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ETRI
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Considerations for Mobility Support in NAT-PT
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Abstract

The document specifies considerations for mobility support in NAT-PT (RFC-2766) [1].

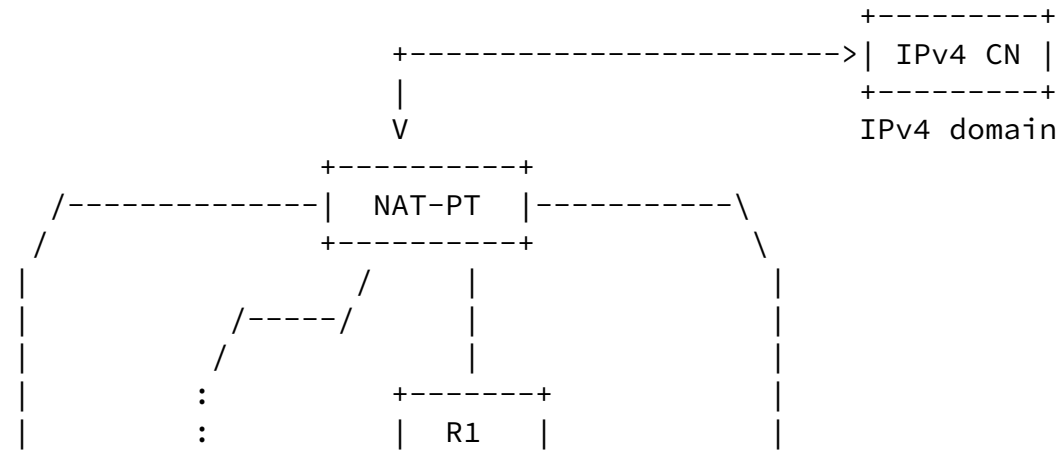
1. Introduction

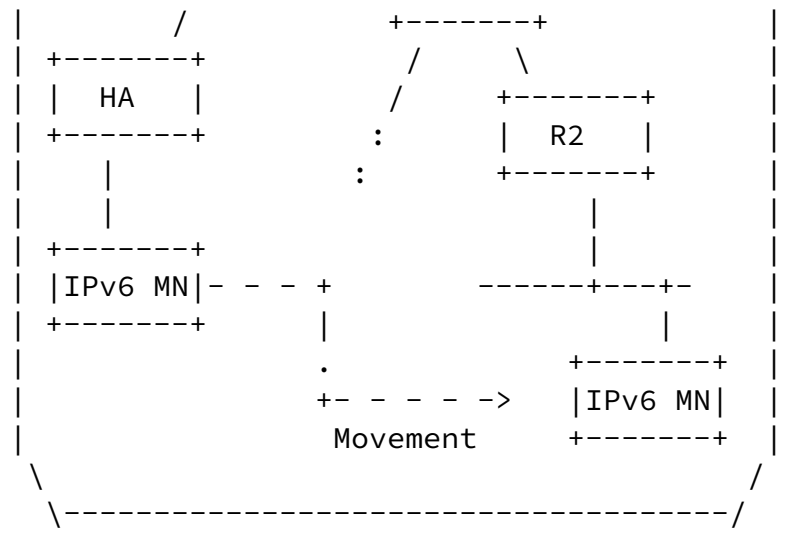
NAT-PT (RFC-2766) enables end-nodes in IPv6 realm to communicate with end-nodes in IPv4 realm and vice versa. RFC-2766 [1] needs some fixes and/or applicability statements. Among them, there exists considerations in NAT-PT [1] when IPv6 end-nodes move. 3GPP drafts [2, 3] mention that there is a need for transltors, such as NAT-PT, but in this case, current RFC-2766 [1] does not support IPv6 mobile nodes. The document specifies considerations for mobility support in NAT-PT (RFC-2766)[1].

2. Issues with mobility support in NAT-PT

2.1 Movement of end-nodes in IPv6 realm (IPv6-MNs)

When IPv6 end-nodes move, there are issues should be considered in RFC-2766. Basically, since mobile IPv6 (MIPv6) [4] provides route optimization, NAT-PT box must update its associated address mapping entries. As well, NAT-PT box needs appropriate handling of controls such as RR (Return Routability), BU (Binding Update), etc.





IPv6 realm

2.2 Movement of end-nodes in IPv4 realm (IPv4-MNs)

Obviously, there is no issue when IPv4 end-nodes move, since mobile IPv4 (MIPv4)][5] uses tunneling.

3. Mobility support in NAT-PT box

This section describes the case that an IPv6-MN moves from home network to other network in the same IPv6 island.

Main consideration is that NAT-PT box does all of MIPv6 functionalities on behalf of IPv4-CNs. Following subsections show how NAT-PT box works in this situation.

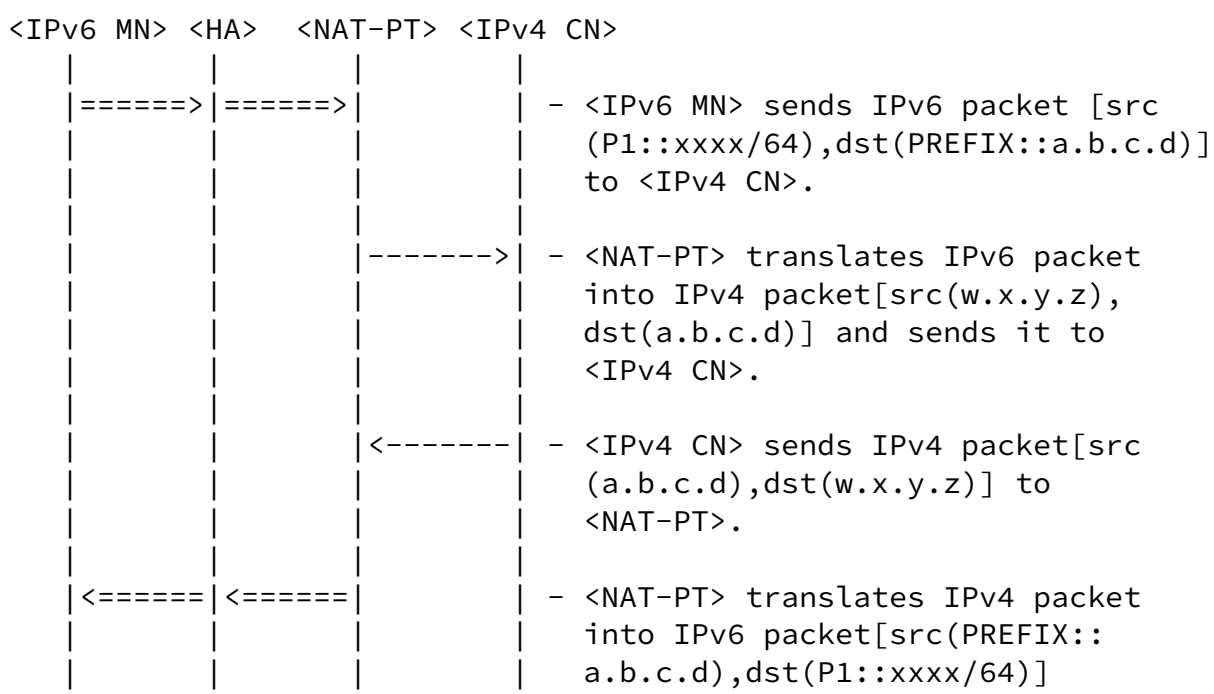
In the example below, the following notations will be used.

```
 ==>    means IPv6 packet.
 -->    means IPv4 packet.
 ++>    means IPv6 over IPv6 tunnel.
```

3.1 Control Sessions

3.1.1 Initial state

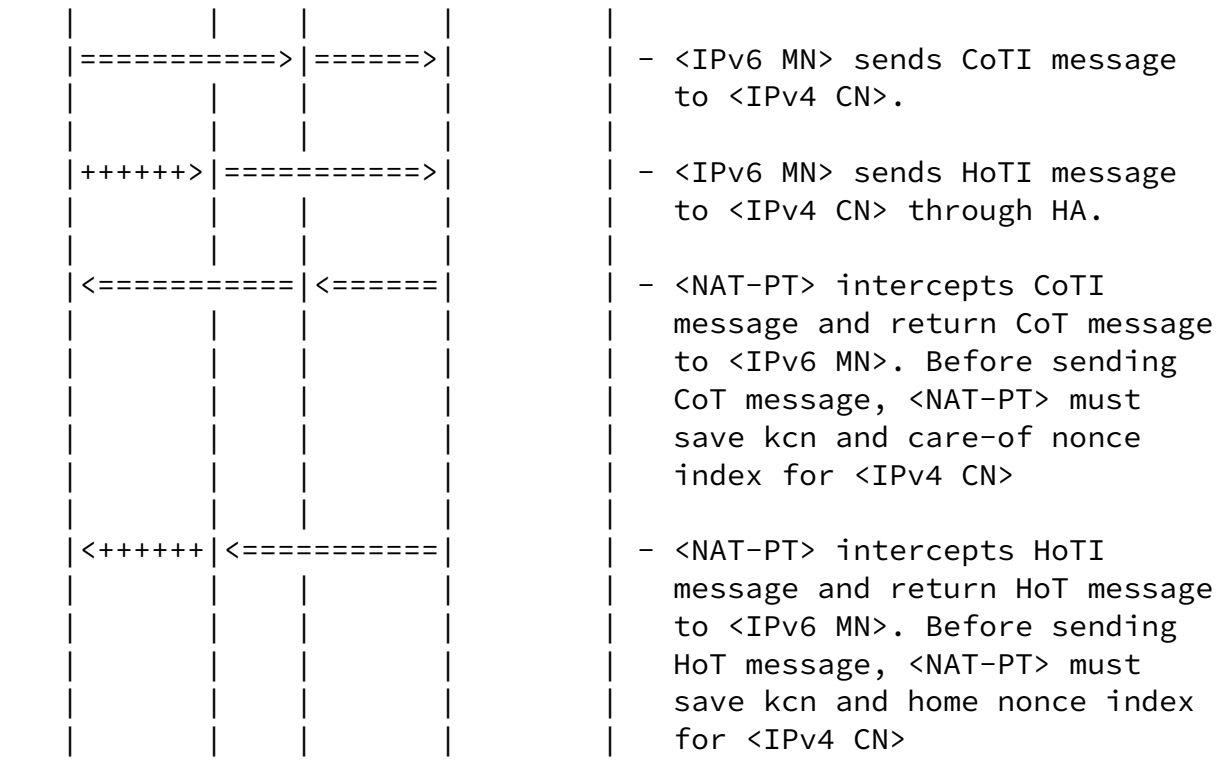
In initial state <IPv6 MN> is in home network and it communicates with <IPv4 CN> like general NAT-PT outbound session.



* IPv6 MN
  P1::xxxx/64 (Home Address)
* HA
  advertises P1::/64
* NAT-PT
  advertises PREFIX::/64
  Mapping Table:
    mapping_entry[0] = {P1::xxxx/64, w.x.y.z}
  Binding Cache Table:
    binding_cache_entry[0] = {}
  Kcn/nonce Table:
    kcn_entry[0] = {}
* IPv4 CN
  a.b.c.d

3.1.2 RR procedure

After <IPv6 MN>'s moving from home network to other subnet, <IPv6 MN> tries RR procedure to check reachability of <IPv4 CN> before sending BU.



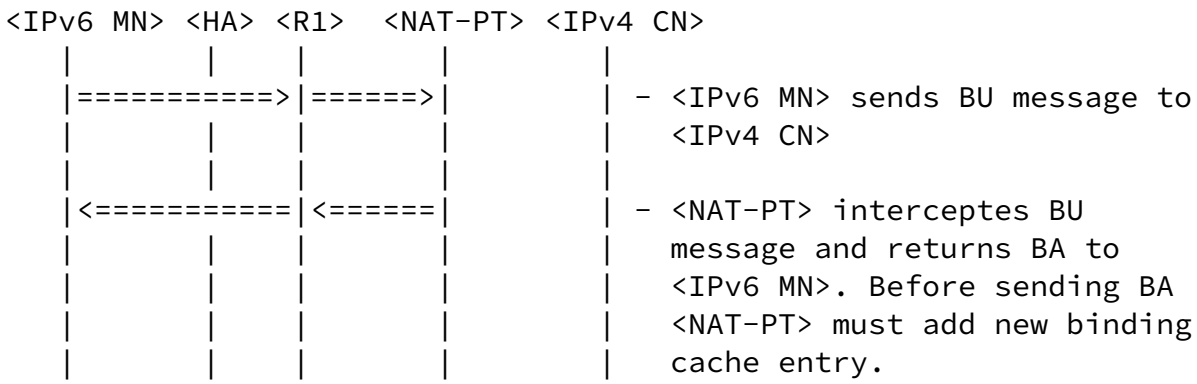
* IPv6 MN
  P1::xxxx/64 (Home Address)
  P2::xxxx/64 (Care of Address)
* HA
  advertises P1::/64
* R1
  advertises P2::/64

* NAT-PT
  advertises PREFIX::/64

```
    Mapping Table:
        mapping_entry[0] = { P1::xxxx/64, w.x.y.z }
    Binding Cache Table:
        binding_cache_entry[0] = {}
    Kcn/nonce Table:
        kcn_entry[0] = { HA: P1::xxxx/64, COA: P2::xxxx/64,
                         CN: a.b.c.d, Kcn: nnn,
                         Home Nonce index: nnn,
                         Care-of Nonce Index: nnn }
* IPv4 CN
    a.b.c.d
```

3.1.3 Binding Update/Acknowledge

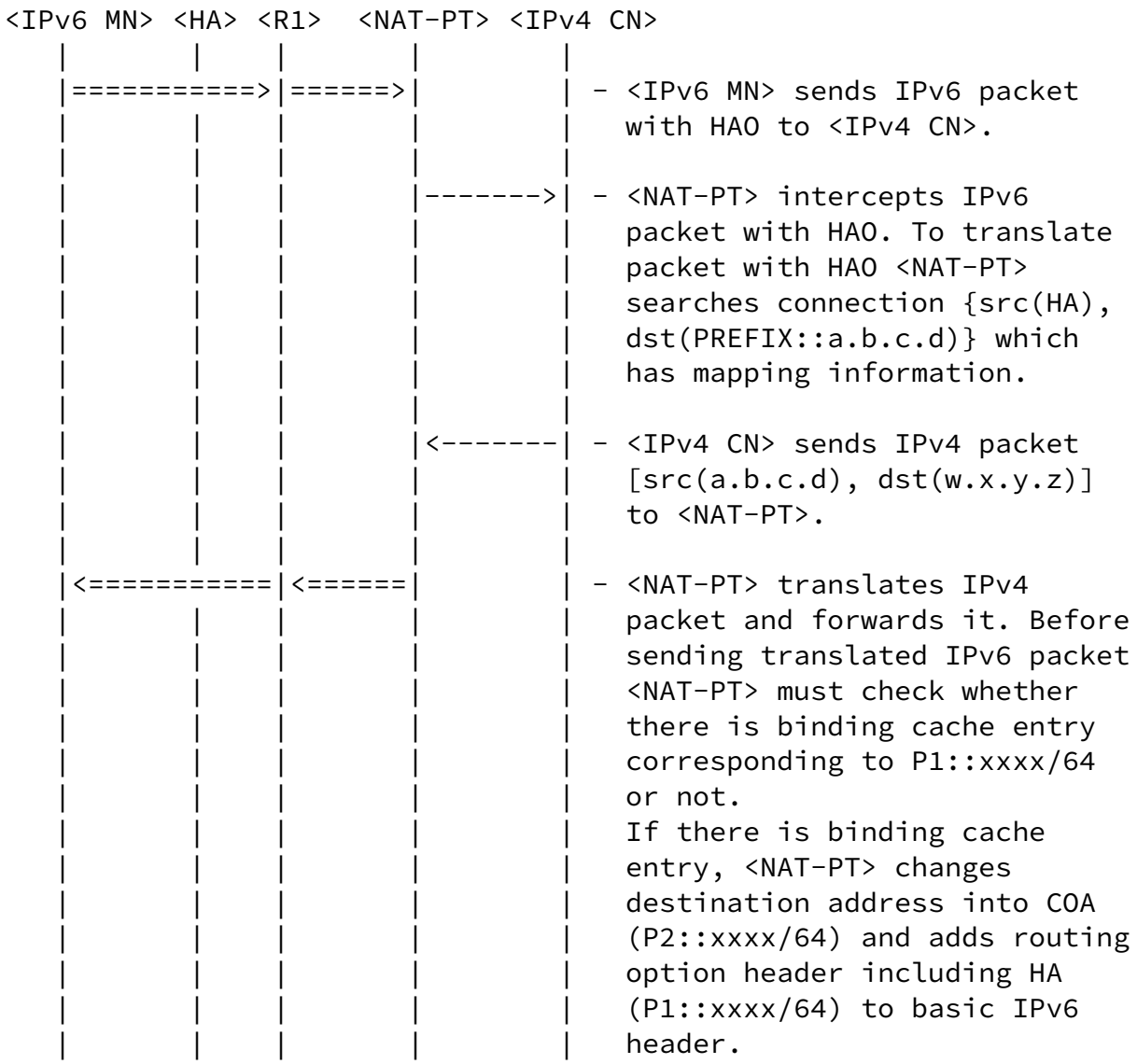
After finishing RR procedure <IPv6 MN> makes authenticator and sends BU message to <IPv4 CN> for route optimization.




```
* IPv6 MN
    P1::xxxx/64 (Home Address)
    P2::xxxx/64 (Care of Address)
* HA
    advertises P1::/64
* R1
    advertises P2::/64
* NAT-PT
    advertises PREFIX::/64
    Mapping Table:
        mapping_entry[0] = { P1::xxxx/64, w.x.y.z }
    Binding Cache Table:
        binding_cache_entry[0] = { HA: P1::xxxx/64,
                                   COA: P2::xxxx/64,
                                   Lifetime: nnn, Flag: 0,
                                   Seq no: nnn, Usage info: nnn}
    Kcn/nonce Table:
        kcn_entry[0] = { HA: P1::xxxx/64, COA: P2::xxxx/64,
                         CN: a.b.c.d, Kcn: nnn,
                         Home Nonce index: nnn,
                         Care-of Nonce Index: nnn }
```

* IPv4 CN
  a.b.c.d

3.2 General Data Transimission



* IPv6 MN
  P1::xxxx/64 (Home Address)
  P2::xxxx/64 (Care of Address)
* HA

```
        advertises P1::/64
     * R1
        advertises P2::/64
     * NAT-PT
        advertises PREFIX::/64
        Mapping Table:
           mapping_entry[0] = { P1::xxxx/64, w.x.y.z }
        Binding Cache Table:
           binding_cache_entry[0] = { HA: P1::xxxx/64,
                                      COA: P2::xxxx/64,
                                      Lifetime: nnn, Flag: 0,
```



```
                                      Seq no: nnn, Usage info: nnn}
        Kcn/nonce Table:
           kcn_entry[0] = { HA: P1::xxxx/64, COA: P2::xxxx/64,
                            CN: a.b.c.d, Kcn: nnn,
                            Home Nonce index: nnn,
                            Care-of Nonce Index: nnn }
     * IPv4 CN
           a.b.c.d
```

4. IPv6-MNs move from one island to another island

This issue should be also considered. This version of the draft is not mentioned yet.

5. Security Considerations

Security consideration is not studied yet.

8. Acknowledgments

Authors would like to acknowledge the idea sharing contributions by Hee Cheol Lee and for detailed comments by KyeongJin Lee on this document.

Normative References

[1] Tsirtsis, G. and P. Srisuresh, "Network Address Translation - Protocol Translation (NAT-PT)", RFC 2766, February 2000.

[2] J. Soininen (ed.), "Transition Scenarios for 3GPP Networks", draft-ietf-v6ops-3gpp-cases-03, March 2003 (Work-in-Progress).

[3] J. Wiljakka (ed.), "Analysis on IPv6 Transition in 3GPP Networks", draft-ietf-v6ops-3gpp-analysis-03, March 2003 (Work-in-Progress).

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

[5] C. Perkins, Ed., "IP Mobility Support for IPv4", RFC 3344, August 2002

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