Netext WG   S. Krishnan
Internet-Draft   Ericsson
Intended status: Standards Track   S. Gundavelli
Expires: September 15, 2013   Cisco
                                                      M. Liebsch
                                                             NEC
                                                       H. Yokota
                                                            KDDI
                                                     J. Korhonen
                                           Nokia Siemens Networks
                                                  March 14, 2013

Update Notifications for Proxy Mobile IPv6
draft-ietf-netext-update-notifications-01

Abstract

   Proxy Mobile IPv6 (PMIPv6) is a network based mobility management
   protocol that enables IP mobility for a host without requiring its
   participation in any mobility-related signaling. This document
   proposes a mechanism for the Local Mobility Anchor to asynchronously
   notify the Mobile Access Gateway about changes related to the
   mobility session.

Status of this Memo

Copyright Notice

Table of Contents

1. Introduction

Proxy Mobile IPv6 [RFC5213] describes the protocol operations to
maintain reachability and session persistence for a Mobile Node (MN)
without the explicit participation from the MN in signaling
operations at the Internet Protocol (IP) layer. In order to
facilitate such network-based mobility, the PMIPv6 protocol defines a
Mobile Access Gateway (MAG), which acts as a proxy for the Mobile
IPv6 [RFC6275] signaling, and the Local Mobility Anchor (LMA) which
acts similar to a Home Agent. The setup of the mobility session is
initiated by the MAG by sending a PBU message and confirmed by the
LMA in the PBA message. Once the mobility session is set up for a
given lifetime, the LMA has no mechanism to inform the MAG about
changes to the mobility session or any parameters related to the
mobility session.

One such scenario where such a mechanism is needed is when the LMA
wants to inform the MAG that it needs to re-register MNs being
attached to the MAG. It is possible to achieve a similar effect by
using a much shorter lifetime for the mobility sessions but in
several networks this results in an unacceptable, and mostly
unnecessary, increase in the signaling load and overhead. More
suitable is to enable a demand-based trigger from an LMA by means of
signaling from the LMA to one or more MAGs.

This document defines a new mobility header message for performing
notifications and a corresponding mobility header message for the MAG
to acknowledge the notification. While it is possible to use an
existing mobility header type for this purpose, for instance the
PMIPv6 Heartbeat message [RFC5847], the existing messages do not
provide the required semantics. e.g. The Heartbeat message does not
provide a reason why it was sent.

2. Example use case: LMA-requested re-registration

Consider a use case where an LMA (rfLMA) wants to move over one or
more mobility sessions from a given MAG to a different LMA (r2LMA)
using [RFC6463], e.g. in order to allow planned maintenance. The LMA
could send an update notification to the MAG to force a re-
registration for one or more MNs. The MAG tries to register and gets
a redirect from the rfLMA towards the r2LMA according to the
mechanisms as per [RFC6463]. Such operation is exemplarily depicted
in Figure 1.

```
 +--+        +---+              +-----+            +-----+
 |MN|        |MAG|              |rfLMA|            |r2LMA|
 +--+        +---+              +-----+            +-----+
  |           |                   |                  |
  O----------O-----------------O                  |
  |           | UPN[FORCEREREG] |                  |
  |           |<----------------|                  |
  |           |       PBU       |                  |
  |           |---------------->|      [IWK]       |
  |           |   PBA(redirect) |<---------------->|
  |           |<----------------|                  |
  |           |                 |                  |
  |           |                 |                  |
  |<===================data===================>|
  |           |                 |                  |
  .           .                 .                  .
  .           .                 .                  .
  .           .                 .                  .
  |           |       PBU       |                  | Lifetime
  |           |----------------------------------->| extension
  |           |                 |                  |
  |           |                 |                  |
```
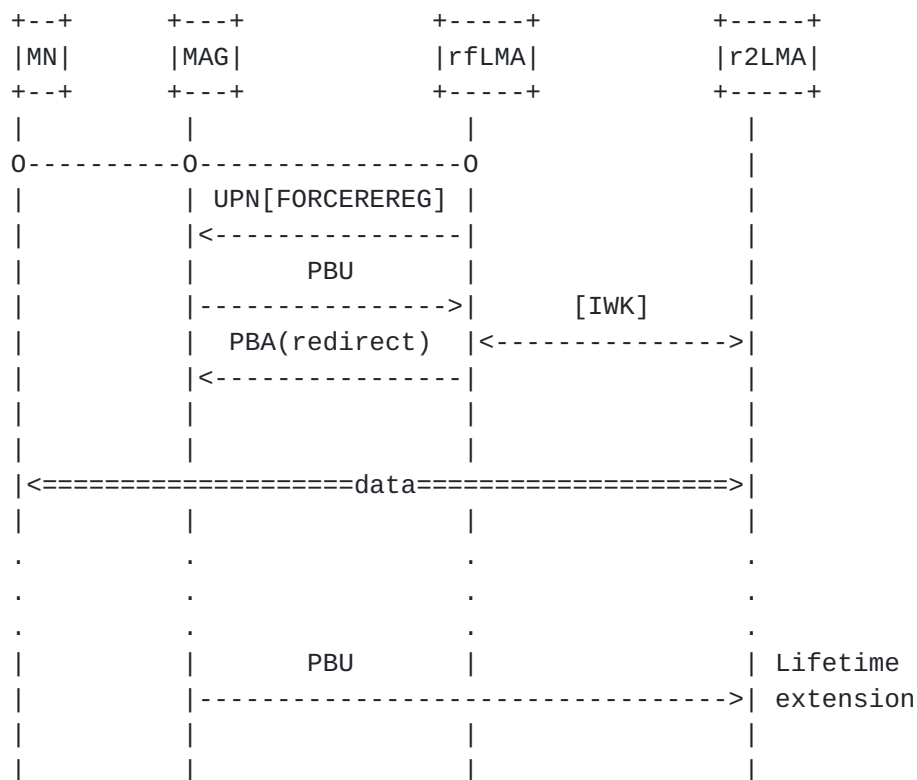
                Figure 1: Using the UPN for LMA-requested re-registration

3. LMA Behavior

   The LMA sends the Update Notification message in response to a
   condition that is specified in the Notification Reason field. If the
   LMA requires an acknowledgement from the MAG concerning the UPN
   message, it MUST set the A bit to 1. If not it MUST set the A bit to
   0. The LMA MAY retransmit the UPN messages if reliability is
   required for the specific Notification reason. If the UPN message is
   retransmitted, the LMA MUST reuse the same sequence number as the
   original message. If the LMA receives an UPA message with a failure
   Status (Status value >127) it SHOULD log an error.

4. MAG Behavior

   If a received Update Notification message has the A bit set to 1, the
   MAG MUST create and transmit an Update Notification Acknowledgement
   message in response to the UPN message. The sequence number of the
   UPA message MUST be copied from the UPN message that is being
   responded to. Depending on whether the message was processed
   successfully or not, the MAG MUST set the Status value in the UPA
   message to an appropriate value. The actual processing required on

the MAG is out of the scope of this document and will be specified
for each Notification reason.

5. Message Formats

5.1. Update Notification(UPN)

The LMA sends an UPN message to a MAG to notify the MAG that some
information regarding the mobility session or parameters related to
the mobility session has changed.

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
                                +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
                                |           Sequence #          |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     Notification Reason       |A|          Reserved           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
.                                                               .
.                       Mobility options                        .
.                                                               .
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
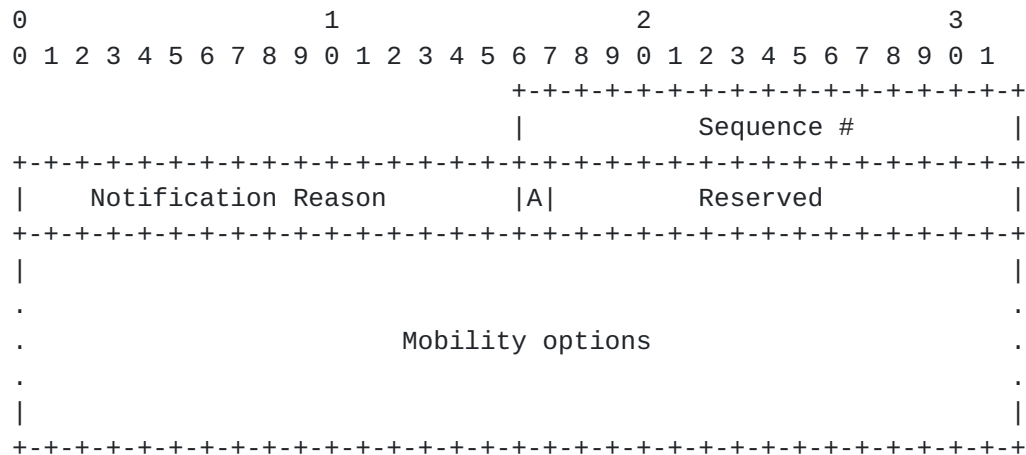
Sequence Number: A monotonically increasing integer. Set by the
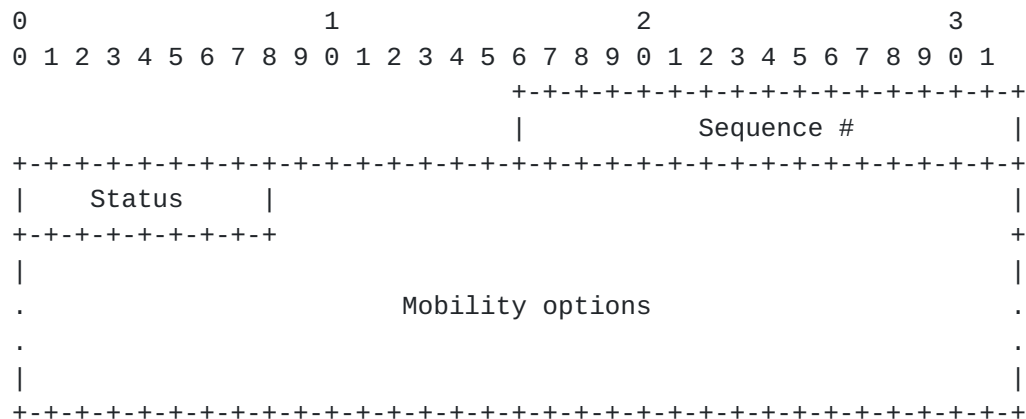LMA and retained for retransmissions.

Acknowledgement Requested (A): If this bit is set, the MAG MUST
send an UPA message in response to the received UPN message.

Notification Reason: Contains the code corresponding to the reason
that caused the LMA to send the Update Notification to the MAG.
This field does not contain any structure and MUST be treated as
an enumeration.

Mobility Options: Contains a set of mobility options for the MAG
to act upon. The set of mobility options that can be present in
the message is related to the Notification Reason field in the
message.

5.2. Update Notification Acknowledgement(UPA)

The MAG sends an UPA message to a LMA in order to acknowledge that it
has received an UPN message with the A bit set.

```
    0                   1                   2                   3
    0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
                                   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
                                   |             Sequence #        |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |     Status    |                                               |
   +-+-+-+-+-+-+-+-+                                               +
   |                                                               |
   .                        Mobility options                       .
   .                                                               .
   |                                                               |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

   Sequence Number: Copied from the UPN message being acknowledged.

   Status: Specifies the result of the MAG's processing of the UPN
   message. The status codes between 0 and 127 signify successful
   processing of the UPN message and codes between 128 and 255
   signify that an error occurred during processing of the UPN
   message.

   Mobility Options: Contains a set of mobility options used to
   provide context to the LMA. The set of mobility options that can
   be present in the message is related to the Status field in the
   message.

6. Security Considerations

   The protocol specified in this document uses the same security
   association as defined in [RFC5213] for use between the LMA and the
   MAG to protect the UPN messages.Support for integrity protection
   using IPsec is REQUIRED, but support for confidentiality is NOT
   REQUIRED .

7. IANA Considerations

   The Update Notification message require a single Mobility Header Type
   (TBA1) from the Mobility Header Types registry at
   http://www.iana.org/assignments/mobility-parameters

   The Update Notification Acknowledgement message require a single
   Mobility Header Type (TBA2) from the Mobility Header Types registry
   at http://www.iana.org/assignments/mobility-parameters

   This document creates a new registry for Notification Reasons. The

allocation policy for this field is First Come, First Served.

This document creates a new registry for Status codes in the UPA message. The allocation policy for this field is First Come, First Served.

8. Acknowledgements

The authors would like to thank Basavaraj Patil, Rajeev Koodli and other members of netext working group for their valuable comments to improve this document.

9. References

9.1. Normative References

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

[RFC5213] Gundavelli, S., Leung, K., Devarapalli, V., Chowdhury, K.,
           and B. Patil, "Proxy Mobile IPv6", RFC 5213, August 2008.

9.2. Informative References

[RFC5847] Devarapalli, V., Koodli, R., Lim, H., Kant, N., Krishnan,
           S., and J. Laganier, "Heartbeat Mechanism for Proxy Mobile
           IPv6", RFC 5847, June 2010.

[RFC6275] Perkins, C., Johnson, D., and J. Arkko, "Mobility Support
           in IPv6", RFC 6275, July 2011.

[RFC6463] Korhonen, J., Gundavelli, S., Yokota, H., and X. Cui,
           "Runtime Local Mobility Anchor (LMA) Assignment Support
           for Proxy Mobile IPv6", RFC 6463, February 2012.

Authors' Addresses

    Suresh Krishnan
    Ericsson
    8400 Blvd Decarie
    Town of Mount Royal, Quebec
    Canada

    Phone: +1 514 345 7900 x42871
    Email: suresh.krishnan@ericsson.com

    Sri Gundavelli
    Cisco
    170 West Tasman Drive
    San Jose, CA 95134
    USA

    Email: sgundave@cisco.com

    Marco Liebsch
    NEC
    Kurfuersten-Anlage 36
    D-69115 Heidelberg
    Germany

    Email: marco.liebsch@neclab.eu

    Hidetoshi Yokota
    KDDI

    Email: yokota@kddilabs.jp

    Jouni Korhonen
    Nokia Siemens Networks
    Linnoitustie 6
    FI-02600 Espoo
    Finland

    Email: jouni.nospam@gmail.com