



State of the Art Packet and
Optical Networking






Ribbon Networking Portfolio

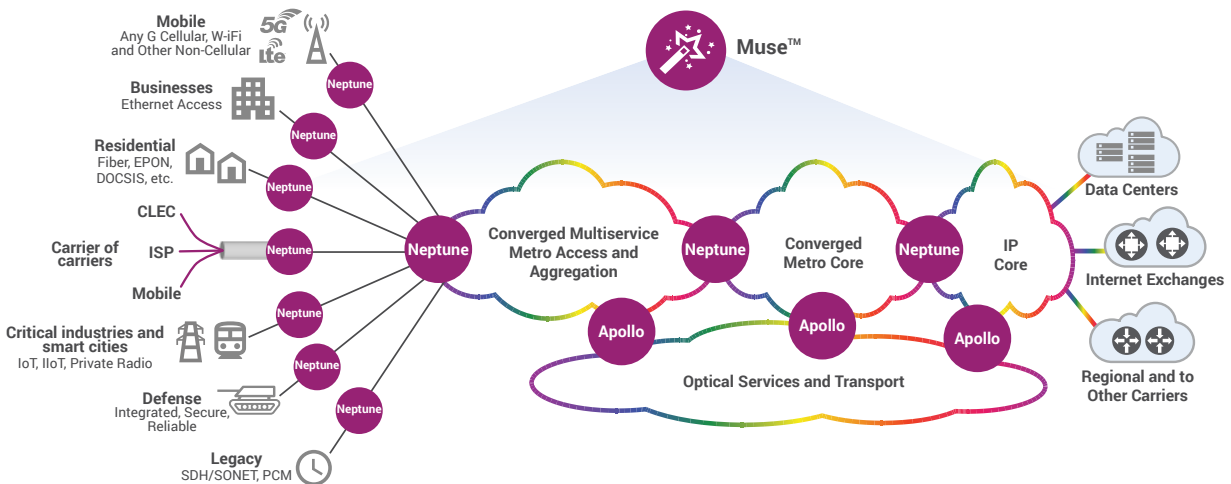
Dynamic and Secure Networking for a Digital Economy

We live in a digital economy, where modern services and applications, like 5G, Broadband Cloud Connectivity, Critical Infrastructures, Smart Cities and Defense, rely on a dynamic network that must fulfill multiple missions:

- **High performance** to handle increasing traffic demands
- **Deterministic** to meet customer SLAs
- **Secure** to protect against hacking and misuse
- **High availability** to assure customer satisfaction
- **Cost-effective** to maximize return on investment

Ribbon's networking portfolio meets these missions with three interoperable product families.

 <p>Neptune</p>	<p>Neptune Packet Networking</p>	<p>Delivers multiservice packet aggregation and transport based on Elastic MPLS and segment routing, for seamlessly evolving to new IP and 5G services.</p>
 <p>Apollo</p>	<p>Apollo Optical Networking</p>	<p>Delivers reconfigurable and programmable low-latency optical transport that simultaneously speeds up provisioning of new services while maximizing traffic throughput at the lowest cost per bit.</p>
 <p>Muse</p>	<p>Muse Lifecycle Automation</p>	<p>Delivers complete lifecycle management and domain orchestration for underlying Neptune and Apollo networks, to speed up time to revenues, reduce TCO, and integrate into wider ecosystems.</p>



Optimized for Service Provider and Private Networks

Ribbon's transport portfolio Apollo packet and optical networking solutions span access, metro, regional and long haul geographies for a broad range of Service Provider and Private Network customers.

Service Providers

- Broadband Service Providers
- Internet Service Providers
- Mobile Network Operators (Cellular)
- Multi-System Operators (Cable)
- Carrier of Carriers

Private Networks

- Critical infrastructures like power utilities, transportation, and pipelines
- Research and education networks
- Defense networks
- Enterprises
- Cloud service providers

Apollo

Optical Transport with Packet Services

The Apollo product line provides state-of-the-art transparent and flexible DWDM and OTN transport with integrated packet switching capabilities. A modular architecture allows optimized solutions across access, metro, regional, and long-haul networks. Apollo combines high performance, low-latency OTN transport, and OTN switching with software-configurable optical routing for maximum efficiency. Apollo is self-aware with intelligent reporting for efficient and SDN-ready operations. Apollo also provides deployment choice, whether as an integrated solution or as standalone subsystems for disaggregated multivendor solutions.

Programmable
for maximum
throughput

Automated
provisioning and
restoration

Self-aware
unsurpassed E2E
visibility and operability

Open
modular disaggregated
solutions

9600 Series Low power flexible DWDM transport

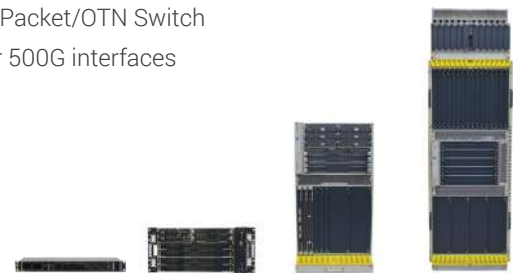
- Common cards
- No placement restrictions



	OPT9603	OPT9608	OPT9624
Size	2RU	5RU	15RU
Line Capacity	1.6Tbps	4.8Tbps	14.4Tbps
Photonics	CDCF ROADMs, Fixed and dynamic amplifiers		

9900 Series Scalable OTN switching

- Universal Packet/OTN Switch
- Scaled for 500G interfaces



	OPT9901X	OPT9904X	OPT9914	OPT9932
Size	1RU	5RU	22RU	Full rack
Switching Capacity	400G	2.8Tbps	5.6Tbps Scaled for 14T	16Tbps Scaled for 32T

APOLLO BENEFITS

Elastic:

- Multiple switching options (packet, OTN, wavelength)
- Any Topology: Linear, ring, and mesh
- Elastic Hardware: Innovation configurability for minimal capital costs

Intelligent:

- LightPULSE™: Integrated OSNR reporting and OTDR capabilities
- GMPLS: Flexible control plane
- SDN Applications: Immediate savings and new revenue generation

Powerful and comprehensive:

- Line Speeds: 10G to 600G line rates in the same hardware
- Network locations: Solutions from access to core
- Encryption: Per-service encryption and customer EKM

Effective:

- Efficient: Low power and high density
- Low Cost: Lowest Industry TCO
- Compatible: NEBS and ETSI compliant

Neptune

Packet aggregation with integrated optics

The Neptune product line streamlines end-to-end service delivery by combining carrier-grade service assurance, visibility, and control with efficient multiservice packet transport. Neptune offers converged support for Ethernet, MPLS, Segment Routing, FlexE, TDM, OTN, and WDM to provide a powerful, flexible solution for high-performance services. This is a perfect fit for operators looking for a multiservice aggregation platform. With TDM support, legacy services are easily migrated onto this platform and Elastic MPLS, SDN, NFV, and enhanced 8273.2 Class D timing capabilities make the Neptune platform ideal for 5G transport in a converged metro-transport environment.



Dynamic, Deterministic Transport



Elastic Multiservice



Carrier-Grade Service Assurance



5G Transport with Elastic Scalability

	NPT-1010D	NPT-1022	NPT-1050	NPT-1250	NPT-1300	NPT-1800	NPT-2514	NPT-2532	
	NPT-1010	NPT-1020/21		NPT-1200					
Capacity	5 Gbps	Up to 60 Gbps	Up to 300 Gbps	Up to 560 Gbps	Up to 1.6 Tbps	Up to 2 Tbps	Up to 7 Tbps	Up to 16 Tbps	
Height	1U	1U	1U	2U	3U	8U	22U	42U	
	Access			Metro Aggregation			Metro Core		

NEPTUNE BENEFITS

Dynamic deterministic:

- Comprehensive portfolio: Right sized, high density, low power from 5G to 2T
- Deterministic performance: Meets the policies and parameters of each service transported
- Dynamic Flexibility: Programmable with Elastic MPLS, SDN, and NFV, providing the right technology at the right points in the network

Carrier-grade service assurance:

- Ultra-high availability: Comprehensive hardware resilience with transport and service restoration
- Network telemetry: Provides advanced assurance capabilities
- Advanced operations software: Real-time, right-first time, OAM, and network analytics

Elastic multiservice:

- Elastic MPLS: MEF CE2.0 services, Layer 2/ Layer 3 VPNs and TDM
- Multi-technology: Segment Routing, MPLS (IP and TP), Ethernet, Flex Ethernet, packet, WDM, OTN and TDM

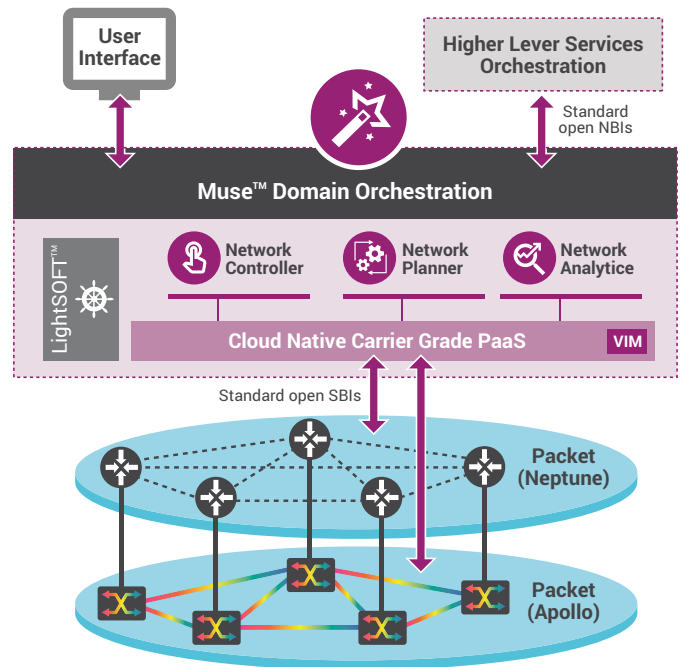
5G-ready with elastic scalability:






- Hybrid network slicing: Provides configurable service isolation options
- Enhanced timing and synchronization: Suitable for 5G networks
- Open ecosystem integration: Standards-based, field-proven interfaces (NETCONF/YANG, OpenFlow, PCEP, BGP-LS) allow seamless interoperability in the wider 5G, OSS, and BSS ecosystems
- Elastic scalability: Pay-as-you-grow scalability

Muse

Ribbon Transport Domain Orchestration

Muse Domain Orchestration is the mastermind of Ribbon's transport solution. Powered by a carrier-grade PaaS, and working in conjunction with Ribbon's LightSOFT™ network management system, Muse delivers complete lifecycle management for the underlying packet and optical transport network. Built for a 5G services world, Muse enables network operators to programmatically configure and combine hard and soft slicing technologies to create slices appropriate to different sets of 5G-enabled services and customer sub-networks. Then using a rich set of tools, operators can design, provision, and assure a broad array of services on top of the slices. Muse solves all major transport challenges.



Transport Challenge	Muse Domain Orchestration Solution
 <p>Seamless planning to Implementation</p>	<p>Iterative planning for greenfield and brownfield networks allows creating a customized balance between performance and investment. Plug-and-play features ensure rapid and error-free installation and turn up.</p>
 <p>Optimally sharing a common infrastructure for multiple slices and services</p>	<p>Creates and manages “hybrid slices” that combine hard slicing resources like FlexE slots and ODU channels, with soft slicing VPN and segment routed packet resources.</p>
 <p>Fast time to market and service differentiation</p>	<p>Template driven processes rapidly define and provision services; including tools to design new templates from scratch suited to specific network capabilities and customer needs.</p>
 <p>Smooth network operation</p>	<p>Continuous network and service monitoring identifies degradations before they become service affecting. Dynamic restoration recovers from outages using shared resources.</p>
 <p>Living in a multivendor 5G ecosystem</p>	<p>Standard and open NBIs and SBIs enable integration with higher level orchestration and other network equipment</p>

Contact us to find out how to Modernize your Network with Ribbon Packet and Optical Transport

About Ribbon

Ribbon Communications (Nasdaq: RBBN), which recently merged with ECI Telecom Group, delivers global communications software and network solutions to service providers, enterprises and critical infrastructure sectors. We engage deeply with our customers, helping them modernize their networks for improved competitive positioning and business outcomes in today's smart, always-on and data-hungry world. Our innovative, end-to-end solutions portfolio delivers unparalleled scale, performance, and agility, including core to edge IP solutions, UCaaS/CPaaS cloud offers, leading-edge software security and analytics tools, as well as packet and optical networking leveraging ECI's Elastic Network technology.