Project Information

100 Gigabit Ethernet Transport Technologies

100GET-AL investigates architectures, concepts, technologies and prototype implementations for a flexible, cost efficient, reliable and service independent transport network providing next generation transmission/physical layer technologies and carrier-grade packet transport solutions for the requirements of the future internet.

Main focus

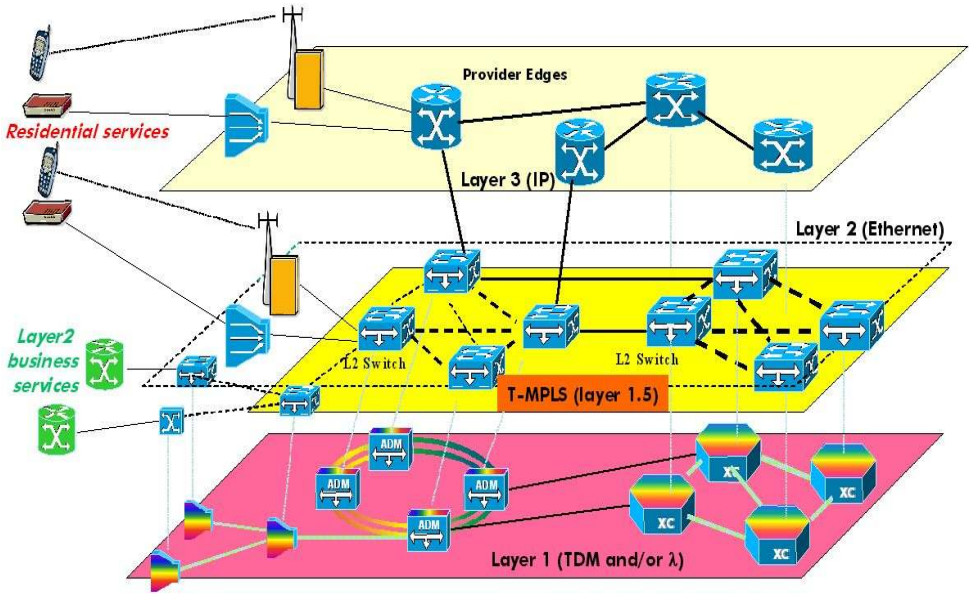
100GET-AL shall raise key innovations for a convergence network based on a multi-layer, multi-service architecture with new 100 Gb/s transmission technologies and novel Layer 2 packet transport techniques offering carrier grade performance to fulfill availability, reliability, Quality-of-Service (QoS) and supervision requirements of future services and broadband applications. Topics covered by the project include:

- Scalable network solutions with node capacities in the multi-Terabit/s range to match the rapidly growing traffic.
- Flexible control plane solutions for 100G-Ethernet packet networks enabling flexible, cost-effective network operation and end-to-end QoS provisioning across multiple layers and domains.
- Physical layer technologies for next-generation, high-capacity, Ethernet-based transport networks and investigation of 100 Gb/s Tx and Rx subsystems.
- Technology options for low-cost 100 Gb/s transponders, including the design, realisation and test of electronic circuits and opto-electronic components based on the most advanced high-speed electronic and opto-electronic technologies and HF packaging techniques.
- Investigation of the most powerful technology options for 100G-Ethernet transport in a system demonstrator for transmission experiments over lab and field fibre infrastructure and interworking with 100 Gb/s packet node.

Approach

With Alcatel-Lucent Germany as industrial project leader, the 100GET-AL consortium comprises renowned German industry partners and research institutes to address the challenging project goals, complemented by a group of excellent French partners addressing 100 Gb/s technology issues.

The research work is structured in two major activities, one addressing new



100GET-AL

Project ID: CP4-001

Start Date: 1 October 2007

Closure date: 31 September 2010

Partners:

Alcatel-Lucent Deutschland AG, Germany

Alcatel Thales III-V Lab, France

Fraunhofer Institute for Telecommunications, Heinrich-Hertz-Institut, Germany

IntexyS SA, France

MICRAM Microelectronic GmbH, Germany

u2t Photonics AG, Germany

University of Limoges, France

Co-ordinator:

Eugen Lach

Alcatel-Lucent Deutschland AG, Germany

E-mail: eugen.lach@alcatel-lucent.de

Project Website

www.celtic-initiative.org/projects/100GET

Layer 2 packet transport concepts. Key targets here are scalable, carrier-grade packet transport solutions to efficiently offload Layer 3 networks with IP routers by electronic as well as photonic approaches below Layer 3, supporting both packet-based Ethernet services and wavelength-based OTH services in a cost-optimized way. An essential cornerstone for the converged multi-layer, multi-domain networks will be an integrated, automated control plane and related management functions to enable high-quality, resilient network service provisioning at minimum total cost.

The second major activity investigates and develops physical layer technologies for next generation 100G-Ethernet-based transmission. This goal will be achieved by investigating promising technology options for low cost 100 Gb/s transponders, including the design, realisation and test of advanced electronic circuits and electro-optic components for 100 Gb/s transport subsystems (Tx/Rx). The subsystem building blocks will be realised on the basis of the most advanced high-speed electronic and opto-electronic technologies (SiGe, InP) and HF packaging techniques, offering a high integration level, low power consumption and promising cost/performance tradeoffs. Different circuit architectures and opto-electronic Tx/Rx subsystems will be analysed and the most promising concepts will be designed and realised for integration into advanced 100 Gb/s Tx/Rx prototypes. The subsystem prototypes will be integrated into a system demonstrator and analysed in serial 100Gb/s transmission system tests in order to enable identifying the most powerful technology options. Common 100 Gb/s field transmission tests are planned in the framework of an inter-project collaboration with DTAG. It is expected that the results of this project will provide a solid basis for contributions to 100G-Ethernet standardisation (e.g. IEEE P802.3ba 40Gb/s and 100Gb/s Ethernet Task Force, ITU-T SG 15).

Main results

- Scalable, multi-Terabit network architecture with effective DWDM and Layer 2 packet transport solutions for cost and energy-efficient provisioning of carrier grade network services.
- Integrated GMPLS-based control plane for converged multi-layer, multi-domain transport networks offering simplified, automated network operation, improved data and control plane resilience and end-to-end QoS.
- New solutions for scalable 100Gb/s packet processing and flexible, programmable protocol termination and signalling features as well as service-agnostic switching for cost optimized node solutions.
- Prototype realization of key building blocks of a 100Gb/s packet node equipped with novel L2 packet transport techniques and an integrated Control Plane. Tests of 100 Gb/s packet transport over a 100 Gb/s transmission link in a real network environment with real high-speed applications.
- 100 Gb/s system concepts and specification parameters for 100G-Ethernet standardization.
- Theoretical and experimental evaluation of 100 Gb/s system performance, incl. tolerance, margins, spectral efficiency for DWDM transmission and potential reach lengths of different 100 Gb/s modulation formats.
- Selection of most promising 100 Gb/s electronics and opto-electronic technology options and feasibility demonstration of advanced 100 Gb/s ASICs, driver electronics, opto-electronic components and integration concepts for 100 Gb/s transponders.
- Serial OTU-4 transport interface solution based on 56Gbaud DQPSK with high spectral efficiency and high OSNR tolerance and solutions for cost efficient optical short-reach interfaces based on serial 100/107 Gb/s OOK-VSB or parallel WDM approach.
- Realisation of an advanced 100 Gb/s system demonstrator and demonstration of robust 100 Gb/s transmission within field environment (in collaboration with DTAG/OCTET).

Impact

The project will prepare the field for new Terabit transport networks based on cost-efficient solutions below Layer 3. The de-risking of new technologies for 100 Gb/s transmission and processing as well as new architectures exploiting the potential of multi-layer approaches and the new functionalities of integrated network control for automated operation will enable the industrialization of novel cost-efficient solutions and put network operators in the position to cope with the traffic and service requirements of future internet.

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

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

Celtic Office

c/o Eurescom, Wieblinger Weg 19/4,

69123 Heidelberg, Germany

Phone: +49 6221 989 405, e-mail: office@celtic-initiative.org

www.celtic-initiative.org

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