Modernizing Communications for Oil, Gas and Water Companies

with Ribbon's Optimized Packet and Optical Transport Solution

Increased Efficiency and Security by Digitizing Oil, Gas, and Water Networks

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 of the Highways

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.
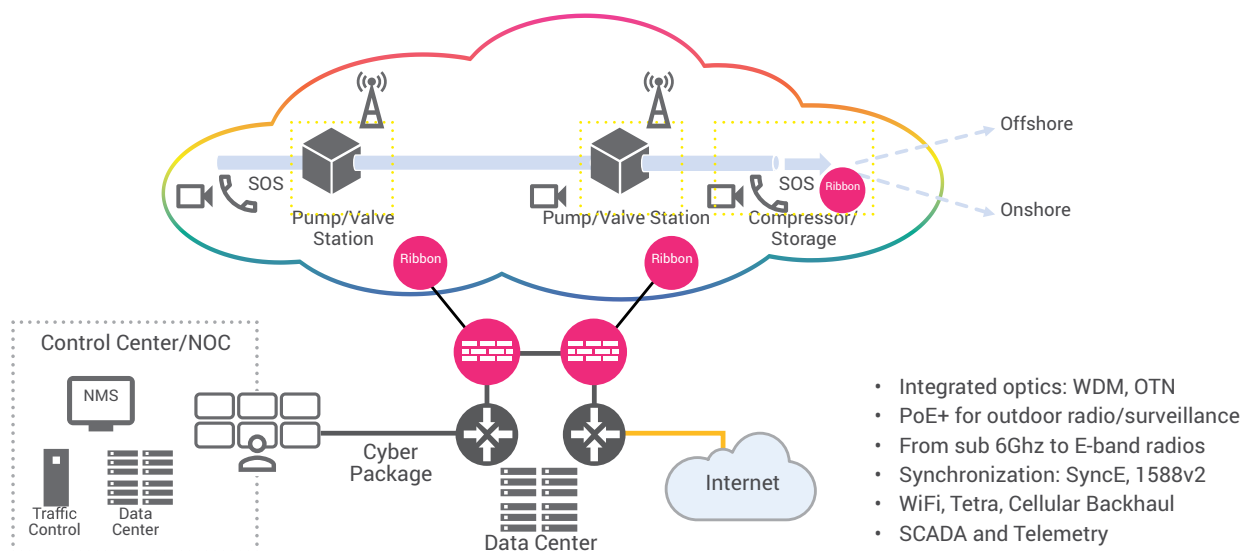
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Cost-Effective and Risk-Free Transition to Packet

Ribbons packet solutions are optimized for the communications network used by Oil, Gas and Water (OGW) companies. We have used them to provide many OGW companies around the world with a risk-free evolution to packet based communications infrastructure.

Legacy services and low-rate mission-critical services like SCADA, monitoring and control are migrated to the packet layer, when it makes sense for the network operator . Our Elastic MPLS, dual stack, packet technology has been designed with mission critical networks in mind. It provides IP/MPLS to support IT networks and MPLS-TP (deterministic MPLS) to support the mission critical OT services which require low latency, high reliability, deterministic performance and extensive OAM. With extensive Circuit emulation (CES) capabilities the correct packet transport technology can be selected to meet the service needs on a service by service basis. Ribbon's field proven processes ensure this migration process is risk free.

Ribbon's solution 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.

Ribbon has extensive experience in transitioning networks and developed field hardened, proven processes for this migration.
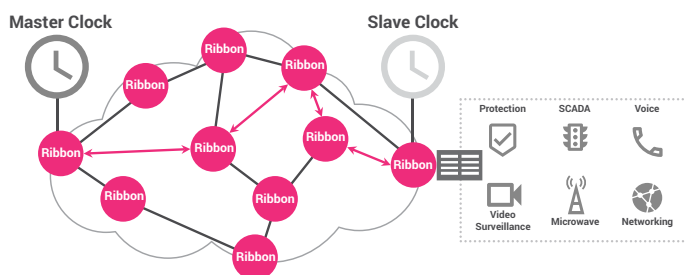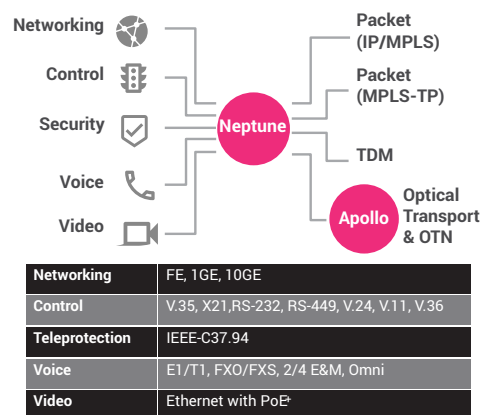
Holistic Security Suite

Critical industries are a prime target for cyber-attacks. Data security is a particularly complex matter. It must protect both IT and OT assets and be able to identify tangible threats from amongst the multitude of reported events.

Our solution provides physical layer security, encryption, firewalls, and intrusion detection. It provides the capabilities to identify and tackle potential attacks in several ways:

- **Preventing attacks where they occur** with distributed attack mitigation.

- **Guarding the integrity of the SCADA and OT network.** The system maintains a complete OT network map and continuously monitors all transactions for abnormal behavior, providing early warnings of any tampering.

- **Identifying real threats** with advanced correlation and analysis for a clear view of tangible threats.

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Multiservice Platform

With Ribbon's packet and optical portfolio you have a complete multiservice platform for 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 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. The solution 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. The solution 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 solution provides an open and future-proof way to add new services and applications.

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+

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. The solution 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.

Muse provides an intuitive GUI which 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-Ribbon transport devices by using Ribbon's 3rd party integration solution.

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

Optimized for High Availabilty

Oil, Gas and water companies require communications networks that provide 'five-9s availability' or better, Ribbons solution for Oil, gas and water provides 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	Ribbons solution for Oil, Gas and Water 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: • Circuit emulation is used to support legacy services • 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 Muse™
Need enhanced security	Tailored, holistic security suite provides comprehensive protection for the communications infrastructure: • 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	Extensive multiservice capabilities provide 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. • Easy extension of the services with intuitive, right-first-time introduction of new resources enabled by Muse. • Proven SDN 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	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 Muse • Advanced software provided by Muse ensures the network is operating at maximum • availability, utilization, and efficiency • Third-party device management integrated into Ribbon's end-to-end management

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.

Contact Us Contact us to learn more about Ribbon solutions.

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