Open Compute Project

Telecom Working Group

Modular Industrial Cloud Architecture

May 23, 2016

Jeff Sharpe, Sr. Product Manager

Gold Member

Open Compute Project (OCP)
Global Company & Industry Participation

- Research & Development Centers
- Sales / Support Offices
- Manufacturing Site

- Intel® IoT Solutions Alliance Premier Member
- PICMG Executive Member
- PC/104 Embedded Consortium Affiliate Member
- SFF-SIG Voting Member
- Communications Platform Trade Assoc. Member
- SGeT Founding Member
- PXISA Sponsor Member
- AXIe Consortium Strategic Member
- Automated Imaging Association (AIA) Member
- Wind River Hardware Partner
- Montavista Partner
- Freescale Connect Partner
- AMD Embedded Premier Partner
- ETSI MEC Committee Member
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- Automated Imaging Association (AIA) Member
- Wind River Hardware Partner
- Montavista Partner
- Freescale Connect Partner
- AMD Embedded Premier Partner
- ETSI MEC Committee Member

- Established: August, 1995
- Headquarters: Taipei, Taiwan
- Ownership: Publicly listed since 2002
- Listing: TAIEX: 6166

- 302 R&D Engineers
- 121 Software Engineers
- Total Employees: 1686

San Jose
Mannheim
Munich
London, UK
Tel Aviv
Beijing
Shanghai
Bangalore
Shenzhen
Seoul
Tokyo
Taipei (Headquarters)

At ADLINK, We CARE
Company Core

A world-class provider of robust and reliable Application-Ready Intelligent Platforms (ARIP) for

- Communications
- Measurement/Automation
- Transportation
- Military
- IOT
- Mining / Industrial
- Infotainment / Vending
- Medical
End-to-End Network Solutions
Application Ready Platforms

Telecom Network Solutions

Network Security & DPI

Video Streaming, Transcoding

Mobile Edge Computing

IoT Compute & Analytics

At ADLINK, We CARE
MICA: Common Platform Infrastructure Reusable for Next Generation Networks

Private Cloud & Fog Infrastructure
- Cloud Interconnection, Cloud Security
- Fog Nodes;
- Fog to Fog, Fog to Cloud
- Edge Intelligence device: MEC, IoT Analytics Appliance

Telecom / NFV/5G
- vRAN Appliance: BTS/RNC/eNB
- vNF Infrastructure
- Gateway-SBC, PCRF, etc.
- Unified DPI, High end NGFW

Datacenter Data/Media Processing
- Surveillance: video analytics
- Entertainment: Broadcast & Streaming
- Education & Healthcare: remote conferencing
Guiding Principles around MICA

• Common building block modules shared across multiple platforms, from rack-mount to rack-scale: CPU, SysMngt, I/O units, ARM, switch & storage

• Re-usable sled form factor as building blocks in rack-mount boxes
  – Use back plane to connect modules
  – Seamless integration with RRC switch through PCIe

• Sufficient high-speed differential pairs in backplane: primarily use PCIe to connect surrounding devices and Ethernet for Network connectivity

• Open Architecture, easily transition to OCP / Open Frame
MICA Alliance - Building a Platform Infrastructure

Open Architecture

Chassis, Sleds, Custom Systems

Application Partners

Middleware

Integration, Testing & Support

Saguna
IBM
NETSCOUT
Silicom Ltd.
Connectivity Solutions
SANBlaze Technology, Inc.
PRISMTECH
PENTAIR
WIND™
PeerApp
asics
Predixion
NXP
intel
Modular Industrial Cloud Architecture (MICA)

Next Gen. COTS Server, Optimizing Performance, Cost and Footprint

**MICA Compute Nodes**
- Broadwell, Skylake, Purley (Skylake + FPGA)
- ½ and ¼ width sleds for needed core density
- Flexibility: Mix and Match E3 and E5
- Integrated NFVi Software and Platform S/W

**MICA Switching Nodes**
- Intel RedRock Canyon & Broadcom PEX
- Extension trays for flexible I/O configs
- System Management and Wide range of SW

**I/O Nodes**
- Optional Network Interface Modules
- Optical, Copper, w and w/o Bypass
- ¼ Width size to support large I/O options

**MICA Systems**
- 19” to 23”- Telecom and Data Center systems
- AC/DC power, NEBS Ready, Customizable
- Multiple options based on required solution

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At ADLINK, We CARE
MICA Complete System Options
Reusing common components

Data Center
- 21-23” Frame 900mm-depth
- 2u and 3u Versions
- ½ and ¼ width nodes
- Front and rear insertion
- PCI Expansion Slots
- AC/DC power options,
- CPU/Storage Focused
- Rear I/O

Central Office
- 19” Frame 600mm-depth
- 2u,4u+ versions
- ½ and ¼ width nodes
- Ethernet / PCIe Switching
- NEBS / Carrier-Grade
- AC/DC power options,
- Front I/O
- Easily incorporate other Silicon

OCP Telecom (Proposed)
- 19” Frame 600mm-depth
- 1U – 4U Arrays
- Mix/Match CPU, Storage, Switching
- RRC Switch Fabric
- PLX PCI Switching option
MICA Fully Supports OCP/Open Rack

MICA Sleds (½ & ¼ Width, CPUs, Storage, Switch, I/O)

MICA Systems

MICA 1U = 4U to OCP or Open Rack
Architectural Proposal: MICA to OCP-T

- 19” x 600mm size
- OCP Support 0.5OU mounting
- With RRC, achieve a high CPU sled density.
- Mix/MATCH CPUs
- IPMI/Redfish/DMTF Support

- MICA computing/Storage/Network resources into a OpenRack smoothly.
- Remove the switch redundancy that is not required by OCP.
- Provide the Internal fabric that is not implemented by existing OCP solution
- Transition easily from MICA, then scale to OCP when required.
The **MICA Fabric** blends the best of PCIe for direct CPU control of resources (storage, I/O) with switched fabric for CPU-CPU and off-rack comms – highest BW at lowest SW complexity

- **Switched sub-fabric** is Ethernet at its core, with PCIe at the edge; Natively supports SDN/NFV

- **PCIe direct connect sub-fabric** is dual star within each 2U block for I/O, SSD and security

- **PCIe module connections** minimize cost, boost performance & provide multi-vendor support

- **Dual uplink** upgradeable >100Gb by allocating switch fabric ports to uplink

- **Enables additional silicon**

- **Scalable** from 1U to 4U without performance degradation

- **Eliminates** TOR switch, SFP+ modules & cables

- **Systems are configured**, not purpose built
Collaborative Efforts for OCP Telecom

Potential OCP Collaborative Efforts:
- 2u/3u appliance integration
- Fan, Power, Interconnects
- System Management
- ToR / Appliance switch integration
- OCP tray, Power and backplane connectivity
- Reliability, Integration & NEBs validation
- Sled Silicon:
  - Coordinated efforts to reduce redesign with Best in Class form factors
  - Best of both worlds for Frame level deployment and Appliance Architectures
  - Options for Frame level management or system/appliance level management
  - Reusable common sleds in multiple form factors
Embedded Network Function Virtualization

- Host any guest Operating System
- Add accelerated virtual NIC driver for Virtual Network Functions
- Carrier Grade management and telco middleware functions
- Add Carrier Grade accelerated vSwitch
- Add critical real-time performance enhancements to Hypervisors
- Based on standard open source components

NFVi Server Software

- OpenStack
- ADLINK Cloud/MEC Hardware

OSS / BSS

- NFV Orchestrators
- Carrier Grade Management and Telco Middleware
- Carrier Grade KVM
- Carrier Grade Linux

Virtual Network Functions (VNFs)

- Accelerated Virtual Port (AVP) vNIC driver
- Intel® DPDK

- VMs: vBRAS, vEPC, vCPE

Running any guest OS

- CANONICAL
- CentOS
- red Hat
- WIND
Security Solutions
Distributed Throughout Network

- ASICs, HW Accelerators
- I/O focused
- Common Platform
- Distributed Security
- Transition as vNF
- Throughput & Performance
Enabling Next Generation DPI Solutions

- **Security**
  Security Gateways, Protocol firewalls/ALGs, Web application firewalls, network antivirus, IPS, IDS, email scanning, SBC, BGF, data leak detection/prevention

- **Application Distribution**
  L3-L7 Load Balancers, Application message routing for fault-tolerance

- **Network & Subscriber Analytics**
  QoS/QoE Stats, Subscriber Profiling, Application usage, Network utilization & health & inventory, …

- **Interception/Monitoring**
  Lawful intercept, capture for debug/diagnosis, debugging/troubleshooting tools, protocol analyzers, information extraction

- **Modification & Injection**
  Ad insertion, tracking id insertion, misspelled URL completion / redirection*, content framing

- **Application Policy Enforcement**
  Traffic Shaping, Content Filtering, Permit/Deny application communication

- **Metering & Accounting**
  Track usage per connection, track usage per source/destination/app/time, …

- **Content Caching**
  Caching Data/Video at the edge vs. Datacenter improves latency and customer experience

- **Content Adaptation & Optimization**
  Still image compression, bundling web pages, transcoding, adapting for mobile

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- **Latency Reduction**

- **Reusable / Distributed throughout Network**

- Enables other Silicon Solutions

- Hybrid / Flexible switching solutions

- Flexibility of sled options and scalability

- **Ready for 5G scale**
ETSI Mobile-Edge Computing (MEC) & RAN Enables Smarter IOT Communications
ADLINK announces MICA Open Architecture based on Intel’s OCMA Program

Common Platform: Reusable sled assets for flexibility and scalability

MICA Alliance with many eco-system partners to assist GTM, and customization

Collaboration with key telecoms and suppliers for critical needs and priorities

Proposed submission of MICA to OCP for the Telecom industry