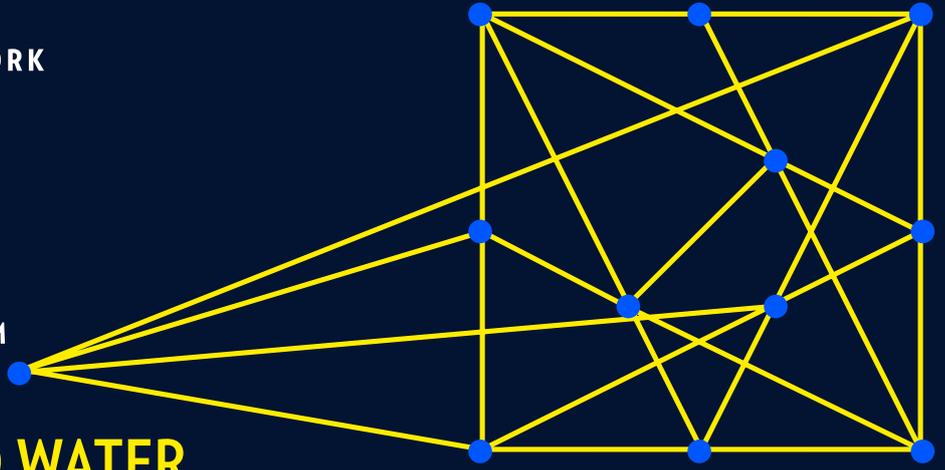


ElastiGRID™

FOR OIL, GAS AND WATER



By digitizing their networks, oil, gas, and water industries can make their distribution networks more efficient and secure. IoT devices allow the monitoring of pipelines and other remote assets in real-time. Advanced voice and video provides the ability for increased collaboration between the remote front-line workers and central office experts. Video surveillance, perimeter intrusion detection, and access control all increase the physical security. The communications network is fundamental to transporting this digitized data efficiently, while continuing to support features, such as mission-critical services (like SCADA), and the monitoring and control of Intelligent Electronic Devices (IEDs).

Risk-Free Transition
tailor-made evolution for legacy services, like SCADA

Secure Packet
guaranteed mission-critical services

High Availability
provided by advanced network architecture

Multiservice
support for digitization of the network

DRIVERS OF MODERNIZATION

THE NEED TO DIGITIZE THE OIL, GAS AND WATER INDUSTRIES

Digitization improves efficiency, pipeline management, and security by allowing IoT devices to be used for monitoring, and control and video to be used for security. Legacy TDM networks do not support the efficient transport of these services and packet transport is required.

INCREASED REGULATION

We see ever-increasing regulation to reduce carbon footprint, and to improve safety and service availability.



SECURITY AND SAFETY

Security has become paramount and networks need to be further hardened against both physical and cyber attacks. SCADA, PAGA, and emergency voice continue to be key for supporting the safety of staff and assets.

IMPROVE USER EXPERIENCE

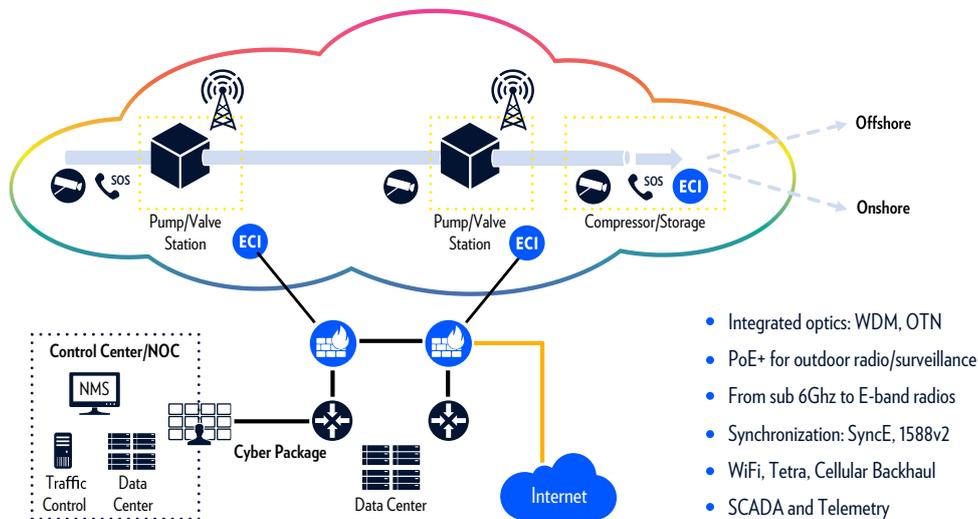
Digitizing the oil, gas, and water industries will greatly enhance asset management by providing real-time connectivity to a vast number of sensors and control devices. Real-time HD-video provides the opportunity to greatly enhance productivity by allowing remote staff to demonstrate issues to central office experts.

COST-EFFECTIVE AND RISK-FREE TRANSITION TO PACKET

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, monitoring, and 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, by:

- **Adding 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).
- **Introducing technology 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.



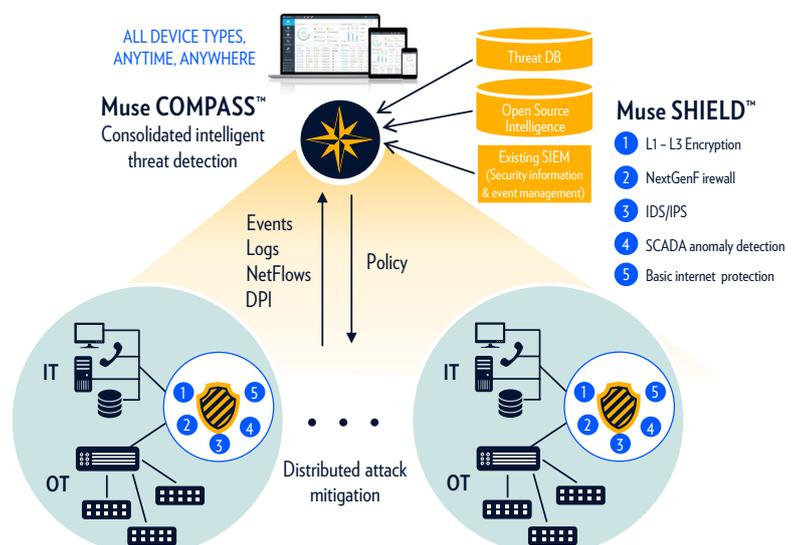
ECI has extensive experience in transitioning networks and developed field hardened, proven processes for this migration.

HOLISTIC SECURITY SUITE

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

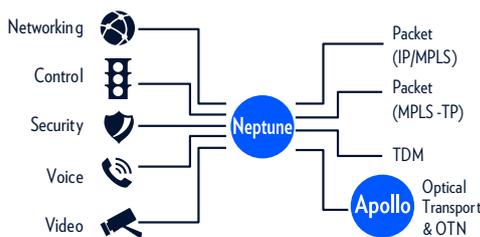
ElastiGRID uses Muse™ cyber security suite for physical layer security with encryption, firewalls, and intrusion detection. It provides the capabilities to identify and deal with potential attacks in several ways:

- **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 warning for 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 the OT and IT services over the most appropriate transport technology. Mission-critical OT, like SCADA, requires the static, deterministic behavior that TDM and MPLS-TP provides. Whereas, IP/MPLS provides optimized



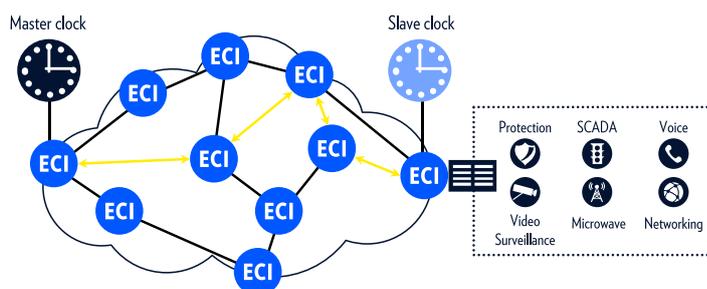
Networking	FE, 1GE, 10GE
Control	V.35, X21, RS-232, RS-449, V.24, V.11, V.36
Teleprotection	IEEE-C37.94
Voice	E1/T1, FXO/FXS, 2/4 E&M, Omni
Video	Ethernet with PoE

support for IT services like voice, video, and non-mission-critical networking. The dual-stack IP/MPLS and MPLS-TP approach allows the transport of IT and OT traffic on the same platform. Configuring and maintaining the SLAs and QoS on a service-by-service basis supports this without compromising security. 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 distinct challenges. Cameras used to provide remote video surveillance generate vast quantities of HD content. This needs to be backhauled to control locations to allow the real-time analysis required to search for potential security breaches. 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 cameras, outdoor wireless sensors, and control devices. The Mercury™ NNFV platform provides an open and future-proof way to add new services and applications in the form of VNFs 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 maintaining, monitoring and controlling IEDs. 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 provides end-to-end network visibility to simplify operations with rapid right-first-time network provisioning, rapid fault isolation, and automation of routine tasks for easier and smoother day-to-day operations. Advanced operation 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 3rd party integration solution.

For oil, gas, and water operators 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 an extended temperature range for use in energy 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 a catastrophic failure.
- **Potential network failure protection:** 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 packet

ElastiGRID provides a risk-free evolution path to allow oil, gas, and water operators to transition their legacy TDM communications networks to packet networks, which is a pre-requisite for digitizing energy, as follows:

- Legacy services operate on this platform - natively or by using circuit emulation
- MPLS-TP is used to provide deterministic packet 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, with the Muse™ security suite. This provides comprehensive protection for both OT 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 digitizing the network

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, sensors, video surveillance and control devices are supported by MPLS-TP.
- IP/MPLS is used to support dynamic L2 and L3 services.
- Pay-as-you-grow design, with unique in-service expansion units, scalable cross-connects and in-service upgradable packet fabrics.
- Enhanced functionality can be added easily, using the embedded NFVI capability, like improved security and real-time services, which require ultra-low latency.
- Easy extension of the services with intuitive, right-first-time introduction of new resources enabled by LightSOFT.
- Proven SDN and NFV capabilities can be introduced as they are required by the network operators.
- Supports business services, residential services, mobile backhaul and future IoT applications, allowing energy 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