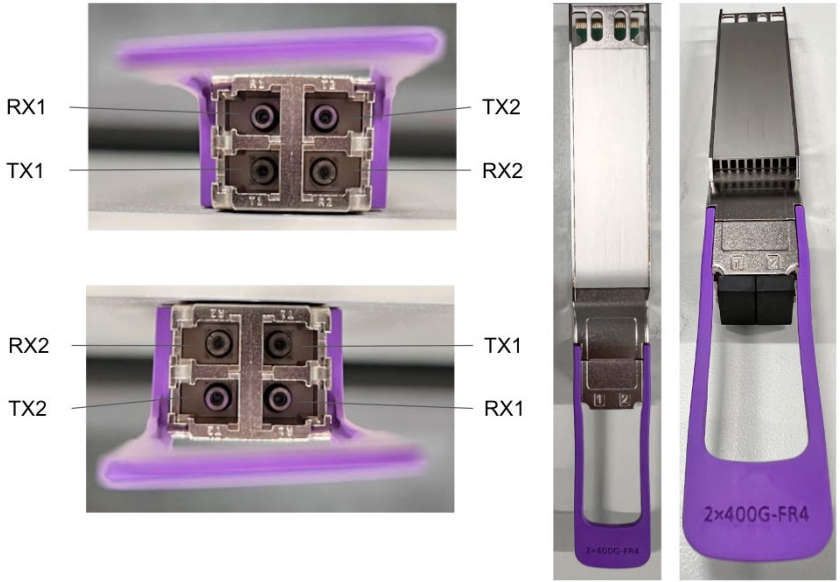
- Power rating: 3,000W
- Max power for Meta typical use cases: 2,100W
- Sound Pressure Level: 71 dBA at 30°C/6000ft
- Operating temperature range
  - [5°C, 30°C] up to 6000ft altitude
  - [5°C, 35°C] at sea level
- PID and linear lookup table Fan Speed Control



Meta typical applications	128x400GE-FR4	128x200GE-FR4	128x100GE-FR4
max typical power spec (W)	2,100	1,570	1,390

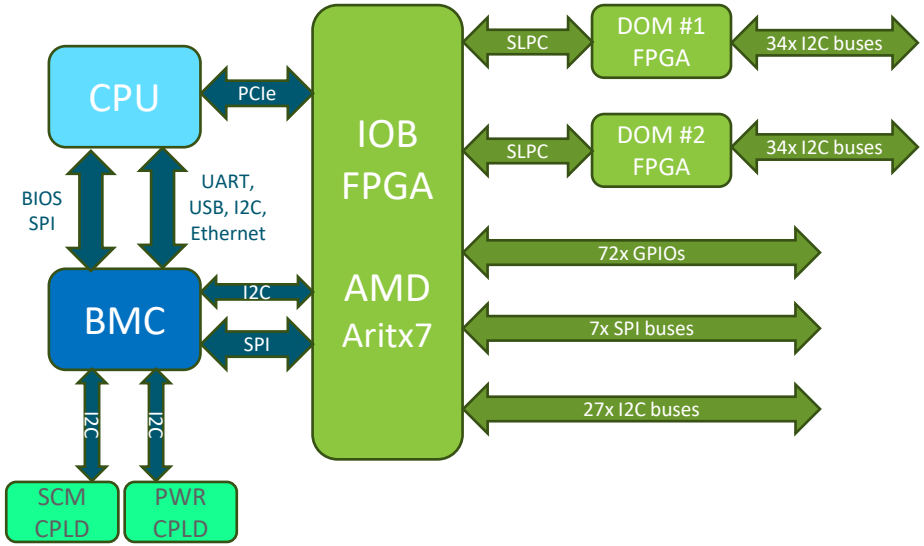
Pluggable modules

- Meta's 2x400G-FR4 OSFP optics modules
  - Each optics module supports dual LC connections
  - Each optics module supports 2x400G, 2x200G, 400G+200G, 200G+400G, 2x200G and 2x100G modes
  - 15-70°C case temperature
  - 16W max power consumption
  - 3Km reach on SMF



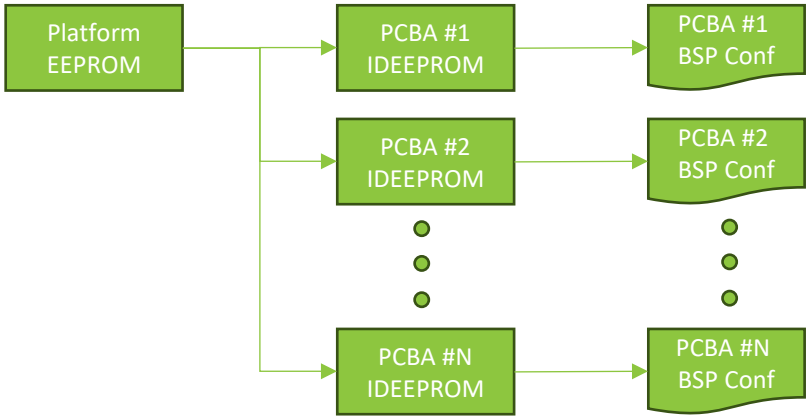
BMC-Lite Architecture

- BMC manages critical power-on sequence control, fail recovery and system event logs.
- CPU manages the VRMs, sensors, FW flash devices and fan trays through IOB, DOM and CPLD logic devices.
- Dual-boot and fail-recovery mechanism for FW resiliency
  - Dual-boot -- BMC, CPLDs
  - Fail-recovery -- BIOS, FPGAs



PlatformManager

- Standardized hardware interface and Type-Length-Value EEPROM format enable automatic discovery of components
- Generalized kernel modules facilitate easy expansion across multiple SKUs and platforms
- Greatly improved software New Product Introduction efficiency
- Flexible to implement second source hardware designs or respin for EOL parts



PSU Agnostics Design

- The objective is to streamline the procurement process.
- We can pre-build the units without the specific PSU SKU type being identified.
- It allows us to customize the PSU SKU at a later stage of the manufacturing process.
- System design, regulatory compliance and manufacturing process have been specifically tailored to achieve this objective.

Cisco 8501 – Engagement Model

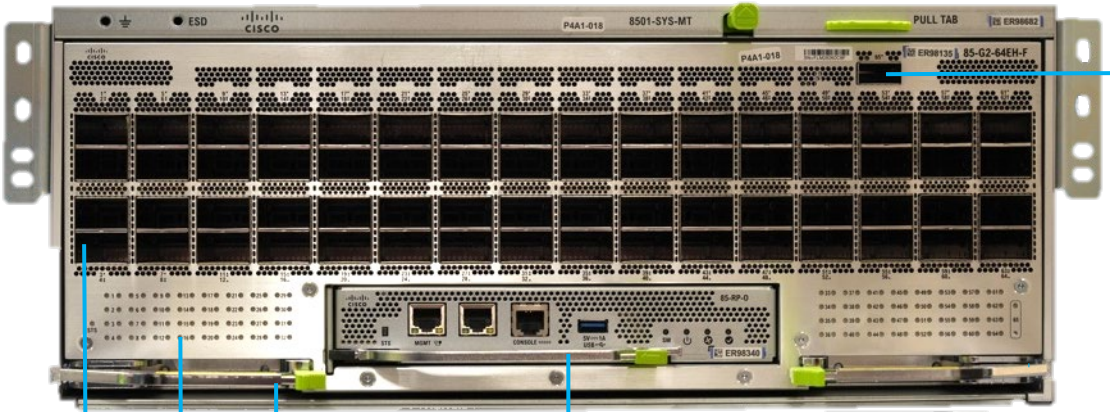
- Evolving partnership models
  - Wedge400C partnership was silicon only
    - Cisco Silicon One Q200 on Wedge400C
    - Deployed in production since 2021
  - Cisco 8501 partnership is gray box
    - Cisco Silicon One G200
    - Cisco-designed System
- Hardware Co-development with Meta & Cisco
  - Common feature set with Minipack3
  - Joint architecture & design reviews with Meta
  - Early prototype availability

Engagement Models

Platform	BW	Cisco Silicon, SDK, and SAI	HW & BSP	NOS
Wedge400C	12.8T	Silicon One Q200	ODM	FBOSS
Cisco 8501	51.2T	Silicon One G200	Cisco	FBOSS

Cisco Developed

Cisco 8501 Front and Rear Views



QSFP28 Port

OSFP Port

User port
LED panel

SMB Ejector

Horizontal SCM

Summary

	Performance	Reliable	Resilient	Ops Efficient	Power Efficient	NPI Efficient
51.2T Switch ASIC	feature				feature	
PHY-less design	feature	feature		feature	feature	feature
Netlake CPU Card	feature					feature
Single-lam PCB Construction		feature		feature		
BOM-optimized RunBMC	feature	feature	feature	feature	feature	feature
Modular SMB and SCM			feature			
Meta 2x400G-FR4 pluggable	feature		feature	feature	feature	feature
Fan and power input redundancy			feature			
FW resilient			feature			
Second source strategy			feature	feature		
BMC-lite	feature		feature			feature
PlatformManager			feature			feature
PID FSC	feature	feature			feature	
PSU agnostics design				Feature		

Call to Action

- Timeline for contribution availability
  - Minipack3 -- specs and design package submission in Sept 2024
  - Cisco 8501 – OCP-Inspired submission Sept 2024 timeline
- Timeline for Product/Facility availability
  - Minipack3 -- mass production Q1 2025
- Where to find additional information
  - Minipack3 -- www.celestica.com
  - Cisco 8501 – www.cisco.com

Thank you!