Transforming Trieste's LightNet Research and Education Network (REN)

Building a Flexible and HPC-Proof Regional University REN

The University of Trieste is the leading institution within the LightNet cooperation agreement established by the local academic and research community and the national REN GARR. It needed to replace and expand the existing LightNet REN that could no longer scale to meet the ever-increasing demands of their users, in particular to support distributed high performance computing based research. As a moderately sized regional network, the institutions required an economical and easy to manage solution.

Ribbon is meeting all of LightNet's needs with a multilayer packet services and optical transport solution, which includes complete network and service lifecycle management through a single pane of glass. To ensure high availability while controlling costs, Ribbon's solution employs a unique (for REN's) spine and leaf services architecture, implemented over an open and flexible optical backbone that implements automated wavelength restoration using shared resources.

LightNet

- Managed by University of Trieste, University of Udine, SISSA, ICTP, AREA Science Park, Elettra - Sincrotrone Trieste, OGS, INAF Trieste, Conservatory of music Tartini, Conservatory of music Tomadini, MIB School of Management, I.R.C.C.S. Burlo, and GARR
- Serves over 50,000 users in academic and research institutions in the Friuli Venezia Giulia Region
- Connects 40 nodes over 550km of dark fiber
- Interconnects with Italian and Slovenian NRENs.

"Learning environments and research centers have become increasingly digitalized making access to reliable, resilient, and competitive connectivity services essential. Our high capacity connections with the national REN GARR, our cross-border links with Slovenia's REN ARNES, and the use of supercomputers for AI simulation and big data analytics have increased our users' need for a high capacity, scalable and adaptable network that cost-effectively meets shifting requirements. Ribbon's multilayer solution covering both service and transport needs gives us all we need to upgrade our network."

— **Giorgio Giorgetti**
  LightNet Technical Director at the
  University of Trieste

LightNet Challenges

LightNet must meet multiple expectations of the academic and research institutions in the FVG Region, including high speed and low latency connectivity for collaborative cluster computing based research. It needs to support many types of circuits:

- High speed connections and alien wavelength transport to adjacent Italian and Slovenian NRENs, GARR and ARNES.
- Private high speed intranet connection for each research or education institution.
- Any to any local peering connections.
- Dedicated 100G connections for HPC and storage facilities.
- Transitory connections for experiments.

In addition, it has the goal of achieving an easy to manage, resilient, scalable, and economical "I do everything by myself" model.

Innovative Ribbon Solution

Ribbon is equipping LightNet with an integrated yet open multilayer solution that meets all packet services, optical transport, and lifecycle management needs, combining performance, economy, and resiliency.

Neptune platforms implement a region-wide spine and leaf packet services architecture. While this typically is used within data centers, it was found to provide an excellent solution for delivering scalability plus high availability on a regional basis. Key features include:

- E-Line (point-to-point) and E-LAN (multipoint-to-multipoint) services
- MPLS-TP transport for 1:1 tunnel protection and restoration
- Services mapped onto colored wavelengths for DWDM transport

Packet Services Logical Connections
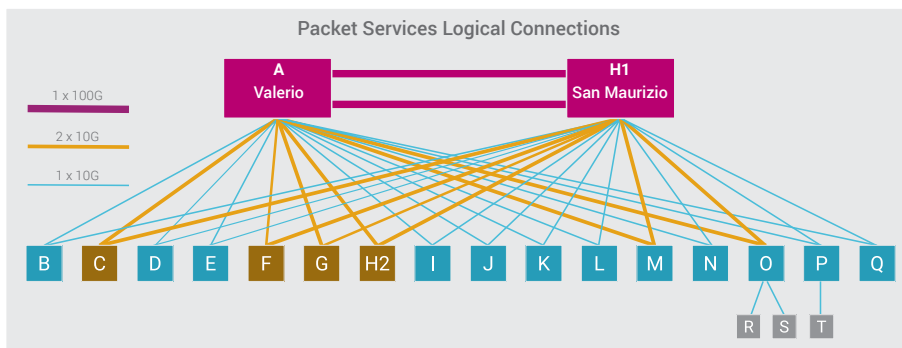
Apollo platforms implement an Open Optical Line System backbone that combines the packet services wavelengths, native express wavelengths, and high speed alien wavelengths from other networks such as the adjacent NRENs. The backbone can support 10G non-coherent wavelengths and 100G coherent wavelengths on the same fiber. Colorless-directionless ROADMs at most nodes ensure high availability using Wavelength Switched Optical Network (WSON) dynamic restoration.

Ribbon integrated NMS system software provides centralized and end-to-end planning, configuration management, service provisioning, analytics, and maintenance. Notably, it monitors the optical performance of both Apollo and alien wavelengths, and uses centralized OTDR to monitor fiber health and to sectionalize fiber breaks to within meters, if these occur. Muse also supports an open northbound Interface for future SDN applications.

Benefits

The transformation of LightNet into a world class REN positions the University of Trieste and its associated institutions as a center of excellence for research and education. It enables institutions and users to conduct leading edge projects relying on cloud-based applications, high performance collaborative computing, and interaction with other NRENs, without constraints. Moreover, the staff has the tools to manage the infrastructure directly, to continuously plan, configure and operate the network to respond rapidly to ongoing user needs.

High performance
for computing collaboration

Economical
multilayer architecture

Resilient
for high availability

Easy to operate
with a minimal staff

Contact Ribbon to learn more about building a high-performance Research & Education Network at rbbn.com

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.

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