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Integrating PMIP into LISP Network
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Abstract

PMIP and LISP are both network-based. Integration of PMIP with a hierarchical design into the LISP network provides network-based fast-mobility support to enable a mobile node to perform handover in both LISP and non-LISP networks, and non-optimal PMIP routes in the LISP network are avoided.

Status of this Memo

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This Internet-Draft will expire on April 22, 2011.

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1. Introduction

The Locator/ID Separation Protocol (LISP) [I-D.ietf-lisp] belongs to the family of protocols to distinguish between routing locators (RLOCs) and endpoint identifiers (EIDs) and maintains a mapping between them. It takes a network-based approach by using RLOC for routing in the transit core networks and EID within a network. Therefore a site may, among other things, use its EID as a stable identifier even upon change of its RLOC.

In comparison, Mobile IP (MIP) [RFC3775], also distinguishes between a care-of-address (CoA) and a home address (HoA) of a mobile node (MN) and maintains a mapping between them at the home agent in the home network. The CoA is used for routing and may change as the mobile node changes its attachement. The mobile node may then use the stable home address as a session identifier so that the IP session is not broken upon change of routing address. The network-based variant of MIP is proxy mobile IP (PMIP) [RFC5213], which replaces the CoA of the MN with the routing address is the proxy-CoA of a mobile access gateway (MAG) which performs the mobility signaling on behalf of the MN.

Because both LISP and PMIP are network based and because PMIPv6 is designed to support mobility in non-LISP network, integrating PMIPv6 into the LISP network will provide network-based mobility in both LISP and non-LISP networks.

2. Conventions used in this document

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 [RFC2119].

3. PMIP in a non-LISP network and comparison with LISP

PMIP for an MN in a non-LISP network is illustrated by comparing it, which is shown in Figure 1(b), with LISP, which is shown in Figure 1(a).

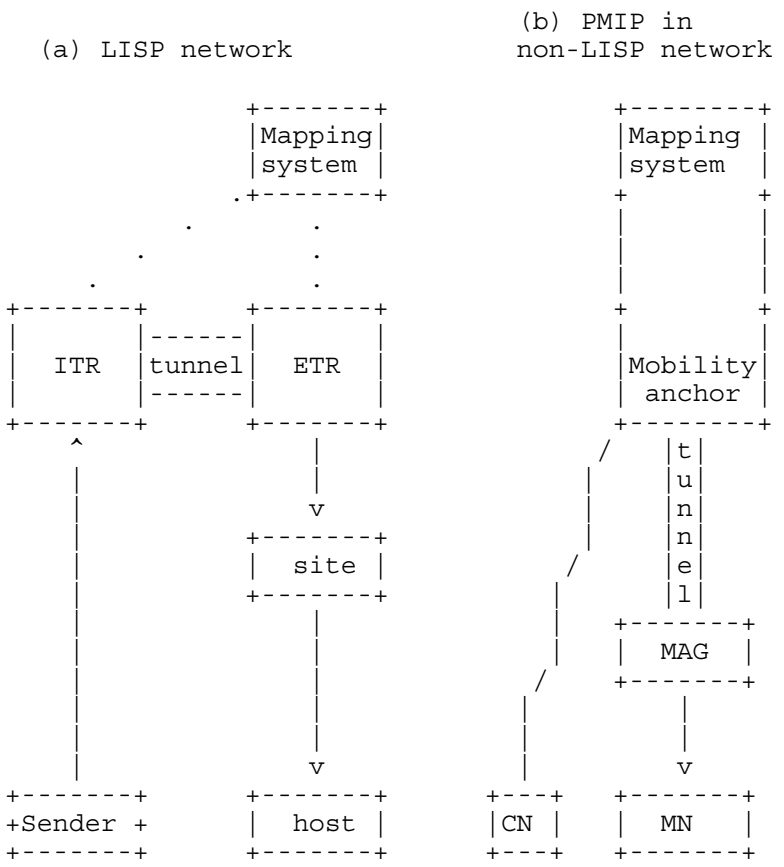

Figure 1. (a) LISP network, (b) PMIP in non-LISP network.

Both LISP and PMIP use map and encapsulation. Yet there are also differences between them.

In LISP, the mapping is between the site prefix, which is the EID, and the RLOC of the ETR serving the site. In PMIP, the mapping is between the home address (HoA) of MN and the proxy CoA of the MAG serving the MN.

In LISP, the ITR queries the map server through a map resolver. The ITR then tunnels the packet to the ETR, which will deliver the packet to the site. In PMIP, the mapping information is located at the mobility anchor so that the mobility anchor will tunnel the packet to the MAG, which will then deliver the packet to the MN.

In LISP, the source of information on how to deliver packet to the

site is kept at the ETR, and the ETRs in different networks provide these information to the mapping system. The ITR queries the mapping system only when needed. In PMIP, the source of information on where the MN is located is at the MAG, and the different MAGs provide these information to the mapping information system that is located in the mobility anchor.

In LISP, routing is via the ETR that serves the site so that the route is already optimized. Yet in PMIP, the mobility anchor can be far from both the CN and the MN so that the route via the mobility anchor can be far from being optimal.

4. PMIP in a LISP network

The MN can be in either a non-LISP network or a LISP network. The senario with the MN in a non-LISP network is already shown in Figure 1(b). We therefore only need to consider the senario in which the MN is in a LISP network.

The integration of PMIP into the LISP network is illustrated in Figure 2. A hierarchy is introduced into the PMIP using the concept of hierarchical MIP (HMIP) [RFC5380].

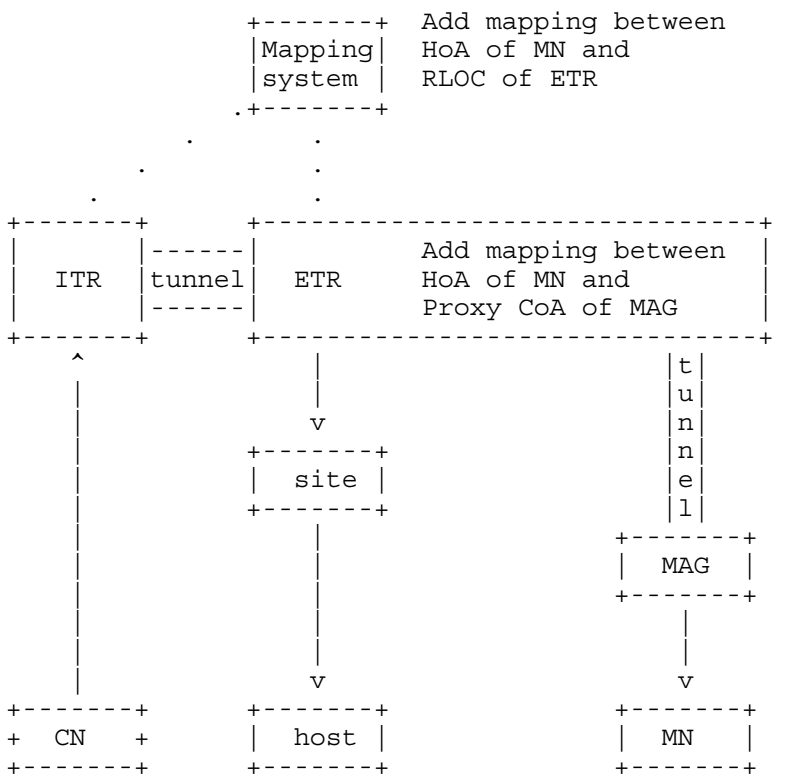

Figure 2 Integrating a hierarchy of PMIP into LISP network.

In the LISP network, two levels of hierarchy are involved. The LISP mapping system and the LMA both keep the mapping between the HoA of the MN and the RLOC of the new ETR; the ETR keeps the mapping between the HoA of the MN and the proxy CoA of the MAG. In terms of the role of maintaining the mapping information, the ETR behaves like a LMA to the MAG, whereas the LISP mapping system behaves like a LMA to the ETR.

It is certainly possible to run PMIP without this hierarchy. Yet utilizing this hierarchy in the LISP network enables route optimization. In addition, it also significantly reduces the amount of mapping updates in the LMA because the majority of handovers are expected to be between two MAG's under the same ETR.

4.1. MN being stationary at its home link

When an MN first attaches to a network, it may obtain an IP address (HoA) from that network, which is its home network. As long as MN

does not move away from this home link, routing to reach this MN does not need tunneling in this network. This situation is the same for both the LISP network and the non-LISP network.

The LISP mapping system is therefore not affected.

A related senarios is as follows: The MN may first attach to a site in a LISP network and obtain a globally unique IP address (HoA) from the site. The site may be using a provider independent network prefix so that it is supported by LISP to change provider or to multi-home to different provider networks. The MN may move within the site, and the reachability of the MN within this site may be managed by the site itself. Then LISP is again not affected.

4.2. MN handover within its home network

When an MN performs handover within its home network, it may continue to use its HoA using PMIP. If this home network is a LISP network served by an ETR, the ETR acts at the mobility anchor as illustrated in Figure 3. An equivalent way to look at it is that the LMA funciton co-locates with the ETR. To the MAG, the ETR behaves like the local mobility anchor (LMA) defined in PMIP. The tunneling is between the ETR and the new MAG using the proxy CoA of the MAG.

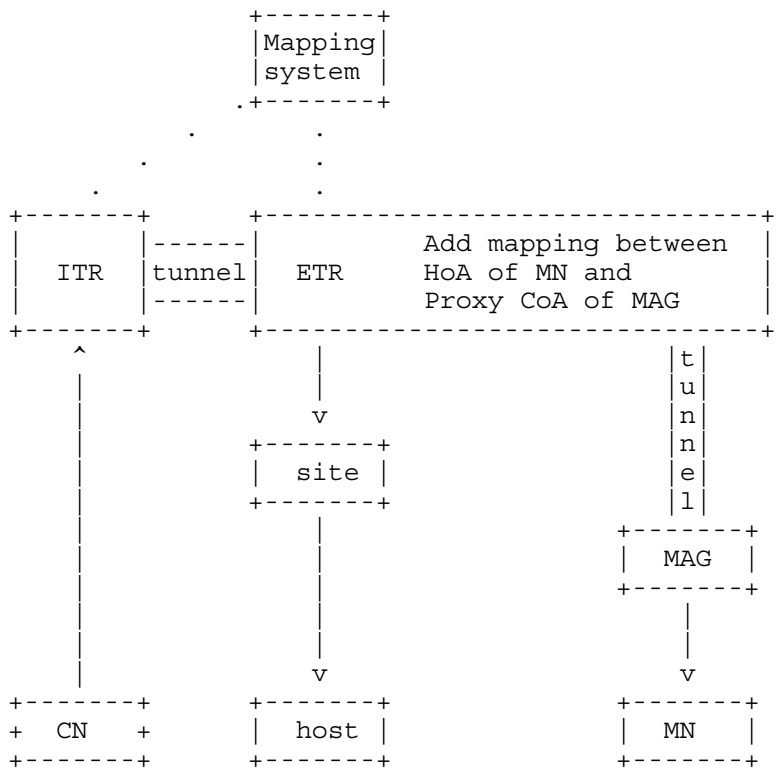

Figure 3 MN running PMIP in LISP home network.

As long as the MN is within its home network, the LISP mapping system is unaffected. That is, the senario in Figure 3 is a simplified version of Figure 2 with which the LISP mapping system does not need an additional entry for the MN.

The above senario includes the case in which the MN originally attaches to a site supported by LISP and then leaves the site but is under the same ETR as the site.

4.3. MN handover to a visited LISP network

An MN that has moved to a new LISP network could simply use a new IP from the new network so that the new network has now become its new home network. Yet the MN may need to use its HoA which it has acquired from the previous network. The LISP mapping system needs to keep an updated mapping between the HoA of the MN and the RLOC of the ETR of the visited network. The ETR also needs to keep an updated mapping between the HoA of the MN and the proxy CoA of the new MAG.

The new MAG needs to perform proxy binding update with the new ETR on behalf of the MN, whereas the new ETR needs to perform both a mapping update with the LISP mapping system and a proxy binding update with the LMA of the MN. The update to the LISP mapping system ensures that packets destined to the MN are forwarded to the ETR of the visited network, whereas the update with the LMA ensures that packets originating from non-LIST network will also be forwarded to this ETR.

4.4. MN handover within a visited LISP network

After a handover to a visited LISP network, the MN may peform additional handovers within that visited network. When the MN performs such handover from one MAG to another MAG under the same ETR in the visited LISP network, only the mapping system at the ETR needs to update the binding between the HoA of the MN and the proxy CoA of the new MAG. The new MAG performs proxy binding update with the ETR on behalf of the MN. This senario is a simplified version of Figure 2 in which the LISP mapping system does not need further update.

5. Security Considerations

TBD

6. IANA Considerations

None

7. References

7.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

7.2. Informative References

[I-D.ietf-lisp]
Farinacci, D., Fuller, V., Meyer, D., and D. Lewis, "Locator/ID Separation Protocol (LISP)", draft-ietf-lisp-09 (work in progress), October 2010.

[RFC3775] Johnson, D., Perkins, C., and J. Arkko, "Mobility Support in IPv6", RFC 3775, June 2004.

[RFC5213] Gundavelli, S., Leung, K., Devarapalli, V., Chowdhury, K.,

and B. Patil, "Proxy Mobile IPv6", RFC 5213, August 2008.

[RFC5380] Soliman, H., Castelluccia, C., ElMalki, K., and L. Bellier, "Hierarchical Mobile IPv6 (HMIPv6) Mobility Management", RFC 5380, October 2008.

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