



ribbon

TECH FORUM 23



# Monetize Your Network Improving Your Broadband ROI

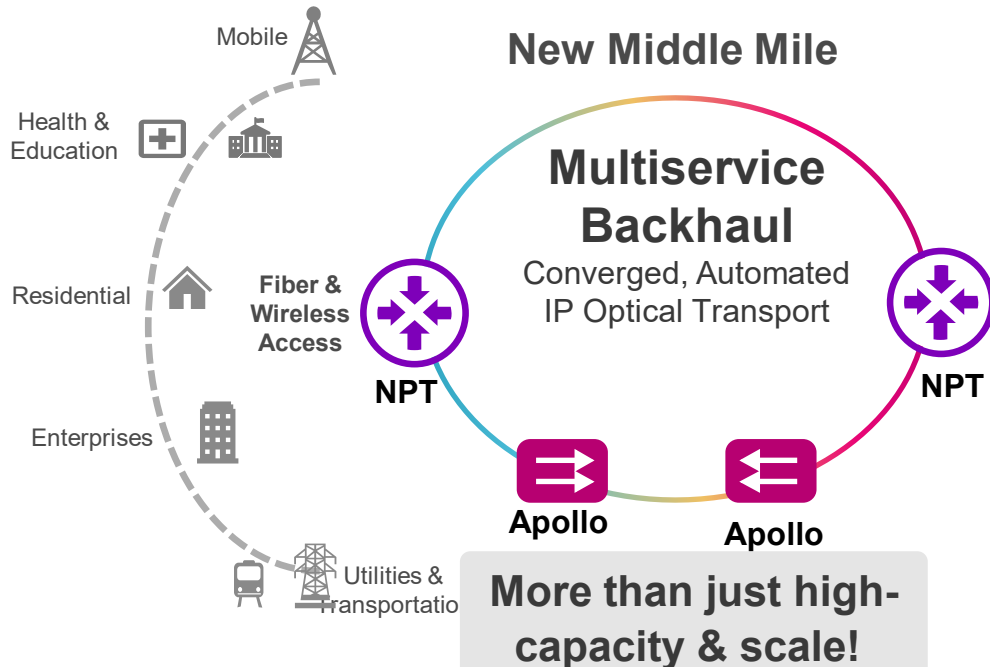
**David Stokes**

Head of IP Portfolio and Solutions Marketing

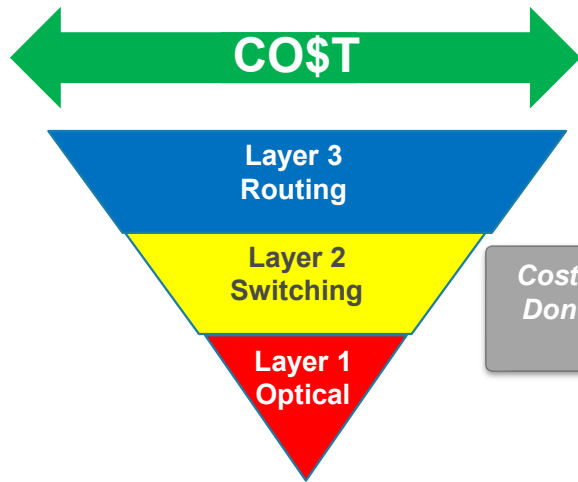
# Turning New Technology Into Revenue

## New Scalable Middle Mile is Essential

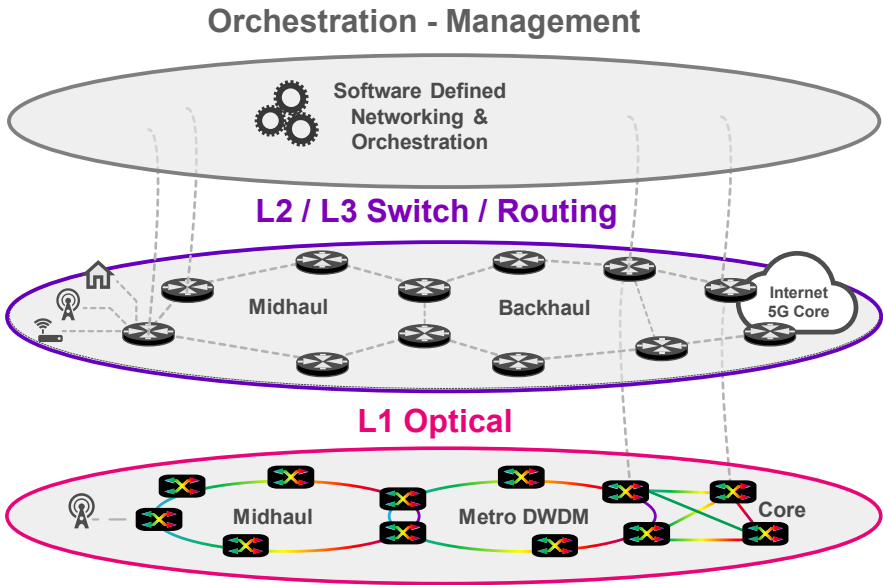
- Cost-Effective
- Service Aware
- Operational simplicity
- Built to Last – Avoid Truckrolls



# Cost Effective Use of Technology

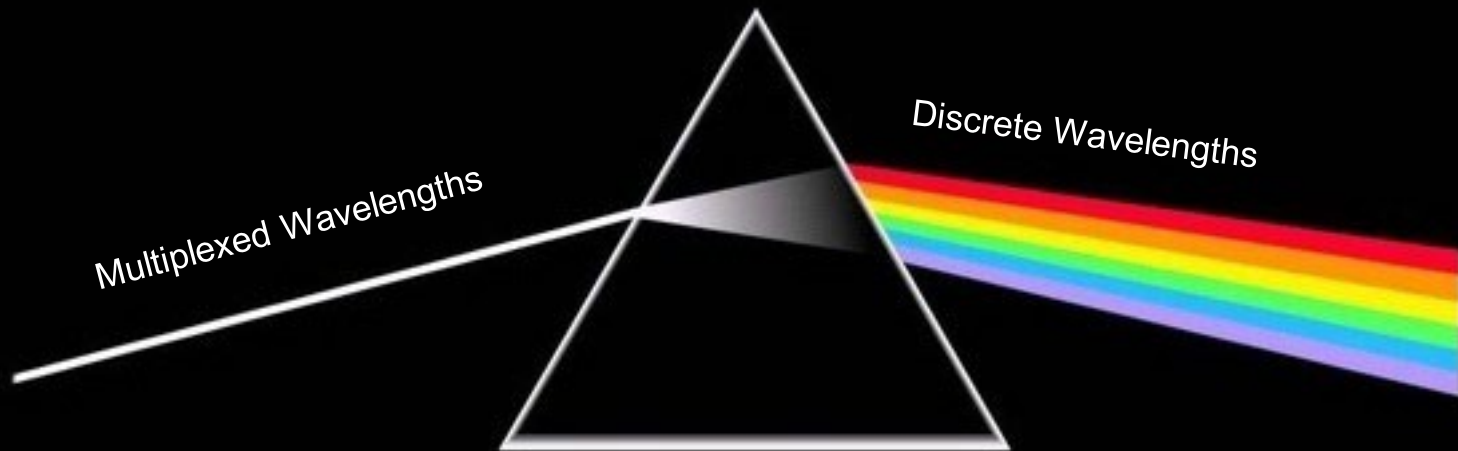


*Cost-Efficient Transport is Done at the Lowest Layer Possible*



Transport Technologies Can Be Deployed Separately or In Combinations to Support Requirements

# DWDM Optical Transport



**DWDM is a Simple Technology, used for...**

- Fiber Relief - Traffic Isolation - Efficient Long Reach Transport

# Optical Layer Flexibility



## Massive Scale

- Wavelengths Support Bandwidth from 10Gb to 1.2Tb+
- Typical Optical Design Provides Dozens of Wavelengths
- Increase Backbone Capacity As Needed



## Not Just 'Dumb Pipes' Anymore

- Signal Health Monitoring and Alerting
- Instant Fiber Break Detection and Geo-Location
- Layer 1 ULL Encryption



## Application

- Leased Wave Services / Leased Spectrum
- Backhaul Services

*Unmatched Capacity  
Extended Reach  
Scales Easily*

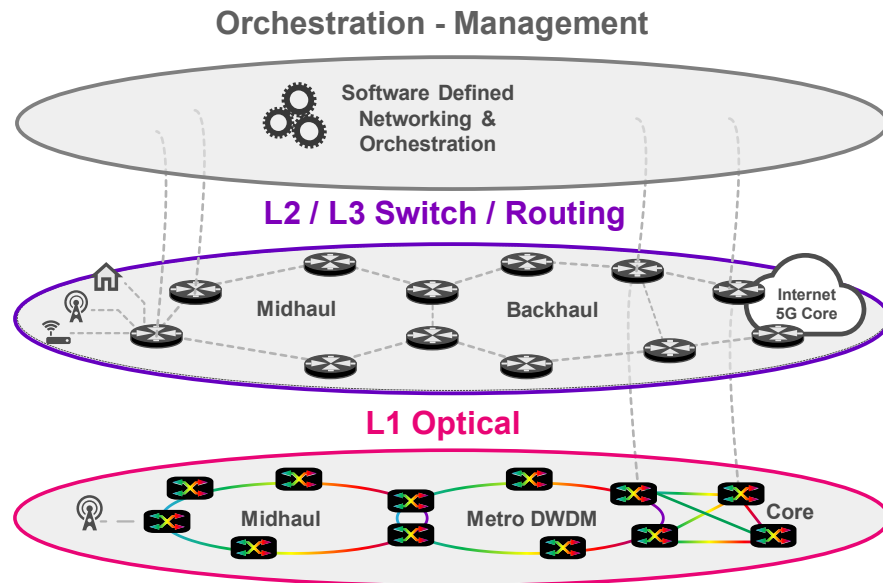
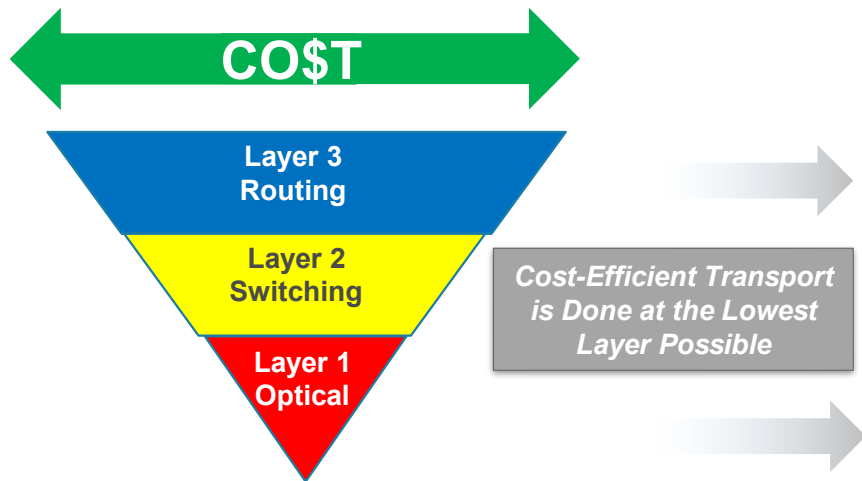
**Lambda 4: 200Gb / 400Gb**

**Lambda 3: 200Gb / 400Gb**

**Lambda 2: 100Gb / 200Gb**

**Lambda 1: 100Gb / 200Gb**

# Cost Effective Use of Technology



Transport Technologies Can Be Deployed Separately or In Combinations to Support Requirements

# IP Routing – Market Trends



## Traffic Growth

- Internet
- Mobile
- VOD
- Online Gaming



## Capacity

- IP Links Growth from 10G to 100G with Trend to 400G and Beyond



## Topology

- Transition from P2P Lines to Rings and Virtual Mesh Topologies



## Network Simplification

- Fewer Protocols
- Programmability and Automation



## Openness

- Standardized Interfaces
- Decoupling Software from Hardware



## Network Convergence

- TCO Savings
- Extended ROI
- Additional Revenue from Service Diversity



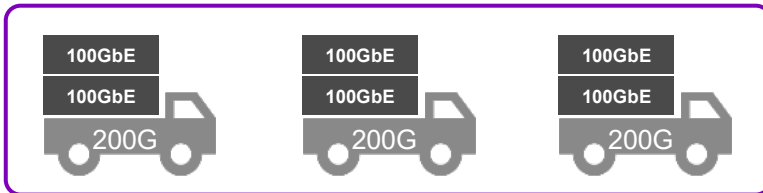
# Bypassing 200G, the Move is to 400G+ Lanes

Services Traffic

Optical Network

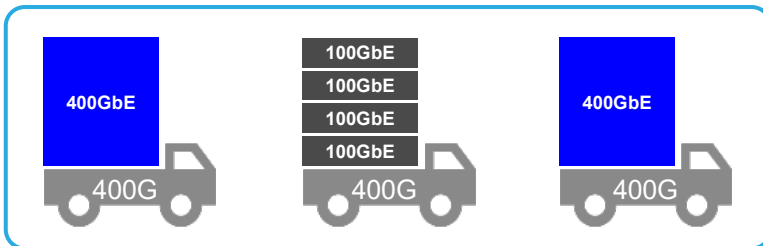
Yesterday

100 GbE



Today

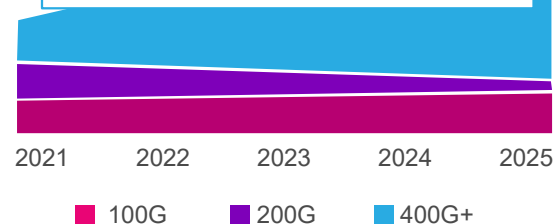
400 GbE



## Market Forecast

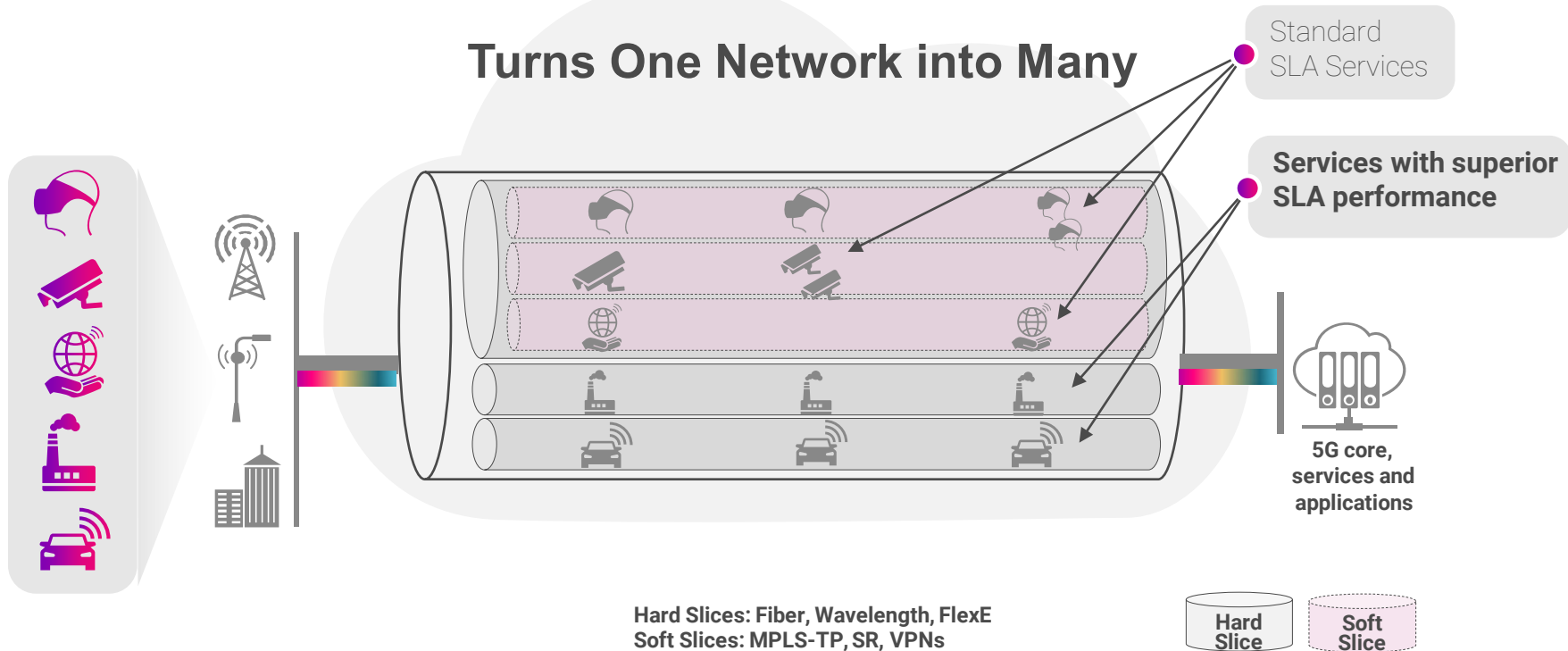
400G+ Ports Shipments Forecast  
(Source: Cignal AI)

400GbE ZR+  
Coherent  
Approaching  
*Price Parity* with 100G!



# Network Segregation using Transport Network Slicing

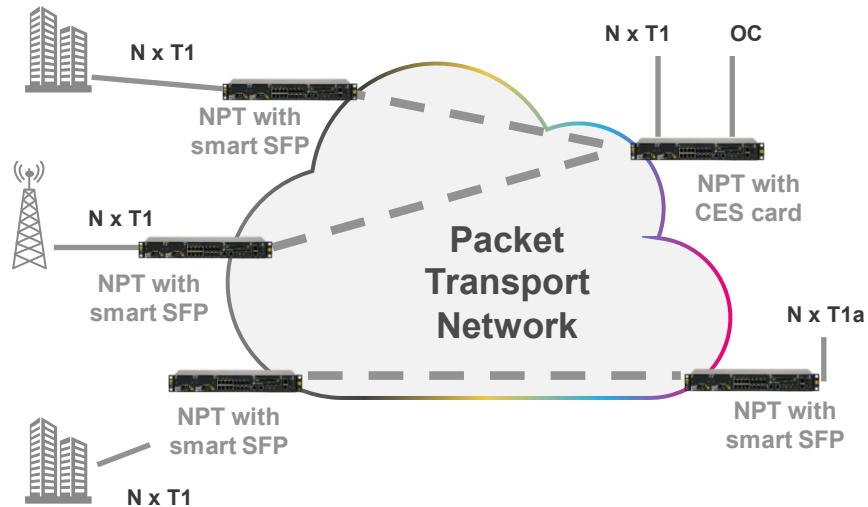
## Turns One Network into Many



# TDM to IP Migration: Circuit Emulation Services

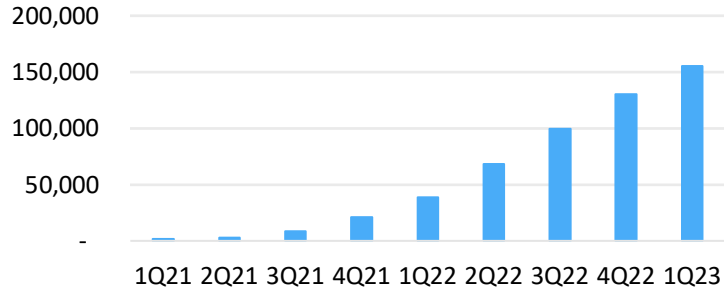
## Seamless and risk-free transport of legacy circuits

- **Comprehensive CES technology**
  - Both smart SFP pluggables and service cards
  - Supports SAToP, CESoPSN and CEP
- **Multiple Applications supported**
  - TDM aggregation
  - Voice Trunk Migration
  - Legacy Service Migration
- **Proven expertise**
  - Field proven processes for network migration
  - Supported many different solutions environments



# IPoDWDM and IPoOT with ZR / Open ZR+ modules

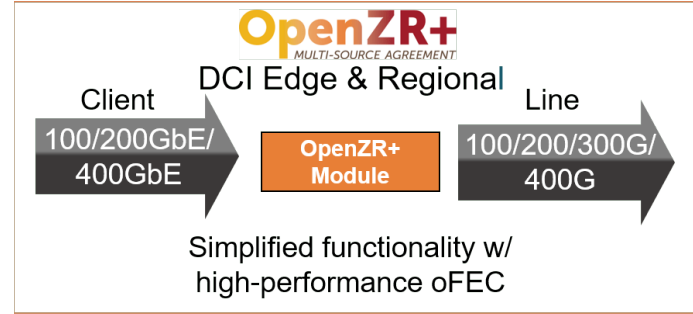
Growing Global 400G ZR cumulative shipments



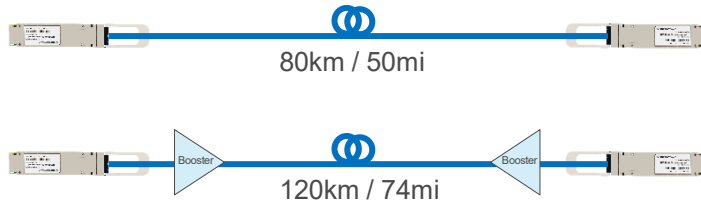
Source: Omdia

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OpenZR+ Multi-Source Agreement (MSA)



400G ZR use cases



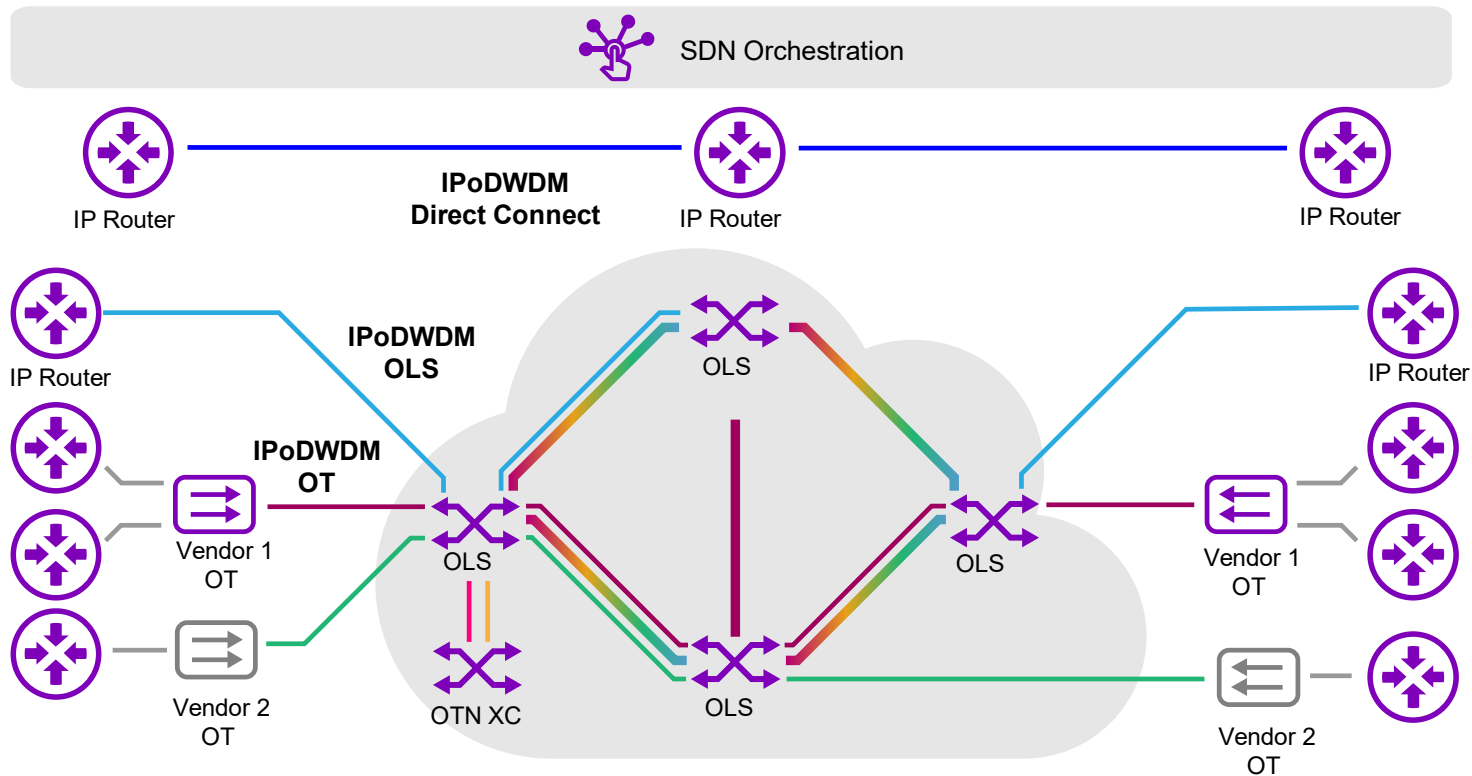
- FEC - CFEC
- Power 15W
- Speed 400Gb
- 10dbm
- OIF standard
- Gray

400G OpenZR use cases



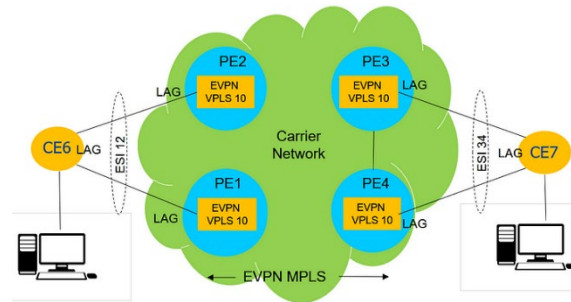
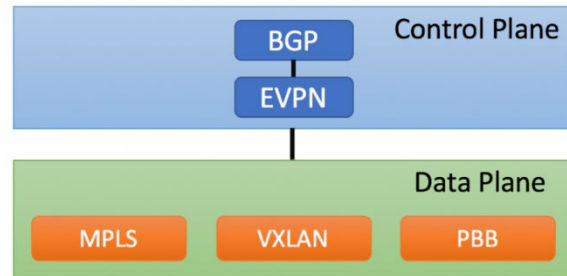
- FEC - oFEC
- Power 25W
- 0dbm Coherent
- Speed 100Gb / 200Gb/400Gb
- OpenZR+ MSA standard
- X5 higher price

# Ribbon Supports All Approaches



# Ethernet VPN (EVPN) – How It Is Different

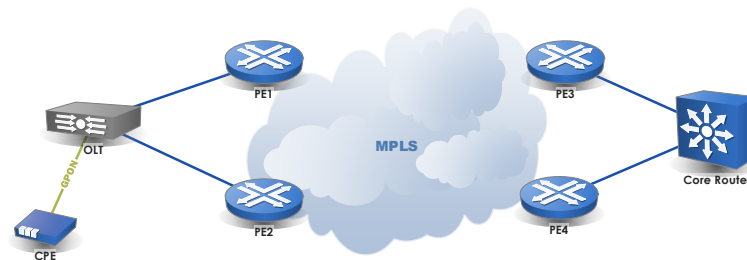
- **Data Plane is separated from Control Plane**
  - MAC Learning and Segment Identification is done via BGP
  - Traffic is forwarded over the MPLS data plane
  - No full mesh required for ELAN applications
  - Efficient handling of Broadcast, Unknown Unicast, and Multicast (BUM) traffic
- **Multi-Homing Advantage**
  - All active multihoming allows CE-PE connections to different PEs to be identified by an Ethernet Segment ID (ESI)
  - MAC Address is associated in MP-BGP with the ESI
  - PEs that have not learned the MAC will still advertise the ESI availability
  - BUM traffic is handled by a single connected PE called the Designated Forwarder (DF)



# Typical Use Case

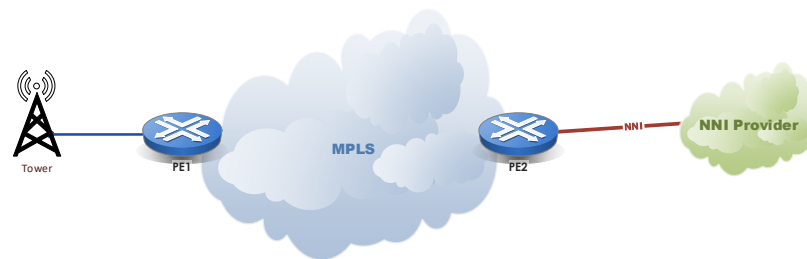
## • Optical Line Terminal - Multihomed

- All active multihomed connection with EVPN based L2VPN connected to Core Router
- Resilient against failure of either link, or connected PE device
- Development continues to expand use cases



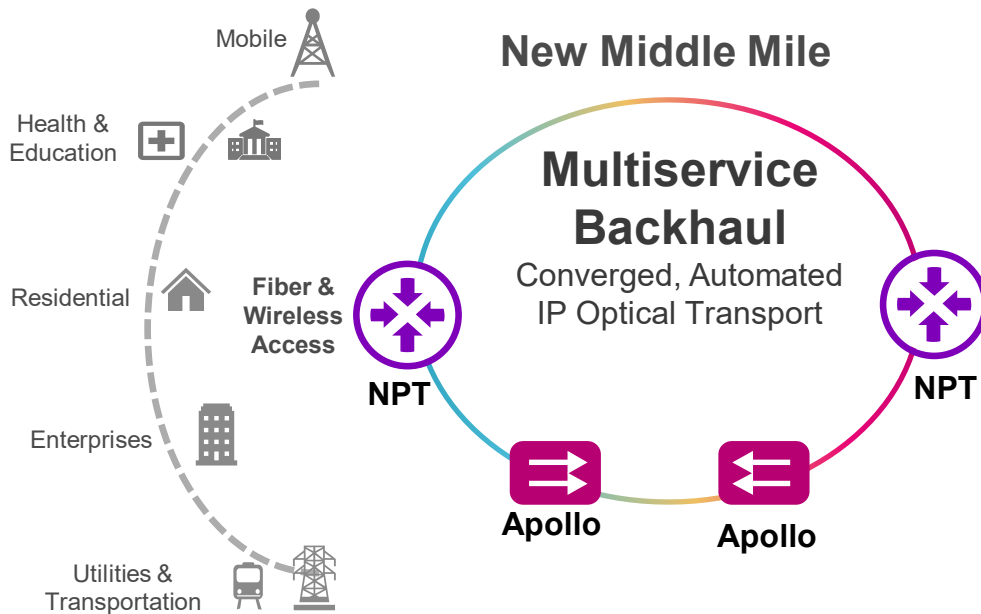
## • Cellular Backhaul

- VPWS over EVPN to build MEF E-Line service
- All to one bundled connection at cell tower, traffic connected to NNI on customer specified VLAN



# In Summary: Design for Today, Scale to Tomorrow

- Today's technology is Game Changing
- Build for Today But...
- ...What is Built Today Meet the Future
- Add Revenue Potential
  - Customized Service Delivery
  - Wave Services
  - Service encryption







# Case Studies

# Georgia Transmission Corp

## Customer Challenge

- US Cooperative for Power Generation & Transmission
- Critical Need to Control Operational Destiny
- Need for Greater Network Capacity
- Essential to Improve Reliability and Security



GeorgiaTransmission

**Georgia  
Transmission  
Corp**

TSO owned by  
38 EMCs.



## Why Ribbon

- **Pure Layer 1 Optical Transport**
  - Easily Scales as Demand Scales
  - Began as a 10G, Now Carrying 200G Lambdas
- **Highly Reliable**
  - 8-fold Reduction in Trouble Tickets
  - Integrated OTDR Fiber Health Management
- **Per Service Configurable Security**
  - Encryption for OT Traffic, Unencrypted for ISP/Partner Traffic
- **State-wide Backbone for Service Delivery**
  - Residential Broadband Service
  - Wireless Backhaul
  - Wave Services
  - Internal Communications (SCADA)
- **Approaching 100+ Apollo nodes in 2023**

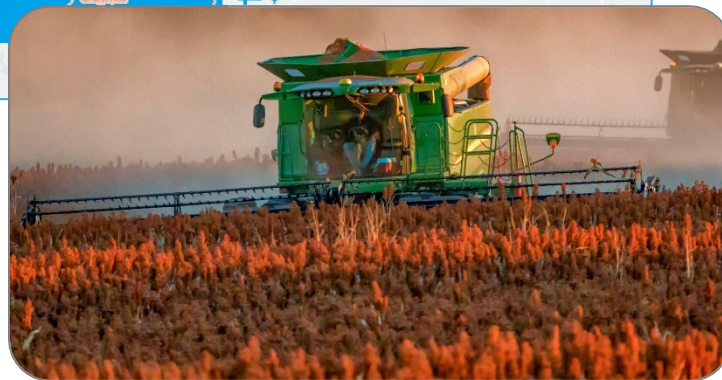
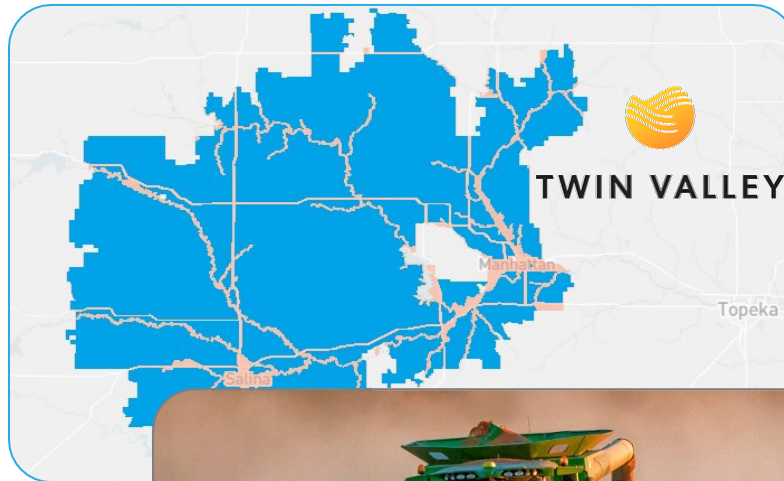
# Twin Valley Telephone

## Customer Challenges

- **Large Rural Service Provider, Clay Center, Kansas**
- **Scale to Provide Robust Middle Mile**
  - Backbone Sized to Accommodate Current and Projected Growth
- **Network Reliability**
  - Automated, Flexible and Optimized Traffic Failover

## Solution

- **IP/MPLS 400GbE Backbone**
  - Service Awareness
  - Sub 50ms Service Restoration (TI-LFA)
  - Advanced Traffic Engineering (SR-TE)

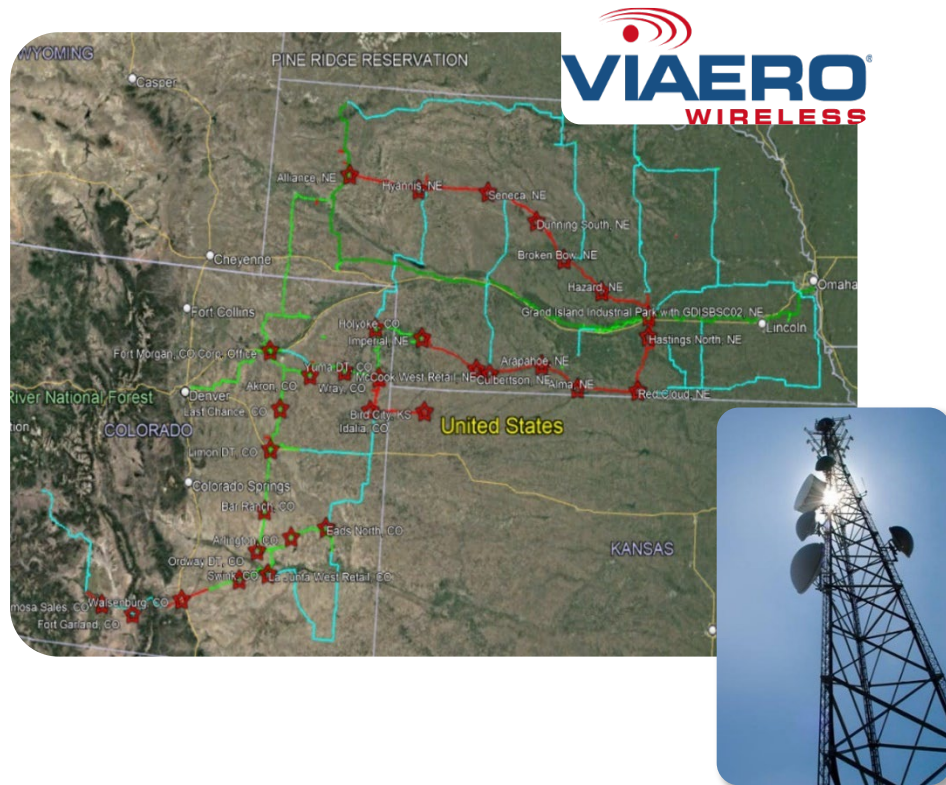


# Viaero Wireless

- Optical / IP Ethernet, WB, Backbone & IP Core
- 300+ Apollo/NOT Nodes
- 2300+ km of Ribbon Lit Fiber
- 1,000+ Cell Towers in Service Area

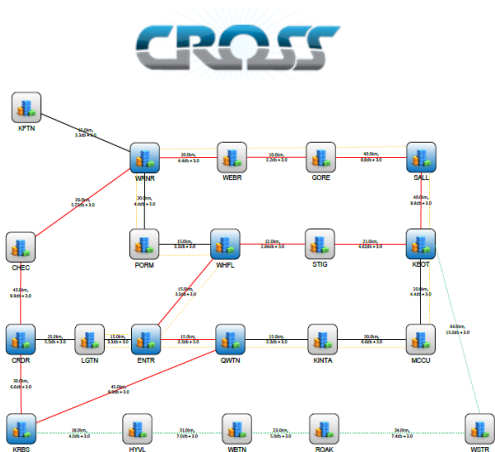
## Design Keys

- **Lowest Achievable Latency**
  - Optical Express Routes
- **<50ms Failover Required**
  - MPLS-TP Moving to Segment Routing
- **In Service OTDR**



# Cross Telephone

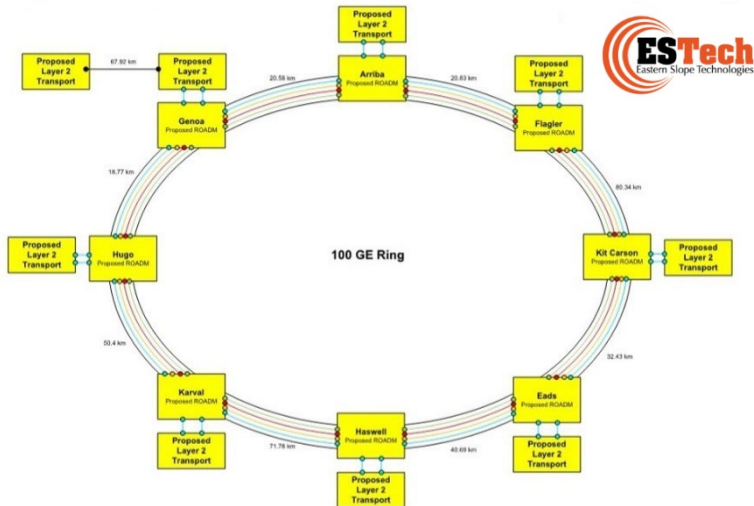
- Telephone, high-speed Internet and digital television provider in Oklahoma
- Need to grow packet and optical network capacity with future flexibility
- Current network does not meet needs



- Crosstel is an Ericsson customer (radio and microwave) who referred Ribbon
- Solution met current needs with agility to grow
- Integrated NPT and Apollo solution
  - Services from each NPT are 6x10GbE and 32xT1
  - 10G wavelengths outside of core terminated by NPT1200
  - OTN Transport coherent 100G, with ROADMs in a few core sites for future growth

## Customer Challenge

- Ethernet + Optical backbone for wireless backhaul, business, and consumer traffic
- Replace EOL Fujitsu system
- Integrated solution scalable to handle future traffic needs as well as legacy services

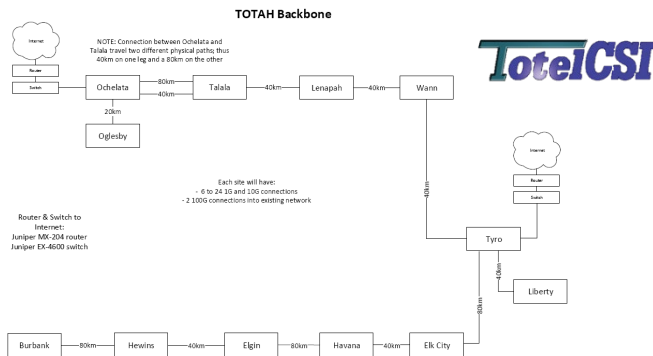


## Why Ribbon

- **Tailored solution**
  - In customer's view "upgraded transport by orders of magnitude while meeting cost expectations."
  - Common management system
  - Integrated L2 services over optical ROADM plus 100G/200G transport backbone
  - 10G legacy services and 100G/200G coherent wavelengths on the same fiber
  - Turnkey professional services
- **Delivers revenue growth and reduced TCO**
  - Greatly increased traffic capacity
  - Massive scalability up to 10Tb backbone
  - More rapid service deployment
  - Reduced administrative costs

# Totah Communication

- Grow residential broadband ARPU and enter SMB and mobile backhaul markets
- Unable to achieve growth goals with current network due to fiber exhaustion
- Require turn-key solution and extended support



- **Integrated, scalable, cost efficient, solution solving Totah's fiber exhaustion:**
  - Unified IP and Optical transport platform with 100G core transmission network
  - Agility to extend to 200G with a software upgrade
- **Multiservice flexibility allows dynamic, rapid introduction of new services:**
  - Multiservice IP supports evolving mix, of residential, business, and mobile services , including 5G backhaul
  - Comprehensive NMS for the entire network
- **Comprehensive continuous project support**

# Highlights

- **Standards-Based IP and Optical Solutions**
- **Globally Deployed in Over 140 Countries**
- **No Persistent Licensing Fees**
- **100% US-Based Support**
- **Buy America Act and BABA Compliant**
- **10-12 Week Delivery on Entire Catalog**

 **IP WAVE**





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# THE RIGHT WAY