Interworking Architectures and Protocols of Wireless Local Area Networks (WLANs) and Third Generation (3G) Cellular Networks

The aim of this project is to develop a novel architecture for interworking between Wireless Local Area Networks (WLANs) and third Generation (3G) cellular networks. The significance of this architecture is that the IP Multimedia Subsystem (IMS), proposed by the 3G Partnership Project (3GPP), has been used as an arbitrator for coupling and real-time session management. This model is expected to provide the highest possible level of internetworking where fully seamless continuity of service across heterogeneous networks is considered to be the ultimate accomplishment.
Research Topic: Interworking Architectures and Protocols of Wireless Local Area Networks (WLANs) and Third Generation (3G) Cellular Networks

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Description

Modern (3G) cellular networks are capable of providing high mobility, whereas WLANs are known for having relatively higher bandwidth. Ubiquitous data services and very high data rates across heterogeneous networks may be achieved by using WLANs as a complementary technology for today’s cellular data networks. Hence there is a strong need for efficient interworking mechanisms between WLANs and 3G cellular data networks.

With the aim for addressing this need, a variety of interworking architectures have been proposed in the current literature. However, due to many technical challenges, these approaches provide limited access for interworking. This project proposes an interworking model capable of overcoming many of these challenges, while providing a mobile host the highest possible level of access to 3G cellular services via a WLAN.

The most significant benefit of the proposed architecture (Figure 1) is its capability for negotiating and managing real-time sessions by using the 3GPP’s IP Multimedia Subsystem (IMS) as an arbitrator for interworking. The preliminary evaluation also points out how it may further address a number of unresolved issues in interworking. An effective framework for IP address distribution, possibility of continuation or seamless continuation of service with the help of an innovative mobility management entity (embedded within the IMS), and the use of a SGSN emulator for bypassing high traffic volumes form the core network are also among the potential advantages of this architecture.

Future research directions will be essentially aimed towards incorporating an IP-layer based soft handoff scheme within the IMS based Mobility Manager for ensuring minimal packet loss and handoff delay variation for facilitating seamless vertical handoffs. Furthermore, areas such as optimizing data routing and QoS provisioning in such heterogeneous environments will also be investigated.
Figure 1. Architecture for Interworking between WLAN-3G Cellular Networks.