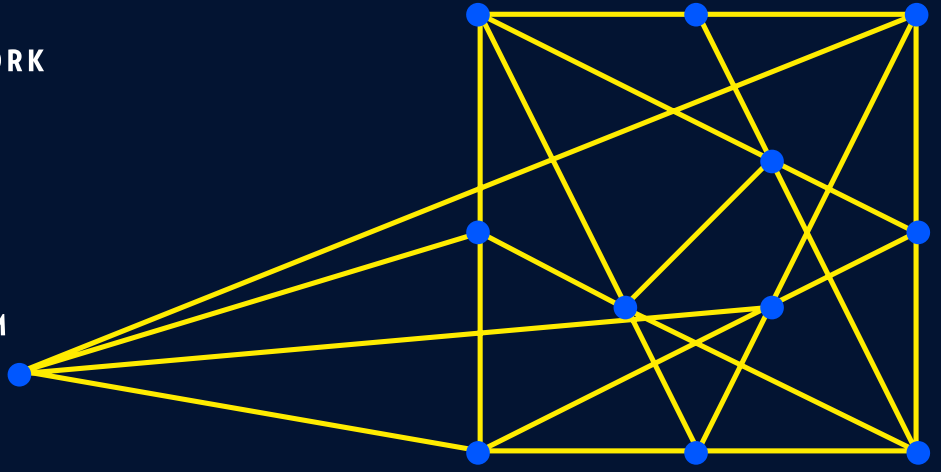


# ElastiGRID™ FOR RAILWAYS



## EVOLVING TO SUPPORT THE DIGITAL RAILWAY

Rail services have always been vital for a country’s economic prosperity. They are essential for efficient bulk transfer of people to main employment centers, and for freight to reach primary distribution hubs. As passenger and freight numbers continue to grow rapidly, rail networks face acute capacity problems, which if not addressed, will impede this growth. The digital railway offers a solution to this capacity shortfall, making the existing rail infrastructure considerably more productive. It addresses the increased needs for capacity by introducing more flexibility in the handling of rolling stock, while maintaining strict safety and reliability standards. The digital railway uses traffic management systems like the European Railway Traffic Management System (ERTMS) and in-train signaling (e.g. ETCS), to allow trains to run much closer together. The telecoms network is key to this evolution; it provides a risk-free migration to a highly secure, always-up packet platform, providing support for all communication systems used by rail operators.

**Risk-Free Transition**  
with tailor made evolution  
for legacy services

**Secure Packet**  
guarantees  
mission-critical services

**High Availability**  
provided by advanced  
operations software

**Multiservice**  
to enable the Intelligent  
Transport System

### DRIVERS OF MODERNIZATION

#### EVOLUTION TO A DIGITAL RAILWAY

In-train signaling (European Train Control System) and traffic management systems are required to optimize rail capacity.

#### INCREASED REGULATION

Rail is a critical National infrastructure we see ever-increasing regulation to reduce carbon emission and improve punctuality.



#### SECURITY AND SAFETY

Signaling and control must be ‘always-up’. Networks must be fully secured against cyber attacks. Must be able to detect and react to physical track anomalies.

#### IMPROVE USER EXPERIENCE

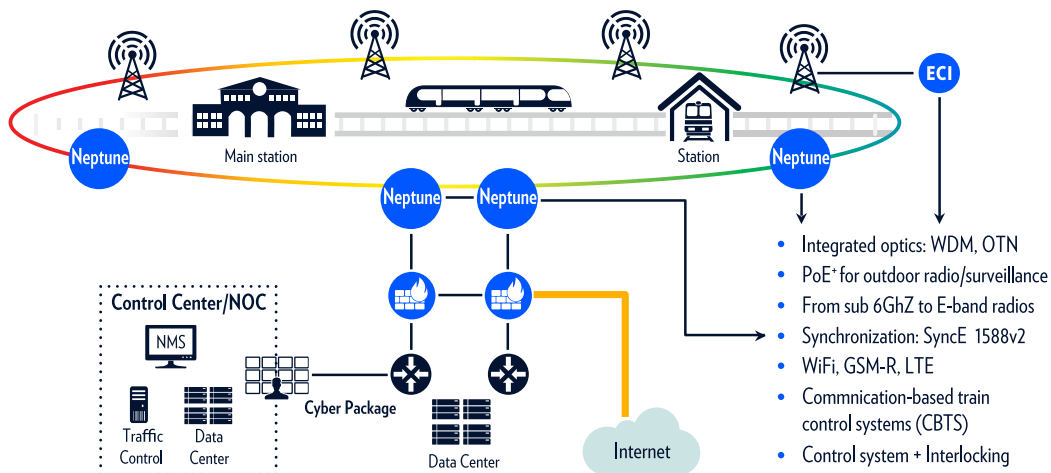
From on-station to on-train, users expect a seamless digital experience.

# COST-EFFECTIVE AND RISK-FREE

ElastiGRID provides cost-effective, risk-free transition to a packet-based network. It supports native transport for legacy services and low-rate mission-critical services like SCADA, signaling, and traffic control. When it makes sense, these services are migrated to the packet layer using circuit emulation. ElastiGRID's circuit emulation approach allows seamless transition to packet. Elastic MPLS uses a dual-stack approach, where IP/MPLS provides transport for non-mission-critical applications and MPLS-TP provides the deterministic behavior and extensive OAM expected for mission-critical services.

ElastiGRID provides a pay-as-you grow architecture, making the transition to packet extremely cost effective:

- **Capacity is added 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 is introduced when required** with unique in-service expansion units to scale connectivity and elasticity (Eth, Optical, PCM, CES); and with integrated WDM, OTN, and bidirectional SFPs to simplify optical connectivity.



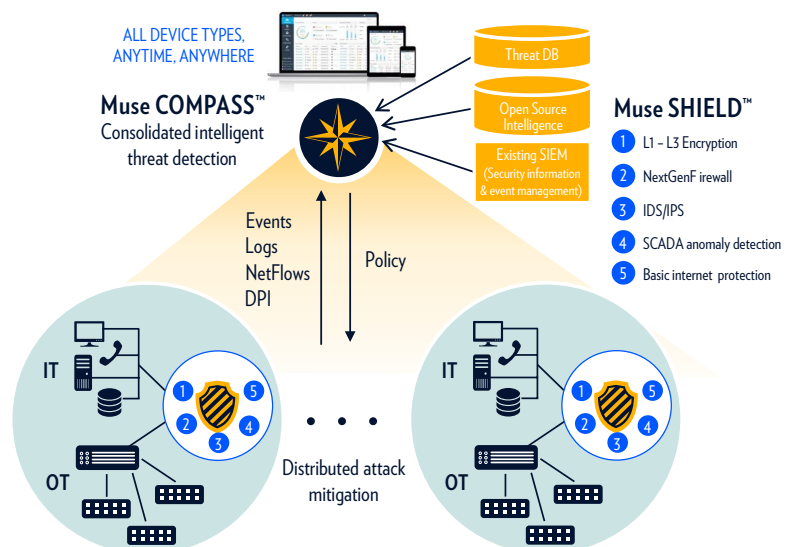
ECI has extensive experience in transitioning networks and developed field-hardened, proven processes for this migration.

# HOLISTIC SECURITY SUITE

Critical infrastructures (CI) are a prime target for cyber-attacks. Data security is a particularly complex matter. It must protect Information Technologies (IT) and Operational Technologies (OT) and be able to identify tangible threats from a multitude of reported events.

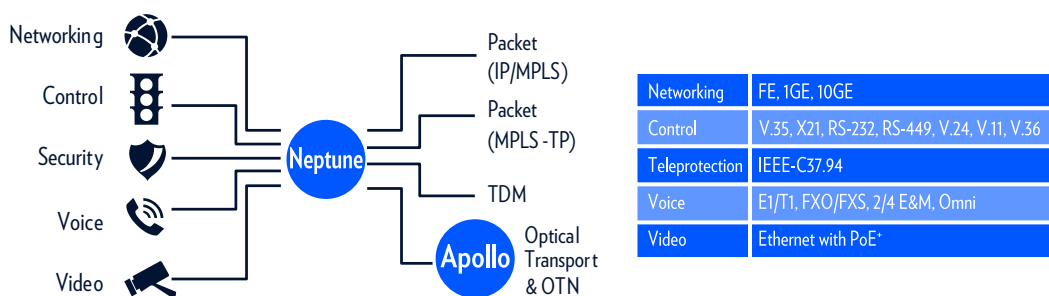
ElastiGRID uses Muse™ cyber security suite for physical layer security with encryption, firewalls, and intrusion detection. It provides the capabilities to identify and deal with potential attacks in several ways:

- **Prevents attacks where they occur** with distributed attack mitigation.
- **Guards the integrity of the SCADA and 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.



# MULTISERVICE PLATFORM

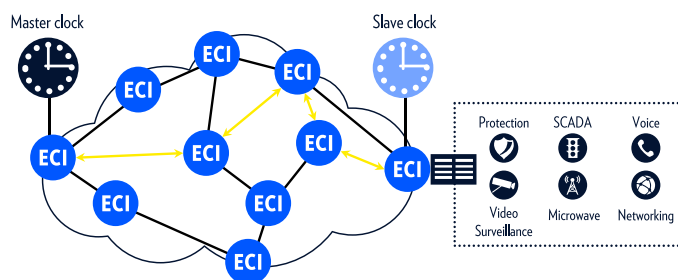
ElastiGRID provides a complete multiservice platform, supporting OT and IT services over the most appropriate transport technology. Mission-critical OT, like teleprotection and SCADA, requires the static, deterministic behavior that TDM and MPLS-TP provide; whereas, IP/MPLS provides optimized support for IT services like voice, video, and non-mission-critical networking. ElastiGRID seamlessly integrates the packet and optical layers to enable cost-efficient transport of the high-capacity data generated by video and other (IT) applications. Video technology adds specific challenges; thousands of trackside cameras generate vast quantities of HD video content. This must be backhauled to a few control locations to allow real-time analysis, required for hazard identification of the trackside environment. ElastiGRID provides a multicast architecture with end-to-end QoS monitoring to ensure the quality of the video network. Cost-effective bulk transport of the video traffic is provided by optical transport and Power over Ethernet (PoE) interfaces. These are available to power the trackside cameras and other outdoor monitoring devices. The Mercury™ NNFV platform provides an open, future-proof way to add new services and applications in the form of VNF's such as cyber security, virtual routing, enhanced OAM, CCTV storage, and more.



Traditionally, TDM provides the tools to derive and distribute the accurate timing that is fundamental to the operation of railway services. As networks evolve to packet, the timing architecture must remain robust. ElastiGRID allows an approach similar to that used in TDM. A built-in GPS receiver or an external timing source provides the master clock. 1588v2 precision timing protocol (PTP) distributes timing across the network and MPLS-TP reduces packet delay variation by using deterministic, bidirectional traffic paths.

ElastiGRID provides software to simplify network operations with LightSOFT® network management, providing an intuitive GUI that simplifies operations with rapid get-it-right-the-first-time network provisioning and rapid fault isolation. Advanced operations software provided by Muse™ is able to analyze the network data to ensure the network is operating at maximum availability, utilization, and efficiency. This functionality can be further extended to non-ECI transport devices by using ECI's 3<sup>rd</sup> party integration solution.

For rail networks wishing to use their unique geographical footprint to generate extra revenues as a Utelco, the multiservice capabilities of ElastiGRID provide the managed L2 and L3 VPNs required for business services, residential services, mobile backhaul, and future IoT applications.



## OPTIMIZED FOR HIGH AVAILABILITY

Railway operators require communications networks that provide 'five-9s availability' or better, ElastiGRID achieves this with:

- **Fully-redundant hardened design of the network elements:** With 1+1 and 1:1 protection of key units and extended temperature range for use in railway applications (-25°C to +70°C).
- **Fast protection against single and multiple network failures:** MPLS-TP supports sub-50ms protection switching for single failures. Used in conjunction with pseudowire redundancy, protection is provided for multiple failures.
- **Remote disaster recovery:** Allows network and management restoration from geographically dispersed sites in the event of catastrophic failure.
- **Potential network failure prediction:** Muse provides advanced operations software to monitor network performance in real time and helps identify trends over time.

# RISK-FREE TRANSITION TO PACKET

## YOUR CHALLENGES

## OUR SOLUTIONS

**Need risk-free evolution to the digital railway**

ElastiGRID provides the scalable, elastic multiservice platform required for migrating mission-critical services, as networks move to provide the Intelligent Transport System that supports the digital railway:

- Legacy services operate on this platform - natively or by using circuit emulation
- MPLS-TP is used to provide the deterministic transport and advanced OAM required for mission-critical services
- Service assurance is guaranteed with advanced operations software provided by LightSOFT® and Muse™

**Need enhanced security**

ElastiGRID provides tailored, holistic security via the Muse™ security suite.

This provides comprehensive protection for both transport and IT networks, including:

- Integrated SCADA protection, secured connectivity, and secured services
- L1 to L3 encryption with L1 optical intrusion detection

# INTELLIGENT HIGH AVAILABILITY MULTISERVICE

## YOUR CHALLENGES

## OUR SOLUTIONS

**Need a multiservice network to support all the services associated with the digital railway**

ElastiGRID provides extensive multiservice capabilities, allowing support of OT services, IT services, and advanced consumer services from a single platform:

- Mission-critical services like SCADA and teleprotection and supported by MPLS-TP
- IP/MPLS is used to support L2 and L3 services
- Pay-as-you-grow design, with unique in-service expansion units, scalable crossconnects and in-service upgradable packet fabrics
- Enhanced functionality can be easily added by using the embedded NFVI capability, e.g. improved security and real-time services, which require ultra-low latency
- Easy extension of the services with intuitive, get-it-right-the-first-time introduction of new resources enabled by LightSOFT
- Proven SDN and NFV capabilities can be introduced as they are required by the rail network
- Supports business services, residential services, mobile backhaul, and future IoT applications, allowing rail operators to evolve as a Utelco.

**Need highly available telecoms network for mission-critical services**

ElastiGRID provides the intelligent, highly-available network required for mission-critical services with:

- Hardened network elements and optimized architectures provided by Neptune and Apollo
- Intuitive operations and rapid fault isolation provided by LightSOFT
- Advanced software provided by Muse ensures the network is operating at maximum availability, utilization, and efficiency
- Third-party device management integrated into ECI's end-to-end management

Contact us to discover how ElastiGRID ensures risk-free transition to a secure packet network

## ABOUT ECI



ECI is a global provider of ELASTIC network solutions to CSPs, utilities as well as data center operators. Along with its long-standing, industry-proven packet-optical transport, ECI offers a variety of SDN/NFV applications, end-to-end network management, a comprehensive cyber security solution, and a range of professional services. ECI's ELASTIC solutions ensure open, future-proof, and secure communications. With ECI, customers have the luxury of choosing a network that can be tailor-made to their needs today - while being flexible enough to evolve with the changing needs of tomorrow. For more information, visit us at [www.ecitele.com](http://www.ecitele.com)