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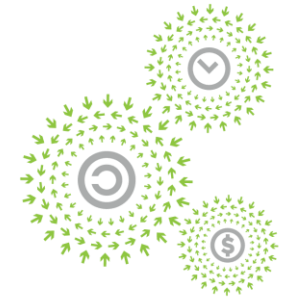
OCP Global Summit | March 14–15, 2019



Accelerated uCPE powered by Modularity



TELCO



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Founded in 1987



A public company
NASDAQ



HQ, R&D and
manufacturing facilities
are in Israel, with offices in
the US and Denmark



33 years of experience
in networking and
connectivity



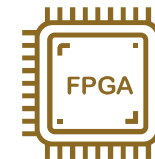
350 employees



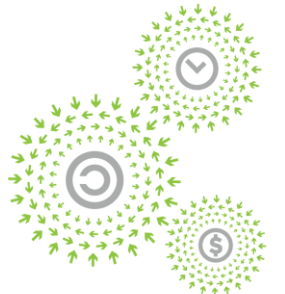
Collaboration with
strategic partners



Intel SOC design house



FPGA design experts
both HW and IP cores



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Agenda

- 2018 recap and Edge Compute status
- Edge compute – FPGA as acceleration engine
- Edge compute – Security tools



Specifications



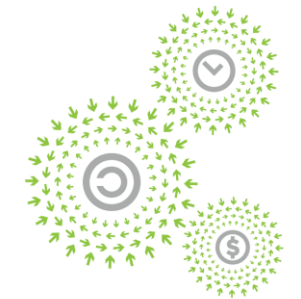
Design
Files



Embedded
Software

2018 recap and uCPE progress

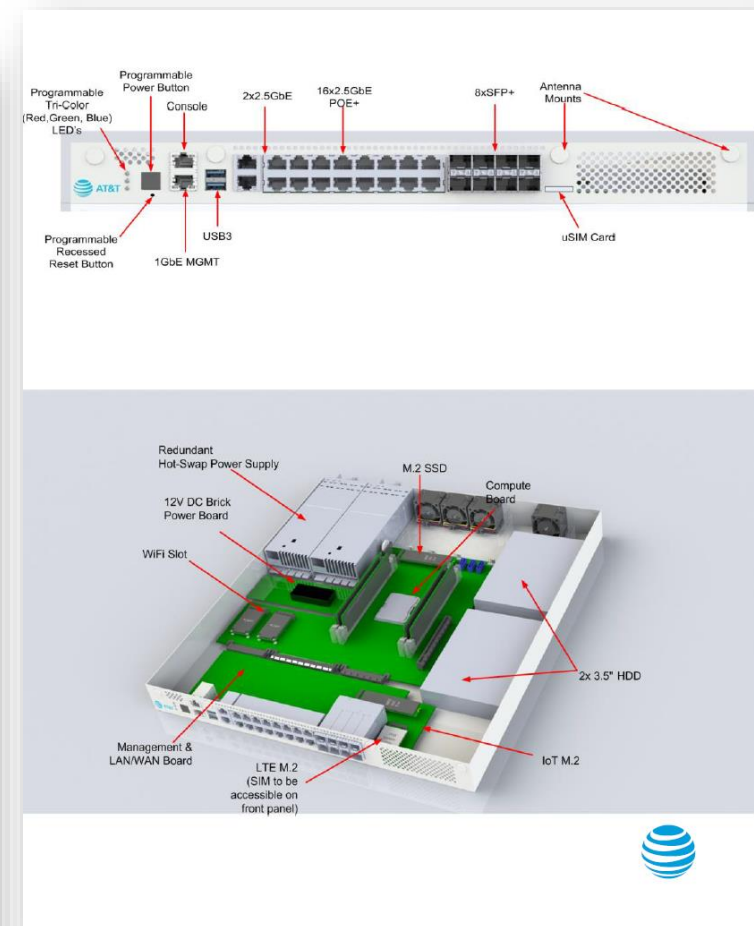
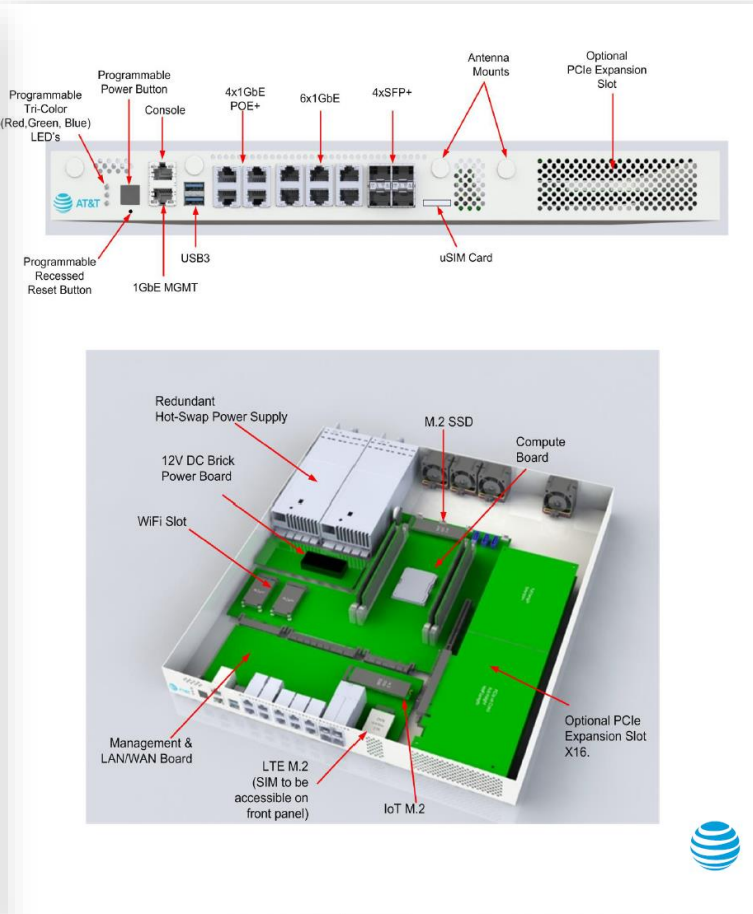
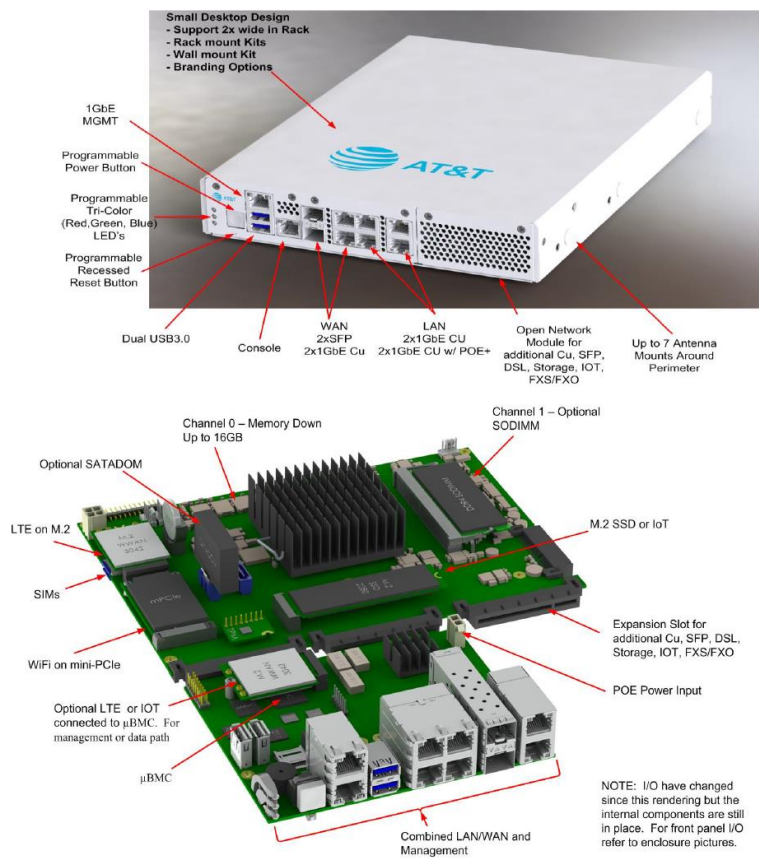
- Silicom uCPE - compliant with AT&T uCPE v2.1
- Silicom will be seeking OCP inspired status for the products



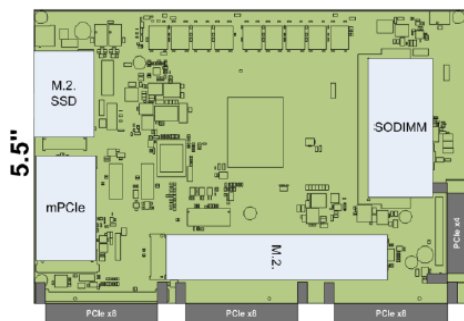
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uCPE 2018 presentation

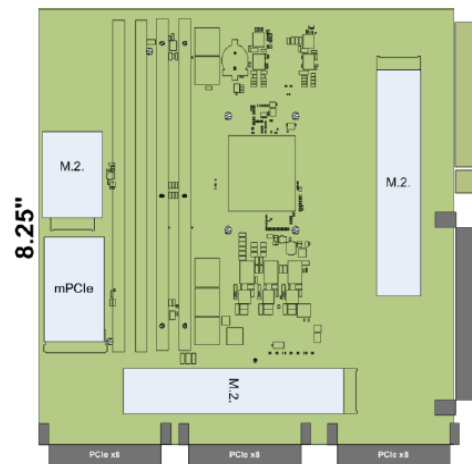
Source: <https://www.youtube.com/watch?v=UvndLtJgJDE>



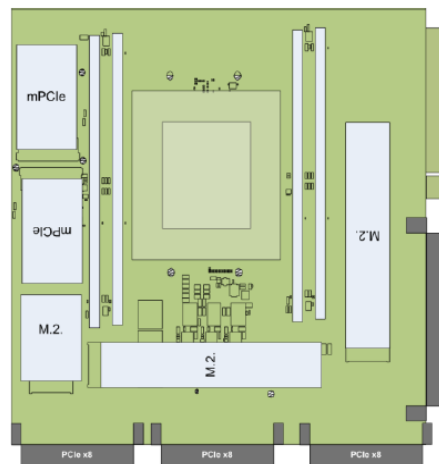
Execution in progress



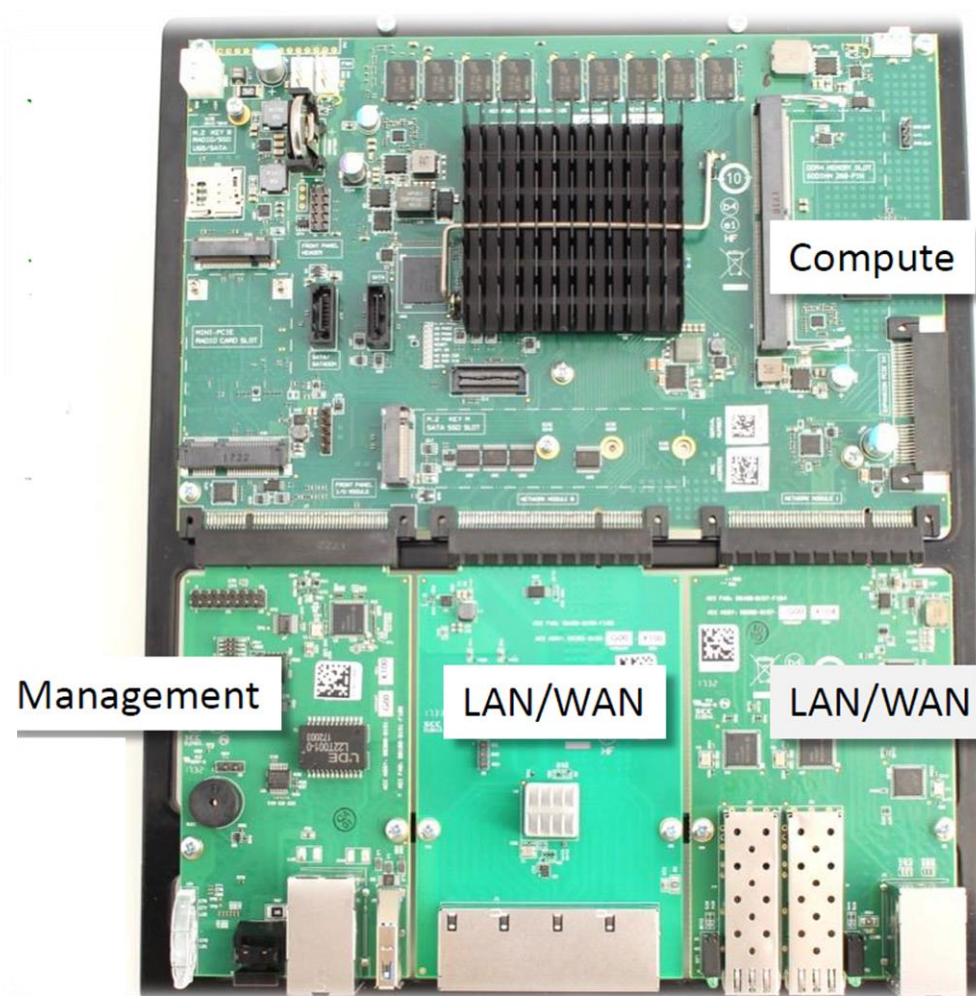
Atom C3000
"Denverton"



Xeon-D
"Broadwell-DE" (and NS)



Xeon-D
"Skylake-D"



Call to Action

How to get involved in the project.

Timeline for Contribution: Q2 2019

Availability : Q1 2019

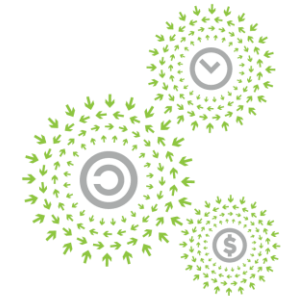
Where to find additional information (URL links)

Where to buy: <https://www.silicom-usa.com/cats/edge-networking-solutions/cpe/>

Project Wiki with latest specification : <https://www.opencompute.org/wiki/Telcos>

Mailing list: <https://ocp-all.groups.io/g/OCP-Telco>

Compliant with: [AT&T uCPE v2.1](#)



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Open platform in action – variety of modules



Many more in the pipeline:

- xDSL
- GFAST
- GPON and 10G PON
- OTN
- **FPGA**

| Type | Feature | Status |
|-----------------|---|----------------|
| Network Module | 4x1GbE RJ45 Switched | Complete |
| Network Module | 4x1GbE, RJ45 Direct | In Planning |
| Network Module | 2x1GbE Rj45/SFP | Complete |
| Network Module | 2x M.2 | Complete |
| Network Module | 2xSFP+, 2xSFP, 2x1GbE RJ45 | In Validation |
| Network Module | 2xSFP+, 4x1GbE RJ45 | In Development |
| Network Module | 4x1GbE Direct, Optional Bypass | In Planning |
| Network Module | 2.5GbE Direct w/POE | In Planning |
| MGMT Module | No BMC | Complete |
| MGMT Module | uBMC | In Planning |
| MGMT Module | Aspeed BMC | In Planning |
| Combined Module | uBMC Combined with Switch (4x1GbE, 2x1G SFP, 2x1GbE w/POE+) | Complete |
| Combined Module | uBMC Combined with Switch (4xSFP+, 2x1GbE, 8x1GbE w/POE+) | In Validation |
| Combined Module | uBMC Combined with Switch (8xSFP+, 32x1GbE w/POE+) | In Validation |

uBMC module

Designed for remote
sideband management of
SD-WAN/NFV uCPEs



Micro →
BMC



Build in security

- ARM based
- Embedded firewall
- IPSec tunneling
- TLS-secured web access
- TPM
- TACAS+

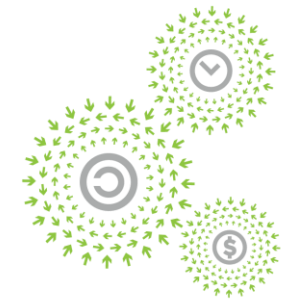
Silicom Ltd.
Connectivity Solutions



Build in Monitoring

- Sensor monitoring (IPMI 2.0)
- Logs and alerts
- Network management protocols (SNMP/NETCONF)
- Management access
- Remote platform control
- Adding Redfish in 2019

Edge Compute work in 2019



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Open ,Modular and Software oriented strategy

Wide range of WAN connectivity

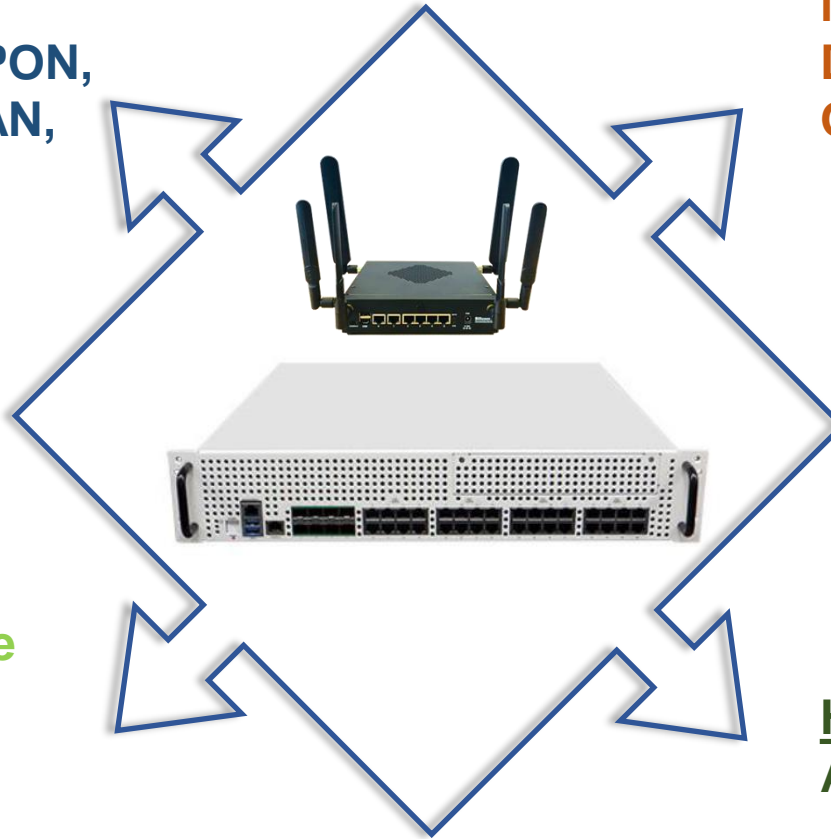
Ethernet 10/25/40/50/100, OTN, GPON, G.FAST and 10G PON, LTE, 5G RAN, DOCSIS

Accelerators for range of use case
(Encryption, Compression, AI Inference, Media

Multiple software models

DPDK, NAV-SDK, MicroBMC, Open vRAN

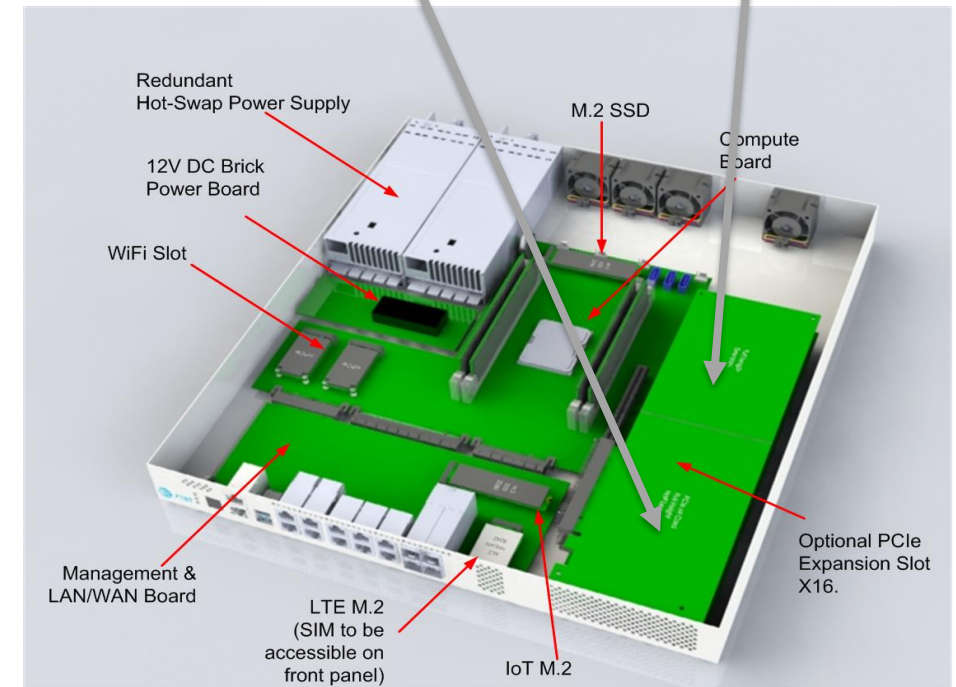
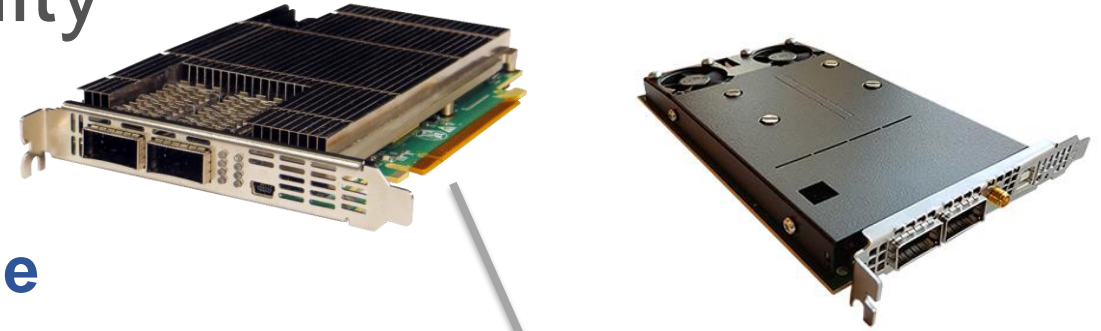
HW platform, BMC, PoE, FPGA
ATOM, Xeon-D, Xeon-SP



CPE with FPGA for 5G/RAN, MEC, Programmability

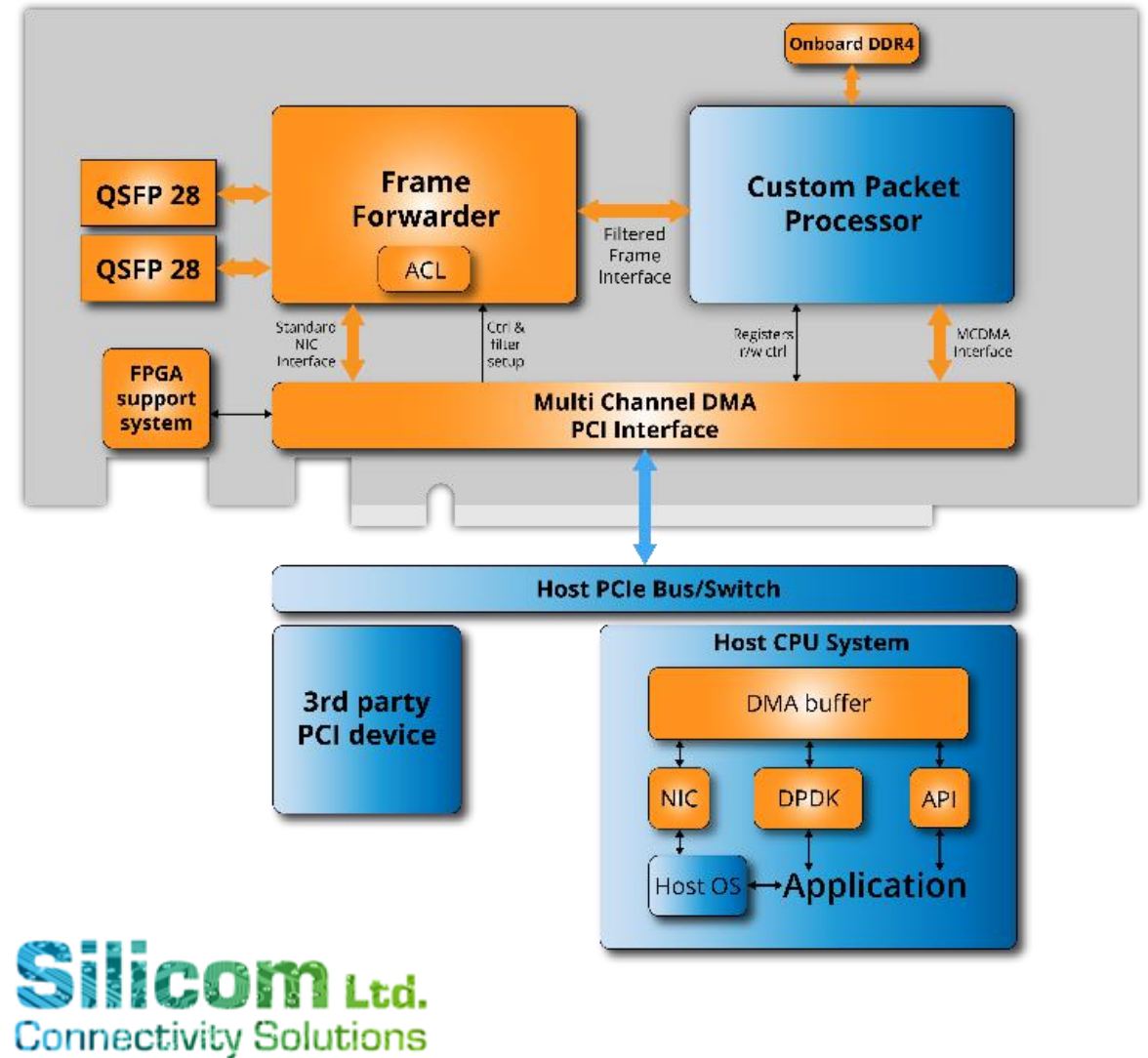


- Add an existing and verified FPGA engine to your CPE
- Create your own engine (BYOC)
- FEC for RF and optical
- OpenRAN and RAN to LAN
- P4 - Telemetry , Segment routing , IPV6
- AI , ML and compilers



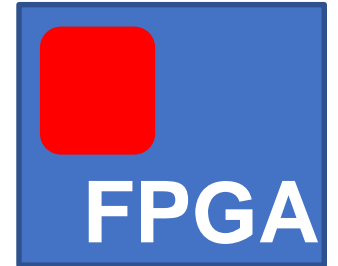
BYOC- Packet Mover

- FPGA integration sandbox
- Multi-channel PCIe DMA interface
- ACL for packet steering
- DMA to host
- DMA to 3rd party PCI devices
- Standard NIC
- Up to 100GE network capability
- Small FPGA resource footprint
- Application acceleration functions



Security for remote devices and IoT

- **MicroBMC - Secure remote management with IPSEC authentication.**
- **MicroFW – PFsense based security module .**
- **EdgeFW – Layer 7 DPI based rule set FW.**
- **All fit on 2 core ARM or bigger .**
- **Embedded , separate device or as FPGA ARM cores .**





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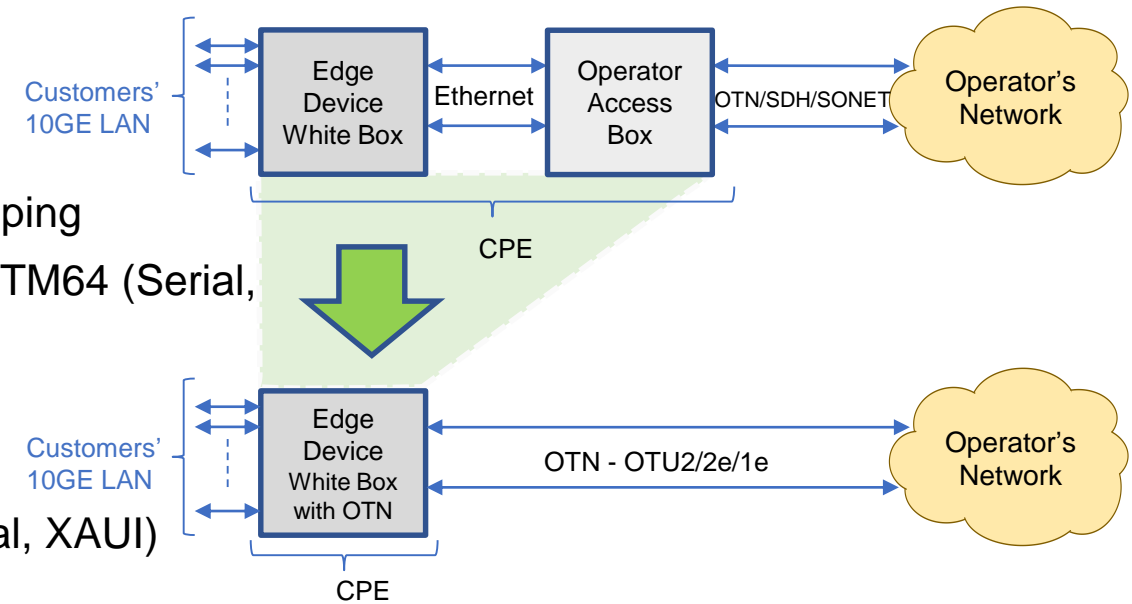


Service Edge with OTN uplink

Development

Line Signal:

- OTU2 FEC (per port) : GFEC, I.4, I.7 (Serial, SFI4.2)
- Client Signals
- Ethernet: FE, GbE, 10GE (Serial, XAUI)
- GbE: Carrier Ethernet OA&M, IEEE 1588 V2 hardware time-stamping
- SONET/SDH: OC3/STM1, OC12/STM4, OC48/STM16, OC192/STM64 (Serial, SFI4.2)
- Section, Line termination
- OTN: OTU2, OTU1, OTU0 (Serial, SFI4.2, GFEC)
- SAN: ESCON, FC-100, FC-200, FC-400, FC-800, FC-1200 (Serial, XAUI)
- Video: DVB-ASI, 270M/1.5/3G SDI
- Infiniband: IB SDR/DDR/QDR
- CPRI: Options1-5, 7,8
- Arbitrary bit-rates: Mapping to ODU0, ODU1, ODU2, ODUflex
- Switching Granularity: ODU0, ODU1, ODU2, ODUflex
- Very low power dissipation (6.2W @ 4x 10GE to OTU2 with EFEC)

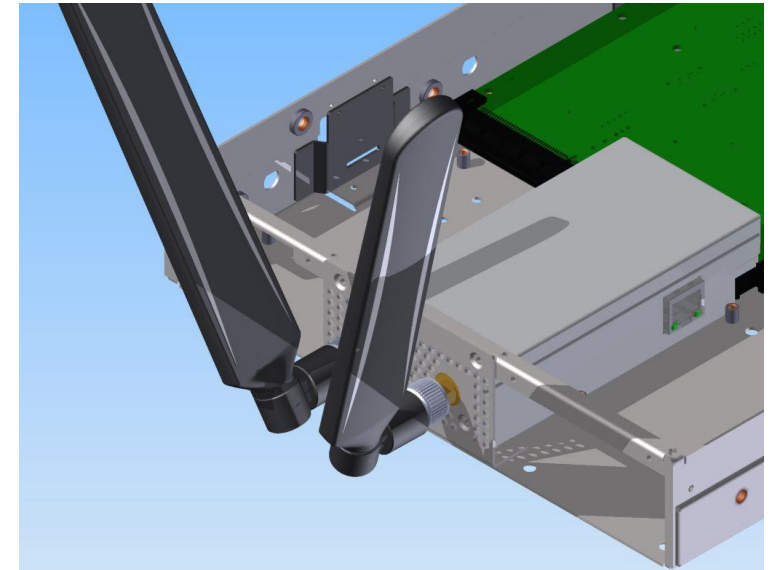


Silicom Ltd.
Connectivity Solutions

Malaga Thin LTE uCPE

Main Features

- Form Factor – NM - fits all Silicom uCPE Platforms
- Connectivity to Host
 - Ethernet 1GbE w/POE Support
 - USB2/3
- LTE or WiFi Radio
- 2x Antenna (on Front Panel)
- ARM (as a bridge)
- 2 Installation Options –
 - Inside Platform
 - Standalone

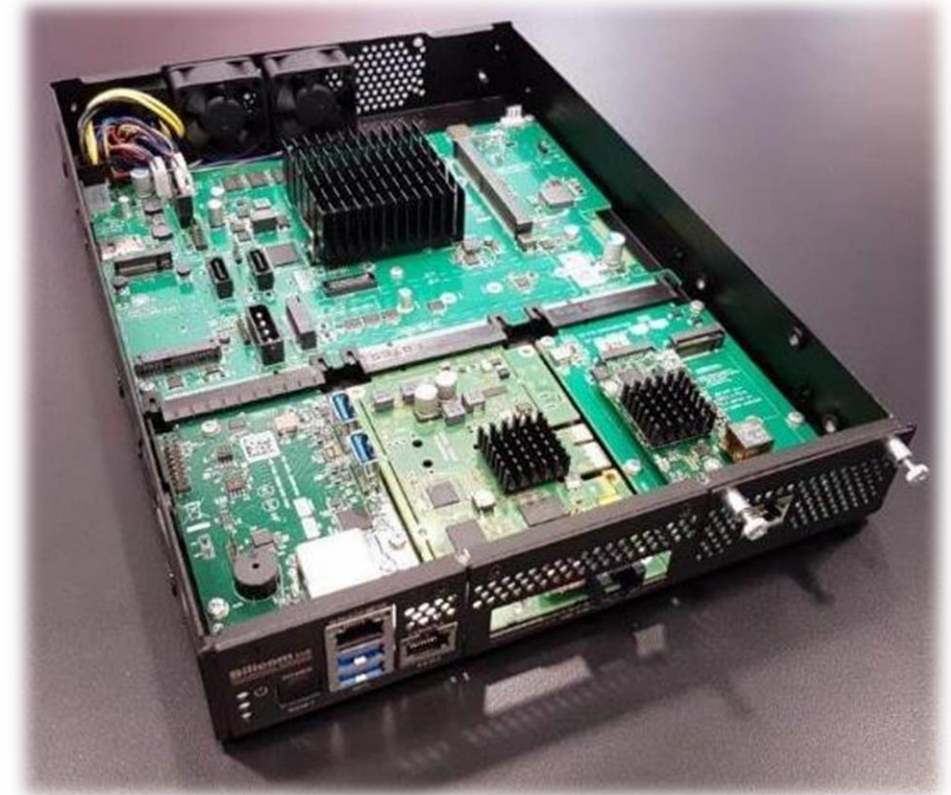


xDSL module (Teleconnect GmbH)

Development

xDSL Module develop by 3rd party

GFAST.PCIE.359



VDSL module (Teleconnect GmbH)

200+ Mbps or 5 Kilometers

- Data rates up to 200+ Mbps downstream and upstream on twisted pairs using a bandwidth up to 30 MHz
- VDSL2: ITU-T G.993.2 Profiles 8, 12, 17, 30 MHz
- ADSL: ITU-T G.992.1/3/5 Annexes A, B, I, J, M, L
- ITU-T G.993.5 Vectoring
- ITU-T G.998.4 PHY Layer Re-Transmission profiles up to 30 MHz

VDSL2-EFM Modem

- Plug & Play VDSL2 module
- ADSL fallback (auto-detection)
- Intel® VRX220 transceiver
- Intel® I211 network interface
- Available for oPOTS and oISDN regions
- Supports full transparent access to Intel DSL software management interface

