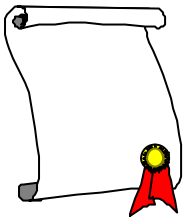
In-Home and SOHO Networking through the Mains Network

Initiative to Empower Next Generation of Powerline-based Networking Systems

March 2003



ANNOUNCEMENT

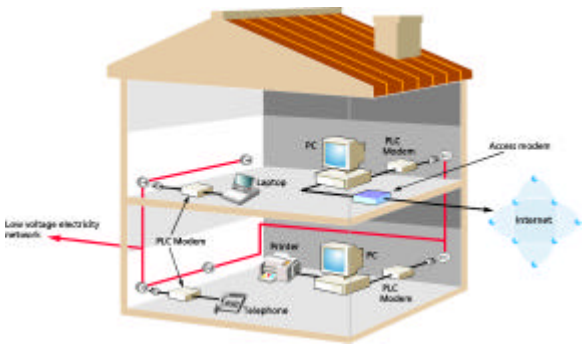
The INSONET Project

INSONET (In-Home and Soho Networking through the Mains Network) was a project partially funded by the European Commission in the frame of IST (Information Society Technologies) programme. Its objective was to design, develop and demonstrate a technology allowing the use of ordinary residential power lines as communication medium for in-house networking purposes.

The project was developed by combining microelectronic design efforts with the required system-level expertise to provide a low-cost high-performances powerline networking solution.

INSONET technology is built around two major components:

- A mixed analog-digital ASIC transceiver providing physical layer functions for high-speed indoor powerline networking applications. To provide a cost-effective solution, the transceiver combines an innovative complex I/Q analog front-end based on high-performances converters with powerful baseband processing functions based on bandwidth-efficient OFDM modulation schemes. The design is implemented with a standard cell approach and 0.35 micron CMOS technology process.
- A software package which runs on an external host processor to provide powerline medium access control functions and to support existing software using TCP/IP through standards USB and Ethernet ports.



The technology was defined to:

- Reach up to 10 Mbps over powerlines with high reliability and high efficiency near to 4 bits/s/Hz, keeping in mind low system-costs.
- Outcome typical impairments associated to indoor powerline communications, such as frequency-selective fading channel response and multipath effects, by using advanced OFDM modulation methods.
- Allow a flexible working bandwidth allocation over the whole usable frequency range (from 10 MHz to 30 MHz) thanks to the analog front-end I/Q architecture design approach which allows frequency translation of the Insonet bandwidth (about 4,2 MHz).
- Bit loading per subcarrier to maximise network throughput and use of mechanisms that dynamically allow to remove sub-carriers of poor quality to provide with the required Quality of Service
- Have the ability to remove any of the data sub-carriers (introduction of frequency notches) in order to avoid potential interferences on existing radio services.
- Maintain good BER figures under heavy powerline network conditions by implementing a powerful concatenated coding system based on interleavers, convolutional codes to clean up the channel and Reed-Solomon codes to provide a significant burst-error-correction capability.

The Insonet technology also delivers software packages to build a complete powerline networking solution. The following elements are also available:

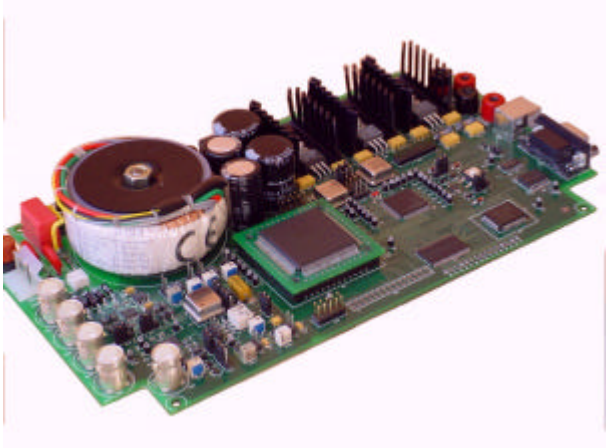
- Medium Access Control (MAC) layer services suited for powerline networking applications by using a carrier sense multiple access with collision avoidance (CSMA/CA) scheme to get the maximum channel efficiency in terms of throughput. It can be adapted by software to other possible MAC schemes.
- Priority scheme to support applications with low-latency requirements.
- Support of broadcast transmissions.
- USB and Ethernet connectivity supporting existing TCP/IP software applications.

The Insonet integrated solution was tapeout on June 2002. Final silicon prototypes had already been qualified and the Insonet-based system is fully operational.

An Insonet-based Demo was built around "Ethernet-to-Powerline" bridges to demonstrate the potential benefits and applications support by using Insonet home networking technology.

Sharing files, sharing a single broadband Internet access between different PCs over broadband indoor PLC channels, streaming of audio and video, all is now possible by using the Insonet broadband PLC technology, a single chip solution combining the Analog Front-End and a powerful OFDM-based processor in the same silicon die.

Insonet solution can be highly cost-effective and well fitted for powerline networking systems, where commercial applications are very price sensitive.



The partners of the INSONET project were:

- Sainco (control and communication systems, project leader)
- Trialog (advanced networking protocols, technology provider)
- ChipIdea (analog-digital IP cores for embedded use in mixed-signal integrated systems, silicon developer)
- AICIA (digital blocks for use in ASIC design, silicon developer)
- Austriamicrosystems (design and production of ASICs, silicon foundry)

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