

A horizontal graphic consisting of five overlapping, curved shapes in a rainbow color gradient: red, pink, orange, yellow, green, and blue.

GEYSERS

GENERALISED ARCHITECTURE FOR DYNAMIC INFRASTRUCTURE SERVICES

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- Instrument: Collaborative Project Large Scale Integrated Project (IP)
- Activity: ICT-2009.1.1 The Network of the Future call 4 FP7
- Grant agreement for: Project duration 36 months
- Project start date: January 2010
- Project budget: 10.433.205 euro (7.035.000 euro EC contribution)
- Project resources: 947 person months

THE GEYSERS' TEAM**Pan-European Carriers:**

- Interoute

Service Providers:

- SAP AG

Telecom Operators:

- Telefonica I+D
- Polish PTT

Manufacturers:

- ADVA Optical Networking
- Alcatel-Lucent italy

SMEs:

- Nextworks (NXW)
- Martel

Universities and Research Org.:

- Fundació i2CAT
- University of Essex
- Institut National de Recherche en Informatique (INRIA)
- University van Amsterdam (UvA)
- Research and Education Society in Information Technology (AIT)
- Technical University of Braunschweig (TUB)
- Interdisciplinair instituut voor BreedBand Technologie (IBBT)
- Indian Institut of Technology (IIT)

NREN:

- Poznan Supercomputing and Networking Center (PSNC)

- Legacy infrastructures business models.
- Network is decoupled from the IT resources/Infrastructure.
- Lack of troubleshooting from optical network to/from app.
- Best practices characterized by global service are delivered over generic infrastructures driven by the ubiquitous presence of internet.

“Today’s telecom operators face the need for providing users with dynamic high capacity and high-performance optical networks connectivity services tightly bounded with IT resources”

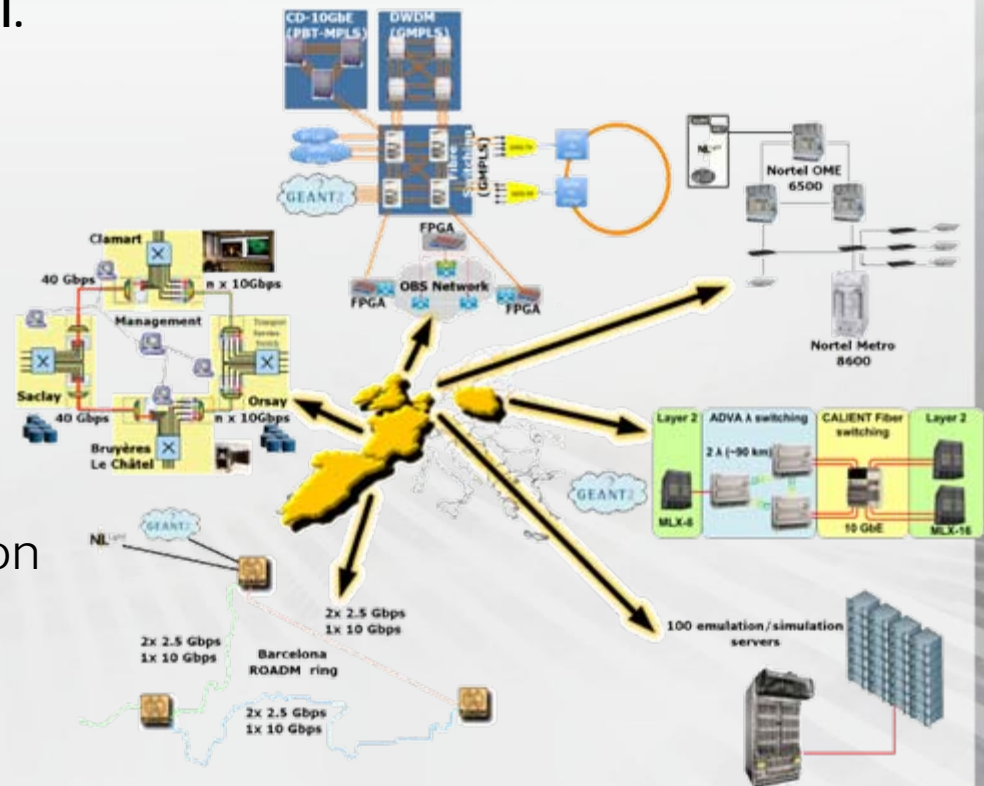
- A novel architecture capable of
 - Seamless and **coordinated provisioning** of optical network plus IT resources
 - **End-to-end service delivery** that overcomes limitations of network/domain segmentation
- A novel **business framework** for network infrastructure provider and network operators (service providers).
- Novel mechanism for infrastructure providers to partition infrastructure resources to compose **logical infrastructures** and offer them to network operators **as a service** (IaaS)

- Enhanced GMPLS/PCE control plane for **dynamic control and re-planning of infrastructure resources** (Net + Any IT) based on End Users and Network Operator requirement.

- Customizable **SLAs** for vertical and horizontal requirements **deployment, trust, security and access control.**

- A distributed and multi-site **validation test-bed**

- A **cost & energy-efficient, proof-of-concept implementation**



GEYSER Architectural View

Roles



Application /service Provider

Application Interface

Network Control Plane (Extended GMPLS Control Plane)

Extended GMPLS

Extended GMPLS

Network Operator

Logical Infrastructure Composition Layer

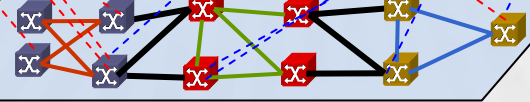
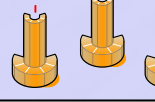


Infrastructure Provider

IT Infrastructure

Network Infrastructure

IT Infrastructure



Storage

Optical infrastructure

Computing



Resources

- Main areas of innovation (**bottom-up**):
 - Logical Infrastructure composition and management
 - IT and Transport service provisioning

Logical Infrastructure Composition and Management

- Main areas of technical development:
 - Physical infrastructure partitioning (information modelling, synchronisation, abstraction,...).
 - Composition of logical optical and IT infrastructures (orchestration,...).
 - Uniform network and IT resources description.
 - Flexible and high resolution infrastructure segmentation tools.
 - AAA infrastructure for heterogeneous resource provisioning.
 - Dynamic logical infrastructure re-planning tools.
 - SLA application awareness.
- Impact:
 - Make available independent logical infrastructures to network operators and service providers.
 - Combine logical infrastructure resources involving multiple infr. Providers.
 - Support the separation of physical infrastructure ownership and operation.

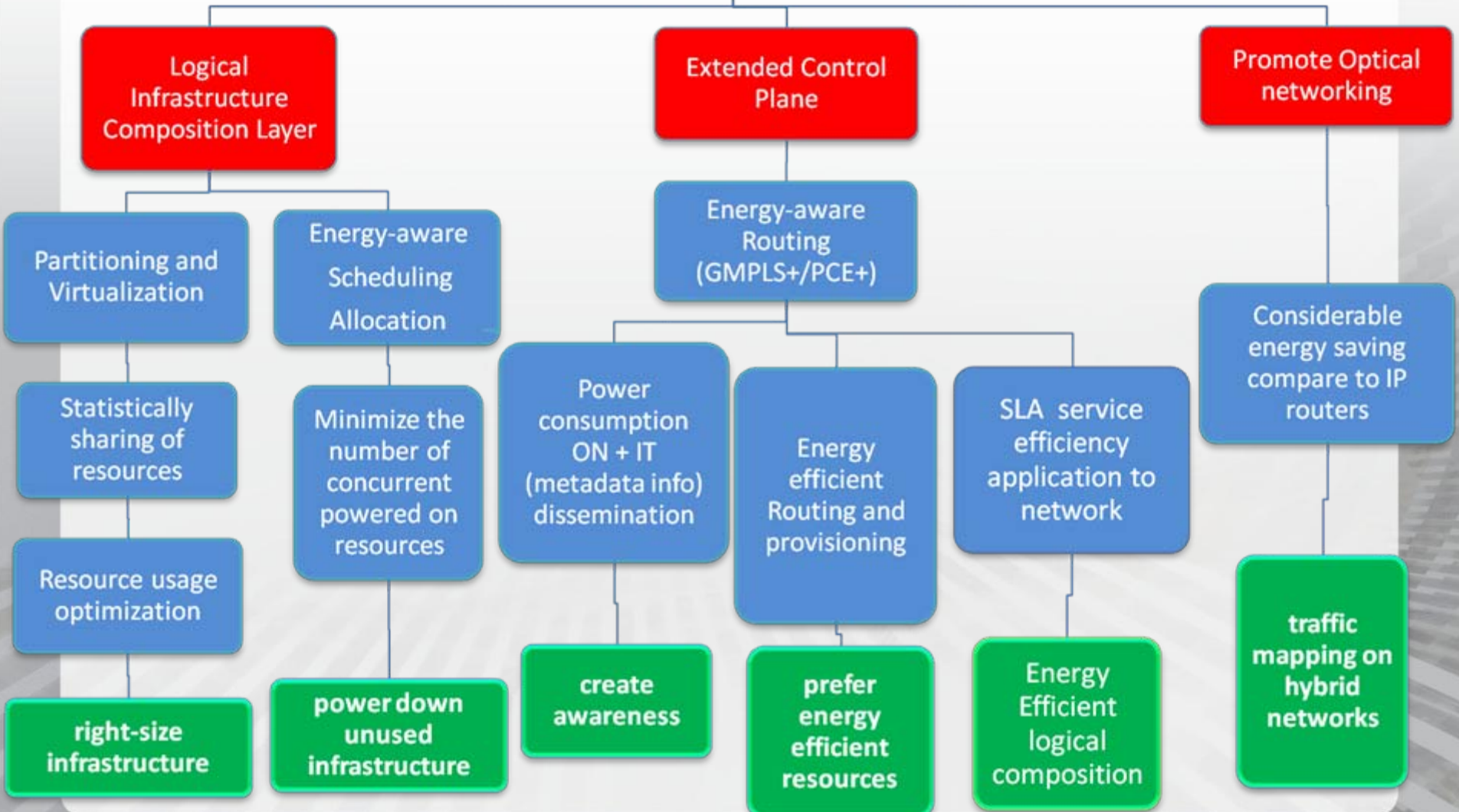
- Main areas of technical development:
 - Extended on demand services for joint Network + IT provisioning (based on an enhanced GMPLS+ and PCE+) with SLA awareness and connection services.
 - Cross layer network service monitoring and recovery tools.
 - Support of multiple switching technologies under the same NCP.
 - Infrastructure on demand support (resource re-planning and allocation) services to change the underlying controlled infrastructure.
 - Backwards compatibility (ASON/GMPLS and PCE).
 - Dynamic and/or Scheduled provisioning functionalities.
 - Evolved User-to-Network Interface with low level granularity and SLA.
- Impact:
 - End-to-end dynamic reservations of network and IT resources.
 - New future internet architecture with a novel layer structure.

- IaaS approach will strongly impact new business model. Allow network operators offering tailored made services to novel markets.
- GEYSERS approach will enable telecom operators to access new markets with new business models. Telecom operator will be allowed moving their business towards high value application layers.
- GEYSERS concept will allow the development of new actors in ICT environment (existing and emerging Network Operators).
- Application and market expectations will drive the development of new business model based on GEYSERS concepts and outcomes based on CAPEX and OPEX optimization.

Energy Efficient aspects

router = 250W/10 Gbps, ethernet is about 1/10th of that, sonet and mems/roadm/wss even much lower

GEYSER Energy efficiency/saving Approach



STRONGEST provides next generation optical transport solutions with 2 scenarios:

- Medium term, GMPLS controlled layer 2 and layer 1 transport. PCE solutions and emphasis on energy efficiency
 - Long term: 100 G packet processing solutions and sub-lambda optical transport
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- The two projects have standard compliant GMPLS control solutions.
 - STRONGEST does not develop optical infrastructure (plus IT) virtualisation solutions, but STRONGEST could consider to adapt the GEYSERS virtualisation service (IaaS) and manage through its own control plane.
 - STRONGEST doesn't look at the IT aspects, but GEYSERS.
 - GEYSERS could benefit through knowledge developed in STRONGEST about optical transport infrastructure evolution.

“strong complementarities between the 2 projects”

TWO COMPLEMENTARY ARCHITECTURE LAYERING:

- **GEYSERS** concentrates more on **the vertical interoperation/interfaces** to allow the network operators to integrate and offer network and IT services as a whole.
- In **ETICS**, the convergence spans vertically from the business to the network layer, and **horizontally from the end customers to carriers**, with more emphasis on the horizontal integration among carriers and their different transport paradigms.

TECHNOLOGICAL COMPLEMENTARITY:

- In **GEYSERS** the major focus is on the **optical technologies that interconnect the business customers** and their remote **application/service** instances. mid-/long-term
- Contrarily, in **ETICS** the mix of heterogeneous transport technologies currently deployed in operational network is taken as starting point of work (access/metro, core, backbone), and **integrate the different data bearing approaches and related control technologies**. short/mid-term

EXPECTED IMPACT AREAS

- **GEYSERS** has the potential to **originate new business actors** across the end-to-end service delivery chain through the LICL concept and its outcomes (in particular the infrastructure resellers).
- **ETICS**, instead, intends to achieve **impact** on the current carriers, their networks, and all the stakeholders of the **end-to-end network service delivery chain**.

GEYSERS will:

- Facilitate the end-to-end service delivery.
- Rely on partitioning the infrastructure to create specific logical infrastructures.
- Each logical infrastructure will be controlled by an enhanced NCP capable of provisioning
- Establish links with other EC projects.

The GEYSERS vision will be realised by implementation the following technical objectives:

- Definition and design of a new Logical Infrastructure Composition Layer (LICL)
- Definition and design of an enhanced Network Control Plane (NCP) architecture and protocol extensions
- Provide a cost-effective, proof-of-concept implementation of the LICL and NCP architectures.
- Deploy a distributed and multi-site validation test-bed.

MANY THANKS



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