

# Project Achievements



## On Board Wireless Secured Video Surveillance



The BOSS project proposes a high-data-rate communication system between rolling trains (or more generally a public transport system) and the wayside base station. This system will allow to deploy enhanced on-board functionalities and services including solutions for increasing passenger security (against attacks) through video surveillance, better access security on-board train, and remote train maintenance.

### Main focus

The aim of the BOSS project was to answer to the needs from public transport operators for new or enhanced on-board functionalities and services, such as passenger security, remote diagnostic, and predictive maintenance. Typically, the video-surveillance solutions are clearly lacking on-board of trains, due to the ab-

sence of efficient transmission means from the train to a supervising control centre. Similarly, diagnostics or maintenance issues are generally handled when the train arrives in stations or during maintenance stops, which prevents proactive actions to be carried out. These observations led us to propose within BOSS an innovative and bandwidth efficient communication system to cope with the increasing needs from public transport operators for new or enhanced on-board functionalities and services, such as passenger security, remote diagnostic, and predictive maintenance. In particular, we propose a reliable solution over WiMAX and UTMS links for large data rate communications between public transport vehicles and the wayside and we introduce abnormal event detection routines to discriminate which data should be transmitted and according to which priority.

## BOSS

Project ID: CP3-004

Start Date: 1 October 2006

Closure date: 31 March 2009

### Partners:

Alstom Transport, France

Arteixo Telecom, Spain

BARCO, Belgium

Budapest University Technology and Economics, Hungary

EGROUP Services Ltd., Hungary

Ingeniería y Economía del Transporte, Spain

Institut National de Recherche sur les Transports et leur Sécurité, France

Université Pierre & Marie Curie Paris, France

Société Nationale des Chemins de fer Français, France

Telefónica I+D, Spain

THALES Communications, France

Université Catholique de Louvain, Belgium

### Co-ordinator:

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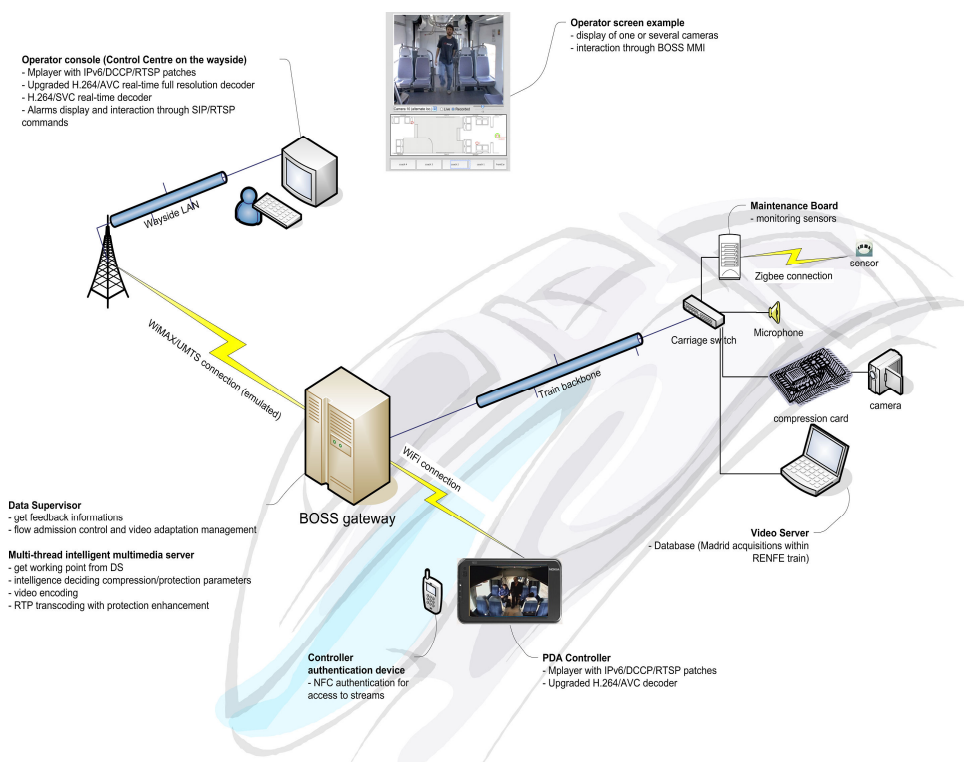
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### Project Websites

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

<http://www.celtic-boss.org>



## Approach

To reach its goal, the BOSS project has developed a communication system relying on an IP gateway inside the train. This gateway enables the communications both inside the train and to the outside world, with adaptation of the data transmitted based on the quality of the available links. Inside the train for mobile passengers and controllers, wired and WiFi links are used while outside the train towards wireless base stations, WiMAX like or UMTS as back-up is used. Mobility outside the train (including vertical and horizontal handovers) and mobility inside the train are proposed, with a differentiated Quality of Service for the different targeted services. This has implied to design supervision of the streams for admission control and adaptation of the video surveillance data, in particular to increase the robustness of existing tools and development of behaviour analysis algorithms to ensure that the passenger security is handled in the best possible way.

It should be noted that services such as video on demand, internet access, and travel information services, which are of great interest for travellers could be integrated in the global BOSS framework via an adapted level of service management.

## Achieved results

The system architecture has been declined into a full communication prototype running under Linux Fedora. Enriched all through the project life by the modules and algorithms developed within the project technical packages on radio communications, signalling, adaptation to the impairments, efficient multimedia compression, abnormal events detection, ... this demonstration prototype is a key element to firstly ensure the validation of the system, secondly to measure and assess the chosen techniques and thirdly to promote the solution towards end-users and potential customers.

In particular, RENFE and SNCF as end-users, as well as ALSTOM and THALES transport divisions as providers of the technical implementation and TELEFONICA as telecommunication providers have been following the project development and are being kept informed of its advances in order to possibly use the project results following the achievement of the project.

A first field campaign has been carried out in April 2008, during which audio/video acquisitions of different events played by team actors have been performed. A second session of tests was carried out during the summer 2008 to validate the possibility of using mesh networks in SCNF Transiliens trains. A third session will be held in April 2009 in Hungary to

demonstrate the GPS-aided hand-over solution proposed by the BOSS partners. Finally, the interest of the BOSS approach and the complete validation of the platform will be done in April 2009 in real conditions in a Civia train operating on a RENFE Cercanias line from Atocha train station.

## Impact

The project prototype will provide the communications systems needed to develop new telecommunications applications in the domain of public transport. The major expected impact is on societal benefits to European end-users, thanks to the enhanced comfort feeling and transport efficiency especially during off-peak hours (with respect to the "European Transport policy for 2010: Time to Decide" vision, which wish to reduce the congestion and nuisances caused by the excessive use of the private car by promoting and developing an efficient, high-quality and safe service for a highly secured mobility of the EU citizens).

The project also explores different wireless technologies, including WiMAX with WiMAX/UMTS handovers and a Near Field Communication (NFC) solution, in order to demonstrate the prototype with (almost or recently) commercially available devices offering the currently most advanced solution for high data rate transmission on the outdoor link and secure connection to the wireless LAN in the indoor link.

## 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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