

The NetLMM Design Team Document



An update

Changes since Montreal

- ❖ Addressed all issues raised in Montreal, including:
 - ❖ Reduced number of messages
 - ❖ Optimised message sequences
 - ❖ Reorganised for readability
 - ❖ Many other issue fixes:

Changes since Montreal

2006-10-04 23:19

- * Changed the security considerations with new text from Mohan.

Applied changes based on Kent's review dated Sep. 27:

- * Added text to the third paragraph of Section 4 regarding the relationship between MN and MAGs.
- * Various fixes to Section 4.1 and 4.2.
- * Added description for some more error cases in Section 7.x, and added a new LMA error code, "Not Associated".

Revisions based on interim WG meeting 26 Sep 2006:

- * Added changes supplied by Nishida-san to clarify Forwarding Update usage.
- * Added changes supplied by Nishida-san for other clarifications and corrections.
- * Added text to Section 4.1 to clarify the relationship (or lack of such!) between LMA and AAA infrastructure.
- * Added text on rate limitation of messages, Section 4.3.4. (Should this be a separate section?)

Changes since Montreal

- * Added Section 4.4 on identity - locator split. Should this be section 4.1 instead?
- * Added Section 7.2.9, about LMA garbage collection.
- * Added clarification of the nature of the MN ID to Section 4.
- * Added Section 4.5 about handling of link-local addresses.
- * Removed the appendix with earlier issues, from Montreal.

2006-10-03 19:40

Revisions based on interim WG meeting 26 Sep 2006:

Changes based on Jari's review.

- * Included new Security Consideration (Section 10) text from Mohan.
- * Split the ID Option into two, to distinguish between IDs and Handles.
- * Changed MAG and LMA ID to MAG and LMA handle (nomenclature change).
- * Split the Prefix Option into Prefix Allocation and Prefix Delegation Options.

Changes since Montreal

- * Added text to Section 5.2 describing updating of forwarding state at the LMA.
- * Added Section 4.3.2 regarding message re-ordering.
- * Made the use of timestamps mandatory for the Location Registration message.
- * Added text on the use of timestamps to Section 6.9. (Should probably be added to the LMA processing description in 7.2, too).
- * Removed most of the text from the Link Local Multicast section (Section 8.2.1) as not relevant with the per-MN prefix assumption.
- * Added clarification about sequence numbers being per handle, not per address.
- * Fixes to Jari's smaller technical issues. Includes removal of Section 8.1.3, "Future Extensions".
- * Fixes to Jari's editorial issues.

Other Changes:

- * Updated the text on handling of the Disassociation message to also cover the routing cache in Section 7.2.4

Changes since Montreal

2006-10-02 14:50

Revisions based on interim WG meeting 26 Sep 2006:

Changes based on Jari's review.

- * Clarified the circumstances when a MAG sends MN address/prefix information to the LMA, in Section 4.1
- * Added text in Section 7.1.5 about address allocation through DHCP with MAG as relay.
- * Removed the use of the Location Deregistration message from the old MAG.
- * Added text in Section 7.1.8 about garbage collection of old MN state
- * Removed the LMA Allocation Request message

2006-09-18 17:43

- * Fixes based on Marco's review
- * Fixes from Phil:

Changes since Montreal

- * Made use of 'status 1, "Success"' consistent
- * Added clarification to Section 8.1.1
- * Removed details about sending RAs from 7.1.3.3

2006-09-17 14:07

- * Added Kent's revised Section 8.2.2, IP Multicast
- * Clarified the use of source and destination IDs in messages
- * Adjusted the language in 5.7 to match the heartbeat handling
- * Assigned explicit zero values to all Option Sub-Types which had no explicit sub-type value
- * Language fixes up to Section 6.7

2006-09-15 17:41

- * Added Yokota-san's revision of Para. 4, Section 4.1

Changes since Montreal

- * Added modified error messages 65, 66 and 67 in Section 5.9, to match the new functionality of the Location Registration message
- * Added indication of required Options for each message.
- * Added Section 5.7.1, Heartbeat Handling.
- * Removed Address Option sub-types 2-7, and renamed the option (Section 6.4)
- * Removed the sections on Link Availability Test, as superseded by the heartbeat handling section
- * Removed all usage and reference to the Routing Setup message

2006-09-14 15:34

- * Added text from Marco to Section 6.7
- * Added message sequence charts based on Yokota-san's MSCs, in Section 4.1 and Section 4.2
- * Removed sequence number from status option and added text regarding use of sequence numbers for the re-sending logic.

Changes since Montreal

- * Added Figure 1 in Section 3 (Needs further work)
- * Applied Kent's comments from September 13th:
- * Moved IPsec requirements from end Section 4.2 to beginning of Section 4.3
- * Removed message Sub-Type
- * Added implementation and usage requirements for each message
- * Started removing MN Address * and Routing * messages from the draft
- * Removed the Message Optimization section
- * Removed all uses of the MN Address * messages.

2006-09-12 11:26

- * Removed duplicate text, first paragraph of Section 5.
- * Removed the Status field from the message header, and defined a Status option to carry status information in Acknowledgements.

Changes since Montreal

- * Added a new message, the Acknowledgement message.
- * Moved the 'Message Optimization' section to the end of Section 5, leaving the 'Acknowledgement Message' and 'Message Status' sections adjacent.
- * Moved [RFC2960] to informative references
- * Adjusted language related to Acknowledgements to match the change in Acknowledgement format.

2006-09-07 17:19

- * Draft reorganization.
- * Merged Section 5 and 7.1, and Section 6 and 7.2.
- * Merged Appendix A.1 and A.2

2006-09-07 13:52

Changes since Montreal

- * Added requirements on IPsec support to Section 4.2
- * Added note from Katsutoshi regarding default value of protocol constants to Section 5.11
- * Removed empty appendices B, C and D, as they should not be covered here (B, C), or are already covered (D)
- * Added Marco's appendix section on Issues with omitting the MN Address Setup and Routing Setup

2006-09-05 13:08

- * Language fixes, Sections 1-4.

2006-09-04 14:28

- * Applied Marco's updates to the Section 5.11 text
- * Added a Registration Lifetime Option (Section 7.2.7)
- * Changed the NetLMM Address Option (Section 7.2.2) to have both subnet prefix and address prefix fields
- * Removed all references to the Routing Tag

Changes since Montreal

- * Added Status code ranges, and experimental and vendor-specific status codes (Section 7.1.1)
- * Added reference to Experimental Numbers: RFC 3692 * Added reference to NTP Timestamp: RFC 4330)

2006-09-04 10:09

- * Applied resolution of A.3.j: Get the correct RFC to reference for IPv6 in IPv6 tunnelling ==> RFC 2473
- * Added description of option padding, and figures, to Section 7.2
- * Added Marco's retransmission description to Section 5.11
- * Applied Marco's updates:
 - * Section 5.11 -> added text for retransmit scheme
 - * Section 8.1.1 and Section 8.2.1 -> added prefix in addition to IP address to the Routing Cache entry.
 - * deleted entry for general capabilities (since we do not provide examples or details in the draft)
 - * describe the use of the Data Transport option and a basic algorithm for forwarding approach selection
 - * Section 9.1.3 -> deleted reference to appendices about details for GRE and MPLS

Remaining Issues

The following changes discussed at the interim meeting has *not* been implemented in this revision:

- Change name of the Location Registration message to 'Forwarding Update' to reflect the use of this to indicate forwarding state to the LMA also in cases when the MN has not moved. This would leave the 'Location Deregistration' message with a very mis-aligned name. Needs revisiting.
- Specify per-message which options may occur multiple times.
- Text about the MAG being a router or a layer 3 bridge.
- Text about handling of MLD states on handover.
- How to handle 2461 nodes which doesn't use DNA.

The DT Proposal - one page

- ❖ Clean match between protocol and topology
- ❖ Will run over IPv4, IPv6 or *mixed* infrastructure
- ❖ Optimised handover performance
- ❖ Support for not only MNs, but setting up AR - Anchor relationships.

What now?

- ❖ There are indications that consensus in the working group has shifted since the call to accept the design team draft a couple of weeks ago.
- ❖ If so, that's the privilege of every participant
- ❖ However, I believe the consequences should at least be mentioned...

Why basing LMM on
PMIP is a bad idea.

PMIP issues

- ❖ Trust relationship mismatch
- ❖ Creates a new transport protocol
- ❖ Management mismatch

Trust Relationship Mismatch

- ❖ MIP assumes a one-to-one trust relationship between Moving Node and Anchor.
- ❖ In a Local Mobility Domain (LMD) the trust relationship is between the ARs and the Anchor.
- ❖ You have to bootstrap the MN - Anchor relationship off the AR - Anchor relationship somehow:

Trust Relationship Mismatch

- ❖ MN - AR trust relationship:
 - ❖ Null trust relationship - the BUs don't have per-MN authentication. Lets anybody inject BUs.
 - ❖ ARs holds keys for all MNs. Much data, in a vulnerable location.
 - ❖ AR fetches MN key from AAA server on handover. Uses AR-AAA trust relationship, can be made secure, but what about the handover timing??

Trust Relationship Mismatch

- ❖ This issue can be solved, but can it be solved without pain?

New Transport Protocol

- ❖ IP flow from MN to peer:
The Mobility Header (MH) carries information from MN's IP stack (IP layer) to CN/HA's stack with state update for the sending node (MN).
This makes sense
- ❖ Messages from AR to Anchor:
Application level messages between two nodes about routing setup for a third node's addresses.

New Transport Protocol

- ❖ Messages from AR to Anchor:
Application level messages between two nodes about routing setup for a third node's addresses.
- ❖ These messages are not related to the state of the L3 (IP layer) state of these node's addresses or routing - they are application messages for the LMM application, related to various MNs.
- ❖ Using MH for this in practice elevates the MN to be a new transport protocol, which creates a bad precedence and is a bad idea...

Management Mismatch

- ❖ Same basis as trust relationship mismatch
- ❖ You can either use the existing MIPv6 bootstrapping techniques to bootstrap MN or AR setup -- but not both...
- ❖ This can be handled, but will bloat MIPv6 more...