

# Project Achievements



## Next Generation Solutions for Wireless Process Manufacturing



# LOOP

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### Partners:

CBT, Communication & Multimedia, S.L, Spain

CTTC - Centro Tecnológico de Telecomunicaciones de Catalunya, Spain

Demokritos, Greece

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### Project Website

[www.celtic-initiative.org/projects/loop](http://www.celtic-initiative.org/projects/loop)

The LOOP project intended to take a step towards Next Generation Network (NGN) solutions to open up new market opportunities in wireless process manufacturing for the automotive industry, and, for telecom operators, to anticipate new services and products in the run-up towards the deployment of Beyond-3G networks.

### Main focus

The NGN vision is aiming towards a converged wireless networking world where the user will be able to attain any service, at any time on effectively any network that is optimized for the application at hand. The convergence of Internet and mobile services is currently being addressed by the IMS (IP Multi-media Subsystems) platform, driven mainly by the operators to promote market opportunities in combining the appealing services of internet with the roaming capability of mobile networks. However, this convergence does not go far enough, and there is a clear need to enhance legacy architectures to provide cost-effective end-to-end communications for telecom operators to anticipate new products and services. This will raise significant research challenges: undeniably, system coexistence solutions for Wireless Area Networks (WAN) and Long Term Evolution (LTE) RAN (Figure 1) and their impact on the 3GPP System Architecture Evolution require further innovation to

deliver new market opportunities.

Under the umbrella of converged services and networks, LOOP technology is targeting potential applications in the wireless market for process manufacturing. This market is expected to grow at a pace of approximately 30% per year; faster than the wired contingent. Nevertheless, adoption of wireless technology is still low and most managers are reluctant to introduce radio solutions; key impediments being latency and performance issues. In LOOP these challenges have been addressed for metrology-based applications in the automotive industry.

### Approach

The LOOP approach was to propose innovative solutions towards the main key scenarios targeting:

- ◆ Seamless and efficient terminal mobility between heterogeneous wireless networks;
- ◆ Enhanced coverage for mobile subscribers based on cooperation with neighboring users;
- ◆ Smart terminals for opportunistic use of licensed radio spectrum;
- ◆ Enhanced Network Optimization for operators and process manufacturers

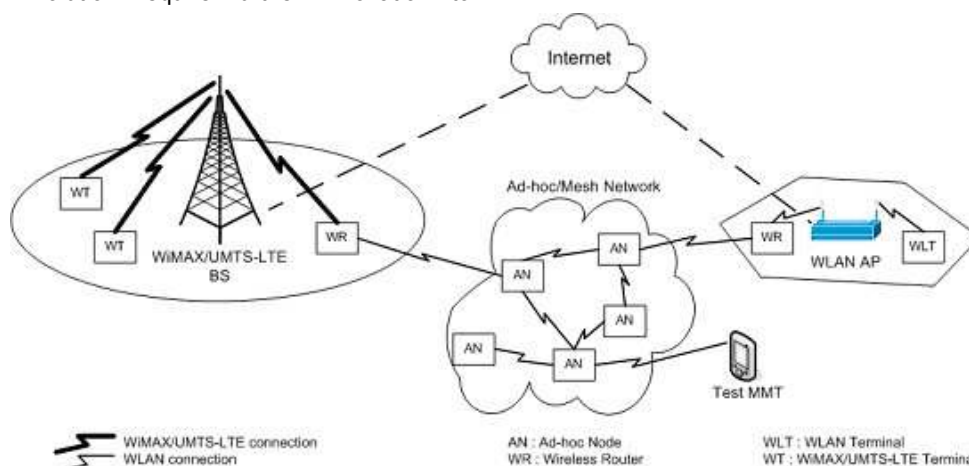


Figure 1 LOOP Scenario

These solutions were tested using software simulation tools available within the consortium, and real networking test bed equipment. Specifically, LOOP tested and validated protocol solutions to demonstrate:

- ◆ Remote management of Coordinate Measurement Machines (CMMs) for process manufacturing applications using the automotive industry as a showcase;
- ◆ Network planning and optimization in WiMAX systems;
- ◆ Seamless and efficient mobility between WiFi and UMTS systems

## Main results

LOOP has transferred engineering know-how to meet the short-term market requirements for operators to anticipate the commercial deployment towards NGNs in terms of delivering potential products that include:

- ◆ Dual mode terminals to allow efficient mobility between legacy systems and WiFi;
- ◆ New network equipment to support the notion of “co-operative networks”;
- ◆ New testing equipment to allow coverage planning and QoS delivery for WiMAX;
- ◆ Identifying cost-effective wireless deployment scenarios based on cognitive radio.

In terms of potential applications for wireless process manufacturing, LOOP has been the platform to

provide potential solutions for automating the car production process one step further. Coordinate Measurement Machines (CMM) in car manufacturing are pivotal for the quality control phase, providing a contextualized visual platform for managing quality in a cost-effect manner. The metrology capability of these machines provide a 3D scanned image, which allow on-site engineer to ensure the assembled body parts are aligned with manufacturer speci-



cations. However, the manner in which this “contextually rich data” is transferred and processed still relied heavily on human interaction, resulting in high production costs. LOOP has taken a step towards full automation by demonstrating a first working prototype for minimizing human interaction on the factory floor. LOOP demonstrated a **remote monitoring and management tool for CMMs to provide virtual metrology services to onsite engineers on the factory floor at any place and at any time.**

LOOPs key driver has been towards new innovative products for the telecom and automotive industry, however along the way LOOP has had great success on the sci-

entific stage with 37 publications that includes:

- ◆ 2 Book Chapters
- ◆ 11 International Journals (e.g. IEEE Transactions on Communications, IEEE Communications Letters, IEEE Communications Magazine)
- ◆ 24 International Conferences
- ◆ 2 Contributions towards standardization in the IEEE 1900.6 Working Group on Spectrum Sensing Interfaces and Data Structures for Dynamic Spectrum Access and other Advanced Radio Communication Systems.
- ◆ A commercial roadmap is in place that earmarks the marketing of the product through the TRIMEK commercial network that expands four continents (Spain, UK, USA, Canada, Mexico, Brazil, Argentina, China, India, Germany, Holland, France, Sweden, Poland, Portugal, Italy, Czech Republic, Taiwan, Korea and Iran).

## Impact

The impacts of NGN are expected to be significant to the ICT market: NGN will provide, firstly, the vehicle for enhancing access to communication services and applications; and, secondly, a basis for the Ubiquitous Network Society, where easy-to-use networks are connected at anytime, anywhere, with anything and for anyone. LOOP is one piece in the jigsaw, by helping European industry to sustain a leading role in manufacturing of high-value products and machinery. This position can only be sustained by early and effective adoption of the Internet of Things and Services and pioneering effective wireless communication strategies that can be successfully demonstrated. LOOP technology has delivered the first prototypes for communication systems encompassing both “Virtual Part and Video streaming” applications for the factory floor. Moreover, LOOP has demonstrated that it is possible to establish effective QoS provisioning to control transmission of key sensitive information in a dynamic factory environment. The first impact from initial results suggest that LOOP has the potential to provide that competitive edge to communication equipment and machine manufacturers and as such the LOOP roadmap for commercial exploitation is already in place.

## 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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