



Advanced Applications, Key to Revenue Growth

The Intelligent Middle Mile

Dave Gibson

Ribbon IP Optical

The Intelligent Middle Mile: Roadmap to Success

- Evolution of the Middle Mile
 - More Complex Fiber Topologies
 - Latency, Why it Matters
- Advanced Applications
 - The Revenue Yield Problem
 - Here Today, More Tomorrow
 - Traffic Engineering and Management
- The Intelligent Middle Mile
 - Solves the Revenue Yield Problem
 - Empowers Investments in the Entire Network
 - Built for the Long Term, Avoids the Forklift



Funding Realities

- Today: Historic Levels of Public Funding

- RDOF, BEAD, ReConnect, MMG, RUS...
- Little to No Opex Funding Available
- Unlikely to Repeat



- Revenue-Forward Networking

- Capital Investment
- Return on Investment
- Improved Time to Revenue
- Total Cost of Ownership
- Extending the Life of Your Network

\$105 Billion



The Yield Problem: Why More Bandwidth Isn't the Answer

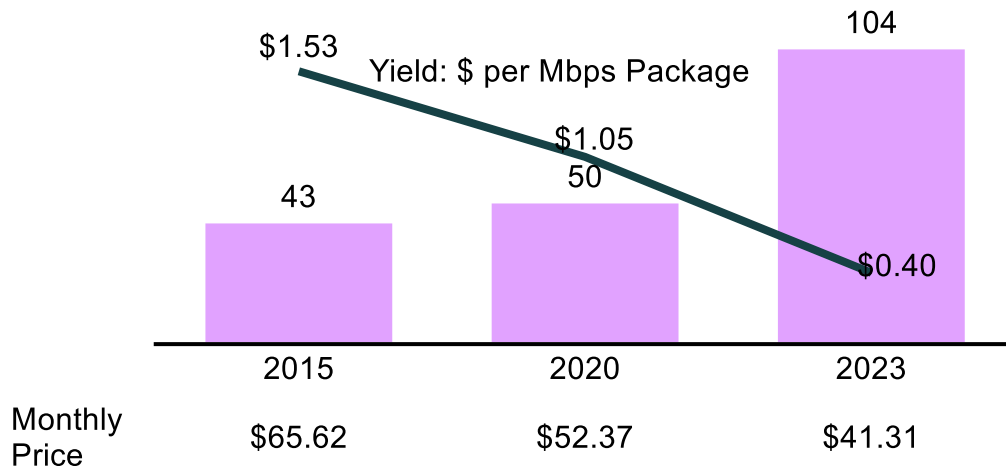
Historically Customers have Migrated Speed Packages at a Moderate Rate

Yield (\$/ Mbps) has Declined Steadily as Industry Creates More Capacity

Acceleration of High Capacity Gigabit is **Accelerating Yield Declines**

Average Speed Package and Yield Curves

2015 - 2023

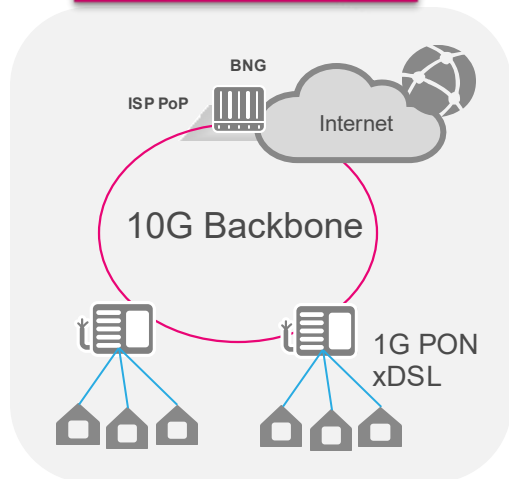


Source: U.S. Bureau of Labor Statistics; U.S. Telecom Pricing Report 2023; Packages for US Telecom "Consumer Choice" as part of Broadband Pricing Index study

Better Monetization is Essential to Reverse this Trend

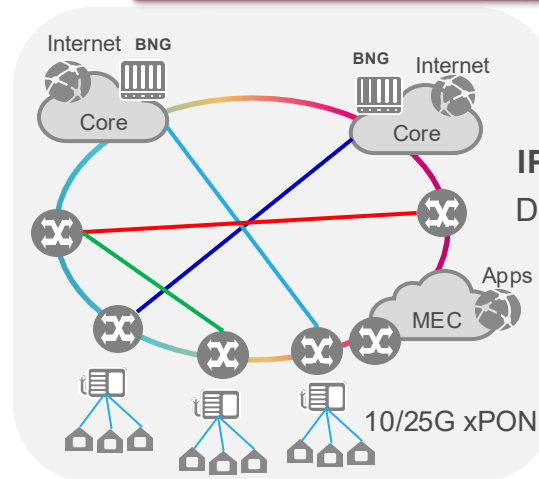
Fiber Topology Evolution and Adaptation

Access Only



- G-PON and Other Legacy
- Access Devices Not Built for Advanced Applications
- Fixed Ring Capacity, Difficult and Expensive to Upgrade

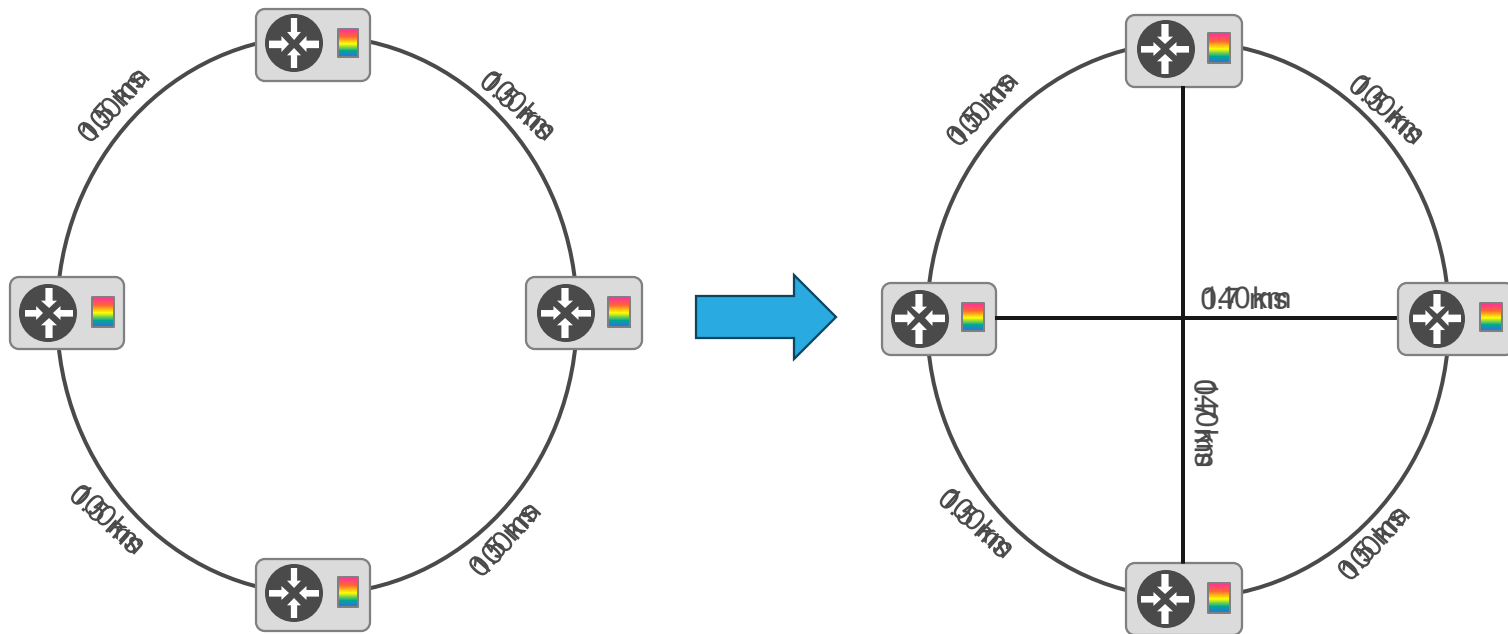
Access + Middle Mile



**Converged
IP Optical Transport**
Dynamic Virtual Mesh
400G

- XGS-PON, 10G/25G+
- Lower Latency
- Intelligent Transport
- Middle Mile Scales Easily to Terabits

Evolving Fiber Architectures – Latency

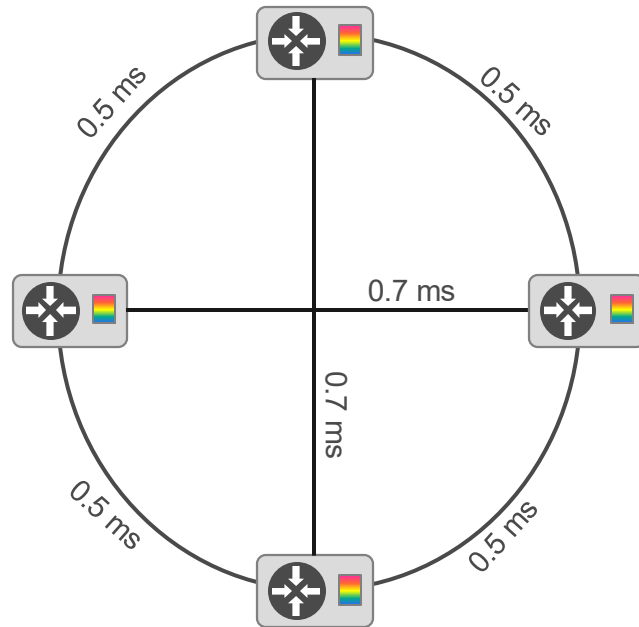
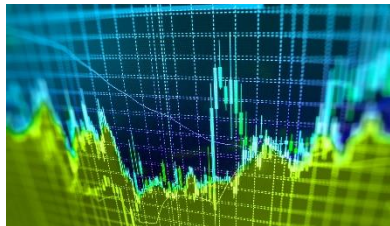


The Majority of Latency for Fiber Routes is a Broadband Network Signal Travel Time.

Evolving Fiber Architectures – Latency

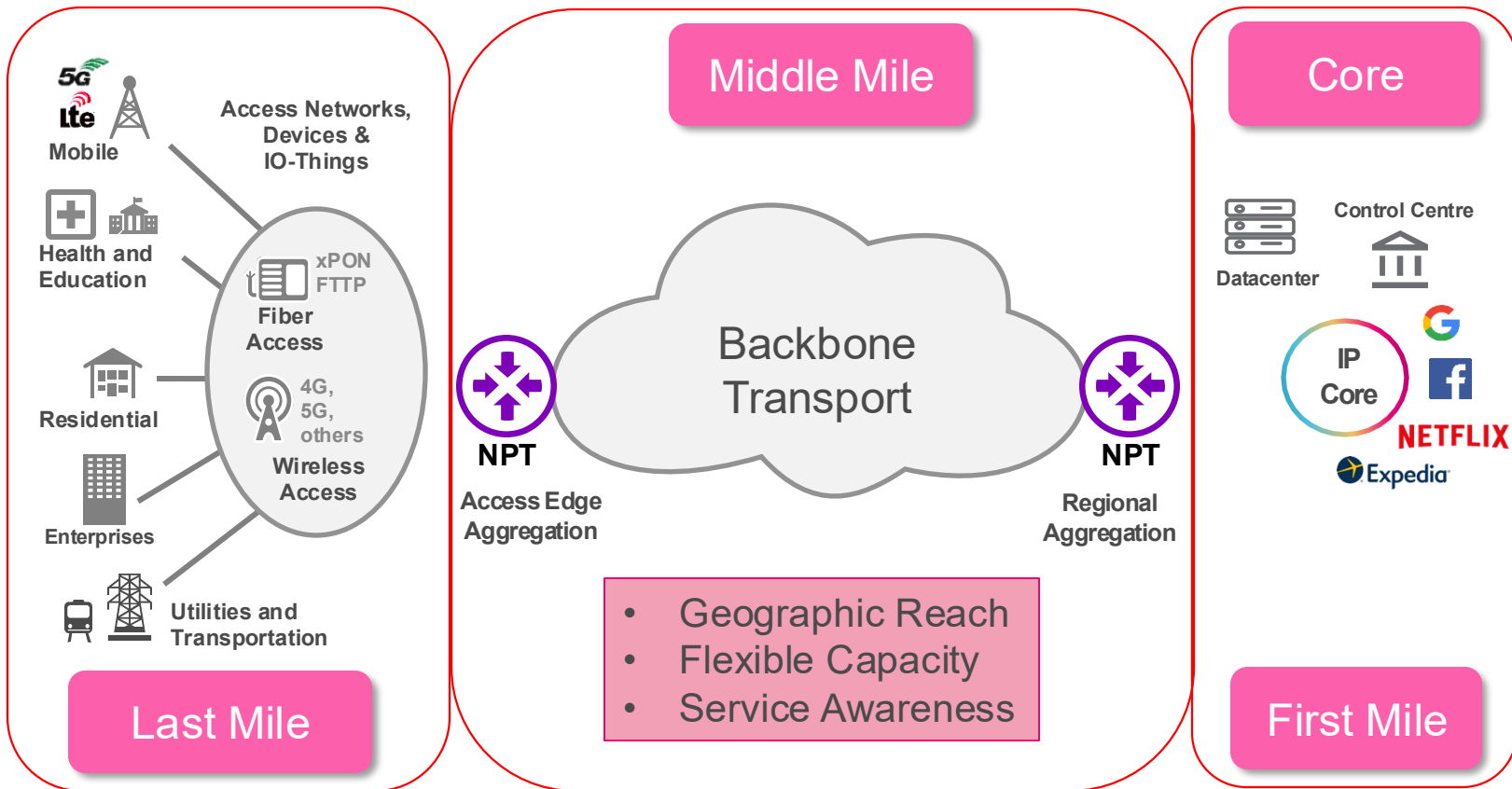
Fiber ‘Shortcuts’ Aren’t New, but...

Rapid-Decision L3 Protocols Allow Full Utilization of Complex Topologies, Enhancing Service Quality.



A 1-Millisecond Advantage ... Can be Worth \$100 Million a Year to a major brokerage firm.

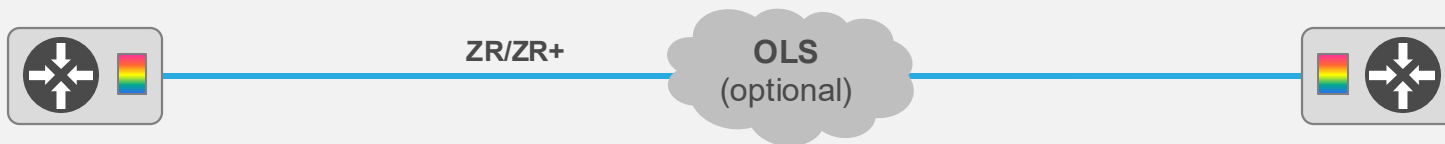
What is the 'Middle-Mile' ?



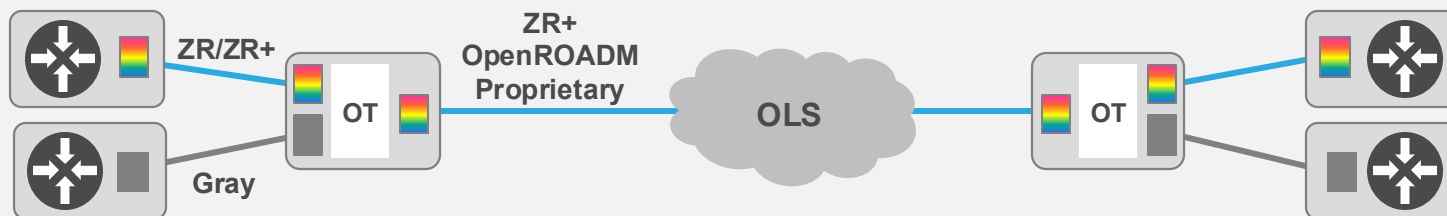
Evolving Network Architectures – Coherent Routing

MULTI-LAYER DOMAIN CONTROL

Coherent
Routing
without OT



Coherent
Routing
with
book-ended
OT

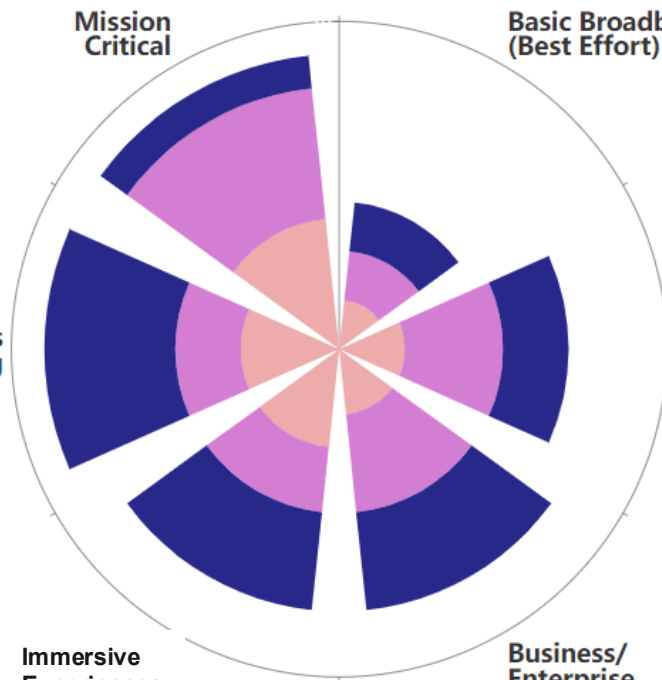


Cost Effective and Flexible Architecture

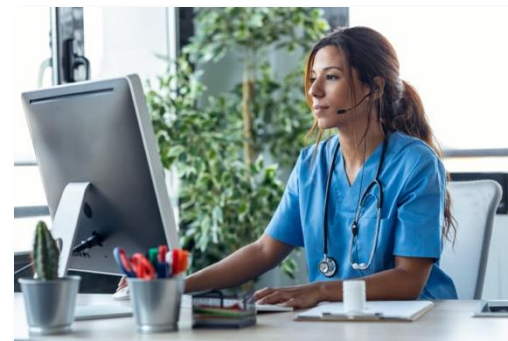
Advanced Applications and Revenue



Hi-res
Streaming



Low Latency High Availability High Speed



META

Traffic Engineering is Critical to Happy and Loyal Customers

Streaming Entertainment

- **High Bandwidth**, “Best Effort”
- Latency: tolerant
- Minor Packet Loss: tolerant

Business Connectivity

- **Reliability** is Essential

Education

- **Security**, Controlled Access

Telehealth, Telemedicine

- **Encryption**, Privacy are Paramount

NETFLIX



Education

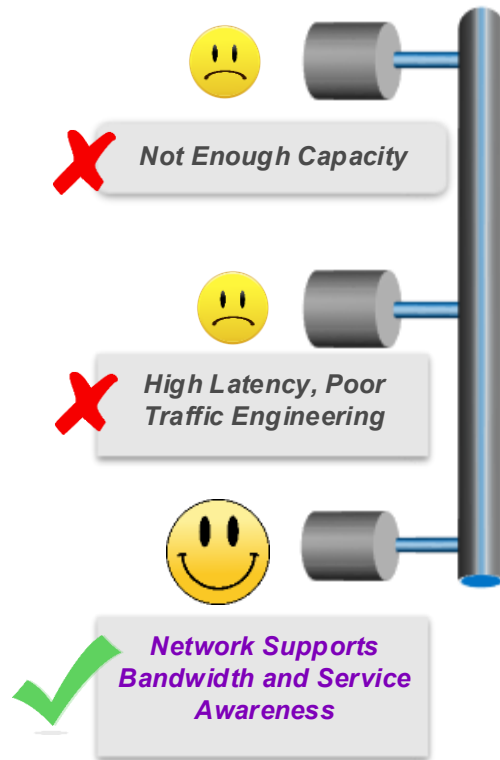
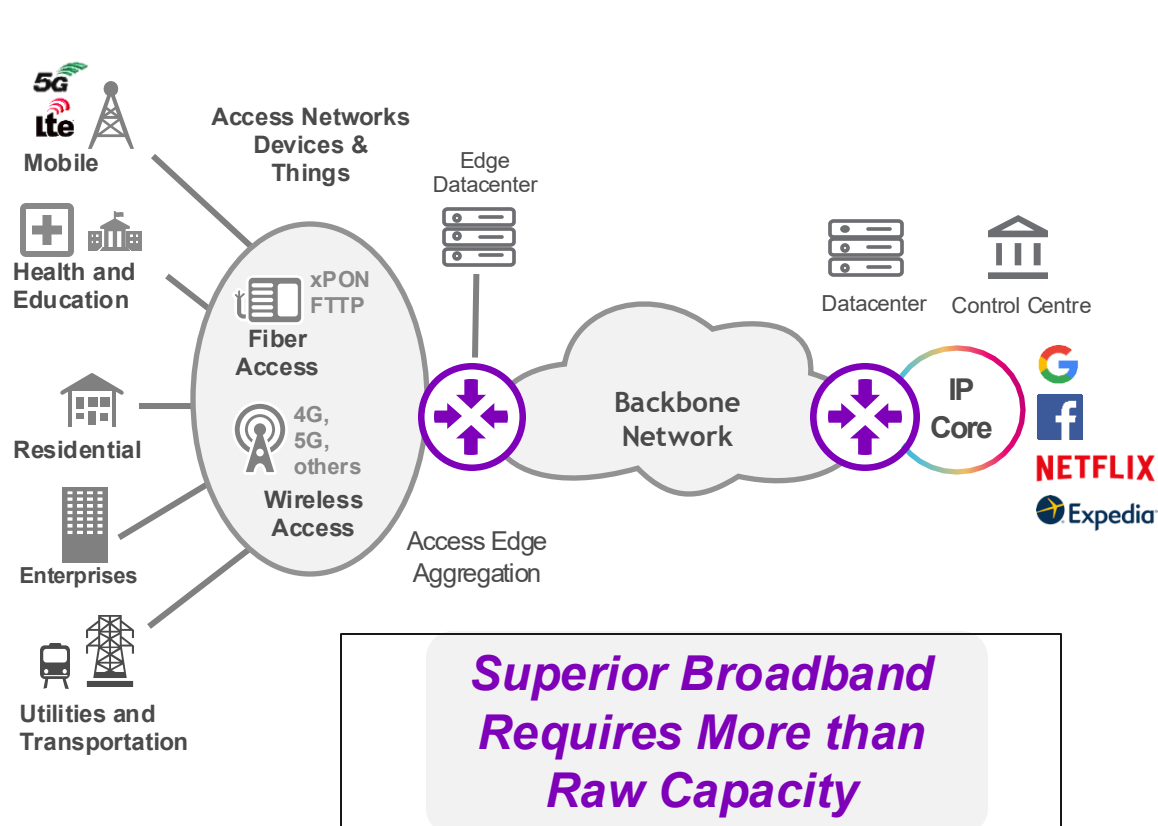


Business

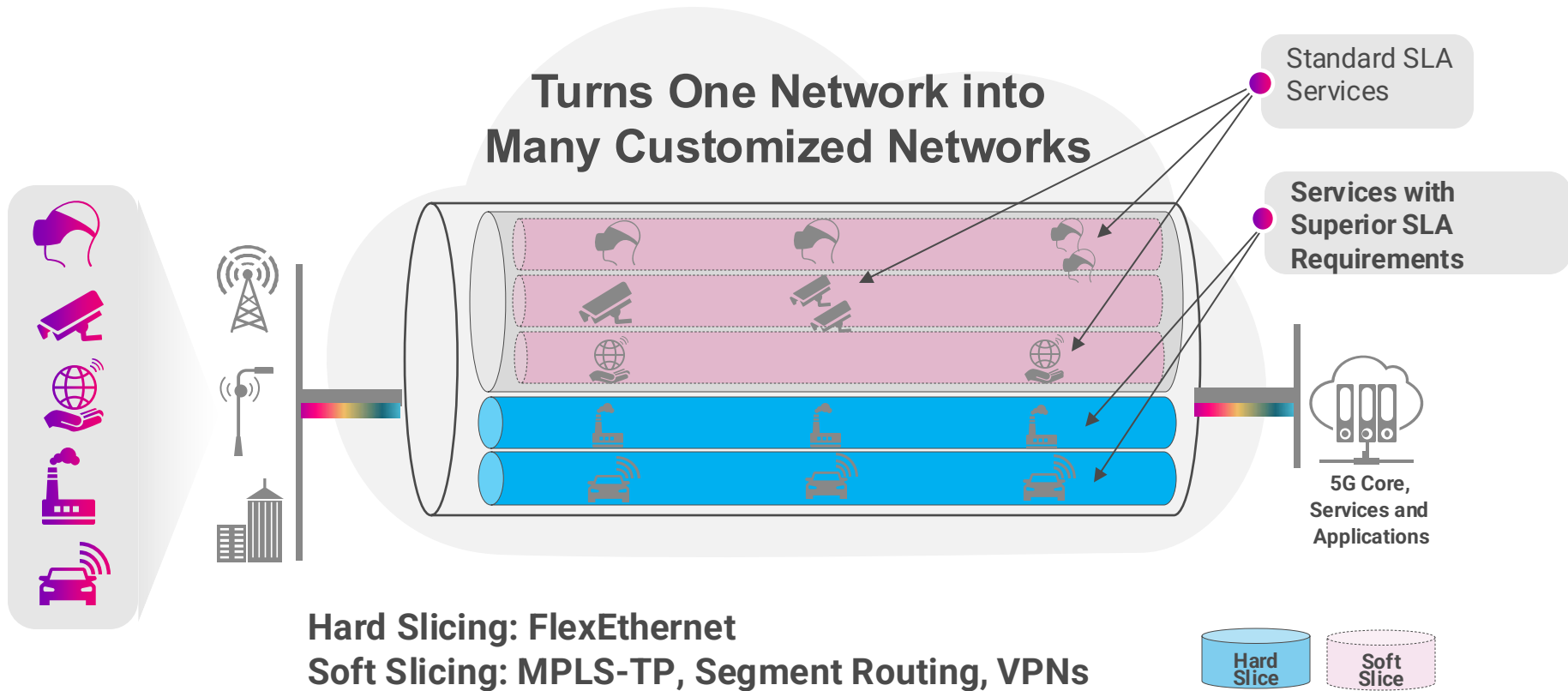


Health Services

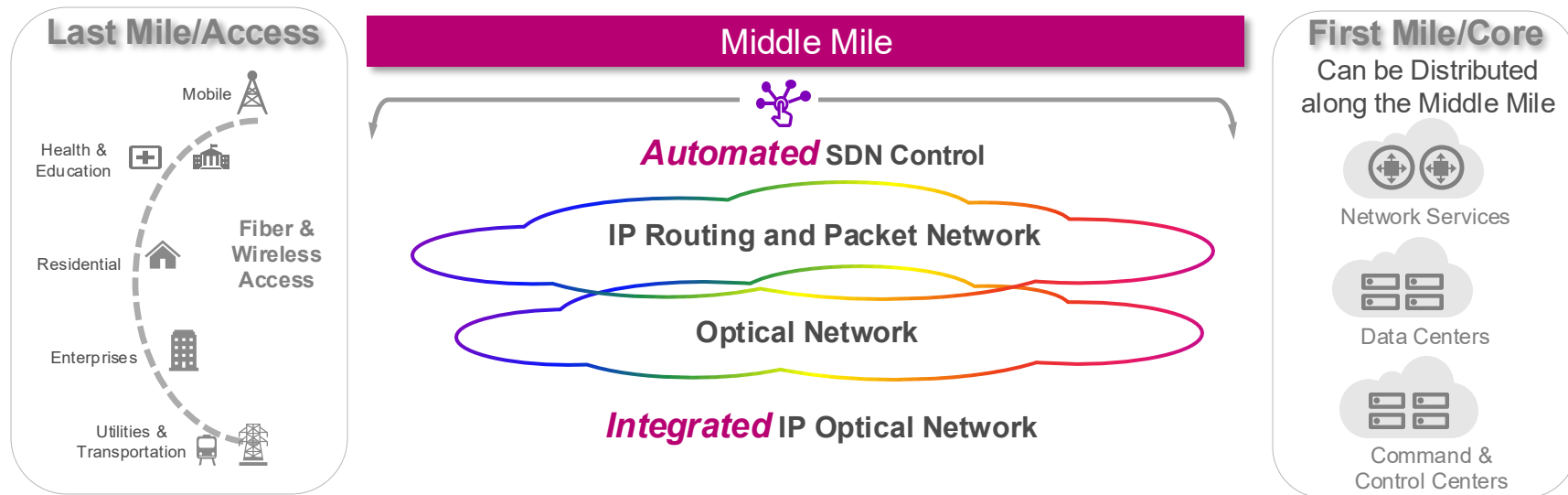
Network Scalability – More Than Just Capacity



Traffic Engineering Example: Transport Network Slicing



Intelligent Middle Mile Approach



Service Aware	Differentiated Services and SLAs	YES
Flexible Topology	Tailorable to Operator Architecture	YES
Forecast Tolerant	Grow Capacity and Reach Smoothly	YES
Economical	Minimize TCO	YES

In Summary

- Public Investment is *CapEx Only* so Spend Wisely!
- Cost-Improved Technology Advances
 - Advanced Service Handling Routers
 - Coherent Routing with 400G Optics
- Traffic Engineering Enables Enhanced Service Offerings
- Intelligent Middle Mile Design is Key to Sustainability and Revenue Growth



Contact Information

Dave Gibson
Ribbon IPO
Regional and MSO
dgibson@rbbn.com
(303) 809-6363

Thank You



**ACCELERATE YOUR
NETWORK
TRANSFORMATION**

ribbon