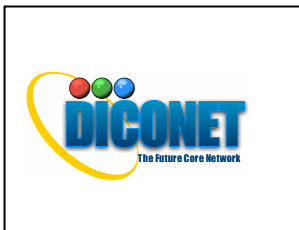


# Dynamic Impairment Constraint Networking for Transparent Mesh Optical Networks

**The DICONET project proposes a novel approach to optical networking providing a disruptive solution for the utilization of the core network of the future. It is the vision and goal of DICONET consortium to provide high speed end-to-end connectivity with quality of service and high reliability, exploiting optimized protocols and lightpath routing algorithms.**

## At A Glance: DICONET

### **Dynamic Impairment Constraint Networking for Transparent Mesh Optical Networks**



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**Duration:** 01/2008 – 06/2010

**Total Cost:** € 4,854,712

**EC Contribution:** € 3,198,874

**Contract Number:** INFSo-ICT-216338

These routing strategies will complement a universal control and management plane offering flexibility for the future network infrastructure

## Main Objectives

The key innovation of DICONET: The development of a dynamic network planning and routing tool residing in the core network nodes, incorporating real-time measurements of optical layer performance into IA-RWA algorithms, and which is integrated into a unified control plane, is the key enabler for networks capable of automated, rapid network reconfiguration. This feature of fast dynamic reconfiguration upon user or network request is fundamentally different from slow, planned provisioning and reconfiguration used today. In addition our dynamic approach provides advanced network resiliency features not currently available in today's static networks. The DICONET consortium is committed to realize the following project objectives:

- Development of Impairment Aware RWA Algorithms
- Optimum equipment (regenerators & monitors) placement
- Study of failure localization algorithms to enable resiliency
- Study of OPM/OIM techniques
- Development of fast and accurate modeling tools
- Experimental verification of the models
- Realization of dynamic network planning tool
- Protocol extensions to enable an IA-control plane
- Verification of the DICONET tools, algorithms and protocols
- Techno-economic studies to support exploitation of results
- Dissemination of project results

***The key innovation of DICONET: “The development of a dynamic network planning tool residing in the core network nodes that incorporates real-time measurements of optical layer performance into IA-RWA algorithms and is integrated into a unified control plane”,***

## Technical Approach

The work that needs to be performed during the life-time of the DICONET projects has been organized in several work-packages that perform stand alone research and development activities but they are also inter-related through an efficient integration of the project activities in order to ensure that the project objectives will be realized as planned. Besides the Project management, other work-packages are as follows:

- Network architecture and support studies: This work package aims at defining dynamic optical network architectures and analyzing these network architectures in order to support the activities in the other technical work packages.
- Development of a network planning tool for dynamic traffic/impairments: This activity will study efficient optical layer impairment monitoring and will design and develop a dynamic network planning tool based on advanced physical layer modeling and impairment dissemination techniques.
- Impairment aware lightpath routing: This work package will be devoted to the design, development and test of impairment aware routing and wavelength assignment algorithms (IA-RWA) for lowest cost routing while maintaining required quality of service.
- Network management and control protocol: This activity aims at the implementation of the most appropriate control protocols extensions which are going to be used by the DICONET test-bed.
- Integration and testing of the developed protocol extensions in a test-bed for validation and performance evaluation
- Exploitation & Dissemination: This activity aims at addressing the exploitation and dissemination of the developed modules.

### Key Issues

The challenges associated with the realization of the DICONET approach are as follows:

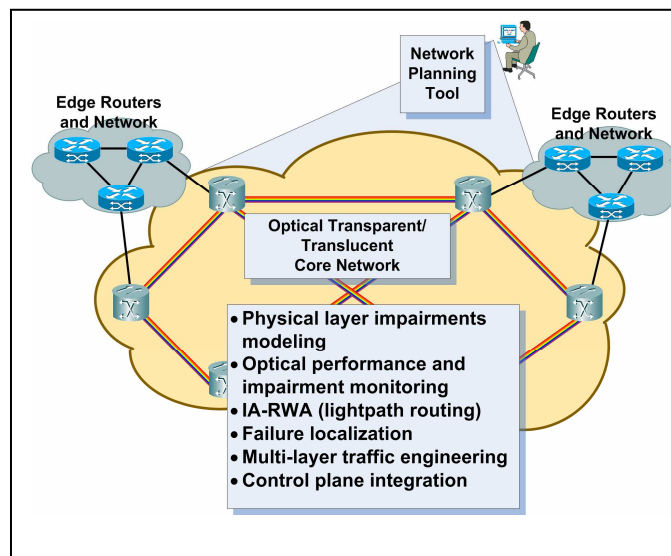
- The physical layer information on individual impairments from optical performance monitors

must be combined and evaluated in order to guarantee SLAs.

- Accurate modeling of the variety of physical impairments and their interplay.
- An integrated framework that connects and associates the physical impairments and the networking aspects (e.g. traffic blocking, utilization of resources, end-to-end delay, throughput).
- A mechanism that allows the impairment information to be exchanged between the network components. This can be performed through the use of appropriate signaling or/and routing mechanisms and protocols.

### Expected Impact

The DICONET project aims



- at providing new results in several areas supporting a new generation of high capacity networks:

- new optical networking concept,
- development of a dynamic network planning tool residing in the core network nodes
- advanced network

resiliency features not available in current network implementations.

- at contributing in the definition of standards in the domain of high speed networking. Extensions to current standards (e.g. GMPLS),
- at realizing an ultra high capacity network capable of rapid reconfiguration,

The planning tool that will be developed, which does not exist commercially will include new design criteria leading to significant performance advantages, while reducing OPEX.

Besides the direct impact to the market leaders that are partners in our consortium, DICONET activities will open unique opportunities to develop new optical devices for impairment and performance monitoring, specialized software tools and related technological advancements. The potential impact of DICONET for creating new opportunities for SMEs is tremendous