



60 GHz Radio-Communications for Short Range Applications

Scheduled:

Monday 15 September 2008, morning

Presenter:

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Abstract:

This tutorial provides an overview and state of art of radio communication systems and research projects that have been conducted since 1995 on 60 GHz radio communications. Recent evolutions of standardisation issues are also included in the tutorial where the accent is put on MGWS (MultiGigaBits Wireless Systems).

First, millimetre-wave propagation properties are presented considering multipath characteristics and path-loss attenuation of the channel at 60 GHz. Overall models developed within the framework of IST projects and research topics are presented. Dedicated FTR&D measurements and models are also detailed and used as the baseline of PHY/MAC layer assessments.

Secondly, 60 GHz PHY layer systems developed in the ACTS MEDIAN project, IST-Broadway, WigWAM are presented. Recent UWB-OFDM systems developed by France Telecom and used at the starting point of FT&D proposal in standardisation (IEEE802.15.3c) are described and compared to other existing systems proposed in the IEEE802.15.3c Task Group. Standardisation activities are presented considering usage models, targeted data rates, services and PHY/MAC system designs. A synthesis of regulation issues is also processed to lead to in the next section to link budgets.

A comparison between these all systems is carried out, considering link level performance and link budget leading to radio coverage estimation of bit rate. The impact of propagation models on link budget is also discussed highlighting validity range of radio engineering when considering millimetre-wavelength.

Outline:

Three important points are presented.

Propagation issues at 60 GHz. What is the impact of antenna diagram on measurements and what sense to give to a small wavelength to define propagation scenarios?

An overview of different PHY/MAC systems proposed and developed through European research projects are detailed to position recent systems issued from FTR&D studies and standardisation activities resulting from IEEE802.15.3c activities.

Third, performance assessments are carried out considering link level performance issued from literature, IEEE802.15.3c contributions and FTR&D results. Budget link models are developed to define the radio coverage of these systems and show the sensitivity to propagation modelling accuracy on radio coverage assessments. This approach combines multipath propagation impact and narrow band aspects in the estimation.

Biographical Sketch:

Isabelle Siaud received the Electronic Master Dipl from the University Pierre et Marie Curie (UMPC Paris VI) in 1992. From 1993 to 1998, she joined the France Telecom R&D Network Engineering Tool (NET) laboratory in Belfort-France to work on propagation modelling for future mobile radio communications (UMTS) and short range millimetric radio transmissions (WPAN). In 1999, she joined the Broadband Wireless Access laboratory of Rennes to work on PHY layer designs based on multi-carrier techniques. She was implied in the Digitale Radio Mondiale consortium which specified a new ETSI standard for ionospheric broadcasting transmissions. Actually, she contributes to the design of innovative PHY layer systems for WMAN (IEEE802.22) and short range WPANs systems based on Ultra Wideband and multi-carrier techniques. She is involved in the IST-MAGNET and has been a head of the Ultra Wideband – MultiCarrier (UWB-MC) cluster of the IST/FP6 MAGNET project. She designed UWB-OFDM WPAN systems through IST-MAGNET project involvements that have been the baseline of IEEE802.15.3c proposals in favour of OFDM. She also concentrated her efforts on advanced interleaving algorithms for baseband processing under low cost implementation. She is actually implicated in the IST-IPHOBAC project dealing with millimeter-wave RoF system specifications and standardisation issues. She actively participates to the WWRF forum as a vice chair of the working group 5 dealing with 'short range radiocommunications'. She devotes some time to teaching radio communications at the University UMPC Paris VI within the Sdi ESCO Master in France.