# Research Issues in Wireless

## Communications and Networking

Farhat Anwar
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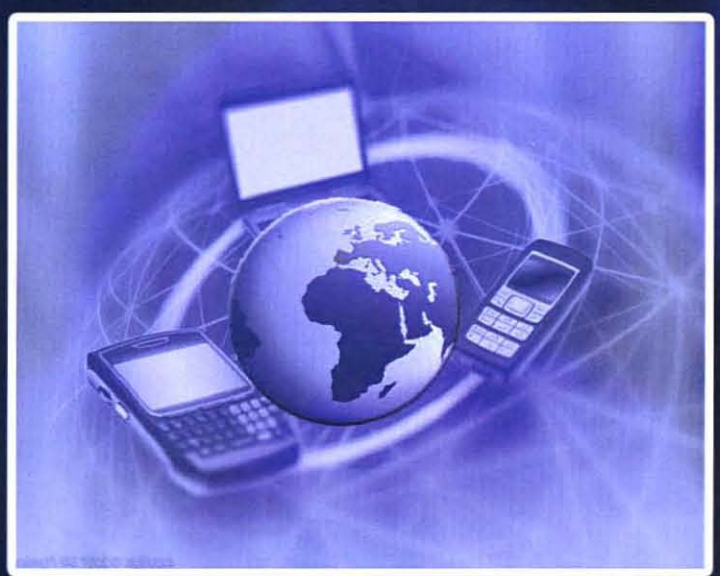

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# CHAPTER 14

# ENHANCED SIGMA PROTOCOL FOR FOR HIGH SPEED MOBILE NODE IN IP BASED COMMUNICATION SYSTEM

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## 14.1 INTRODUCTION

Recent development in wireless technologies inspiring users and vendors to alter their preference from wired Internet connection to wireless Internet connection. This technology-shifting provides better communication services in return, such as, the ability to communicate while the mobile node (MN) is moving from one network to another. However, Internet was initially designed for fixed networks. Consequently, there was no provisioning for IP to support mobility. Mobile IP (MIP) (RFC 2002) [1] is the first standard protocol designed by Internet Engineering Task Force (IETF) to fill-in the aforementioned gap [2]. The development of MIP has enabled users to maintain continuous connection even while on move. Therefore, MIP has been quickly adapted and widely used to endure continuous Internet connection in mobility environments. This ubiquitous access of Internet raises the expectation of the users. Today, users wish for watching online movies, news, playing interactive games, checking emails, or having audio/video conversation while he/she is moving. To provide these services, MIP requires numerous support of real-time and multimedia applications such as Voice over IP (VoIP), video streaming, audio and video conferencing, interactive gaming etc. All of these applications require continuous Internet access and uninterrupted service. Although MIP is suitable for some time insensitive applications, it is no more suitable for real-time and multimedia applications. The use of MIP may results in high handover latency and high packet loss rate due to the IP address resolution and registration process. In additions, though MIP was designed for macro-mobility level (large area), it is only suitable for a relatively slow moving host [3].

This constraint of MIP has led to the intensive research and development of the alternative solutions. Subsequently, several protocols are designed to improve overall mobile computing performance. Among them, the well-known protocols are Mobile IPv6 (MIPv6), Fast Handover Mobile IPv6 (FMIPv6), Hierarchical Mobile IPv6 (HMIPv6), the combination of fast and hierarchical handover which is known as Fast Hierarchical Mobile IPv6 (FHMIPv6), Seamless Mobile IP (S-MIP), Simultaneous Binding. In paper [4], the authors show that all of these enhancement schemes do not completely fulfill the required specification and have some shortcomings. Therefore, Seamless IP based Generalized Mobility Architecture (SIGMA) is designed.

SIGMA is a transport layer protocol which is solely designed to enhance and improve MIP's performance by aiming at minimizing the high latency and packet loss rate during migrations [5]. However, SIGMA has shown excellent performance improvement in minimal speed scenarios where the speed is less than or equal to 20m/s (72km/h). In highly mobile environments, the overall performance of SIGMA reduces drastically [4]. Therefore, SIGMA is also not suitable for real-time applications, multimedia applications and other delay-sensitive applications running on high speed mobility. Consequently, a robust enhancement scheme is need to be developed to provide seamless communication which is applicable to any mobility conditions.