

## Together IP, GMPLS and Ethernet Reconsidered

**IP and Ethernet are becoming the dominant technologies in most network segments. TIGER aims to improve the adaptation capabilities between them. The project will propose a global solution covering pre-defined requirements, which include service, network, control, and management. The solution will be based on an extended use of Generalized Multi-Protocol Label Switching (GMPLS). TIGER will also benchmark the solution with competing architectures, and participate to related standardization activities.**

### Main focus

Nowadays, there is a common consensus in the industry that IP and Ethernet will remain the fundamental networking technologies for a long time, as supported by the strong trend towards IP/Ethernet access, backhaul, metro and core. Nevertheless, related protocol families and architectures are still evolving autonomously instead of being integrated in terms of technical features and service-driven applications. TIGER aims at analyzing current

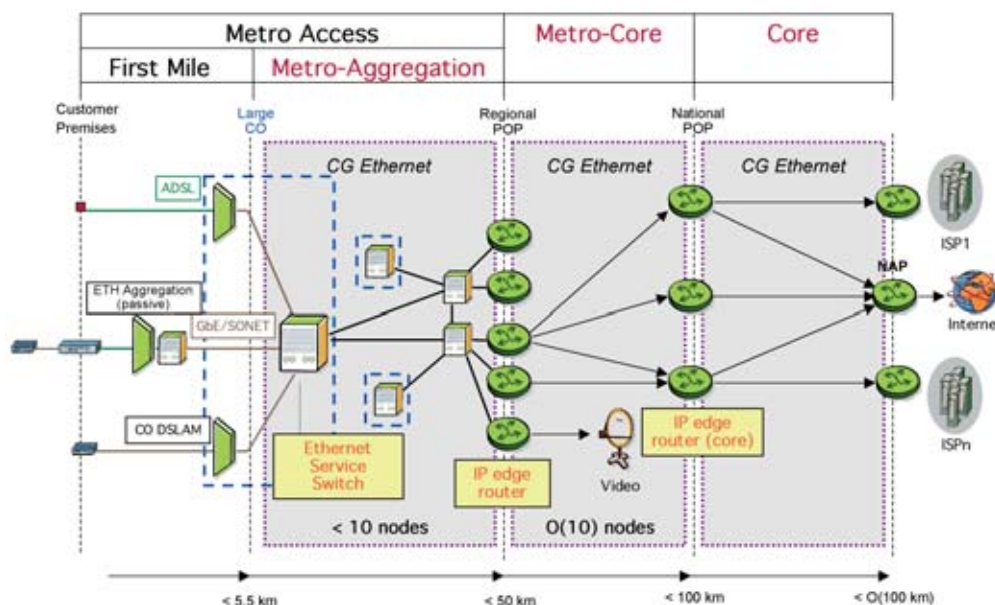
and future requirements and at proposing extensions and innovative features answering those constraints.

The first step will consist in analyzing major existing solutions with respect to specific service support (such as virtual private line services), technology features (data and control), and standardization status.

Then, three main axes may serve as guidelines for the new solution(s):

- Enhancement of the adaptation capabilities between IP and Ethernet
- Extend usage of GMPLS control capabilities to Ethernet data plane and
- Determine the behaviour of the IP layer on top of these new solutions.

A complete description of the new functions and related protocol architecture will be provided and illustrated as application reference study cases. Then, the solutions proposed will be evaluated through detailed quantitative and functional benchmarking studies on cost, performance, scalability, etc. Finally, migration scenarios and required actions at appropriate standardization bodies will be undertaken to enable wide endorsement and interoperability of the proposed solution.



## TIGER

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### Partners

Alcatel-Lucent, France

Alcatel-Lucent, Belgium

ENST, France

FORTH, Greece

France Télécom, France

IBBT, Belgium

RAD Data Communications, Israel

Nokia Siemens Network, Germany

Siemens, Israel

UPC – Universidad Politécnica de Catalunya, Spain

Virtual Trip Ltd. Greece

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### Project web site

www.celtic-initiative.org/projects/tiger

## Approach

Ethernet is not only the current key Layer 2 technology of choice, but will remain very attractive in the future, together with pure IPv4/v6 packet forwarding, due to its wide deployment. These are the two fundamental data plane building blocks of any future access, metro and backbone networks. TIGER focuses on designing and evaluating integrated solutions for metro Ethernet services, taking into account collaborative mechanisms with the IP layer for these environments. In particular, the project focuses on the following items:

- Requirement analysis for future networks both in terms of infrastructure and services.
- Analysis of the current and emerging technologies in these market segments.
- Definition of the reference network architecture.
- Design and specification of an integrated solution that includes:
  - an optimized collaboration and appropriate cooperation between pure IP and Ethernet technologies and services
  - a unified intelligent control of the overall infrastructure using Generalized Multi-protocol Label Switching (GMPLS) including a specific Layer 2 profile and related extensions.

## About CELTIC

Celtic is a European research and development programme, established as Eureka cluster, 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. Launched in November 2003, Celtic (Cooperation for a sustained European Leadership in Telecommunications) was founded and has been supported by major European telecommunication players, both vendors and operators. Celtic fills the gap between public R&D programmes not specifically focused on telecoms and short-term R&D efforts by the telecoms industry

**Timeframe:** 8 years, from 2004 to 2011

- The design and the specification of the data plane, protocol architectures, associated traffic control mechanisms and theory of operation.
- Accurate description of operational modes and services implementation.
- Realization of benchmarking studies of the TIGER solution aiming at significantly influence implementation decisions:
  - Functional analysis with respect to competitive approaches in terms of data and control plane, theory of operation
  - Analytical demonstration whenever appropriate
  - Dimensioning and performance studies validating the added value of the TIGER solution
- Operational "user guide" for both infrastructure management and service.

## Main results

The first major result of TIGER is to provide an in-depth analysis and assessment of the market requirements.

The second major result expected by TIGER is the detailed specification, validation and evaluation of an integrated Ethernet-IP service solution, providing the required level of description for:

- Data plane development
- Control plane protocol development

**Total budget:** in the range of 1 billion euro, shared between governments and private participants

**Participants:** companies from the telecommunications industry (small, medium and large), universities, research institutes, and local authorities from all 35 Eureka countries may participate in Celtic projects.

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- Managing and operating such environments
- Optimisation strategies
- Migration plan

An associated result is to provide a proof of concept demonstration of the proposed approach with respect to existing alternative or emerging solutions.

Finally, for the project will contribute significantly to international standards bodies (including IEEE 802.1 and IETF), major industrial forums (including DSL Forum, MEF), thus influencing the global market.

## Impact

The integration of the major technologies IP and Ethernet is a strategic market opportunity. Time to market is fundamental in this context, as international players are pushing in different directions avoiding convergence.

One of the main impacts of the project will therefore be to provide a detailed analysis of the limitations of current solutions, together with the proposals of improvements through architecture extensions and/or new solutions. The technological expertise and market strengths with the integrated nature of theoretical and practical results envisioned make it important to jointly assess the manufacturing, marketing, and selling of the TIGER project results. Partners of the consortium will be able to adapt their exploitation strategy having in mind their client needs and the subsequent potential commercialisation process.

As a complete solution design, evaluation and validation, TIGER will give the required level of specification, both for product development and solution deployment. TIGER will also influence the market promoting the project solutions, regarding for instance protocol evolution needs for data networks. Thus, when required, partners will seek to spread results and propose new standards, or extensions to existing standards to the broader community. This will be done through supporting the present approach and ensuring the multi-vendor/operator compatibility of the proposed solutions by proper standardisation strategy.

By the end of the project, TIGER outputs will fuel the market for further exploitation.