

Project Information



Management Platform for Next Generation Optical Networks

The aim of the MANGO project is to analyze, design, develop and evaluate a pilot of an integrated network management platform that includes capabilities of optical performance monitoring (OPM) to be applied in the next generation optical networks.

Main focus

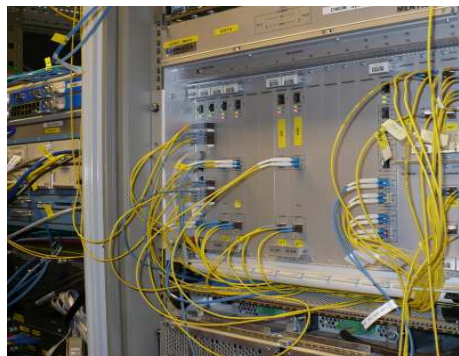
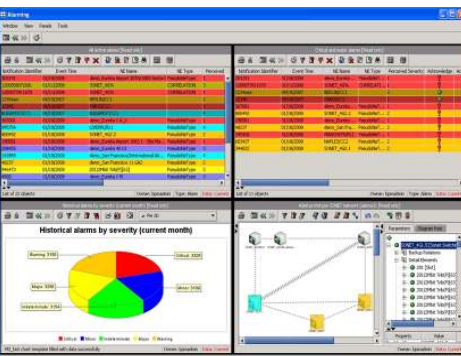
A particular emphasis will be put on management of optical connections, automated fault and performance management, and complex Quality of Service (QoS) management. Management of optical connections will include path engineering that takes into consideration physical aspects and characteristics of optical links in transparent domains such as optical signal impairments. Fault and performance management will include monitoring of the parameters in optical networks, from the pure physical level up to the high level QoS Service Level Agreement (SLA) parameters. All issues within this project will be treated from the perspective of the most recent protocols, such as optical link connections protocols, GMPLS in the IP-over-DWDM and IP/Ethernet-over-DWDM architectures. The developed management platform will be eventually evaluated both by simulations and by implementing a pilot version of the

software in the provider network equipped with OPM instruments.

Approach

Optical communications technologies have emerged as a key enabler of broadband networking solutions for residential and enterprise customers. The amount of raw bandwidth available on an optical fiber, the support of wide array of signal formats and data rates, and the ability to choose among a number of topologies (ring, mesh, point-to-point, tree, etc) make optical technologies a strategic component in the evolution of core and access networks. Furthermore, the introduction of flexibility in the optical layer has the potential to provide significant cost reductions, in particular when using all-optical switching techniques.

However, the benefits of optical networking do not come without several associated challenges. First of all, contrary to what happens when processing is done in the electronic domain, all-optical switching involves dealing with analogue signals. Nonlinear effects are a big concern, as they can severely impact the signal quality. It is therefore necessary to compensate for such impairments and, consequently, this places a complete set of



MANGO

Project ID: CP4-017

Start Date: 15 November 2007

Closure date: 30 December 2010

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Acreo AB, Sweden

Comarch S.A., Poland

Proximion, Sweden

Royal Institute of Technology (KTH), Sweden

TeliaSonera Sweden, Sweden

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www.projects.celtic-initiative.org/mango/

new requirements on the management of the new generation of optical networks.

Another major industry trend is convergence, which has resulted in integration of optical switching and data switching technologies. The development of the optical control plane protocols, such as GMPLS, and of Ethernet over transport solutions, such as those based on GFP and VCAT, is drastically changing the shape of the optical networking field and of its management.

To address the above-mentioned needs, MANGO will produce a number of innovations:

- ◆ Fault and performance management software for next generation optical networks featuring all optical switching technologies and integrated data switching capabilities.
- ◆ Algorithms for cost-efficient allocation of lightpath connections in optical networks taking into account the signal quality constraints.
- ◆ Specification of efficient rules for alarm fault correlation and propagation across layers.
- ◆ Integration of the management software, algorithms and fault correlation rules into a fully equipped testbed.

About Celtic

Celtic is a European research and development programme, designed to strengthen Europe's competitiveness in telecommunications through short and medium term collaborative R&D projects. Celtic is currently the only European R&D programme fully dedicated to end-to-end telecommunication solutions.

Timeframe: 8 years, from 2004 to 2011

Clusterbudget: in the range of 1 billion euro, shared between governments and private participants

Main results

The main result of this project will be a network management tool for the next generation optical networks.

This final result will be obtained through the following steps:

- ◆ Establishing a set of requirements for Fault, Performance, and QoS (Quality of Service) monitoring of the optical networks, and define the correlation with Fault, Performance, and QoS SLA (Service Level Agreement) parameters of the services offered to the clients by an optical network operator.
- ◆ Developing resource optimization and performance analysis model consisting of resource model, failure model and routing/restoration model.
- ◆ Developing and applying algorithms for routing and wavelength assignment to (possibly) protected lightpath connections, also taking into account network's physical parameter impairments.
- ◆ Creating software that allows the operator to manage the all-optical connections (Layer 1 and Layer 2). The software will be able to manage the light-paths, monitor them, and control the QoS that is guaranteed to the clients.

Participants: small, medium and large companies from telecommunications industry, universities, research institutes, and local authorities from all 35 Eureka countries.

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- ◆ Evaluation of the developed management platform in a multi-technology and multi-layer network, set from the network operator perspective.

Impact

So far, all-optical networks are not widely deployed for several reasons. One of them is lack of the management software allowing easy management of the heterogeneous optical networks. Another reason is lack of standardized interfaces allowing usage of different management software with elements from different vendors. The management standards used for, e.g., IP networks (SNMP) cannot in fact be directly applied for managing optical networks. The TeleManagement Forum implementation agreement TMF814 (also known as MNTM, Multi Technology Network Management) has gained notable penetration in the market, but most implementations contain vendor-specific extensions and modifications that render them not completely interoperable.

The MANGO project will use an open dissemination and transfer platform, which will start its operation in the countries of the project members. Results will be disseminated among a broad target audience including:

- ◆ Academia – the results of the project will be of interest for the research community and will be the foundation of further scientific research as well as for education of students.
- ◆ Industry – managers will be made aware of the results and challenges faced by the telecommunications industry as new technologies and services are introduced.
- ◆ Professional associations in the telecommunications sector.

