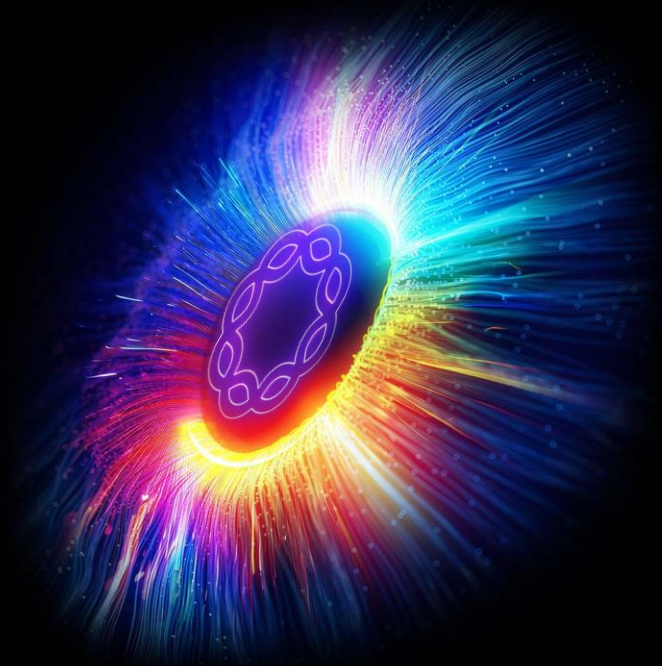


ribbon
INSIGHTS



Broadband Aggregation

The Intelligent Middle Mile

Jack Breeding

Dallas Insights 2024



Broadband Architecture – Market Trends



Traffic Growth

- Internet
- Mobile
- VOD
- Gaming/Immersive Apps



Capacity

- IP Links Growth from 10G to 100G, 200G with Trend to 400G and Beyond



Topology

- Transition from P2P Lines & Rings to Partial and Virtual Mesh Topologies



Advanced Applications

- Telehealth/Medicine
- Low and Ultra-Low Latency
- Remote Learning



Open & Unlocked

- Standardized Interfaces
- Decoupling Software from Hardware

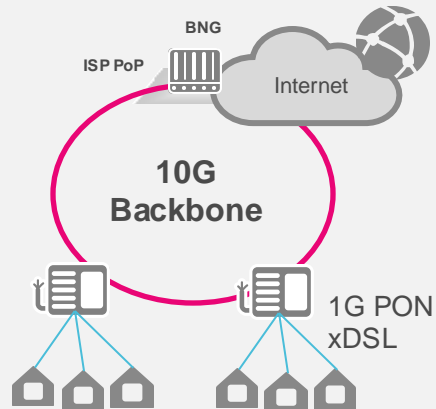


Network Convergence

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

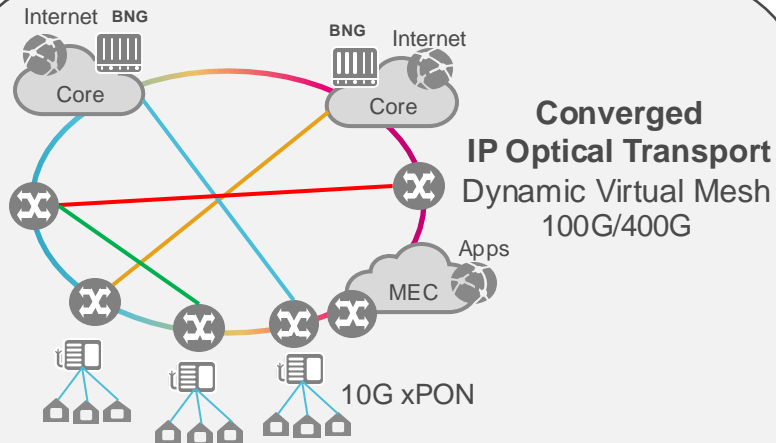
Fiber Topologies Adapt to New User Demands

Access Only



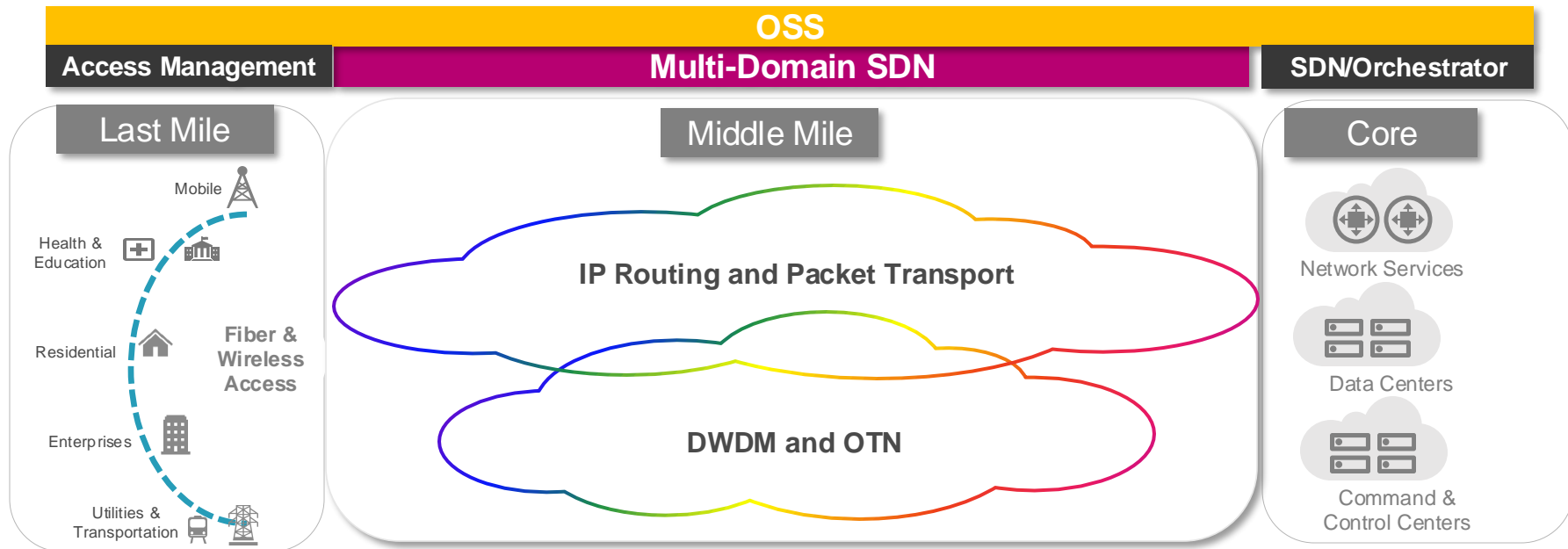
- G-PON and Other Legacy
- Access Devices Not Built for Advanced Applications
- Fixed Ring Capacity, Difficult and Expensive to Upgrade

Access + Middle Mile



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

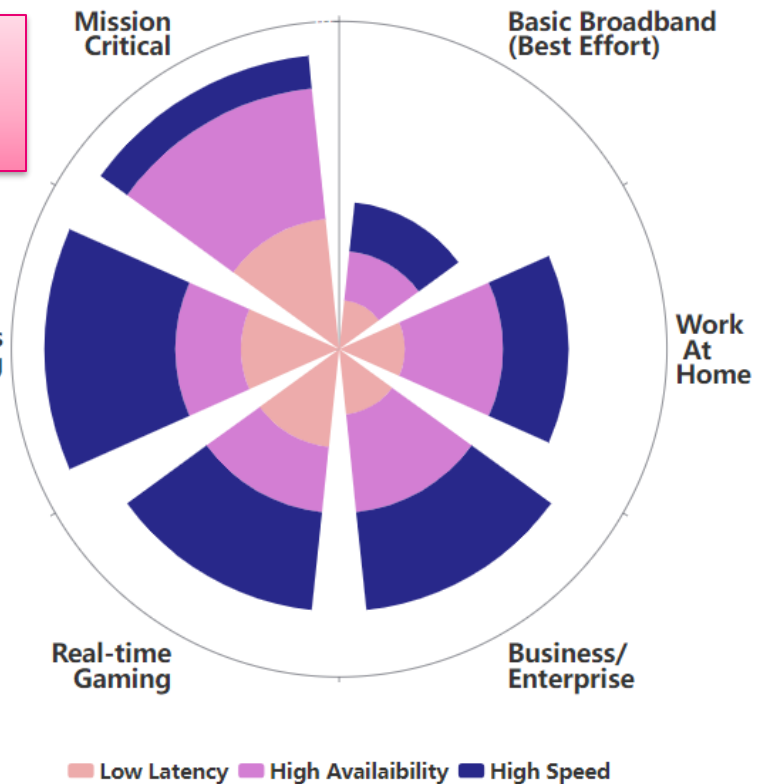
Definition: The Intelligent Middle Mile



- Connects Last Mile with Core Services and Applications
- Combines IP and Optical Networking
- From 10s to 1000s of Kilometers
- Reliable, Secure, and Meets Service Performance and SLA Requirements

Service Awareness and Handling

- Quality of Experience
- Meet SLAs
- Increased Revenue



Multilayer Design Approach

IP/Packet - NPT



Deterministic

Dynamic, Deterministic Transport



Transport

400G Transport with Elastic Scalability



Multiservice Aggregation

Multiservice Access Aggregation

Optical - Apollo



Powerful

10G to 2x600G in the same platform



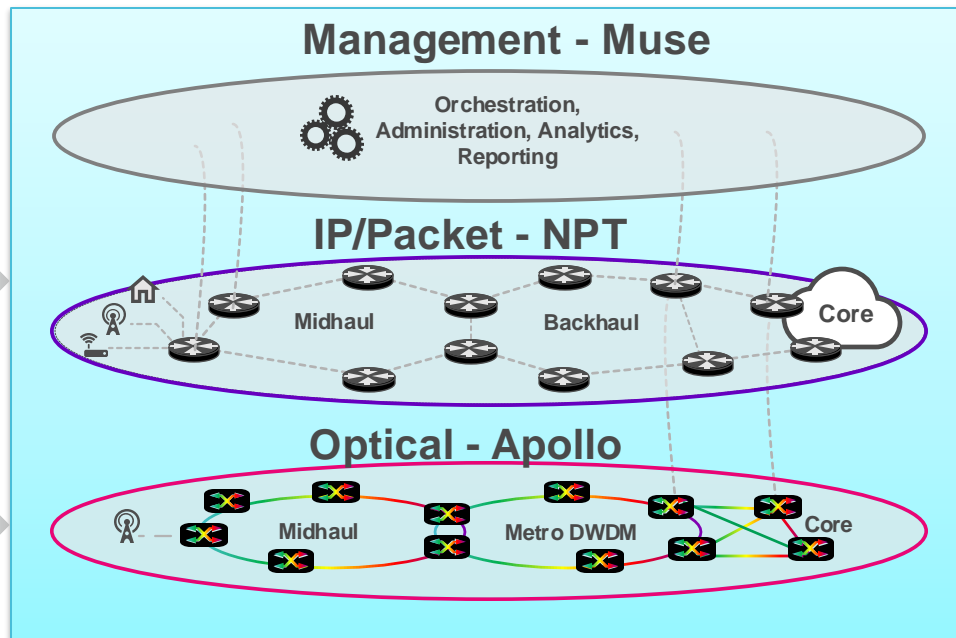
Intelligent

SDN features and integrated monitoring



Open

Standardized APIs, Open Optics



Configurable

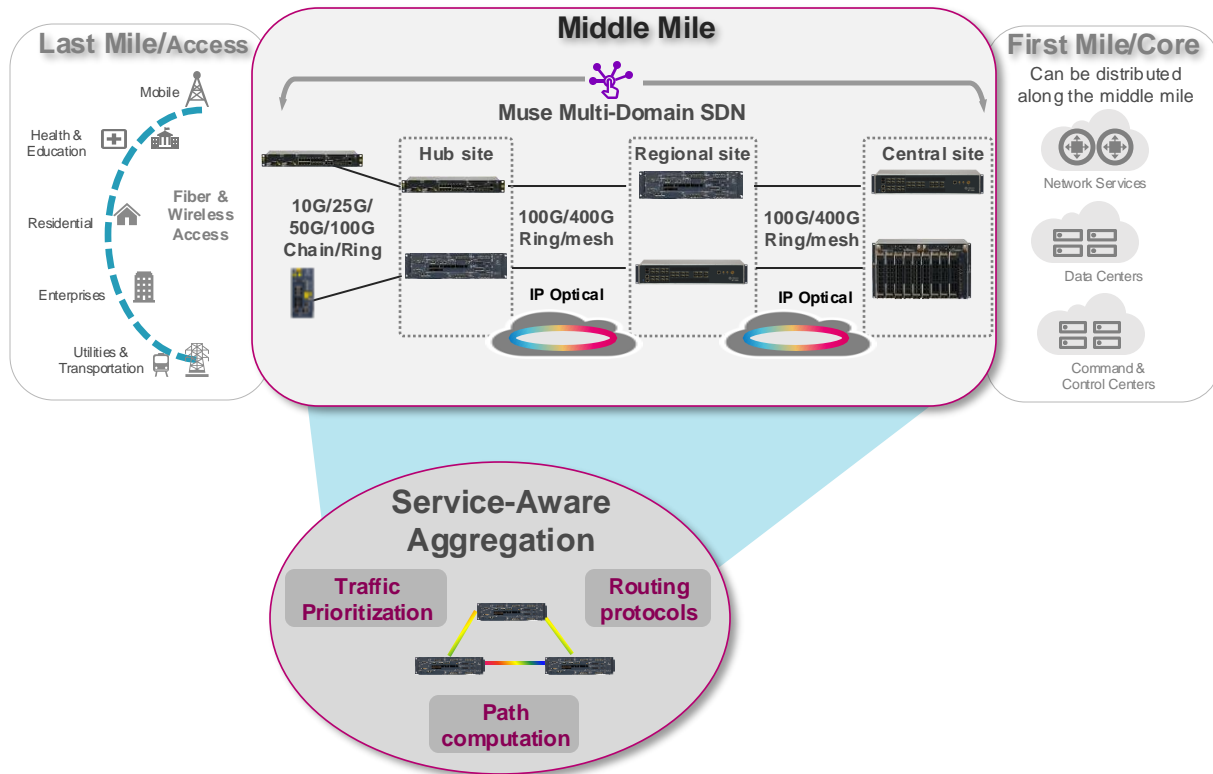
Automation

Streamlined

Open Architecture

NPT Service Aware Routing: Tailorable To Each Middle Mile

- **Huge Set of Interfaces**
Supports All Access Networks & Services
- **All Network Topologies**
To meet Operational and Business Needs
- **Right-fit Form Factors**
With Multiple Architectures and Capacities
- **IP Optical Integration**
With IPoDWDM, IPoOLS, IPoOTN
- **Common, Proven NOS**
Provides Capabilities
Optimized for Revenue Enhancement



NPT Product Portfolio

NPT XDR Family

High Performance Routers

- NPT 2100
- NPT 2300
- NPT 2400
- NPT 2714

NPT AR Family

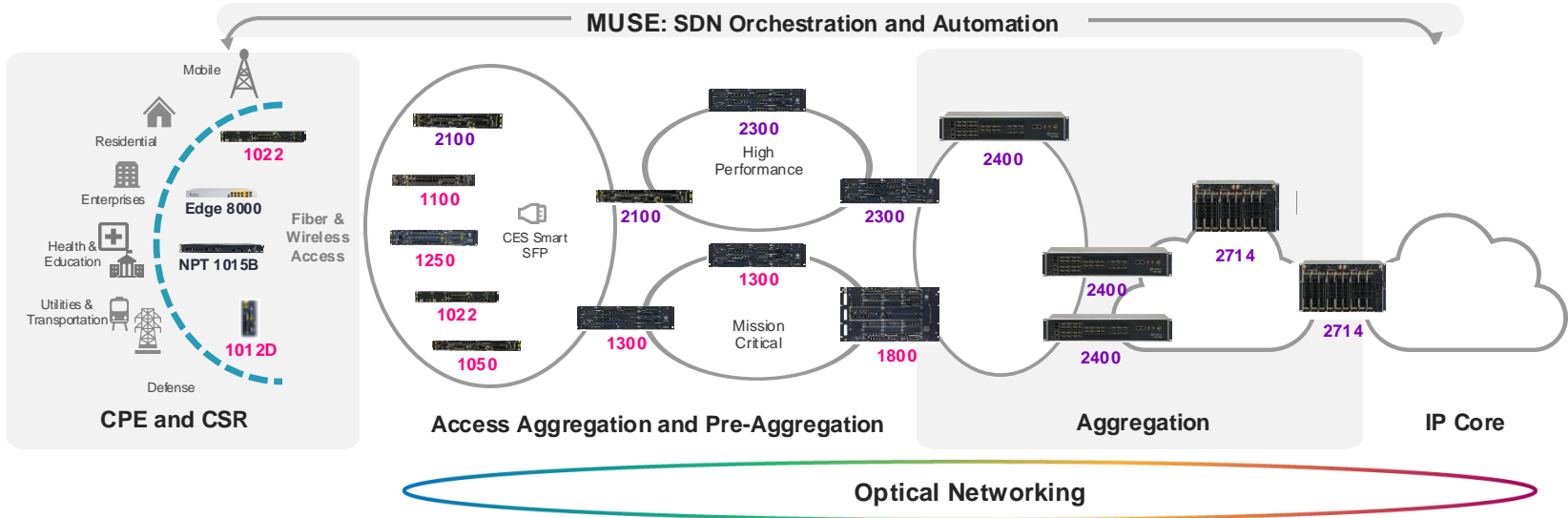
High Availability Routers

- NPT 1012D
- NPT 1015B
- NPT 1022
- NPT 1050
- NPT 1100
- NPT 1250
- NPT 1300
- NPT 1800

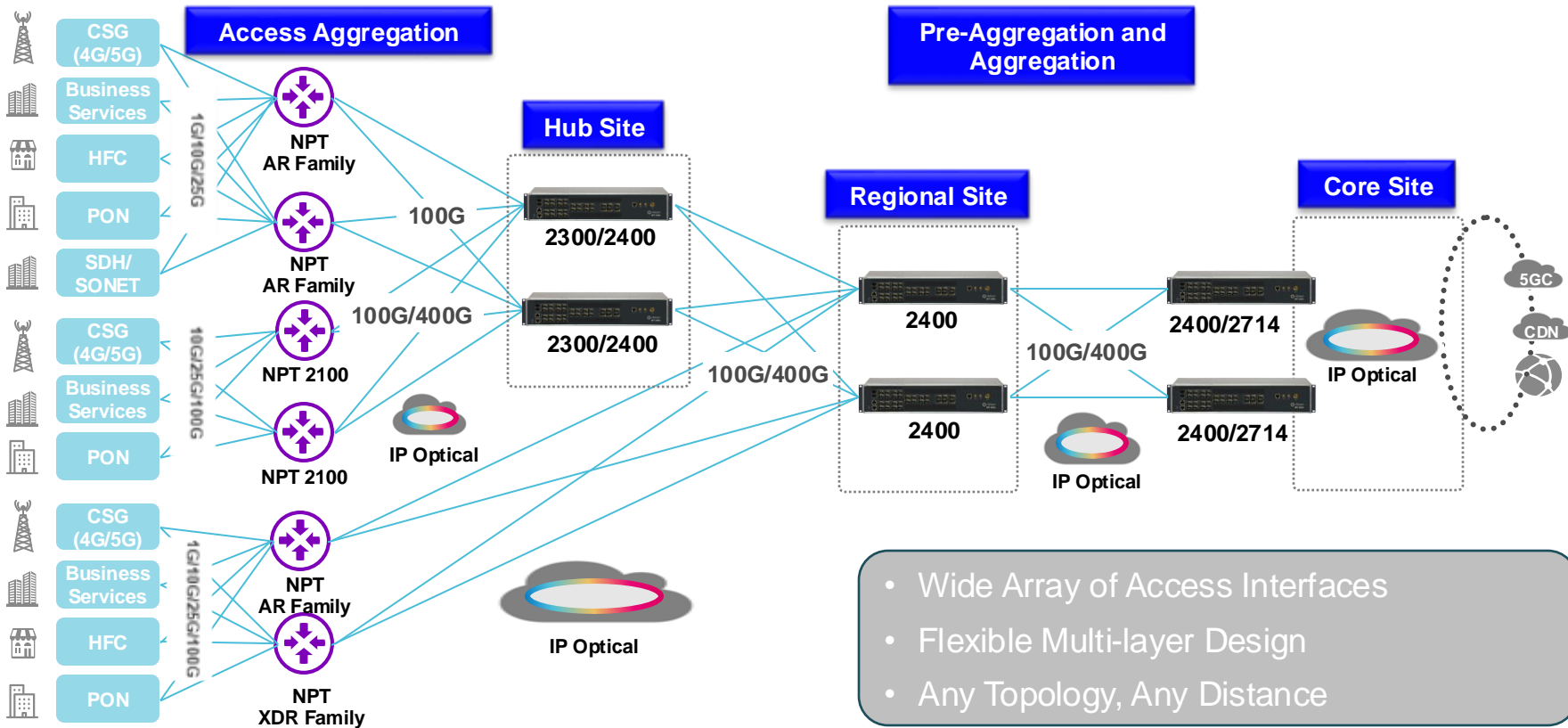
Associated Products

CPE devices

- Edge 8100
- Edge 8300

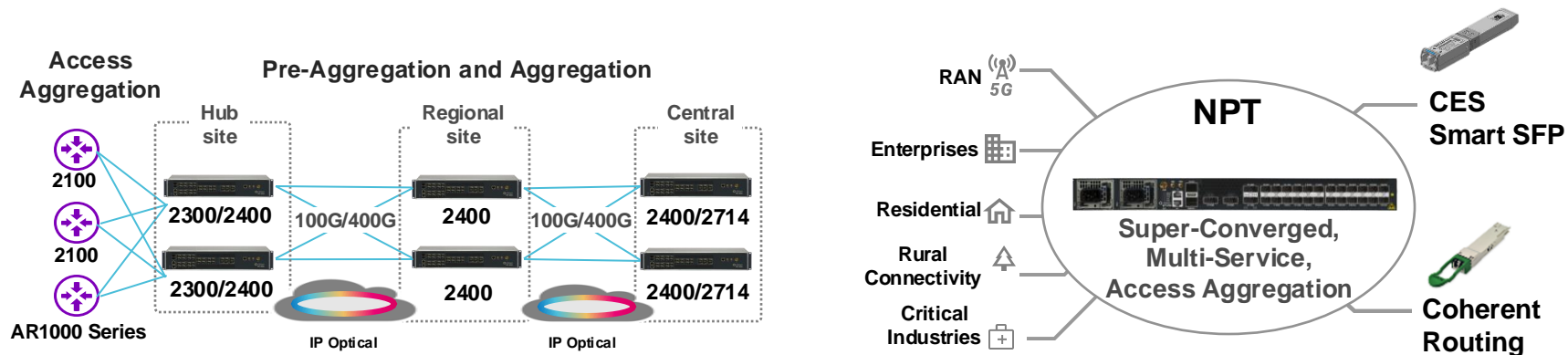


Aggregation Architecture



- Wide Array of Access Interfaces
- Flexible Multi-layer Design
- Any Topology, Any Distance

Access Aggregation in the Middle Mile with NPT



- **Network convergence:** Ethernet/IP, MBH, 5G xhaul and TDM migration in a single platform
- **Multiple form factors:** Modular/fixed, redundant/non-redundant, integrated/disaggregated, Airflow: Front to back/ Left to right
- **Deployment flexibility:** Low noise, low power, temperature hardened make NPT suitable for deployment in street cabinet, office or CO environments

How NPT Helps You Succeed



AR Routers



XDR Routers



Proven Automated IP

Industry leading practical automation orchestration of proven IP portfolio and routing stack



Coherent Routing

Full support of coherent pluggables seamlessly supporting IPoDWDM, IPoOLS, IPoOLS



Optimized for the Middle Mile

Service-aware aggregation providing multiservice access, and performance guaranteed transport



Open Architecture

Ribbon's carrier-grade IP Wave rNOS spans across the whole portfolio and open, standards compliant, interfaces



Engineered for need

Right-fit, multilayer integration with IPoDWDM, IPoOLS, Colored/coherent interfaces



Better Economics

Right-fit form factors; modular, scalable, cost optimized supported by consulting and design tools



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