BONE Major Achievments

WP14 : Virtual Centre of Excellence on Optical Switching Systems

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WP Objectives

Work in this WP has been organised in two directions that constitute the pillars of Optical Switching Systems when designing future optical networks:

System and Networking with emphasis on:

- New switching paradigms and network architectures
- Multi-granular, GMPLS switching nodes
- Switching and network reliability, benchmarking and cost analysis
- Technology aspects and technology evaluation
- Review and assessment of current enabling-technology
- Emerging applications and switching functions i.e. complex functional switching components

Enabling Technologies with emphasis on:

- New switching devices and essential technology including ring resonators, slow-light generation devices, fibre based switches, photonic crystals and QD-SOAs
- Large scale switching experiments and test-bed development

Status at start of the BONE-project

Optical technology has been maturing over the last years and has unlocked most of the fiber capacity making capacity an abundant resource. However, the majority of WDM deployment had occurred in the form of point-to-point links with amplifiers in between as needed. Optical WDM light paths are static and are seen as a scarce resource. Once set up, they remain in place, essentially forever. Therefore, the prime objective of the Virtual Centre of Excellence on Optical switching systems (VCE-S) work package is to craft R&D directions and define the position of photonic switching in future optical networks. R&D actions must be aligned with current technologies and system perspectives for the future internet.

Major progress during BONE-project

WP14 has been running very satisfactory with a high level of participation and activity, throughout all three years of the project. WP14 has integrated 39 partners and 119 researchers. The overall outcome is a much heightened level of collaboration within European Institutions that result in a high number of mobility actions, joint papers as well as joint experiments. Access to unique experimental resource was also an important added value. This outcome significantly raised awareness and knowledge about research activities taking place throughout EU.

Partners of WP14 strongly focussed on two areas of integration, namely *mobility actions* and *joint projects*. Both proved to serve very well in terms of integrating researchers and research activities. Below is a list of topics that holds major scientific results achieved in this work package. For details please refer to the *deliverables.*

- Power-Cost-Effective Node Architecture for Multicast Light-Tree Routing in WDM Networks.
- Feasible parallel schedulers for OBS/OPS nodes.
- Performance and complexity analysis of optical switching fabrics.
- Performance of optical switching system architectures with shared wavelength converters.
- Code-based optical nodes.
- Repacking and rearranging algorithms for multi-plane banyan type switching fabrics.
- Power Consumption and Supply of Individual Network Elements.
- All-optical switches utilizing microring resonators.
- All-optical label processing techniques for ultra-fast optical packet switches.
- The Optical Switch Architecture with Recirculation Buffer and Wavelength Conversion.
- Encompassing switch node impairments and capabilities in dynamic optical networks.

- Reliability of various optical switching technologies.
- Photonic code label processors for ultrafast routing.
- Hardware efficient optoelectronic switch fabrics.
- Low-crosstalk optical packet-switching architectures based on wavelength-switching and wavelength-sensitive devices.
- Novel Multi-granularity Optical Switching Node with Wavelength Management Pool Resources.
- Comparison of the synchronous/asynchronous operation paradigm in optical switches.

In total WP14 has produced and published 60 joint scientific papers of which half were joint partner papers. A major part of these papers were produced as a result of the 19 mobility actions that have taken place between partners.

Added value of the BONE NoE

Apart from scientific results achieved through BONE, the overall most significant value that BONE has added to the optical switching community is the way BONE has integrated scientific institutions throughout Europe. This has already proven to be a permanent connection, where partners are discussing further collaborations and future EU projects. Working together, throughout the years of BONE, has created strong ties and given scientists confidence to initiate collaborative work.