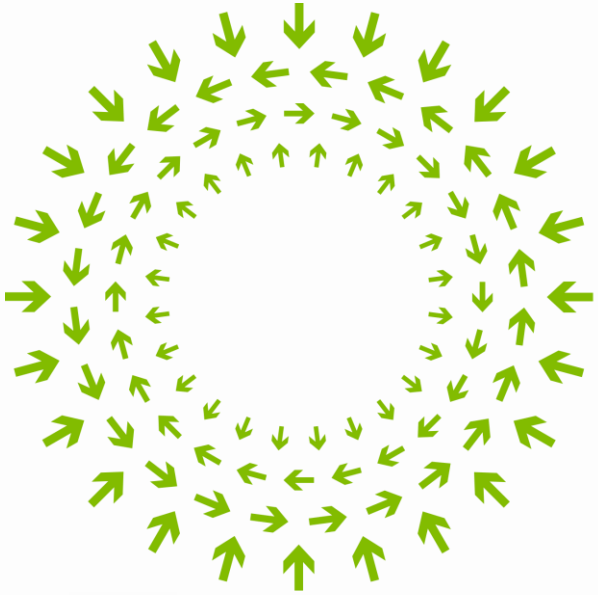
AT&T uCPE Specification



OPEN
Compute Project

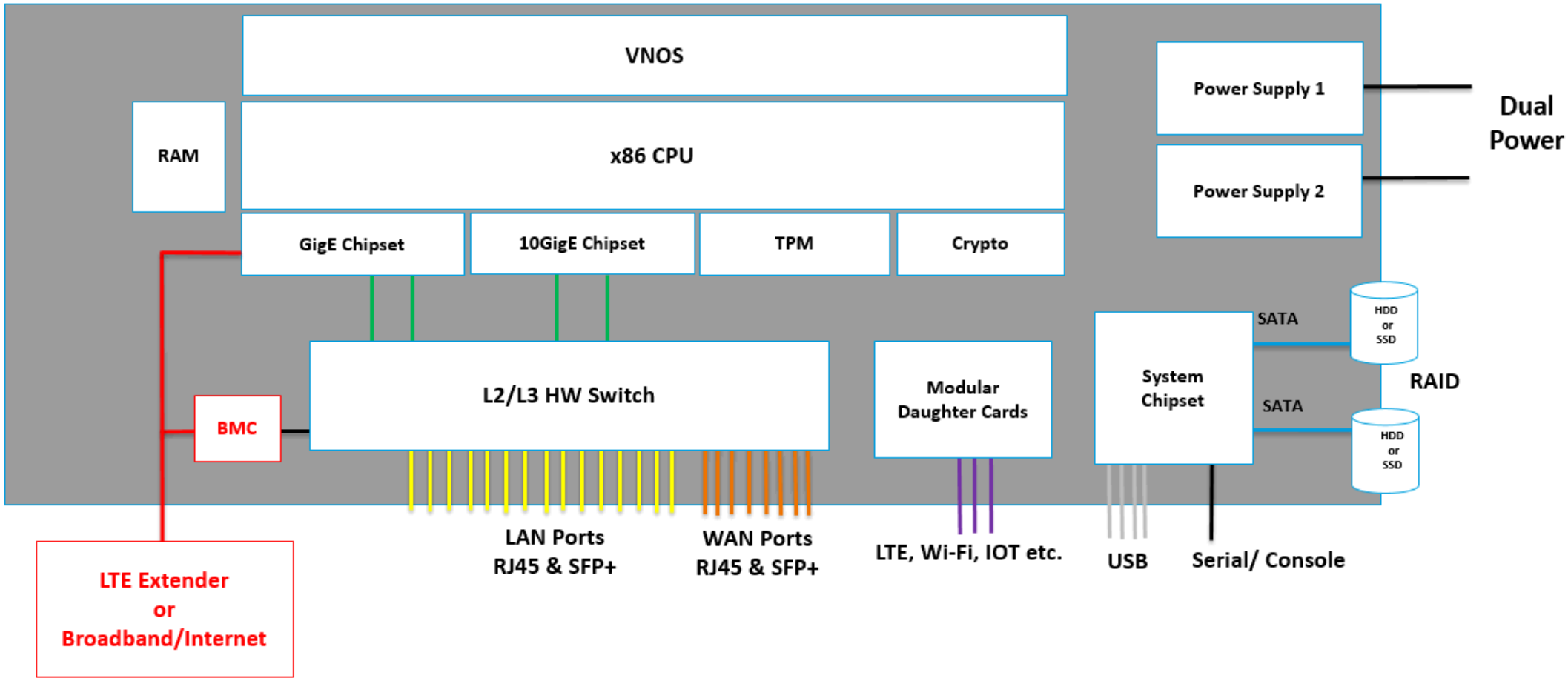
AT&T Team

AT&T OCP uCPE Specification

- AT&T submitted Universal CPE (uCPE) Specification ratified - Available on OCP Telco Wiki:
  - Currently the High level specification includes the hardware design requirements

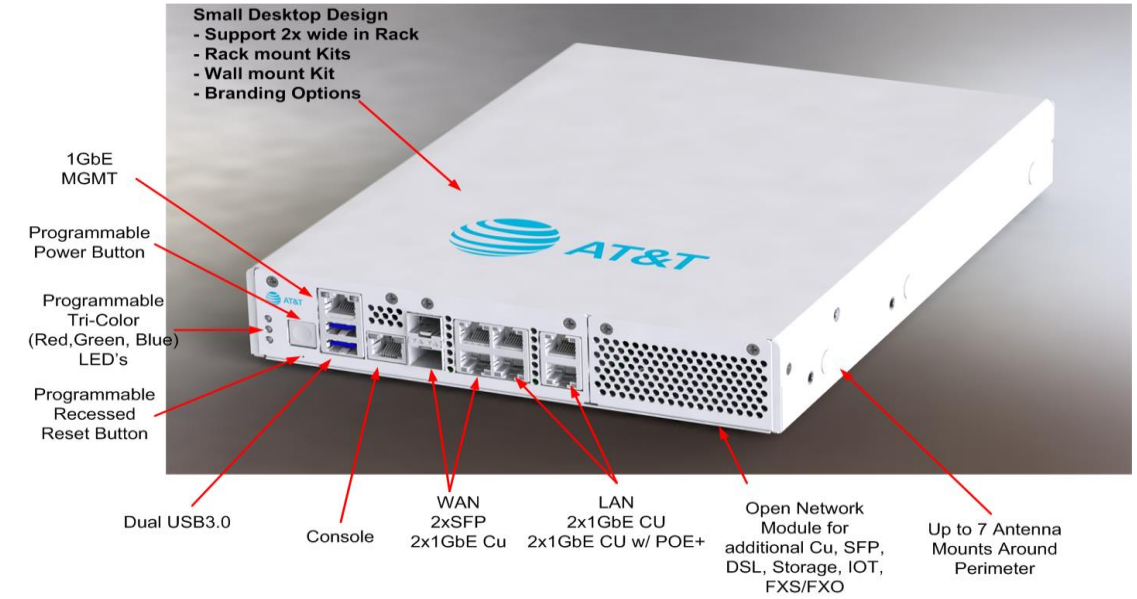
- Silicom Limited & Intel have agreed to submit their low level design to OCP:
  - Silicom has agreed to make the initial draft of the low level board design available to OCP by the end of 2Q18
  - They will provide the finalized board design by the end of 2018
  - This will include all four sizes of uCPE defined in the high level design

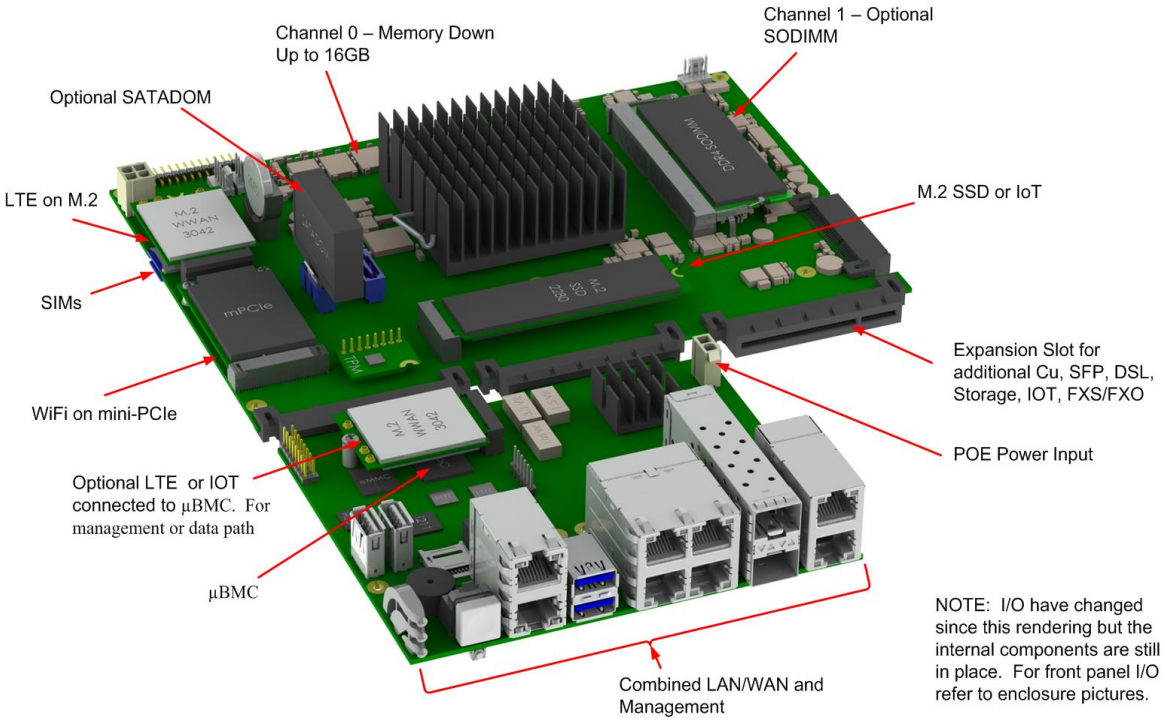
Whitebox uCPE Hardware – High Level Architecture



Extra Small

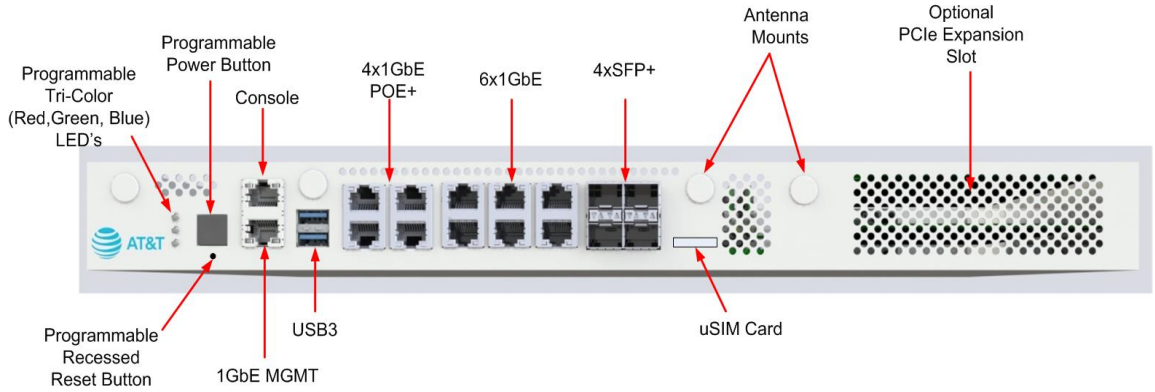
Component	
CPU	Denverton 4 Core C3558
Memory	8GB DDR4 ECC
Storage	64GB eMMC
Switch Silicon	Marvell 88E6190X
Switched Ports	LAN: 4 RJ45, (2 with PoE+) WAN: 2 RJ45 & 2 SFP
Non-switched Ports	1 RJ45 (Shared with BMC)
BMC	Yes, uBMC
TPM	Yes, Infineon SLB 6970 TPM 2.0
QAT	Included in Denverton
USB	2 External
Serial Console	1
Power	Single, with Dying Gasp from BMC
Form Factor	Desktop

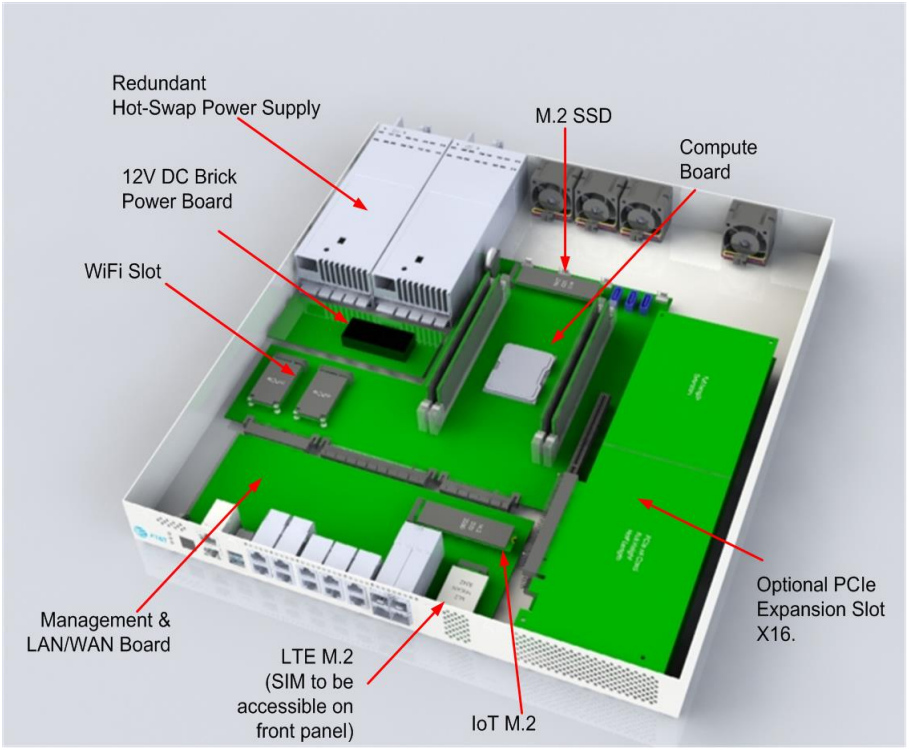




Small

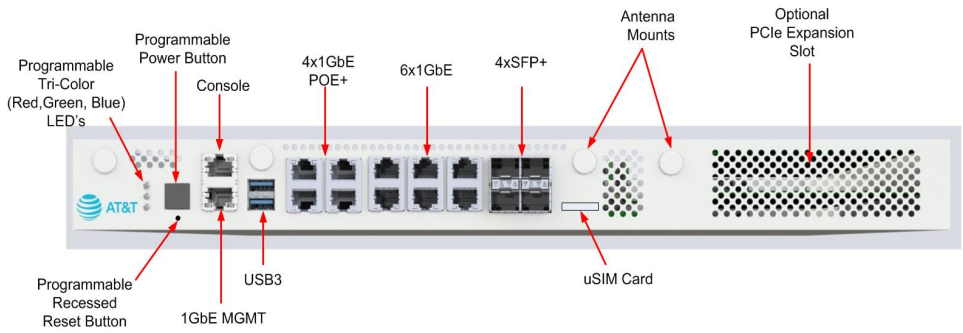
Component	
CPU	Xeon-D 4 Core 1521
Memory	16GB DDR4 ECC
Storage	200GB SSD Primary
Switch Silicon	Broadcom H3 BCM56160
Switched Ports	LAN: 8 RJ45 LAN, 2 SFP+ (4x PoE+) WAN: 2 RJ45 & 2 SFP+
Non-switched Ports	1 RJ45 (Shared with BMC)
BMC	Yes
TPM	Yes
QAT	No
USB	2
Serial Console	1
Power	Single, with Dying Gasp
Form Factor	1RU

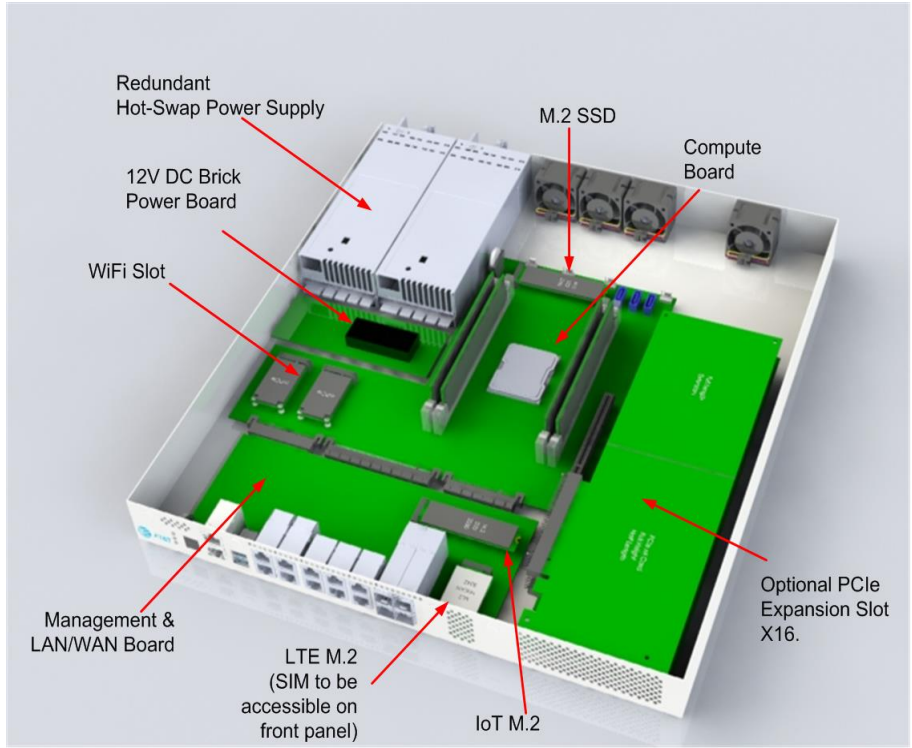




Medium

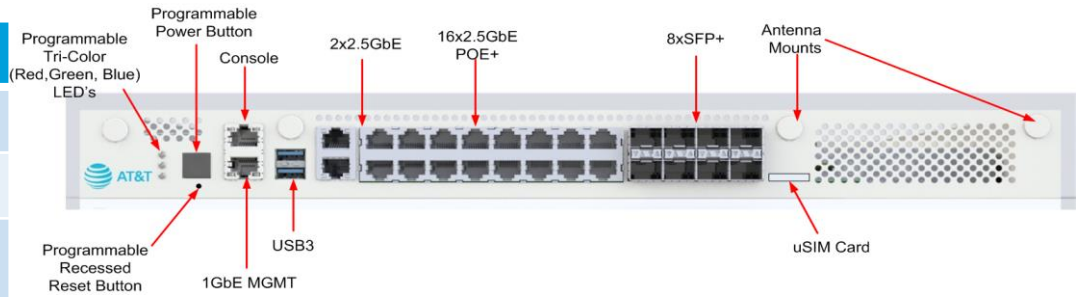
Component	
CPU	Xeon-D 8 Core 1541
Memory	32GB DDR4 ECC
Storage	400GB SSD Primary
Switch Silicon	Broadcom H3 BCM56160
Switched Ports	LAN: 8 RJ45 LAN, 2 SFP+ (4x PoE+) WAN: 2 RJ45 & 2 SFP+
Non-switched Ports	1 RJ45 (Shared with BMC)
BMC	Yes
TPM	Yes
QAT	No
USB	2
Serial Console	1
Power	Dual Redundant, with Dying Gasp
Form Factor	1RU

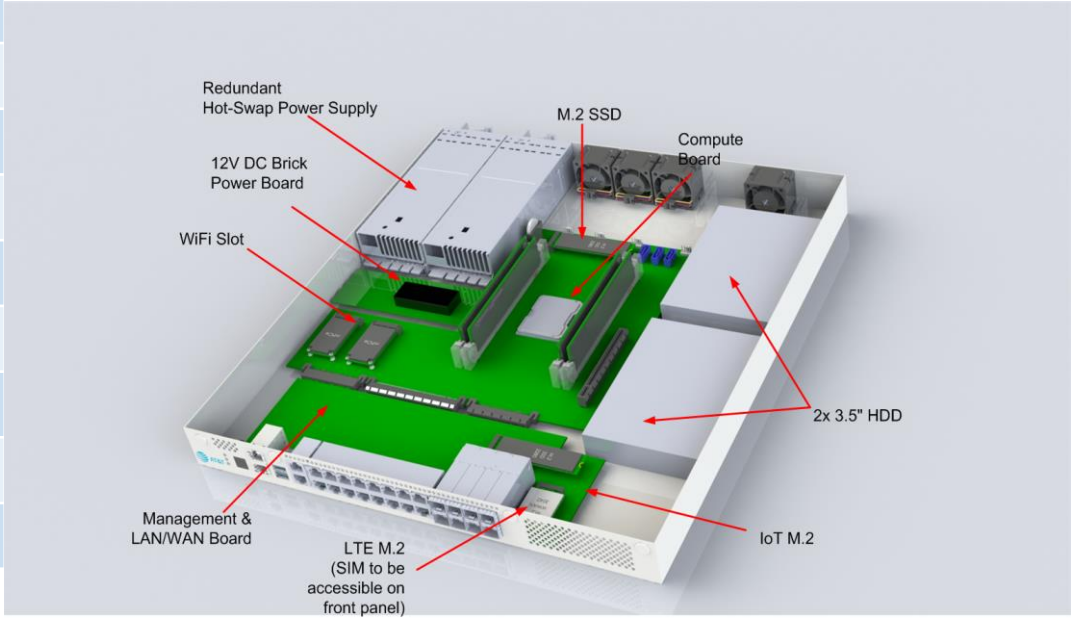




Large

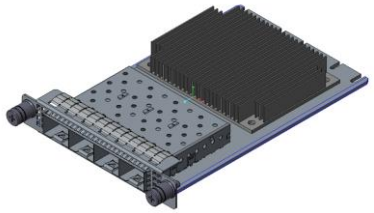
Component	
CPU	Xeon-D 16 Core 1577
Memory	64GB DDR4 ECC
Storage	100GB SSD Primary 2*3TB HDD Secondary
Switch Silicon	Broadcom H3 BCM56172
Switched Ports	LAN: 24 RJ45 1GE LAN, 4 SFP+ (24x PoE+) WAN: 2 RJ45 & 4 SFP+
Non-switched Ports	1 RJ45 (Shared with BMC)
BMC	Yes
TPM	Yes
QAT	No
USB	2
Serial Console	1
Power	Dual Redundant, with Dying Gasp
Form Factor	2RU



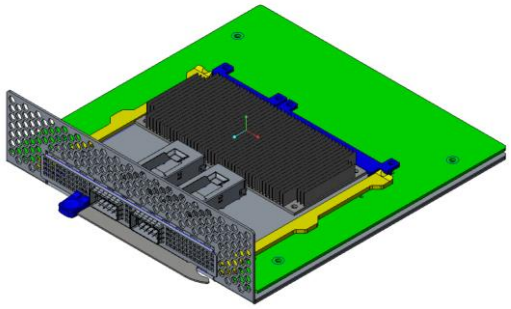


Whats Next

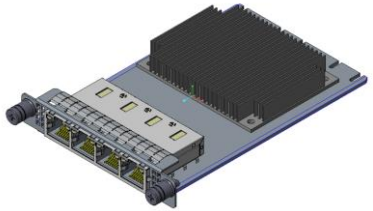
- OCP Network Module
  - Work within OCP to create a standardized Network Module form factor
  - Potentially based on OCP Mezz 3.0 (pictured right)
- OpenBMC for uCPE
  - Create a BMC HW design for typical uCPE use cases/deployment models
  - Silicom has agreed to submit their uBMC design and associated software
- SIAD – Cell Site Access Device
  - Submit AT&T's design for the next-gen SIAD



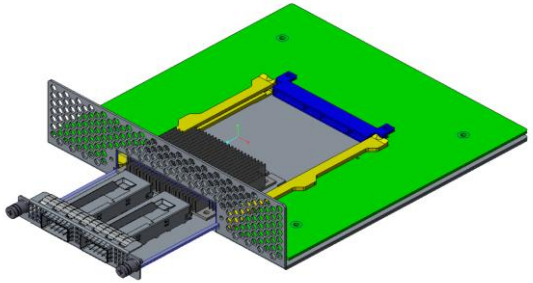
Small 4 Port SFP



OCP NIC 3.0 "Large"



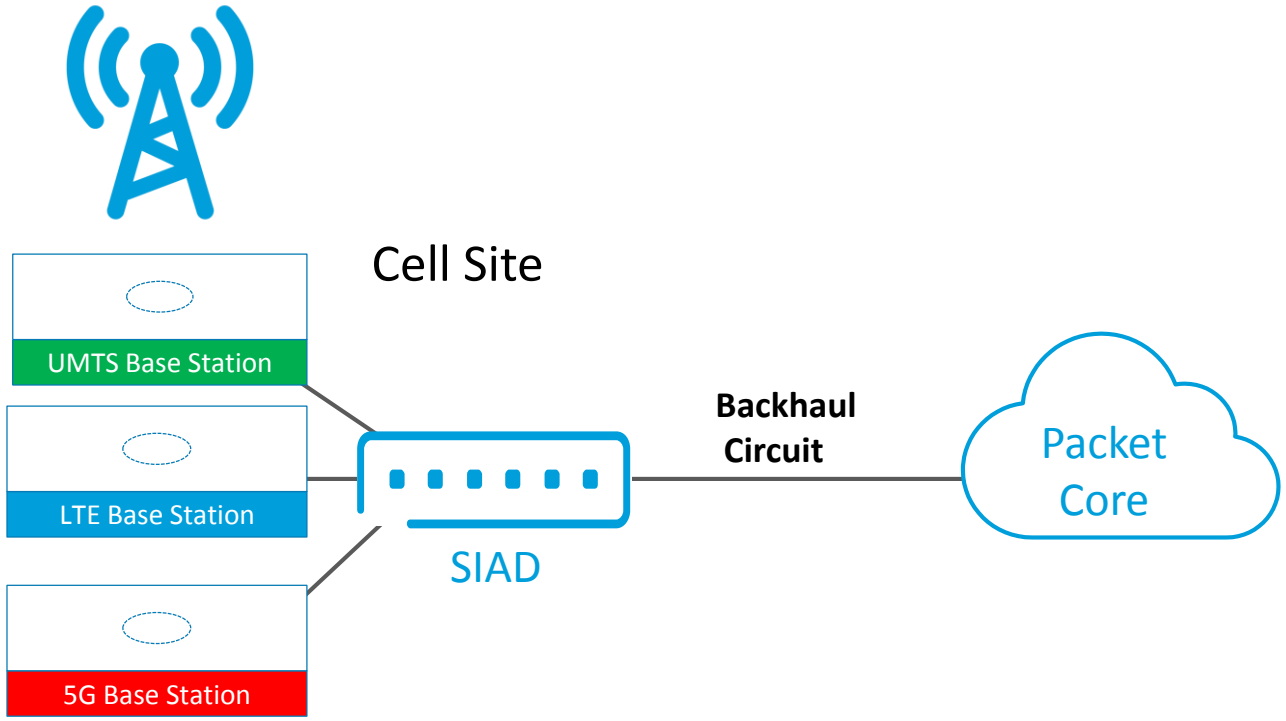
Small 4 Port RJ45



OCP NIC 3.0 "Small"

What is the SIAD

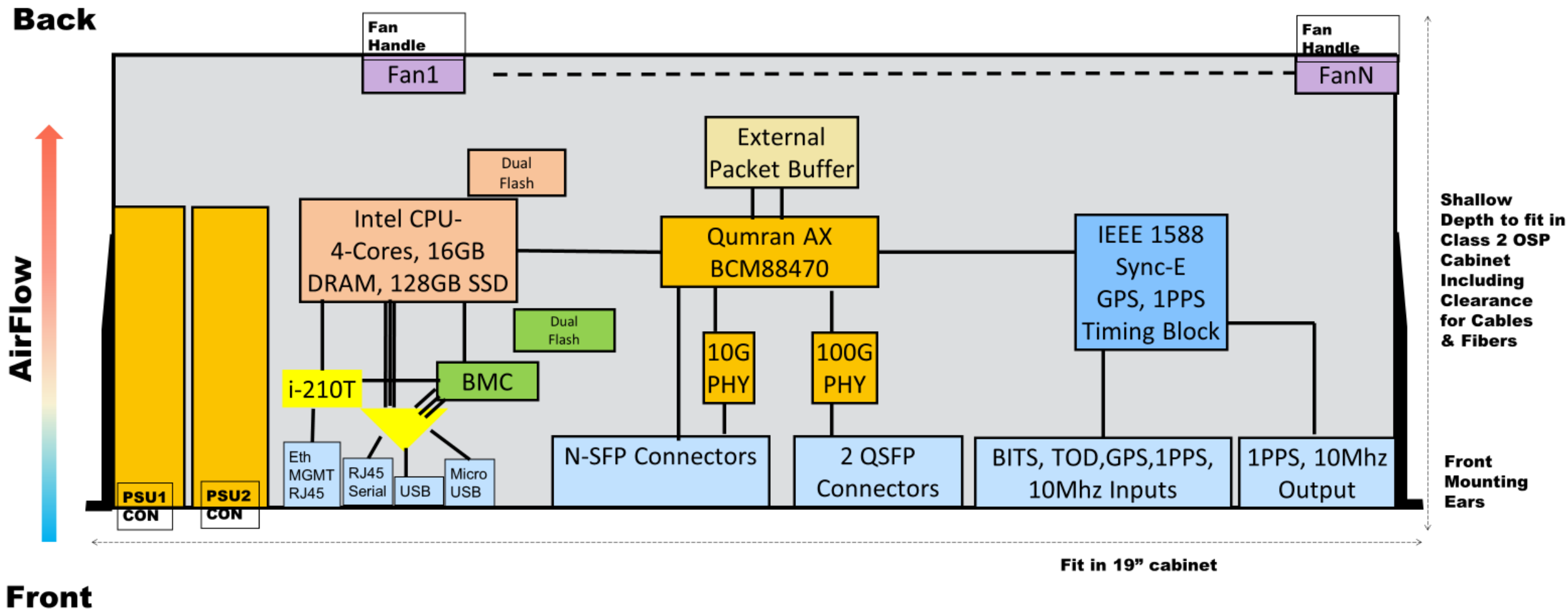
- Smart Integrated Access Device (SIAD)
  - Internal AT&T name for the router we place at each cellsite
  - Aggregates multiple base stations at the cellsite
  - Can also connect support equipment at the site
  - Provides routing upstream toward the packet core
  - Failure detection/reroute
  - Traffic Management – Shaping, QoS
  - 5G will require a SIAD refresh to support increased BTW needs
  - AT&T introduced the concept to the OCP Telco Working Group during the March monthly conference call

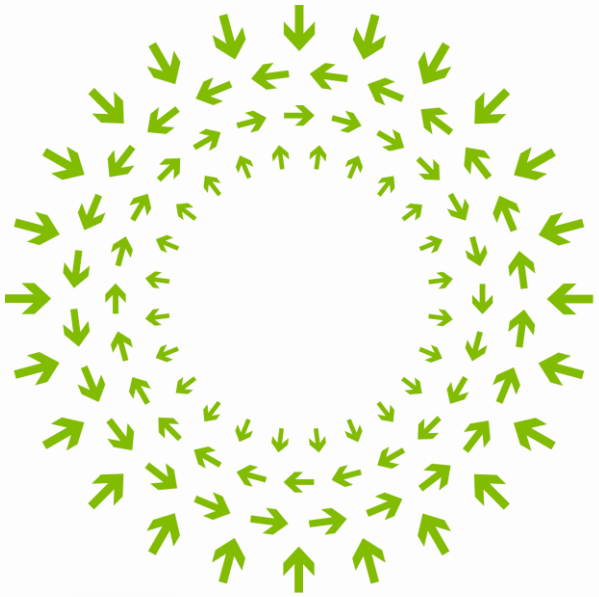


SIAD - Major Features

- The Outdoor SIAD is temperature hardened router meeting TP76200 requirements designed to operate in a GR-3108 Class 2 OSP (Out Side Plant) cabinet for Cell Site Backhaul.
  - Operating Temperature range (-40C to + 65C)
  - Physical Dimension: 1RU, 19”, shallow depth.
  - Front to Back Air flow. Front access to power and ports.
  - Removal, Hot Swappable Fans and PSU modules. 1+1 Redundant DC PSU.
  - Ability to support 1588V2 and SyncE with T-GM, T-TSC, T-TC, T-OC, T-BC support.
  - Supports local input: GPS, TOD, T1/E1-BITS, 1PPS, 10Mhz, and output: 1PPS, 10Mhz.
  - Support up to 2 100G QSPF28 ports and N {10G, 1G, 100M} SFP/SFP+ ports
  - MACSEC Support for up to 2x100G and 4x10G including MACSEC dot1q-in-the-clear.
  - OnBoard BMC with dual flash for remote field upgrade
  - Intel x86 CPU with dual flash for remote field upgrade
  - Broadcom Qumran-AX MAC.
  - Circuitry to support for up to 80km optics

High-Level Block Diagram





OPEN

Compute Project