

Open Compute Project Telecom Working Group

Modular Industrial Cloud Architecture

May 23, 2016

Jeff Sharpe, Sr. Product Manager

Gold Member
Open Compute Project (OCP)



At ADLINK, We CARE



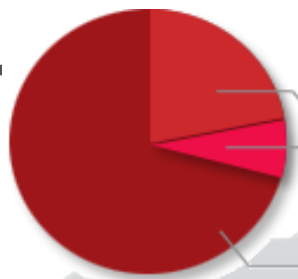
IoT Solutions
Alliance
Premier



ADLINK
TECHNOLOGY INC.

TECHNOLOGY INC.

Global Company & Industry Participation



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

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

San Jose ▶▶▶

London, UK ▶

Mannheim ▶▶▶

Munich ▶▶▶

Tel Aviv ▶

Bangalore ▶

Singapore ▶

Shenzhen ▶▶▶

Beijing ▶▶▶

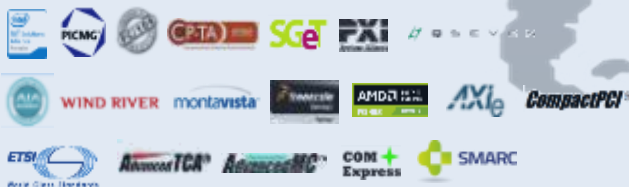
Seoul ▶▶▶

Tokyo ▶▶▶

Shanghai ▶▶▶

Taipei (Headquarters) ▶▶▶

- 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



Established

August, 1995

Headquarters

Taipei, Taiwan

Ownership

Publicly listed since 2002

Listing

TAIEX: 6166

Company Core

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



Communications



IOT



Measurement/Automation



Mining / Industrial



Transportation



Infotainment / Vending



Military



Medical

End-to-End Network Solutions

Application Ready Platforms

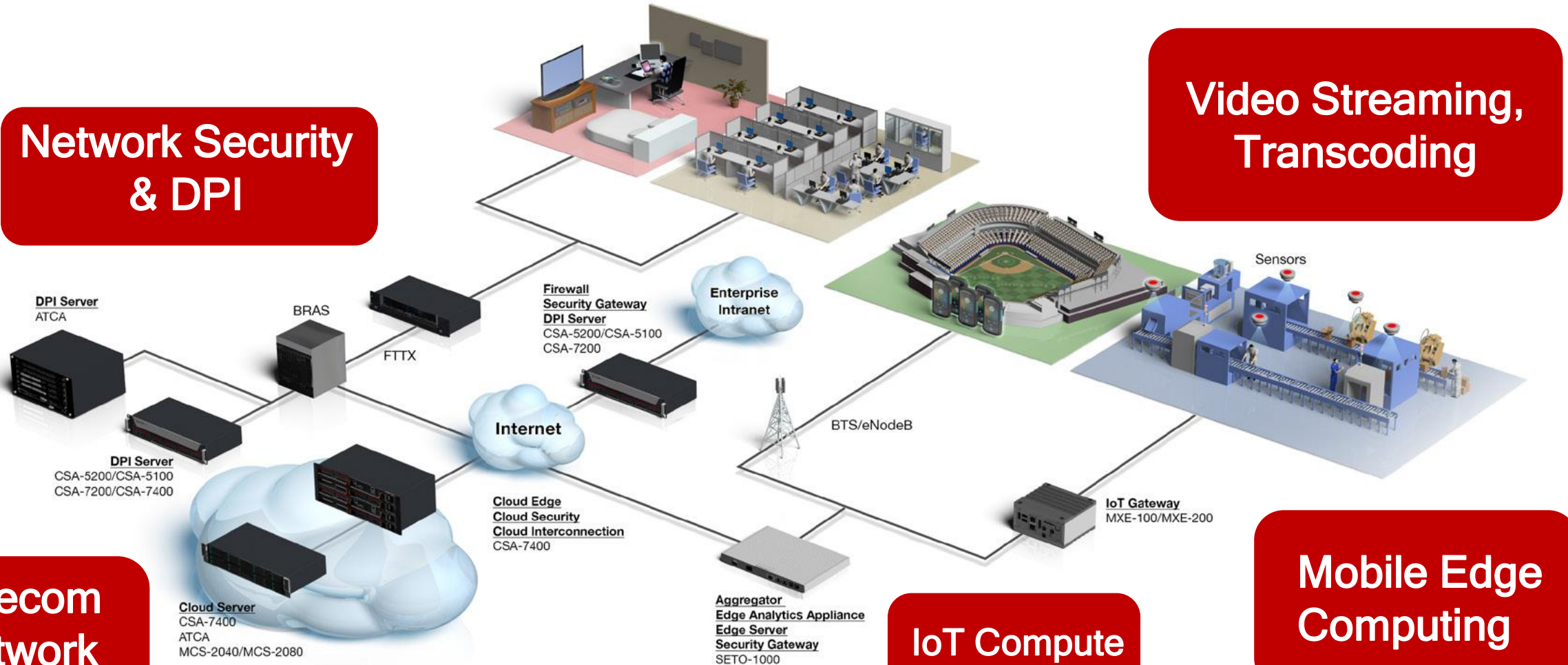
Network Security
& DPI

Video Streaming,
Transcoding

Telecom
Network
Solutions

IoT Compute
& Analytics

Mobile Edge
Computing



MICA: Common Platform Infrastructure Reusable for Next Generation Networks

Telecom / NFV/5G

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

Private Cloud/IoT Fog Infrastructure

Private Cloud & Fog Infrastructure

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

Telecom/ Core Infrastructure / NFV

Media Processing

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

Integration, Testing
& Support
Middleware

Saguna

NETSCOUT.

Silicom Ltd.
Connectivity Solutions

IBM

PA PeerApp

SANBlaze
Technology, Inc.

Hero

asis

PRISMTECH

Predixion
Predict Everything.

PENTAIR

NXP

intel

WIND™

Modular Industrial Cloud Architecture (MICA)

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

MICA Compute Nodes

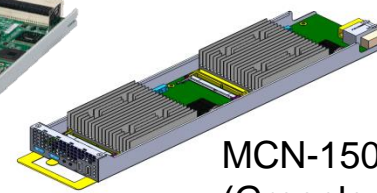
- Broadwell, Skylake, Purley (Skylake + FPGA)
- ½ and ¼ width sleds for needed core density
- Flexibility: Mix and Match E3 and E5
- Integrated NFVi Software and Platform S/W



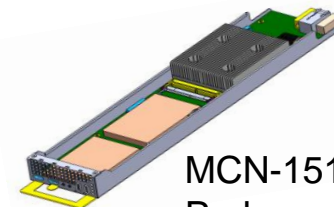
MCN-2600
Broadwell



MCN-2610T
Purley



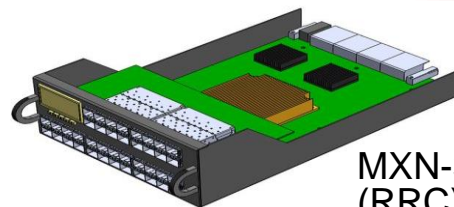
MCN-1500
(Greenlow
GT4e)



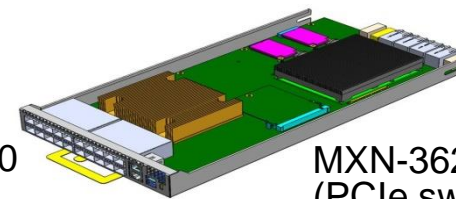
MCN-1510
Purley

MICA Switching Nodes

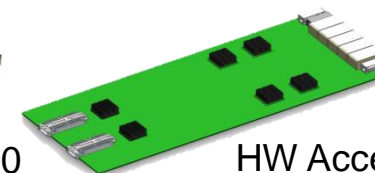
- Intel RedRock Canyon & Broadcom PEX
- Extension trays for flexible I/O configs
- System Management and Wide range of SW



MXN-3610
(RRC)



MXN-3620
(PCIe switch)



HW Accelerators
ARM

I/O Nodes

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



CSA-Z5C4F



CSA-ZBX10



CSA-Z5C2F



CSA-Z5C8F+

MICA Systems

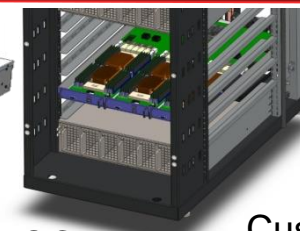
- 19" to 23" - Telecom and Data Center systems
- AC/DC power, NEBS Ready, Customizable
- Multiple options based on required solution



CSA-
7200/7400



MCS-2080



OCP



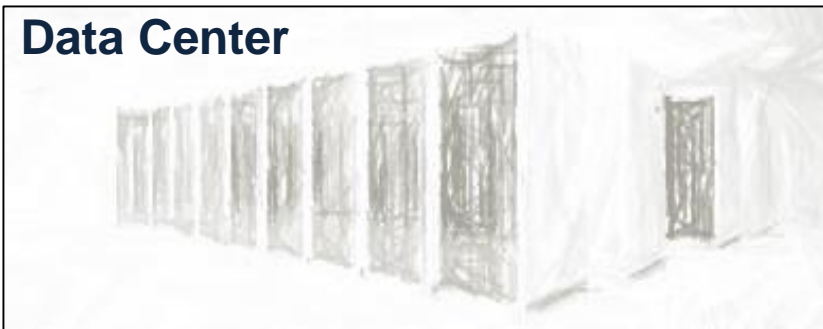
Custom



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



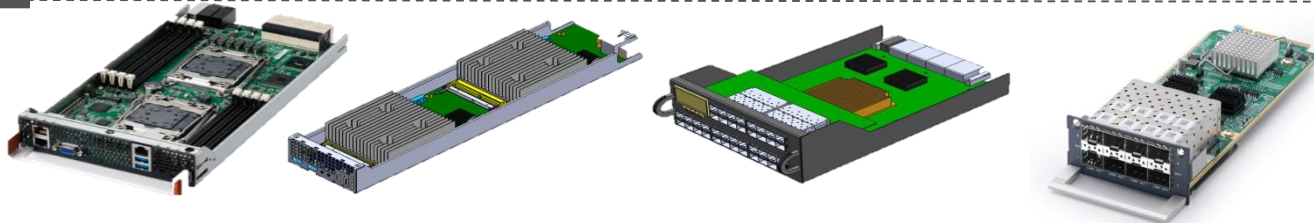
OCP Telecom (Proposed)



- 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 ($\frac{1}{2}$ & $\frac{1}{4}$ Width, CPUs, Storage, Switch, I/O)

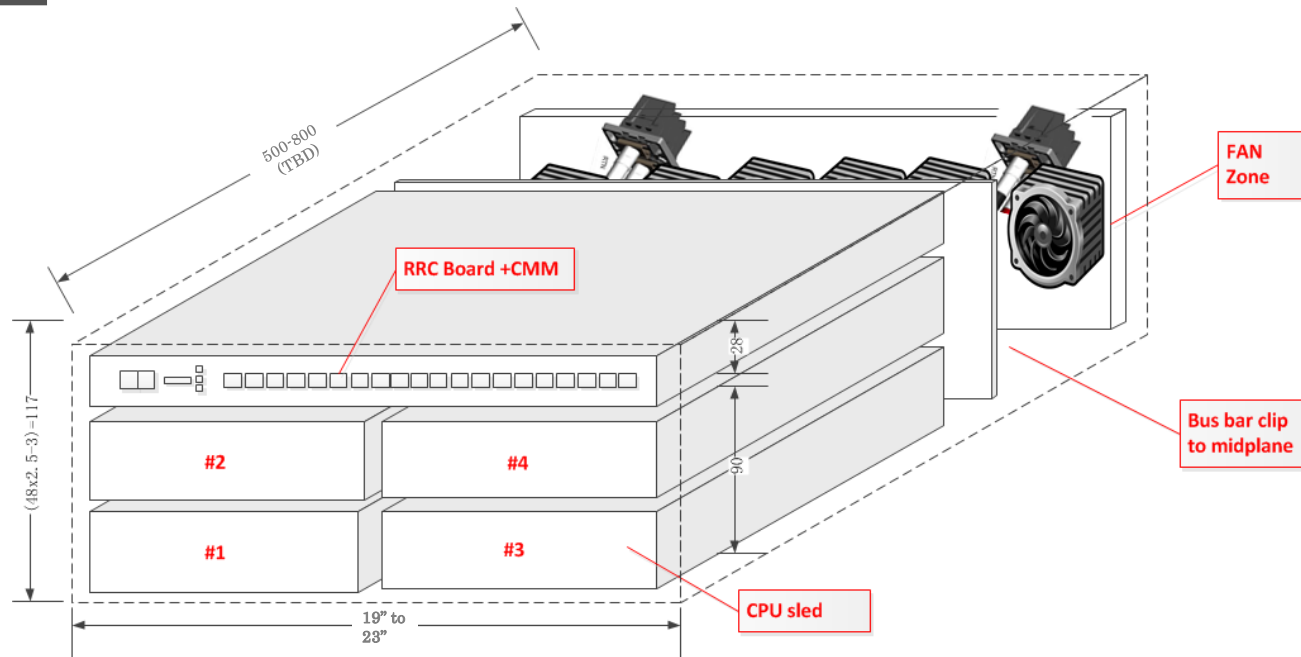


MICA Systems

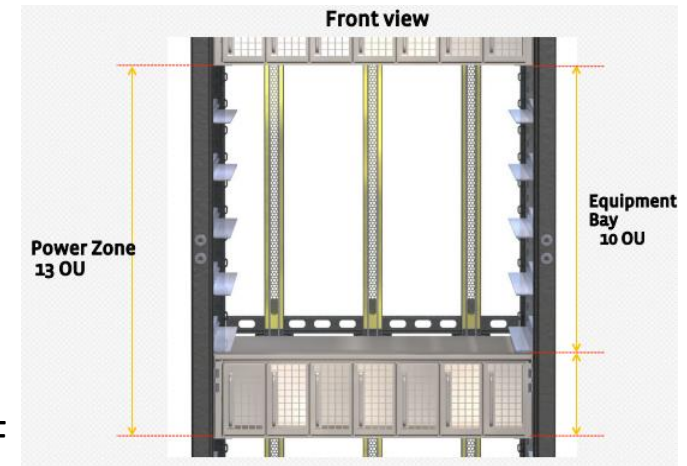


MICA 1U = 4U to OCP or Open Rack

Architectural Proposal: MICA to OCP-T

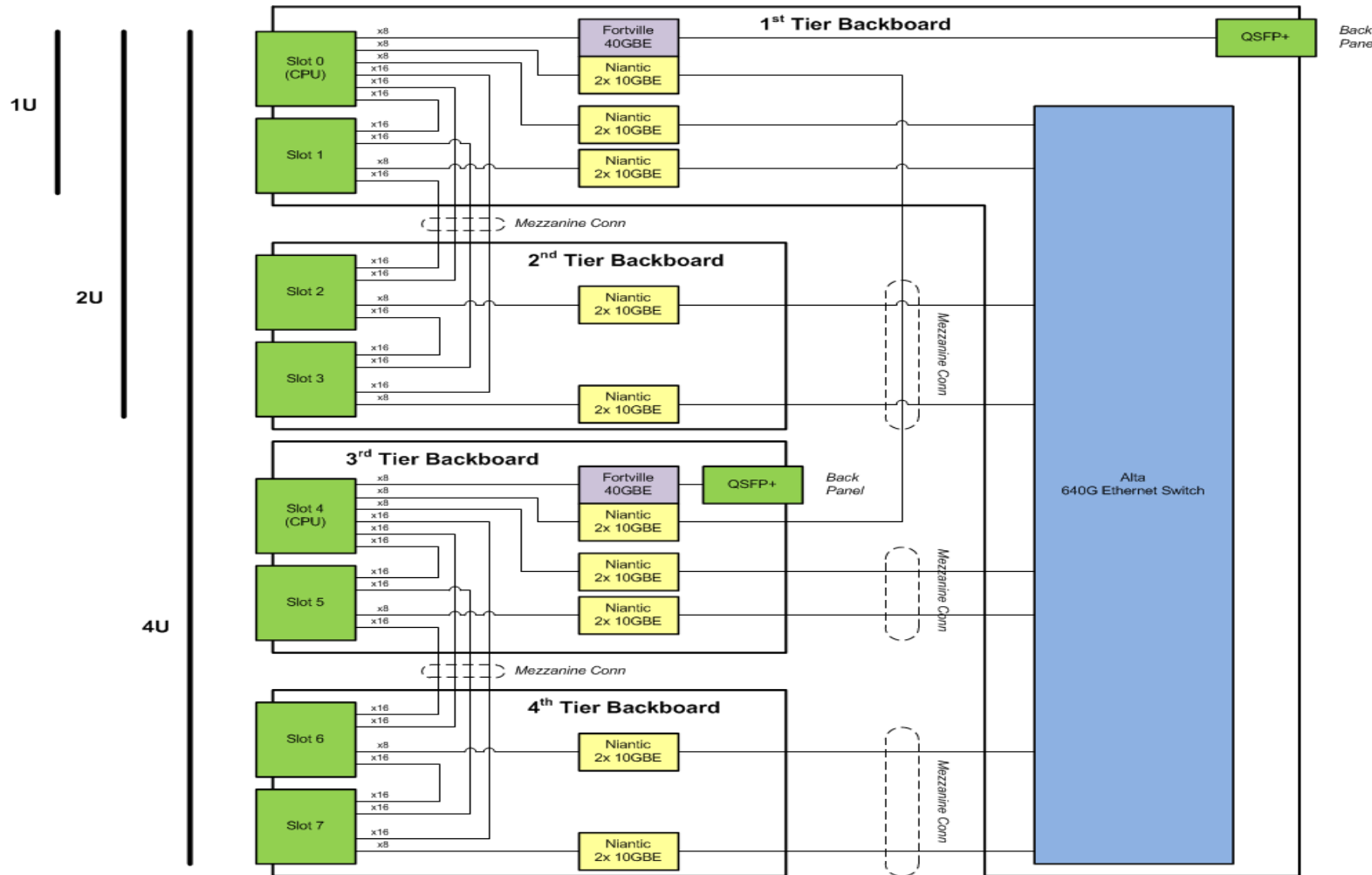


- 19" x 600mm size
- OCP Support 0.5OU mounting
- With RRC, achieve a high CPU sled density.
- Mix/Match CPUs
- IPMI/Redfish/DMTF Support



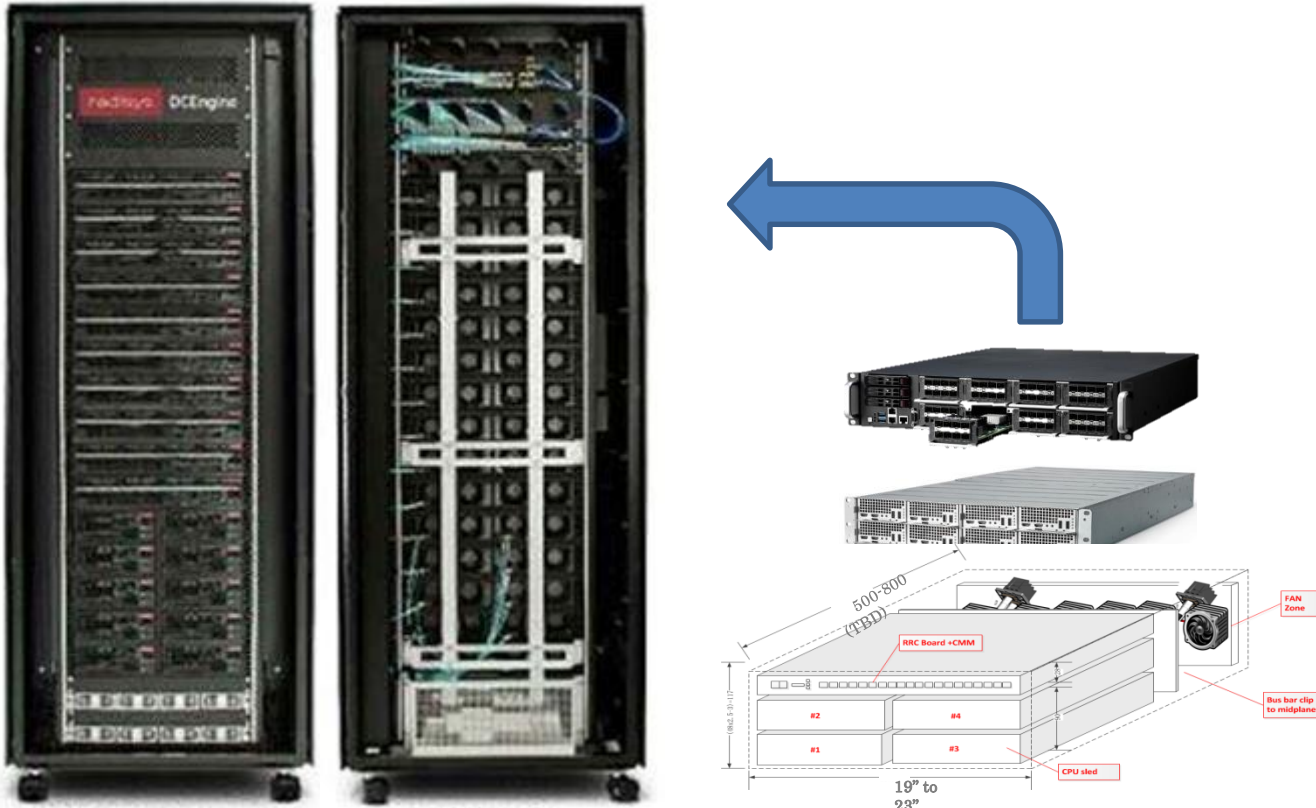
- MICA computing/Storage/Network resources into a OpenRack smoothly.
- Remove the switch redundancy that is not required by OCP.
- Provide the Internal fabric that is not implemented by existing OCP solution
- Transition easily from MICA, then scale to OCP when required.

MICA Hybrid Fabric Example OCP Implementation



- **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



Radisys DCEngine & ADLINK MICA on-going discussions:

- 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

- **Global Operators**

- Needs/Wants/Schedule/Priorities
- OCP Telecom Working Group

- **Potential OCP Collaborative Efforts:**

radisys

- 2u/3u appliance integration
- Fan, Power, Interconnects
- System Management
- ToR / Appliance switch integration

- **asis**

- OCP tray, Power and backplane connectivity

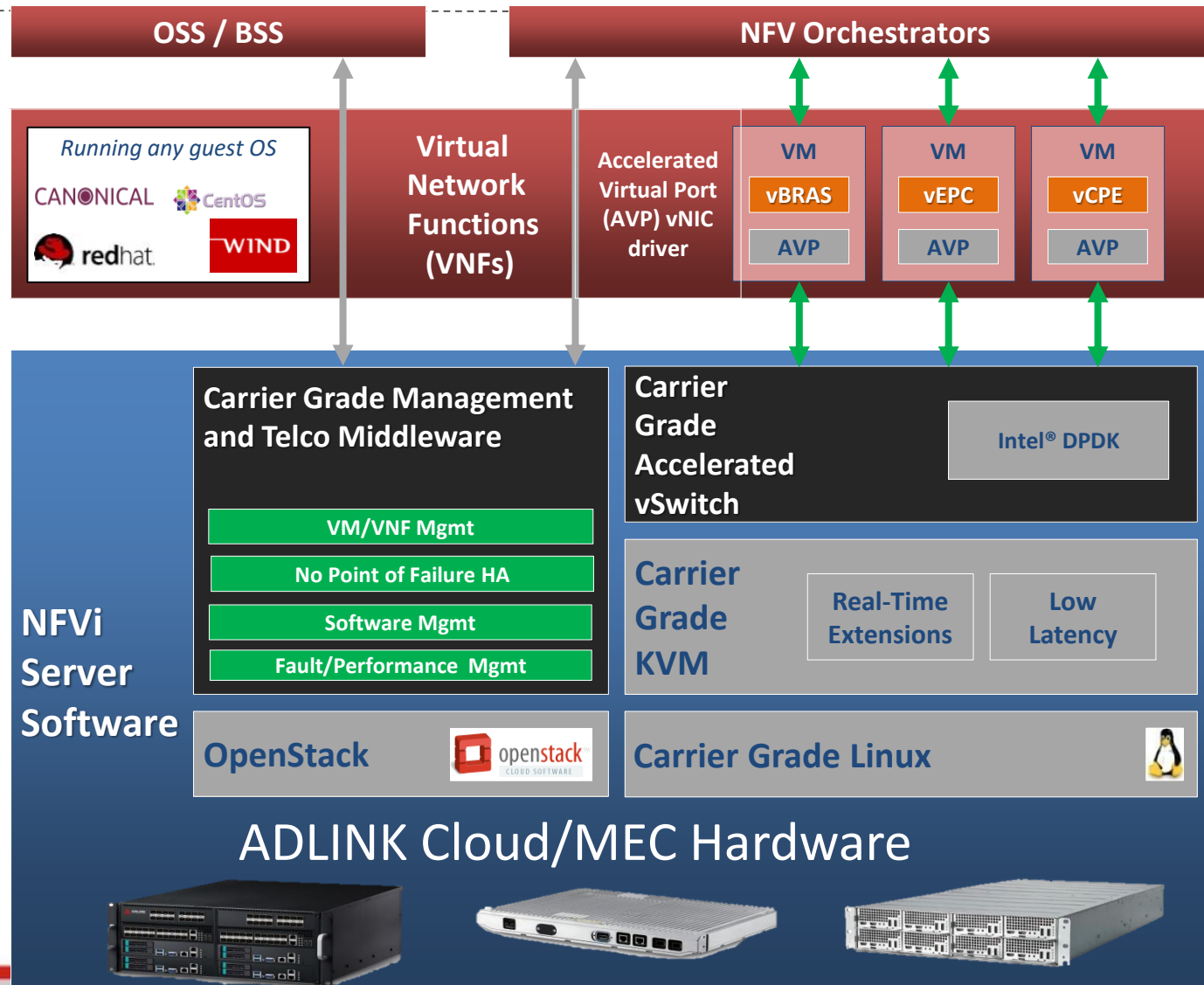
- **UNICOM**

- Reliability, Integration & NEBs validation

- **Sled Silicon:**



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

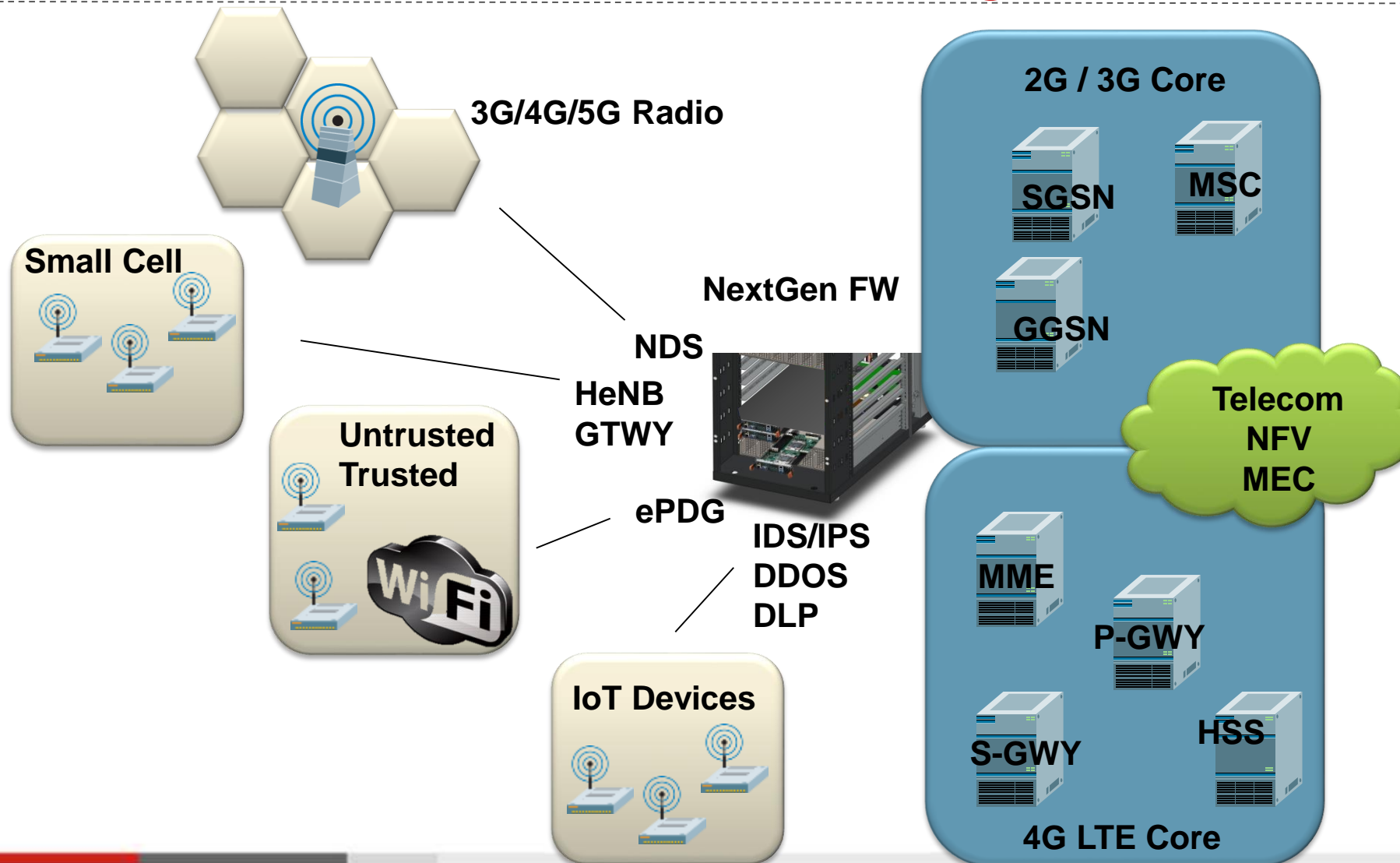
Add Carrier Grade accelerated vSwitch

Add critical real-time performance enhancements to Hypervisors

Based on standard open source components

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

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

Modification & Injection

Ad insertion, tracking id insertion, misspelled URL completion / redirection*, content framing

Application Distribution

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

Security

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

Application Policy Enforcement

Traffic Shaping, Content Filtering, Permit/Deny application communication

Network & Subscriber Analytics

QoS/QoE Stats, Subscriber Profiling, Application usage, Network utilization & health & inventory, ...

Interception/Monitoring

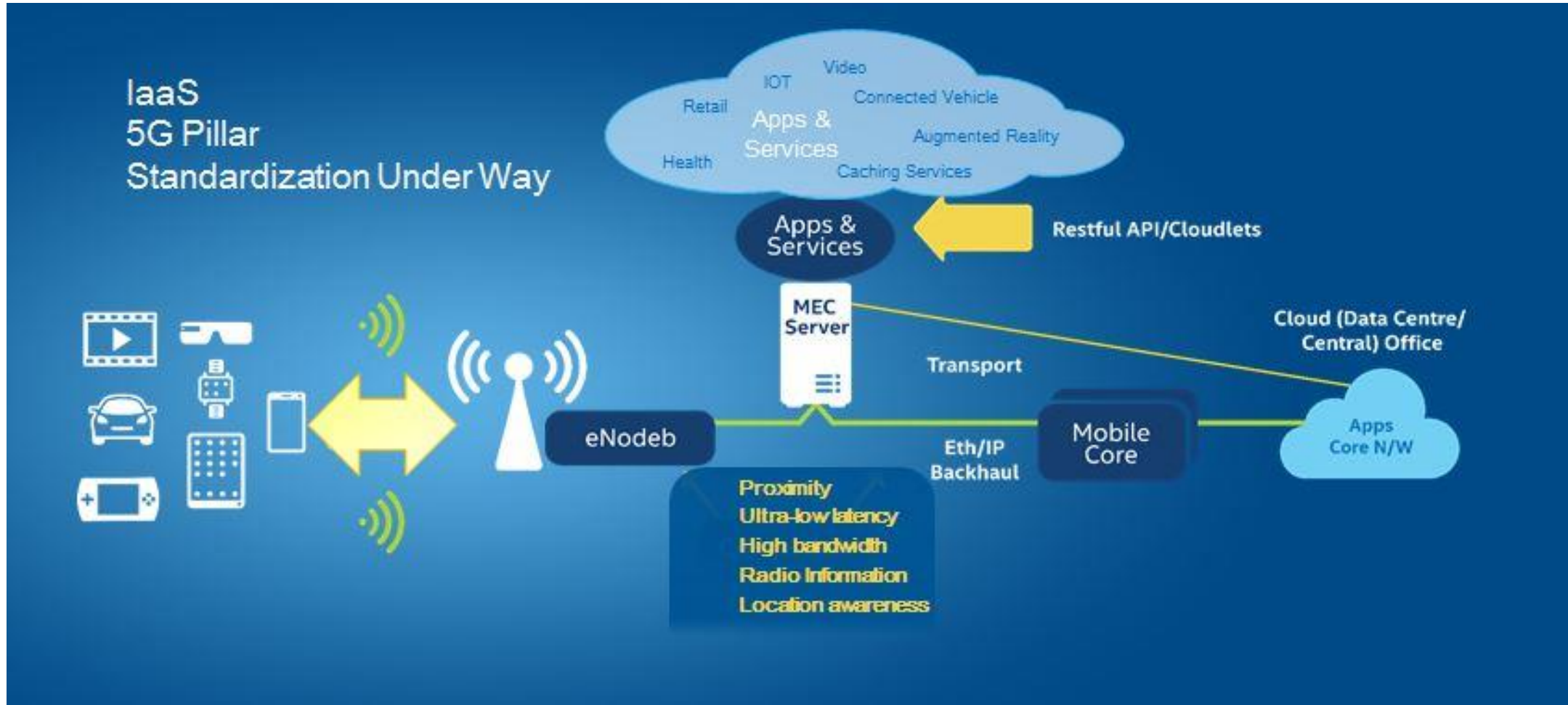
Lawful intercept, capture for debug/diagnosis, debugging/troubleshooting tools, protocol analyzers, information extraction

Metering & Accounting

Track usage per connection, track usage per source/destination/app/time, ...

- 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



Summary

- **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**