Network Working Group
Internet-Draft
Expires: September 7, 2009

Seil Jeon
Univ. of Soongsil, Korea
Younghan Kim
Univ. of Soongsil, Korea

March 7, 2009

Mobile Multicasting Support in Proxy Mobile IPv6
draft-sijeon-netlmm-mms-pmip6-01.txt

Status of this Memo

This Internet-Draft is submitted to IETF in full conformance with the provisions of BCP 78 and BCP 79.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

The list of current Internet-Drafts can be accessed at http://www.ietf.org/ietf/1id-abstracts.txt.

The list of Internet-Draft Shadow Directories can be accessed at http://www.ietf.org/shadow.html.

This Internet-Draft will expire on September 7, 2009.

Abstract

To support IP-based group mobile communication, such as mobile IPTV, IP multicasting is required. Two major constraints in mobile multicasting are the tunnel convergence problem and high handover latency. To reduce the constraints, several mobile multicasting schemes based on Mobile IP have been proposed. To meet requirements, we present a multicasting architecture and fast handover scheme for Proxy Mobile IPv6 (PMIPv6).

Table of Contents

1. Introduction

High performance of wireless technologies enable multimedia streaming service such as IPTV audio/video stream. Since these services are based on group communication, IP multicasting is also required. Traditional IP multicast mechanisms, including multicast routing and membership management protocols, have been designed for static hosts [2]. Moreover, up to now, IP mobility protocols for mobile multicasting depended on host-based Mobile IP variants (Mobile IP and Fast Mobile IPv6). However, Mobile IP variant protocols require modifications to a applied solution on mobile devices and IP reconfiguration during handoff. The Proxy Mobile IPv6 (PMIPv6) in [3] does not require any mobility related protocol and IP reconfiguration in the same PMIPv6 domain. With the strength of PMIPv6, several service solutions are described in [4]. However, the solution needs to solve two major constraints which are the tunnel convergence problem and high handover latency [5]. Thus, we present a multicasting architecture and fast handover operation considering the requirements for PMIPv6.

2. Terminology and Functional Components

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 [1].

- Mobile Node (MN)
- Previous Mobile Access Gateway (P-MAG) - The MAG that manages mobility relaged signaling for a MN before handover. In this document, a MAG and Access Router (AR) are collocated
- New Mobile Access Gateway (N-MAG) - The MAG that manages mobility related signaling for the MN after handover
- Multicast Router (MR)
- MLD Forwarding Proxy (MF-Proxy)
- PMIPv6 Multicast Context Transfer (MCT) - It is transmitted by the P-MAG forecasting MN's destination to the N-MAG. This message includes a MN ID, a MN home network prefix and a P-MAG IP address,

and multicast group address of the MN executing handoff.

3. PMIPv6 Multicasting Architecture

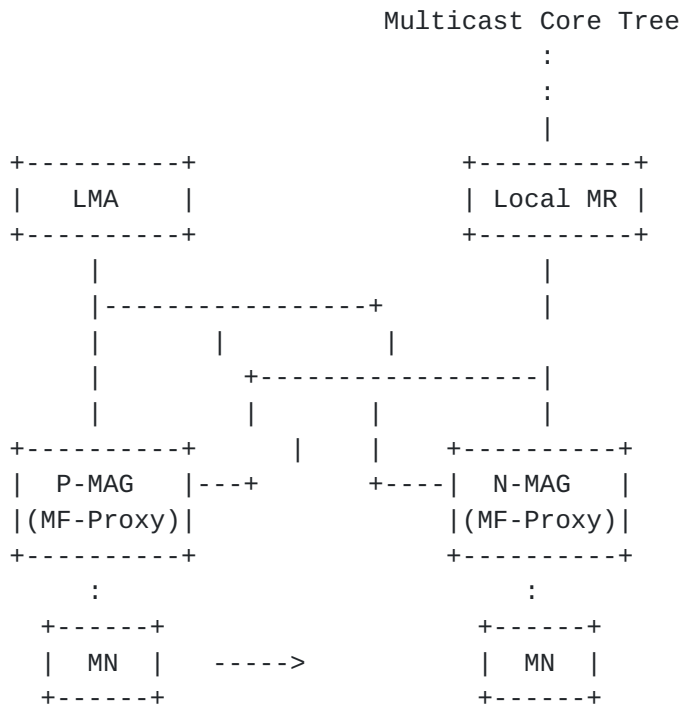

Figure 1: Multicasting architecture in PMIPv6 domain

To design PMIPv6-based multicasting services, we should consider the position of the multicast router (MR). If a LMA contains the MR function, it introduces a tunnel convergence problem similar to Mobile IP variant bi-directional tunnel schemes. To solve the problem, we separate the MR function from the LMA. Moreover, if a MAG has a MR function and a local MR is connected with MAGs, the routing update overhead degrades the performance of PMIPv6 components due to frequent MNs' movement. Thus, Figure 1 shows the proposed PMIPv6 multicasting architecture where the MAG only contains a MLD forwarding proxy function using the IGMP/MLD forwarding proxy [6]

proposed by the IETF. This model can solve the tunnel convergence problem and reduce the routing processing overhead.

4. Handover Operation

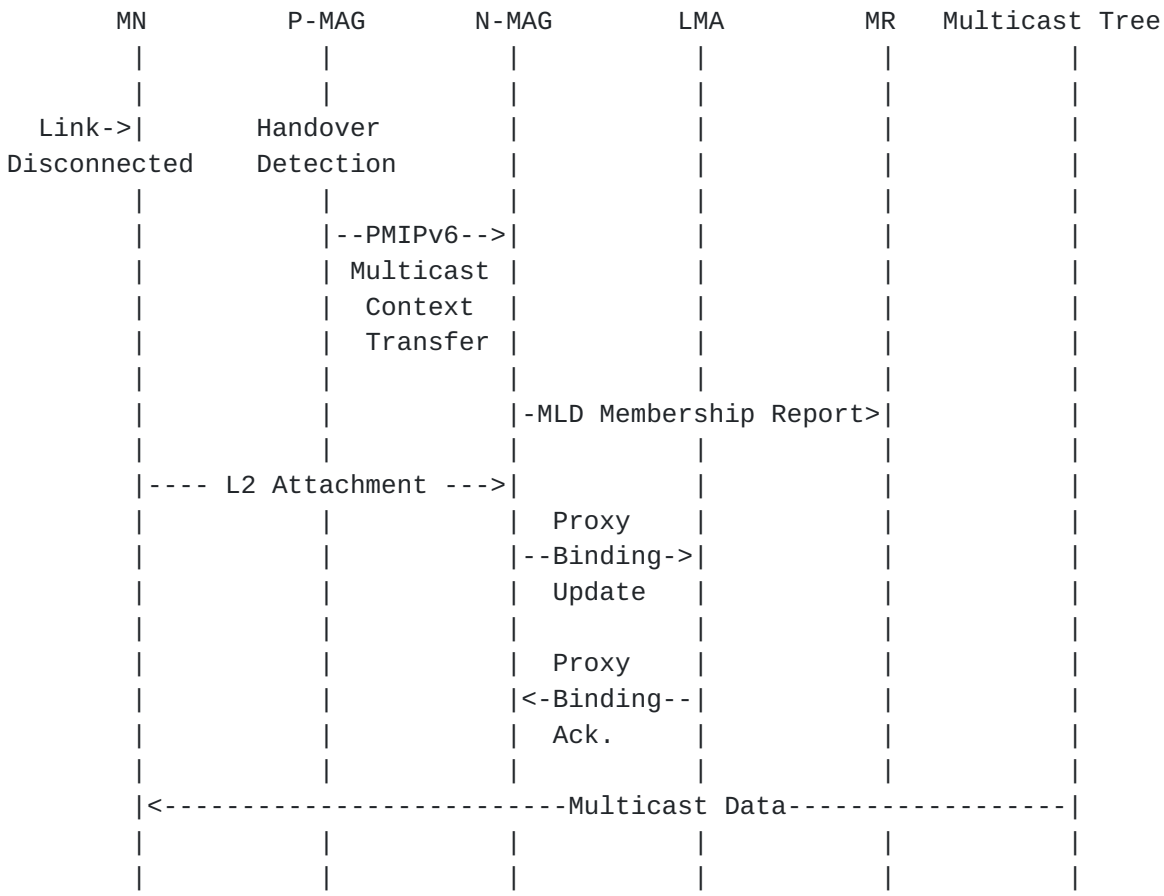

Figure 2: Fast multicast handover procedure using PMIPv6

Directly applying a PMIPv6 handover scheme to the proposed network model leads to service disruption due to the latency cased by MLD query/report. To solve this problem, we propose a fast handover scheme using the context transfer mechanism. Figure 2 shows handover operation. When a MN hands off, the MAG with MLD forwarding proxy predicts an MN's movement direction and transfers the multicast context message, which includes the MN ID, the MN home network

prefix, the current MAG address, and the multicast group address. Then, the N-MAG checks whether it is a receiving node of multicast data corresponding to the group requested by the P-MAG. If this is not the case, it joins the group by sending a MLD report.

5. Message Formats

TBD

6. IANA Considerations

TBD

7. Security Considerations

This document does not discuss any special security concerns in detail. The protocol of this document is built on the assumption that all participating nodes are trusted each other as well as there is no adversary who modifies/injects false messages to corrupt the procedures.

8. Acknowledgment

This work was supported by the IT R&D program of MKE/IITA. [Research on Ubiquitous Mobility Management Methods for Higher Service Availability]

8. References

8.1. Normative References

[1] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[2] R. Vida, and L. Costa, "Multicast Listener Discovery Version(MLDv2) for IPv6," IETF RFC 3810, June 2004.

[3] S. Gundavelli, K. Leung, V. Devarapalli, K. Chowdhury, and B. Patil, "Proxy Mobile IPv6", IETF RFC 5213, Augurst 2008.

[4] Y. K. Zhao, P. Seite, "The Solution for PMIPv6 Multicast Service," draft-zhao-multimob-pmip6-solution-02.txt, November 2008.

[5] I. Romdhani, M. Kellil, and H. Lach, "IP Mobile Multicast : Challenges and Solutions," IEEE Communications Surveys & Tutorials, vol. 6, no. 1, pp. 18-41, 2004.

[6] B. Fenner, H. He, B. Haberman, and H. Sandick, "Internet Group Management Protocol (IGMP) / Multicast Listener Discovery (MLD)-Based Multicast Forwarding ("IGMP/MLD Proxying")", IETF RFC 4605, August 2006.

Author's Addresses

Seil Jeon
University of Soongsil in Seoul
11F Hyungnam Engineering Bldg. 317, Sangdo-Dong,
Dongjak-Gu, Seoul 156-743 Korea
Phone: +82 2 814 0151
E-mail: sijeon@dcn.ssu.ac.kr

Younghan Kim
University of Soongsil in Seoul
11F Hyungnam Engineering Bldg. 317, Sangdo-Dong,
Dongjak-Gu, Seoul 156-743 Korea
Phone: +82 2 820 0904
E-mail: yhkim@dcn.ssu.ac.kr