

# NGN Solutions

for Defense Forces and HLS Agencies



## Secure, Modernized Turnkey Solutions for Tomorrow's Defense Challenges

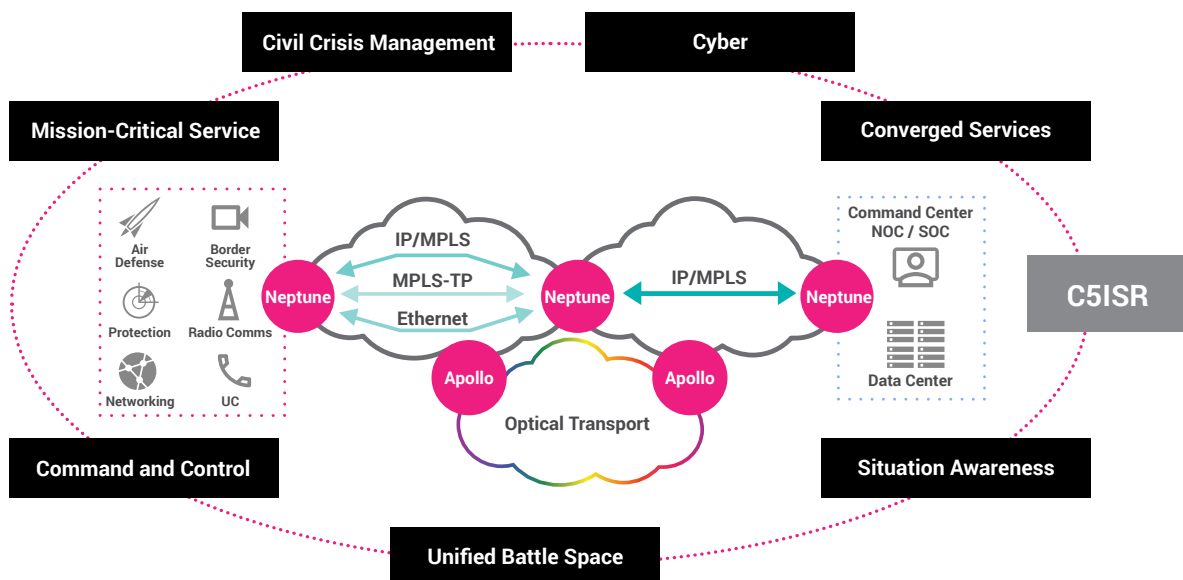
Today's battlefield is changing faster than ever. As armed forces, strategic sensors, and ammunition systems are becoming more integrated, so is the transformation of the methods, means, and weapons of war. In other words, we now have a digital ecosystem in which Network Centric Warfare is the name of the game. In this ecosystem, effective decision-making requires the pooling and analysis of data from a vast array of sensors and other information sources. The data must be delivered securely, in real-time, to wherever it is required. Network Centric Warfare is about using this data to be the first to know, understand, decide, and act. To meet these needs, Ribbon provides highly-secure, highly-reliable next-generation communication solutions.

**Reliable High Bandwidth**  
based on advanced hardware and software services

**Multilevel Security**  
for mission-critical services

**Flexible and Future-Proof**  
multiservice elastic reconfiguration

**Turnkey Solutions**  
fully-integrated, end-to-end tailored solutions



## Reliable High-Bandwidth Connectivity

Decision-making on the modern battlefield requires real-time information to be made available when and where it is required. This data can be from a vast array of sources, including sensors, complex systems, weapons, and ultra-high-quality video sources. This data must then be analyzed in real time to allow informed decisions and provide the control of network-dependent weapons such as drones, robots, and unmanned vehicles. Packet networking is required in this network to provide the agility to link the data generated from modern IP-enabled data sources and systems to multiple destination points in a defense network. Optical networking is required to support bulk data transport for long distances with ultra-low latency.

Ribbon provides tailor-made, secure, hardened, field-proven defense solutions. These solutions integrate intelligent optical networking with agile packet transport to provide a converged, secure, communication network.

- Neptune is a multiservice packet platform able to support both modern IP-enabled devices as well as legacy systems.
- Apollo is a high-capacity, feature-rich, optical platform.
- The Muse™ software suite allows seamless operation across Apollo and Neptune.

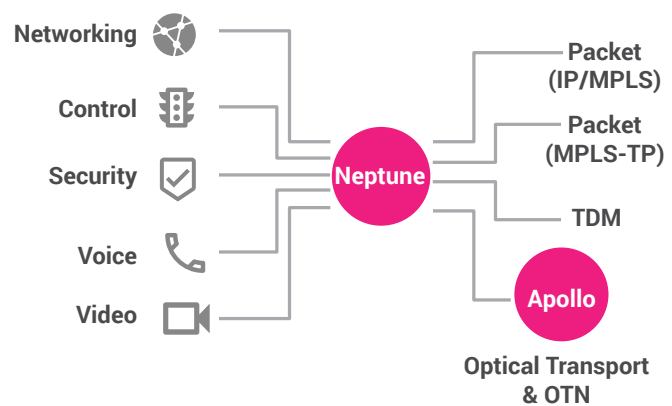
With this portfolio, Ribbon provides a single integrated communications network, able to support video surveillance systems, command and control networks, sensors, radar, and smart IoT devices, as well as legacy TDM-based sensors and systems.

Neptune's unique Elastic MPLS capabilities allow mission-critical and non-mission-critical communications on the same network. MPLS-TP provides the deterministic transport needed for mission-critical applications and IP/MPLS provides the dynamic IP transport expected for non-mission-critical IT applications.

Defense networks must be accessible at all times.

This means the communications network must be "always-on", with more than five 9s availability. Ribbon has designed its defense solutions with this in mind, and achieves better than transport-grade reliability with 4 levels of resilience:

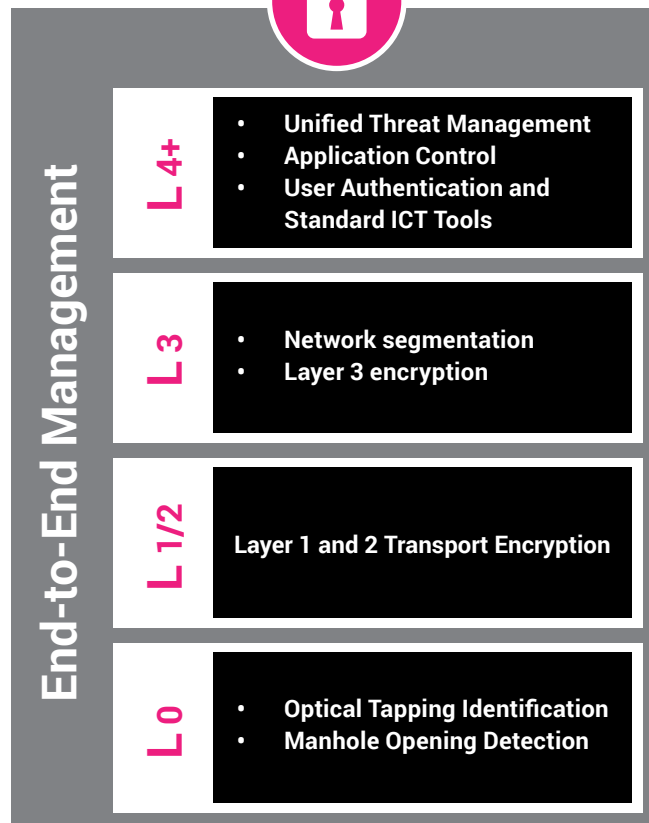
- **Equipment:** Fully-redundant hardened design of the Network Elements (NEs) with 1+1 and 1:1 protection of key units and extended temperature range for field installations (-25°C to +70°C).
- **Network:** Fast protection against single and multiple network failures for packet transport MPLS-TP that supports sub-50ms protection switching for single failures:
  - when used in conjunction with pseudowire redundancy, providing protection for multiple failures;
  - for advanced optical protection mechanisms like ASON or WSON to restore network connections in the event of a catastrophic node failure.
- **Management:** Advanced software with intuitive operations provides rapid fault isolation in the event of network failure or degradation. In addition, LightINSIGHT™ provides the ability to monitor network performance in real time and helps identify trends over time.
- **System disaster recovery:** Field-proven processes and procedures provide network and management restoration from geographically-dispersed sites in the event of a catastrophic failure.



## Multilevel Security

By definition, defense networks are a prime target for cyber-attacks. The aim of these attacks can be to either take control of the network or to disable communications. Ribbon helps secure the defense communications network and the data that it transports against such attacks with a comprehensive set of multilayer security mechanisms:

- **Intrusion detection:** Uses physical measurements and analytics to identify tampering and physical intrusion.
- **MACsec:** Ensures that only authorized data streams are allowed.
- **L1-L3 Encryption:** Encrypts all the data, including the in-band optical management channels.
- **IPsec:** Used to secure the VPNs.
- **Secured DCN:** Protects the DCN and each site on the DCN. Stops one site from being able to launch an attack on another.
- **Secured access:** Implements authentication with at least two factors.
- **Comprehensive:** Integrated into SIEM/SOC.



## Flexible and Future-Proof

Modernization is never complete and Ribbon's defense solutions provide the flexibility to scale as the needs evolve:

- **State-of-art optical transport** with CDC-F and OTN to allow scalable network growth
- **Added capacity when needed** with unique in-service expansion units and in-service upgradeable packet fabrics (e.g. 10G to 60G, 100G to 200/320G, 1T to 2T)
- **Technology introduced when required** with unique in-service expansion units to scale connectivity and elasticity (Ethernet, Optical, PCM, CES)
- **Integrated WDM, OTN, and bidirectional SFPs** are provided to simplify optical connectivity
- **State of the art operations** with an easily managed, unified, and secure communications solution, improving operational and administrative effectiveness and efficiency.

In addition, Ribbon's defense solutions also have future-proof agility, with new telecom capabilities added as they become hardened for the battlefield. Examples include Elastic MPLS for introducing new packet transport techniques, like Segment Routing and Flexible Ethernet when required. An NFVi blade hosted on the Neptune platform provides an open and future proof way to add new services and applications in the form of VNF's. The Muse software suite provides Software Defined Networking (SDN).

## Fully-Integrated Turnkey Solution

Ribbon has been providing communications solutions in hundreds of critical infrastructure networks over the past 50 years. Customers include power utilities, rail, highways, airports, oil, gas, water, government, and defense. ECI uses the experience gained from these customers to optimize its industry-leading Elastic Services Platform solutions to provide a communications network that defense forces and HLS agencies can depend on.

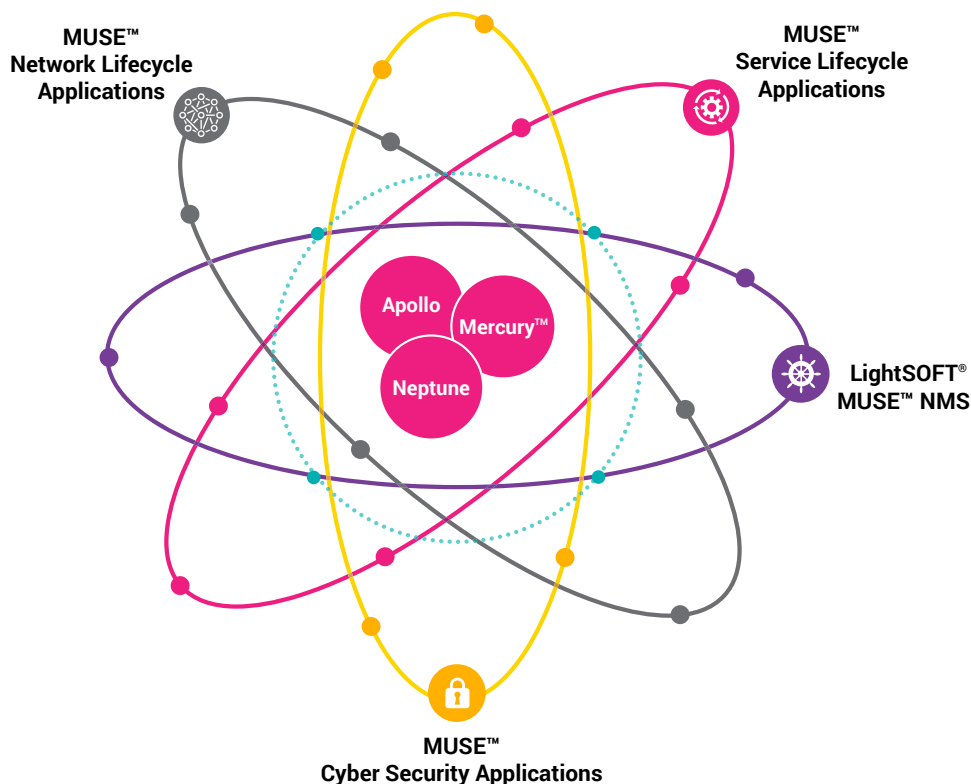
Ribbon understands the need to provide tailored solutions and our specialists go the extra mile to understand your particular challenges. Ribbon provides solutions to address these challenges incorporating best-in-class Ribbon products, 3rd-party wireless access products, and customized or commercial off-the-shelf equipment. These are all integrated under Ribbon's Muse software suite.

In addition, Ribbon is able to offer extremely rapid network turn-up. We offer complete racks with pre-integrated and tested solutions (power, optics, and other) ready for shipping and deployment.

Extensive experience in multiple networks worldwide have enabled Ribbon to develop field-proven, hardened, processes for migration. This means defense forces and HLS agencies can be assured that migrating to a next-generation Ribbon communication network is straightforward.

## ELASTIC Services Platform

The ELASTIC Services Platform is Ribbon's portfolio framework for a set of dynamic network resources controlled by a suite of modular software applications. This provides tools required to create, manage, and evolve tailored communications solutions for defense networks.



### Neptune

#### Powered by Elastic MPLS for Future-Proof Packet Transport

The Neptune product line provides powerful, flexible, and efficient platform streamlining packet transport for defense networks. Elastic MPLS is at the heart of the Neptune portfolio. It allows Neptune to provide a complete multiservice platform to support mission-critical and non-mission-critical services over the most appropriate transport technology. Mission-critical services require the static, deterministic behavior that TDM and MPLS-TP provide. In contrast, IP/MPLS and segment routing provide optimized support for services like voice, video, and non-mission-critical networking. The mission-critical and non-mission-critical services run across different network elements if air-gap security is required, or on the same network element if it is not required. The key benefits that Neptune provides for defense networks are:

- MPLS-TP for mission-critical services, and IP/MPLS for non-mission-critical services
- Mission-critical service availability with advanced redundancy and protection schemes
- Native support of legacy TDM/SDH interfaces
- Layer 2 and 3 encryption
- NFVi for best-of-breed point-of-access security applications.

### Apollo

#### Optimized Optical Transport

The Apollo product line provides state-of-the-art transparent and flexible DWDM transport with integrated OTN and packet-switching capabilities. A modular architecture allows scaling solutions compatible with point-to-point, ring, and mesh architectures. Apollo combines high-performance, low-latency OTN transport and OTN switching, with software-configurable optical routing for maximum efficiency. Apollo has unique integrated intelligence features to make network administration and maintenance simple and intuitive. The key benefits that Apollo provides for defense networks are:

- Flexible high-capacity optical infrastructure, including ADMs, ROADMs, muxponders, and amplifiers
- Seamless integration with the packet layer
- Layer 1 optical encryption per service
- LightPULSE™ for easy detection of network degradation, failure, or fiber tapping
- Future-ready business evolution with WDM, scalable from 10 Gbps to 1 Tbps.

### Mercury™

#### Software Virtualization Provides Network Flexibility

Mercury mixes and matches a rich library of certified Ribbon and 3rd-party Virtualized Network Functions (VNFs). This allows critical infrastructure network operators to introduce functionality where and when they need it. This is key for security functionality, multi-access edge computing, and services that require ultra-low latency. The key benefits that Mercury provides for defense networks are:

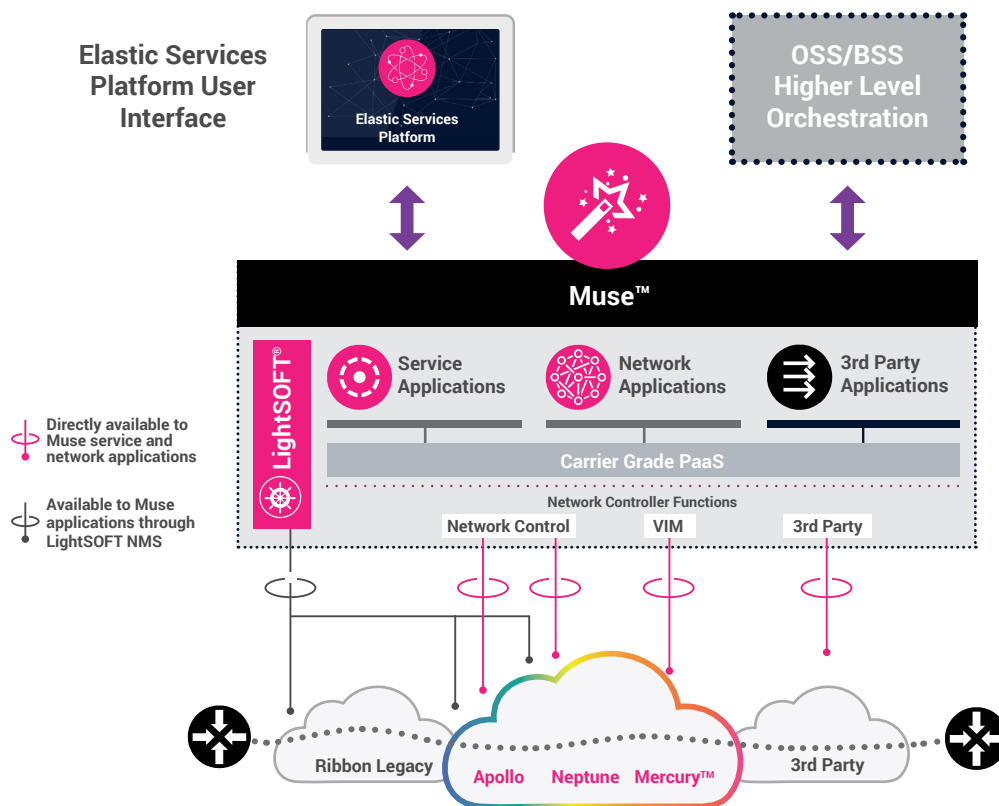
- Ability to support best-of-breed VNFs for security
- Service chaining, allowing the assignment of multiple applications to a service
- Flexibility to allow the network to adapt to future needs.

## Muse™ Software Suite

### Advanced operations software

The Muse suite is Ribbon's holistic software offering, leveraging the best of industry-leading management systems and applications. Muse delivers real-time control over a secure network infrastructure and automates the service and network operation life cycles. The key benefits that the Muse software suite provides for defense networks are:

- Intuitive network management with LightSOFT®
- Simplified service creation and lifecycle management with Muse Lifecycle Applications
- Comprehensive, unified view of network resources, over time, with LightINSIGHT
- Management of 3rd-party NEs with Muse 3rd-party NMS.



## Muse™ Cyber Security Platform

### Securing the Network

Defense networks are a prime target for cyber-attacks. The Mercury NFV platform hosts the Muse cyber security solution. This provides physical layer security with encryption, firewalls, and intrusion detection. The key benefits that the Muse cyber security platform provides for defense networks are:

- Prevents attacks where they occur with distributed attack mitigation.
- Guards the integrity of the OT network. The system maintains a complete OT network map and continuously monitors all transactions for abnormal behavior allowing early warnings of any tampering.
- Identifies real threats with advanced correlation and analysis for a clear view of tangible threats, and ranks them by severity.

## Meeting the Needs of a Modern Defense Network

Your Challenges	Our Solutions
<b>Reliable, High Bandwidth</b>	<p><b>Scalable high-capacity packet and optical solutions:</b></p> <ul style="list-style-type: none"> <li>• Intelligent high-capacity CDC-F optical transport with OTN</li> <li>• Optimized high capacity multiservice packet transport</li> </ul> <p><b>Four levels of resilience provide ultra-high availability making it better than transport grade:</b></p> <ul style="list-style-type: none"> <li>• <b>Equipment:</b> Hardened fully redundant network elements, meeting unique defense requirements</li> <li>• <b>Network:</b> Optimized architectures and extensive protection schemes tailored to the defense needs</li> <li>• <b>Management:</b> Advanced software with intuitive operations for rapid fault isolation, increased availability, maximized utilization, and improved efficiency</li> <li>• <b>System disaster recovery:</b> Field-proven processes and procedures keep the network operational</li> </ul>
<b>Multilevel Security</b>	<p><b>Tailored, holistic cybersecurity and network immunity:</b></p> <ul style="list-style-type: none"> <li>• Comprehensive cyber protection suite integrated into external SIEM/SoC</li> <li>• Intrusion detection with machine-learning analytics</li> <li>• Encryption including the OAM channels</li> <li>• Secure DCN protection of the sites and data centers</li> </ul>
<b>Flexible, Future Proof</b>	<p><b>Extensive multiservice with Elastic MPLS:</b></p> <ul style="list-style-type: none"> <li>• MPLS-TP for deterministic transport and advanced OAM</li> <li>• IP/MPLS for dynamic L2 and L3 services</li> <li>• Easy support of legacy networks and services</li> </ul> <p><b>Unique features for scalability and expansion:</b></p> <ul style="list-style-type: none"> <li>• Pay-as-you-grow design, in-service expansion units, and in-service upgradable packet fabrics</li> <li>• Embedded NFV, allowing easy addition of new functionality</li> <li>• Just-in-time introduction of new services/resources</li> <li>• Multilayer and multitechnology planning tool</li> </ul>
<b>Turnkey Solutions</b>	<p><b>Ribbon provides an end to end solution with:</b></p> <ul style="list-style-type: none"> <li>• Easy integration for best-of-breed 3rd-party equipment</li> <li>• Single Network Management System</li> <li>• Unique pre-integrated solutions</li> <li>• Field implementation and support</li> <li>• Easy intervention for fast rollout</li> <li>• Knowledge transfer for self-sustainability</li> </ul>

### About Ribbon

Ribbon Communications (Nasdaq: RBBN) delivers communications software, IP and optical networking solutions to service providers, enterprises and critical infrastructure sectors globally. 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 software-centric solutions, cloud-native offers, leading-edge security and analytics tools, along with IP and optical networking solutions for 5G. We maintain a keen focus on our commitments to Environmental, Social and Governance (ESG) matters, offering an annual Sustainability Report to our stakeholders. To learn more about Ribbon visit [rbbn.com](http://rbbn.com).

**Contact Us** Contact us to learn more about Ribbon solutions.