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Wireless Quality-of-Service for 60GHz Streaming Media

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Key skills: *computer engineering; electronics; physics; telecommunications, network modelling*

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Background:

Provision of streaming digital media between a computer server and television, for example, is attracting much investment by consumer electronics organisations such as IBM [1] and many others through the WirelessHD consortium [2]. Two candidate wireless technologies are being considered: ultra-wideband (often referred to as ‘WiMedia’) and 60GHz. Both occupy several Giga-Hertz of the RF spectrum that enable data rates in excess of Giga-bits per second. Soon the 60GHz band will be undergoing licensing as an ISM band and has 5GHz of available bandwidth. Much research has already been conducted on propagation and antenna aspects of 60GHz streaming media [3]. With the development of any wireless system a quality-of-service (QoS) architecture is required that manages multiple users, user authentications etc, and is integrated into practical design and requirements. This also extends to 60GHz streaming media and forms the objective of this PhD.

Delay sensitive traffic types such as streaming digital media have strict QoS requirements; QoS has always been a very important research area in communication networks. Time variant nature of the wireless channel can lead to increased multipath fading thereby making it even more difficult to meet QoS requirements due to its error prone nature. Although classical methods such as Intserv or Diffserv seem to satisfy most of the QoS requirements in traditional networks but ultra-wideband technologies such as WiMedia do have their own set of QoS features, like strict delay requirements, admission control, congestion avoidance, and traffic shaping etc. Further it is very important to consider the other vital network requirements such as security etc while developing and deploying the novel QoS architecture because it could easily be breached upon in any and ultra wideband wireless networks.

The primary aim of this PhD is firstly to understand Ultra-wideband technology (WiMedia), its applications, QoS requirements and then feed this knowledge into development of some novel secure QoS policies and architecture for the said technology before deploying them after analysis performed through modelling and simulations.

Programme

The aim of this PhD is to investigate and develop innovative means of providing QoS for streaming media services provided over a 60GHz wireless link. The programme is a rich blend of theory, computer simulation and experimentation and has the following milestones:

- i. report of prior art (6 months)
- ii. analysis of candidate solutions and transfer report (12 months)
- iii. results from performance modelling and 2nd year report (24 months)
- iv. experimentation using a 60GHz wireless development platform (30 months)
- v. thesis submission (36 months)

Impact potential

The researcher is encouraged to publish in leading academic journals. Examples relevant to this programme of study are: IEEE Transactions on Wireless, IEEE Transactions on Vehicular Technology and IET Communications.

The researcher is encouraged to develop exploitable outputs. Examples pertinent to this programme of study are: concept demonstrator for use in attracting further investment and patenting of novel techniques.

References

[1] B Gaucher, B. Floyd, S. Reynolds, U. Pfeiffer, J. Grzyb, A. Joseph, E. Mina, B. Orner, H. Ding, R. Wachnik, K. Walter, "Silicon germanium based millimetre-wave ICs for Gbps wireless communications and radar systems," Semiconductor Science and Technology, vol. 22, no. 1, pp. S236-S243, Jan. 2007

[2] <http://www.wirelesshd.org/>

[3] S. K Yong , C-C Chong, "An overview of multigigabit wireless through millimeter wave technology: potentials and technical challenges", EURASIP Journal on Wireless Communications and Networking, Vol. 2007 , Iss. 1 pp50 - 50

