Comparative Analysis of Binding Update Alternatives for Mobile IP Version 6

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Abstract - As Internet growth and technology have advanced, there has been growing interest in providing robustness, high-performance, and Internet connectivity to portable devices. However, the current deployment of the Internet Protocol (IPv4) was not designed for this purpose. Hence, in IPv6, Mobile IPv6 was built from the ground up for mobility. However, there is still some room for improvement of the existing Route Optimization scheme in MIPv6. Hence, a lot of research work has been carried out to resolve this gap. In this paper, we propose and analyze two possible approaches for enhancing Route Optimization.

Keywords: Mobile IPv6, Mobile Node, Correspondent Node, Binding Update, Diffie-Hellman, Route Optimization.

1 Introduction

IPv6 was suggested due to shortcomings of IPv4 during the mid-90s. However, the introduction of Network Address Translation (NAT) has helped to overcome the shortage of IPv4 addresses. Hence, although IPv6 has been documented and standardized for quite some time, it is not being widely deployed. However, all this will be changed when we tighten up mobility and IPv6 to cater for 21st century needs. Mobile IPv6 is especially for the needs of computing devices in the move (mobile computing), like Personal Digital Assistant (PDA), Mobile Phone, hotspot, Wireless LAN etc. Mobility is the ability for devices to change locations, while connected to the network, continuously accessing information services, anytime, anywhere.

Mobile IPv6 has these features [6]:
- Access application anywhere
- Maintain connection during movement
- More than portability
- Without geographical limitations
- Network technology independent
- Must able to communicate with other nodes that don’t implement mobility
- Without modification in the standard routing procedures or address formats
- Secure

Motivation of Mobile IPv6

The motivation behind the development of the Mobile IP standard comes from needs for mobile devices, which could connect and move seamlessly across a growing number of connectivity options. Mobile IPv6 (an enhancement of Mobile IP) is will handle mobility between subnets across homogeneous and inhomogeneous media.

The protocol allows a mobile node to communicate with other hosts (correspondent node) after changing its point of attachment from one subnet to another. The huge address space of IPv6 (available addresses in IPv6 is 2128 ≈ 3.4 x 1038 compared with IPv4 is 232 = 4 billion) will meet the requirements for rapid development of Internet easily. Security and QoS are also integrated in Mobile IPv6.

Challenges of Mobile IPv6

With the promising outcome from Mobile IPv6, it deserves to have a bright future. However, final standardization is still in progress, and at the same time, there are certain issues that make roaming with mobility devices a little bit unfriendly.

In this paper we will further investigate in one of the most crucial challenge. In the current MIPv6 standard, it takes quite a lengthy process to initiate the actual data/voice traffic exchange. This was largely due to certain security mechanism and checking was needed before any communication was allowed to establish. On top of that, standard way of getting route optimization uses return routability and unfortunately, return routability procedure is not immune from security attacks. The above challenge will be clearly examined in later sections. Our proposed architecture solution will intend to iron out this gap for ease of Mobility IPv6 deployment.

2. Overview of Mobile IPv6

When the mobile is on its home network, it uses the traditional routing functions to exchange IP datagram with its correspondents. Therefore, as long as the mobile