Problem Statement and Requirement: Mobile Multicast
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Abstract

This document discusses the problem and requirement of multicast solution in the mobile networks. One current issue in mobile multicast solution has been raised and requirements of mobile IPTV on multicast mobility will also be summarized especially for some mechanisms such as the tunneling, service capability and security discussion which is basis of supporting the mobile IPTV applications.

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1. Introduction

While more and more operators begin to provide the wireless broadband network systems, the needs for multicast and broadcast service in mobile network become promising. Recently IPTV might become one of the desirable applications for mobile network. Mobile IPTV service is a kind of A/V services which are combined with interactive data for the related or supplementary information of A/V program using bi-directional wireless broadband links. User can enjoy the downlink A/V stream and access more detailed or value-added information via uplink simultaneously.

In the mobile network, Mobile IPv4 (MIPv4)[RFC3344], Mobile IPv6[RFC3775], DSMIPv6 [DSMIPv6] and PMIPv6[Gundavelli08] is the basic way to support IP mobility management. It allows the mobile nodes(MN) to maintain the reachability while moving in the IP network. After registration to home agent(HA), the packets destined to MN could be routed correctly by using the tunneling mechanism, while MN is away from the home network.

But the current IP mobility management mechanism lack of full support of multicast service. This document will illustrate the main issue of them. Since DSMIPv6 is principally similar to MIPv6, so it will not be illustrated independently in this document.
2. IP mobility management multicast support in mobile network

2.1. Mobile IPTV multicast framework

ITU make detailed description on IPTV architecture and multicast frameworks. Mobile IPTV content delivery infrastructure may consists of four different layers, i.e. Content Source, Core, Metro(Edge), and Access. Content source is where IPTV service contents are originated and they can be placed in either inside or outside of delivery infrastructure. Core is service/network provider's backbone infrastructure. Metro, in other words Aggregation or Edge, is where it connects and aggregates between core and access. Access is user domain that includes last mile.

The transport profile of Mobile IPTV are shown in the picture below:

```
| Wired or Wireless |
|                  |
| +-----------------+
| Mobile IPTV      |
| +-------------+    | Access |------| Edge |------| Core |
| Terminal        |
+-----------------+      V                      |
| Content Source  |
+-----------------+                  |
|                  |
+-----------------+\                  |
| content source  |
|                  |
```

In the case of IPTV support in mobile network, such architecture will be considered and mapped to the network entity of IP mobility management.

2.2. Mobile IPv4 support Multicast

Section 4.3 and 4.4 of [RFC3344] discuss the support of multicast and broadcast. In order to receive multicast packet through it’s home network, a mobile node MUST join the multicast group in one of two ways. One is based on co-located care-of address, the other is based on the home address (foreign agent care-of address). In both cases, a mobile node tunnels IGMP messages to its home agent, the home agent...
forwards multicast datagrams down the tunnel to the mobile node.

```
Access network              IP multicast packets
(Wired or Wireless)         |
+-----+ V +-----+ +-----+ |
| MN1 | ======| FA | HA |
| +-----+ ======| HA | V |
| MN2 | +-----+ |
| +-----+ +-----+ +-----+ |
```

Figure 1: Nested tunneling in MIP4 for Multicast

In the case of co-located care-of address, the home agent SHOULD tunnel the datagram to this care-of address directly; In the case of foreign agent care-of address, the home agent MUST first encapsulate the datagram in a unicast datagram addressed to the mobile node’s home address and then MUST tunnel the resulting datagram (nested tunneling) to the mobile node’s care-of address. If there are more than 500 MNs under the same FA, there will be 500 tunnels between HA and FA to transmit multicast packets.

2.3. Mobile IPv6 support Multicast

In this document, the analysis on multicast of mobile IPv6 will be made only based on mobile IPTV. The Home Agent (HA) may be part of the core function in the mobile IPTV framework. The edge function normally could be considered as the access gateway (AGW) in the deployment of mobile IPv6 in mobile network.

```
Access network              IP multicast packets
(Wired or Wireless)         |
+-----+ V +-----+ +-----+ |
| MN   | ======| AR | HA |
| +-----+ ======| HA | V |
| MN   | +-----+ |
| +-----+ +-----+ +-----+ |
```

Figure 2: Nested tunneling in MIP6 for Multicast

Notification: it’s recommended to have some notification mechanism in...
mobile IPv6. It’s useful to do synchronous actions for incoming mobile IPTV service events.

By the way, it is recommended that DSMIP6 has similar situation, and Proxy mobile IPv6 will be described in a separate document.
3. Security Considerations

Multicast security is one of the most crucial issues in mobile IPTV service such that it is required to provide security capabilities to protect mobile IPTV multicast network from any malicious attempts caused by multicast security holes such as denial of service attacks.

After the integration IP mobility management like MIP4, MIP6 with the multicast service, it should not deprecate the security protection of the basic IP mobility management mechanism.
4. IANA Considerations

This document makes no requests to IANA.
5. Normative References


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