Strategies for Implementing Edge Services in the 10G Cable Network

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Agenda

- What – and Where – Is The Edge?
- Emerging Edge Deployment Models
- Is a Converged Architecture Possible?
- Summary and Moving Forward
What Is Edge Computing?

The Edge is the Outpost Layers of Processing or Network

What – and Where – Is the Edge?

Closer to ENDPOINT DEVICES

TO IMPROVE SERVICE CAPABILITIES

5G

COMPUTE & STORAGE

Optimize TCO

Comply with Data Locality

And reduce application latency

BEFORE TRANSITION TO THE ENDPOINT OR ANOTHER NETWORK

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What – and Where – Is the Edge?

Distributing Cloud Technologies and Economics

Latency expectation

Latency expectation

- Varies <1 ms
- <5 ms
- <10-40 ms
- < 60 ms
- ~100 ms

Driver for edge

Latency, bandwidth,
Security, connectivity

Devices / Things
Emerging Edge Deployment Models

Edge Deployment Models

- On-Prem Edge
  - Controller
  - Edge Platform
- Network Edge
  - Controller
  - Edge Platform

Telco/MSO/Public Cloud

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Emerging Edge Deployment Models

Network Edge Platform Architectures (Part 1)
Emerging Edge Deployment Models

Network Edge Platform Architectures (Part 2)
Mapping to the MSO Network

- Compute everywhere enables maximum flexibility
- Location dictates form factor and Service characteristics
- Standards and COTS allows for Converged Access and Services
Emerging Edge Deployment Models

Where Does the Edge Live IRL?

Latency
- Further from users and higher aggregation density  << ------ >>  Closer to users and serves more specific area

Environment
- Full power and environmental controls  << ------ >>  Limited power delivery; space and thermal constraints

Management
- Can use typical data center techniques  << ------ >>  Equipment is distributed and harder to manage/service
Current Edge Landscape (and Challenges)

**Challenges:** CSPs/CoSPs have multiple edge verticals (IOT, Enterprise, Telco) with differing architectures.
Is a Converged Architecture Possible?

Converged Edge Reference Architecture
Considerations for Designing Your Edge

- What type of Services do you want to offer and what reqs will they bring?
- What business models / partnerships do you want to support – who owns what?
- Where are you willing to deploy equipment / functions / infrastructure?
- What equipment and sw infrastructure can be consolidated across the network?
- Who is going to own the various parts of the Edge solution in the organization?

“The Edge” might be unique to each network but best deployed through standard hw/sw building blocks !!
Enable Innovation Everywhere in the Network

MULTI-ACCESS EDGE COMPUTING FOR 10G

- 10G era is Multi-Access and allows Services in a wide range of performance tiers
- Build your Edge network – wherever it is! – for flexibility, agility, and scalability
- Leverage standards, COTS, and reference architectures for faster TTM and lower TCO
- Choose the right network arch and platforms to support future Services

Smart networks from Data Center to edge

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Thank You!

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Backup
Summary and Moving Forward

Edge Compute Enables New Services

**MISSION-CRITICAL IOT:**
Low Latency
Ultra Reliability

**MASSIVE IOT:**
Reduce Backhaul Requirements

**ENHANCED BROADBAND**
Better Experience
Faster Transactions
Service Innovations Increase Across Enterprise Verticals

INDUSTRIAL
- Machine vision inspection
- Factory automation
- Robotics

RETAIL
- Digital inventory management
- Personalized shopping
- Theft detection

TRANSPORTATION
- Smart cities
- Traffic monitoring
- Road infrastructure

ON-PREMISE INFRASTRUCTURE TRANSFORMS TO SUPPORT SERVICES
- uCPE + SD-WAN
- + Automation
- Cloud Based Apps & Services
  (Eg: IOT, AI)

2016
2018
2020 & Beyond

Machine vision inspection
Factory automation
Robotics
Digital inventory management
Personalized shopping
Theft detection
Smart cities
Traffic monitoring
Road infrastructure

75% of enterprise-generated data will be created and processed outside the traditional data center or cloud by 2025¹

43% share of AI tasks taking place on edge devices (vs. cloud) in 2023²

80% Of IP traffic will be from video by 2021³

2. ABI Research: https://www.abiresearch.com/press/hardware-vendors-will-win-big-meeting-demand-edge-ai-hardware/
Key Drivers for Edge Computing

- Low latency that cannot be achieved by using centralized cloud
- Reduction of movement of the massive amount of data generated by IoT devices to reduce cost and enable efficient use of resources
- Data privacy and data sovereignty
- Context awareness
- Scenarios where connectivity is unreliable or limited
- Better experience, faster transactions
Elements of the Edge Solution

1. Edge Optimized Platforms
   - Hardware to move, store, and process the data
   - Software to converge the workloads
   - Partnerships to win with the ecosystem

2. Network Functions
   - Enterprise
   - Wireless access
   - Multi-access edge computing
   - Edge central offices

3. Edge Services
   - Live broadcast
   - Cloud gaming
   - Industrial automation
   - Smart retail
   - Smart stadium
Enabling Edge Platform Puts Multi-Access Networking and Cloud Computing Closer to the Devices
Convergence Across the Edge Spectrum

On-premise edge
Ucm nodes
Converged Architecture for
Private Wireless IOT Services

Access edge
Nodes
Converged Architecture for
Virtual CMTS
Virtual RAN

Near edge
Headend/Hub
Converged Architecture for
5G Core
Cloud Services

Headend
Regional cloud
Converged Architecture for
HEF
Cloud Services

A Converged architecture drives better TCO for future Access Networks and serv...
Is a Converged Architecture Possible?

Smart City / Video Analytics Use Case

Annotated video output streams

Raw video input streams

OpenNESS Edge Platform

Platform Microservices

EAA  ELA  EDA  EVA  DNS  GW

NFV Infrastructure

dataplane

CPU  GPU  FPGA  VPU  vSwitch  NIC

OpenVINO

Local Mgmt

Headend

VIM

OpenNESS Controller

Analytics Controller

Action Engines

Edge Compute

Software Management Infrastructure