GMPLS Fast Restoration in Massive WDM Networks

Nokia leading in network scalability and single domain control plane restoration

Opportunity

As network speeds have been increasing, it becomes much more cost effective for the traffic to remain primarily on WDM optical layer, terminating on electrical OTN switches (Layer 1) or router nodes (Layer 2 & 3) only where needed.

Nokia's unique advanced optical layer restoration is integrated into the 1830PSS platform. It detects network faults, calculates a new path through the network and switches the affected wavelengths to the newly established restoration path.

The distributed intelligent control plane unlocks the true power, flexibility and efficiency of colorless, directionless, contentionless and flexible grid ROADMs (CDC-F).

Nokia's GMPLS restoration options dramatically lower network costs by providing

- Simplified network planning
- Reduced operational costs by eliminating manual reconfigurations
- Faster service turn-up
- Improved reliability

Optical networking carriers can build a new generation of flexible, dynamic optical networks and ensure continuity of service at lower costs. The tremendous pace in bandwidth demands by today's applications and devices, are driving the rapid growth of optical network size.

Nokia is ensuring its GMPLS restoration application is scalable and capable of managing massive networks of the future enabling networking carriers to protect their entire network with confidence.

Breakthrough Innovations

✓ 1830PSS Fast Photonic Lightpath algorithms embedded in the GMPLS control plane application which is decentralized and optical impairment-aware to enable instant calculation of feasible optical routes.

✓ Largest GMPLS network in the world implemented in Nokia R&D Labs, combining real and virtual hardware to simulate authentic conditions.

✓ 1830PSS CDC-F 2.0 hardware supporting C & L band integrated ROADM (twin WSS with switched gain amp) supporting up to 16 degrees and converged OTN switching.

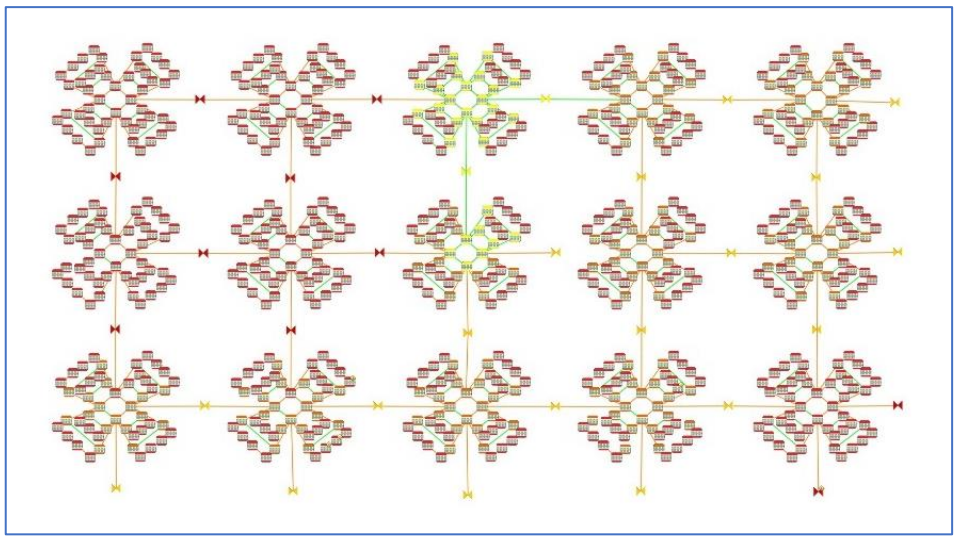
✓ Nokia PSE-3s Coherent DSP with Probabilistic Constellation Shaping (PCS) for dynamic rates 100G, 200G, 300G, 400G, 600G

Description

Nokia R&D Labs are building and certifying extra-large networks from 400 nodes to 1,000 nodes and even up to 3,000 nodes. The networks are deployed using virtualized 1830PSS nodes in a cloud environment, combined with real hardware nodes and Nokia's Network Management system (NFM-T).

The optical network and DCN network for management and operation are constructed with multiple OSPF areas, where each area can have up to 500 nodes. The distributed GMPLS control plane operates in a single domain managing the ROADM nodes in the multiple OSPF areas.

Visualizing, supervising and maintaining every node in these large networks are realised in a few seconds via industry standard tools and dedicated tools developed by Nokia Optics R&D. Robustness and stress test scenarios are performed round the clock via automation and including best practices such as Chaos Engineering to ensure the network restoration capabilities under any circumstances and network size.



High density network of 1,000 nodes, over 6,500 C & L-band trails protected by a single control plane

Contact

chinmoy.datta@nokia.com Nokia IP Optical Networks