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Topology-based Distributed Mobility Anchoring in PMIPv6
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Abstract

This document presents a topology-based distributed mobility management (DMM) mechansim in PMIPv6-based network. In this mechanism, a different sub-network prefix is assigned to a different access router (AR) in PMIPv6-domain. The sub-network prefix and corresponding AR address information is stored in the topology server. With this mechanism, there is no need to query mobile node (MN)'s localized mobility anchor (LMA) address information whenever MN moves from one network to another.

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1. Introduction

Centralized mobility management protocols such as MIPv6 [1] and PMIPv6 [2] have several problems such as single-node failure, congestion possibility, scalability and non-optimal routes [3]. One method to resolve such problems is to use the distributed mobility management (DMM) mechanism to distribute mobile agent function to access routers (ARs) [4]. Especially, in PMIPv6-based DMM, when a mobile node (MN) moves from one network to another, a new AR should know (1) whether the MN firstly enters the PMIPv6 domain and (2) the address information of the LMA for the MN when the AR knows that the MN moves from another network.

This document presents a topology-based distributed mobility management mechanism in PMIMv6 domain. Here, topology server is defined to store the topology information containing sub-network prefix assigned to different ARs and corresponding AR address information. With this mechanism, overhead can be decreased due to control message exchange to know the local mobility anchor (LMA) for a mobile node (MN) when the MN frequently moves from one network to another especially in micro-cell based mobile network environment.

2. Conventions and Terminology

2.1. Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL","SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [5].

2.2 Terminology

TBD.

3. Protocol Operation

Figure 1 show the message exchange procedure to provide topology-based DMM in PMIPv6-based network presented in this document. A network prefix "PREF" is allocated to the PMIPv6 domain. However, a different sub-network prefix belonging toe the same network prefix "PREF" is allocated to a different AR in PMIPv6 domain. For example, a sub-network prefix "PREF1" belonging to "PREF" is allocated to AR1 and a different sub-network prefix "PREF2" belonging to the same "PREF" is allocated to AR2. Even though a different sub-network prefix is allocated to a different AR, all ARs advertise the same network prefix "PREF" throught the interfaces providing PMIPv6 service.

The sub-network prefix and corresponding AR address mapping information is stored in the topology server.

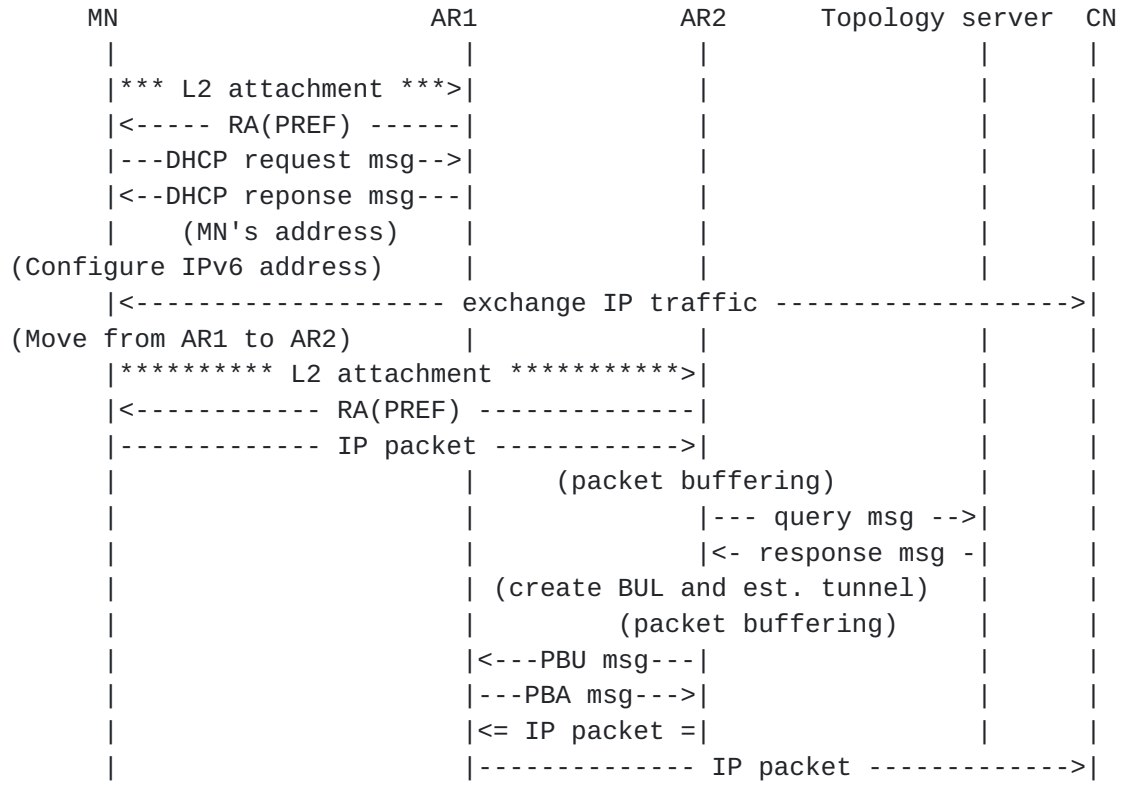

Figure 1: Message exchange scenario

When an MN firstly enters the PMIPv6 domain and connects to an AR (say, AR1), AR1 transmits to the MN a Router Advertisement (RA) message by setting "M (Managed address configuration)" flag in order to configure an address to the MN by using the stateful address configuration method [6]. The network prefix "PREF" is set to the prefix option information field in the RA message. The MN having received the RA message transmits the dynamic host configuration protocol (DHCP) request message to the AR1 [7]. The AR1 considers that the MN firstly connects to the PMIPv6 domain and transmits the DHCP response message containing an address belonging to the "PREF1" to th eMN. The MN sets the address contained in the DHCP response message to its interface. After that, the MN can communicate to a correspondent node (CN) within the Internet.

When the MN moves from AR1 to AR2 while communicating with a CN, the AR1 begins to perform the LMA function for the MN and stores packets sent from the CN into the buffer. The AR1 stores the MN's infomation into ist Binding Cache Entry (BCE). When the MN connects to AR2, the AR2 transmits the RA message containing network prefix set to "PREF" to the MN. The MN having received the RA message considers that it connects to the same network. It continues to use the address configured previously and transmits IP address as usual. AR2 checks the first packet transmitted by the MN. If the first packet contains the DHCP request packet, AR2 considers that the MN firstly connects to the PMIPv6 domain. Otherwise, AR2 considers that the MN moves from another AR area and performs the MAG (Mobility Access Gateway) function for the MN. AR2 checks its topology table in order to know the LMA address for the MN. Sub-network prefix (that is, sub-network address and subnet mask) and corresponding LMA address information is stored in the topology table. If AR2 finds a cache table entry according to the MN, then AR2 establishes the tunnel with the AR1 (that is, the LMA for the MN) by exchanging the PBU/PBA message defined in PMIPv6 protocol. Otherwise, AR2 transmits the topology-query message including the MN address information to the topology server in order to know the LMA address for the MN. Topology server transmits the topology-response message including sub-network prefix and corresponding AR address information to the AR2. Then AR2 stores the sub-network prefix and AR address information in the topology server and establishes the tunnel with the AR1 by exchanging the PBU/PBA messages.

4. Security Considerations

TBD

5. IANA Considerations

TBD

6. References

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