

Optical peRformanCe monitoring enabling dynamic networks using a Holistic cross-layEr, Self-configurable Truly flexible appRoAch



Vision

An optical network has to be observable before it can become controllable and be subject to optimization.

The vision of the ORCHESTRA project is to close the loop between the physical layer and the network control plane, by using information provided by the coherent transceivers that can be extended, almost for free, to operate as software-defined optical performance monitors (soft-OPMs). This will enable a real cross-layer optimization, providing true network dynamicity and unprecedented efficiency.

PROJECT ACRONYM: ORCHESTRA

PROJECT TITLE: Optical peRformanCe monitoring enabling dynamic networks using a Holistic cross-layEr, Self-configurable Truly flexible appRoAch

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KEYWORDS: Optical communications, network technologies / internetworking, optical monitoring, physical layer impairments, dynamic network operation, DSP algorithms, OAM handler, control and monitor infrastructure, cross-layer optimization, failure and fault localization

Objectives

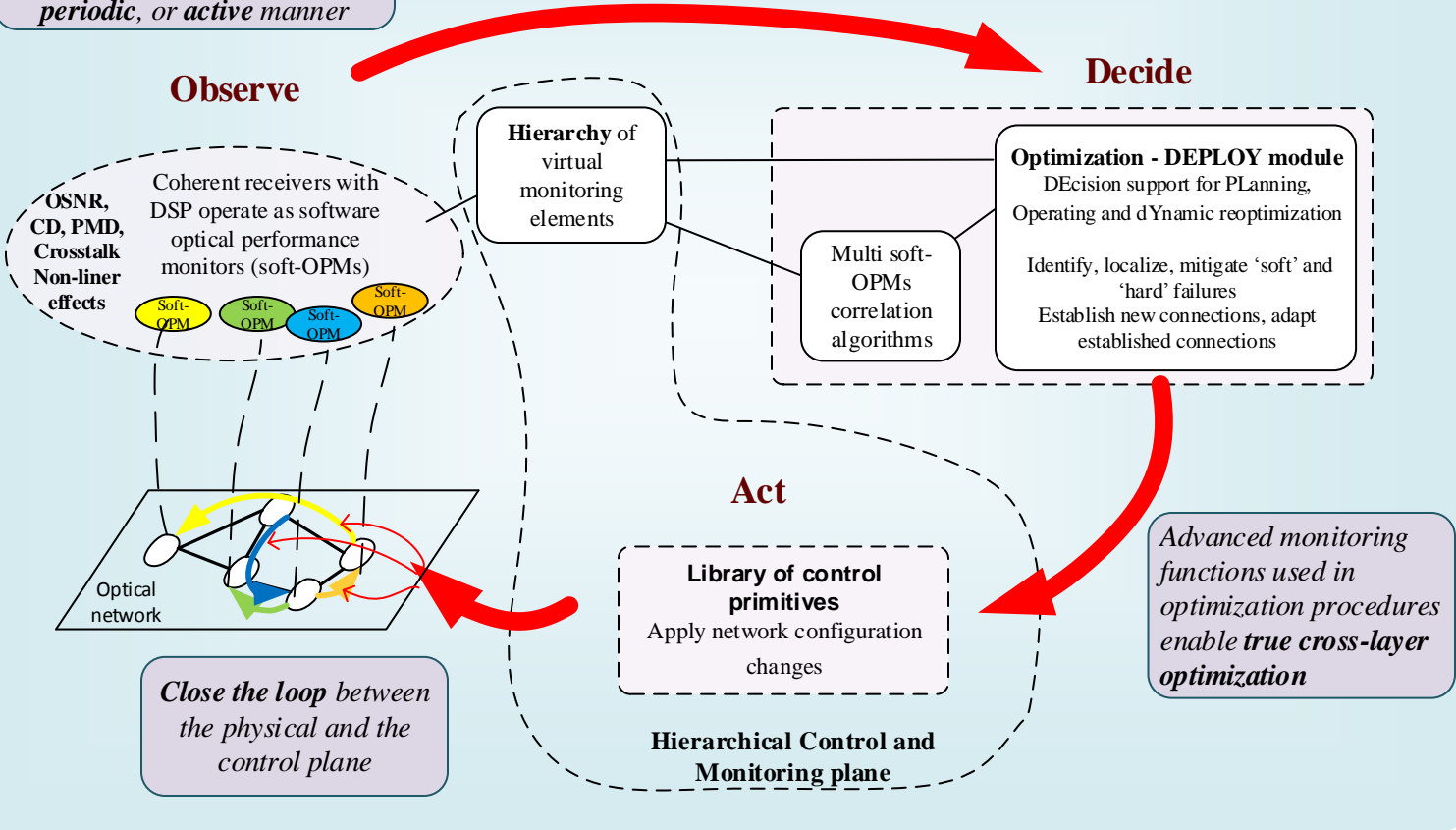
1. Develop an advanced DSP-based physical-layer multi-impairment monitoring algorithm suite
2. Develop a holistic approach to Quality of Transmission (QoT) determination in all network lightpaths using information from distributed software-defined optical performance monitors (soft-OPMs) and advanced correlation algorithms
3. Develop a hierarchical control and monitoring infrastructure providing active and passive monitoring capabilities with rapid and effective reactions to degradations and failures
4. Develop dynamic optimization procedures for fault management and network re-optimization
5. Lower the barriers of resource sharing among operators' domains through the efficient monitoring of alien lightpaths and accurate physical layer SLAs
6. Demonstrate dynamic and highly efficient flexible network operation enabled by software-defined optical performance monitoring

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Advanced DSP algorithms add real-time multi-impairment monitoring capability to coherent receivers
Monitors operate in a **threshold, periodic, or active** manner

*A novel **hierarchical monitoring plane** handles monitoring information in an efficient and scalable manner*

*Impairment information from **multiple soft-OPMs** deployed in the network is **correlated** to provide even more knowledge of the state of the physical layer*



Use cases

Forecast of failures from the analysis of physical parameters

Reduce CapEx or postpone investments by reducing margins traditionally considered in optical channel provisioning

Detect possible performance degradation after fixing failures

Tuning for non-optimized paths

