Accelerated uCPE powered by Modularity
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
Agenda

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

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

uCPE 2018 presentation

Source: https://www.youtube.com/watch?v=UvndLtUgJDE
Execution in progress
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
## Open platform in action – variety of modules

<table>
<thead>
<tr>
<th>Type</th>
<th>Feature</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Module</td>
<td>4x1GbE RJ45 Switched</td>
<td>Complete</td>
</tr>
<tr>
<td>Network Module</td>
<td>4x1GbE, RJ45 Direct</td>
<td>In Planning</td>
</tr>
<tr>
<td>Network Module</td>
<td>2x1GbE RJ45/SFP</td>
<td>Complete</td>
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<tr>
<td>Network Module</td>
<td>2x M.2</td>
<td>Complete</td>
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<tr>
<td>Network Module</td>
<td>2xSFP+, 2xSFP, 2x1GbE RJ45</td>
<td>In Validation</td>
</tr>
<tr>
<td>Network Module</td>
<td>2xSFP+, 4x1GbE RJ45</td>
<td>In Development</td>
</tr>
<tr>
<td>Network Module</td>
<td>4x1GbE Direct, Optional Bypass</td>
<td>In Planning</td>
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<tr>
<td>Network Module</td>
<td>2.5GbE Direct w/POE</td>
<td>In Planning</td>
</tr>
<tr>
<td>MGMT Module</td>
<td>No BMC</td>
<td>Complete</td>
</tr>
<tr>
<td>MGMT Module</td>
<td>uBMC</td>
<td>In Planning</td>
</tr>
<tr>
<td>MGMT Module</td>
<td>Aspeed BMC</td>
<td>In Planning</td>
</tr>
<tr>
<td>Combined Module</td>
<td>uBMC Combined with Switch (4x1GbE, 2x1G SFP, 2x1GbE w/POE+)</td>
<td>Complete</td>
</tr>
<tr>
<td>Combined Module</td>
<td>uBMC Combined with Switch (4xSFP+, 2x1GbE, 8x1GbE w/POE+)</td>
<td>In Validation</td>
</tr>
<tr>
<td>Combined Module</td>
<td>uBMC Combined with Switch (8xSFP+, 32x1GbE w/POE+)</td>
<td>In Validation</td>
</tr>
</tbody>
</table>

Many more in the pipeline:
- xDSL
- GFAST
- GPON and 10G PON
- OTN
- FPGA
uBMC module

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

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

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
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

Multiple **software models**
DPDK, NAV-SDK, MicroBMC, Open vRAN

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

**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.
Service Edge with OTN uplink

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)
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
xDSSL module (Teleconnect GmbH)

xDSSL Module develop by 3rd party
GFAST.PCIE.359
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