

## Home Base Station: An Emerging Network Paradigm

A Home Base Station (HBS) is characterized by very low costs, plug-and-play installation, low transmission power, use of existing fixed broadband (typically, digital subscriber lines) backhaul and usually limits access to a closed user group, such as, household members. Mass adoption of HBs will strongly influence the local area evolution towards International Mobile Telecommunications-Advanced (IMT-Advanced) and create new business opportunities for mobile operators.

### Main focus

The possible unplanned nature of the HBS installation and operation, coupled with

the need to co-exist with conventional (macrocellular) mobile wireless networks makes the HBS concept technically challenging. The HOMESNET project will seek to address these technical challenges, as well as, to contribute in the regulatory and standardisation initiatives that serve to bring the HBS concept to forefront as mainstream in-building solution. At the moment the driving forces behind the HBS concept are large European operators and manufacturers. Therefore it is expected that project will strengthen overall position of European players on the markets. The HOMESNET project also intends to contribute to Panlab by setting up a testbed to test and verify Home Base Station (HBS)



## Homesnet

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### Partners:

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AALTO University, Finland

European Communications Engineering, Finland

France Telecom, France

INOVEL Electronics and Software Systems Ltd., Turkey

Izmir Institute of Technology, Turkey

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### Project Website

[www.celticplus.eu/Projects/Celtic-projects/Call6/HOMESNET/homesnet-default.asp](http://www.celticplus.eu/Projects/Celtic-projects/Call6/HOMESNET/homesnet-default.asp)

concept and the continued evolution towards IMT-Advanced. This testbed will provide a valuable repository of test cases and results made available (without violating Intellectual Property Rights of relevant parties) to the wider research community.

## Approach

To make HBS a success story for European industry, HOMESNET will consider the evolving HBS concepts and their evolution from technological, economical and services viewpoint;

It will show through simulations the impact of the proposed architecture and OAM enhancements to the performance of combined HBS/Femto BS and macro-cellular networks. It will also create and test practically viable interference control methods for HBS/Femto BS systems. An experimental testbed will be used to further demonstrate various HBS concepts developed within the project

It will create improved operations and maintenance (OAM) capabilities. This includes means for monitoring and remote management as well as advanced algorithms for analysis and potentially usage of radio signal measurements in order to support interference modelling. It will also address the future requirements of OAM for IMT-Advanced and related standardization issues.

It will address different architecture options. For example in the 3G High Speed Packet Access (HSPA) and Long Term Evolution

(LTE) there are various architecture options. In the future it is important to find the best trade-off in terms of backward compatibility, scalability and cost efficiency. Architecture should also enable effective control and management of the network and it should be future proven in the sense that it provides good basis for emerging local area evolution towards IMT-Advanced systems.

It will point out main characters that make certain services and applications especially suitable for local area systems based on Home- and Femto-cells. It will also consider HBS as a potential Hub over other home devices and create techno-economical models for the emerging ecosystem. It will develop means for improved localization, emergency, and public safety applications.

## Main results

The major results that are expected from the project are the following:

- ◆ Cost-effective, scalable and future proven HBS system architecture for 3G evolution.
- ◆ Guidelines for HBS concept evolution towards IMT-Advanced.
- ◆ Services and applications. This includes localization, emergency response, and public safety applications.
- ◆ Techno-economical models for the HBS ecosystem.

- ◆ Performance evaluation for combined HBS/Femto BS and macro-cellular networks.
- ◆ Interference control methods for HBS/Femto BS systems.
- ◆ Effective, simple and innovative OAM system for emerging HBS concepts and local area network extensions.
- ◆ Mobility algorithms adapted to contiguous femto-cell wide area coverage.
- ◆ Optical HBS backhaul solutions to avoid bandwidth exhaust of legacy broadband solutions.

Results are contributed into standards development organizations and shared with industry forums (e.g., Femto Forum, GSMA Femto Working Group etc.) so as to encourage and expedite adoption of standards-based HBS solutions.

## Impact

HOMESNET project will help in keeping R&D competence as well as Intellectual Property Rights (IPRs) owned by European industry.

Expected impact areas are

- ◆ Results will help to find new business opportunities beyond those that are already known from research related to competing technologies. These opportunities are related to both services and technology.
- ◆ Project will provide technical and economic information about bottlenecks in home BS mass deployment. This information will give an advance for European operators while competing on home markets.
- ◆ Project will guide and support standardization activities on this development area. While 3GPP standardization is characterized by a hectic development of bit level details, project will provide better environment to develop basic new ideas and thus, have a fundamental impact to future standards.
- ◆ Interoperability problems are examined and results can be directly applied to practise.
- ◆ The always increasing demand on capacity will make the use of deployment schemes based on contiguous Femto-cells the long-term solution enabling very high-capacity (~1Gbps/KM<sup>2</sup>).

## 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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