

Radio technology for ultra-fast data transport

TITLE

SiGi Spot: 60 GHz radio technology for high-capacity wireless in-home communication networks

AIM

New low-cost radio technology using the license-free 60 GHz frequency band

POSSIBLE USE

Wireless connections in consumer electronics

PROJECT MANAGER

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This IOP grant supports five researchers (postdoctoral and PhD students)

INDUSTRIAL PARTNERS

Philips Research (Eindhoven) and Philips Semiconductors (Nijmegen) have contributed to making this project happen.

In close cooperation with Philips Research and TNO Science and Industrie the Eindhoven and Delft universities of technology are working on a new radio technology using the license-free 60 GHz frequency band. There are a multitude of multimedia applications calling for ultra-broadband wireless transmission over short distances with low-cost small-sized radio terminals. The problem is, however, that current wireless LAN products are not suitable for this since their capacity is limited because of bandwidth restrictions in the conventional frequency bands. This explains the interest in exploring possibilities to use higher frequencies. This project addresses the use of the 60 GHz band in which 5 GHz of spectral space has been allocated for license-free use.

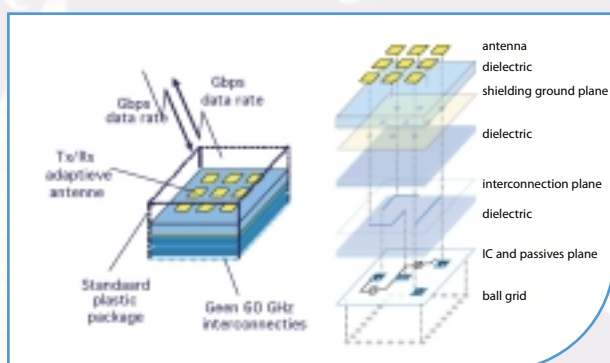
Currently, wireless LAN technology can achieve some 20 Mbit/s payload at the network layer. This is not sufficient to support the sustained data rates needed for the transport of multiple multimedia streams throughout the "Ambient Intelligence" home with sufficient Quality of Service. An obvious solution to this problem is to resort to the license-free 60 GHz band, where bandwidth is abundantly available. By using this resource, a 100 times higher network capacity can be achieved whereas data rates in the order of Gbps become feasible. On top of that, antennas can be made so small that these can be integrated with the radio frequency electronics. This would bring mass production of low-cost small-sized radio units within reach. Applications can be foreseen in the area of consumer electronics such as wireless connections between a DVD player and a plasma screen on the wall with multiple video streams and transmission of uncompressed HDTV signals.

Project description

The goal of the project is to define a new low-cost radio technology that utilizes the license-free 60 GHz band. The research work will focus on the real bottlenecks which frustrate mass application. The project starts with a study towards application scenarios and user and system requirements. The state of antenna and front-end design and the design of the base band algorithms, e.g. for modulation and channel coding, and higher layer protocols will also be reviewed. The industrial partners Philips and TNO will provide accommodation to all researchers at their premises as well as research facilities for prototyping and testbedding. This way the first step to embed knowledge and experience in the Dutch industry is being made.

60 GHz transmitter/receiver module

A potentially low-cost transmitter/receiver module of compact size in the form of a multi-chip module in a low-cost package, which can be quickly installed without knowledge of sophisticated mm wave test and packaging skills, could be a new killer application.



Concept of a 60 GHz multi-chip radio module

A joint optimization of the radio frequency part and base band part is a new approach. This also holds for the design of the link and higher layers which should be tailored to the typical 60 GHz channel properties.

Expected results

The low-cost 60 GHz radio technology is still in its infancy. The technology demonstrated so far is not optimal and still far from commercialization. The expected end result of this project is a laboratory setup which demonstrates ultra-fast data transport on the basis of a 60 GHz radio technology which is potentially suited for low-cost mass production. In addition, this setup will be used to show that radio transmission in the 60 GHz band can be made robust against line-of-sight obstruction. With this setup the industry will get an idea of the opportunities for further commercialization of the technology.

Innovation Oriented research Program (IOP) Generic Communication stimulates research on generic communication in the user environment. An important goal is to transfer the knowledge of universities and research institutes to the business community for them to apply it. The program has four themes: transport technologies; communication and control; security: user ID and service control; and gateways for private users. More information: program coordinator dr. Joke de Jong, telephone +31 70 373 52 98, email j.c.de.jong@senternovem.nl

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