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Improvement of Pre-authentication with Neighbor Graph for Fast Handoff in WLANs

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Abstract

As wireless communication proliferates, the number of users accessing the Internet via a mobile phone or a PDA (Personal Data Assistant) is rapidly increasing. Especially, WLANs (Wireless Local Area Networks) are quickly becoming ubiquitous in our daily life because of supporting high data rate service. However, WLANs have some problems and one of them is that they currently do not support seamless handoff for providing multimedia service.

In this paper, we give an overview of WLAN authentication and handoff latency, introduce IAPP (Inter-Access Point Protocol) using neighbor graph to support fast handoff and improve the handoff procedures with IAPP and pre-authentication mechanism. We suggest a novel WLANs' handoff mechanism regarding to both security and mobility. This paper will make a contribution to provide a robust security and fast handoff for wireless communications.

I. Introduction

The success of the Internet has brought a growing demand for data communication. In addition, as wireless communication proliferates, the number of users accessing the Internet via a mobile phone or a PDA is rapidly increasing. Especially, WLANs [1] are quickly becoming ubiquitous in our daily life because WLANs offer several fundamental benefits including user mobility, rapid installation, flexibility and scalability than cellular.

However, WLANs have more problems such as fast handoff to transfer multimedia data, security to guarantee the privacy, and integration to support ubiquitous network and so on. We are researching about the mobility problem to support fast handoff. Mobility is divided into two methods; macro mobility and micro mobility method. One is macro mobility and MIP (Mobile IP) is a representative protocol to support this. MIP is specified by the IETF (Internet Engineering Task Force) to solve mobility problem between network domains. There are several WG (Working Group) such as MIPSHOP (MIPv6 Signaling and Handoff Optimization) WG [2] for fast handoff and SEAMOBY (Seamless Mobility) WG [3] for context transfer and CARD (Candidate Access Router Discovery).

The other is micro mobility. Currently, IAPP [4] is ratified for STA (Station) to move between APs (Access Point). APs previously exchange STA's context that includes security and QoS parameters so that they decrease the handoff latency during the movement. Supporting voice and multimedia with seamless mobility implies that the total latency (layer 2 and layer 3) of handoffs between APs should be small. Specifically, the overall latency should not exceed 50 *ms* to prevent excessive jitter [5]. But 802.1X [6] authentication in WLANs is taken about 750~1200 *ms* [7]. It takes the longest time during network connections compared to the procedures such as probe, association, authentication and so on.

In this paper, we improve the handoff procedure with IAPP and pre-authentication mechanism to reduce the authentication delay occurring during a horizontal handoff. In section 2, we give an overview of WLAN authentication and handoff latency during network connections. And then, we introduce IAPP using neighbor graph to support fast handoff in section 3. We suggest the concept of pre-authentication using neighbor graph in section 4. Finally, we conclude the result in the fifth section.

II. Overview of IEEE 802.11i Authentication

The IEEE 802.11i [8] Working Group reinforces WLAN authentication with new schemes such as IEEE 802.1X and EAP (Extensible Authentication Protocol) [9]. However, authentication increases handoff latency when a mobile moves between networks. To support fast handoff, pre-authentication that is conducted by 802.1X and EAP is needed.

2.1 IEEE 802.1X and EAP authentication

EAP and 802.1X solution protocol stack is illustrated in Figure 1.

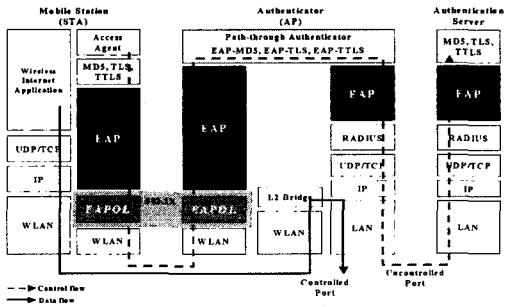

Figure 1. EAP and 802.1X solution protocol stack.