



Home Gigabit Access)))

www.ict-omega.eu

Project goal

The OMEGA project will set a global standard for ultra broadband home area networks. The new standard will enable transmission speeds of one gigabit per second (1 Gbps) via heterogeneous communication technologies, including power line communications and wireless connections. Thus, OMEGA aims to make home area networks as easy to use as electricity from the socket, putting an end to the coverage limitations as well as the wiring clutter in the home.

With OMEGA's gigabit home network, users will get easy access to high-bandwidth information and communication services such as telepresence, 3D gaming, enhanced interactivity, virtual reality, high-definition video as well as e-health applications and services for the exchange of user-generated business or multimedia content.

Background

Home networks at gigabit speed are a pivotal technology for realising the EU's vision of the future Internet. The demand for gigabit home networks is driven by the emerging future Internet services running over new high-speed optical access networks and the rapidly growing number of communicating devices in the home.

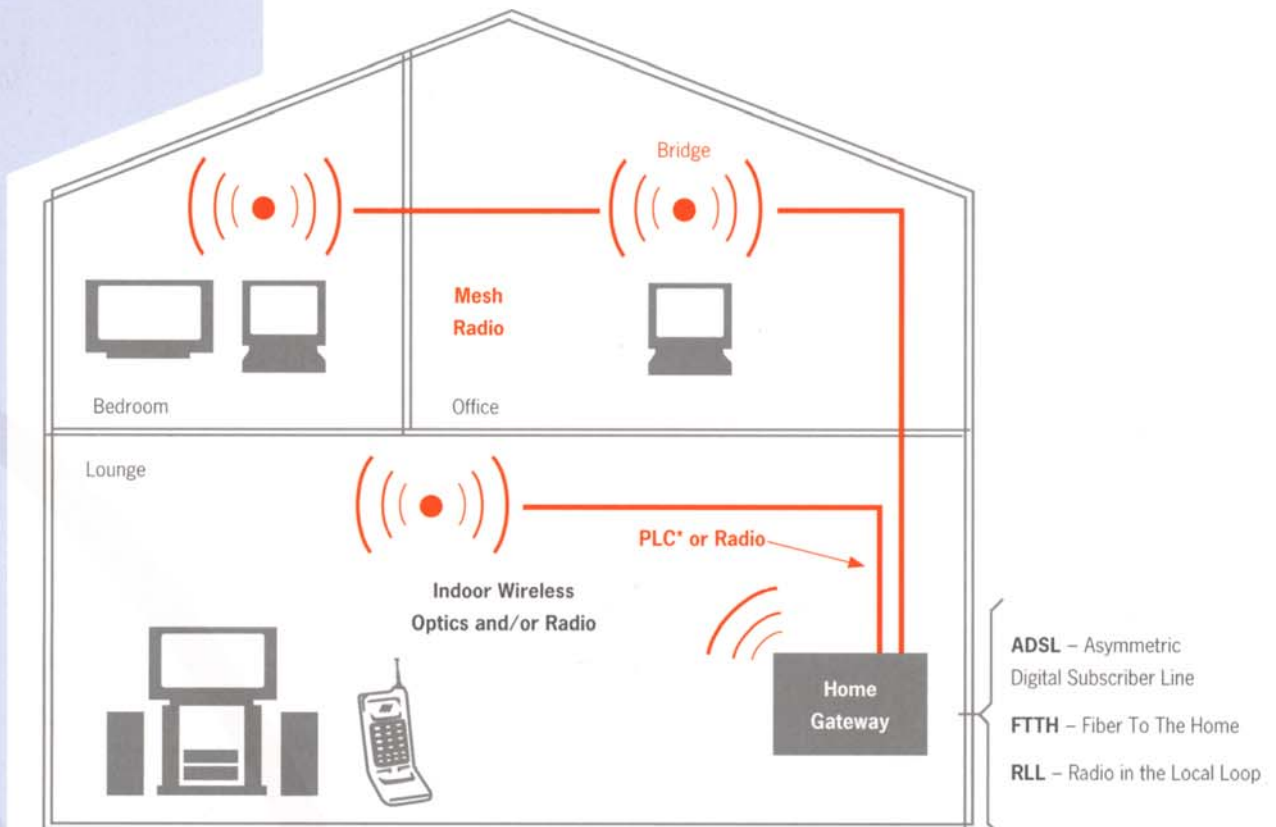
Current home networks suffer from the fact that many devices are limited to gross transmission rates of 54 megabit per second in case of wireless links, or require troublesome wiring to achieve higher rates. Thus, current home networks are at risk of becoming a bottleneck, when fed by high-speed optical access networks, which offer 100 megabit per second or more, both down- and upstream.

The future Internet will offer extremely high bandwidth in core and access networks. Home area networks play a key role in realising the benefits of this high bandwidth and making it tangible for the users by providing critical access to this infrastructure for end devices

within the home. Extending access into the home and to individual devices is the only way to ensure the success of the future Internet.

Future home area networks must enrich the lives of users, for example by allowing visual communications with their friends or relatives and by enabling interactive experiences through entertainment. Furthermore, home networks should also support citizens in maintaining their independence as they age, for example by offering remote healthcare and by allowing them to communicate with their family to reduce any sense of isolation they may have. In short, users must have the ability to control their virtual as well as their physical environment via home networks.

Users will require such networks to be simple to install, without any new wiring, and easy enough to use so that information services running on the home area network will be just another utility, like electricity, water, and gas.



* Power Line Communications

The OMEGA project is centred on the needs of the user: gigabit radio frequency and optical links, combined with more robust local-area radio frequency and visible-light communications will provide wireless connectivity within the home and its surroundings. Combined with power line communications this

provides a communications backbone in the home without new wires.

A technology-independent MAC layer will control this network and provide services as well as connectivity to any number of devices the user wishes to connect in the home network in any room

of a house or apartment. Furthermore, this MAC layer will allow the service to follow the user from device to device. In order to make this vision come true, substantial progress is required in the fields of power line, optical-wireless and radio frequency physical layers, in protocol design, and in system architecture.

Technical approach

The goal of OMEGA is to distribute 1 Gbps over heterogeneous technologies in all rooms. Three main technologies that require no new wires in the home will be investigated and optimised, in order to meet this challenging goal.

Radio communications

Current and future services and contents in home networks put diverse demands on the underlying transmission technology. Due to the trade-off between data rate and coverage range inherent to radio systems, only a mixture of different radio technologies trimmed to the different classes of applications can fulfil all the requirements to the desired extent. To avoid inefficient and cumbersome solutions with coexistence problems as experienced today, OMEGA will integrate various appropriate radio devices into a converged heterogeneous radio network, which meets the customer's demands with respect to quality of service, reliability, throughput, ubiquity, and self-configuration. In addition to the crucial aspect of convergence at the radio layer, advanced PHY, MAC, and cross-layer mechanisms will be developed, and coexistence will be achieved on system and hardware level.

Power line communications

OMEGA aims to increase the current frequency range for power line communications up to 100 MHz. A tight investigation of medium impairments as well as electromagnetic compatibility in this enlarged spectrum will help to define advanced modulation schemes based on multi-carrier approaches that best fit this wider communication pipe containing a higher number of carriers.

As a consequence, this will provide a foundation for new wide-bandwidth power line communication transceivers that can substantially increase the data rates available as well as home coverage for consumer applications.

Optical wireless communications

OMEGA aims to combine optical wireless communications techniques in order to provide a range of communications channels, which together can provide robust optical wireless communications. Infrared optical wireless will be used to provide Gbps line-of-sight communications, while visible light communication will provide broadcast coverage at lower data rates. In addition, a complete hybrid optical-wireless prototype will be incorporated into the OMEGA platform.

Convergence

The OMEGA project will pioneer a new method of convergence at the MAC layer, identifying the advantages and the limits of such an approach in terms of performance, reliability, stability, backward compatibility, costs, and potential impacts onto existing standards.

Continuity from the access network

The goal of OMEGA is to build a network that extends the access network into the home to make it reach the farthest home device. Access network continuity will therefore play a key role. It will require novel methods for managing the interconnection of the home area network (HAN) with various existing networks, as well as novel methods for the interoperability of the different media renderers with the proposed services.

Expected impact

Advanced home network standards

The OMEGA project will provide significant contributions to standards, especially in the fields of convergence layer, power line and wireless optic communications. The aim is to advance standards to a level that allows the seamless interconnection of all home devices within a gigabit home network.

New business opportunities

OMEGA will demonstrate a proof of concept ultra-broadband home area network on the scale of one apartment and will evaluate roll-out scenarios based on actual services. The remarkable capabilities of such a network will open up new business opportunities in the entire value chain, from manufacturers to network operators, service and content providers up to the end users. The results of the project should enable and encourage the development of new advanced integrated services to the benefit of Europe's ICT industry and economy.

Better inclusion of all citizens

Currently, home networks provide only benefits to ICT-savvy users, and even their benefits are still limited. The adoption of OMEGA's results will change this, giving all citizens, independently of their technical knowledge, the opportunity to access advanced information and communication services that will enrich their lives at gigabit-speed. This will be particularly relevant for the growing number of elderly people, who will get easy access to services like, for instance, telemedicine and telepresence.

Partners

Orange Labs, France Telecom,
France (Coordinator)

University of Roma, Italy

INSA-IETR, France

IHP Microelectronics, Germany

Infineon Germany

Thyia, Slovenia

Thomson, France

ComNets, RWTH Aachen, Germany

SPiDCOM Technologies, France

Technikon, Austria

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About Omega

OMEGA is an Integrated Project in the ICT area funded by the European Commission under the Seventh Research Framework Programme (FP7). The project is running for three years from January 2008 to December 2010.

OMEGA will develop a user-friendly home area network capable of delivering high-bandwidth services and content at a transmission speed of one gigabit

per second. The interdisciplinary project consortium consists of 20 European partners from industry and academia.

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Gateway