

Project Information



Converged Infrastructure for Emerging Regions

CIER will develop a network for rural areas. This All-IP network provides communication and all other kinds of data transfer based on different wireless communication standards and uses wired and satellite based connections to the Internet. CIER designs network architectures and defines functional requirements for self-configuration, self-organization and self-management of heterogeneous devices in heterogeneous, dynamic and scalable networks based on different radio technologies.

Main focus

The CIER project provides the Future Internet building blocks required to connect rural areas in Europe and sparsely populated areas in developing countries to the global communication infrastructure. In remote parts of Europe and Africa, the lack of energy supply, of wired infrastructure, of trained personnel and the limitation in OPEX and CAPEX impose stringent requirements on the network building blocks that support the communication infrastructure. Consequently, in this promising but untapped market, the CIER project aims at designing and implementing energy-efficient, robust, reliable and af-

fordable wide heterogeneous wireless mesh networks to connect geographically very large areas in a challenged environment.

These aspects are the key drivers behind the project. In terms of technical focus, the following key results from the CIER project will pave the way:

- ◆ Energy-aware optimisation and management of hardware and physical layer technologies, including solar-based solutions.
- ◆ Development of energy-efficient and – aware communication protocols and network management, including cognitive prediction of resource availability (energy) and demand.
- ◆ Development of self-managing, low cost, wireless backhubs for wide-area multi-hop networks.
- ◆ Development of convergence mechanisms for heterogeneous link layer technologies.
- ◆ Support for multi-operator integrated service provisioning.

Solutions produced by taking into account those parts of the world find their place in



CIER

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Partners:

France Telecom, France

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LinkNet, Zambia

Magister Solutions, Finland

Media Broadcast, Germany

Oy L M Ericsson Ab, Finland

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Project Website

www.celticplus.eu/projects/celtic-projects/call7/CIER/cier-default.asp

both urban and rural areas of Europe as well as the rest of the world's yet unconnected regions. As a part of the CIER project, field trials are used as a proof-of-concept for the developed system. These field trials along with simulations and experiments are further used to validate and evaluate the developed converged infrastructure, assessing the achievable cost reductions and performance enhancements.

Approach

CIER will progress in three phases as follows:

Phase 1:

In Phase 1, scenarios, business models and requirements will be defined, and overall system architecture will be specified based on input from all partners. System components and interfaces will be specified based on these results. The architecture developed in WP2 will be improved continuously based on the input from the implementation work packages WP3 (wireless backhaul) and WP4 (network operations), mostly through direct communication with respective WP leader.

Phase 2:

In Phase 2, a prototypical implementation and testing of the system components will be carried out. During this phase, the partners will work concurrently on different layers of the system and produce results, which will be tested and validated at component level be-

fore moving to WP5. System integration, conformance testing, execution of trials and dissemination of the results will be carried by WP5. Two possible trials are planned for the project. The first field trial including minimal components from CIER architecture will be realized during phase 2 in case respective funding is released by partner countries. This phase will provide first experience with a real rural environment, initial system evaluation and end-user requirements analysis.

Phase 3:

Phase 3 is composed of the second field trial and a detailed performance evaluation study. The second field trial will introduce additional functionalities and improve the ones already present in the first trial; in case there will be one. Both field trials will include only a subset of the entire CIER system, due to impossibility of real implementations for some components. In such cases, simulations and emulations will be used. All partners will contribute to Phase 3 in order to integrate an operational prototype system that enables provisioning of reliable and yet cost-effective broadband internet services in remote areas.

Main results

The expected outcome of the project is a flat-IP architecture with maximal support for legacy systems, native support for mobility and alternative energy solutions.

Its functionalities include on-demand self-configuration and self-maintenance between different types of network.

The network will be able to cover very large areas, rural suited, with a reliable, heterogeneous wireless backhaul solution. It will be ready for satellite/fiber/high-altitude platform integration as a gateway to a fibre-based core infrastructure.

A focus will be on novel energy-efficient MAC layer algorithms for wireless backhauls, enhancements to existing MAC protocols, and contributions to new protocol standardizations.

New routing algorithms and MAC layer algorithms will be integrated into a proof-of-concept system platform. The implementation will show a cost-efficient way for broadband connectivity for rural areas in Europe.

Impact

Major impact on European and (more generally) international economy will come from the development of future wireless networks for emerging regions like Africa or rural Europe. Hence, the impacts of CIER will be through:

- ◆ innovative research in the area of future internet that will inherently cover future urban area solutions for Europe,
- ◆ the use of research results in rural areas of Europe by significantly improving the connectivity in those regions, and
- ◆ the newly created market opportunities that have not been options for European Companies due to technical challenges.

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.

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