IPv6 Ready Phase-2
Network Mobility (NEMO)

Conformance Test Specification
for Mobile Router

Technical Document
Revision 1.1.0

IPv6 Forum
IPv6 Ready Logo Committee

http://www.ipv6forum.org
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Modification Record

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NEW

Added the IPsec advanced function "Fine-Grain Selectors" based on RFC4877.

- "Reference standards" in "1 Overview"
- IPsec setting in "3.1 Common Setup-1"
- Packet figure in "5. Common Packets" and "6. Test Specification"

Revision 1.0.1 November 1, 2007

Correct

"3. Common Setup"

- Correction the IPsec Parameter.

Editorial

Title, footer, and copyright were fixed.

Version 1.0.0 January 22, 2007

First Release

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Principle Authors:

- IPv6 Promotion Council, Certification Working Group

Commentators:

- TTA/IT Testing Laboratory

Introduction

The IPv6 forum plays a major role to bring together industrial actors, to develop and deploy the new generation of IP protocols. Contrary to IPv4, which started with a small closed group of implementers, the universality of IPv6 leads to a huge number of implementations. Interoperability has always been considered as a critical feature in the Internet community.
Due to the large number of IPv6 implementations, it is important to provide the market a strong signal proving the level of interoperability across various products.
To avoid confusion in the mind of customers, a globally unique logo programme should be defined. The IPv6 logo will give confidence to users that IPv6 is currently operational. It will also be a clear indication that the technology will still be used in the future. To summarize, this logo programme will contribute to the feeling that IPv6 is available and ready to be used.

The IPv6 Logo Programme consists in three phases

Phase 1 :
In a first stage, the Logo will indicate that the product includes IPv6 mandatory core protocols and can interoperate with other IPv6 implementations.

Phase 2 :
The "IPv6 ready" step implies a proper care, technical consensus and clear technical references. The IPv6 ready logo will indicate that a product has successfully satisfied strong requirements stated by the IPv6 Logo Committee (v6LC).
To avoid confusion, the logo "IPv6 Ready" will be generic. The v6LC will define the test profiles with associated requirements for specific functionalities.

Phase 3 :
Same as Phase 2 with IPsec mandated.

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1 Overview

This document organization tests by group based on related test methodology or goals. Each group begins with a brief set of comments pertaining to all tests within that group. This is followed by a series of description blocks; each block a single test. The format of the description block is as follows:

Description block

[Purpose]	The PURPOSE is the short statement describing what the test attempts to achieve. It is usually phrased as a simple assertion of the future or capability to be tested.
[CATEGORY]	The CATEGORY shows you who need to satisfy the test shortly.
[REQUIREMENT OF TEST]	The REQUIREMENT describes the condition of the NUT.
[TOPOLOGY]	The TOPOLOGY describes the network used in the test.
[TEST SETUP]	The TEST SETUP describes how to initialize and configure the NUT before starting each test. If a value is not provided, then the protocol's default value is used.
[INITIALIZATION]	The INITIALIZATION describes step-by-step instructions for carrying out the setting before the test.
[PROCEDURE]	The PROCEDURE describes step-by-step instructions for carrying out the test.
[JUDGMENT]	The JUDGEMENT describes expected result. If we can observe as same result as the description of Judgment, the NUT passes the test.
[REFERENCES]	The REFERENCE section contains some parts of specification related to the tests. It also shows the document names and section numbers.

Reference to Common

Refer to a common part for some blocks because there are only several kinds of content.

Reference to Common packets

The reference to Common packets in [INITIALIZATION] and [PROCEDURE] is described.

- Refer to the packet simply.
  Example)
  5. Send Binding Update. (Refer to X.X.X)

- The packet is referred to, and amplification is described.
  Example)
  5. Send Binding Update(Sequence No=10000). (Refer to X.X.X)
  6. Receive Binding Acknowledgement. (HA0 -> NUTX) (Refer to X.X.X)
     # The Lifetime field is less than or equal to 60 seconds.

- Especially, the packet of the focus supplements the field to which it pays attention with the table form.
  Example)
  5. Send Binding Update. (Refer to X.X.X)

IPv6 Header	Source Address (Care-of Address of Mobile Node)	MN(global)
	Destination Address (Correspondent Node Address)	NUT(global)
Destination Option	Home Address of Mobile Node	MN(global)
Mobility Header	MH Type	5
	A	1
	H	0
	Sequence	10000
	Lifetime	60
Nonce Indices Option	Home Nonce Index	any
	Care-of Nonce Index	any
Binding Authorization Data Option	Authenticator	any

Acronyms

CN	- Correspondent Node
HA	- Home Agent
MN	- Mobile Node
MR	- Mobile Router
VMN	- Visited Mobile Node
LFN	- Local Fixed Node
HL	- Home Link
FL	- Foreign Link
HNP	- Home Network Prefix
MNP	- Mobile Network Prefix
HoA	- Home Address
HoA(from HNP)	- Home Address derived from the Home Network Prefix.
HoA(from MNP)	- Home Address derived from the Mobile Network Prefix.
CoA	- Care-of Address
BCE	- Binding Cache Entry
BLE	- Binding Update List Entry

ICMPv6	- Internet Control Message Protocol for IPv6
DHAAD	- Dynamic Home Agent Address Discovery
HAAD	- Home Agent Address Discovery
MPD	- Mobile Prefix Discovery
MPS	- Mobile Prefix Solicitation
MPA	- Mobile Prefix Advertisement
BRR	- Binding Refresh Request
RR	- Return Routability
HoTI	- Home Test Init
CoTI	- Care-of Test Init
HoT	- Home Test
CoT	- Care-of Test
BU	- Binding Update
BA	- Binding Acknowledgement
BE	- Binding Error
Re-Reg	- Re-Registration
De-Reg	- De-Registration
Co-Reg	- Correspondent Registration

Reference standards

This documentation covers the functions specified in the IETF RFC and Network Mobility Test Profile listed below.

(1) RFC3963: Network Mobility (NEMO) Basic Support Protocol
(http://www.ietf.org/rfc/rfc3963.txt)

(2) RFC3775: Mobility Support in IPv6
(http://www.ietf.org/rfc/rfc3775.txt)

(3) RFC3776: Using IPsec to Protect Mobile IPv6 Signaling between Mobile Nodes and Home Agents
(http://www.ietf.org/rfc/rfc3776.txt)

(4) RFC4877: Mobile IPv6 Operation with IKEv2 and the Revised IPsec Architecture
(http://www.ietf.org/rfc/rfc4877.txt)

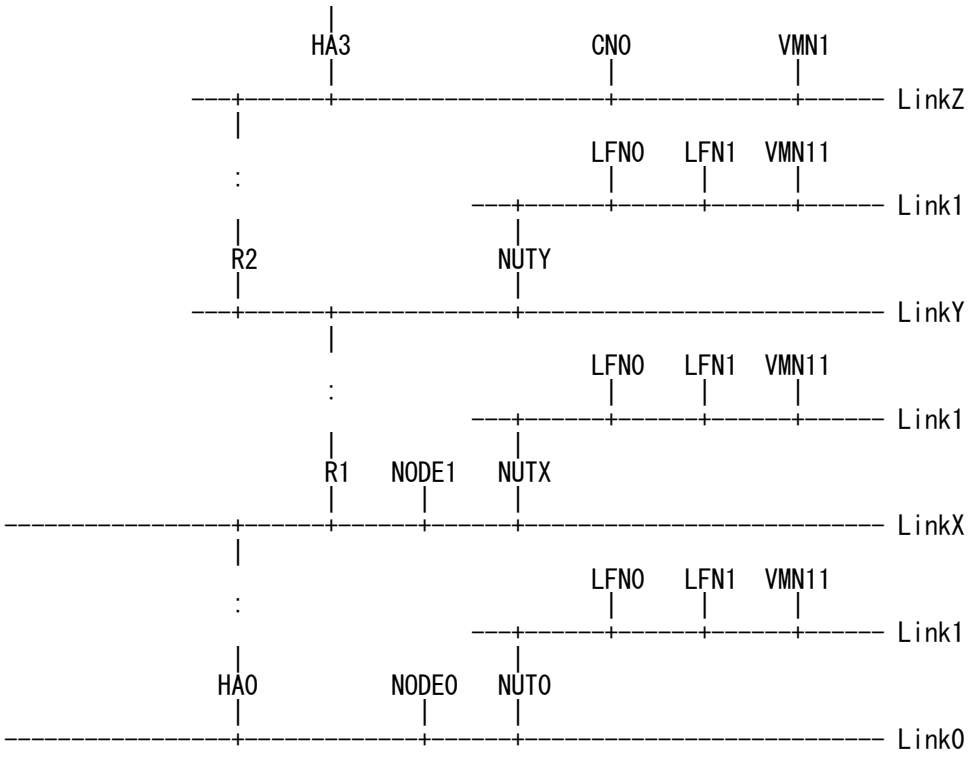
(5) IPv6 Ready Logo Phase-2 Netowork Mobility (NEMO) Policy
(http://www.ipv6ready.org/about_phase2_test.html)

(6) IPv6 Ready Logo Phase-2 Netowork Mobility (NEMO) Test Specification Profile
(http://www.ipv6ready.org/about_phase2_test.html/)

2 Common Topology

2.1 Common Topology-1

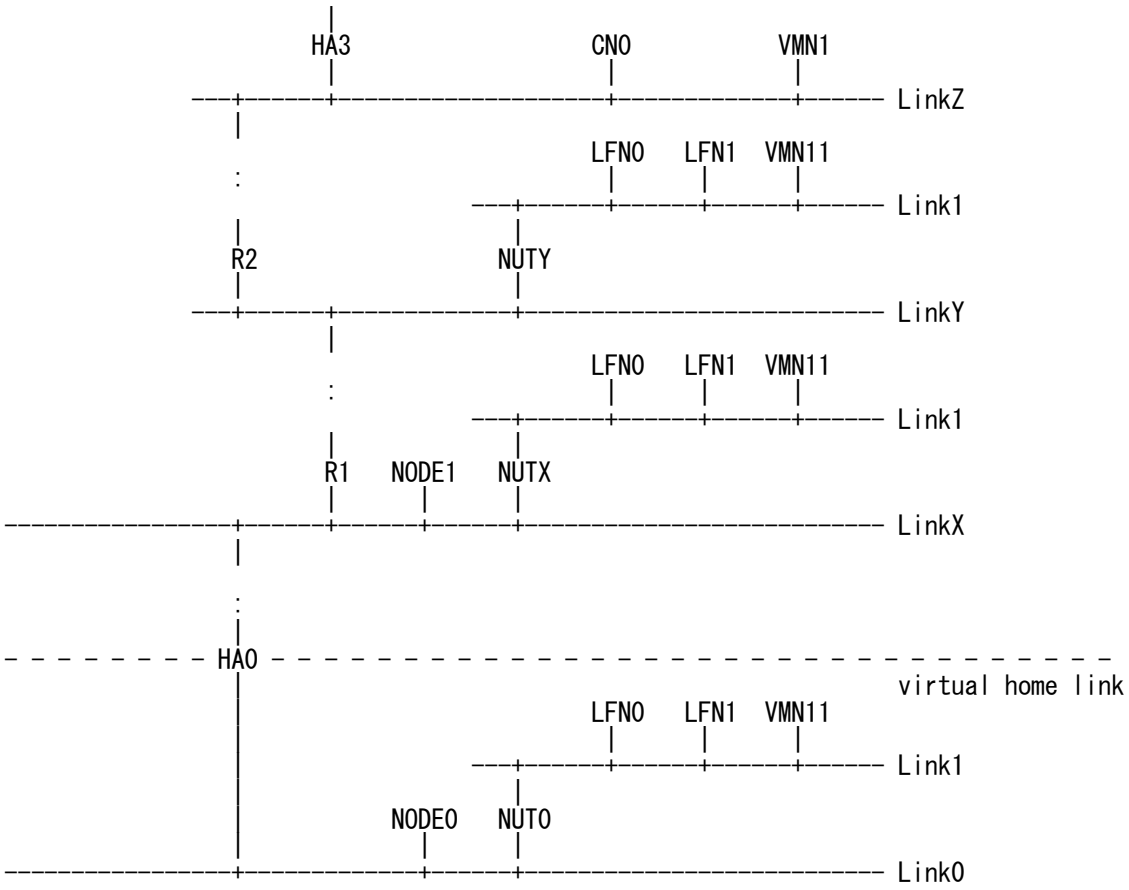
- In the case of Real Home Link



Link0	global	3ffe:501:ffff:100::/64	home link
LinkX	global	3ffe:501:ffff:200::/64	foreign link
LinkY	global	3ffe:501:ffff:300::/64	foreign link
LinkZ	global	3ffe:501:ffff:400::/64	foreign link
Link1	global	3ffe:501:ffff:104::/64	NEMO link
HA0 (Link0)	global	3ffe:501:ffff:100:200:ff:fe00:a0a0	home agent
	link-local	fe80:: 200:ff:fe00:a0a0	
	ether	00:00:00:00:a0:a0	
NODE0	global	3ffe:501:ffff:100:200:ff:fe00:a3a3	
	link-local	fe80:: 200:ff:fe00:a3a3	
	ether	00:00:00:00:a3:a3	
R1 (LinkX)	global	3ffe:501:ffff:200:200:ff:fe00:a4a4	
	link-local	fe80:: 200:ff:fe00:a4a4	
	ether	00:00:00:00:a4:a4	
NODE1	global	3ffe:501:ffff:200:200:ff:fe00:a5a5	
	link-local	fe80:: 200:ff:fe00:a5a5	

	ether	00:00:00:00:a5:a5	
R2 (LinkY)	global	3ffe:501:ffff:300:200:ff:fe00:a6a6	
	link-local	fe80:: 200:ff:fe00:a6a6	
	ether	00:00:00:00:a6:a6	
HA3 (LinkZ)	global	3ffe:501:ffff:400:200:ff:fe00:a8a8	home agent of VMN1
	link-local	fe80:: 200:ff:fe00:a8a8	
	ether	00:00:00:00:a8:a8	
CN0	global	3ffe:501:ffff:400:200:ff:fe00:aaaa	correspondent node
	link-local	fe80:: 200:ff:fe00:aaaa	
	ether	00:00:00:00:aa:aa	
VMN1	global	3ffe:501:ffff:400:200:ff:fe00:abab	visited mobile node
	link-local	fe80:: 200:ff:fe00:abab	
	ether	00:00:00:00:ab:ab	
VMN11 (Link1)	global	3ffe:501:ffff:104:200:ff:fe00:abab	care-of address of VMN1
LFN0	global	3ffe:501:ffff:104:200:ff:fe00:b0b0	local fixed node
	link-local	fe80:: 200:ff:fe00:b0b0	
	ether	00:00:00:00:b0:b0	
LFN1	global	3ffe:501:ffff:104:200:ff:fe00:b1b1	local fixed node
	link-local	fe80:: 200:ff:fe00:b1b1	
	ether	00:00:00:00:b1:b1	
NUT0 (Link0)	global	3ffe:501:ffff:100::<Nut.egress>	egress interface
	link-local	fe80::< Nut.egress >	
	ether	< Nut.egress >	
NUTX (LinkX)	global	3ffe:501:ffff:200::< Nut.egress >	Care-of address
NUTY (LinkY)	global	3ffe:501:ffff:300::< Nut.egress >	Care-of address
NUT0 (Link1)	global	3ffe:501:ffff:104::< Nut.ingress >	ingress interface
	link-local	fe80::< Nut.ingress >	
	ether	< Nut.ingress >	

- In the case of Virtual Home Link



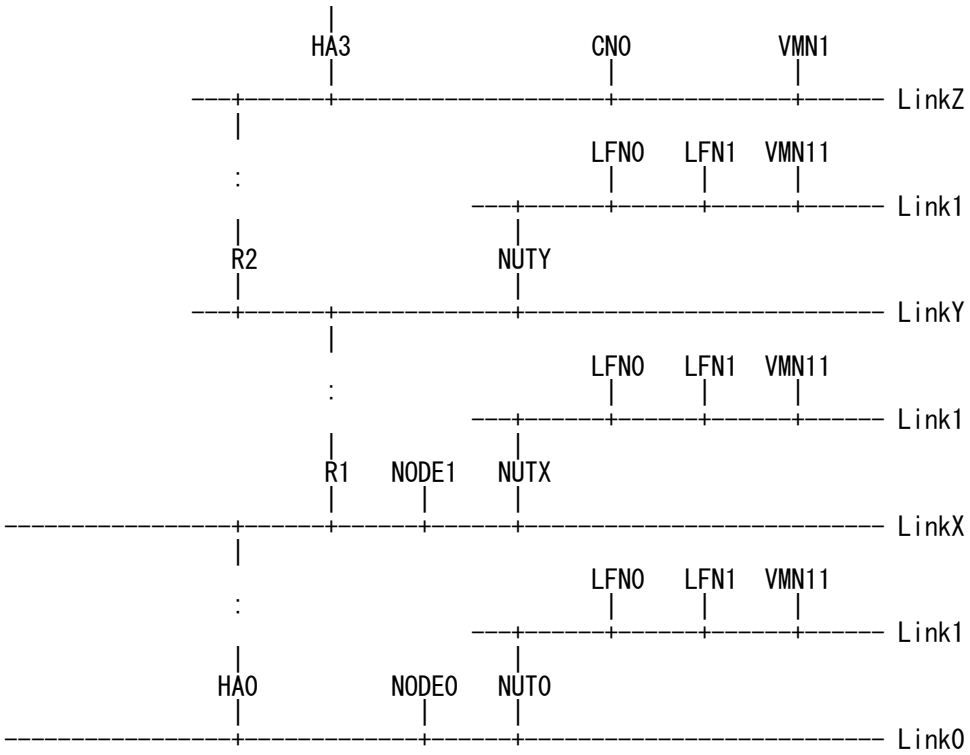
Link0	global	3ffe:501:ffff:100::/64	virtual home link
LinkX	global	3ffe:501:ffff:200::/64	foreign link
LinkY	global	3ffe:501:ffff:300::/64	foreign link
LinkZ	global	3ffe:501:ffff:400::/64	foreign link
Link1	global	3ffe:501:ffff:104::/64	NEMO link
HA0 (Link0)	global	3ffe:501:ffff:100:200:ff:fe00:a0a0	home agent
	link-local	fe80:: 200:ff:fe00:a0a0	
	ether	00:00:00:00:a0:a0	
NODE0	global	3ffe:501:ffff:100:200:ff:fe00:a3a3	
	link-local	fe80:: 200:ff:fe00:a3a3	
	ether	00:00:00:00:a3:a3	
R1 (LinkX)	global	3ffe:501:ffff:200:200:ff:fe00:a4a4	
	link-local	fe80:: 200:ff:fe00:a4a4	
	ether	00:00:00:00:a4:a4	
NODE1	global	3ffe:501:ffff:200:200:ff:fe00:a5a5	
	link-local	fe80:: 200:ff:fe00:a5a5	
	ether	00:00:00:00:a5:a5	
R2 (LinkY)	global	3ffe:501:ffff:300:200:ff:fe00:a6a6	
	link-local	fe80:: 200:ff:fe00:a6a6	

	ether	00:00:00:00:a6:a6	
HA3 (LinkZ)	global	3ffe:501:ffff:400:200:ff:fe00:a8a8	home agent of VMN1
	link-local	fe80:: 200:ff:fe00:a8a8	
	ether	00:00:00:00:a8:a8	
CN0	global	3ffe:501:ffff:400:200:ff:fe00:aaaa	correspondent node
	link-local	fe80:: 200:ff:fe00:aaaa	
	ether	00:00:00:00:aa:aa	
VMN1	global	3ffe:501:ffff:400:200:ff:fe00:abab	visited mobile node
	link-local	fe80:: 200:ff:fe00:abab	
	ether	00:00:00:00:ab:ab	
VMN11 (Link1)	global	3ffe:501:ffff:104:200:ff:fe00:abab	care-of address of VMN1
LFN0	global	3ffe:501:ffff:104:200:ff:fe00:b0b0	local fixed node
	link-local	fe80:: 200:ff:fe00:b0b0	
	ether	00:00:00:00:b0:b0	
LFN1	global	3ffe:501:ffff:104:200:ff:fe00:b1b1	local fixed node
	link-local	fe80:: 200:ff:fe00:b1b1	
	ether	00:00:00:00:b1:b1	
NUT0 (Link0)	global	3ffe:501:ffff:200:: < Nut.egress >	egress interface
	link-local	fe80:: < Nut.egress >	
	ether	< Nut.egress >	
NUTX (LinkX)	global	3ffe:501:ffff:200:: < Nut.egress >	Care-of address
NUTY (LinkY)	global	3ffe:501:ffff:300:: < Nut.egress >	Care-of address
NUT0 (Link1)	global	3ffe:501:ffff:104:: < Nut.ingress >	ingress interface
	link-local	fe80:: < Nut.ingress >	
	ether	< Nut.ingress >	

2.2 Common Topology-2

R2 in Link Y has same Link Local address as R1 in Link X.

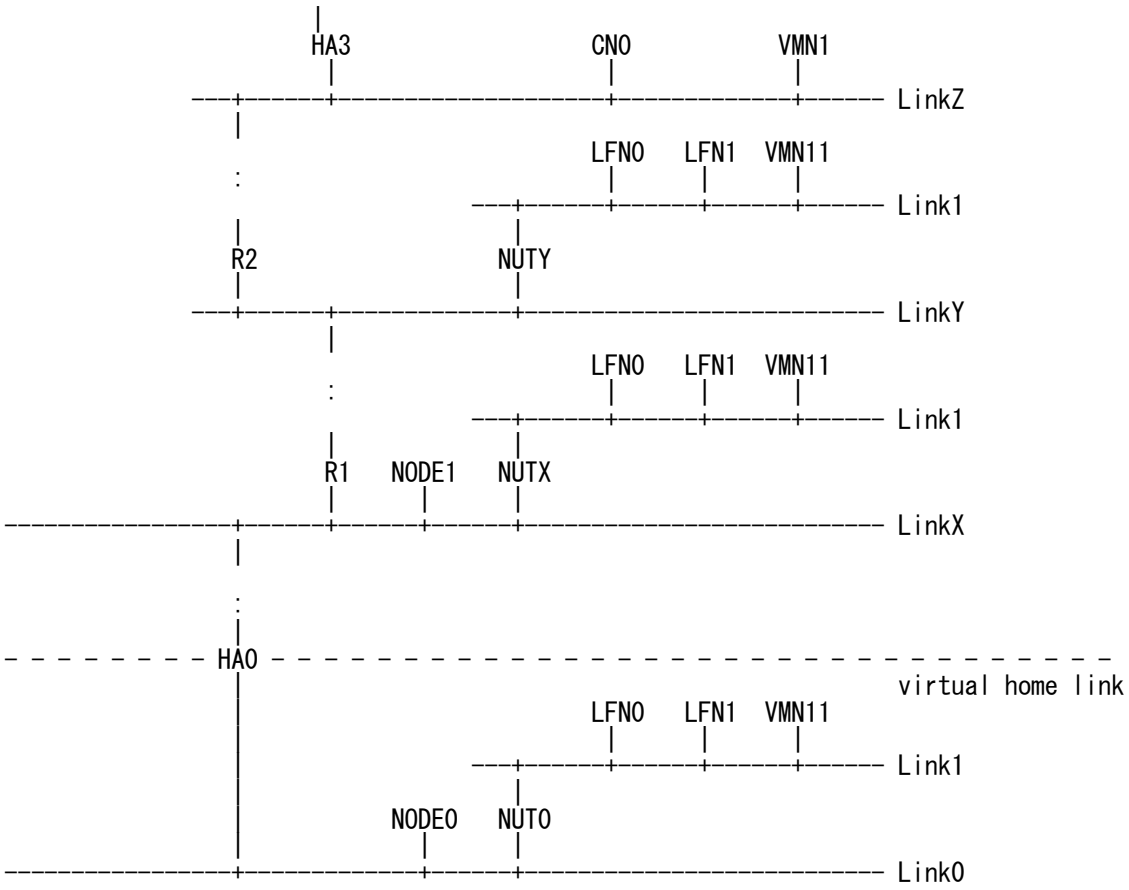
- In the case of Real Home Link



Link0	global	3ffe:501:ffff:100::/64	home link
LinkX	global	3ffe:501:ffff:200::/64	foreign link
LinkY	global	3ffe:501:ffff:300::/64	foreign link
LinkZ	global	3ffe:501:ffff:400::/64	foreign link
Link1	global	3ffe:501:ffff:104::/64	NEMO link
HA0 (Link0)	global	3ffe:501:ffff:100:200:ff:fe00:a0a0	home agent
	link-local	fe80:: 200:ff:fe00:a0a0	
	ether	00:00:00:00:a0:a0	
NODE0	global	3ffe:501:ffff:100:200:ff:fe00:a3a3	
	link-local	fe80:: 200:ff:fe00:a3a3	
	ether	00:00:00:00:a3:a3	
R1 (LinkX)	global	3ffe:501:ffff:200:200:ff:fe00:a4a4	
	link-local	fe80:: 200:ff:fe00:a4a4	
	ether	00:00:00:00:a4:a4	
NODE1	global	3ffe:501:ffff:200:200:ff:fe00:a5a5	
	link-local	fe80:: 200:ff:fe00:a5a5	
	ether	00:00:00:00:a5:a5	
R2 (LinkY)	global	3ffe:501:ffff:300:200:ff:fe00:a4a4	

	link-local	fe80:: 200:ff:fe00:a4a4	
	ether	00:00:00:00:a4:a4	
HA3 (LinkZ)	global	3ffe:501:ffff:400:200:ff:fe00:a8a8	home agent of VMN1
	link-local	fe80:: 200:ff:fe00:a8a8	
	ether	00:00:00:00:a8:a8	
CN0	global	3ffe:501:ffff:400:200:ff:fe00:aaaa	correspondent node
	link-local	fe80:: 200:ff:fe00:aaaa	
	ether	00:00:00:00:aa:aa	
VMN1	global	3ffe:501:ffff:400:200:ff:fe00:abab	visited mobile node
	link-local	fe80:: 200:ff:fe00:abab	
	ether	00:00:00:00:ab:ab	
VMN11 (Link1)	global	3ffe:501:ffff:104:200:ff:fe00:abab	care-of address of VMN1
LFN0	global	3ffe:501:ffff:104:200:ff:fe00:b0b0	local fixed node
	link-local	fe80:: 200:ff:fe00:b0b0	
	ether	00:00:00:00:b0:b0	
LFN1	global	3ffe:501:ffff:104:200:ff:fe00:b1b1	local fixed node
	link-local	fe80:: 200:ff:fe00:b1b1	
	ether	00:00:00:00:b1:b1	
NUT0 (Link0)	global	3ffe:501:ffff:100:: < Nut.egress >	egress interface
	link-local	fe80:: < Nut.egress >	
	ether	< Nut.egress >	
NUTX (LinkX)	global	3ffe:501:ffff:200:: < Nut.egress >	Care-of address
NUTY (LinkY)	global	3ffe:501:ffff:300:: < Nut.egress >	Care-of address
NUT0 (Link1)	global	3ffe:501:ffff:104:: < Nut.ingress >	ingress interface
	link-local	fe80:: < Nut.ingress >	
	ether	< Nut.ingress >	

- In the case of Virtual Home Link



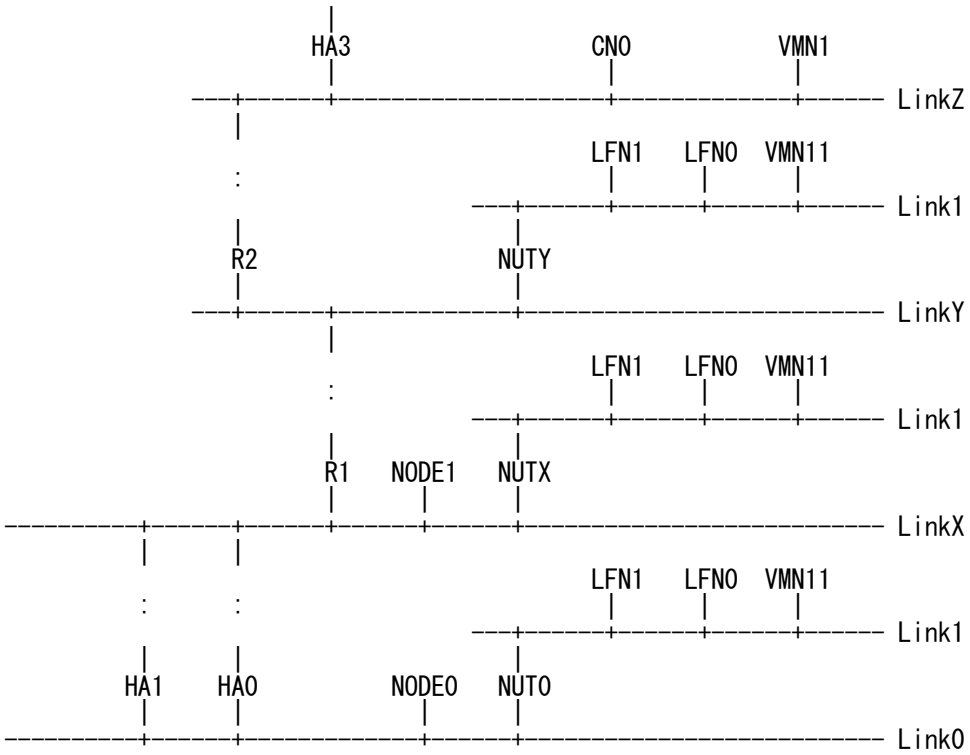
Link0	global	3ffe:501:ffff:100::/64	virtual home link
LinkX	global	3ffe:501:ffff:200::/64	foreign link
LinkY	global	3ffe:501:ffff:300::/64	foreign link
LinkZ	global	3ffe:501:ffff:400::/64	foreign link
Link1	global	3ffe:501:ffff:104::/64	NEMO link
HA0 (Link0)	global	3ffe:501:ffff:100:200:ff:fe00:a0a0	home agent
	link-local	fe80:: 200:ff:fe00:a0a0	
	ether	00:00:00:00:a0:a0	
NODE0	global	3ffe:501:ffff:100:200:ff:fe00:a3a3	
	link-local	fe80:: 200:ff:fe00:a3a3	
	ether	00:00:00:00:a3:a3	
R1 (LinkX)	global	3ffe:501:ffff:200:200:ff:fe00:a4a4	
	link-local	fe80:: 200:ff:fe00:a4a4	
	ether	00:00:00:00:a4:a4	
NODE1	global	3ffe:501:ffff:200:200:ff:fe00:a5a5	
	link-local	fe80:: 200:ff:fe00:a5a5	
	ether	00:00:00:00:a5:a5	
R2 (LinkY)	global	3ffe:501:ffff:300:200:ff:fe00:a4a4	
	link-local	fe80:: 200:ff:fe00:a4a4	

	ether	00:00:00:00:a4:a4	
HA3 (LinkZ)	global	3ffe:501:ffff:400:200:ff:fe00:a8a8	home agent of VMN1
	link-local	fe80:: 200:ff:fe00:a8a8	
	ether	00:00:00:00:a8:a8	
CN0	global	3ffe:501:ffff:400:200:ff:fe00:aaaa	correspondent node
	link-local	fe80:: 200:ff:fe00:aaaa	
	ether	00:00:00:00:aa:aa	
VMN1	global	3ffe:501:ffff:400:200:ff:fe00:abab	visited mobile node
	link-local	fe80:: 200:ff:fe00:abab	
	ether	00:00:00:00:ab:ab	
VMN11 (Link1)	global	3ffe:501:ffff:104:200:ff:fe00:abab	care-of address of VMN1
LFN0	global	3ffe:501:ffff:104:200:ff:fe00:b0b0	local fixed node
	link-local	fe80:: 200:ff:fe00:b0b0	
	ether	00:00:00:00:b0:b0	
LFN1	global	3ffe:501:ffff:104:200:ff:fe00:b1b1	local fixed node
	link-local	fe80:: 200:ff:fe00:b1b1	
	ether	00:00:00:00:b1:b1	
NUT0 (Link0)	global	3ffe:501:ffff:100:: < Nut.egress >	egress interface
	link-local	fe80:: < Nut.egress >	
	ether	< Nut.egress >	
NUTX (LinkX)	global	3ffe:501:ffff:200:: < Nut.egress >	Care-of address
NUTY (LinkY)	global	3ffe:501:ffff:300:: < Nut.egress >	Care-of address
NUT0 (Link1)	global	3ffe:501:ffff:104:: < Nut.ingress >	ingress interface
	link-local	fe80:: < Nut.ingress >	
	ether	< Nut.ingress >	

2.3 Common Topology-3

There are two home agents.

- In the case of Real Home Link



Link0	global	3ffe:501:ffff:100::/64	home link
LinkX	global	3ffe:501:ffff:200::/64	
LinkY	global	3ffe:501:ffff:300::/64	
LinkZ	global	3ffe:501:ffff:400::/64	
Link1	global	3ffe:501:ffff:104::/64	NEMO link
HA0 (Link0)	global	3ffe:501:ffff:100:200:ff:fe00:a0a0	home agent
	link-local	fe80:: 200:ff:fe00:a0a0	
	ether	00:00:00:00:a0:a0	
HA1 (Link0)	global	3ffe:501:ffff:100:200:ff:fe00:a1a1	home agent
	link-local	fe80:: 200:ff:fe00:a1a1	
	ether	00:00:00:00:a1:a1	
R1 (LinkX)	global	3ffe:501:ffff:102:200:ff:fe00:a4a4	
	link-local	fe80:: 200:ff:fe00:a4a4	
	ether	00:00:00:00:a4:a4	
NODE1	global	3ffe:501:ffff:200:200:ff:fe00:a5a5	
	link-local	fe80:: 200:ff:fe00:a5a5	
	ether	00:00:00:00:a5:a5	
R2 (LinkY)	global	3ffe:501:ffff:103:200:ff:fe00:a6a6	

	link-local	fe80:: 200:ff:fe00:a6a6	
	ether	00:00:00:00:a6:a6	
HA3 (LinkZ)	global	3ffe:501:ffff:400:200:ff:fe00:a8a8	Home agent of VMN1
	link-local	fe80:: 200:ff:fe00:a8a8	
	ether	00:00:00:00:a8:a8	
CN0	global	3ffe:501:ffff:400:200:ff:fe00:aaaa	Correspondent node
	link-local	fe80:: 200:ff:fe00:aaaa	
	ether	00:00:00:00:aa:aa	
VMN1	global	3ffe:501:ffff:400:200:ff:fe00:abab	visited mobile node
	link-local	fe80:: 200:ff:fe00:abab	
	ether	00:00:00:00:ab:ab	
VMN11 (Link1)	global	3ffe:501:ffff:104:200:ff:fe00:abab	care-of address of VMN1
LFN0	global	3ffe:501:ffff:104:200:ff:fe00:b0b0	local fixed node
	link-local	fe80:: 200:ff:fe00:b0b0	
	ether	00:00:00:00:b0:b0	
LFN1	global	3ffe:501:ffff:104:200:ff:fe00:b1b1	local fixed node
	link-local	fe80:: 200:ff:fe00:b1b1	
	ether	00:00:00:00:b1:b1	
NUT0 (Link0)	global	3ffe:501:ffff:100:: < Nut.egress >	Home address
	link-local	fe80:: < Nut.egress >	
	ether	< Nut.egress >	
NUTX (LinkX)	global	3ffe:501:ffff:102:: < Nut.egress >	Care-of address
NUTY (LinkY)	global	3ffe:501:ffff:103:: < Nut.egress >	Care-of address
NUT0 (Link1)	global	3ffe:501:ffff:104:: < Nut.ingress >	ingress interface
	link-local	fe80:: < Nut.ingress >	
	ether	< Nut.ingress >	

3 Common Setup

3.1 Common Setup-1

- Reboot NUT
- Enable MR function
  - Turn on MR functions
- Initialize IPsec configuration
- Set IPsec configuration

  The tests require following configurations, If a related message is used.

  *SA9 and SA10 are not appeared in RFC3775,RFC3776.These are assumed.

  *SA7,SA8,SA9 and SA10 are not used on the test.

  - MR-HA0 SA1/SA2, Transport mode, Binding Update/Binding Acknowledgement
    - SA1 (Transport mode, Binding Update)

SPI	0x111 (273)	
Source address	MR HoA(HNP)	3ffe:501:ffff:100:: <Nut.egress>
Destination address	HA0	3ffe:501:ffff:100:200:ff:fe00:a0a0
Mode	ESP Transport	
Upper Layer	Mobility Header (default)	
	Binding Update Message (Advanced Function "Fine-Grain Selectors")	
Encryption algorithm	3des-cbc (default)	
	Key	V6LC-111--12345678901234
Authentication algorithm	hmac-sha1 (default)	
	key	V6LC-111--1234567890

    - SA2 (Transport mode, Binding Acknowledgement)

SPI	0x112 (274)	
Source address	HA0	3ffe:501:ffff:100:200:ff:fe00:a0a0
Destination address	MR HoA(HNP)	3ffe:501:ffff:100:: <Nut.egress>
Mode	ESP Transport	
Upper Layer	Mobility Header (default)	
	Binding Acknowledgement Message (Advanced Function "Fine-Grain Selectors")	
Encryption algorithm	3des-cbc (default)	
	key	V6LC-112--12345678901234
Authentication algorithm	hmac-sha1 (default)	
	key	V6LC-112--1234567890

  - MR-HA0 SA3/SA4, Tunnel mode, Return Routability Signaling
    - SA3 (Tunnel mode, Home Test Init)

SPI	0x113 (275)		
Source address	MR HoA(HNP)		3ffe:501:ffff:100:: <Nut.egress>
Destination address	HA0		3ffe:501:ffff:100:200:ff:fe00:a0a0
Mode	ESP Tunnel		
Upper Layer		Mobility Header (default)	
		Home Test Init Message (Advanced Function "Fine-Grain Selectors")	
Encryption algorithm	3des-cbc (default)		
	key	V6LC-113--12345678901234	
Authentication algorithm	hmac-sha1 (default)		
	key	V6LC-113--1234567890	

- SA4 (Tunnel mode, Home Test)

SPI	0x114 (276)		
Source address	HA0		3ffe:501:ffff:100:200:ff:fe00:a0a0
Destination address	MR HoA(HNP)		3ffe:501:ffff:100:: <Nut.egress>
Mode	ESP Tunnel		
Upper Layer		Mobility Header (default)	
		Home Test Message (Advanced Function "Fine-Grain Selectors")	
Encryption algorithm	3des-cbc (default)		
	key	V6LC-114--12345678901234	
Authentication algorithm	hmac-sha1 (default)		
	key	V6LC-114--123456	

➢ MR-HA0 SA5, Transport mode, Prefix Discovery

- SA5 (Transport mode, Mobile Prefix Solicitation)

SPI	0x115 (277)		
Source address	MR HoA(HNP)		3ffe:501:ffff:100:: <Nut.egress>
Destination address	HA0		3ffe:501:ffff:100:200:ff:fe00:a0a0
Mode	ESP Transport		
Upper Layer		ICMP Header (default)	
		Mobile Prefix Solicitation Message (Advanced Function "Fine-Grain Selectors")	
Encryption algorithm	3des-cbc (default)		
	key	V6LC-115--12345678901234	
Authentication algorithm	hmac-sha1 (default)		
	key	V6LC-115--1234567890	

- SA6 (Transport mode, Mobile Prefix Advertisement)

SPI	0x116 (278)		
Source address	HA0		3ffe:501:ffff:100:200:ff:fe00:a0a0
Destination address	MR HoA(HNP)		3ffe:501:ffff:100:: <Nut.egress>
Mode	ESP Transport		

Upper Layer		ICMP Header (default)
		Mobile Prefix Advertisement Message (Advanced Function "Fine-Grain Selectors")
Encryption algorithm	3des-cbc (default)	
	key	V6LC-116--12345678901234
Authentication algorithm	hmac-sha1 (default)	
	key	V6LC-116--1234567890

- MR-HA0 SA7/SA8, Tunnel mode, Payload Packets
  - SA7 (Tunnel mode, Payload Packets)

SPI	0x117 (279)	
Source address	MR HoA(HNP)	3ffe:501:ffff:100:: <Nut.egress>
Destination address	HA0	3ffe:501:ffff:100:200:ff:fe00:a0a0
Mode	ESP Tunnel	
Upper Layer		X (No using)
Encryption algorithm	3des-cbc	
	key	V6LC-117--12345678901234
Authentication algorithm	hmac-sha1	
	key	V6LC-117--1234567890

  - SA8 (Tunnel mode, Payload Packets)

SPI	0x118 (280)	
Source address	HA0	3ffe:501:ffff:100:200:ff:fe00:a0a0
Destination address	MR HoA(HNP)	3ffe:501:ffff:100:: <Nut.egress>
Mode	ESP Tunnel	
Upper Layer		X (No using)
Encryption algorithm	3des-cbc	
	Key	V6LC-118--12345678901234
Authentication algorithm	hmac-sha1	
	key	V6LC-118--123456

- MR-HA0 SA9/SA10, Tunnel mode, Payload Packets that belong to Mobile Network Prefix
  - SA9 (Tunnel mode, Payload Packets that belong to Mobile Network Prefix)

SPI	0x119 (281)	
Source address	MR HoA(HNP)	3ffe:501:ffff:100:: <Nut.egress>
Destination address	HA0	3ffe:501:ffff:100:200:ff:fe00:a0a0
Mode	ESP Tunnel	
Upper Layer		X (No using)
Encryption algorithm	3des-cbc	
	key	V6LC-119--12345678901234
Authentication algorithm	hmac-sha1	
	key	V6LC-119--123456

- SA10 (Tunnel mode, Payload Packets that belong to Mobile Network Prefix)

SPI	0x11a (282)	
Source address	HA0	3ffe:501:ffff:100:200:ff:fe00:a0a0
Destination address	MR HoA(HNP)	3ffe:501:ffff:100:: <Nut.egress>
Mode	ESP Tunnel	
Upper Layer		X (No using)
Encryption algorithm	3des-cbc	
	key	V6LC-11A--12345678901234
Authentication algorithm	hmac-sha1	
	key	V6LC-11A--123456

➢ MR-HA1 SA1/SA2, Transport mode, Binding Update/Binding Acknowledgement

- SA1 (Transport mode, Binding Update)

SPI	0x211 (529)	
Source address	MR HoA(HNP)	3ffe:501:ffff:100:: <Nut.egress>
Destination address	HA1	3ffe:501:ffff:100:200:ff:fe00:a1a1
Mode	ESP Transport	
Upper Layer		Mobility Header (default)
		Binding Update Message (Advanced Function "Fine-Grain Selectors")
Encryption algorithm	3des-cbc (default)	
	key	V6LC-211--12345678901234
Authentication algorithm	hmac-sha1 (default)	
	key	V6LC-211--1234567890

- SA2 (Transport mode, Binding Acknowledgement)

SPI	0x212 (530)	
Source address	HA1	3ffe:501:ffff:100:200:ff:fe00:a1a1
Destination address	MR HoA(HNP)	3ffe:501:ffff:100:: <Nut.egress>
Mode	ESP Transport	
Upper Layer		Mobility Header (default)
		Binding Acknowledgement Message (Advanced Function "Fine-Grain Selectors")
Encryption algorithm	3des-cbc (default)	
	key	V6LC-212--12345678901234
Authentication algorithm	hmac-sha1 (default)	
	key	V6LC-212--1234567890

➢ MR-HA1 SA3/SA4, Tunnel mode, Return Routability Signaling

- SA3 (Tunnel mode, Home Test Init)

SPI	0x213 (531)	
Source address	MR HoA(HNP)	3ffe:501:ffff:100:: <Nut.egress>
Destination address	HA1	3ffe:501:ffff:100:200:ff:fe00:a1a1
Mode	ESP Tunnel	

Upper Layer		Mobility Header (default)
		Home Test Init Message (Advanced Function "Fine-Grain Selectors")
Encryption algorithm	3des-cbc	
	key	V6LC-213--12345678901234
Authentication algorithm	hmac-sha1	
	key	V6LC-213--1234567890

- SA4 (Tunnel mode, Home Test)

SPI	0x214 (532)	
Source address	HA1	3ffe:501:ffff:100:200:ff:fe00:a1a1
Destination address	MR HoA(HNP)	3ffe:501:ffff:100:: <Nut.egress>
Mode	ESP Tunnel	
Upper Layer		Mobility Header (default)
		Home Test Message (Advanced Function "Fine-Grain Selectors")
Encryption algorithm	3des-cbc (default)	
	key	V6LC-214--12345678901234
Authentication algorithm	hmac-sha1 (default)	
	key	V6LC-214--123456

➢ MR-HA1 SA5/SA6, Transport mode, Prefix Discovery

- SA5 (Transport mode, Mobile Prefix Solicitation)

SPI	0x215 (533)	
Source address	MR HoA(HNP)	3ffe:501:ffff:100:: <Nut.egress>
Destination address	HA1	3ffe:501:ffff:100:200:ff:fe00:a1a1
Mode	ESP Transport	
Upper Layer		ICMP Header (default)
		Mobile Prefix Solicitation Message (Advanced Function "Fine-Grain Selectors")
Encryption algorithm	3des-cbc (default)	
	key	V6LC-215--12345678901234
Authentication algorithm	hmac-sha1 (default)	
	key	V6LC-215--1234567890

- SA6 (Transport mode, Prefix Discovery)

SPI	0x216 (534)	
Source address	HA1	3ffe:501:ffff:100:200:ff:fe00:a1a1
Destination address	MR HoA(HNP)	3ffe:501:ffff:100:: <Nut.egress>
Mode	ESP Transport	
Upper Layer		ICMP Header (default)
		Mobile Prefix Advertisement Message (Advanced Function "Fine-Grain Selectors")
Encryption	3des-cbc (default)	

algorithm	key	V6LC-216--12345678901234
Authentication algorithm	hmac-sha1 (default)	
	key	V6LC-216--1234567890

- MR-HA1 SA7/SA8, Tunnel mode, Payload Packets
  - SA7 (Tunnel mode, Payload Packets)

SPI	0x217 (535)	
Source address	MR HoA(HNP)	3ffe:501:ffff:100:: <Nut.egress>
Destination address	HA1	3ffe:501:ffff:100:200:ff:fe00:a1a1
Mode	ESP Tunnel	
Upper Layer	X (No using)	
Encryption algorithm	3des-cbc	
	key	V6LC-217--12345678901234
Authentication algorithm	hmac-sha1	
	key	V6LC-217--1234567890

  - SA8 (Tunnel mode, Payload Packets)

SPI	0x218 (536)	
Source address	HA1	3ffe:501:ffff:100:200:ff:fe00:a1a1
Destination address	MR HoA(HNP)	3ffe:501:ffff:100:: <Nut.egress>
Mode	ESP Tunnel	
Upper Layer	X (No using)	
Encryption algorithm	3des-cbc	
	key	V6LC-218--12345678901234
Authentication algorithm	hmac-sha1	
	key	V6LC-218--123456

- MR-HA1 SA9/SA10, Tunnel mode, Payload Packets that belong to Mobile Network Prefix
  - SA9 (Tunnel mode, Payload Packets that belong to Mobile Network Prefix)

SPI	0x219 (537)	
Source address	MR HoA(HNP)	3ffe:501:ffff:100:: <Nut.egress>
Destination address	HA1	3ffe:501:ffff:100:200:ff:fe00:a1a1
Mode	ESP Tunnel	
Upper Layer	X (No using)	
Encryption algorithm	3des-cbc	
	Key	V6LC-218--12345678901234
Authentication algorithm	hmac-sha1	
	Key	V6LC-218--123456

  - SA10 (Tunnel mode, Payload Packets)

SPI	0x21a (538)	
Source address	HA1	3ffe:501:ffff:100:200:ff:fe00:a1a1
Destination address	MR HoA(HNP)	3ffe:501:ffff:100:: <Nut.egress>

Mode	ESP Tunnel	
Upper Layer		X (No using)
Encryption algorithm	3des-cbc	
	Key	V6LC-218--12345678901234
Authentication algorithm	hmac-sha1	
	key	V6LC-218--123456

4 Common Initialization

None

5 Common Packets

5.1 ICMPv6 Router Solicitation

5.1.1 Router Solicitation

IPv6 Header	Source Address	(link-local/global)
	Destination Address	(All-routers multicast address)
ICMPv6 Header	Type	133
Source Link Layer Option	Type	1
	Link Layer Address	(ether)

5.2 ICMPv6 Router Advertisement

5.2.1 Router Advertisement (Router)

IPv6 Header	Source Address	(link-local)
	Destination Address	(All-nodes multicast address)
ICMPv6 Header	Type	134
	H Flag	0
Prefix Information Option	Type	3
	A Flag	1
	R Flag	0/1
	Prefix	(prefix/global)

5.2.2 Router Advertisement (Home Agent)

IPv6 Header	Source Address	(link-local)
	Destination Address	(All-nodes multicast address)
ICMPv6	Type	134
	H Flag	1
Prefix Information Option	Type	3
	R Flag	1
	Prefix	(global)
Home Agent Information Option	Type	8
	R Flag	1
	Preference	>0
	Lifetime	>0

5.3 ICMPv6 Neighbor Solicitation

5.3.1 Neighbor Solicitation (Duplicate Address Detection)

IPv6 Header	Source Address	0::0 (Unspecified address)
	Destination Address	(Solicited-node multicast address)
ICMPv6 Header	Type	135
	Target Address	(link-local/global)

5.3.2 Neighbor Solicitation (Address Resolution)

IPv6 Header	Source Address	(link-local/global)
	Destination Address	(Solicited-node multicast address)
ICMPv6 Header	Type	135
	Target Address	(global)
Source Link Layer Option	Type	1
	Link Layer Address	(ether)

5.3.3 Neighbor Solicitation (Neighbor Unreachability Detection)

IPv6 Header	Source Address	(link-local/global)
	Destination Address	(link-local/global)
ICMPv6 Header	Type	135
	Target Address	(link-Local/global)

5.4 ICMPv6 Neighbor Advertisement

5.4.1 Neighbor Advertisement (unsolicited)

IPv6 Header	Source Address	(link-local/global)
	Destination Address	(All-nodes multicast address)
ICMPv6 Header	Type	136
	R Flag	1
	S Flag	0
	Target Address	(link-local/global)
Target Link Layer Option	Type	2
	Link Layer Address	(ether)

5.4.2 Neighbor Advertisement (solicited)

IPv6 Header	Source Address	(link-local/global)
	Destination Address	(link-local/global)
ICMPv6 Header	Type	136
	R Flag	1
	S Flag	1
	Target Address	(link-local/global)
Target Link Layer Option	Type	2
	Link Layer Address	(ether)

5.5 ICMPv6 Destination Unreachable

5.5.1 Destination Unreachable

IPv6 Header	Source Address	(global)
	Destination Address	(global)
ICMPv6 Header	Type	1
	Code	3
	Payload Data	Any

5.5.2 Destination Unreachable (tunneled)

IPv6 Header	Source Address	(global)
	Destination Address	(global)
IPv6 Header	Source Address	(global)
	Destination Address	(global)
ICMPv6 Header	Type	1
	Code	3
	Payload Data	Any

5.6 ICMPv6 Parameter Problem

5.6.1 Parameter Problem

IPv6 Header	Source Address	(global)
	Destination Address	(global)
ICMPv6 Header	Type	4
	Code	0/1/2
	Pointer	Any
	Payload Data	Any

5.6.2 Parameter Problem (tunneled)

IPv6 Header	Source Address	(global)
	Destination Address	(global)
IPv6 Header	Source Address	(global)
	Destination Address	(global)
ICMPv6 Header	Type	4
	Code	0/1/2
	Pointer	Any
	Payload Data	Any

5.7 ICMPv6 Echo request

5.7.1 Echo request

IPv6 Header	Source Address	(global)
	Destination Address	(global)
ICMPv6 Header	Type	128
	Code	0
	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

5.7.2 Echo request (tunneled)

IPv6 Header	Source Address	(global)
	Destination Address	(global)
IPv6 Header	Source Address	(global)
	Destination Address	(global)
ICMPv6 Header	Type	128
	Code	0
	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

5.7.3 Echo request w/ Type2 Routing Header

IPv6 Header	Source Address	HA/CN (global)
	Destination Address	MR (care-of, global)
Type 2 Routing Header	Home Address	MR (home, global)
ICMPv6 Header	Type	128
	Code	0
	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

5.7.4 Echo request w/ Home Address option (tunneled)

IPv6 Header	Source Address	(global)
	Destination Address	(global)
IPv6 Header	Source Address	MR (care-of, global)
	Destination Address	HA/CN (global)
Destination Option Header	Home Address	MR (home, global)
ICMPv6 Header	Type	128
	Code	0
	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

5.7.5 Echo request w/ Type2 Routing Header and Home Address option

IPv6 Header	Source Address	MR B (care-of, global)
	Destination Address	MR A (care-of, global)
Type 2 Routing Header	Home Address	MR A (home, global)
Destination Option Header	Home Address	MR B (home, global)
ICMPv6 Header	Type	128
	Code	0
	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

5.8 ICMPv6 Echo reply

5.8.1 Echo reply

IPv6 Header	Source Address	(global)
	Destination Address	(global)
ICMPv6 Header	Type	129
	Code	0
	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

5.8.2 Echo reply (tunneled)

IPv6 Header	Source Address	(global)
	Destination Address	(global)
IPv6 Header	Source Address	(global)
	Destination Address	(global)
ICMPv6 Header	Type	129
	Code	0
	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

5.8.3 Echo reply w/ Home Address option

IPv6 Header	Source Address	MR (care-of, global)
	Destination Address	HA/CN (global)
Destination Option Header	Home Address	MR (home, global)
ICMPv6 Header	Type	129
	Code	0
	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

5.8.4 Echo reply w/ Type2 Routing Header and Home Address option

IPv6 Header	Source Address	MR-A (care-of, global)
	Destination Address	MR-B (care-of, global)
Type 2 Routing Header	Home Address	MR-B (home, global)
Destination Option Header	Home Address	MR-A (home, global)
ICMPv6 Header	Type	129
	Code	0
	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

5.9 Binding refresh Request

5.9.1 Binding refresh Request

IPv6 Header	Source Address	CN (global)
	Destination Address	MR (home, global)
Mobility Header	Payload Proto	59
	Header Len	0
	MH Type	0
	Reserved	0
	Checksum	Any
	Reserved	0

5.9.2 Binding refresh Request (tunneled)

- Basic

IPv6 Header	Source Address	HA (global)
	Destination Address	MR (care-of, global)
Encapsulating Security Payload	Security Parameters Index	Any
	Sequence Number	Any
	Initialization Vector	Any
IPv6 Header	Source Address	CN (global)
	Destination Address	MR (home, global)
Mobility Header	Payload Proto	59
	Header Len	0
	MH Type	0
	Reserved	0
	Checksum	Any
	Reserved	0

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA (global)
	Destination Address	MR (care-of, global)
IPv6 Header	Source Address	CN (global)
	Destination Address	MR (home, global)
Mobility Header	Payload Proto	59
	Header Len	0
	MH Type	0
	Reserved	0
	Checksum	Any
	Reserved	0

5.10 MIPv6 Home Test Init

5.10.1 Home Test Init

IPv6 Header	Source Address	MR (home, global)
	Destination Address	CN (global)
Mobility Header	Payload Prot	59
	Header Len	1
	MH Type	1
	Reserved	0
	Checksum	Any
	Reserved	0
	Hot Init Cookie	Any

5.10.2 Home Test Init (tunneled)

IPv6 Header	Source Address	MR (care-of, global))
	Destination Address	HA (global)
Encapsulating Security Payload	Security Parameters Index	Any
	Sequence Number	Any
	Initialization Vector	Any
IPv6 Header	Source Address	MR (home, global)
	Destination Address	CN (global)
Mobility Header	Payload Prot	59
	Header Len	1
	MH Type	1
	Reserved	0
	Checksum	Any
	Reserved	0
	Hot Init Cookie	Any

5.10.3 Home Test Init (other tunneled)

- Basic

IPv6 Header	Source Address	(global)
	Destination Address	(global)
Encapsulating Security Payload	Security Parameters Index	Any
	Sequence Number	Any
	Initialization Vector	Any
IPv6 Header	Source Address	MR (home, global)
	Destination Address	CN (global)
Mobility Header	Payload Prot	59
	Header Len	1
	MH Type	1
	Reserved	0
	Checksum	Any
	Reserved	0
	Hot Init Cookie	Any

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	(global)
	Destination Address	(global)
IPv6 Header	Source Address	MR (home, global)
	Destination Address	CN (global)
Mobility Header	Payload Prot	59
	Header Len	1
	MH Type	1
	Reserved	0
	Checksum	Any
	Reserved	0
	Hot Init Cookie	Any

5.10.4 Home Test Init (tunneled tunneled)

IPv6 Header	Source Address	(global)
	Destination Address	(global)
IPv6 Header	Source Address	(global)
	Destination Address	(global)
Encapsulating Security Payload	Security Parameters Index	Any
	Sequence Number	Any
	Initialization Vector	Any
IPv6 Header	Source Address	VMN1 (global)
	Destination Address	CN0 (LinkZ, global)
Mobility Header	Payload Prot	59
	Header Len	1
	MH Type	1
	Reserved	0
	Checksum	Any
	Reserved	0
	Hot Init Cookie	Any

5.11 MIPv6 Care-of Test Init

5.11.1 Care-of Test Init

IPv6 Header	Source Address	MR (care-of, global)
	Destination Address	CN (global)
Mobility Header	Payload Prot	59
	Header Len	1
	MH Type	2
	Reserved	0
	Checksum	Any
	Reserved	0
	Care-of Init Cookie	Any

5.11.2 Care-of Test Init (other tunneled)

- Basic

IPv6 Header	Source Address	(global)
	Destination Address	(global)
Encapsulating Security Payload	Security Parameters Index	Any
	Sequence Number	Any
	Initialization Vector	Any
IPv6 Header	Source Address	MR (care-of, global)
	Destination Address	CN (global)
Mobility Header	Payload Prot	59
	Header Len	1
	MH Type	2
	Reserved	0
	Checksum	Any
	Reserved	0
	Care-of Init Cookie	Any

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	(global)
	Destination Address	(global)
IPv6 Header	Source Address	MR (care-of, global)
	Destination Address	CN (global)
Mobility Header	Payload Prot	59
	Header Len	1
	MH Type	2
	Reserved	0
	Checksum	Any
	Reserved	0
	Care-of Init Cookie	Any

5.12 MIPv6 Home Test

5.12.1 Home Test

IPv6 Header	Source Address	CN (global)
	Destination Address	MR (home, global)
Mobility Header	Payload Prot	59
	Header Len	2
	MH Type	3
	Reserved	0
	Checksum	Any
	Home Nonce Index	Any
	Home Init Cookie	0
	Home Keygen Token	Any

5.12.2 Home Test (tunneled)

IPv6 Header	Source Address	HA (global)
	Destination Address	MR (care-of, global)
Encapsulating Security Payload	Security Parameters Index	Any
	Sequence Number	Any
	Initialization Vector	Any
IPv6 Header	Source Address	CN (global)
	Destination Address	MR (home, global)
Mobility Header	Payload Prot	59
	Header Len	2
	MH Type	3
	Reserved	0
	Checksum	Any
	Home Nonce Index	Any
	Home Init Cookie	0
	Home Keygen Token	Any

5.12.3 Home Test (other tunneled)

- Basic

IPv6 Header	Source Address	(global)
	Destination Address	(global)
Encapsulating Security Payload	Security Parameters Index	Any
	Sequence Number	Any
	Initialization Vector	Any
IPv6 Header	Source Address	CN (global)
	Destination Address	MR (home, global)
Mobility Header	Payload Prot	59
	Header Len	2
	MH Type	3
	Reserved	0
	Checksum	Any
	Home Nonce Index	Any
	Home Init Cookie	0
	Home Keygen Token	Any

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	(global)
	Destination Address	(global)
IPv6 Header	Source Address	CN (global)
	Destination Address	MR (home, global)
Mobility Header	Payload Prot	59
	Header Len	2
	MH Type	3
	Reserved	0
	Checksum	Any
	Home Nonce Index	Any
	Home Init Cookie	0
	Home Keygen Token	Any

5.12.4 Home Test (tunneled tunneled)

IPv6 Header	Source Address	(global)
	Destination Address	(global)
IPv6 Header	Source Address	(global)
	Destination Address	(global)
Encapsulating Security Payload	Security Parameters Index	Any
	Sequence Number	Any
	Initialization Vector	Any
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	VMN1 (global)
Mobility Header	Payload Prot	59
	Header Len	2
	MH Type	3
	Reserved	0
	Checksum	Any
	Home Nonce Index	Any
	Home Init Cookie	0
	Home Keygen Token	Any

5.13 MIPv6 Care-of Test

5.13.1 Care-of Test

IPv6 Header	Source Address	CN (global)
	Destination Address (Care-of Address of Mobile Node)	MR (care-of, global)
Mobility Header	Payload Prot	59
	Header Len	2
	MH Type	4
	Reserved	0
	Checksum	Any
	Care-of Nonce Index	Any
	Care-of Init Cookie	Any
	Care-of Keygen Token	Any

5.13.2 Care-of Test (other tunneled)

- Basic

IPv6 Header	Source Address	(global)
	Destination Address	(global)
Encapsulating Security Payload	Security Parameters Index	Any
	Sequence Number	Any
	Initialization Vector	Any
IPv6 Header	Source Address	CN (global)
	Destination Address	MR (care-of, global)
Mobility Header	Payload Prot	59
	Header Len	2
	MH Type	4
	Reserved	0
	Checksum	Any
	Care-of Nonce Index	Any
	Care-of Init Cookie	Any
	Care-of Keygen Token	Any

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	(global)
	Destination Address	(global)
IPv6 Header	Source Address	CN (global)
	Destination Address	MR (care-of, global)
Mobility Header	Payload Prot	59
	Header Len	2
	MH Type	4
	Reserved	0
	Checksum	Any
	Care-of Nonce Index	Any
	Care-of Init Cookie	Any
	Care-of Keygen Token	Any

5.14 MIPv6 Binding Update

5.14.1 Binding Update to HA at foreign link

- Implicit mode

IPv6 Header	Source Address	MR (care-of, global)
	Destination Address	HA (global)
Destination Option Header	Home Address	MR (home, global)
Encapsulating Security Payload	Security Parameter Index	Any
	Sequence	Any
	Initialization Vector	Any
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	5
	Reserved	0
	Checksum	Any
	Sequence Number	Any
	A Flag	1
	H Flag	1
	L Flag	Any
	K Flag	Any
	M Flag	0
	R Flag	1
	Reserved	0
	Lifetime	Any
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	MR (care-of, global)

- Explicit mode

IPv6 Header	Source Address	MR (care-of, global)
	Destination Address	HA (global)
Destination Option Header	Home Address	MR (home, global)
Encapsulating Security Payload	Security Parameter Index	Any
	Sequence	Any
	Initialization Vector	Any
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	5
	Reserved	0
	Checksum	Any
	Sequence Number	Any
	A Flag	1
	H Flag	1
	L Flag	Any
	K Flag	Any
	M Flag	0
	R Flag	1
	Reserved	0
	Lifetime	Any
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	MR (care-of, global)
Mobile Network Prefix Option	Option Type	6
	Option Length	18
	Reserved	0
	Prefix Length	64
	Prefix	MNP

5.14.2 Binding Update to HA at home link

- w/ Home Address option

IPv6 Header	Source Address	MR (home, global)
	Destination Address	HA (global)
Destination Option Header	Home Address	MR (home, global)
Encapsulating Security Payload	Security Parameter Index	Any
	Sequence	Any
	Initialization Vector	Any
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	5
	Reserved	0
	Checksum	Any
	Sequence Number	Any
	A Flag	1
	H Flag	1
	L Flag	Any
	K Flag	Any
	M Flag	0
	R Flag	Any
	Reserved	0
	Lifetime	Any
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	MR (home)

- w/o Home Address option

IPv6 Header	Source Address	MR (home, global)
	Destination Address	HA (global)
Encapsulating Security Payload	Security Parameter Index	Any
	Sequence	Any
	Initialization Vector	Any
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	5
	Reserved	0
	Checksum	Any
	Sequence Number	Any
	A Flag	1
	H Flag	1
	L Flag	Any
	K Flag	Any
	M Flag	0
	R Flag	Any
	Reserved	0
	Lifetime	Any
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	MR (home)

5.14.3 Binding Update to CN at foreign link/home link

IPv6 Header	Source Address	MR (care-of/home, global)
	Destination Address	CN (global)
Destination Option Header	Home Address	MR (home, global)
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	5
	Reserved	0
	Checksum	Any
	Sequence Number	Any
	A Flag	Any
	H Flag	0
	L Flag	0
	K Flag	0
	R Flag	0
	Reserved	0
	Lifetime	Any
Nonce Indices Option	Option Type	4
	Option Length	4
	Home Nonce Index	Any
	Care-of Nonce Index	Any
Binding Authorization Data Option	Option Type	5
	Option Length	12
	Authenticator	Any

5.14.4 Binding Update to CN at home link

IPv6 Header	Source Address	MR (home, global)
	Destination Address	CN (global)
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	5
	Reserved	0
	Checksum	Any
	Sequence Number	Any
	A Flag	Any
	H Flag	0
	L Flag	0
	K Flag	0
	R Flag	0
	Reserved	0
	Lifetime	0
Nonce Indices Option	Option Type	4
	Option Length	4
	Home Nonce Index	Any
	Care-of Nonce Index	Any
Binding Authorization Data Option	Option Type	5
	Option Length	12
	Authenticator	Any

5.14.5 Binding Update to CN (other tunneled)

IPv6 Header	Source Address	(global)
	Destination Address	(global)
IPv6 Header	Source Address	MR (care-of, global)
	Destination Address	CN (global)
Destination Option Header	Home Address	MR (home, global)
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	5
	Reserved	0
	Checksum	Any
	Sequence Number	Any
	A Flag	Any
	H Flag	0
	L Flag	0
	K Flag	0
	R Flag	0
	Reserved	0
	Lifetime	Any
Nonce Indices Option	Option Type	4
	Option Length	4
	Home Nonce Index	Any
	Care-of Nonce Index	Any
Binding Authorization Data Option	Option Type	5
	Option Length	12
	Authenticator	Any

5.14.6 Binding Update to CN(other tunneled)

IPv6 Header	Source Address	(global)
	Destination Address	(global)
IPv6 Header	Source Address	MR (care-of, global)
	Destination Address	CN (global)
Destination Option Header	Home Address	MR (home, global)
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	5
	Reserved	0
	Checksum	Any
	Sequence Number	Any
	A Flag	Any
	H Flag	0
	L Flag	0
	K Flag	0
	R Flag	0
	Reserved	0
	Lifetime	Any
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	MR (home, global)
Nonce Indices Option	Option Type	4
	Option Length	4
	Home Nonce Index	Any
	Care-of Nonce Index	Any
Binding Authorization Data Option	Option Type	5
	Option Length	12
	Authenticator	Any

5.15 MIPv6 Binding Acknowledgement

5.15.1 Binding Acknowledge from HA at foreign link

IPv6 Header	Source Address	HA (global)
	Destination Address	MR (care-of, global)
Type2 Routing Header	Home Address	MR (home, global)
Encapsulating Security Payload	Security Parameter Index	Any
	Sequence	Any
	Initialization Vector	Any
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	6
	Reserved	0
	Checksum	Any
	Status	Any
	K Flag	Any
	R Flag	1
	Reserved	0
	Sequence	Any
	Lifetime	Any

5.15.2 Binding Acknowledge from HA at home link

- w/ Type2 Routing Header

IPv6 Header	Source Address	HA (global)
	Destination Address	MR (home, global)
Type2 Routing Header	Home Address	MR (home, global)
Encapsulating Security Payload	Security Parameter Index	Any
	Sequence	Any
	Initialization Vector	Any
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	6
	Reserved	0
	Checksum	Any
	Status	Any
	K Flag	Any
	R Flag	Any
	Reserved	0
	Sequence	Any
	Lifetime	Any

- w/o Type2 Routing Header

IPv6 Header	Source Address (Home Agent Address)	HA (global)
	Destination Address (Home Address of Mobile Node)	MR (home, global)
Encapsulating Security Payload	Security Parameter Index	Any
	Sequence	Any
	Initialization Vector	Any
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	6
	Reserved	0
	Checksum	Any
	Status	Any
	K Flag	0
	R Flag	Any
	Reserved	0
	Sequence	Any
	Lifetime	0

5.15.3 Binding Acknowledge from CN at foreign link/home link

IPv6 Header	Source Address	CN (global)
	Destination Address	MR (care-of/home, global)
Type2 Routing Header	Home Address of Mobile Node	MR (home, global)
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	6
	Reserved	0
	Checksum	Any
	Status	Any
	K Flag	Any
	R Flag	0
	Reserved	0
	Sequence	Any
	Lifetime	Any
Binding Authorization Data Option	Option Type	5
	Option Length	12
	Authenticator	Any

5.15.4 Binding Acknowledge from CN at home link

IPv6 Header	Source Address	CN (global)
	Destination Address	MR (home, global)
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	6
	Reserved	0
	Checksum	Any
	Status	Any
	K Flag	Any
	R Flag	0
	Reserved	0
	Sequence	Any
	Lifetime	0
Binding Authorization Data Option	Option Type	5
	Option Length	12
	Authenticator	Any

5.15.5 Binding Acknowledge to CN(other tunneled)

IPv6 Header	Source Address	(global)
	Destination Address	(global)
IPv6 Header	Source Address	CN (global)
	Destination Address	MR (care-of/home, global)
Type2 Routing Header	Home Address of Mobile Node	MR (home, global)
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	6
	Reserved	0
	Checksum	Any
	Status	Any
	K Flag	Any
	R Flag	0
	Reserved	0
	Sequence	Any
	Lifetime	Any
Binding Authorization Data Option	Option Type	5
	Option Length	12
	Authenticator	Any

5.15.6 Binding Acknowledge to HA(other tunneled)

IPv6 Header	Source Address	(global)
	Destination Address	(global)
IPv6 Header	Source Address	HA3 (global)
	Destination Address	VMN11 (global)
Type2 Routing Header	Home Address	VMN1 (global)
Encapsulating Security Payload	Security Parameter Index	Any
	Sequence	Any
	Initialization Vector	Any
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	6
	Reserved	0
	Checksum	Any
	Status	Any
	K Flag	0
	R Flag	0
	Reserved	0
	Sequence	Any
	Lifetime	Any
Binding Authorization Data Option	Option Type	5
	Option Length	12
	Authenticator	Any

5.16 MIPv6 Binding Error

5.16.1 Binding Error

IPv6 Header	Source Address	(global)
	Destination Address	(global)
Mobility Header	Payload Prot	59
	Header Len	2
	MH Type	7
	Reserved	0
	Checksum	Any
	Status	1/2
	Reserved	0
	Home Address of Mobile Node	MR(global)/unspecified

5.16.2 Binding Error (tunneled)

- Basic

IPv6 Header	Source Address	HA (global)
	Destination Address	MR (care-of, global)
Encapsulating Security Payload	Security Parameters Index	Any
	Sequence Number	Any
	Initialization Vector	Any
IPv6 Header	Source Address	CN (global)
	Destination Address	MR (global)
Mobility Header	Payload Prot	59
	Header Len	2
	MH Type	7
	Reserved	0
	Checksum	Any
	Status	1/2
	Reserved	0
	Home Address of Mobile Node#A	MR(global) /Unspecified

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA (global)
	Destination Address	MR (care-of, global)
IPv6 Header	Source Address	CN (global)
	Destination Address	MR (global)
Mobility Header	Payload Prot	59
	Header Len	2
	MH Type	7
	Reserved	0
	Checksum	Any
	Status	1/2
	Reserved	0
	Home Address of Mobile Node#A	MR(global) /Unspecified

5.16.3 Binding Error (other tunneled)

IPv6 Header	Source Address	(global)
	Destination Address	(global)
IPv6 Header	Source Address	CN (global)
	Destination Address	MR (global)
Mobility Header	Payload Prot	59
	Header Len	2
	MH Type	7
	Reserved	0
	Checksum	Any
	Status	1/2
	Reserved	0
	Home Address of Mobile Node#A	MR (global) /Unspecified

5.17 ICMP Home Agent Address Discovery Request

5.17.1 HAAD request

IPv6 Header	Source Address	MR (global)
	Destination Address	(Home-Agents anycast address)
ICMPv6 Header	Type	144
	Code	0
	Checksum	Any
	Identifier	Any
	R Flag	1
	Reserved	Any

5.18 ICMP Home Agent Address Discovery Reply

5.18.1 HAAD reply

IPv6 Header	Source Address	HA (global)
	Destination Address	MR (global)
ICMPv6 Header	Type	145
	Code	0
	Checksum	Any
	Identifier	Any
	R Flag	1
	Reserved	0
	Home agent Addresses	HAs (global)

5.19 ICMP Mobile Prefix Solicitation

5.19.1 MPS

IPv6 Header	Source Address	MR (care-of, global)
	Destination Address	HA (global)
Destination Option Header	Home Address of Mobile Node	MR (home, global)
Encapsulating Security Payload	Security Parameters Index	Any
	Sequence Number	Any
	Initialization Vector	Any
ICMPv6 Header	Type	146
	Code	0
	Checksum	Any
	Identifier	Any
	Reserved	0

5.20 ICMP Mobile Prefix Advertisement

5.20.1 MPA

IPv6 Header	Source Address	HA (global)
	Destination Address	MR (care-of, global)
Type2 Routing Header	Home Address	MR (home, global)
Encapsulating Security Payload	Security Parameters Index	Any
	Sequence Number	Any
	Initialization Vector	Any
ICMPv6 Header	Type	147
	Code	0
	Checksum	Any
	Identifier	Any
	M flag	0
	O flag	0
	Reserved	0

6. Test Specification: Mobile Router operation

6.1 Generate HoA

None

6.2 Generate CoA

6.2.1 NEMO-MR-3-2-1-1-001 - Generate CoA using RFC2462 at foreign-link

[PURPOSE]

NEMO-MR-3-2-1-1-001 - Generate CoA using RFC2462 at foreign-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

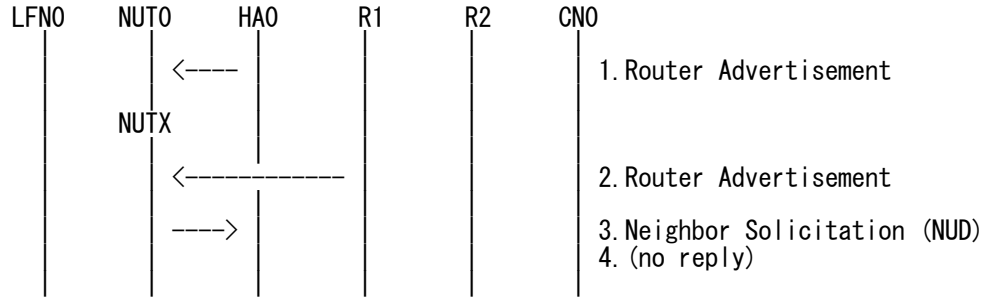
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

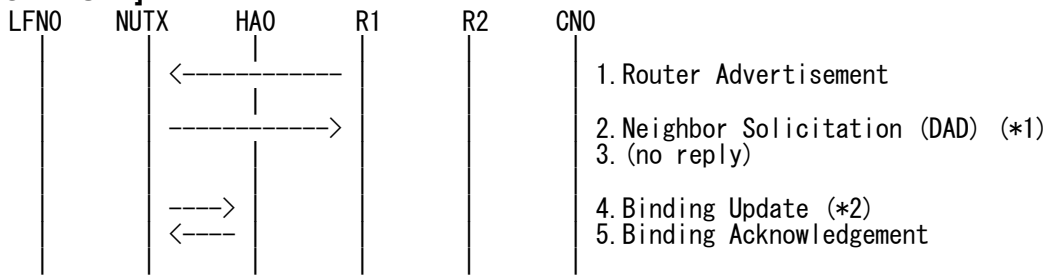


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Neighbor Solicitation (DAD).
   (0 -> solicited-node multicast) (*1) (Refer to 5.3.1)

IPv6 Header	Source Address	0::0 (Unspecified address)
	Destination Address	NUTX (LinkX, Solicited-node multicast address)
ICMPv6 Header	Type	135
	Target Address	NUT (LinkX, link-local)

3. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
4. Receive Binding Update. (NUTX -> HA0) (*2) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	5
	Reserved	0
	Checksum	Any
	Sequence Number	Any
	A Flag	1
	H Flag	1
	L Flag	Any
	K Flag	Any
	M Flag	0
	R Flag	1
	Reserved	0
	Lifetime	Any
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	5
	Reserved	0
	Checksum	Any
	Sequence Number	Any
	A Flag	1
	H Flag	1
	L Flag	Any
	K Flag	Any
	M Flag	0
	R Flag	1
	Reserved	0
	Lifetime	Any
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Option Type	6
	Option Length	18
	Reserved	0
	Prefix Length	64
	Prefix	MNP

5. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[JUDGMENT]

(*1) PASS: R1 receives Neighbor Solicitation (DAD).
Then, check whether this packet fills all of the following.
- The target address is a link local address.

(*2) PASS: HA0 receives Binding Update.
Then, check whether this packet fills all of the following.
- The Mobile Router Flag (R) is set to 1.
- Alternate Care-of Address option is set to a Care-of Address.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.6

RFC3775 Mobility Support in IPv6
See Section 11.5.2

6.3 Movement Detection

6.3.1 NEMO-MR-3-3-1-1-003 - Use Neighbor Unreachability Detection (Target Address=global)

[PURPOSE]

NEMO-MR-3-3-1-1-003 - Use Neighbor Unreachability Detection (Target Address=global)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

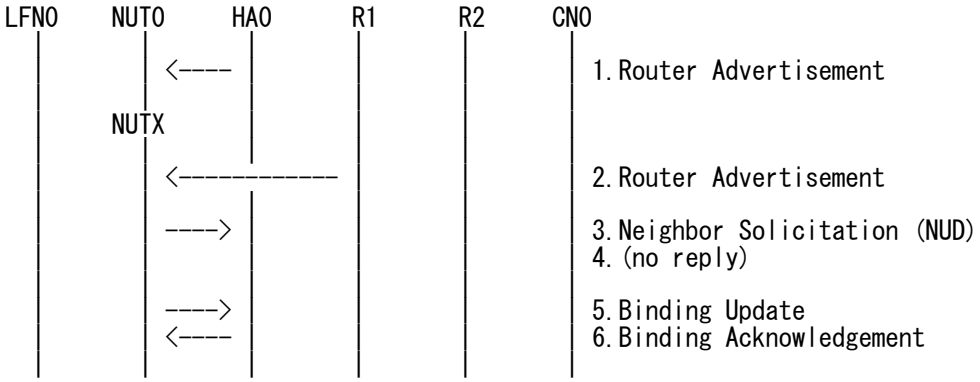
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

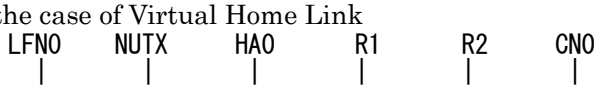
[INITIALIZATION]

- In the case of Real Home Link



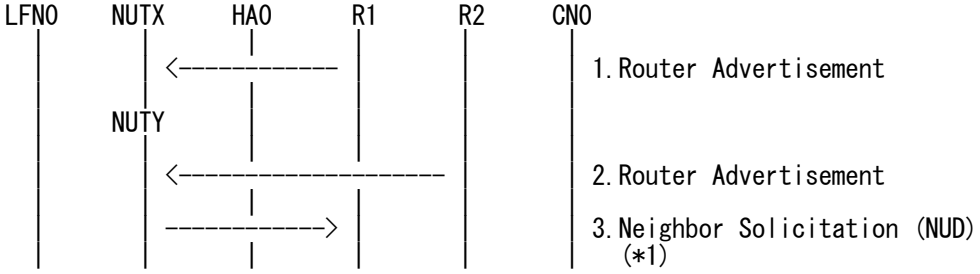
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Send Router Advertisement. (R2 -> R2_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUTX -> R1) (*1) (Refer to 5.3.3)

IPv6 Header	Source Address	NUTX (LinkX, global/link-local)
	Destination Address	R1 (LinkX, global/link-local)
ICMPv6 Header	Type	135
	Target Address	R1 (LinkX, global)

[JUDGMENT]

(*1) PASS: R1 receives Neighbor Solicitation (NUD).
Then, check whether this packet fills all of the following.
- The target address is set to R1 global address of Router Advertisement[1].

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.6

RFC3775 Mobility Support in IPv6
See Section 11.5.1

6.3.2 NEMO-MR-3-3-1-1-005 - Routers use the Router Address (R) bit (The link-local addresses of Routers are not globally unique)

[PURPOSE]

NEMO-MR-3-3-1-1-005 - Routers use the Router Address (R) bit (The link-local addresses of Routers are not globally unique)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

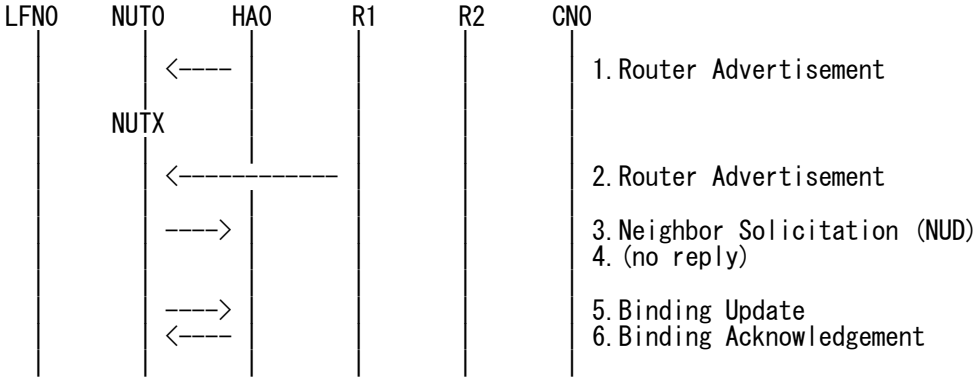
Refer to 2.1.1.2 Common Topology-2

[TEST SETUP]

Refer to 3.1 Common Setup-1

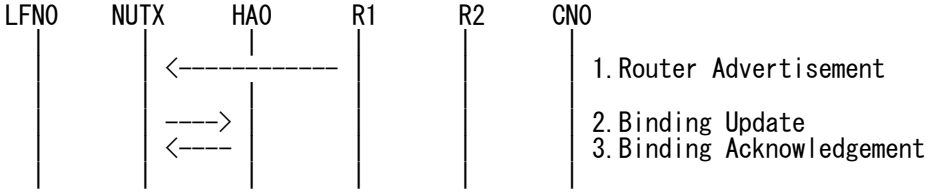
[INITIALIZATION]

- In the case of Real Home Link



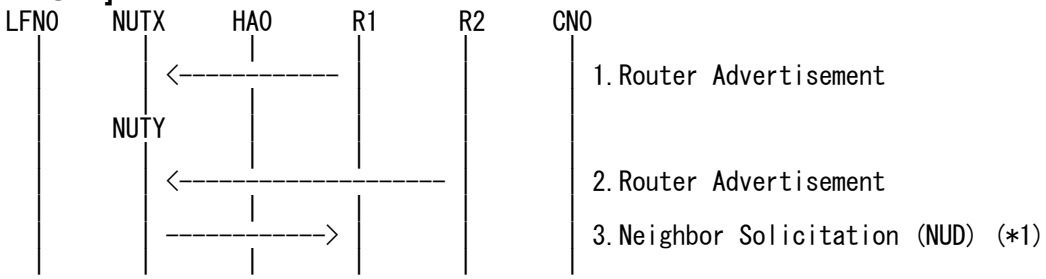
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
   # Link Local Address is same of R2 (fe80::200:ff:fe00:a4a4)
   # The Router Address (R) bit is ON, since that provides a global address of R1.
2. Send Router Advertisement. (R2 -> R2_allnode_multi) (Refer to 5.2.1)
   # Link Local Address is same of R1 (fe80::200:ff:fe00:a4a4)
   # The Router Address (R) bit is ON, since that provides a global address of R2.
3. Receive Neighbor Solicitation (NUD). (NUTX -> R1) (*1) (Refer to 5.3.3)

IPv6 Header	Source Address	NUTX (LinkX, global/link-local)
	Destination Address	R1(LinkX, global/link-local)
ICMPv6 Header	Type	135
	Target Address	R1 (LinkX, global)

[JUDGMENT]

(*1) PASS: R1 receives Neighbor Solicitation(NUD).
Then, check whether this packet fills all of the following.
- The target address is set to R1 global address of Router Advertisement[1].

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.6

RFC3775 Mobility Support in IPv6
See Section 11.5.1

6.3.3 NEMO-MR-3-3-1-1-002 - Use the old router when the old router is reachable

[PURPOSE]

NEMO-MR-3-3-1-1-002 - Use the old router when the old router is reachable

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

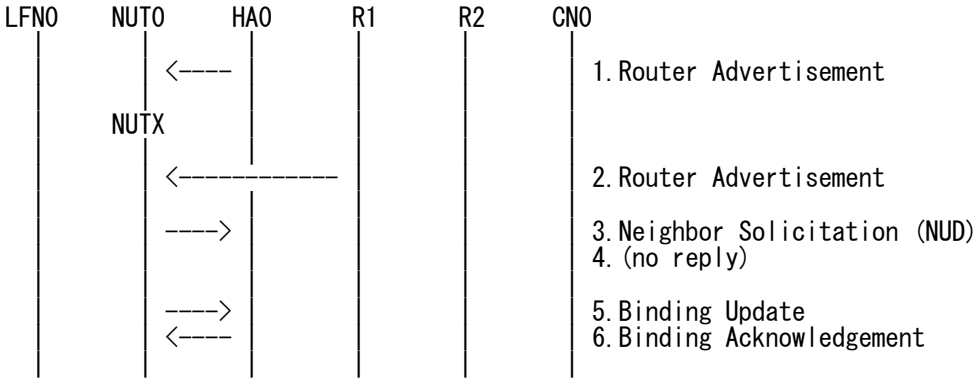
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

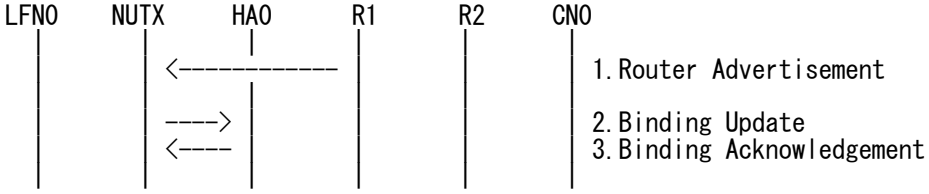
[INITIALIZATION]

- In the case of Real Home Link



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

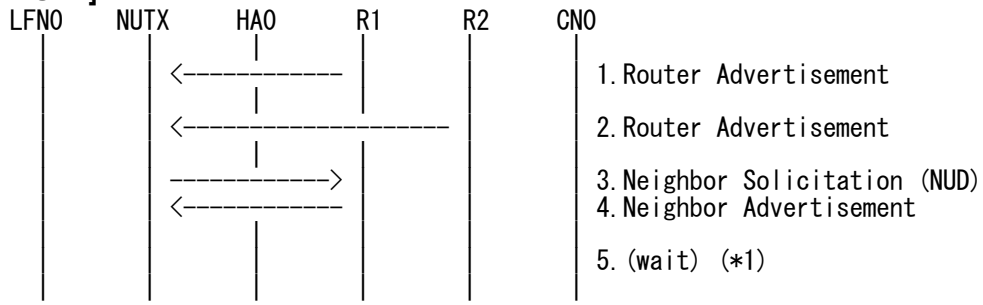
- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Send Router Advertisement. (R2 -> R2_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUTX -> R1) (Refer to 5.3.3)

IPv6 Header	Source Address	NUTX (LinkX, global/link-local)
	Destination Address	R1 (LinkX, global/link-local)
ICMPv6 Header	Type	135
	Target Address	R1 (LinkX, global)

4. Send Neighbor Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.4.2)

IPv6 Header	Source Address	R1 (LinkX, global/link-local)
	Destination Address	NUTX (LinkX, global/link-local)
ICMPv6 Header	Type	136
	R Flag	1
	S Flag	1
	Target Address	R1 (LinkX, global)
Target Link Layer Option	Link Layer Address	R1 (ether)

5. (wait) (*1)

[JUDGMENT]

(*1) PASS: HA0 does not receive Binding Update(Care-of Address NUTY).

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.6

RFC3775 Mobility Support in IPv6
See Section 11.5.1

6.3.4 NEMO-MR-3-3-1-1-004 - Invalidate CoA on the unreachable link

[PURPOSE]

NEMO-MR-3-3-1-1-004 - Invalidate CoA on the unreachable link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

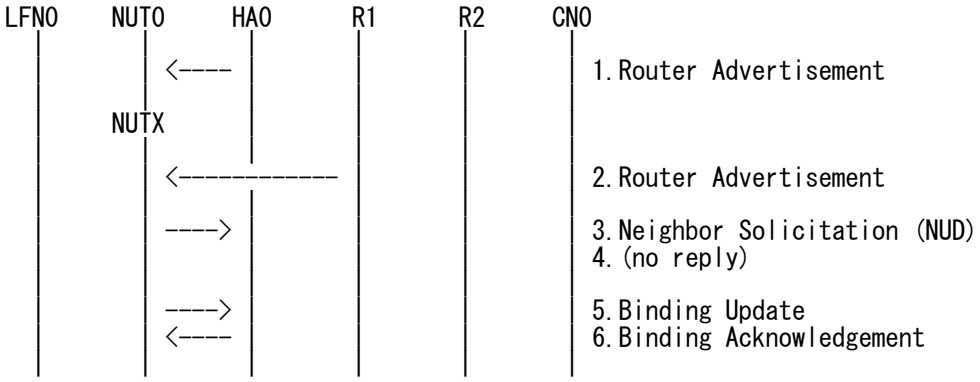
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

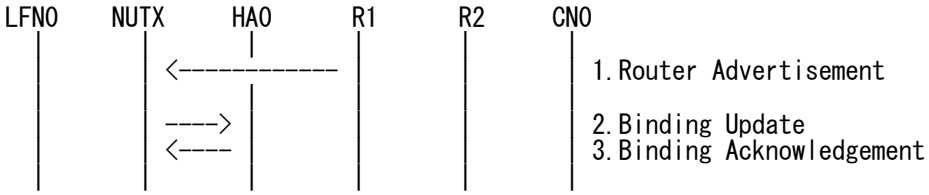
[INITIALIZATION]

- In the case of Real Home Link



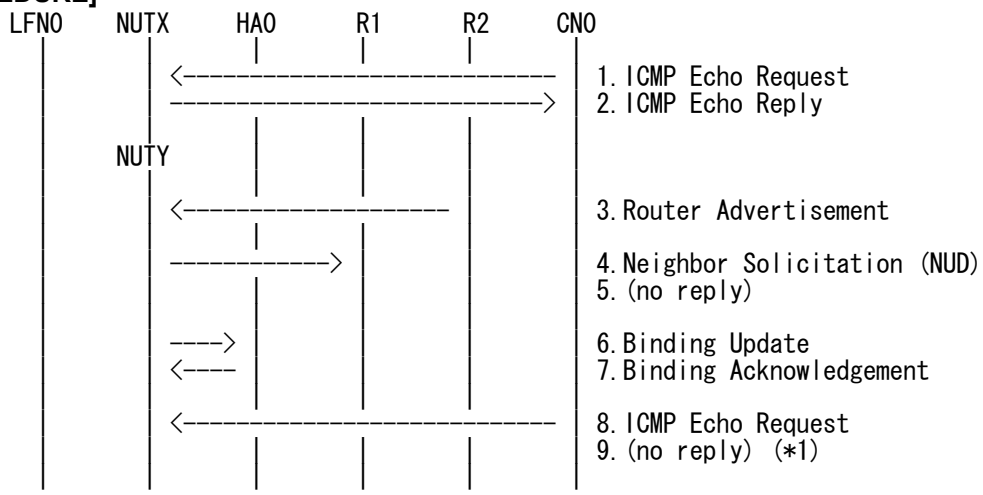
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[PROCEDURE]



1. Send ICMP Echo Request. (CN0 -> NUTX) (Refer to 5.7.1)
2. Receive ICMP Echo Reply. (NUTX -> CN0) (Refer to 5.8.1)
3. Send Router Advertisement. (R2 -> R2_allnode_multi) (Refer to 5.2.1)
4. Receive Neighbor Solicitation (NUD). (NUTX -> R1) (Refer to 5.3.3)
5. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
6. Receive Binding Update. (NUTY -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
7. Send Binding Acknowledgement. (HA0 -> NUTY) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.
8. Send ICMP Echo Request. (CN0 -> NUTX) (Refer to 5.7.1)
   # The Destination Address is set to old Care-of Address.

IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	NUTX (LinkX, global)
ICMPv6 Header	Type	128

9. (no reply) (*1)

[JUDGMENT]

(*1) PASS: CN0 does not receive ICMP Echo Reply.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6

See Section 11.5.3

6.4 Mobile Prefix Registration

6.4.1 Sending BU

6.4.1.1 NEMO-MR-2-1-1-1-001 - Sending BU (after moving from home)

[PURPOSE]
NEMO-MR-2-1-1-1-001 - Sending BU (after moving from home)

[CATEGORY]
ROUTER : BASIC FUNCTION

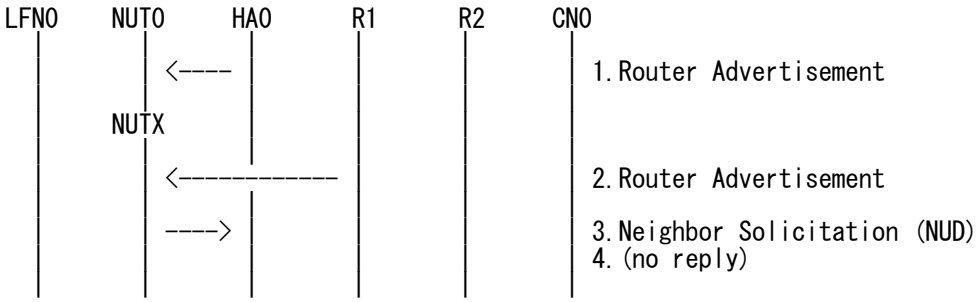
[REQUIREMENT OF TEST]
NONE

[TOPOLOGY]
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]
Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

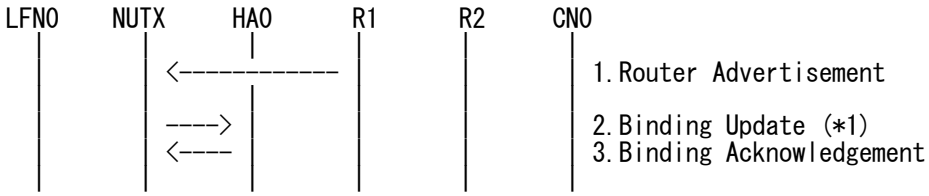


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	5
	Reserved	0
	Checksum	Any
	Sequence Number	Any
	A Flag	1
	H Flag	1
	L Flag	Any
	K Flag	Any
	M Flag	0
	R Flag	1
	Reserved	0
	Lifetime	Any
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	5
	Reserved	0
	Checksum	Any
	Sequence Number	Any
	A Flag	1
	H Flag	1
	L Flag	Any
	K Flag	Any
	M Flag	0
	R Flag	1
	Reserved	0
	Lifetime	Any
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Option Type	6
	Option Length	18
	Reserved	0
	Prefix Length	64
	Prefix	MNP

3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update,

Then, check whether this packet fills all of the following,

- The Acknowledge(A) bit is set to ON.
- The Home Registration(H) bit is set to ON.
- The Mobile Router Flag (R) is set to 1.
- The Reserved is cleared.
- The Home Address destination option is included, and,
  - This option is placed as the right location.
  - NUT generated a Home Address from the egress interface: YES
    -The Home Address field is set to the Home Address generated from the egress interface.

- NUT generated a Home Address from the ingress interface: YES
  -The Home Address field is set to the Home Address generated from the ingress interface.
- The Alternate Care-of Address mobility option is included, and,
  - The Care-of Address field is set to the Care-of Address.
- NUT implement explicit mode: YES
  - The Mobile Network Prefix option is included.
- NUT implement implicit mode: YES
  - The Mobile Network Prefix option is not included.
- The Nonce Indices mobility option is not included.
- The Binding Authorization Data mobility option is not included.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5, 5.1, 5.2, 9

RFC3775 Mobility Support in IPv6
See Section 11.7.1, 11.3.2, 11.5.3, 11.1

RFC3776 Using IPsec to Protect Mobile IPv6 Signaling Between Mobile Nodes and Home Agents
See Section 4.1, 4.2 4.3, 4.4

6.4.1.2 NEMO-MR-2-1-1-1-002 - Valid BU (L = ON) when HoA (from HNP)

[PURPOSE]

NEMO-MR-2-1-1-1-002 - Valid BU (L = ON) when HoA (from HNP)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

Home Address derived from the Home Network Prefix

[TOPOLOGY]

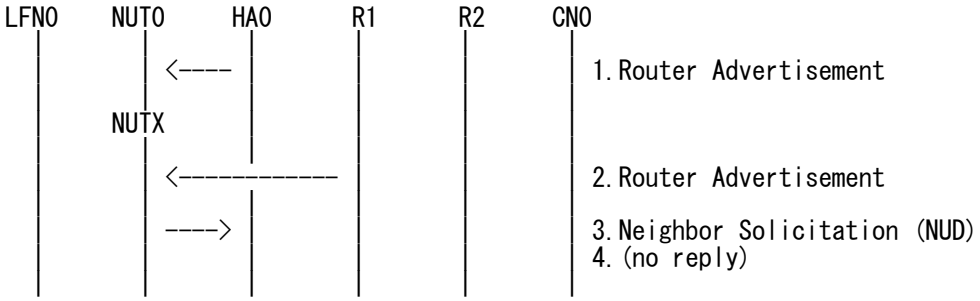
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

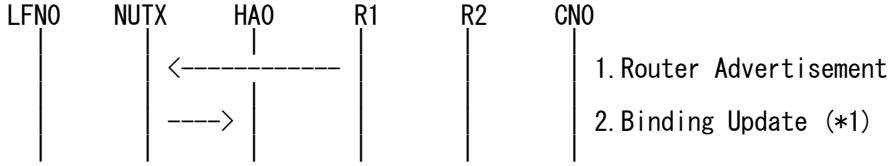


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Link-Local Address Compatibility(L) bit is set to ON.
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	L Flag	1
	R Flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	L Flag	1
	R Flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update,
Then, check whether this packet fills all of the following,
- The Link-Local Address Compatibility(L) bit is set to ON.
- The Mobile Router Flag (R) is set to 1.
- The Home Address destination option is included, and,
  - This option is placed as the right location.
  - The Home Address field is set to the Home Address generated from the egress interface.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.7.1

6.4.1.3 NEMO-MR-2-1-1-1-004 - Valid BU (K = OFF by manual key management)

[PURPOSE]

NEMO-MR-2-1-1-1-004 - Valid BU (K = OFF by manual key management)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NUT sets (K) bit in BU which is transmitted to HA: NO

[TOPOLOGY]

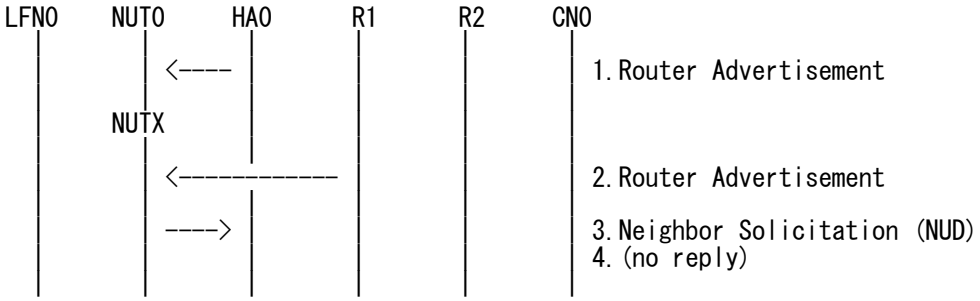
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

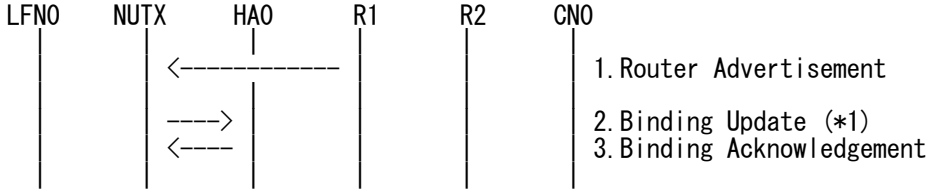


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router (R) bit is set to ON.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	K Flag	0
	R Flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	K Flag	0
	R Flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router (R) bit is set to ON.

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update,
Then, check whether this packet fills all of the following,
- The ESP Header is included.
- The Key Management Mobility Capability(K) bit is set to OFF.
- The Mobile Router (R) bit is set to ON.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.7.1, 6.1.7

6.4.1.4 NEMO-MR-2-1-1-1-006 - Valid Lifetime (Lifetime of HoA > Lifetime of CoA)

[PURPOSE]

NEMO-MR-2-1-1-1-006 - Valid Lifetime (Lifetime of HoA > Lifetime of CoA)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

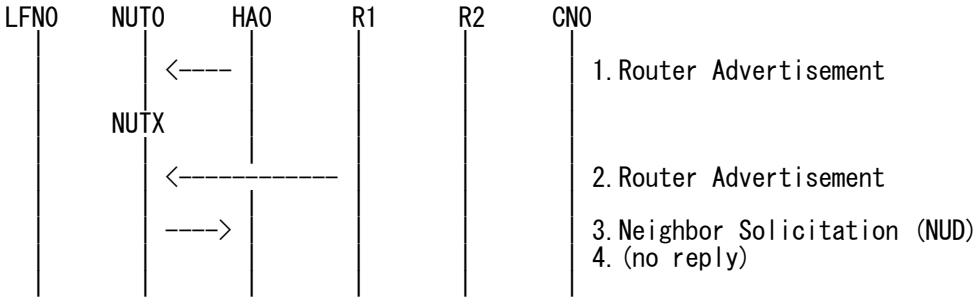
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
   # The Valid Lifetime field and the Preferred Lifetime field in the
   # Prefix Information option are set to 7200 (seconds).
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
   # The Valid Lifetime field and the Preferred Lifetime field in the
   # Prefix Information option are set to 100 (seconds).
2. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R Flag	1
	Lifetime	Any
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R Flag	1
	Lifetime	Any
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUT (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update,
Then, check whether this packet fills all of the following,
- The Lifetime field is set less than the remaining lifetime of the Care-of Address.
- The Mobile Router (R) bit is set to ON.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.7.1

RFC2462 IPv6 Stateless Address Autoconfiguration
See Section 5.5.3

6.4.1.5 NEMO-MR-2-1-1-1-007 - Valid Lifetime (Lifetime of HoA < Lifetime of CoA)

[PURPOSE]

NEMO-MR-2-1-1-1-007 - Valid Lifetime (Lifetime of HoA < Lifetime of CoA)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (REAL HOME LINK)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

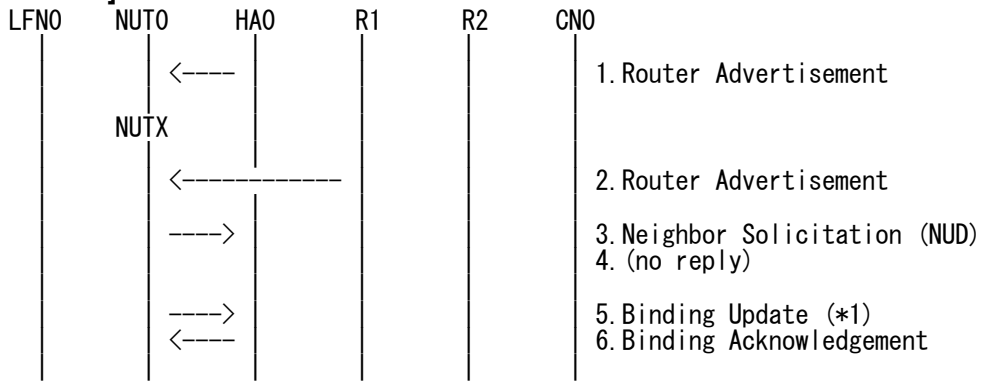
[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

NONE

[PROCEDURE]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
   # The Valid Lifetime field and the Preferred Lifetime field in the
   # Prefix Information option are set to 100 (seconds).
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
   # The Valid Lifetime field and the Preferred Lifetime field in the
   # Prefix Information option are set to 7200 (seconds).
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
5. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI

Mobility Header	MH Type	5
	R Flag	1
	Lifetime	Any
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R Flag	1
	Lifetime	Any
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update,
Then, check whether this packet fills all of the following,
- The Lifetime field is set less than the remaining lifetime of the Home Address.
- The Mobile Router Flag (R) is set to 1.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.7.1

RFC2462 IPv6 Stateless Address Autoconfiguration
See Section 5.5.3

6.4.1.6 NEMO-MR-2-1-1-1-008 - Sending BU (after the expiration of Mobile Network Prefix registration)

[PURPOSE]

NEMO-MR-2-1-1-1-008 - Sending BU (after the expiration of Mobile Network Prefix registration)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

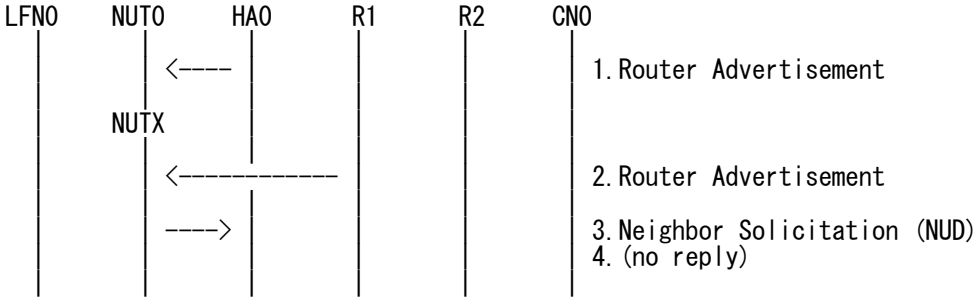
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

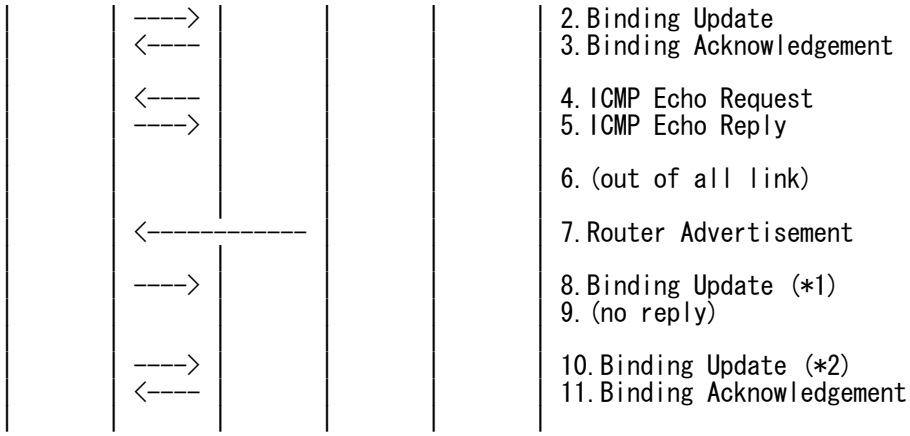


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Lifetime field is less than or equal to 60 seconds.
   # The Mobile Router Flag (R) is set to 1.
4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)
   - Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

   - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (Refer to 5.8.3)
   - Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

   - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. (out of all link)
   # home registration is expired
7. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
8. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5

Alternate Care-of Address Option	R Flag	1
	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

9. (no reply)
10. Receive Binding Update. (NUTX -> HA0) (*2) (Refer to 5.14.1)
    # The Mobile Router Flag (R) is set to 1.
11. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
    # The Mobile Router Flag (R) is set to 1.

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update.
- The Mobile Router Flag (R) is set to 1.

(*2) PASS: HA0 receives the retransmitted Binding Update.
Then, check whether this packet fills all of the following,
- The initial retransmission timer is set to InitialBindackTimeoutFirstReg.
- The Mobile Router Flag (R) is set to 1.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.7.1, 11.8

6.4.1.7 NEMO-MR-2-1-1-1-013 - Retransmissions & Back off (Use InitialBindackTimeoutFirstReg as the initial retransmission timer)

[PURPOSE]

NEMO-MR-2-1-1-1-013 - Retransmissions & Back off (Use InitialBindackTimeoutFirstReg as the initial retransmission timer)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NUT re-transmits BU to HA for valuable BA: YES/NO

[TOPOLOGY]

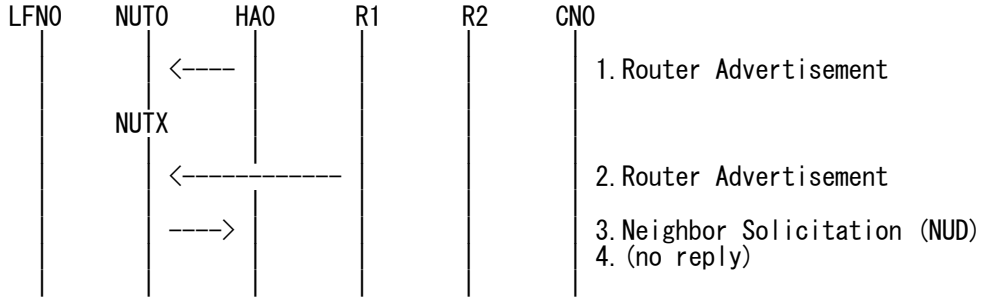
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

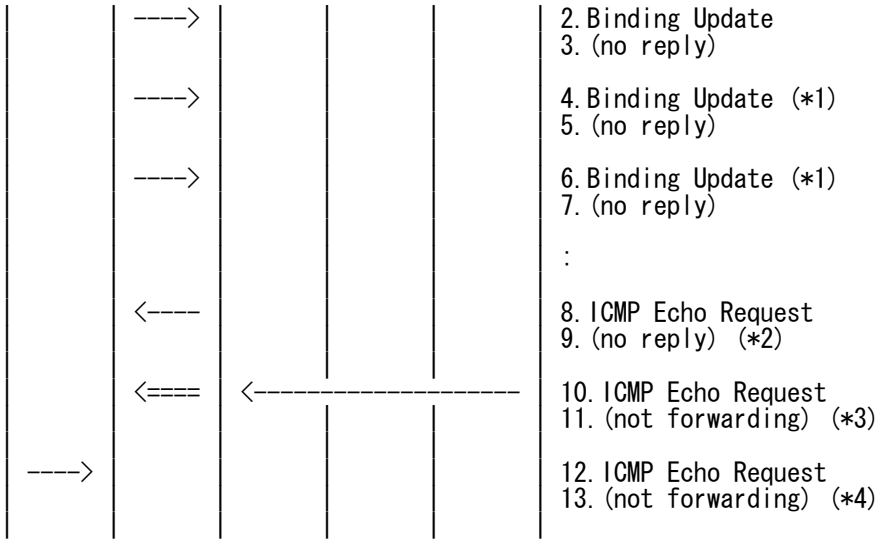


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. (no reply)
4. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	Sequence Number	Any
	R Flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	Sequence Number	Any
	R Flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

5. (no reply)
6. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
7. (no reply)
8. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)

Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

9. (no reply) (*2)
10. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> LFN0)

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

11. (not forwarding) (*3)
12. Send ICMP Echo Request. (LFN0 -> CN0)

IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128

13. (not forwarding) (*4)

[JUDGMENT]

The judgment changes by the following settings of "REQUIREMENT of TEST".

- NUT re-transmits BU to HA for valuable BA: YES
  (*1) PASS: HA0 receives the retransmitted Binding Update.
  Then, check whether this packet fills all of the following,
  - Sequence Number value greater than that used.
  - The Mobile Router Flag (R) is set to 1.
  - The initial retransmission timer is set to InitialBindackTimeoutFirstReg.
  - Timeout period is doubled upon each retransmission.
  - Transmit until the retransmission interval becomes MAX_BINDACK_TIMEOUT.

  (*2) PASS: HA0 does not receive ICMP Echo reply.
  (*3) PASS: LFN0 does not receive ICMP Echo Request.
  (*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

- NUT re-transmits BU to HA for valuable BA: NO
  (*1) PASS: HA0 does not receive retransmitted Binding Update.
  (*2) PASS: HA0 does not receive ICMP Echo reply.
  (*3) PASS: LFN0 does not receive ICMP Echo Request.
  (*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.8, 13, 11.7.1, 11.1

6.4.2 Receiving BA

6.4.2.1 NEMO-MR-2-2-1-1-001 - BU accepted (Status = 0 and R = ON)

[PURPOSE]

NEMO-MR-2-2-1-1-001 - BU accepted (Status = 0 and R = ON)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

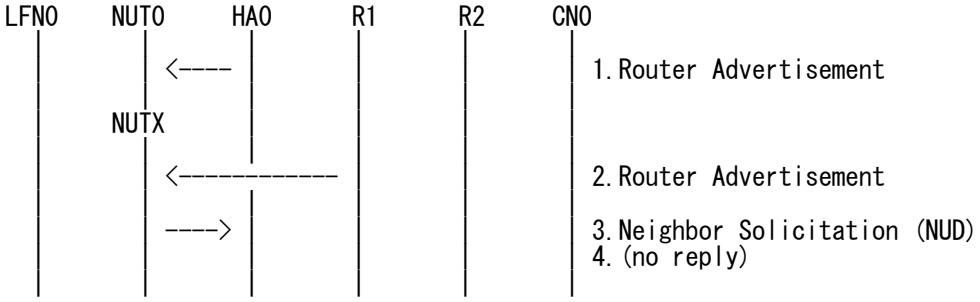
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

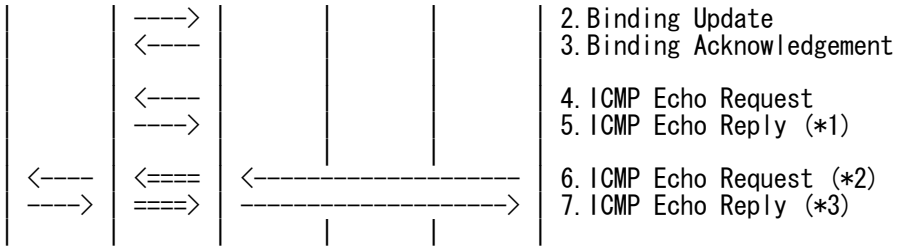


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0(Binding Update accepted).
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	0
	R Flag	1

4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)
   - Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

   - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (*1) (Refer to 5.8.3)
   - Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

   - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> LFN0) (Refer to 5.7.2)
   Receive ICMP Echo Request. (CN0 -> LFN0) (*2) (Refer to 5.7.1)

IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

7. Send ICMP Echo Reply. (LFN0 -> CN0) (Refer to 5.8.1)
   Receive ICMP Echo Reply. (out: NUTX -> HA0, in: LFN0 -> CN0) (*3) (Refer to 5.8.2)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129

[JUDGMENT]

(*1) PASS: HA0 receives ICMP Echo Reply with Home Address Option.

(*2) PASS: LFN0 receives ICMP Echo Request.

(*3) PASS: CN0 receives ICMP Echo Reply.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5, 5.3, 9

RFC3775 Mobility Support in IPv6

See Section 11.7.3, 9.2

RFC3776 Using IPsec to Protect Mobile IPv6 Signaling Between Mobile Nodes and Home Agents

See Section 4.1, 4.2, 4.3, 4.4

6.4.2.2 NEMO-MR-2-2-1-1-039 - BU accepted (Invalid Mobility Header Reserved)

[PURPOSE]

NEMO-MR-2-2-1-1-039 - BU accepted (Invalid Mobility Header Reserved)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

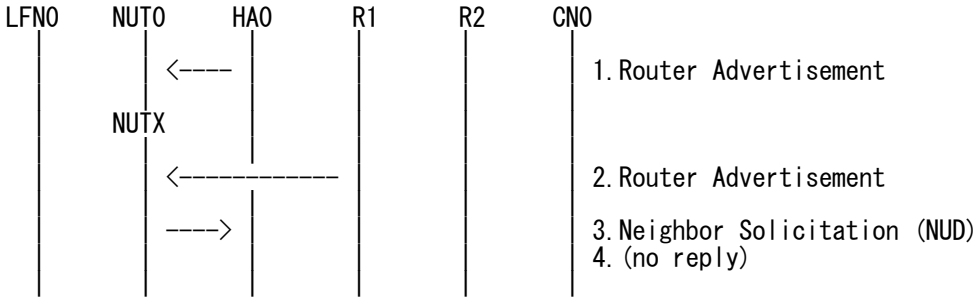
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

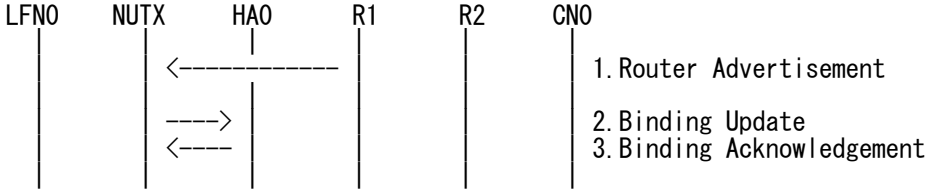


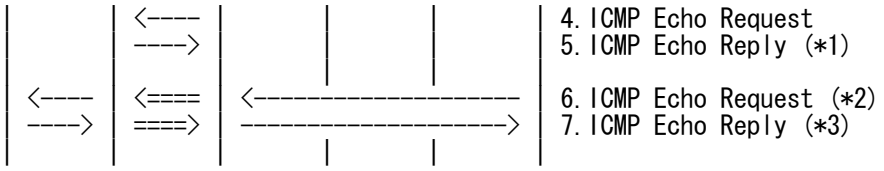
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0(Binding Update accepted).
   # The Mobile Router Flag (R) is set to 1.
   # The Reserved field is not set to 0.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Reserved	Any
	Status	0
	R Flag	1
	Reserved	Any

4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (*1) (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> LFN0) (Refer to 5.7.2)
   Receive ICMP Echo Request. (CN0 -> LFN0) (*2) (Refer to 5.7.1)

IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

7. Send ICMP Echo Reply. (LFN0 -> CN0) (Refer to 5.8.1)
   Receive ICMP Echo Reply. (out: NUTX -> HA0, in: LFN0 -> CN0) (*3) (Refer to 5.8.2)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129

[JUDGMENT]

(*1) PASS: HA0 receives ICMP Echo Reply with Home Address Option.

(*2) PASS: LFN0 receives ICMP Echo Request.

(*3) PASS: CN0 receives ICMP Echo Reply.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5

RFC3775 Mobility Support in IPv6

See Section 6.1.1, 6.1.8, 11.7.3, 9.2

6.4.2.3 NEMO-MR-2-2-1-1-014 - BU accepted (K = OFF by manual key management)

[PURPOSE]

NEMO-MR-2-2-1-1-014 - BU accepted (K = OFF by manual key management)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NUT sets (K) bit in BU which is transmitted to HA: NO

[TOPOLOGY]

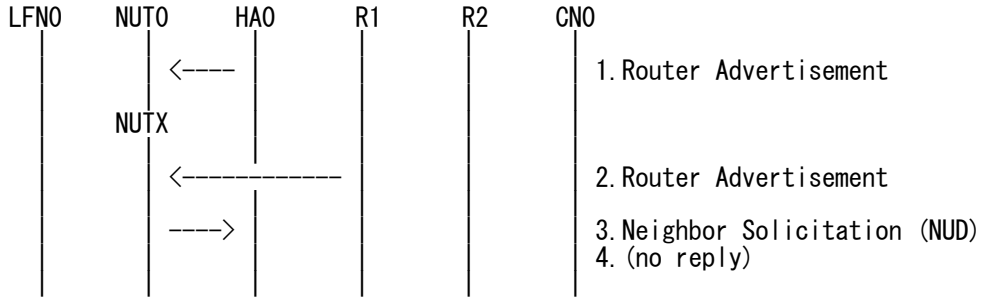
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

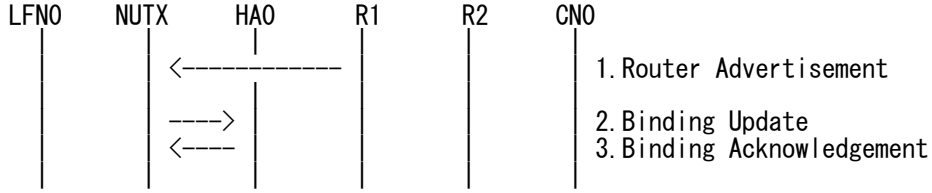


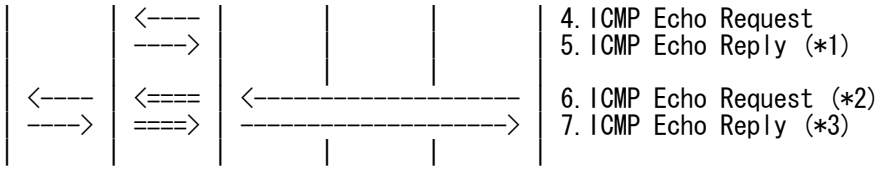
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0(Binding Update accepted).
   # The K bit field is set to 0.
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	0
	K flag	0
	R flag	1

4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)
   - Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

   - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (*1) (Refer to 5.8.3)
   - Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

   - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> LFN0) (*2) (Refer to 5.7.2)
   Receive ICMP Echo Request. (CN0 -> LFN0) (Refer to 5.7.1)

IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

7. Send ICMP Echo Reply. (LFN0 -> CN0) (Refer to 5.8.1)
   Receive ICMP Echo Reply. (out: NUTX -> HA0, in: LFN0 -> CN0) (*3) (Refer to 5.8.2)

IPv6 Header	Source Address	NUTX (LinkX, global)

	Destination Address	HA0 (Link0, global)
IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129

[JUDGMENT]

(*1) PASS: HA0 receives ICMP Echo Reply with Home Address Option.

(*2) PASS: LFN0 receives ICMP Echo Request.

(*3) PASS: CN0 receives ICMP Echo Reply.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5

RFC3775 Mobility Support in IPv6

See Section 11.7.3, 10.3.1

6.4.2.4 NEMO-MR-2-2-1-1-020 - Valid Lifetime (Lifetime of BA < Lifetime of BU)

[PURPOSE]

NEMO-MR-2-2-1-1-020 - Valid Lifetime (Lifetime of BA < Lifetime of BU)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

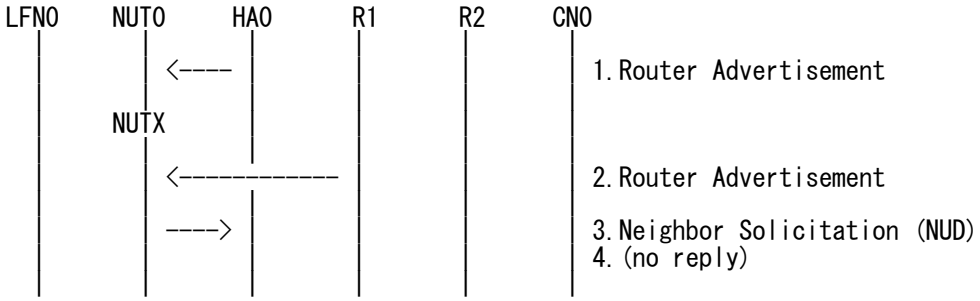
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

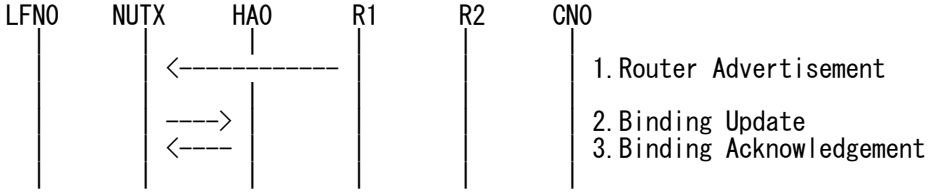


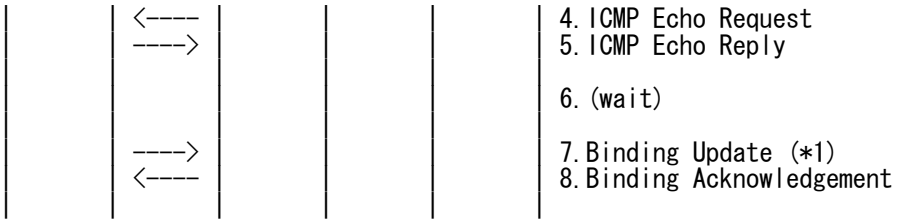
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation. (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.
   # The value of Lifetime is less than BU[2].
   # The Binding Refresh Advice mobility option is not included.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	R flag	1
	Lifetime	Less than BU[2]

4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. (wait)
   # Wait during a maximum of the lifetime value in the Binding Acknowledgement[3].
7. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
   - Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI

Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

8. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update before the expiration of the following period,
- The Mobile Router Flag (R) is set to 1.
- The remaining lifetime of the home registration set to the lifetime of the Binding Acknowledgement[3].

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.7.3

6.4.2.5 NEMO-MR-2-2-1-1-026 - Valid Lifetime (Refresh Interval of BA < Lifetime of BU)

[PURPOSE]

NEMO-MR-2-2-1-1-026 - Valid Lifetime (Refresh Interval of BA < Lifetime of BU)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

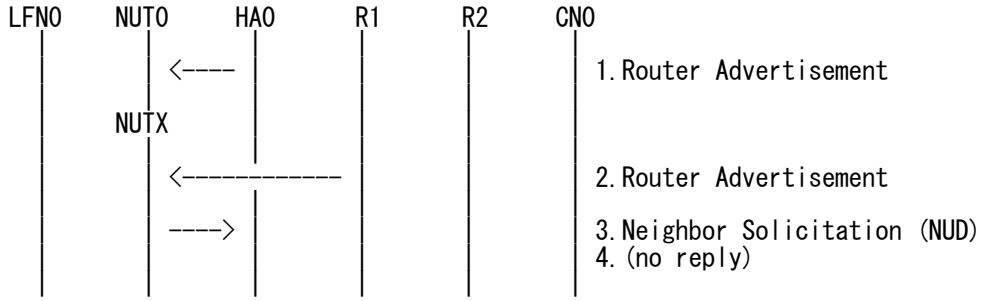
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

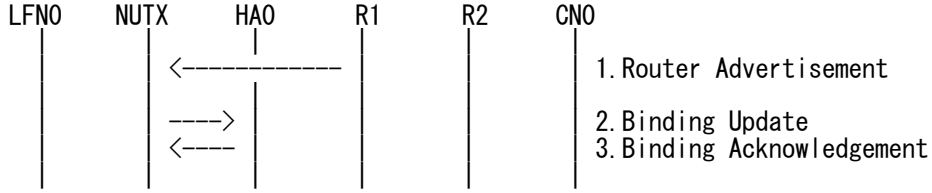


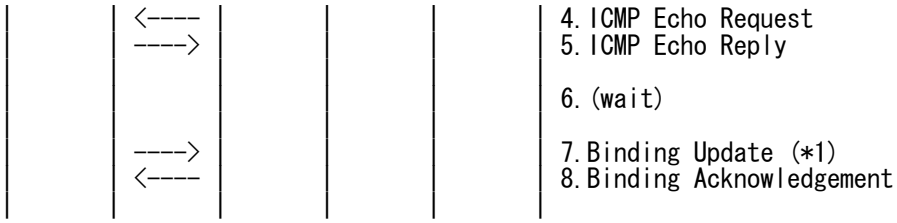
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.
   # The value of Refresh Interval is less than BU[2].

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	status	0
	R flag	1
	Lifetime	(same value as Binding Update[2])
Binding Refresh advice option	interval	(less than Binding Update[2])

4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. (wait)
   # Wait during a maximum of the Refresh Interval in the Binding Acknowledgement[3].
7. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI

Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

8. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update before the expiration of the following period,
- The remaining lifetime of the home registration which set to the Refresh Interval of the Binding Acknowledgement.
- The Mobile Router Flag (R) is set to 1.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.7.3

6.4.2.6 NEMO-MR-2-2-1-1-060 - BU accepted (Status = 0 & R = OFF)by HA0(turn off MR support)

[PURPOSE]

NEMO-MR-2-2-1-1-060 - BU accepted (Status = 0 & R = OFF)by HA0(turn off MR support)

[CATEGORY]

ROUTER: ADVANCED FUNCTION (DHAAD)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

Function of Dynamic Home Agent Address Discovery: YES

[TOPOLOGY]

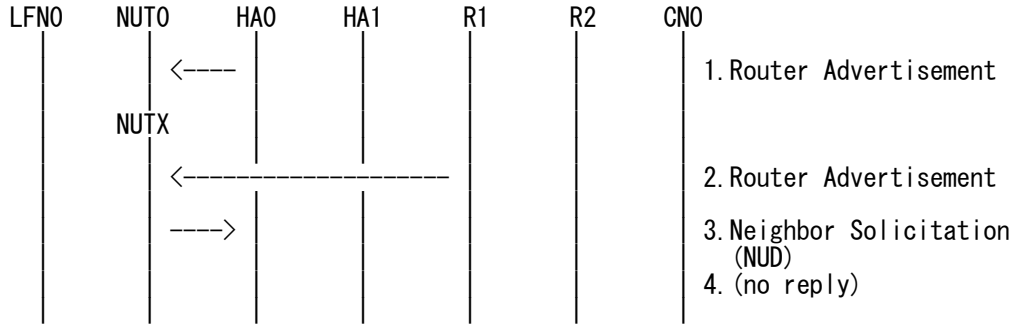
Refer to 2.1.1.1 Common Topology-3

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

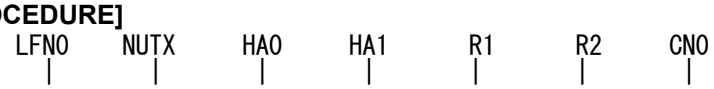


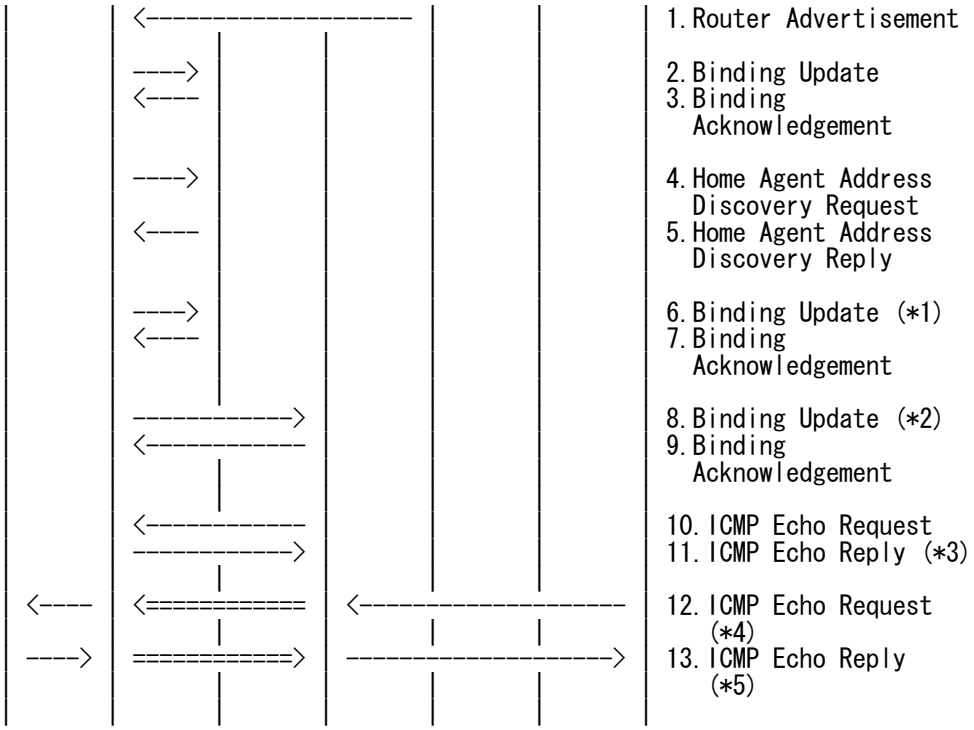
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0 with) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0 .
   # The Mobile Router Flag (R) is set to 0.
4. Receive Home Agent Address Discovery Request. (NUTX -> NUT0_ha_any) (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) is set to 1.

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	(Home-Agents anycast address)
Mobility Header	Type	144
	Code	0
	Checksum	Any
	Identifier	Any
	R Flag	1
	Reserved	0

5. Send Home Agent Address Discovery Reply. (HA0 -> NUTX) (Refer to 5.18.1)
   # The Mobile Router Support Flag (R) is set to 1.
   # The Home Agent Addresses field contains global IP address for HA1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Mobility Header	Type	145
	Code	0
	Checksum	Any
	Identifier	Any
	R Flag	1
	Reserved	0
	Home agent Addresses	HA1 (Link0, global)

6. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to Any.
   # The lifetime is set to 0.

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)

Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	Any
	Lifetime	0
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUT (care-of/home, global)

7. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0 .
   # The Mobile Router Flag (R) is set to 0.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	Payload Prot	59
	Header Len	3
	MH Type	6
	Reserved	0
	Checksum	Any
	Status	0
	K Flag	Any
	R Flag	0
	Reserved	0
	Sequence	Any
	Lifetime	0

8. Receive Binding Update. (NUTX -> HA1) (*2) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
9. Send Binding Acknowledgement. (HA1 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0.
   # The Mobile Router Flag (R) is set to 1.
10. Send ICMP Echo Request. (HA1 -> NUTX with Type2 Routing Header)
    (Refer to 5.7.3)
    - Basic

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

    - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

11. Receive ICMP Echo Reply. (NUTX -> HA1 with Home Address Option) (*3)
    (Refer to 5.8.3)
    - Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

    - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

12. Send ICMP Echo Request. (out: HA1 -> NUTX, in: CN0 -> LFN0)
    (Refer to 5.7.2)
    Receive ICMP Echo Request. (CN0 -> LFN0) (*4) (Refer to 5.7.1)

IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

13. Send ICMP Echo Reply. (LFN0 -> CN0) (Refer to 5.8.1)
Receive ICMP Echo Reply. (out: NUTX -> HA1, in: LFN0 -> CN0)
(*5) (Refer to 5.8.2)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update.
Then, check whether this packet fills all of the following,
- The Lifetime field is set to 0.

(*2) PASS: HA1 receives Binding Update.
Then, check whether this packet fills all of the following,
- The Mobile Router Flag (R) is set to 1.

(*3) PASS: HA1 receives ICMP Echo Reply with Home Address Option.

(*4) PASS: LFN0 receives ICMP Echo Request.

(*5) PASS: CN0 receives ICMP Echo Reply.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.3

6.4.2.7 NEMO-MR-2-2-1-1-061 - BU accepted (Status = 1 & R = OFF)by HA0(turn off MR support)

[PURPOSE]

NEMO-MR-2-2-1-1-061 - BU accepted (Status = 1 & R = OFF)by HA0(turn off MR support)

[CATEGORY]

ROUTER: ADVANCED FUNCTION (DHAAD)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

Function of Dynamic Home Agent Address Discovery: YES

[TOPOLOGY]

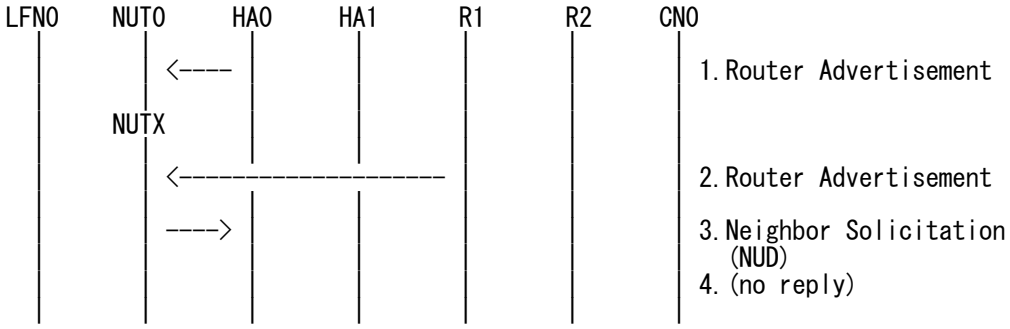
Refer to 2.1.1.1 Common Topology-3

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

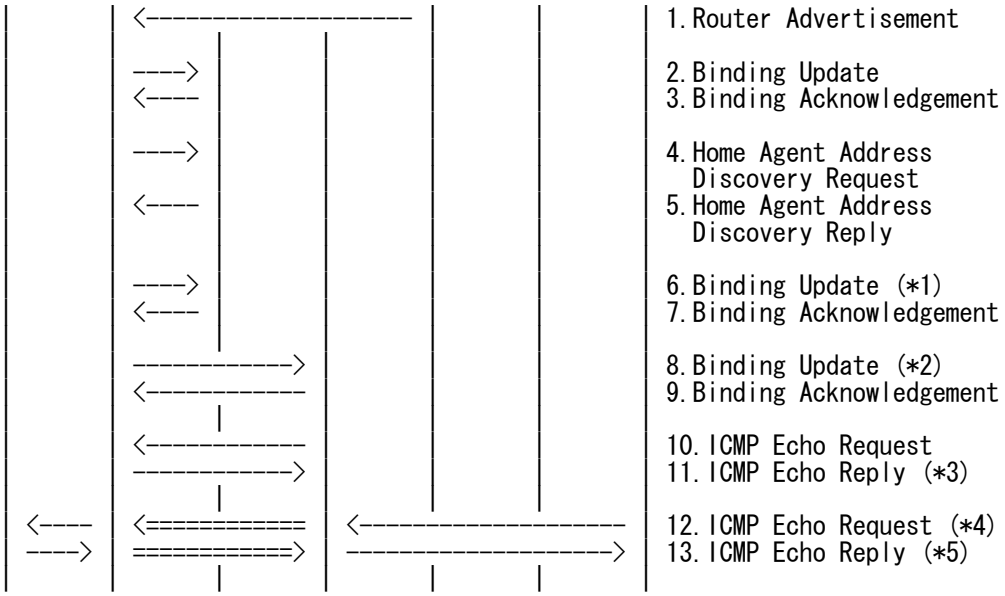


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router (R) bit is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 1(accepted but prefix discovery necessary).
   # The Mobile Router (R) bit is set to 0.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	1
	R Flag	0

4. Receive Home Agent Address Discovery Request. (NUTX -> NUTX_ha_any) (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) bit is set to 1.
5. Send Home Agent Address Discovery Reply. (HA0 -> NUTX) (Refer to 5.18.1)
   # The Home Agent Addresses field contains global IP address for HA1.
   # The Mobile Router Support Flag (R) bit is set to 1.
6. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Lifetime field is set to 0.

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	0
	Lifetime	0
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

7. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
8. Receive Binding Update. (NUTX -> HA1) (*2) (Refer to 5.14.1)
   # The Mobile Router (R) bit is set to 1.
9. Send Binding Acknowledgement. (HA1 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router (R) bit is set to 1.

10. Send ICMP Echo Request. (HA1 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- b) Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

11. Receive ICMP Echo Reply. (NUTX -> HA1 with Home Address Option) (*3) (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

12. Send ICMP Echo Request. (out: HA1 -> NUTX, in: CN0 -> LFN0) (Refer to 5.7.2)
Receive ICMP Echo Request. (CN0 -> LFN0) (*4) (Refer to 5.7.1)

IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

13. Send ICMP Echo Reply. (LFN0 -> CN0) (Refer to 5.8.1)
Receive ICMP Echo Reply. (out: NUTX -> HA1, in: LFN0 -> CN0) (*5) (Refer to 5.8.2)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update.
Then, check whether this packet fills all of the following.
- The Lifetime field is set to 0.

(*2) PASS: HA1 receives Binding Update.
Then, check whether this packet fills all of the following,
- The Mobile Router Flag (R) is set to 1.

(*3) PASS: HA1 receives ICMP Echo Reply with Home Address Option.

(*4) PASS: LFN0 receives ICMP Echo Request.

(*5) PASS: CN0 receives ICMP Echo Reply.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

6.4.2.8 NEMO-MR-2-2-1-1-062 - BU accepted (Status = 2-127 & R = OFF)by HA0(turn off MR support)

[PURPOSE]

NEMO-MR-2-2-1-1-062 - BU accepted (Status = 2-127 & R = OFF)by HA0(turn off MR support)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (DHAAD)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

Function of Dynamic Home Agent Address Discovery: YES

[TOPOLOGY]

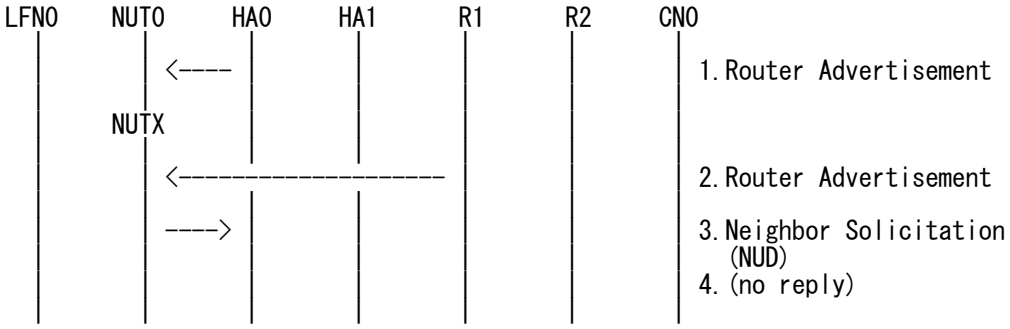
Refer to 2.1.1.1 Common Topology-3

[TEST SETUP]

Refer to 3.1 Common Setup-1

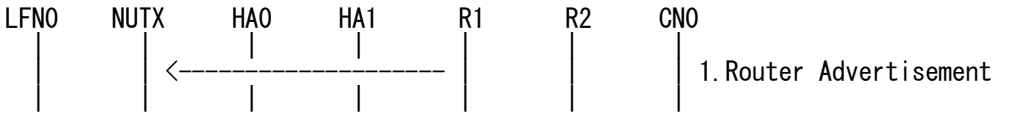
[INITIALIZATION]

- In the case of Real Home Link



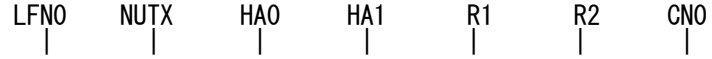
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

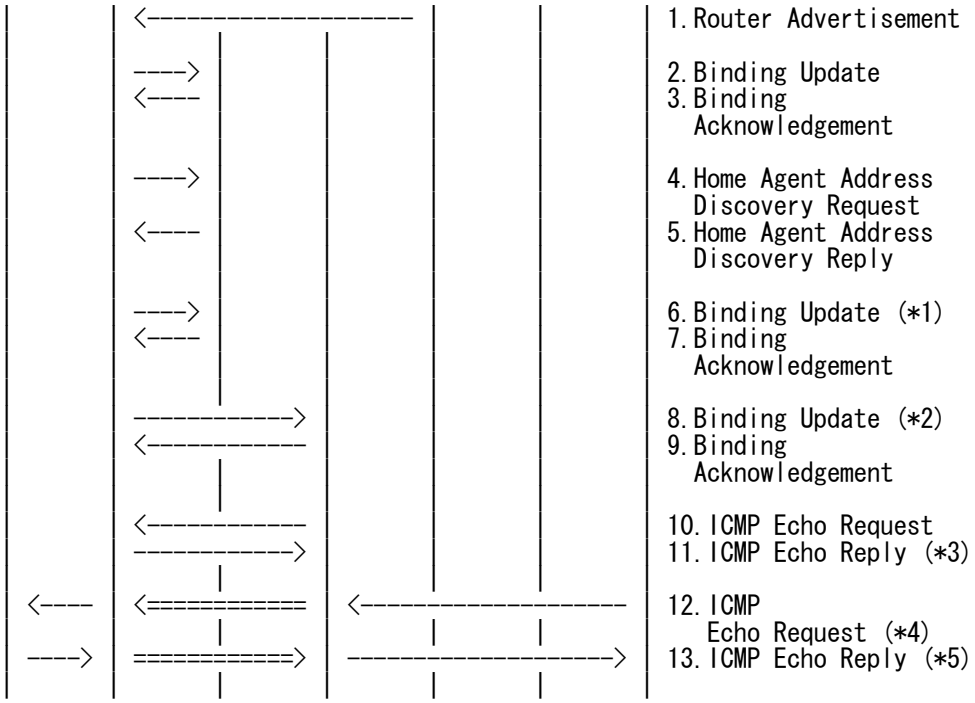
- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router (R) bit is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to the value(=127) except 0 and 1.
   # The Mobile Router (R) bit is set to 0.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	127
	R flag	0

4. Receive Home Agent Address Discovery Request. (NUTX -> NUTX_ha_any) (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) bit is set to 1.
5. Send Home Agent Address Discovery Reply. (HA0 -> NUTX) (Refer to 5.18.1)
   # The Home Agent Addresses field contains global IP address for HA1.
   # The Mobile Router Support Flag (R) bit is set to 1.
6. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Lifetime field is set to 0.

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	Any
	Lifetime	0
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

7. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
8. Receive Binding Update. (NUTX -> HA1) (*2) (Refer to 5.14.1)

The Mobile Router (R) bit is set to 1.

9. Send Binding Acknowledgement. (HA1 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router (R) bit is set to 1.
10. Send ICMP Echo Request. (HA1 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)
   - Basic

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

   - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

11. Receive ICMP Echo Reply. (NUTX -> HA1 with Home Address Option) (*3) (Refer to 5.8.3)
   - Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

   - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

12. Send ICMP Echo Request. (out: HA1 -> NUTX, in: CN0 -> LFN0) (*4) (Refer to 5.7.2)
   Receive ICMP Echo Request. (CN0 -> LFN0) (Refer to 5.7.1)

IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

13. Send ICMP Echo Reply. (LFN0 -> CN0) (Refer to 5.8.1)
   Receive ICMP Echo Reply. (out: NUTX -> HA1, in: LFN0 -> CN0) (*5) (Refer to 5.8.2)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update.
Then, check whether this packet fills all of the following.
- The Lifetime field is set to 0.

(*2) PASS: HA1 receives Binding Update.
Then, check whether this packet fills all of the following,
- The Mobile Router Flag (R) is set to 1.

(*3) PASS: HA1 receives ICMP Echo Reply with Home Address Option.

(*4) PASS: LFN0 receives ICMP Echo Request.

(*5) PASS: CN0 receives ICMP Echo Reply.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5

6.4.2.9 NEMO-MR-2-2-1-1-003 - BU rejected (Status = 128)

[PURPOSE]

NEMO-MR-2-2-1-1-003 - BU rejected (Status = 128)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NUT re-transmits BU to HA for BA(status 128): YES/NO

[TOPOLOGY]

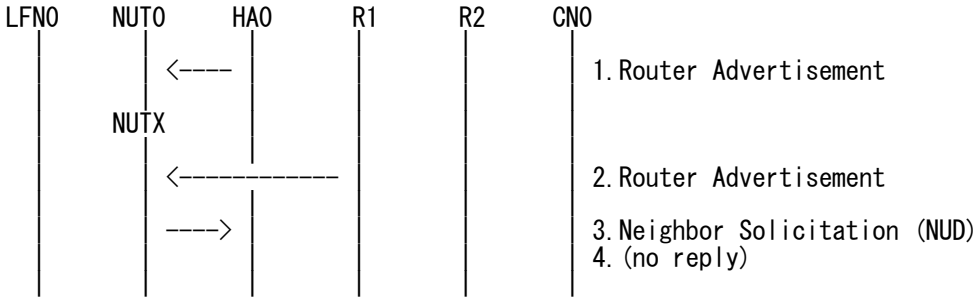
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

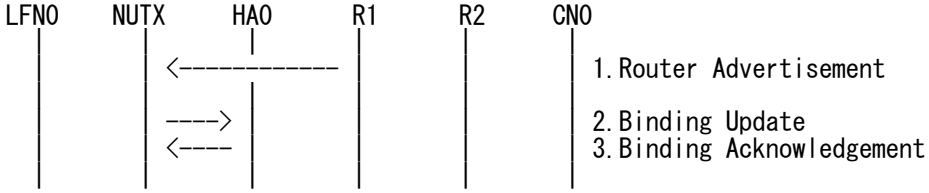


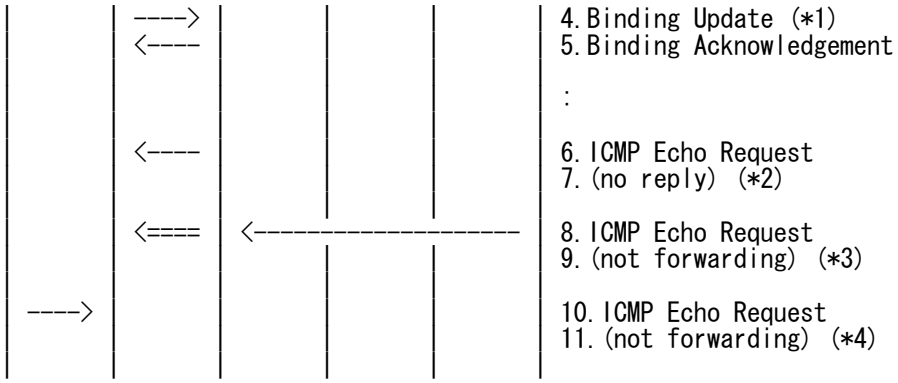
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 128(Reason unspecified).
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	128
	R flag	1

4. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
	Sequece Number	Any
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
	Sequence Number	any
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

5. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 128(Reason unspecified).
   # The Mobile Router Flag (R) is set to 1.
6. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

7. (no reply) (*2)
8. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> LFN0) (Refer to 5.7.2)

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

9. (not forwarding) (*3)
10. Send ICMP Echo Request. (LFN0 -> CN0) (Refer to 5.7.1)

IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128

11. (not forwarding) (*4)

[JUDGMENT]

The judgment changes by the following settings of "REQUIREMENT of TEST".

- NUT re-transmits BU to HA for BA(status 128): YES
  (*1) PASS: HA0 receives the retransmitted Binding Update.
  Then, check whether this packet fills all of the following,
  - The Mobile Router Flag (R) is set to 1.
  - Sequence Number value greater than that used.
  (*2) PASS: HA0 does not receive ICMP Echo reply with Home Address Option.
  (*3) PASS: LFN0 does not receive ICMP Echo Request.
  (*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

- NUT re-transmits BU to HA for BA(status 128): NO
  (*1) PASS: HA0 does not receive retransmitted Binding Update.
  (*2) PASS: HA0 does not receive ICMP Echo reply.
  (*3) PASS: LFN0 does not receive ICMP Echo Request.
  (*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.4

RFC3775 Mobility Support in IPv6
See Section 11.7.3

6.4.2.10 NEMO-MR-2-2-1-1-010 - BU rejected (Status = 135)

[PURPOSE]

NEMO-MR-2-2-1-1-010 - BU rejected (Status = 135)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NUT re-transmits BU to HA for BA(status 135): YES/NO

[TOPOLOGY]

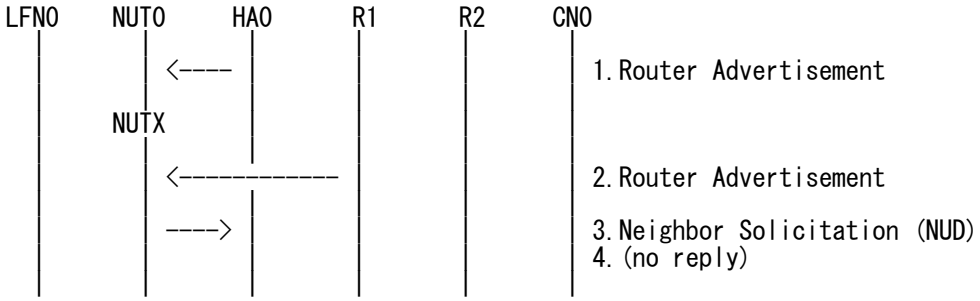
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

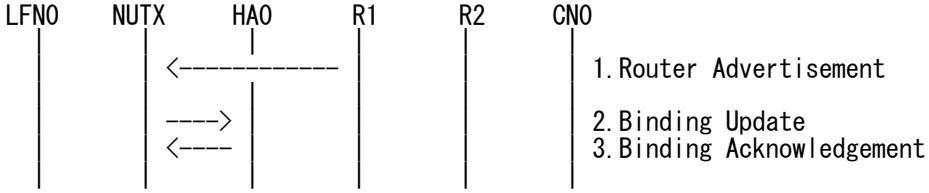


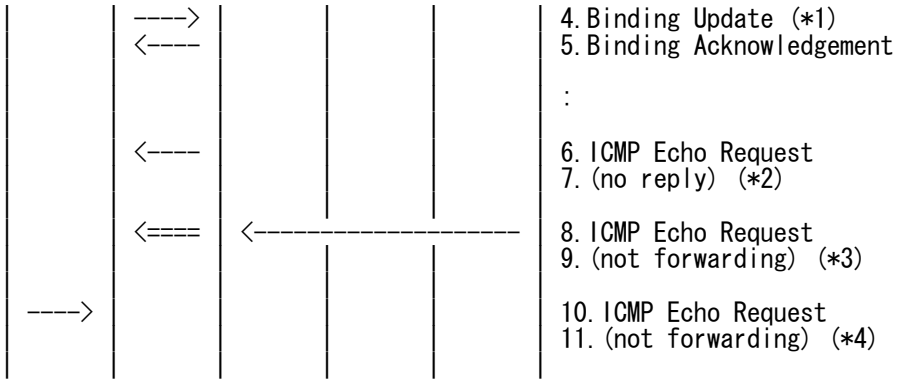
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 135(Sequence number out of window).
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	135
	R flag	1
	Sequence Number	Any

4. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	Sequence Number	Any
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	Sequence Number	Any
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

5. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 135(Sequence number out of window).
   # The Mobile Router Flag (R) is set to 1.
6. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

7. (no reply) (*2)
8. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> LFN0) (Refer to 5.7.2)

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

9. (not forwarding) (*3)
10. Send ICMP Echo Request. (LFN0 -> CN0) (Refer to 5.7.1)

IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129

11. (not forwarding) (*4)

[JUDGMENT]

The judgment changes by the following settings of "REQUIREMENT of TEST".

- NUT re-transmits BU to HA for BA(status 135): YES
  (*1) PASS: HA0 receives the retransmitted Binding Update.
  Then, check whether this packet fills all of the following,
  - The Sequence Number field is set to the following value of the Sequence Number field of Binding Acknowledgement.
  - The Mobile Router Flag (R) is set to 1.
  (*2) PASS: HA0 does not receive ICMP Echo reply.
  (*3) PASS: LFN0 does not receive ICMP Echo Request.
  (*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

- NUT re-transmits BU to HA for BA(status 135): NO
  (*1) PASS: HA0 does not receive the retransmitted Binding Update.
  (*2) PASS: HA0 does not receive ICMP Echo reply.
  (*3) PASS: LFN0 does not receive ICMP Echo Request.
  (*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.4

RFC3775 Mobility Support in IPv6
See Section 11.7.3, 11.7.1

6.4.2.11 NEMO-MR-2-2-1-1-043 - BU rejected (Status = 140) when single HA in home-link

[PURPOSE]

NEMO-MR-2-2-1-1-043 - BU rejected (Status = 140) when single HA in home-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NUT re-transmits BU to HA for BA(status 140): YES/NO

[TOPOLOGY]

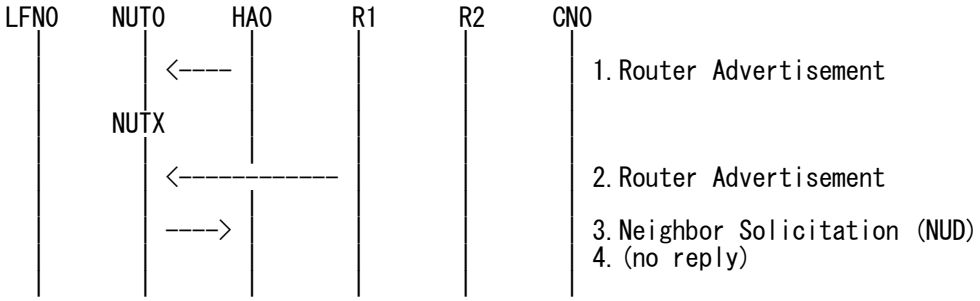
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

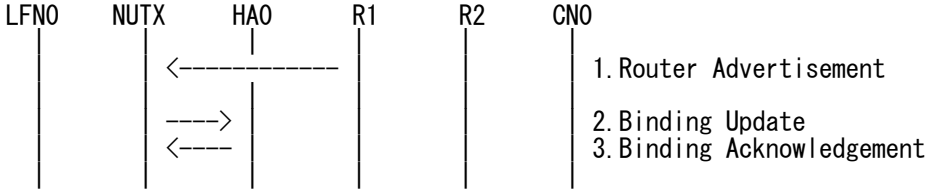


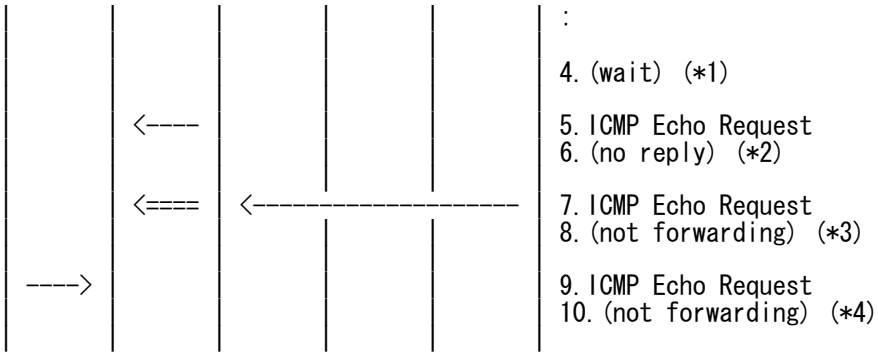
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 140(Mobile Router Operation not permitted).
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	140
	R flag	1

4. (wait)
   # Wait during 30 seconds.
5. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header)
   (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

6. (no reply) (*2)
7. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> LFN0)
   (Refer to 5.7.4)

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

8. (not forwarding) (*3)

9. Send ICMP Echo Request. (LFN0 -> CN0) (Refer to 5.7.1)

IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128

10. (not forwarding) (*4)

[JUDGMENT]

(*1) PASS: HA0 does not receive Binding Updates to same Home Agent.

(*2) PASS: HA0 does not receive ICMP Echo Reply with Home Address Option.

(*3) PASS: LFN0 does not receive ICMP Echo Request.

(*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5.4.1, 5.4.2

6.4.2.12 NEMO-MR-2-2-1-1-044 - BU rejected (Status = 140) when multiple HA in home-link

[PURPOSE]

NEMO-MR-2-2-1-1-044 - BU rejected (Status = 140) when multiple HA in home-link

[CATEGORY]

ROUTER: ADVANCED FUNCTION (DHAAD)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES
Function of Dynamic Home Agent Address Discovery: YES
NUT re-transmits BU to HA for BA(status 140): YES/NO

[TOPOLOGY]

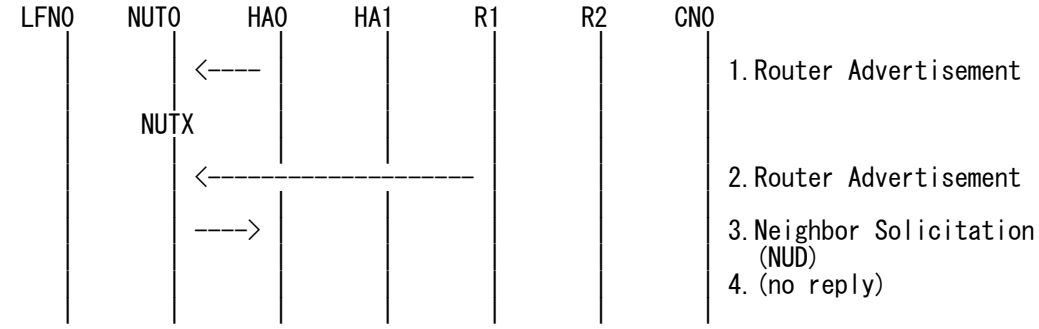
Refer to 2.1.1.1 Common Topology-3

[TEST SETUP]

Refer to 3.1 Common Setup-1

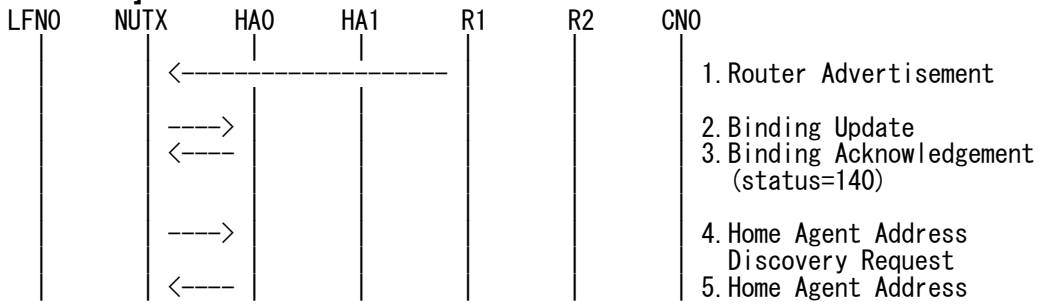
[INITIALIZATION]

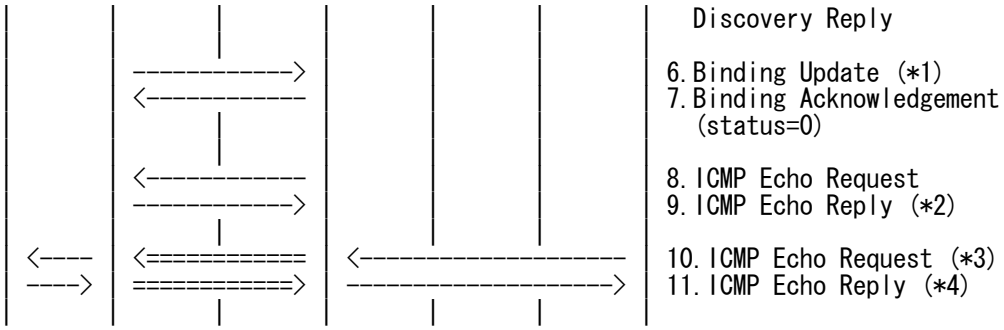
- In the case of Real Home Link



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 140(Mobile Router Operation not permitted).
   # The Mobile Router Flag (R) is set to 1.

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	140
	R flag	1

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Mobility Header	MH Type	6
	Status	140
	R flag	1

4. Receive Home Agent Address Discovery Request. (NUTX -> NUT0_ha_any) (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) is set to 1.

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	(Home-Agents anycast address)
Mobility Header	Type	144
	Code	0
	Checksum	Any
	Identifier	Any
	R Flag	1
	Reserved	0

5. Send Home Agent Address Discovery Reply. (HA0 -> NUTX) (Refer to 5.18.1)
The Mobile Router Support Flag (R) is set to 1.
The Home Agent Addresses field contains global IP address for HA0.
The Home Agent Addresses field contains global IP address for HA1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Mobility Header	Type	145
	Code	0
	Checksum	Any
	Identifier	Any
	R Flag	1
	Reserved	0
	Home agent Addresses	HA0 (Link0, global)
	Home agent Addresses	HA1 (Link0, global)

6. Receive Binding Update. (NUTX -> HA1) (*1) (Refer to 5.14.1)
The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

7. Send Binding Acknowledgement. (HA1 -> NUTX) (Refer to 5.15.1)
The Status field is set to 0(Binding Update accepted).
The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	0
	R flag	1

8. Send ICMP Echo Request. (HA1 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

9. Receive ICMP Echo Reply. (NUTX -> HA1 with Home Address Option) (*2) (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)

Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

10. Send ICMP Echo Request. (out: HA1 -> NUTX, in: CN0 -> LFN0) (Refer to 5.7.4)
    Receive ICMP Echo Request. (CN0 -> LFN0) (*3) (Refer to 5.7.1)

IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

11. Send ICMP Echo Reply. (LFN0 -> CN0) (Refer to 5.8.1)
    Receive ICMP Echo Reply. (out: NUTX -> HA1, in: LFN0 -> CN0) (*4) (Refer to 5.8.2)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129

[JUDGMENT]

(*1) PASS: HA1 receive Binding Update to other Home Agent.
Then, check whether this packet fills all of the following,
- The Mobile Router Flag (R) is set to 1.

(*2) PASS: HA1 receives ICMP Echo Reply with Home Address Option.

(*3) PASS: LFN0 receives ICMP Echo Request.

(*4) PASS: CN0 receives ICMP Echo Reply.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.4.1, 5.4.2

6.4.2.13 NEMO-MR-2-2-1-1-045 -Implicit mode BU rejected (Status = 141) when single HA in home-link

[PURPOSE]

NEMO-MR-2-2-1-1-045 - Implicit mode BU rejected (Status = 141) when single HA in home-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

Mode of Mobile Network Prefix Registration: IMPLICIT
NUT re-transmits BU to HA for BA(status 141): YES/NO

[TOPOLOGY]

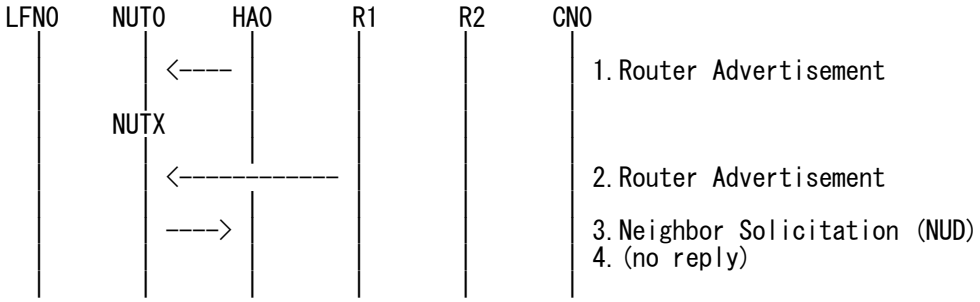
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

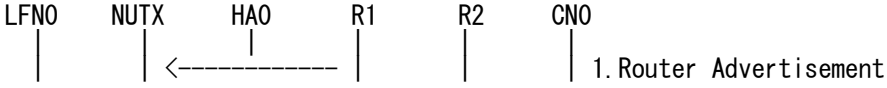


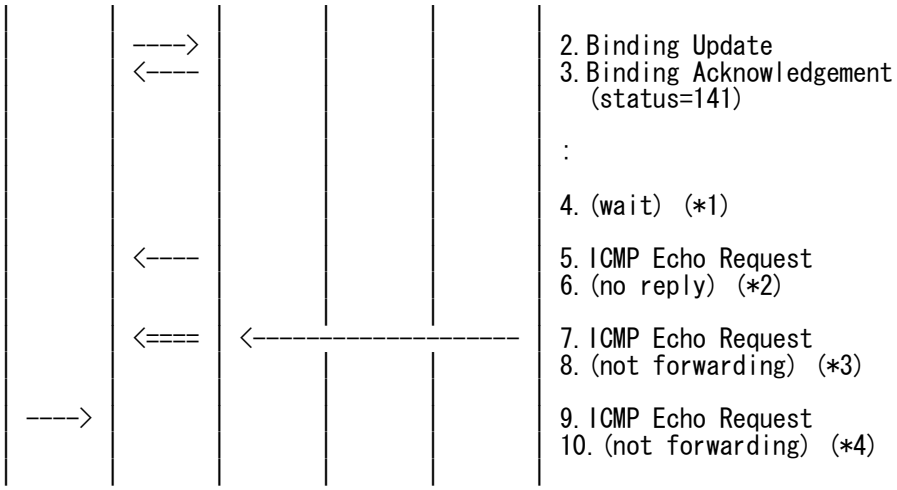
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

3. Send Binding Acknowledgement. (HA0 -> NUTX) (*1) (Refer to 5.15.1)
   # The Status field is set to 141(Invalid Prefix).
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	141
	R flag	1

4. (wait)
   # Wait during 30 seconds.
5. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header)
   (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

6. (no reply) (*2)
7. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> LFN0)
   (Refer to 5.7.2)

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

8. (not forwarding) (*3)
9. Send ICMP Echo Request. (LFN0 -> CN0) (Refer to 5.7.1)

IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128

10. (not forwarding) (*4)

[JUDGMENT]

(*1) PASS: HA0 does not receive Binding Updates to same Home Agent.

(*2) PASS: HA0 does not receive ICMP Echo Reply with Home Address Option.

(*3) PASS: LFN0 does not receive ICMP Echo Request.

(*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5.4.1, 5.4.2

6.4.2.14 NEMO-MR-2-2-1-1-047 - Explicit mode BU rejected (Status = 141) when single HA in home-link

[PURPOSE]

NEMO-MR-2-2-1-1-047 - Explicit mode BU rejected (Status = 141) when single HA in home-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

Mode of Mobile Network Prefix Registration: EXPLICIT
NUT re-transmits BU to HA for BA(status 141): YES/NO

[TOPOLOGY]

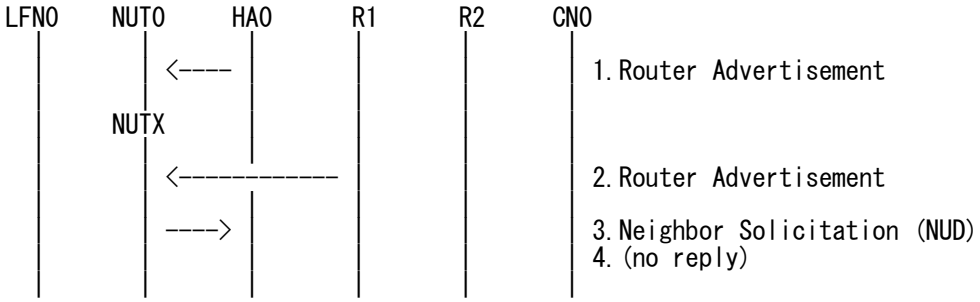
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

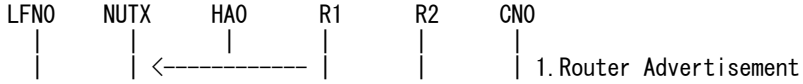


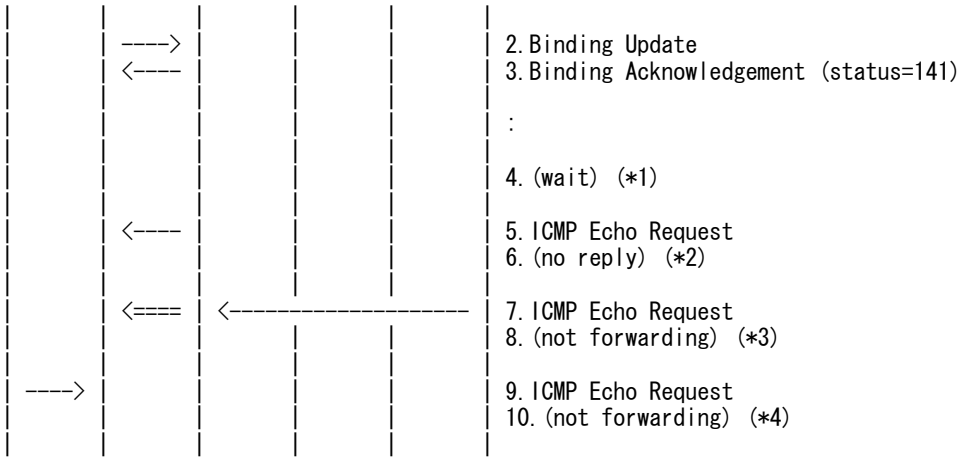
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 141(Invalid Prefix).
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	141
	R flag	1

4. (wait)(*1)
   # Wait during 30 seconds.
5. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header)
   (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

6. (no reply)(*2)
7. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> LFN0)
   (Refer to 5.7.4)

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)

IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

8. (not forwarding)(*3)
9. Send ICMP Echo Request. (LFN0 -> CN0)(Refer to 5.7.1)

IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128

10. (not forwarding)(*4)

[JUDGMENT]

(*1) PASS: HA0 does not receive Binding Updates to same Home Agent.
(*2) PASS: HA0 does not receive ICMP Echo Reply with Home Address Option.
(*3) PASS: LFN0 does not receive ICMP Echo Request.
(*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.4.2

6.4.2.15 NEMO-MR-2-2-1-1-048 - Explicit mode BU rejected (Status = 141) when multiple HA in home-link

[PURPOSE]

NEMO-MR-2-2-1-1-048 - Explicit mode BU rejected (Status = 141) when multiple HA in home-link

[CATEGORY]

ROUTER: ADVANCED FUNCTION (DHAAD)

[REQUIREMENT OF TEST]

Mode of Mobile Network Prefix Registration: EXPLICIT
Function of Real Home Link: YES
Function of Dynamic Home Agent Address Discovery: YES
NUT re-transmits BU to HA for BA(status 141): YES/NO

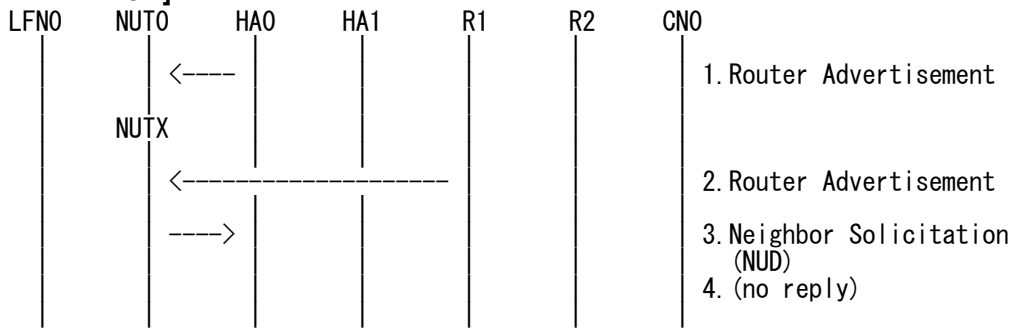
[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-3

[TEST SETUP]

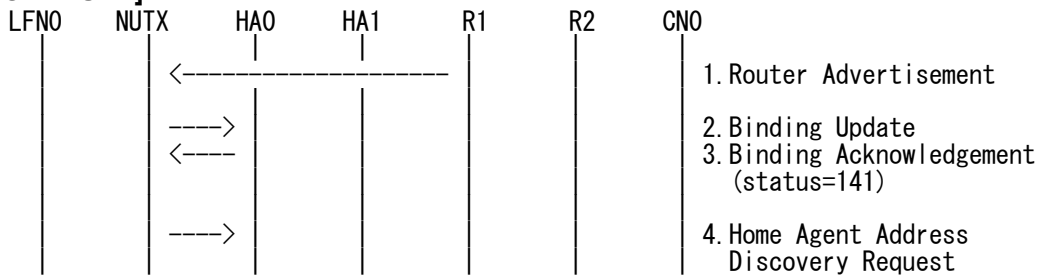
Refer to 3.1 Common Setup-1

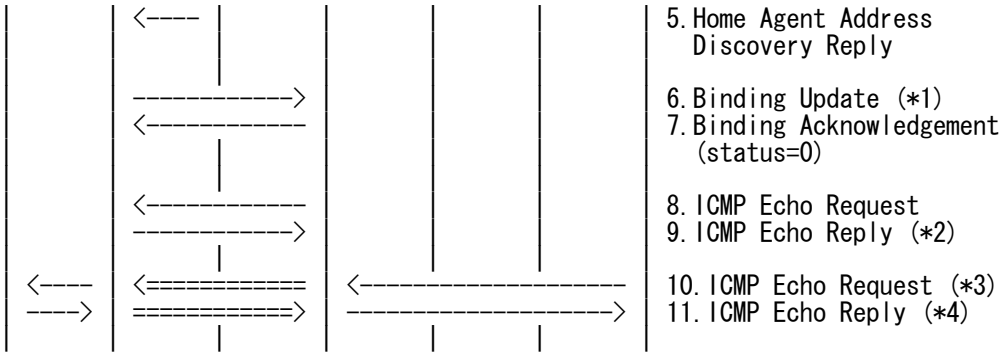
[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 141(Invalid Prefix).
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	141
	R flag	1

4. Receive Home Agent Address Discovery Request. (NUTX -> NUT0_ha_any) (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) is set to 1.

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	(Home-Agents anycast address)
Mobility Header	Type	144
	Code	0
	Checksum	Any
	Identifier	Any
	R Flag	1
	Reserved	0

5. Send Home Agent Address Discovery Reply. (HA0 -> NUTX) (Refer to 5.18.1)
   # The Mobile Router Support Flag (R) is set to 1.
   # The Home Agent Addresses field contains global IP address for HA0.
   # The Home Agent Addresses field contains global IP address for HA1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Mobility Header	Type	145
	Code	0
	Checksum	Any
	Identifier	Any
	R Flag	1
	Reserved	0
	Home agent Addresses	HA0 (Link0, global)
	Home agent Addresses	HA1 (Link0, global)

6. Receive Binding Update. (NUTX -> HA1) (*1) (Refer to 5.14.1)

The Mobile Router Flag (R) is set to 1.

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

7. Send Binding Acknowledgement. (HA1 -> NUTX) (Refer to 5.15.1)

The Status field is set to 0(Binding Update accepted).

The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	0
	R flag	1

8. Send ICMP Echo Request. (HA1 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

9. Receive ICMP Echo Reply. (NUTX -> HA1 with Home Address Option) (*2) (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

10. Send ICMP Echo Request. (out: HA1 -> NUTX, in: CN0 -> LFN0) (Refer to 5.7.2)

Receive ICMP Echo Request. (CN0 -> LFN0) (*3) (Refer to 5.7.1)

IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

11. Send ICMP Echo Reply. (LFN0 -> CN0) (Refer to 5.8.1)

Receive ICMP Echo Reply. (out: NUTX -> HA1, in: LFN0 -> CN0) (*4) (Refer to 5.8.2)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129

[JUDGMENT]

(*1) PASS: HA0 does not receive Binding Updates to same Home Agent.
HA1 receive Binding Update to other Home Agent.
Then, check whether this packet fills all of the following,
- The Mobile Router Flag (R) is set to 1.

(*2) PASS: HA1 receives ICMP Echo Reply with Home Address Option.

(*3) PASS: LFN0 receives ICMP Echo Request.

(*4) PASS: HA0 receives ICMP Echo Reply by reversed tunnel.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.4.2

6.4.2.16 NEMO-MR-2-2-1-1-050 - Implicit mode BU rejected (Status = 142) when single HA in home-link

[PURPOSE]

NEMO-MR-2-2-1-1-050 - Implicit mode BU rejected (Status = 142) when single HA in home-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

Mode of Mobile Network Prefix Registration: IMPLICIT
NUT re-transmits BU to HA for BA(status 142): YES/NO

[TOPOLOGY]

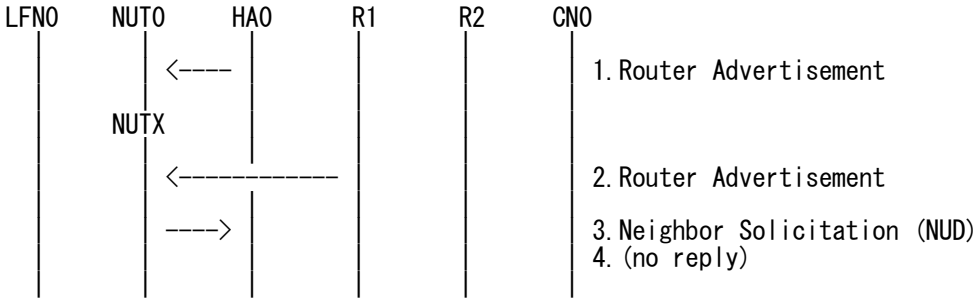
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

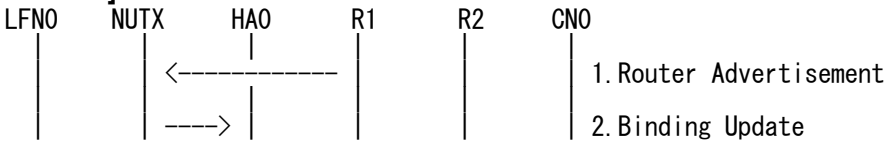


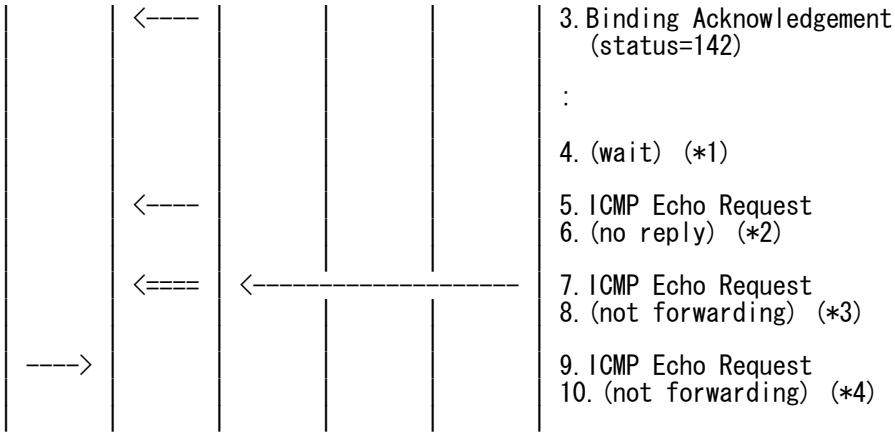
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 142(Not Authorized for Prefix).
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	142
	R flag	1

4. (wait) (*1)
   # Wait during 30 seconds.
5. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header)
   (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

6. (no reply) (*2)
7. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> LFN0)
   Refer to 5.7.1)

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

8. (not forwarding) (*3)
9. Send ICMP Echo Request. (LFN0 -> CN0) (Refer to 5.7.1)

IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128

10. (not forwarding) (*4)

[JUDGMENT]

(*1) PASS: HA0 does not receive Binding Updates to same Home Agent.
(*2) PASS: HA0 does not receive ICMP Echo Reply with Home Address Option.
(*3) PASS: LFN0 does not receive ICMP Echo Request.
(*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.4.1, 5.4.2

6.4.2.17 NEMO-MR-2-2-1-1-052 - Explicit mode BU rejected (Status = 142) when single HA in home-link

[PURPOSE]

NEMO-MR-2-2-1-1-052 - Explicit mode BU rejected (Status = 142) when single HA in home-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

Mode of Mobile Network Prefix Registration: EXPLICIT
NUT re-transmits BU to HA for BA(status 142): YES/NO

[TOPOLOGY]

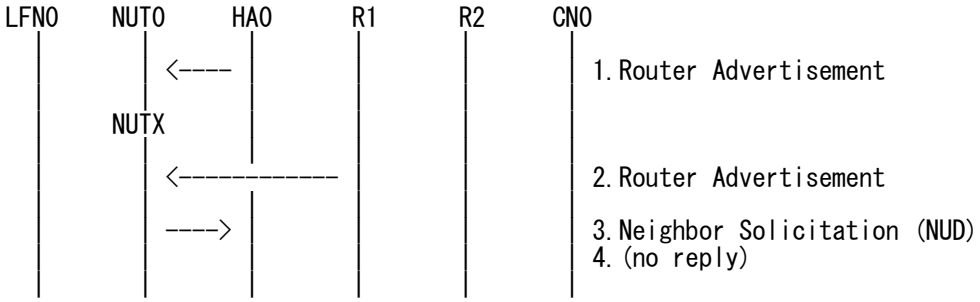
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

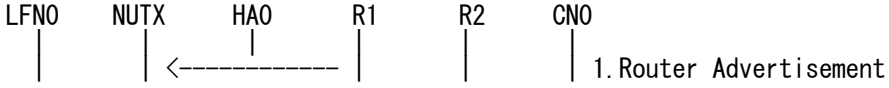


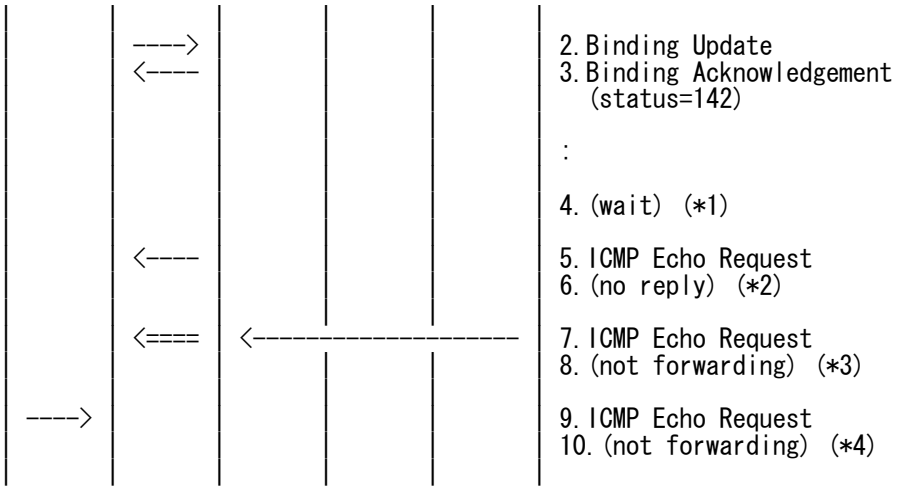
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Support Flag (R) is set to 1.

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 142(Not Authorized for Prefix).
   # The Mobile Router Support Flag (R) is set to 1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	142
	R flag	1

4. (wait) (*1)
   # Wait during 30 seconds.
5. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header)
   (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

6. (no reply) (*2)
7. Send ICMP Echo Request. (out: HA1 -> NUTX, in: CN0 -> LFN0)
   (Refer to 5.7.4)

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

8. (not forwarding) (*3)
9. Send ICMP Echo Request. (LFN0 -> CN0) (Refer to 5.7.1)

IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128

10. (not forwarding) (*4)

[JUDGMENT]

(*1) PASS: HA0 does not receive Binding Updates to same Home Agent.
(*2) PASS: HA0 does not receive ICMP Echo Reply with Home Address Option.
(*3) PASS: LFN0 does not receive ICMP Echo Request.
(*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.4.2

6.4.2.18 NEMO-MR-2-2-1-1-053 - Explicit mode BU rejected (Status = 142) when multiple HA in home-link

[PURPOSE]

NEMO-MR-2-2-1-1-053 - Explicit mode BU rejected (Status = 142) when multiple HA in home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION(DHAAD)

[REQUIREMENT OF TEST]

Mode of Mobile Network Prefix Registration: EXPLICIT
Function of Real Home Link: YES
Function of Dynamic Home Agent Address Discovery: YES
NUT re-transmits BU to HA for BA(status 142): YES/NO

[TOPOLOGY]

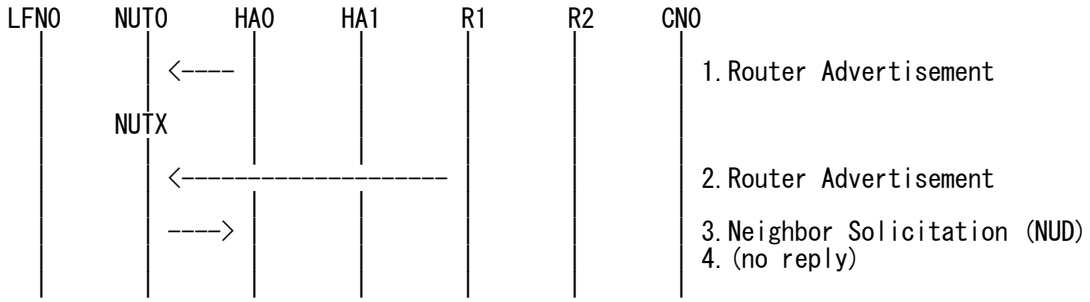
Refer to 2.1.1.1 Common Topology-3

[TEST SETUP]

Refer to 3.1 Common Setup-1

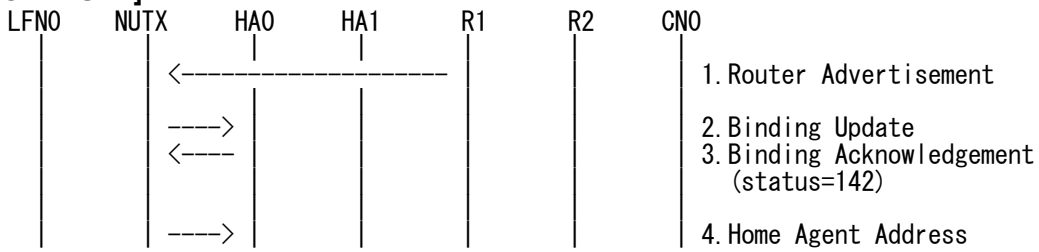
[INITIALIZATION]

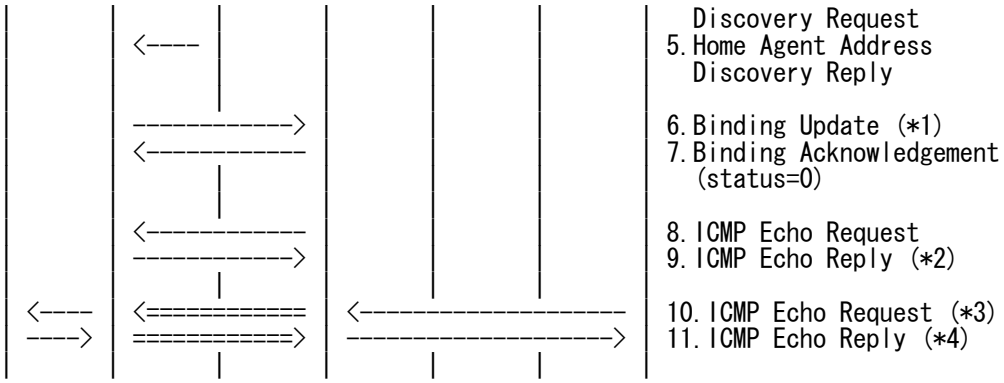
- In the case of Real Home Link



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 142(Not Authorized for Prefix).
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	142
	R flag	1

4. Receive Home Agent Address Discovery Request. (NUTX -> NUT0_ha_any) (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) is set to 1.

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	(Home-Agents anycast address)
Mobility Header	Type	144
	Code	0
	Checksum	Any
	Identifier	Any
	R Flag	1
	Reserved	0

5. Send Home Agent Address Discovery Reply. (HA0 -> NUTX) (Refer to 5.18.1)
   # The Mobile Router Support Flag (R) is set to 1.
   # The Home Agent Addresses field contains global IP address for HA0.
   # The Home Agent Addresses field contains global IP address for HA1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Mobility Header	Type	145
	Code	0
	Checksum	Any
	Identifier	Any
	R Flag	1
	Reserved	0
	Home agent Addresses	HA0 (Link0, global)
	Home agent Addresses	HA1 (Link0, global)

6. Receive Binding Update. (NUTX -> HA1) (*1) (Refer to 5.14.1)

The Mobile Router Flag (R) is set to 1.

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

7. Send Binding Acknowledgement. (HA1 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0(Binding Update accepted).
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	0
	R flag	1

8. Send ICMP Echo Request. (HA1 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

9. Receive ICMP Echo Reply. (NUTX -> HA1 with Home Address Option) (*2) (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

10. Send ICMP Echo Request. (out: HA1 -> NUTX, in: CN0 -> LFN0) (*3) (Refer to 5.7.4)
    Receive ICMP Echo Request. (CN0 -> LFN0) (Refer to 5.7.1)

IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

11. Send ICMP Echo Reply. (LFN0 -> CN0) (*1) (Refer to 5.7.1)
    Receive ICMP Echo Reply. (out: NUTX -> HA1, in: LFN0 -> CN0) (Refer to 5.8.2)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
IPv6 Header	Source Address	LFN0 (Link1, global)

	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129

[JUDGMENT]

(*1) PASS: HA0 does not receive Binding Updates to same Home Agent.
HA1 receive Binding Update to other Home Agent.
Then, check whether this packet fills all of the following,
- The Mobile Router Flag (R) is set to 1.

(*2) PASS: HA1 receives ICMP Echo Reply with Home Address Option.

(*3) PASS: LFN0 receives ICMP Echo Request.

(*4) PASS: HA0 receives ICMP Echo Reply by reversed tunnel.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.4.2

6.4.2.19 NEMO-MR-2-2-1-1-055 - Implicit mode BU rejected (Status = 143) when single HA in home-link

[PURPOSE]

NEMO-MR-2-2-1-1-055 - Implicit mode BU rejected (Status = 143) when single HA in home-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

Mode of Mobile Network Prefix Registration: IMPLICIT
NUT re-transmits BU to HA for BA(status 143): YES/NO

[TOPOLOGY]

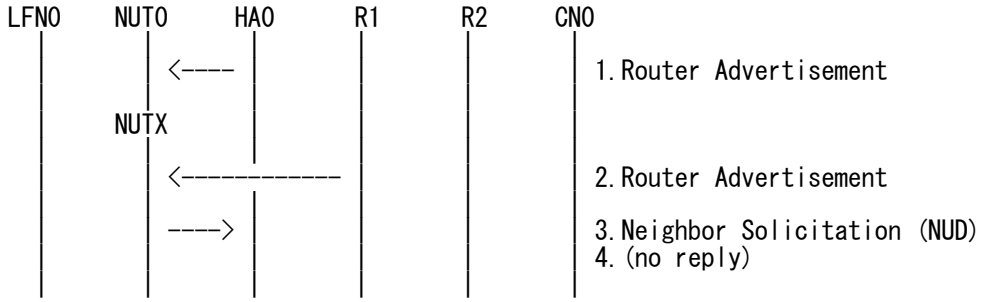
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

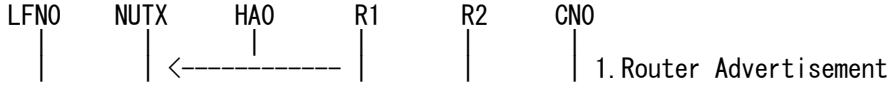


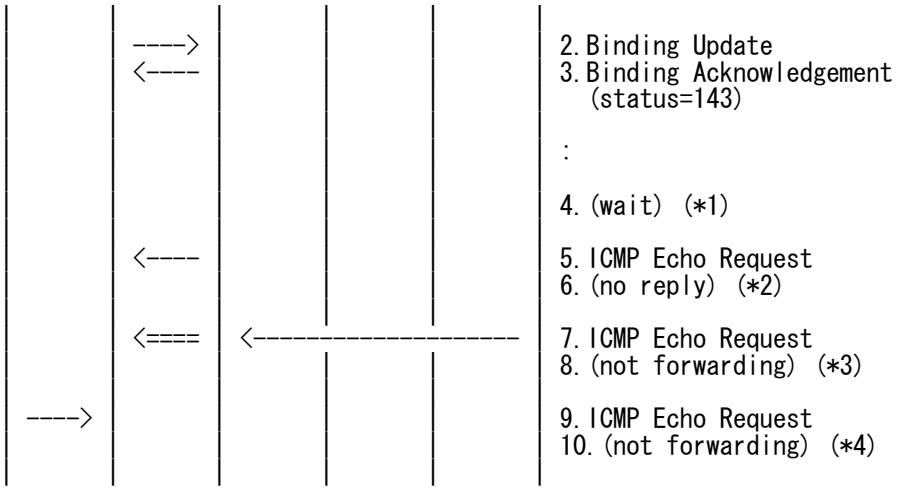
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 143(Forwarding Setup failed (prefixes missing)).
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	143
	R flag	1

4. (wait) (*1)
   # Wait during 30 seconds.
5. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header)
   (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

6. (no reply) (*2)
7. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> LFN0)
   (Refer to 5.7.2)

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

8. (not forwarding) (*3)
9. Send ICMP Echo Request. (LFN0 -> CN0) (Refer to 5.7.1)

IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128

10. (not forwarding) (*4)

[JUDGMENT]

(*1) PASS: HA0 does not receive Binding Updates to same Home Agent.
(*2) PASS: HA0 does not receive ICMP Echo Reply with Home Address Option.
(*3) PASS: LFN0 does not receive ICMP Echo Request.
(*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.4.1, 5.4.2

6.4.2.20 NEMO-MR-2-2-1-1-056 - Implicit mode BU rejected (Status = 143) when multiple HA in home-link

[PURPOSE]

NEMO-MR-2-2-1-1-056 - Implicit mode BU rejected (Status = 143) when multiple HA in home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION(DHAAD)

[REQUIREMENT OF TEST]

Mode of Mobile Network Prefix Registration: IMPLICIT
Function of Real Home Link: YES
Function of Dynamic Home Agent Address Discovery: YES
NUT re-transmits BU to HA for BA(status 143: YES/NO

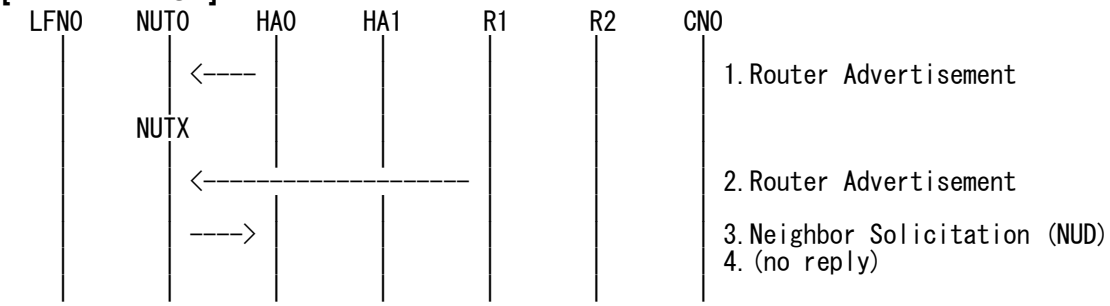
[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-3

[TEST SETUP]

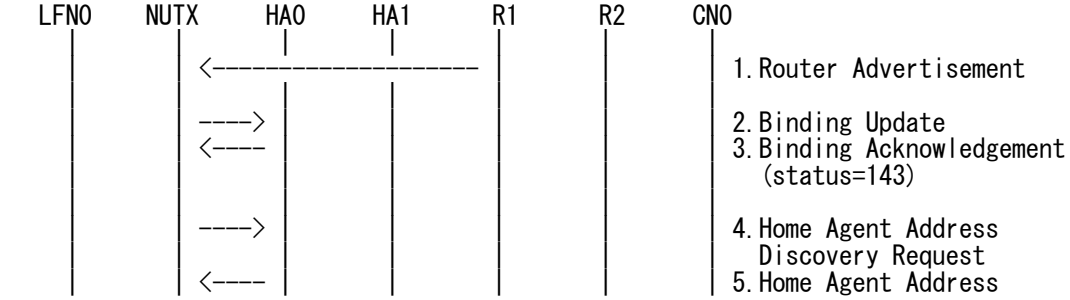
Refer to 3.1 Common Setup-1

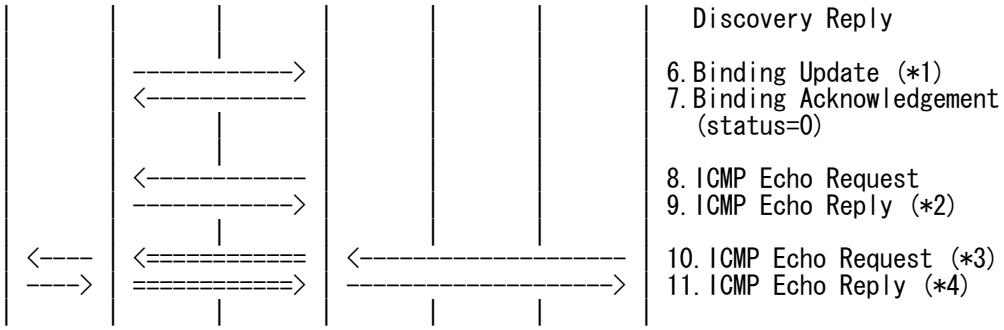
[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 143(Forwarding Setup failed (prefixes missing)).
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	143
	R flag	1

4. Receive Home Agent Address Discovery Request. (NUTX -> NUT0_ha_any)
   (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) is set to 1.

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	(Home-Agents anycast address)
Mobility Header	Type	144
	Code	0
	Checksum	Any
	Identifier	Any
	R Flag	1
	Reserved	0

5. Send Home Agent Address Discovery Reply. (HA0 -> NUTX) (Refer to 5.18.1)
   # The Mobile Router Support Flag (R) is set to 1.
   # The Home Agent Addresses field contains global IP address for HA0.
   # The Home Agent Addresses field contains global IP address for HA1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Mobility Header	Type	145
	Code	0
	Checksum	Any
	Identifier	Any
	R Flag	1
	Reserved	0
	Home agent Addresses	HA0 (Link0, global)
	Home agent Addresses	HA1 (Link0, global)

6. Receive Binding Update. (NUTX -> HA1) (*1)(Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

7. Send Binding Acknowledgement. (HA1 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0(Binding Update accepted).
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	0
	R flag	1

8. Send ICMP Echo Request. (HA1 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)
   - Basic

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

   - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

9. Receive ICMP Echo Reply. (NUTX -> HA1 with Home Address Option) (*2) (Refer to 5.8.3)
   - Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

   - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

10. Send ICMP Echo Request. (out: HA1 -> NUTX, in: CN0 -> LFN0) (*3)(Refer to 5.7.4)
    Receive ICMP Echo Request. (CN0 -> LFN0) (Refer to 5.7.4)

IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

11. Send ICMP Echo Reply. (LFN0 -> CN0) (Refer to 5.8.1)
    Receive ICMP Echo Reply. (out: NUTX -> HA1, in: LFN0 -> CN0) (*4) (Refer to 5.8.2)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129

[JUDGMENT]

(*1) PASS: HA0 does not receive Binding Updates to same Home Agent.
HA1 receive Binding Update to other Home Agent.
Then, check whether this packet fills all of the following,
- The Mobile Router Flag (R) is set to 1.

(*2) PASS: HA1 receives ICMP Echo Reply with Home Address Option.

(*3) PASS: LFN0 receives ICMP Echo Request.

(*4) PASS: HA0 receives ICMP Echo Reply by reversed tunnel.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.4.1

6.4.2.21 NEMO-MR-2-2-1-1-058 - Explicit mode BU rejected (Status = 143) when single HA in home-link

[PURPOSE]

NEMO-MR-2-2-1-1-058 - Explicit mode BU rejected (Status = 143) when single HA in home-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

Mode of Mobile Network Prefix Registration: EXPLICIT
NUT re-transmits BU to HA for BA(status 143: YES/NO

[TOPOLOGY]

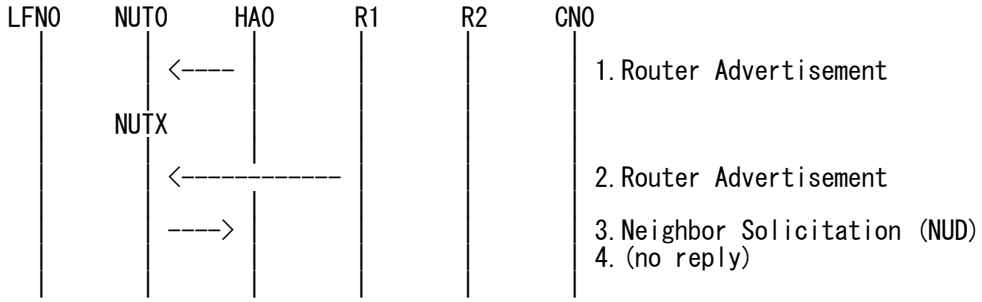
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

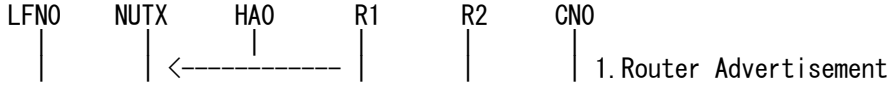


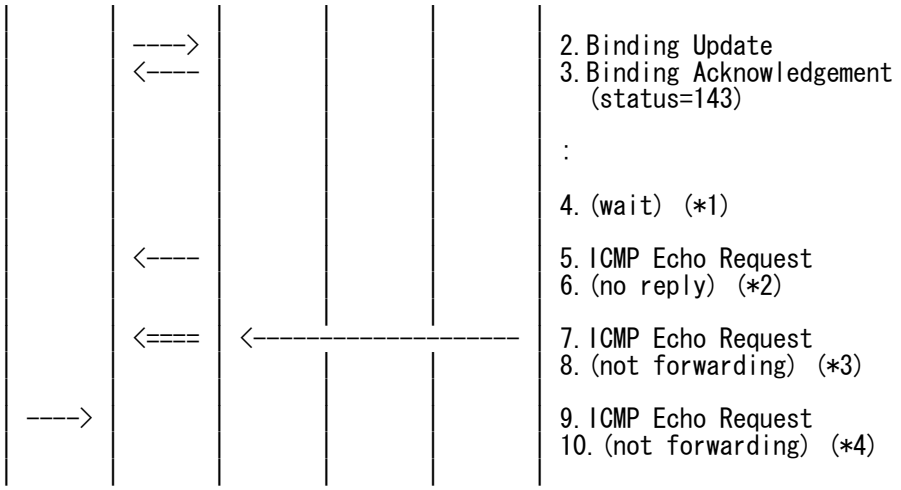
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 143(Forwarding Setup failed (prefixes missing)).
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	143
	R flag	1

4. (wait) (*1)
   # Wait during 30 seconds.
5. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header)
   (Refer to 5.7.1)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

6. (no reply) (*2)
7. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> LFN0)
   (Refer to 5.7.2)

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

8. (not forwarding) (*3)
9. Send ICMP Echo Request. (LFN0 -> CN0) (Refer to 5.7.1)

IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128

10. (not forwarding) (*4)

[JUDGMENT]

(*1) PASS: HA0 does not receive Binding Updates to same Home Agent.
(*2) PASS: HA0 does not receive ICMP Echo Reply with Home Address Option.
(*3) PASS: LFN0 does not receive ICMP Echo Request.
(*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.4.2

6.4.2.22 NEMO-MR-2-2-1-1-016 - Valid Sequence Number (Status = 135 & Sequence Number=65535)

[PURPOSE]

NEMO-MR-2-2-1-1-016 - Valid Sequence Number (Status = 135 & Sequence Number=65535)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NUT re-transmits BU to HA for BA(status 135): YES

[TOPOLOGY]

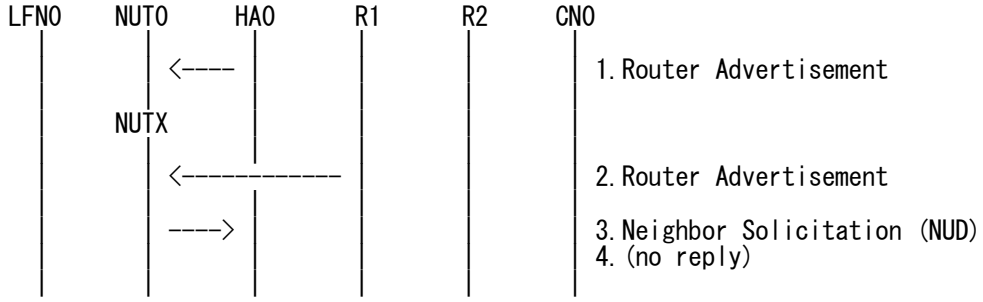
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

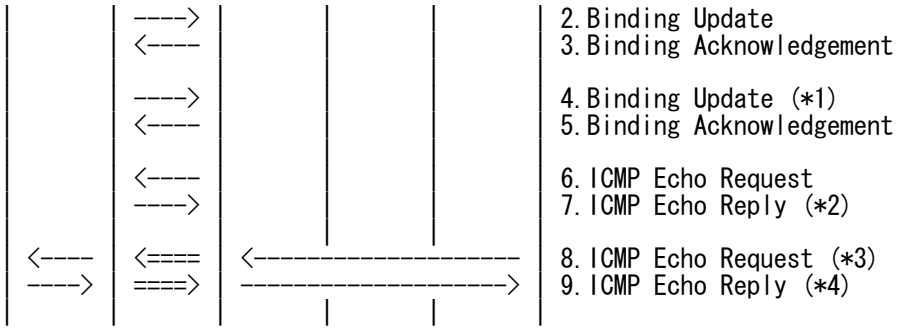


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 135(Sequence Number out of window).
   # The Mobile Router Flag (R) is set to 1.
   # The Sequence Number field is 65535(the maximum value of modulo 2**16).

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	135
	R flag	1
	Sequence	65535

4. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	Sequence Number	Any (<32767)
	R Flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	Sequence Number	Any (<32767)
	R Flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

5. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

7. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (*2) (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

8. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> LFN0) (Refer to 5.7.2)
   Receive ICMP Echo Request. (CN0 -> LFN0) (*3) (Refer to 5.7.1)

IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

9. Send ICMP Echo Reply. (LFN0 -> CN0) (Refer to 5.8.1)
   Receive ICMP Echo Reply. (out: NUTX -> HA0, in: LFN0 -> CN0) (*4) (Refer to 5.8.2)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update,
Then, check whether this packet fills all of the following,
- The Sequence Number field is set to the minimum value.
- The Mobile Router Flag (R) is set to 1.

(*2) PASS: HA0 receives ICMP Echo Reply with Home Address Option.
(*3) PASS: LFN0 receives ICMP Echo Request.
(*4) PASS: CN0 receives ICMP Echo Reply.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.4

RFC3775 Mobility Support in IPv6
See Section 11.7.1

6.4.2.23 NEMO-MR-2-2-1-1-017 - Invalid Sequence Number (BA != BU)

[PURPOSE]

NEMO-MR-2-2-1-1-017 - Invalid Sequence Number (BA != BU)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NUT re-transmits BU to HA for valuable BA: YES/NO

[TOPOLOGY]

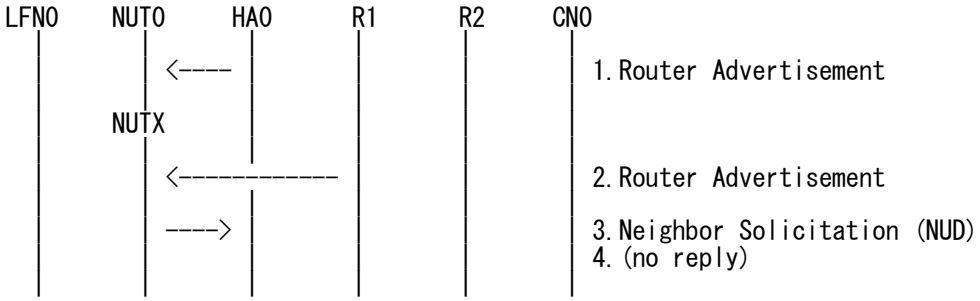
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

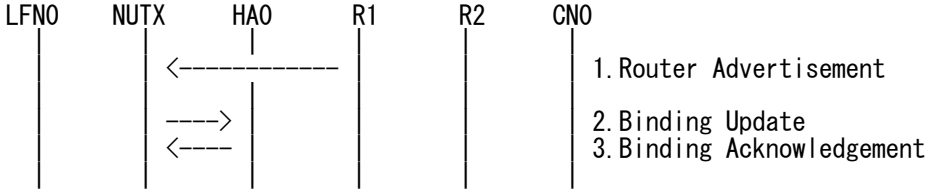


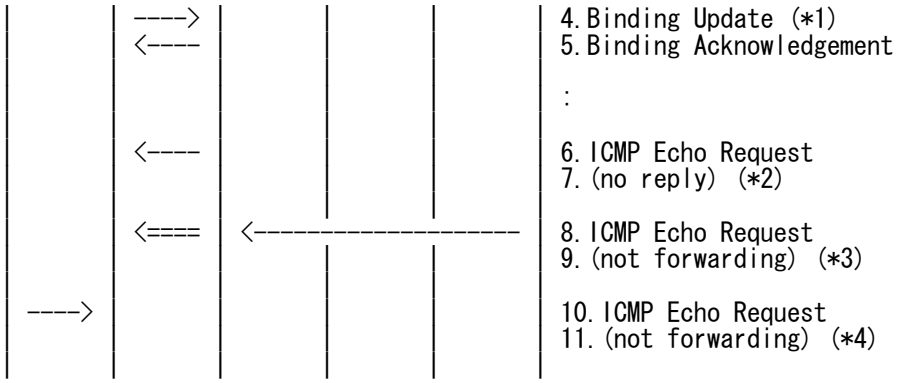
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Sequence Number field does not match the Sequence Number sent by BU[2].
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	0
	RFlag	1
	Sequence	/=BU[2]

4. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	Sequence	Any
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	Sequence	Any
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

5. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Sequence Number field does not match the Sequence Number sent by BU[4].
   # The Mobile Router Flag (R) is set to 1.
6. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)

	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

7. (no reply) (*2)
8. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> LFN0) (Refer to 5.7.4)

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

9. (not forwarding) (*3)
10. Send ICMP Echo Request. (LFN0 -> CN0) (Refer to 5.7.1)

IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128

11. (not forwarding) (*4)

[JUDGMENT]

The judgment changes by the following settings of "REQUIREMENT of TEST".

- NUT re-transmits BU to HA for valuable BA: YES
  (*1) PASS: HA0 receives the retransmitted Binding Update.
  Then, check whether this packet fills all of the following,
  - The Mobile Router Flag (R) is set to 1.
  - Sequence Number value greater than that used.
  - The initial retransmission timer is set to InitialBindackTimeoutFirstReg.
  - Timeout period is doubled upon each retransmission.
  (*2) PASS: HA0 does not receive ICMP Echo Reply with Home Address Option.
  (*3) PASS: LFN0 does not receive ICMP Echo Request.
  (*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

- NUT re-transmits BU to HA for valuable BA: NO
  (*1) PASS: HA0 does not receive the retransmitted Binding Update.
  (*2) PASS: HA0 does not receive ICMP Echo Reply with Home Address Option.
  (*3) PASS: LFN0 does not receive ICMP Echo Request.
  (*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.4

RFC3775 Mobility Support in IPv6
See Section 11.7.1

6.4.2.24 NEMO-MR-2-2-1-1-038 - BA which is not protected by IPsec

[PURPOSE]

NEMO-MR-2-2-1-1-038 - BA which is not protected by IPsec

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NUT re-transmits BU to HA for valuable BA: YES/NO

[TOPOLOGY]

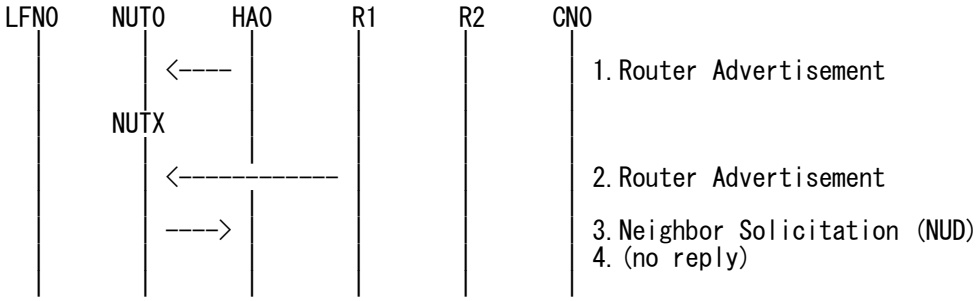
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

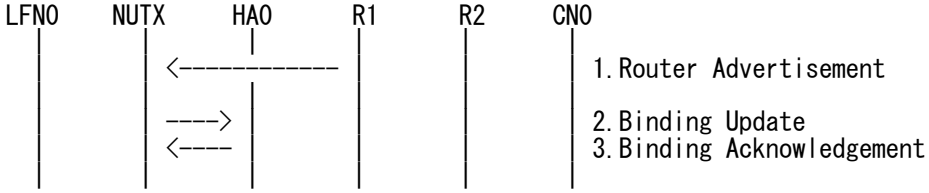


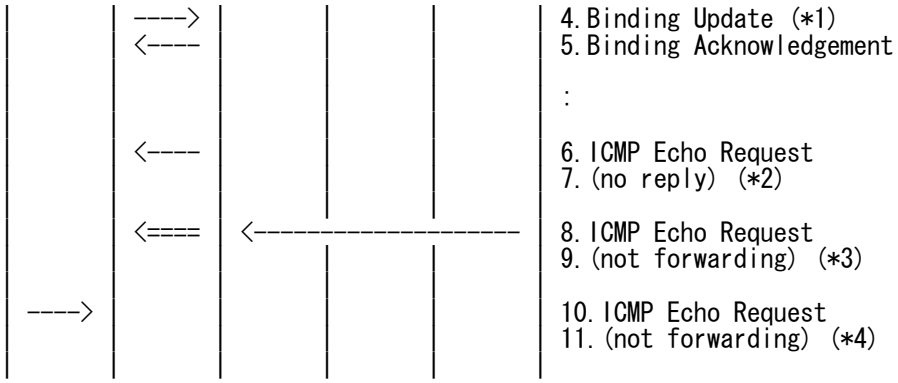
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # BA which is not protected by IPsec.
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Mobility Header	MH Type	6
	Status	0
	R flag	1

4. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	Sequence	Any
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	Sequence	Any
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

5. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # BA which is not protected by IPsec.
   # The Mobile Router Flag (R) is set to 1.
6. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

7. (no reply) (*2)
8. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> LFN0) (Refer to 5.8.2)

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

9. (not forwarding) (*3)
10. Send ICMP Echo Request. (LFN0 -> CN0) (Refer to 5.7.1)

IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128

11. (not forwarding) (*4)

[JUDGMENT]

The judgment changes by the following settings of "REQUIREMENT of TEST".

- NUT re-transmits BU to HA for valuable BA: YES
  (*1) PASS: HA0 receives the retransmitted Binding Update.
  Then, check whether this packet fills all of the following,
  - The Mobile Router Flag (R) is set to 1.
  - Sequence Number value greater than that used.
  - The initial retransmission timer is set to InitialBindackTimeoutFirstReg.
  - Timeout period is doubled upon each retransmission.

  (*2) PASS: HA0 does not receive ICMP Echo Reply with Home Address Option.
  (*3) PASS: LFN0 does not receive ICMP Echo Request.
  (*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

- NUT re-transmits BU to HA for valuable BA: NO
  (*1) PASS: HA0 does not receive the retransmitted Binding Update.
  (*2) PASS: HA0 does not receive ICMP Echo Reply with Home Address Option.
  (*3) PASS: LFN0 does not receive ICMP Echo Request.
  (*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.7.3

6.5 Mobile Network Prefix Re-Registration

6.5.1 Sending BU

6.5.1.1 NEMO-MR-2-1-2-1-001 - Sending BU (after moving from foreign to foreign)

[PURPOSE]
NEMO-MR-2-1-2-1-001 - Sending BU (after moving from foreign to foreign)

[CATEGORY]
ROUTER : BASIC FUNCTION

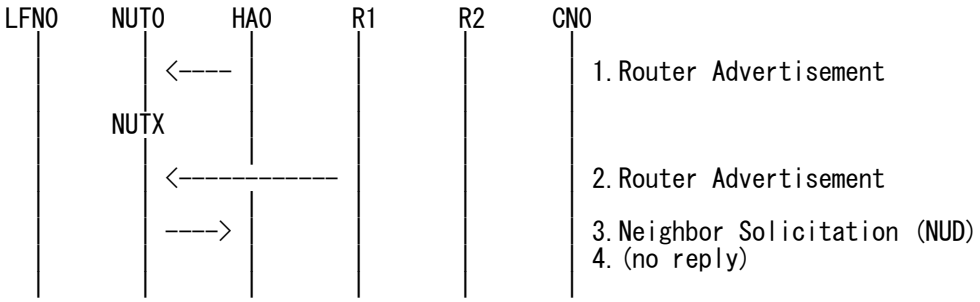
[REQUIREMENT OF TEST]
NONE

[TOPOLOGY]
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]
Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

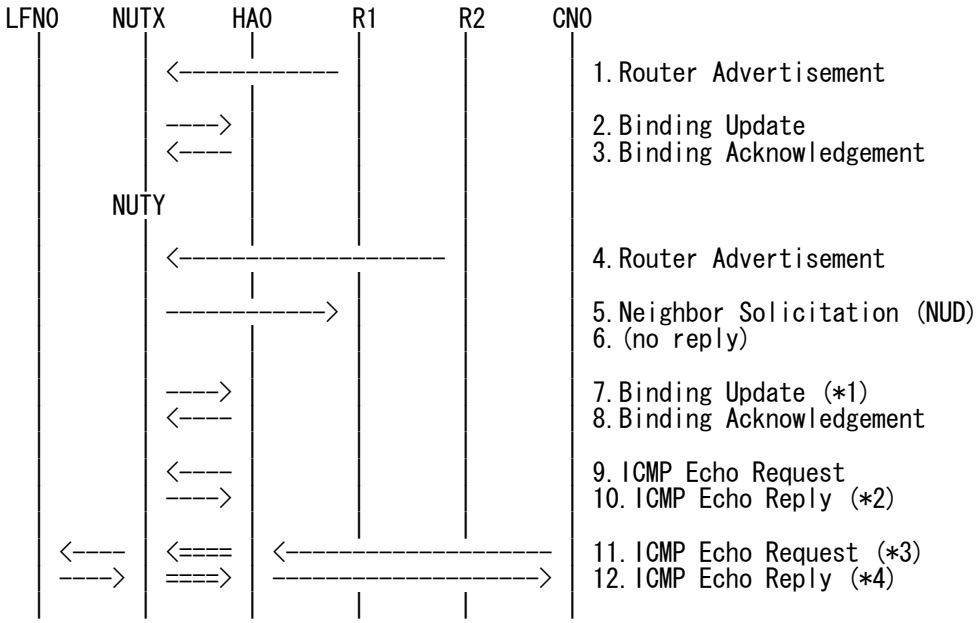


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX)(Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.
4. Send Router Advertisement. (R2 -> R2_allnode_multi)(Refer to 5.2.1)
5. Receive Neighbor Solicitation (NUD). (NUTX -> R1)(Refer to 5.3.3)
6. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
7. Receive Binding Update. (NUTY -> HA0) (*1)(Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTY (LinkY, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Alternate Care-of Address	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTY (LinkY, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	Sequence	Any
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

8. Send Binding Acknowledgement. (HA0 -> NUTY) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.
9. Send ICMP Echo Request. (HA0 -> NUTY with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTY (LinkY, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)

Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTY (LinkY, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

10. Receive ICMP Echo Reply. (NUTY -> HA0 with Home Address Option) (*2) (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTY (LinkY, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTY (LinkY, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

11. Send ICMP Echo Request. (out: HA0 -> NUTY, in: CN0 -> LFN0) (*3) (Refer to 5.7.2)

Receive ICMP Echo Request. (CN0 -> LFN0) (Refer to 5.7.1)

IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

12. Send ICMP Echo Reply. (LFN0 -> CN0) (Refer to 5.8.1)

Receive ICMP Echo Reply. (out: NUTY -> HA0, in: LFN0 -> CN0) (*4) (Refer to 5.8.2)

IPv6 Header	Source Address	NUTY (LinkY, global)
	Destination Address	HA0 (Link0, global)
IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update message,
Then, check whether this packet fills all of the following,
- The Mobile Router Flag (R) is set to 1.
- The Sequence Number is set more than that in the previous Binding Update.
- The Alternate Care-of Address mobility option is included, and,
  - The Care-of Address field is set to the Care-of Address.

(*2) PASS: HA0 receives ICMP Echo Reply with Home Address Option.
(*3) PASS: LFN0 receives ICMP Echo Request.
(*4) PASS: CN0 receives ICMP Echo Reply.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.1, 5.2

RFC3775 Mobility Support in IPv6
See Section 11.7.1, 11.1, 11.5.1

6.5.1.2 NEMO-MR-2-1-2-1-004 - Sending BU (before the expiration of home registration)

[PURPOSE]

NEMO-MR-2-1-2-1-004 - Sending BU (before the expiration of home registration)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

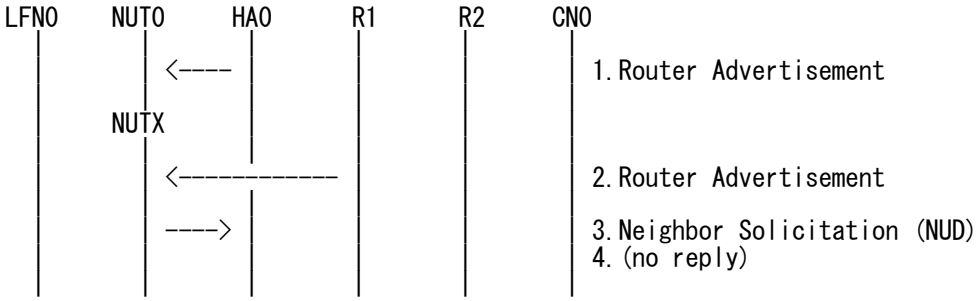
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

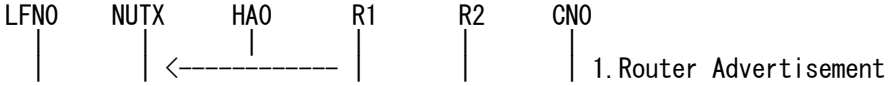


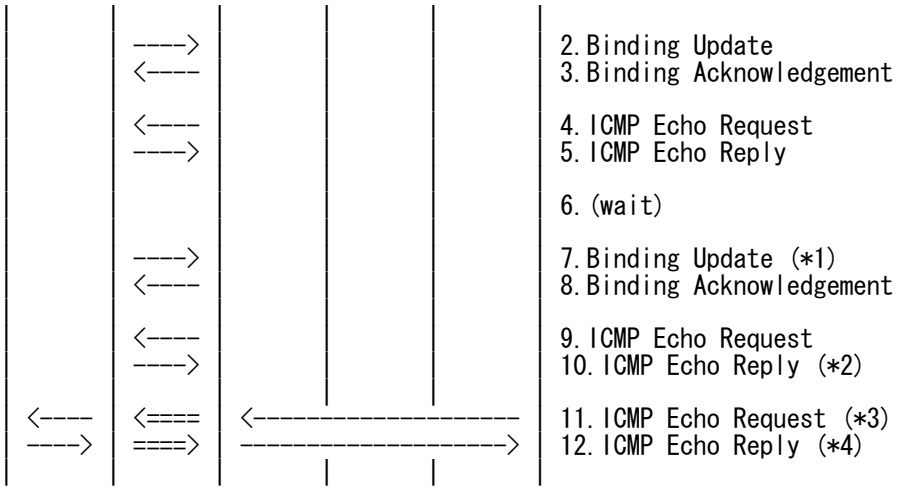
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
   # The Valid Lifetime field and the Preferred Lifetime field in the
   # Prefix Information option are set to 7200 (seconds).
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
   # The Valid Lifetime field and the Preferred Lifetime field in the
   # Prefix Information option are set to 7200 (seconds).
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
   # The lifetime value is less than the Prefix Lifetime.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.
   # The lifetime value is same as the Binding Update[2].
4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)
   - Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

   - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (Refer to 5.8.3)
   - Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

   - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. (wait)
   # Wait during a maximum of the lifetime value in the Binding Acknowledgement [3].

7. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	Sequence	Any
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	Sequence	Any
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

8. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.
9. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

10. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (*2) (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

11. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> LFN0) (Refer to 5.7.2)
    Receive ICMP Echo Request. (CN0 -> LFN0) (*3) (Refer to 5.7.1)

IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

12. Send ICMP Echo Reply. (LFN0 -> CN0) (Refer to 5.8.1)
    Receive ICMP Echo Reply. (out: NUTX -> HA0, in: LFN0 -> CN0) (*4) (Refer to 5.8.2)

IPv6 Header	Source Address	NUTX (LinkX, global)

IPv6 Header	Destination Address	HA0 (Link0, global)
	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update before the expiration of the following period,
- The remaining lifetime of the home registration.

Then, check whether this packet fills all of the following,
- The Mobile Router Flag (R) is set to 1.
- The Sequence Number is set more than that in the previous Binding Update.
- The Alternate Care-of Address mobility option is included, and,
  - The Care-of Address field is set to the Care-of Address.

(*2) PASS: HA0 receives ICMP Echo Reply with Home Address Option.

(*3) PASS: LFN0 receives ICMP Echo Request.

(*4) PASS: CN0 receives ICMP Echo Reply.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.7.1, 11.1, 11.7.3, 11.4.1

RFC2462 IPv6 Stateless Address Autoconfiguration
See Section 5.5.3

6.5.1.3 NEMO-MR-2-1-2-1-005 - Sending BU (when the lifetime for a changed prefix decreases)

[PURPOSE]

NEMO-MR-2-1-2-1-005 - Sending BU (when the lifetime for a changed prefix decreases)

[CATEGORY]

ROUTER: ADVANCED FUNCTION (MPD)

[REQUIREMENT OF TEST]

Function of Mobile Prefix Discovery: YES

[TOPOLOGY]

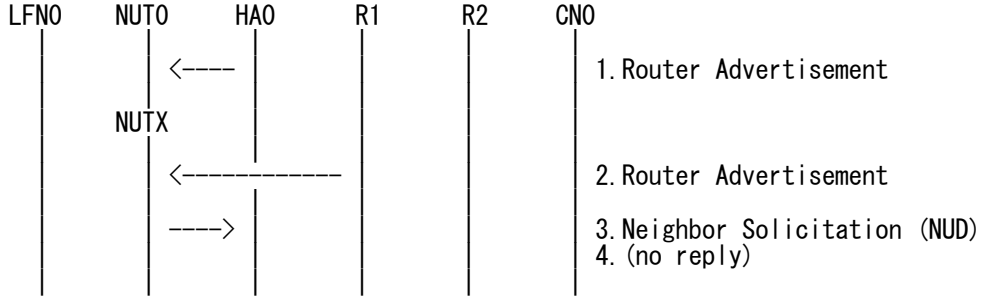
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

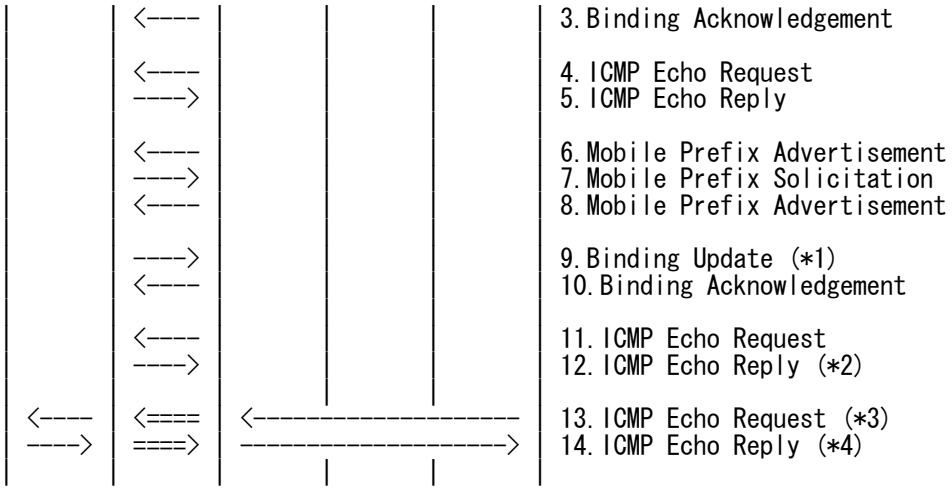


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.
4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. Send unsolicited Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)
   # The Valid Lifetime is set less than the remaining lifetime of the home registration.
   # The Preferred Lifetime is set less than the remaining lifetime of the home registration.
7. Receive Mobile Prefix Solicitation. (NUTX -> HA0) (Refer to 5.19.1)

8. Send Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)
   # The Valid Lifetime is set less than the remaining lifetime of the home registration.
   # The Preferred Lifetime is set less than the remaining lifetime of the home registration.

IPv6 Header	Source Address (Home Agent Address)	HA0 (Link0, global)
	Destination Address (Source Address of an invoking Mobile Prefix Solicitation)	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
Mobility Header	Type	147
	Code	0
	Checksum	Any
	Identifier	Any
	M flag	0
	O flag	0
	Reserved	0
Prefix Information Option	Valid lifetime	Any
	Preffered lifetime	Any

9. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	Sequence	Any
	R flag	1
	Lifetime	Any
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	Sequence	Any
	R flag	1
	Lifetime	Any
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

10. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
    # The Mobile Router Flag (R) is set to 1.
11. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

12. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (*2) (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

13. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> LFN0) (Refer to 5.7.2)
    Receive ICMP Echo Request. (CN0 -> LFN0) (*3) (Refer to 5.7.1)

IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

14. Send ICMP Echo Reply. (LFN0 -> CN0) (Refer to 5.8.1)
    Receive ICMP Echo Reply. (out: NUTX -> HA0, in: LFN0 -> CN0) (*4) (Refer to 5.8.2)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update message,
Then, check whether this packet fills all of the following,
- The Mobile Router Flag (R) is set to 1.
- The Sequence Number field is set more than the Sequence Number in the previous Binding Update[2].
- The Lifetime field is set less than Valid Lifetime in Mobile Prefix Advertisement[8].
- The Alternate Care-of Address mobility option is included, and,
  - The Care-of Address field is set to the Care-of Address.

(*2) PASS: HA0 receives ICMP Echo Reply with Home Address Option.
(*3) PASS: LFN0 receives ICMP Echo Request.
(*4) PASS: CN0 receives ICMP Echo Reply.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.7.1, 11.4.2

6.5.1.4 NEMO-MR-2-1-2-1-006 - Retransmissions & Back off (Use INITIAL_BINDACK_TIMEOUT as the initial retransmission timer)

[PURPOSE]

NEMO-MR-2-1-2-1-006 - Retransmissions & Back off (Use INITIAL_BINDACK_TIMEOUT as the initial retransmission timer)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NUT re-transmits BU to HA for valuable BA: YES/NO

[TOPOLOGY]

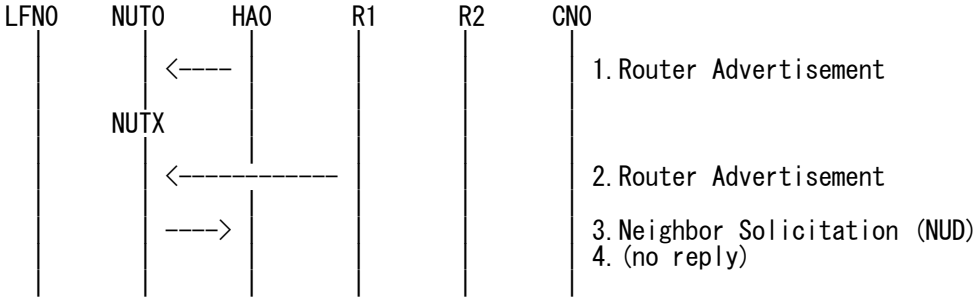
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

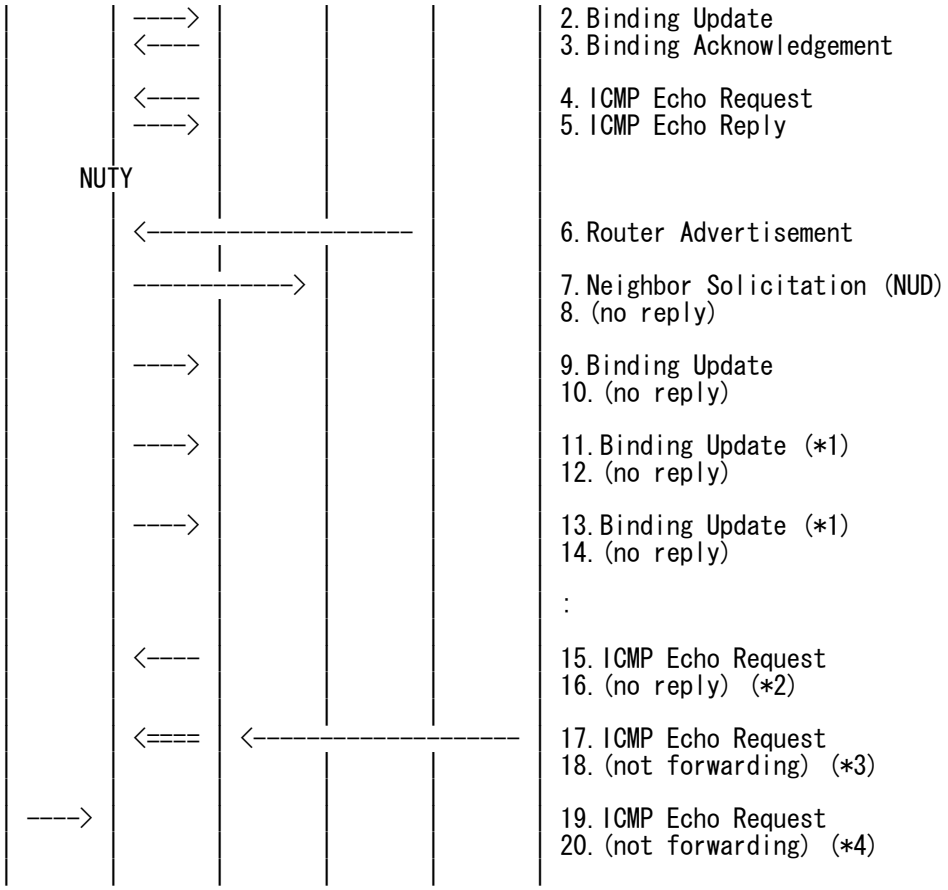


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.
4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header)
   (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option)
   (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. Send Router Advertisement. (R2 -> R2_allnode_multi) (Refer to 5.2.1)
7. Receive Neighbor Solicitation (NUD). (NUTX -> R1) (Refer to 5.3.3)
8. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
9. Receive Binding Update. (NUTY -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
10. (no reply)
11. Receive Binding Update. (NUTY -> HA0) (*1) (Refer to 5.14.1)
    # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTY (LinkY, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	Sequence	Any
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTY (LinkY, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	Sequence	Any
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

12. (no reply)
13. Receive Binding Update. (NUTY -> HA0) (*1) (Refer to 5.14.1)
    # The Mobile Router Flag (R) is set to 1.
14. (no reply)
15. Send ICMP Echo Request. (HA0 -> NUTY with Type2 Routing Header). (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTY (LinkY, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTY (LinkY, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

16. (no reply) (*2)
17. Send ICMP Echo Request. (out: HA0 -> NUTY, in: CN0 -> LFN0) (Refer to 5.7.2)

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTY (LinkY, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

18. (not forwarding) (*3)
19. Send ICMP Echo Request. (LFN0 -> CN0) (Refer to 5.7.1)

IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128

20. (not forwarding) (*4)

[JUDGMENT]

The judgment changes by the following settings of "REQUIREMENT of TEST".

- NUT re-transmits BU to HA for valuable BA: YES
  (*1) PASS: HA0 receives the retransmitted Binding Update.
  Then, check whether this packet fills all of the following,
  - The Mobile Router Flag (R) is set to 1.
  - Sequence Number value greater than that used.
  - The initial retransmission timer is set to INITIAL_BINDACK_TIMEOUT.
  - Timeout period is doubled upon each retransmission.
  - Transmit until the retransmission interval becomes MAX_BINDACK_TIMEOUT.

  (*2) PASS: HA0 does not receive ICMP Echo reply.
  (*3) PASS: LFN0 does not receive ICMP Echo Request.
  (*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

- NUT re-transmits BU to HA for valuable BA: NO
  (*1) PASS: HA0 does not receive retransmitted Binding Update.
  (*2) PASS: HA0 does not receive ICMP Echo reply.
  (*3) PASS: LFN0 does not receive ICMP Echo Request.
  (*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.8, 12, 11.7.1, 11.1

6.6 Returning Home

6.6.1 Sending BU

6.6.1.1 NEMO-MR-2-1-3-1-007 - Sending Neighbor Solicitation for the home agent's address (HoA (from HNP))

[PURPOSE]
NEMO-MR-2-1-3-1-007 - Sending Neighbor Solicitation for the home agent's address (HoA (from HNP))

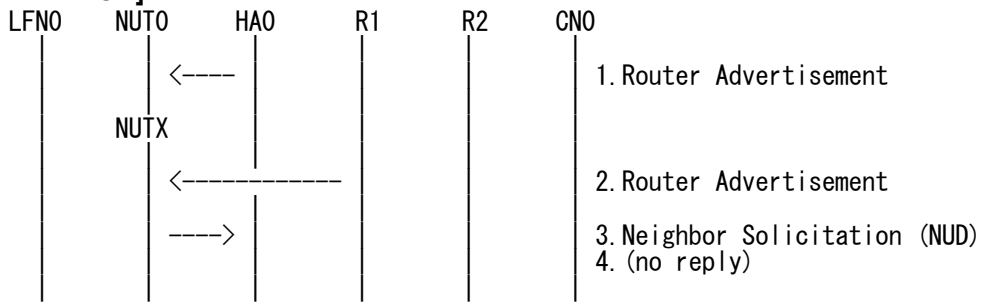
[CATEGORY]
ROUTER : ADVANCED FUNCTION (REAL HOME LINK)

[REQUIREMENT OF TEST]
Function of Real Home Link: YES
Home Address derived from the Home Network Prefix

[TOPOLOGY]
Refer to 2.1.1.1 Common Topology-1

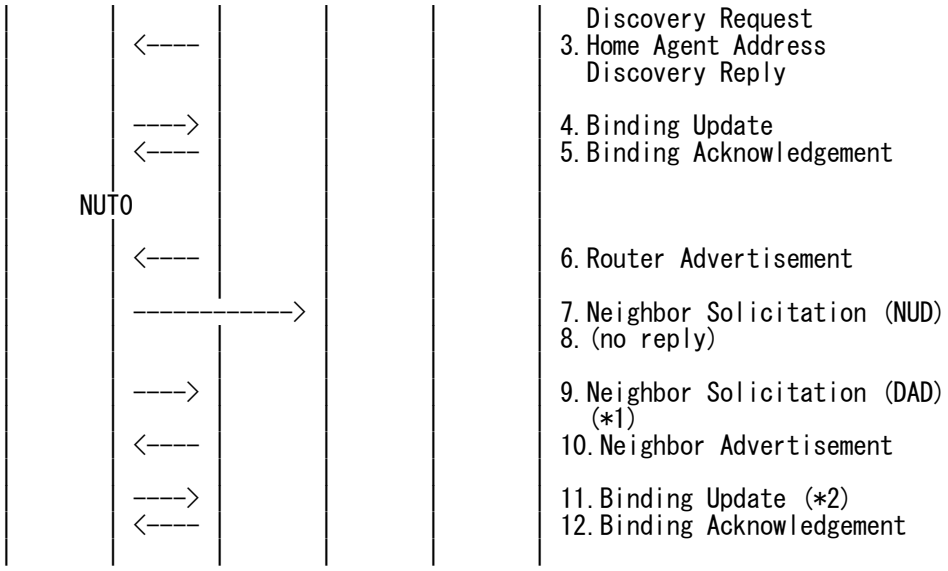
[TEST SETUP]
Refer to 3.1 Common Setup-1

[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.1)
   # Not include HA information.
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
   # Not include HA information.
2. Receive Home Agent Address Discovery Request. (NUTX -> NUT0_ha_any) (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) is set to 1.
3. Send Home Agent Address Discovery Reply. (HA0 -> NUTX) (Refer to 5.18.1)
   # The Mobile Router Support Flag (R) is set to 1.
   # The Home Agent Addresses field contains global IP address for HA0.
4. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
5. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.1)
7. Receive Neighbor Solicitation (NUD). (NUTX -> R1) (Refer to 5.3.3)
8. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
9. Receive Neighbor Solicitation (DAD). (0 -> solicited-node multicast) (*1) (Refer to 5.3.1)

IPv6 Header	Source Address	0::0
	Destination Address	Solicited-node multicast
ICMPv6 Header	Type	135
	Target Address	NUT0 (Link0, global)

10. Send Neighbor Advertisement. (HA0 -> NUT0) (Refer to 5.4.1)

IPv6 Header	Source Address	HA0
	Destination Address	Unsolicited-node multicast
ICMPv6 Header	Type	136
	S Flag	0
	Target Address	NUT0 (Link0, global)
Target Link Layer Option	Link Layer Address	HA0 (Link0, ether)

11. Receive Binding Update. (NUT0 -> HA0) (*2) (Refer to 5.14.2)

- w/ Home Address option

IPv6 Header	Source Address	NUT0 (Link0, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5

	R Flag	Any
	Lifetime	0
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUT0 (Link0, global)

- w/o Home Address option

IPv6 Header	Source Address	NUT0 (Link0, global)
	Destination Address	HA0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R Flag	Any
	Lifetime	0
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUT0 (Link0, global)

12. Send Binding Acknowledgement. (HA0 -> NUT0) (Refer to 5.15.1)

[JUDGMENT]

(*1) PASS: HA0 receives Neighbor Solicitation (DAD).

(*2) PASS: HA0 receives Binding Update.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5.8

RFC3775 Mobility Support in IPv6

See Section 11.5.4

6.6.1.2 NEMO-MR-2-1-3-1-001 - Sending BU of de-registration

[PURPOSE]

NEMO-MR-2-1-3-1-001 - Sending BU of de-registration

[CATEGORY]

ROUTER : ADVANCED FUNCTION (REAL HOME LINK)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

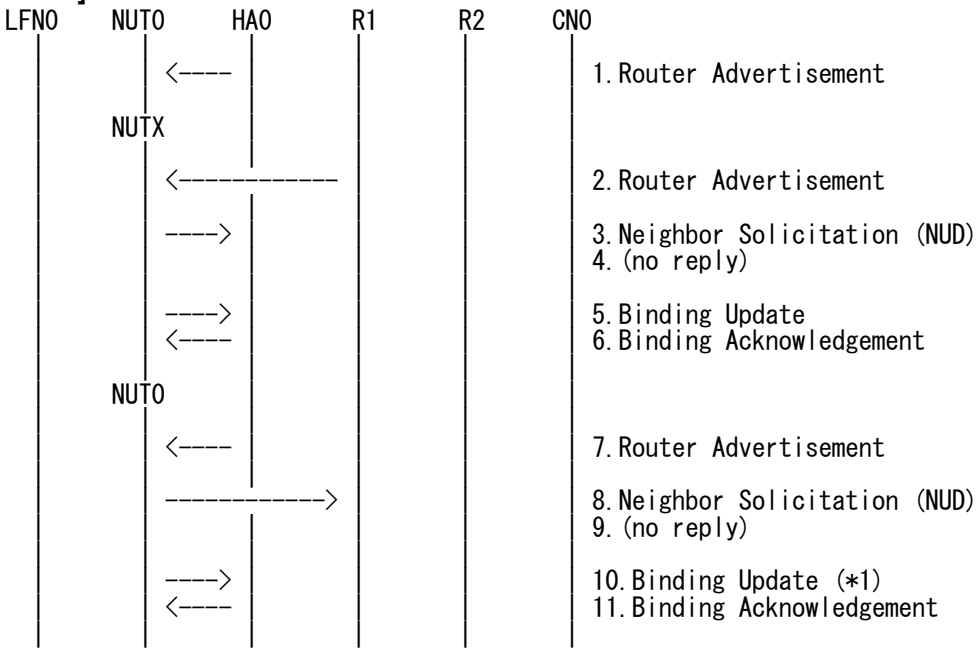
[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

NONE

[PROCEDURE]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
5. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)

The Mobile Router Flag (R) is set to 1.

6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.
7. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
8. Receive Neighbor Solicitation (NUD). (NUTX -> R1) (Refer to 5.3.3)
9. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
10. Receive Binding Update. (NUT0 -> HA0) (*1) (Refer to 5.14.2)
    # The Mobile Router Flag (R) is set to 1.
    # The Lifetime field is set to 0.

- w/ Home Address option

IPv6 Header	Source Address	NUT0 (Link0, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	Sequence Number	Any
	A Flag	1
	H Flag	1
	L Flag	Any
	K Flag	Any
	M Flag	0
	R Flag	1
	Lifetime	0
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUT0 (Link0, global)

- w/o Home Address option

IPv6 Header	Source Address	NUT0 (Link0, global)
	Destination Address	HA0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	Sequence Number	Any
	A Flag	1
	H Flag	1
	L Flag	Any
	K Flag	Any
	M Flag	0
	R Flag	1
	Lifetime	0
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUT0 (Link0, global)

11. Send Binding Acknowledgement. (HA0 -> NUT0) (Refer to 5.15.2)
    # The Mobile Router Flag (R) is set to 1.

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update,
Then, check whether this packet fills all of the following,
- The Source Address is set to the Home Address.
- If the Home Address destination option is included,
  - This option is placed as the right location.
  - The Home Address field is set to the Home Address.
- The Acknowledge(A) bit is set to ON.
- The Home Registration(H) bit is set to ON.
- The Sequence Number is set more than that in the previous Binding Update.
- The Lifetime field is cleared.
- The Mobile Network Prefix option is not included.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5.8

RFC3775 Mobility Support in IPv6

See Section 11.7.1, 11.5.4

RFC3776 Using IPsec to Protect Mobile IPv6 Signaling Between Mobile Nodes and Home Agents

See Section 3.1

6.6.1.3 NEMO-MR-2-1-3-1-009 - Sending Neighbor Solicitation for the home agent's address

[PURPOSE]

NEMO-MR-2-1-3-1-009 - Sending BU of Home de-registration by Receiving BA(status=0 & R = OFF)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (DHAAD)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

Function of Dynamic Home Agent Address Discovery: YES

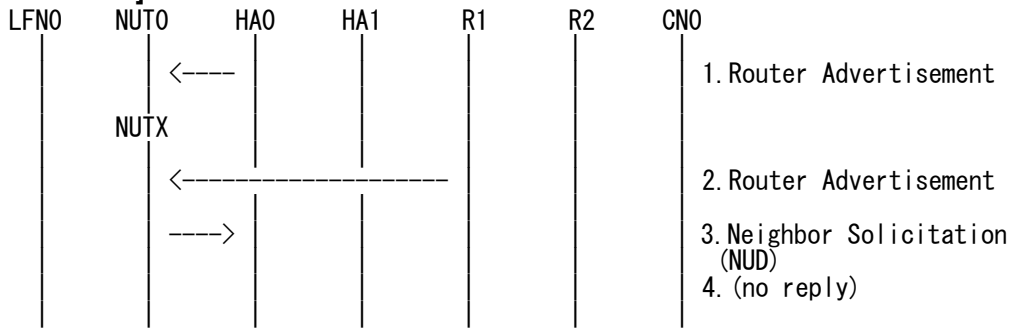
[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-3

[TEST SETUP]

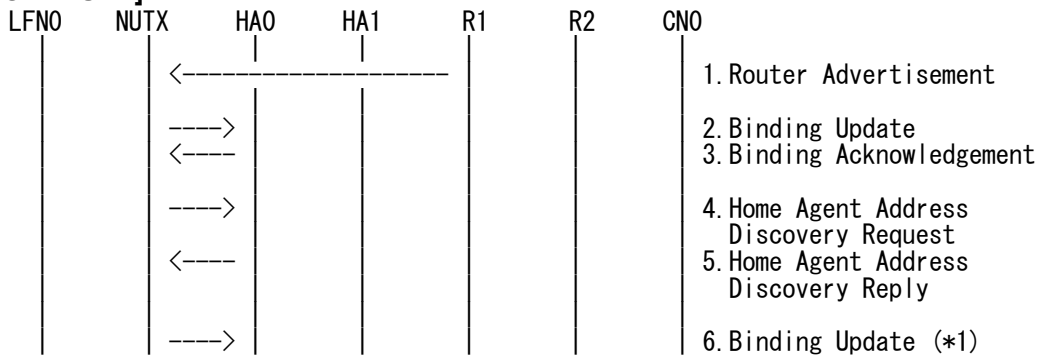
Refer to 3.1 Common Setup-1

[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

[PROCEDURE]



| | | | | | | |

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0 .
   # The Mobile Router Flag (R) is set to 0.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	0
	R Flag	0

4. Receive Home Agent Address Discovery Request. (NUTX -> NUT0_ha_any)
   (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) is set to 1.
5. Send Home Agent Address Discovery Reply. (HA0 -> NUTX)
   (Refer to 5.18.1)
   # The Home Agent Addresses field contains global IP address for HA0.
   # The Home Agent Addresses field contains global IP address for HA1.
   # The Mobile Router Support Flag (R) is set to 1.
6. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 0.
   # The Lifetime field is set to 0.

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	0
	Lifetime	0
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUT (home/care-of, global)

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update.
Then, check whether this packet fills all of the following,
- The Mobile Router Flag (R) is set to 0.
- The Lifetime field is set to 0.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

6.6.2 Receiving BA

6.6.2.1 NEMO-MR-2-2-2-1-027 - Receiving Neighbor Solicitation for home address

[PURPOSE]

NEMO-MR-2-2-2-1-027 - Receiving Neighbor Solicitation for home address

[CATEGORY]

ROUTER : ADVANCED FUNCTION (REAL HOME LINK)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

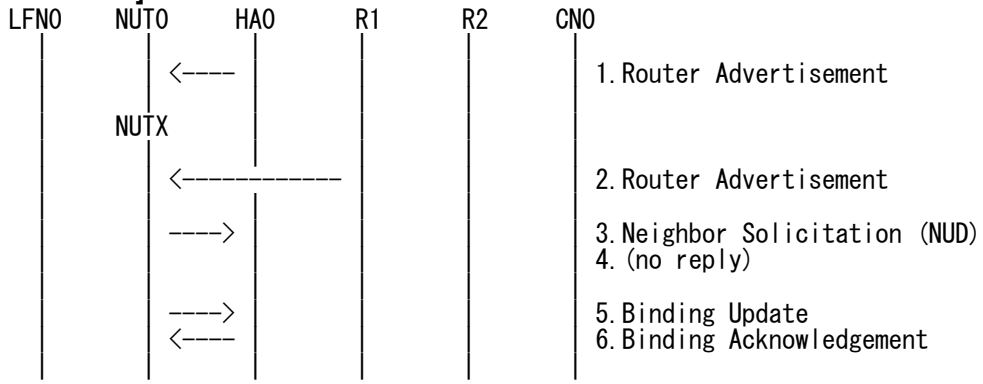
[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

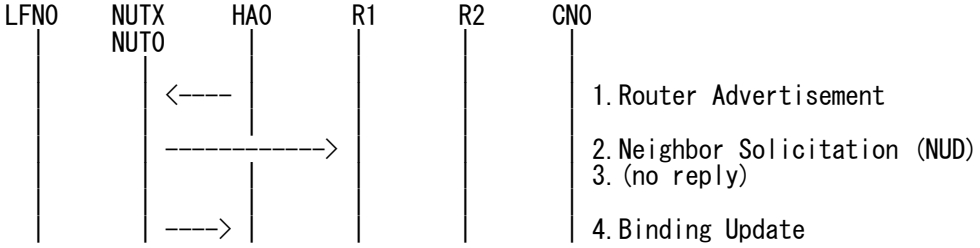
Refer to 3.1 Common Setup-1

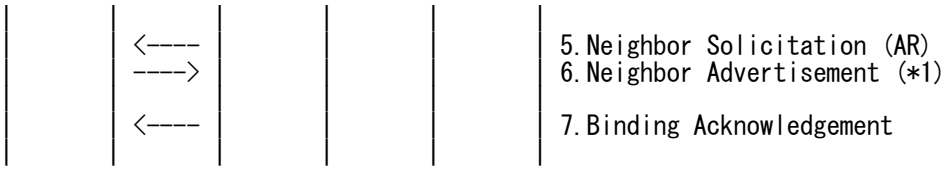
[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

[PROCEDURE]





1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Receive Neighbor Solicitation (NUD). (NUTX -> R1) (Refer to 5.3.3)
3. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
4. Receive Binding Update. (NUT0 -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
   # The Lifetime field is set to 0.
5. Send Neighbor Solicitation (AR). (HA0 -> NUT0) (Refer to 5.3.2)

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUT0 (solicited address)
ICMPv6 Header	Type	135
	Target Address	NUT0 (Link0, global)
Source Link Layer Option	Link Layer Address	HA0 (ether)

6. Receive Neighbor Advertisement. (NUT0 -> HA0) (Refer to 5.4.2)

IPv6 Header	Source Address	NUT0 (Link0, global)
	Destination Address	HA0 (Link0, global)
ICMPv6 Header	Type	136
	S Flag	1
	Target Address	NUT0 (Link0, global)
Target Link Layer Option	Link Layer Addreas	NUT0 (ether)

7. Send Binding Acknowledgement. (HA0 -> NUT0) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[JUDGMENT]

(*1) PASS: HA0 receives Neighbor Advertisement.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.8

RFC3775 Mobility Support in IPv6
See Section 11.5.4

6.6.2.2 NEMO-MR-2-2-2-1-001 - BU of de-registration accepted (Status = 0)

[PURPOSE]

NEMO-MR-2-2-2-1-001 - BU of de-registration accepted (Status = 0)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (REAL HOME LINK)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

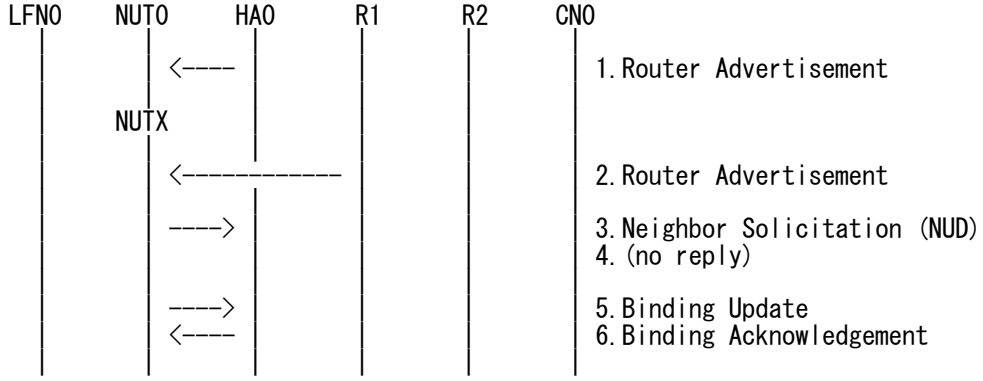
[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

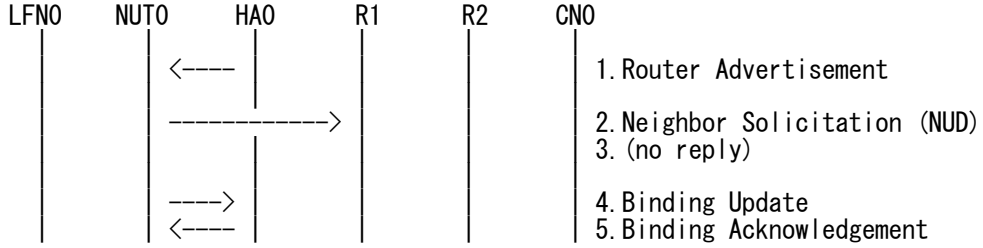
Refer to 3.1 Common Setup-1

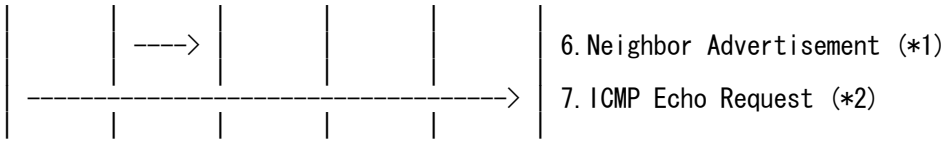
[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router (R) flag is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router (R) flag is set to 1.

[PROCEDURE]





1. Send Router Advertisement. (HA0 -> HA0_allnode_multi)　(Refer to 5.2.2)
2. Receive Neighbor Solicitation (NUD). (NUTX -> R1) (Refer to 5.3.3)
3. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
4. Receive Binding Update. (NUT0 -> HA0) (Refer to 5.14.2)
   # The Mobile Router (R) flag is set to 1.
   # The Lifetime field is set to 0.
5. Send Binding Acknowledgement. (HA0 -> NUT0) (Refer to 5.15.2)
   # The Destination Address is set to the Home Address.
   # The Status field is set to 0(Binding Update accepted).
   # The Sequence # field is set to the Sequence # in the Binding Update[4].
   # The Lifetime field is set to 0.
   # The Mobile Router (R) flag is set to 1.
   # The Binding Authorization Data mobility option is not included.
   # The Binding Refresh Advice mobility option is not included.

- w/o Type2 Routing Header

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Status	0
	R flag	1
	Sequence	Bindung UIpdate[4]
	Lifetime	0

6. Receive Neighbor Advertisement. (NUT0 -> unsolicited-node multicast) (*1) (Refer to 5.4.1)

IPv6 Header	Source Address	NUT0 (Link0, global)
	Destination Address	Unsolicited-nodemulticast
ICMPv6 Header	Type	136
	R Flag	1
	S Flag	0
	O Flag	1
	Target Address	NUT0 (Link0, global)
Target Link Layer Option	Link Layer Address	NUT0 (ether)

7. Send ICMP Echo Request. (LFN0 -> CN0) (Refer to 5.7.1)
   Receive ICMP Echo Request. (LFN0 -> CN0) (*2) (Refer to 5.7.1)

IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128

[JUDGMENT]

(*1) PASS: HA0 receive Neighbor Advertisement.
- The Router (R) flag is set to ON.

(*2) PASS: CN0 receive ICMP Echo Request.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.8

RFC3775 Mobility Support in IPv6
See Section 11.7.3, 11.5.4

6.6.3 Neighbor Discovery

6.6.3.1 NEMO-MR-3-4-1-1-001 - Sending NA (Target Address = link-layer address)

[PURPOSE]

NEMO-MR-3-4-1-1-001 - Sending NA (Target Address = link-layer address)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (REAL HOME LINK)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

Home Address derived from the Home Network Prefix

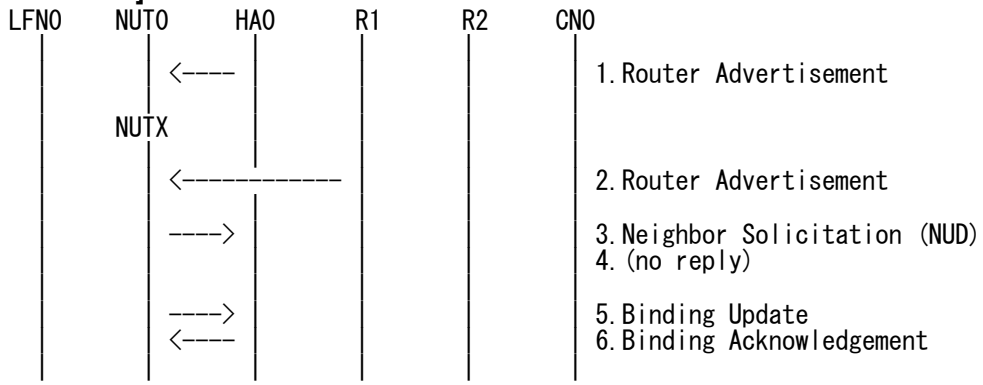
[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

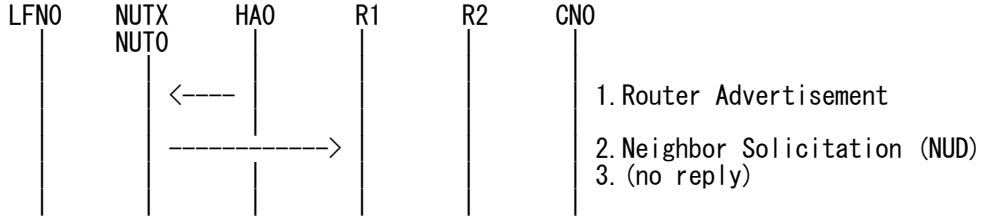
Refer to 3.1 Common Setup-1

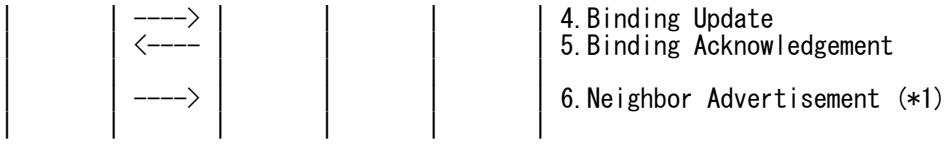
[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

[PROCEDURE]





1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Receive Neighbor Solicitation (NUD). (NUTX -> R1) (Refer to 5.3.3)
3. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
4. Receive Binding Update. (NUT0 -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
   # The Lifetime field is set to 0.
5. Send Binding Acknowledgement. (HA0 -> NUT0) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.
6. Receive Neighbor Advertisement. (NUT0 -> unsolicited-node multicast) (*1) (Refer to 5.4.1)

IPv6 Header	Source Address	NUT0 (Link0, global)
	Destination Address	Unsolicited-nodemulticast
ICMPv6 Header	Type	136
	R Flag	1
	S Flag	0
	O Flag	1
	Target Address	NUT0 (Link0, global)
Target Link Layer Option	Link Layer Address	NUT0 (ether)

[JUDGMENT]

(*1) PASS: HA0 receives Neighbor Advertisement.
Then, check whether this packet fills all of the following.
- The target address is set to the Home Address.
- The Router (R) flag is set to ON.
- The Solicited flag is cleared.
- The Override flag is set to ON.
- The Target Link-layer Address option is set to self link-layer address.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.8

RFC3775 Mobility Support in IPv6
See Section 11.5.4

6.6.3.2 NEMO-MR-3-4-1-1-002 - Returning home (after the expiration of Mobile Network Prefix registration)

[PURPOSE]

NEMO-MR-3-4-1-1-002 - Returning home (after the expiration of Mobile Network Prefix registration)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (REAL HOME LINK)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

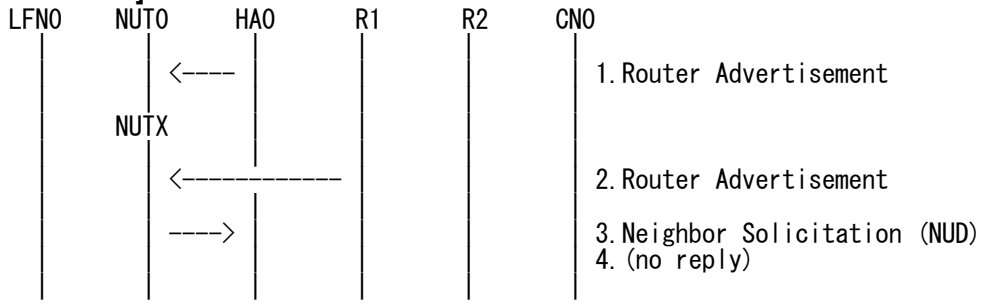
[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

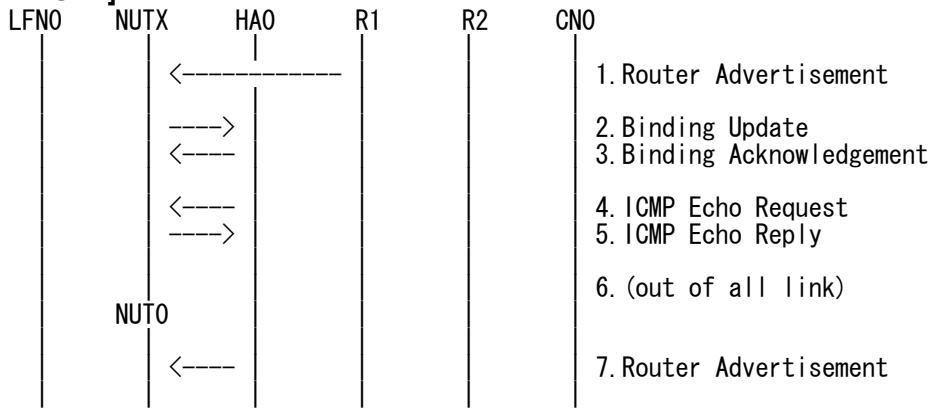
Refer to 3.1 Common Setup-1

[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.
4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)
   - Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

   - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (Refer to 5.8.3)
   - Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

   - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. (wait)
   # mobile network prefix registration is expired
7. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
8. Receive Neighbor Solicitation (DAD). (0::0 -> solicited-node multicast) (*1) (Refer to 5.3.1)

IPv6 Header	Source Address	0::0
	Destination Address	NUT0 (Link0, Solicited-node multicast address)
ICMPv6 Header	Type	135
	code	0
	Target Address	NUT0 (Link0, link-local)

[JUDGMENT]

(*1) PASS: HA0 receives Neighbor Solicitation (DAD).
Then, check whether this packet fills all of the following.
- The target address is a link local address.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.8

RFC3775 Mobility Support in IPv6
See Section 11.5.4

6.7 Neighbor Discovery

6.7.1 Sending RA by Ingress interface

6.7.1.1 NEMO-MR-1-2-1-4-007 - Sending RA(when receiving RS(dst address = all-router multicast address)) on the ingress interface in home-link

[PURPOSE]

NEMO-MR-1-2-1-4-007 - Sending RA(when receiving RS(dst address = all-router multicast address)) on the ingress interface in home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION(Real Home Link)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

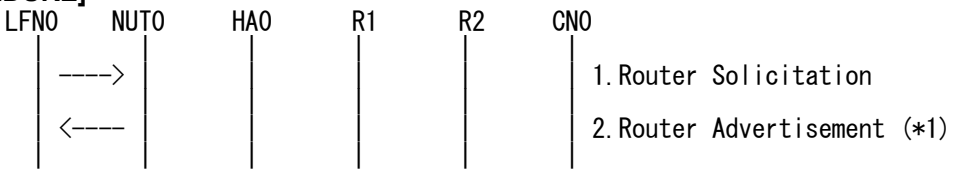
[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)

[PROCEDURE]



1. Send Router Solicitation. (LFN0 -> allrouter_multi) (Refer to 5.1.1)

IPv6 Header	Source Address	LFN0 (Link1, link-local)
	Destination Address	All-routers multicast address
ICMPv6 Header	Type	133
Source Link Layer Option	Link Layer Address	LFN0 (ether)

2. Receive Router Advertisement. (NUT1 -> LFN0) (Refer to 5.2.1)

IPv6 Header	Source Address	NUT1 (Link1, link-local/global)
	Destination Address	LFN0 (link-local) or (All-nodes multicast address)
ICMPv6 Header	Type	134
	H Flag	0
Prefix Information Option	R Flag	Any
	Prefix	(prefix/global)

[JUDGMENT]

(*1) PASS: LFN0 receives Router Advertisement from Mobile Router.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5

6.7.1.2 NEMO-MR-1-2-1-4-008 - Sending RA(when receiving RS(dst address = global address)) on the ingress interface in home-link

[PURPOSE]

NEMO-MR-1-2-1-4-008 - Sending RA(when receiving RS(dst address = global address)) on the ingress interface in home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION(Real Home Link)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

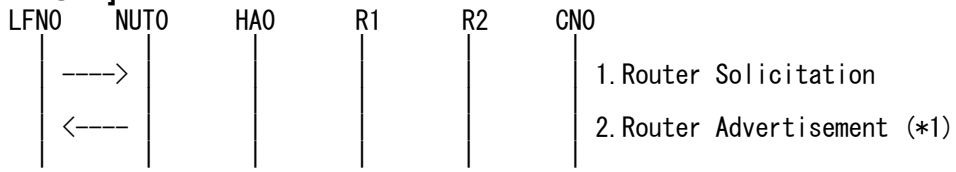
[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)

[PROCEDURE]



1. Send Router Solicitation. (LFN0 -> NUT1) (Refer to 5.1.1)

IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	NUT1 (Link1, global)
ICMPv6 Header	Type	133
Source Link Layer Option	Link Layer Address	LFN0 (ether)

2. Receive Router Advertisement. (NUT1 -> LFN0) (*1) (Refer to 5.2.1)

IPv6 Header	Source Address	NUT1 (Link1, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	134
	H Flag	0
Prefix Information Option	R Flag	Any
	Prefix	(prefix/global)

[JUDGMENT]

(*1) PASS: LFN0 receives Router Advertisement from Mobile Router.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

6.7.1.3 NEMO-MR-1-2-1-4-009 - Sending RA(when receiving RS(dst address = link-local address)) on the ingress interface in home-link

[PURPOSE]

NEMO-MR-1-2-1-4-009 - Sending RA(when receiving RS(dst address = link-local address)) on the ingress interface in home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION(Real Home Link)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

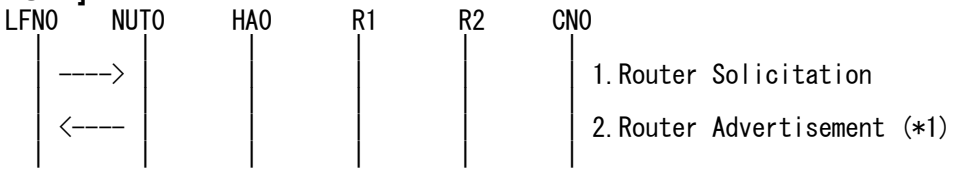
[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)

[PROCEDURE]



1. Send Router Solicitation. (LFN0 -> NUT1) (Refer to 5.1.1)

IPv6 Header	Source Address	LFN0 (Link1, link-local)
	Destination Address	NUT1 (Link1, link-local)
ICMPv6 Header	Type	133
Source Link Layer Option	Link Layer Address	LFN0 (ether)

2. Receive Router Advertisement. (NUT1 -> LFN0) (*1) (Refer to 5.2.1)

IPv6 Header	Source Address	NUT1 (Link1, link-local)
	Destination Address	LFN0 (Link1, link-local)
ICMPv6 Header	Type	134
	H Flag	0
Prefix Information Option	R Flag	Any
	Prefix	(prefix/global)

[JUDGMENT]

(*1) PASS: LFN0 receives Router Advertisement from Mobile Router.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

6.7.1.4 NEMO-MR-1-2-1-4-010 - Sending RA(when receiving RS(dst address = all-router multicast address)) on the ingress interface in foreign-link

[PURPOSE]

NEMO-MR-1-2-1-4-010 - Sending RA(when receiving RS(dst address = all-router multicast address)) on the ingress interface in foreign-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

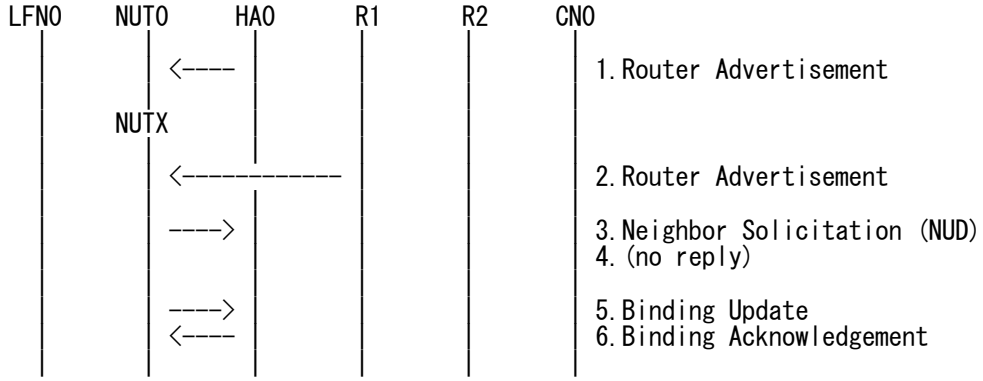
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

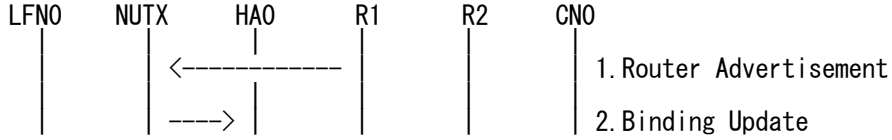
[INITIALIZATION]

- In the case of Real Home Link



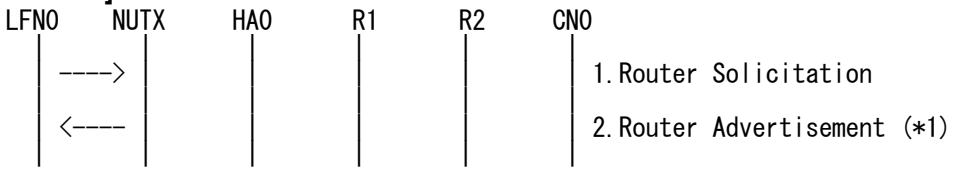
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router (R) flag is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router (R) flag is set to 1.

- In the case of Virtual Home Link



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router (R) flag is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router (R) flag is set to 1.

[PROCEDURE]



1. Send Router Solicitation. (LFN0 -> allrouter_multi) (Refer to 5.1.1)

IPv6 Header	Source Address	LFN0 (Link1, link-local)
	Destination Address	All router multicast address
ICMPv6 Header	Type	133
Source Link Layer Option	Link Layer Address	LFN0 (ether)

2. Receive Router Advertisement. (NUT1 -> LFN0) (*1) (Refer to 5.2.1)

IPv6 Header	Source Address	NUT1(Link1, link-local/global)
	Destination Address	LFN0 (Link1, link-local) or (All-nodes multicast address)
ICMPv6 Header	Type	134
	H Flag	0
Prefix Information Option	R Flag	Any
	Prefix	(prefix/global)

[JUDGMENT]

(*1) PASS: LFN0 receives Router Advertisement from Mobile Router.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

6.7.1.5 NEMO-MR-1-2-1-4-011 - Sending RA(when receiving RS(dst address = global address)) on the ingress interface in foreign-link

[PURPOSE]

NEMO-MR-1-2-1-4-011 - Sending RA(when receiving RS(dst address = global address)) on the ingress interface in foreign-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

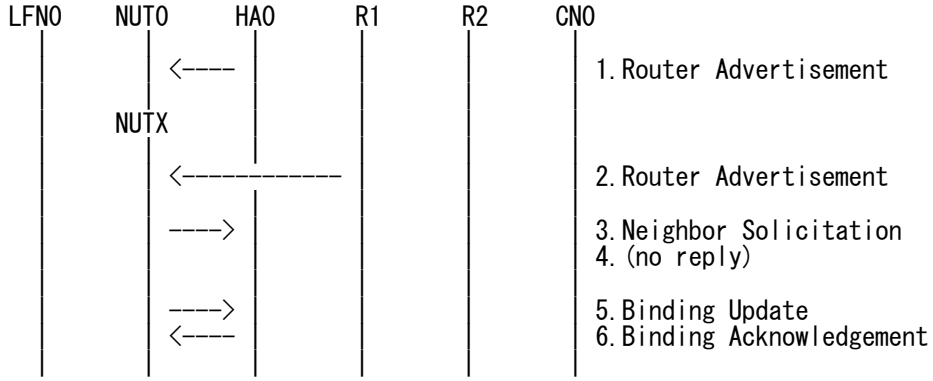
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

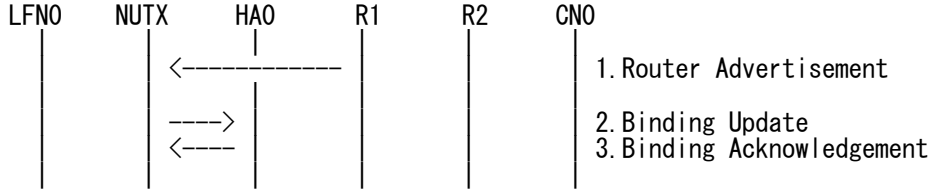
[INITIALIZATION]

- In the case of Real Home Link



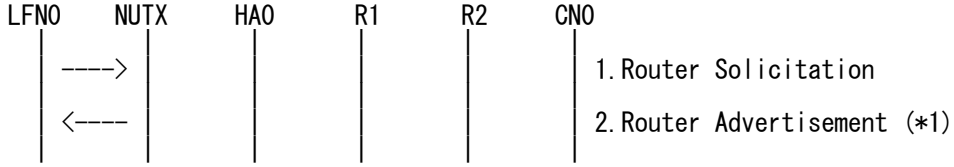
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation. (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

[PROCEDURE]



1. Send Router Solicitation. (LFN0 -> NUT1) (Refer to 5.1.1)

IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	NUT1 (Link1, global)
ICMPv6 Header	Type	133
Source Link Layer Option	Link Layer Address	LFN0 (ether)

2. Receive Router Advertisement. (NUT1 -> LFN0) (*1) (Refer to 5.2.1)

IPv6 Header	Source Address	NUT1 (Link1, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	134
	H Flag	0
Prefix Information Option	R Flag	Any
	Prefix	(prefix/global)

[JUDGMENT]

(*1) PASS: LFN0 receives Router Advertisement from Mobile Router.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

6.7.1.6 NEMO-MR-1-2-1-4-012 - Sending RA(when receiving RS(dst address = link-local address)) on the ingress interface in foreign-link

[PURPOSE]

NEMO-MR-1-2-1-4-012 - Sending RA(when receiving RS(dst address = link-local address)) on the ingress interface in foreign-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

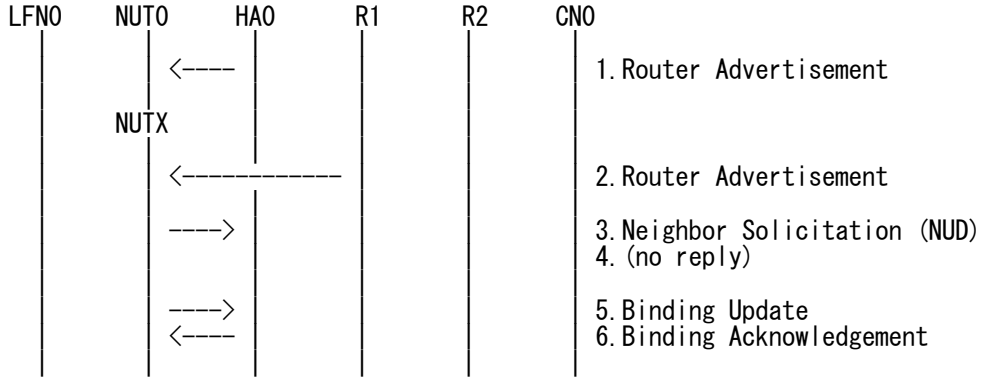
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

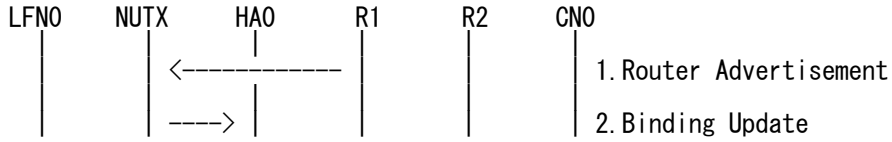
[INITIALIZATION]

- In the case of Real Home Link



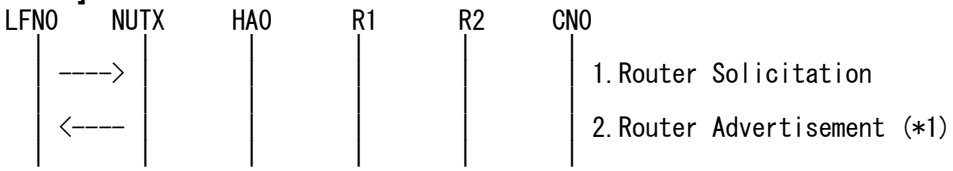
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[PROCEDURE]



1. Send Router Solicitation. (LFN0 -> NUT1) (Refer to 5.1.1)

IPv6 Header	Source Address	LFN0 (Link1, link-local)
	Destination Address	NUT1 (Link1, link-local)
ICMPv6 Header	Type	133
Source Link Layer Option	Link Layer Address	LFN0 (ether)

2. Receive Router Advertisement. (NUT1-> LFN0) (*1) (Refer to 5.2.1)

IPv6 Header	Source Address	NUT1 (Link1, link-local)
	Destination Address	LFN0 (Link1, link-local)
ICMPv6 Header	Type	134
	H Flag	0
Prefix Information Option	R Flag	Any
	Prefix	(prefix/global)

[JUDGMENT]

(*1) PASS: LFN0 receives Router Advertisement from Mobile Router.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

6.7.2 Sending RA by Egress interface

6.7.2.1 NEMO-MR-1-2-1-4-001 - Sending RA(when receiving RS(dst address = all-router multicast address)) on the egress interface in home-link

[PURPOSE]

NEMO-MR-1-2-1-4-001 - Sending RA(when receiving RS(dst address = all-router multicast address)) on the egress interface in home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION (Real Home Link)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

NUT send RA on the egress interface in Home Link: YES

[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

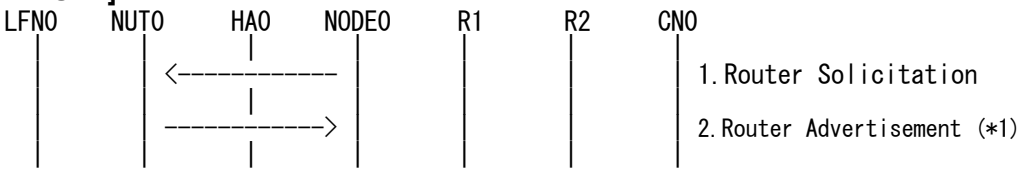
[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)

[PROCEDURE]



1. Send Router Solicitation. (NODE0 -> allrouter_multi) (Refer to 5.1.1)

IPv6 Header	Source Address	NODE0 (Link0, link-local)
	Destination Address	All-routers multicast address
ICMPv6 Header	Type	133
Source Link Layer Option	Link Layer Address	NODE0 (ether)

2. Receive Router Advertisement. (NUT0 -> NODE0) (*1) (Refer to 5.2.1)

IPv6 Header	Source Address	NUT0 (Link0, link-local/global)
	Destination Address	NODE0(Link0, link-local) or (All-nodes multicast address)
ICMPv6 Header	Type	134
	H Flag	0
	Lifetime	0
Prefix Information Option	R Flag	Any
	Prefix	(prefix/global)

[JUDGMENT]

(*1) PASS: NODE0 receives Router Advertisement from Mobile Router.
Then, check whether this packet fills all of the following,
- The Router Lifetime field is set to 0.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.6

6.7.2.2 NEMO-MR-1-2-1-4-002 - Sending RA(when receiving RS(dst address = global address)) on the egress interface in home-link

[PURPOSE]

NEMO-MR-1-2-1-4-002 - Sending RA(when receiving RS(dst address = global address)) on the egress interface in home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION (Real Home Link)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

NUT send RA on the egress interface in Home Link: YES

[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

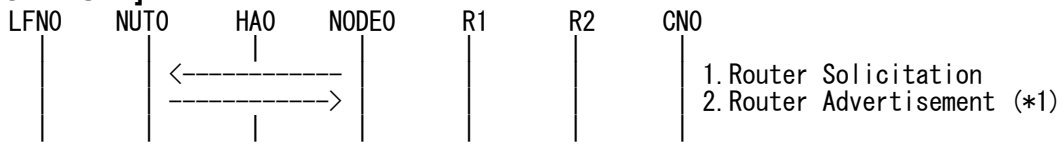
[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)

[PROCEDURE]



1. Send Router Solicitation. (NODE0 -> NUT0) (Refer to 5.1.1)

IPv6 Header	Source Address	NODE0 (Link0, global)
	Destination Address	NUT0 (Link0, global)
ICMPv6 Header	Type	133
Source Link Layer Option	Link Layer Address	NODE0 (ether)

2. Receive Router Advertisement. (NUT0 ->NODE0) (*1) (Refer to 5.2.1)

IPv6 Header	Source Address	NUT0 (Link0, global)
	Destination Address	NODE0 (Link0, global)
ICMPv6 Header	Type	134
	H Flag	0
	Lifetime	0
Prefix Information Option	R Flag	Any
	Prefix	(prefix/global)

[JUDGMENT]

(*1) PASS: NODE0 receives Router Advertisement from Mobile Router.
Then, check whether this packet fills all of the following,
- The Router Lifetime field is set to 0.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5.6

6.7.2.3 NEMO-MR-1-2-1-4-003 - Sending RA(when receiving RS(dst address = link-local address)) on the egress interface in home-link

[PURPOSE]

NEMO-MR-1-2-1-4-003 - Sending RA(when receiving RS(dst address = link-local address)) on the egress interface in home-link

[CATEGORY]

ROUTER: ADVANCED FUNCTION (Real Home Link).

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

NUT send RA on the egress interface in Home Link: YES

[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

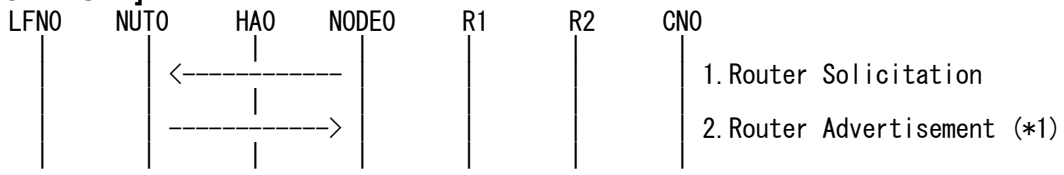
[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)

[PROCEDURE]



1. Send Router Solicitation. (NODE0 -> NUT0) (Refer to 5.1.1)

IPv6 Header	Source Address	NODE0 (Link0, link-local)
	Destination Address	NUT0 (Link0, link-local)
ICMPv6 Header	Type	133
Source Link Layer Option	Link Layer Address	NODE0 (ether)

2. Receive Router Advertisement. (NUT0 -> NODE0) (*1) (Refer to 5.2.1)

IPv6 Header	Source Address	NUT0 (Link0, link-local)
	Destination Address	NODE0 (Link0, link-local)
ICMPv6 Header	Type	134
	H Flag	0
	Lifetime	0
Prefix Information Option	R Flag	Any
	Prefix	(prefix/global)

[JUDGMENT]

(*1) PASS: NODE0 receives Router Advertisement from Mobile Router.
Then, check whether this packet fills all of the following,

- The Router Lifetime field is set to 0.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5.6

6.7.2.4 NEMO-MR-1-2-1-4-004 - Sending RA(after progress of advertising interval) on the egress interface in home-link

[PURPOSE]

NEMO-MR-1-2-1-4-004 - Sending RA(after progress of advertising interval) on the egress interface in home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION (Real Home Link)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

NUT send RA on the egress interface in Home Link: YES

[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

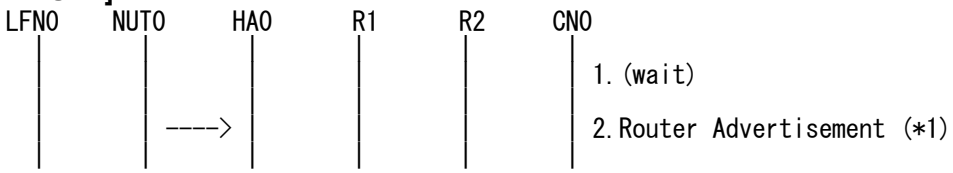
[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)

[PROCEDURE]



1. (wait)

   # Wait during Router Advertisement interval depending on NUT0.

2. Receive Router Advertisement. (NUT0 -> allnode_multi) (*1) (Refer to 5.2.1)

IPv6 Header	Source Address	NUT0 (Link0, link-local/global)
	Destination Address	(All-nodes multicast address)
ICMPv6 Header	Type	134
	H Flag	0
	Lifetime	0
Prefix Information Option	R Flag	Any
	Prefix	(prefix/global)

[JUDGMENT]

(*1) PASS: HA0 receives Router Advertisement from Mobile Router.

Then, check whether this packet fills all of the following,

- The Router Lifetime field is set to 0.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5.6

6.7.2.5 NEMO-MR-1-2-1-4-006 - Don't send RA(after progress of advertising interval) on the egress interface in foreign-link

[PURPOSE]

NEMO-MR-1-2-1-4-006 - Don't send RA(after progress of advertising interval) on the egress interface in foreign-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

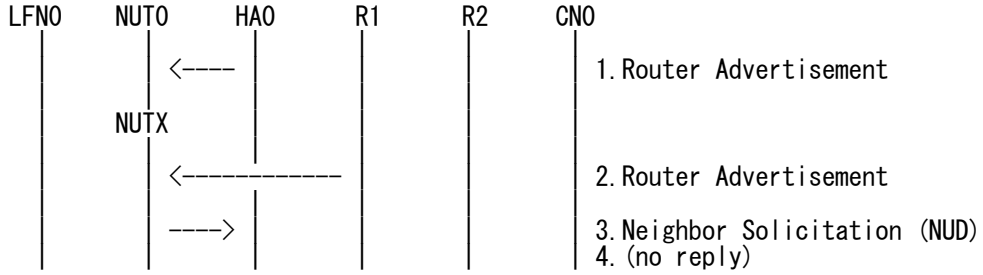
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

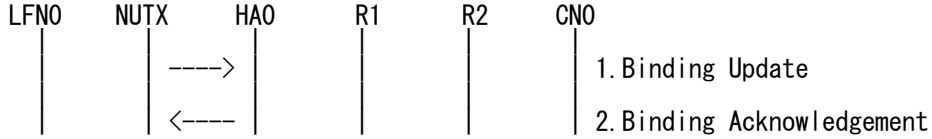


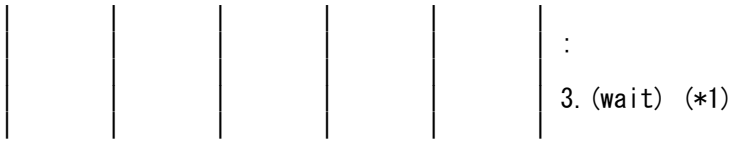
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
2. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.
3. (wait) (*1)
   # Wait during Unsolicited Router Advertisement interval depending on NUTX.

IPv6 Header	Source Address	NUT0 (Link0, link-local/global)
	Destination Address	(All-nodes multicast address)
ICMPv6 Header	Type	134
	H Flag	0
Prefix Information Option	R Flag	Any
	Prefix	(prefix/global)

[JUDGMENT]

(*1) PASS: R1 does not receive Router Advertisement from Mobile Router.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.6

6.7.2.6 NEMO-MR-1-2-1-4-013 - Sending RA(when receiving RS(dst address = all-router multicast address)) on the egress interface in returning home-link

[PURPOSE]

NEMO-MR-1-2-1-4-013 - Sending RA(when receiving RS(dst address = all-router multicast address)) on the egress interface in returning home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION (Real Home Link)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

NUT send RA on the egress interface in Home Link: YES

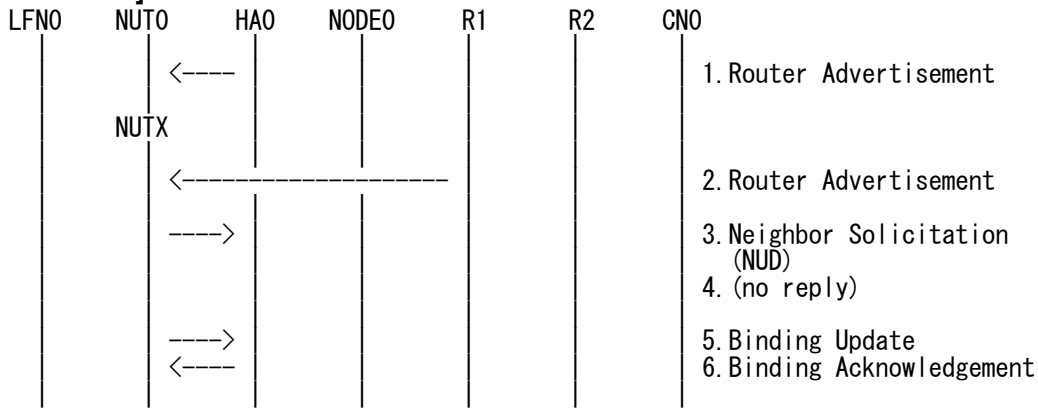
[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

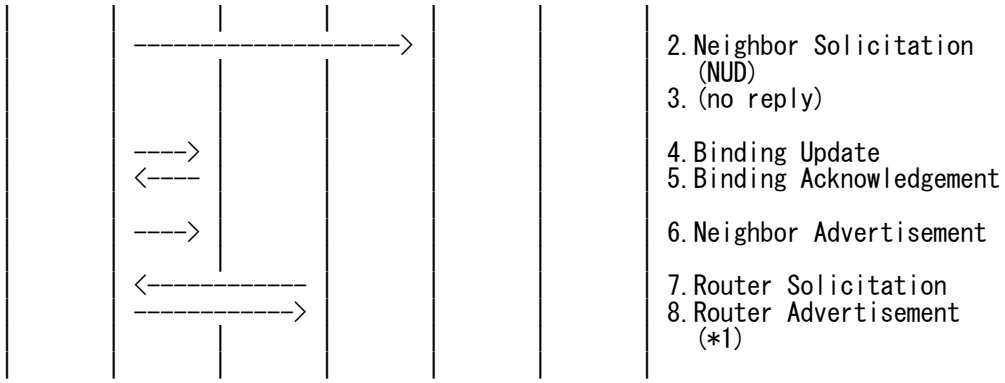
Refer to 3.1 Common Setup-1

[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[PROCEDURE]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Receive Neighbor Solicitation. (NUTX -> R1) (Refer to 5.3.3)
3. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
4. Receive Binding Update. (NUT0 -> HA0) (Refer to 5.14.2)
   # The Lifetime field is set to 0.
   # The Mobile Router Flag (R) is set to 1.
5. Send Binding Acknowledgement. (HA0 -> NUT0) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Neighbor Acknowledgement. (NUT0 -> HA0_allnode_multi)
   (Refer to 5.4.1)
7. Send Router Solicitation. (NODE0 -> allrouter_multi) (Refer to 5.1.1)

IPv6 Header	Source Address	NODE0 (Link0, link-local)
	Destination Address	All-routers multicast address
ICMPv6 Header	Type	133
Source Link Layer Option	Link Layer Address	NODE0 (ether)

8.Receive Router Advertisement. (NUT0 -> NODE0)

IPv6 Header	Source Address	NUT0 (Link0, link-local/global)
	Destination Address	NODE0 (Link0, link-local) or (All-nodes multicast address)
ICMPv6 Header	Type	134
	H Flag	0
	Lifetime	0
Prefix Information Option	R Flag	Any
	Prefix	(prefix/global)

[JUDGMENT]

(*1) PASS: NODE0 receives Router Advertisement from Mobile Router.
Then, check whether this packet fills all of the following,
- The Router Lifetime field is set to 0.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.8

6.7.2.7 NEMO-MR-1-2-1-4-014 - Sending RA(when receiving RS(dst address = global address)) on the egress interface in returning home-link

[PURPOSE]

NEMO-MR-1-2-1-4-014 - Sending RA(when receiving RS(dst address = global address)) on the egress interface in returning home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION (Real Home Link)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

NUT send RA on the egress interface in Home Link: YES

[TOPOLOGY]

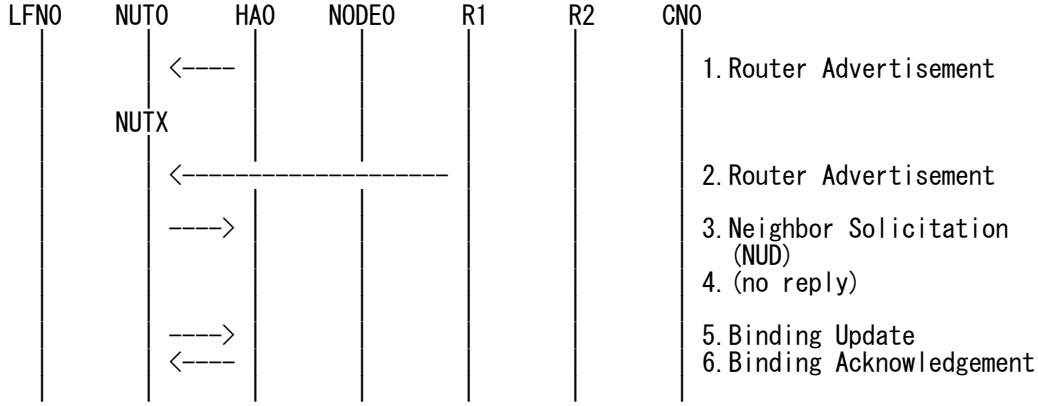
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

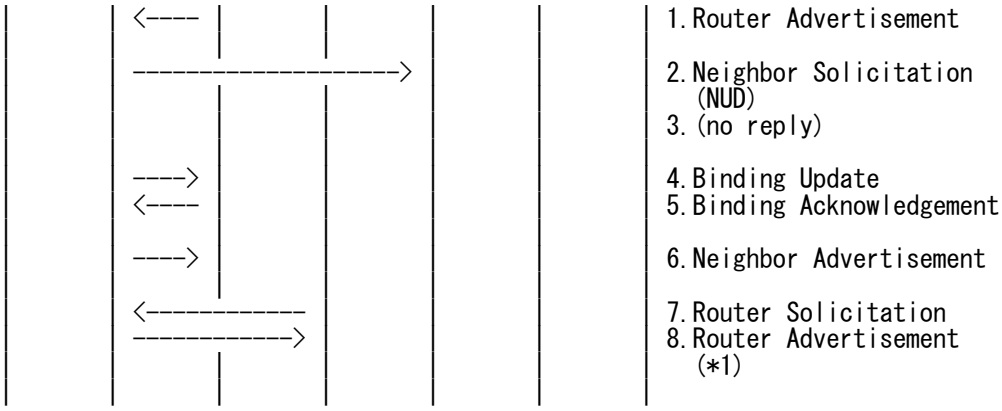
[INITIALIZATION]

- In the case of Real Home Link



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[PROCEDURE]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Receive Neighbor Solicitation (NUD). (NUTX -> R1) (Refer to 5.3.3)
3. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
4. Receive Binding Update. (NUT0 -> HA0) (Refer to 5.14.2)
   # The Lifetime field is set to 0.
   # The Mobile Router Flag (R) is set to 1.
5. Send Binding Acknowledgement. (HA0 -> NUT0) (Refer to 5.15.2)
   # The Mobile Router Flag (R) is set to 1.
6. Send Neighbor Acknowledgement. (NUT0 -> NUT0_allnode_multi) (Refer to 5.4.1)
7. Send Router Solicitation. (NODE0 -> NUT0) (Refer to 5.1.1)

IPv6 Header	Source Address	NODE0 (Link0, global)
	Destination Address	NUT0 (Link0, global)
ICMPv6 Header	Type	133
Source Link Layer Option	Link Layer Address	NODE0 (ether)

8. Receive Router Advertisement. (NUT0 -> NODE0) (*1) (Refer to 5.2.1)

IPv6 Header	Source Address	NUT0 (Link0, global)
	Destination Address	NODE0 (Link0, global)
ICMPv6 Header	Type	134
	H Flag	0
	Lifetime	0
Prefix Information Option	R Flag	Any
	Prefix	(prefix/global)

[JUDGMENT]

(*1) PASS: NODE0 receives Router Advertisement from Mobile Router.
Then, check whether this packet fills all of the following,
- The Router Lifetime field is set to 0.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.8

6.7.2.8 NEMO-MR-1-2-1-4-015 - Sending RA(when receiving RS(dst address = link-local address)) on the egress interface in returning home-link

[PURPOSE]

NEMO-MR-1-2-1-4-015 - Sending RA(when receiving RS(dst address = link-local address)) on the egress interface in returning home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION (Real Home Link)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

NUT send RA on the egress interface in Home Link: YES

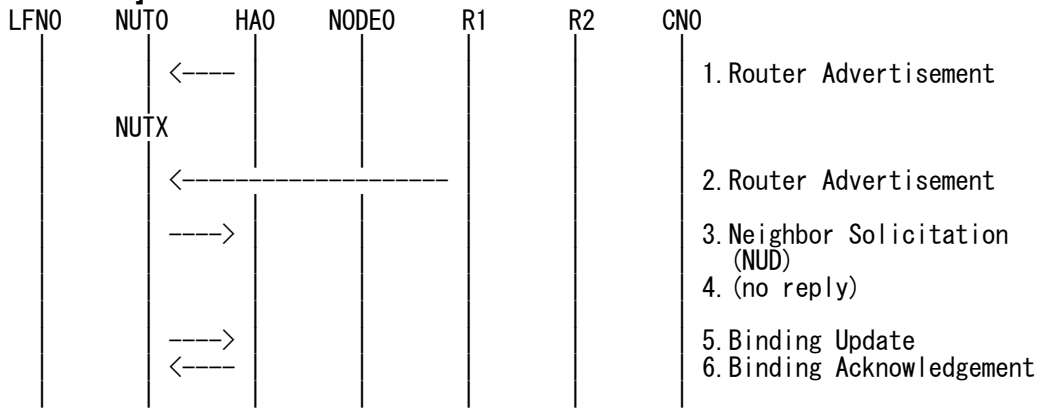
[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

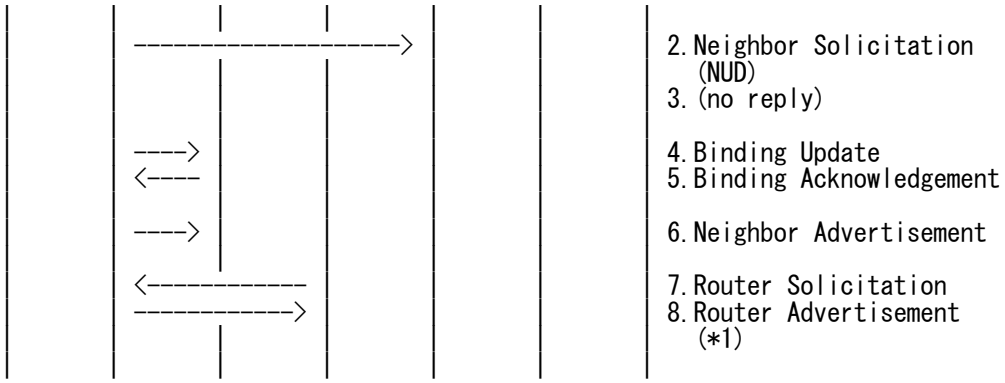
Refer to 3.1 Common Setup-1

[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[PROCEDURE]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Receive Neighbor Solicitation (NUD). (NUTX -> R1) (Refer to 5.3.3)
3. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
4. Receive Binding Update. (NUT0 -> HA0) (Refer to 5.14.2)
   # The Lifetime field is set to 0.
   # The Mobile Router Flag (R) is set to 1.
5. Send Binding Acknowledgement. (HA0 -> NUT0) (Refer to 5.15.2)
   # The Mobile Router Flag (R) is set to 1.
6. Send Neighbor Acknowledgement. (NUT0 -> HA0_allnode_multi)
   (Refer to 5.4.1)
7. Send Router Solicitation. (NODE0 -> NUT0)
   (Refer to 5.1.1)

IPv6 Header	Source Address	NODE0 (Link0, link-local)
	Destination Address	NUT0 (Link0, link-local)
ICMPv6 Header	Type	133
Source Link Layer Option	Link Layer Address	NODE0 (ether)

8. Receive Router Advertisement. (NUT0 -> NODE0) (*1) (Refer to 5.2.1)

IPv6 Header	Source Address	NUT0 (Link0, link-local)
	Destination Address	NODE0 (Link0, link-local)
ICMPv6 Header	Type	134
	H Flag	0
	Lifetime	0
Prefix Information Option	R Flag	Any
	Prefix	(prefix/global)

[JUDGMENT]

(*1) PASS: NODE0 receives Router Advertisement from Mobile Router.
Then, check whether this packet fills all of the following,
- The Router Lifetime field is set to 0.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.8

6.7.2.9 NEMO-MR-1-2-1-4-016 - Sending RA(after progress of advertising interval) on the egress interface in returning home-link

[PURPOSE]

NEMO-MR-1-2-1-4-016 - Sending RA(after progress of advertising interval) on the egress interface in returning home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION (Real Home Link)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

NUT send RA on the egress interface in Home Link: YES

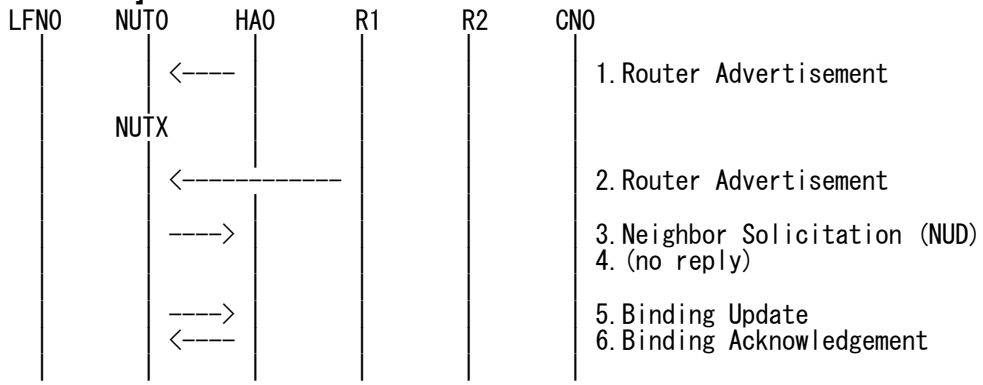
[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

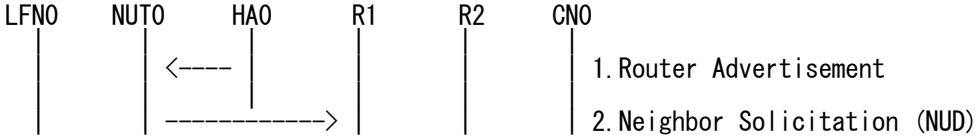
Refer to 3.1 Common Setup-1

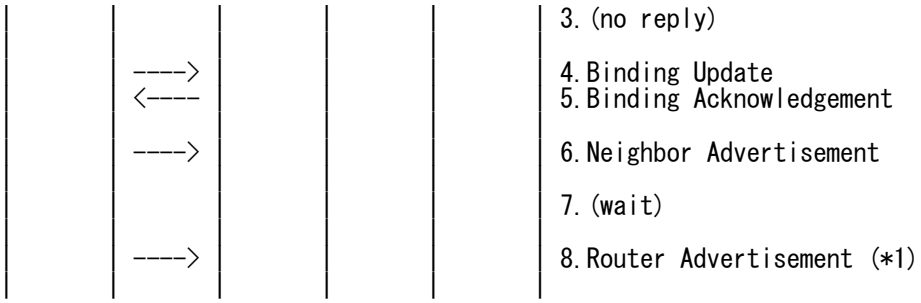
[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[PROCEDURE]





1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Receive Neighbor Solicitation (NUD). (NUTX -> R1) (Refer to 5.3.3)
3. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
4. Receive Binding Update. (NUT0 -> HA0) (Refer to 5.14.2)
   # The Lifetime field is set to 0.
   # The Mobile Router Flag (R) is set to 1.
5. Send Binding Acknowledgement. (HA0 -> NUT0) (Refer to 5.15.2)
   # The Mobile Router Flag (R) is set to 1.
6. Send Neighbor Acknowledgement. (NUT0 -> HA0_allnode_multi)
   (Refer to 5.4.1)
7. (wait)
   # Wait during Router Advertisement interval depending on NUT0.
8. Receive Router Advertisement. (NUT0 -> allnode_multi) (*1) (Refer to 5.2.1)

IPv6 Header	Source Address	NUT0 (Link0, link-local/global)
	Destination Address	(All-nodes multicast address)
ICMPv6 Header	Type	134
	H Flag	0
	Lifetime	0
Prefix Information Option	R Flag	Any
	Prefix	(prefix/global)

[JUDGMENT]

(*1) PASS: HA0 receives Router Advertisement from Mobile Router.
Then, check whether this packet fills all of the following,
- The Router Lifetime field is set to 0.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.8

6.7.3 Receiving RS by Egress interface

6.7.3.1 NEMO-MR-1-1-1-4-002 - Discard receiving RS(dst address = all-routers multicast address) on the egress interface in home-link

[PURPOSE]

NEMO-MR-1-1-1-4-002 - Discard receiving RS(dst address = all-routers multicast address) on the egress interface in home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION (Real Home Link)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

NUT send RA on the egress interface in Home Link: NO

[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

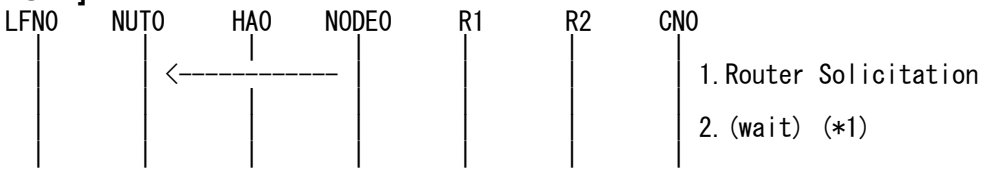
[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)

[PROCEDURE]



1. Send Router Solicitation. (NODE0 -> allrouter_multi) (Refer to 5.1.1)

IPv6 Header	Source Address	NODE0 (Link0, link-local)
	Destination Address	All-routers multicast address
ICMPv6 Header	Type	133
Source Link Layer Option	Link Layer Address	NODE0 (ether)

2. (wait)

   # Wait during a maximum of 3 seconds(RFC2461).

[JUDGMENT]

(*1) PASS: NODE0 does not receive Router Advertisement from Mobile Router.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5.6, 5.7

6.7.3.2 NEMO-MR-1-1-1-4-010 - Discard receiving RS(dst address = global address) on the egress interface in home-link

[PURPOSE]

NEMO-MR-1-1-1-4-010 - Discard receiving RS(dst address = global address) on the egress interface in home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION (Real Home Link)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

NUT send RA on the egress interface in Home Link: NO

[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

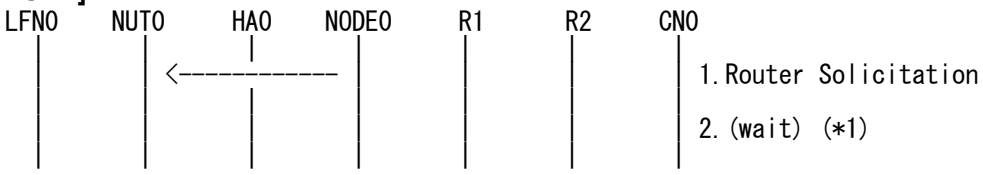
[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)

[PROCEDURE]



1. Send Router Solicitation. (NODE0 -> NUT0) (Refert to 5.1.1)

IPv6 Header	Source Address	NODE0 (Link0, global)
	Destination Address	NUT0 (Link0, global)
ICMPv6 Header	Type	133
Source Link Layer Option	Link Layer Address	NODE0 (ether)

2. (wait) (*1)

   # Wait during a maximum of 3 seconds(RFC2461).

[JUDGMENT]

(*1) PASS: NODE0 does not receive Router Advertisement from Mobile Router.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5.6

6.7.3.3 NEMO-MR-1-1-1-4-011 - Discard receiving RS(dst address = link-local address) on the egress interface in home-link

[PURPOSE]

NEMO-MR-1-1-1-4-011 - Discard receiving RS(dst address = link-local address) on the egress interface in home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION (Real Home Link)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

NUT send RA on the egress interface in Home Link: NO

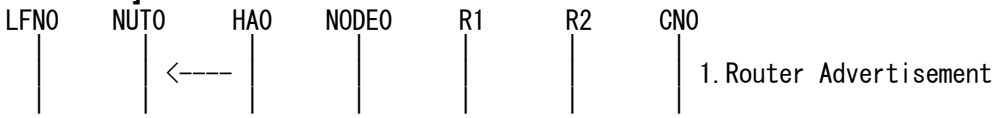
[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

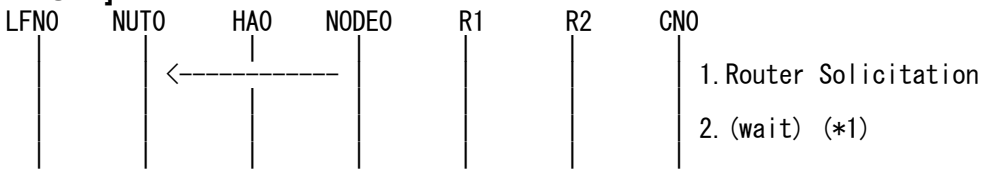
Refer to 3.1 Common Setup-1

[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)

[PROCEDURE]



1. Send Router Solicitation. (NODE0 -> NUT0) (Refer o 5.1.1)

IPv6 Header	Source Address	NODE0 (Link0, link-local)
	Destination Address	NUT0 (Link0, link-local)
ICMPv6 Header	Type	133
Source Link Layer Option	Link Layer Address	NODE0 (ether)

2. (wait) (*1)

   # Wait during 30 seconds.

[JUDGMENT]

(*1) PASS: NODE0 does not receive Router Advertisement from Mobile Router.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5.6

6.7.3.4 NEMO-MR-1-1-1-4-003 - Discard receiving RS(dst address = all-router multicast address) on the egress interface in foreign-link

[PURPOSE]

NEMO-MR-1-1-1-4-003 - Discard receiving RS(dst address = all-router multicast address) on the egress interface in foreign-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

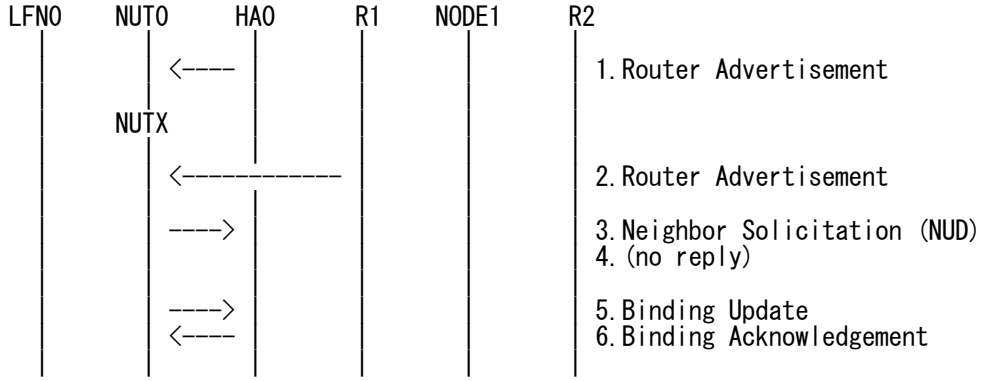
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

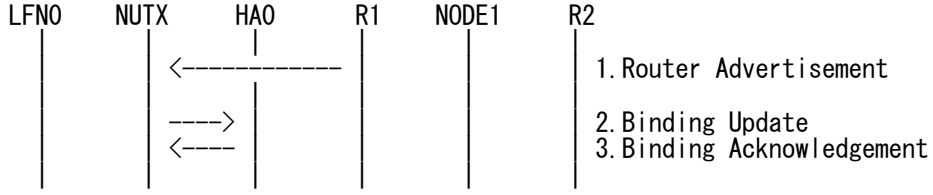
[INITIALIZATION]

- In the case of Real Home Link



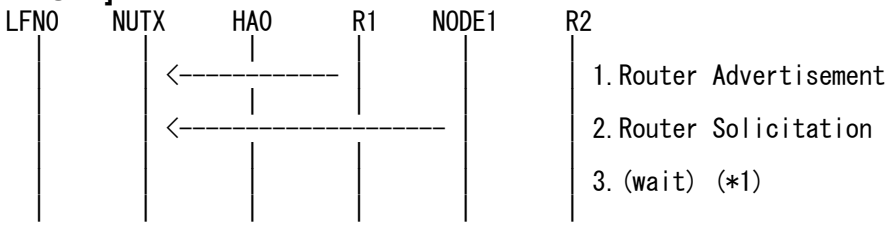
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Send Router Solicitation. (NODE1 -> allrouter_multi) (Refer to 5.1.1)

IPv6 Header	Source Address	NODE1 (LinkX, link-local)
	Destination Address	All-routers multicast address
ICMPv6 Header	Type	133
Source Link Layer Option	Link Layer Address	NODE1 (ether)

3. (wait) (*1)
   # Wait during 30 seconds.

[JUDGMENT]

(*1) PASS: NODE1 does not receive Router Advertisement from Mobile Router.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.6

6.7.3.5 NEMO-MR-1-1-1-4-007 - Discard receiving RS(dst address = global address) on the egress interface in foreign-link

[PURPOSE]

NEMO-MR-1-1-1-4-007 - Discard receiving RS(dst address = global address) on the egress interface in foreign-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

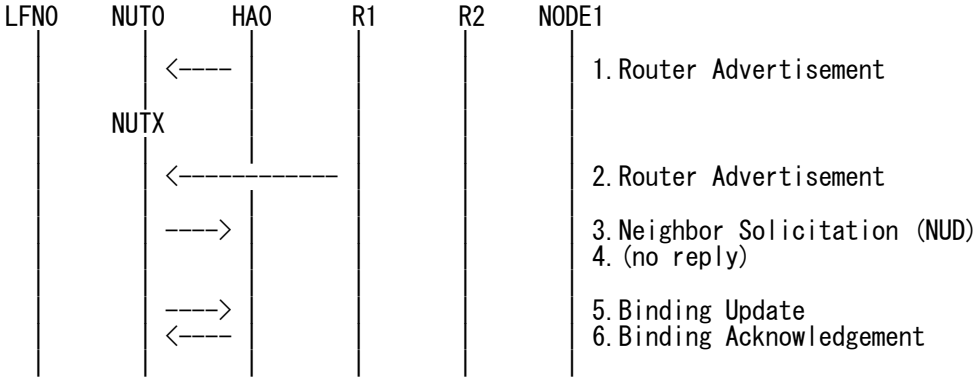
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

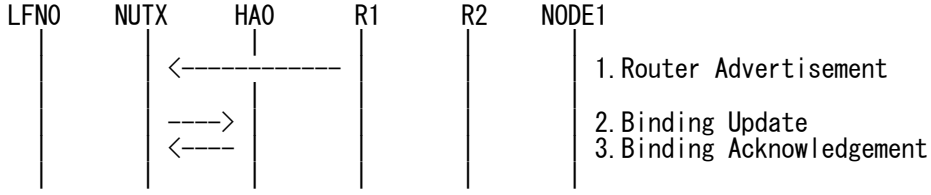
[INITIALIZATION]

- In the case of Real Home Link



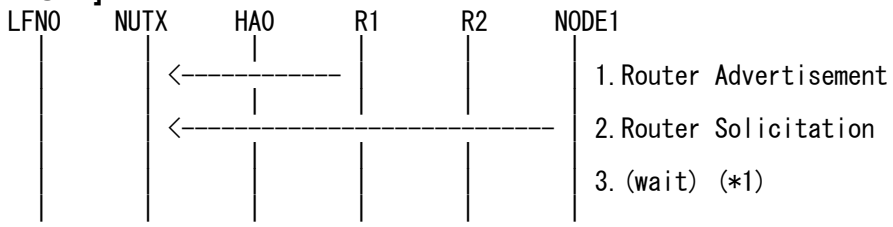
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Send Router Solicitation. (NODE1 -> NUTX) (Refer to 5.1.1)

IPv6 Header	Source Address	NODE1 (LinkX, global)
	Destination Address	NUTX (LinkX, global)
ICMPv6 Header	Type	133
Source Link Layer Option	Link Layer Address	NODE1 (ether)

3. (wait) (*1)
   # Wait during 30 seconds.

[JUDGMENT]

(*1) PASS: NODE1 does not receive Router Advertisement from Mobile Router.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.6

6.7.3.6 NEMO-MR-1-1-1-4-009 - Discard receiving RS(dst address = link-local address) on the egress interface in foreign-link

[PURPOSE]

NEMO-MR-1-1-1-4-009 - Discard receiving RS(dst address = link-local address) on the egress interface in foreign-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

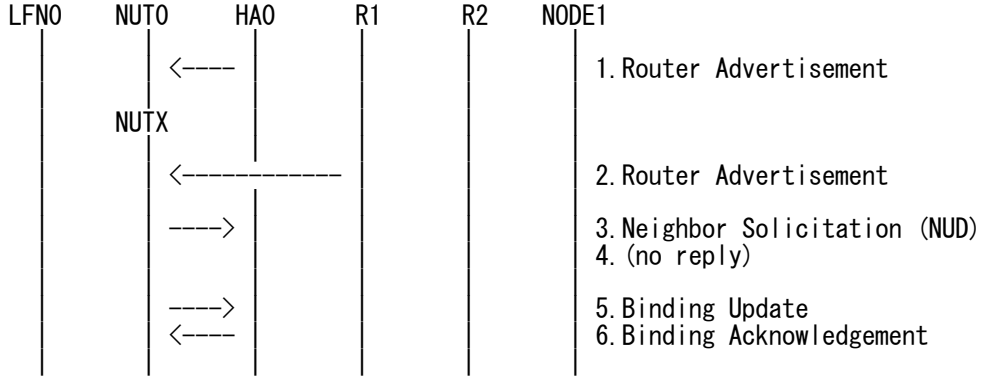
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

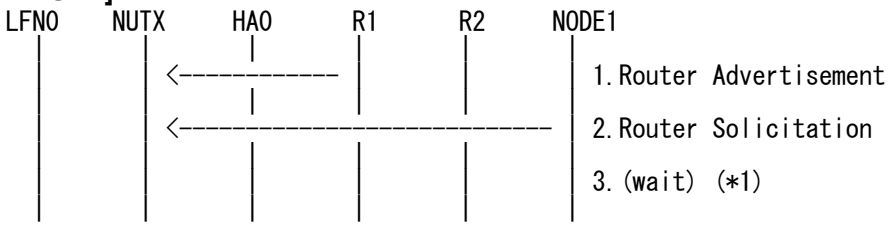


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation. (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Send Router Solicitation. (NODE1 -> NUTX) (Refer to 5.1.1)

IPv6 Header	Source Address	NODE1 (LinkX, link-local)
	Destination Address	NUTX (LinkX, link-local)
ICMPv6 Header	Type	133
Source Link Layer Option	Link Layer Address	NODE1 (ether)

3. (wait) (*1)
   # Wait during 30 seconds.

[JUDGMENT]

(*1) PASS: NODE1 does not receive Router Advertisement from Mobile Router.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.6

6.7.4 Sending NA by Egress interface

6.7.4.1 NEMO-MR-1-4-1-4-001 - Sending NA(when receiving DAD-NS(Target address = global address of nut0)) on the egress interface in home-link

[PURPOSE]

NEMO-MR-1-4-1-4-001 - Sending NA(when receiving DAD-NS(Target address = global address of nut0)) on the egress interface in home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION (Real Home Link)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

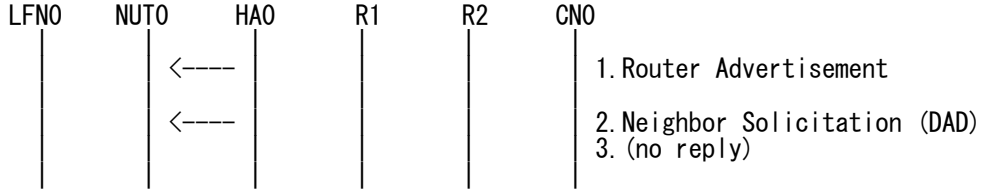
[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

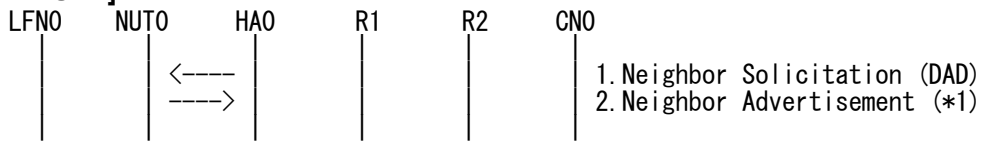
Refer to 3.1 Common Setup-1

[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Neighbor Solicitation (DAD). (0 -> NUT0) (Refer to 5.3.1)
3.(no reply)

[PROCEDURE]



1. Send Neighbor Solicitation (DAD). (0 -> NUT0) (Refer to 5.3.1)

IPv6 Header	Source Address	0::0 (Unspecified address)
	Destination Address	NUT0 (Link0, Solicited-node multicast address)
ICMPv6 Header	Type	135
	Target Address	NUT0 (Link0, global)

2. Receive Neighbor Advertisement. (NUT0 -> HA0) (*1) (Refer to 5.4.2)

IPv6 Header	Source Address	NUT0 (Link0, global/link-local)
	Destination Address	(All-nodes multicast address)
ICMPv6 Header	Type	136
	R Flag	1
	S Flag	1
	Target Address	NUT0 (Link0, global)
Target Link Layer Option	Link Layer Address	NUT0 (ether)

[JUDGMENT]

(*1) PASS: HA0 receives Neighbor Advertisement from Mobile Router.
Then, check whether this packet fills all of the following,
- The Router flag (R) is set to 1.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

6.7.4.2 NEMO-MR-1-4-1-4-002 - Sending NA(when receiving DAD-NS(Target address = link-local(egress of nut0))) on the egress interface in home-link

[PURPOSE]

NEMO-MR-1-4-1-4-002 - Sending NA(when receiving DAD-NS(Target address = link-local(egress of nut0))) on the egress interface in home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION (Real Home Link)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

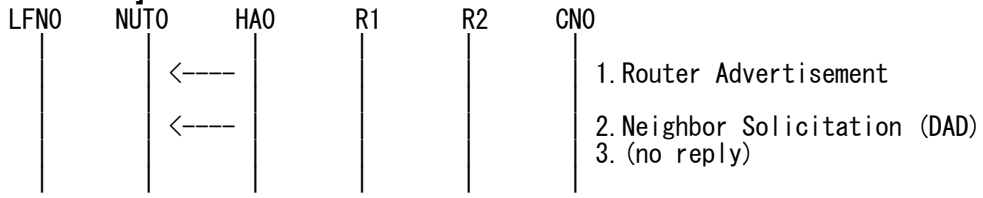
[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

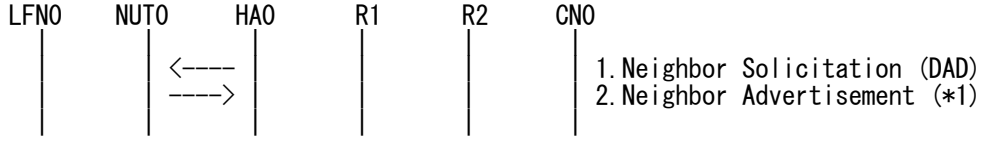
Refer to 3.1 Common Setup-1

[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Neighbor Solicitation (DAD). (0 -> NUT0) (Refer to 5.3.1)
3.(no reply)

[PROCEDURE]



1. Send Neighbor Solicitation (DAD). (0 -> NUT0) (Refer to 5.3.1)

IPv6 Header	Source Address	0::0 (Unspecified address)
	Destination Address	NUT0 (Link0, Solicited-node multicast address)
ICMPv6 Header	Type	135
	Target Address	NUT0 (link-local)

2. Receive Neighbor Advertisement. (NUT0 -> HA0) (*1) (Refer to 5.4.2)

IPv6 Header	Source Address	NUT0 (link-local/global)
	Destination Address	(All-nodes multicast address)
ICMPv6 Header	Type	136
	R Flag	1
	S Flag	1
	Target Address	NUT0 (Link0, link-local)
Target Link Layer Option	Link Layer Address	NUT0 (ether)

[JUDGMENT]

(*1) PASS: HA0 receives Neighbor Advertisement from Mobile Router.
Then, check whether this packet fills all of the following,
- The Router flag (R) is set to 1.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

6.7.4.3 NEMO-MR-1-4-1-4-003 - Sending NA(when receiving AR-NS(Target address = global(egress of nut0))) on the egress interface in home-link

[PURPOSE]

NEMO-MR-1-4-1-4-003 - Sending NA(when receiving AR-NS(Target address = global(egress of nut0))) on the egress interface in home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION (Real Home Link)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

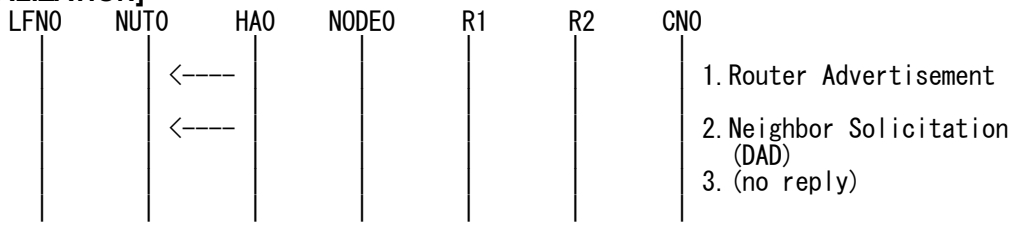
[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

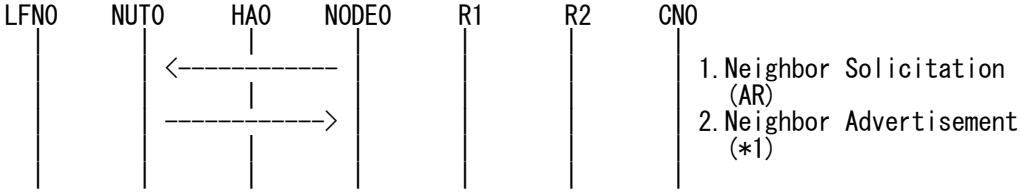
Refer to 3.1 Common Setup-1

[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Neighbor Solicitation (DAD). (0 -> NUT0) (Refer to 5.3.1)
3.(no reply)

[PROCEDURE]



1. Send Neighbor Solicitation (AR). (NODE0 -> NUT0) (Refer to 5.3.2)

IPv6 Header	Source Address	NODE0 (Link0, global)
	Destination Address	NUT0 (Link0, Solicited-node multicast address)
ICMPv6 Header	Type	135
	Target Address	NUT0 (Link0, global)
Source Link Layer Option	Link Layer Address	NODE0 (ether)

2. Receive Neighbor Advertisement. (NUT0 -> NODE0) (*1) (Refer to 5.4.2)

IPv6 Header	Source Address	NUT0 (Link0, global/link-local)
	Destination Address	NODE0 (Link0, global)
ICMPv6 Header	Type	136
	R Flag	1
	S Flag	1
	Target Address	NUT0 (Link0, global)
Target Link Layer Option	Link Layer Address	NUT0 (ether)

[JUDGMENT]

(*1) PASS: NODE0 receives Neighbor Advertisement from Mobile Router.
Then, check whether this packet fills all of the following,
- The Router flag (R) is set to 1.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

6.7.4.4 NEMO-MR-1-4-1-4-004 - Sending NA(when receiving AR-NS(Target address = link-local(egress of nut0))) on the egress interface in home-link

[PURPOSE]

NEMO-MR-1-4-1-4-004 - Sending NA(when receiving AR-NS(Target address = link-local(egress of nut0))) on the egress interface in home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION (Real Home Link)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

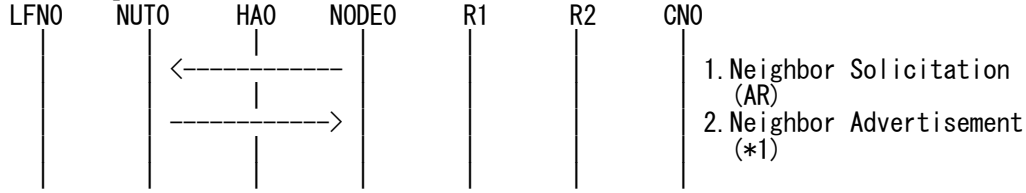
[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)

[PROCEDURE]



1. Send Neighbor Solicitation (AR). (NODE0 -> NUT0) (Refer to 5.3.2)

IPv6 Header	Source Address	NODE0 (Link0, link-local)
	Destination Address	NUT0 (Link0, Solicited-node multicast address)
ICMPv6 Header	Type	135
	Target Address	NUT0 (Link0, link-local)
Source Link Layer Option	Link Layer Address	NODE0 (ether)

2. Receive Neighbor Advertisement. (NUT0 -> NODE0) (*1) (Refer to 5.4.2)

IPv6 Header	Source Address	NUT0 (Link0, link-local/global)
	Destination Address	NODE0 (Link0, link-local)
ICMPv6 Header	Type	136
	R Flag	1
	S Flag	1
	Target Address	NUT0 (Link0, link-local)
Target Link Layer Option	Link Layer Address	NUT0 (ether)

[JUDGMENT]

(*1) PASS: NODE0 receives Neighbor Advertisement from Mobile Router.
Then, check whether this packet fills all of the following,

- The Router flag (R) is set to 1.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5

6.7.4.5 NEMO-MR-1-4-1-4-006 - Sending NA(when receiving DAD-NS(Target address = global(CoA))) on the egress interface in foreign-link

[PURPOSE]

NEMO-MR-1-4-1-4-006 - Sending NA(when receiving DAD-NS(Target address = global(CoA))) on the egress interface in foreign-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

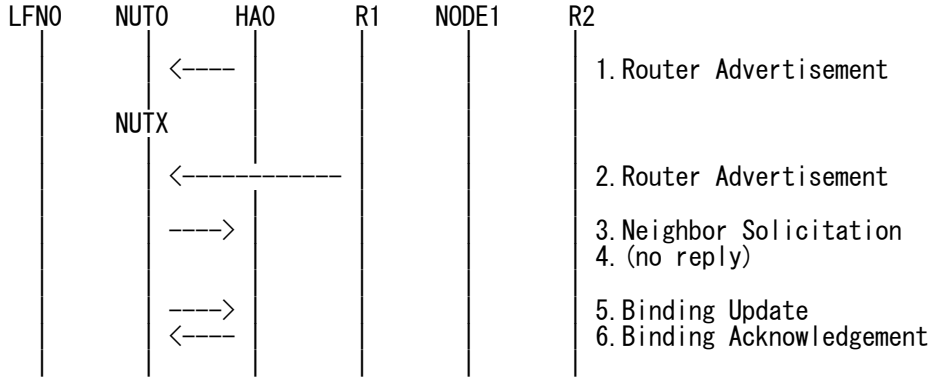
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

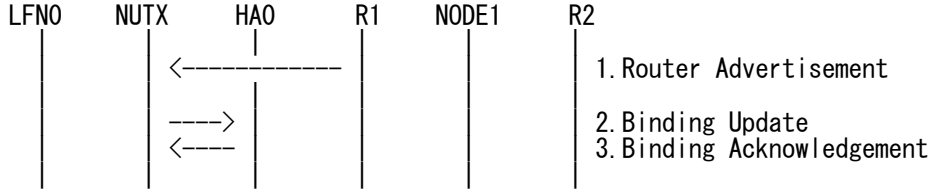
[INITIALIZATION]

- In the case of Real Home Link



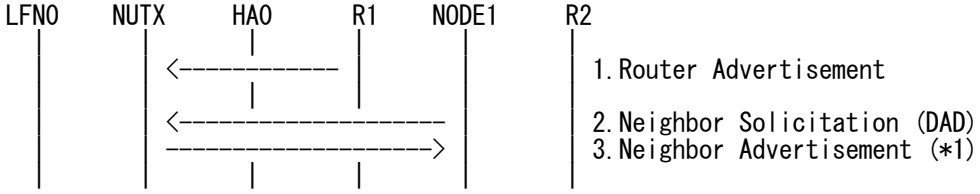
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation. (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Send Neighbor Solicitation (DAD). (0 -> NUTX) (*1) (Refer to 5.3.1)

IPv6 Header	Source Address	0::0 (Unspecified address)
	Destination Address	NUTX (LinkX, Solicited-node multicast address)
ICMPv6 Header	Type	135
	Target Address	NUTX (LinkX, global)

3. Receive Neighbor Advertisement. (NUTX -> NODE1) (*1) (Refer to 5.4.2)

IPv6 Header	Source Address	NUTX (LinkX, global/link-local)
	Destination Address	(All-nodes multicast address)
ICMPv6 Header	Type	136
	R Flag	0
	S Flag	1
	Target Address	NUTX (LinkX, global)
Target Link Layer Option	Link Layer Address	NUTX (ether)

[JUDGMENT]

(*1) PASS: NODE1 receives Neighbor Advertisement from Mobile Router.
Then, check whether this packet fills all of the following,
- The Router flag (R) is set to 0.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.6

6.7.4.6 NEMO-MR-1-4-1-4-007 - Sending NA(when receiving DAD-NS(Target address = link-local(egress of nutx))) on the egress interface in foreign-link

[PURPOSE]

NEMO-MR-1-4-1-4-007 - Sending NA(when receiving DAD-NS(Target address = link-local(egress of nutx))) on the egress interface in foreign-link

[CATEGORY]

ROUTER :BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

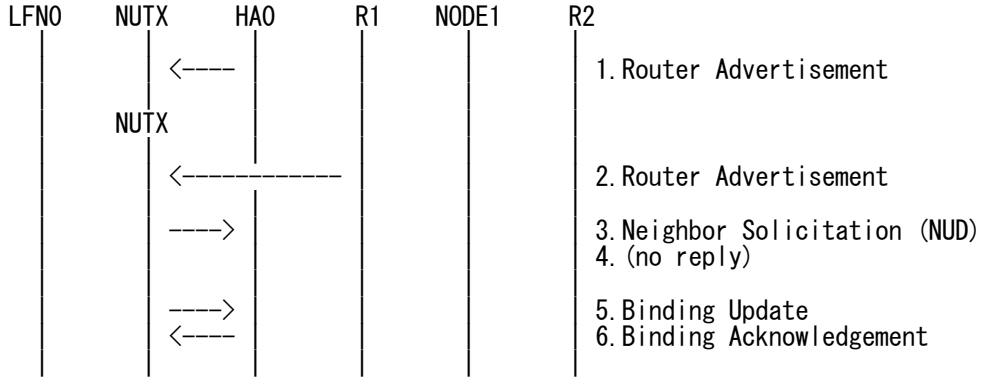
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

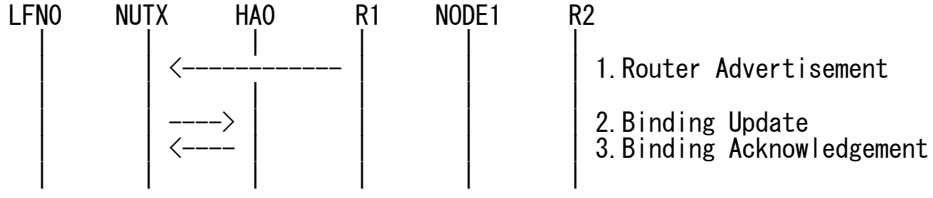
[INITIALIZATION]

- In the case of Real Home Link



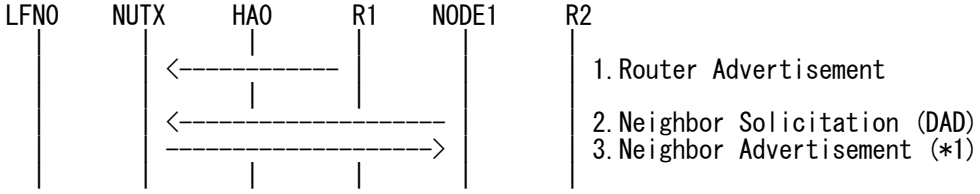
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Send Neighbor Solicitation (DAD). (0 -> NUTX) (Refer to 5.3.1)

IPv6 Header	Source Address	0::0 (Unspecified address)
	Destination Address	NUTX (LinkX, Solicited-node multicast address)
ICMPv6 Header	Type	135
	Target Address	NUTX (LinkX, link-local)

3. Receive Neighbor Advertisement. (NUTX -> NODE1) (*1) (Refer to 5.4.2)

IPv6 Header	Source Address	NUTX (LinkX, link-local/global)
	Destination Address	(All-nodes multicast address)
ICMPv6 Header	Type	136
	R Flag	0
	S Flag	1
	Target Address	NUTX (LinkX, link-local)
Target Link Layer Option	Link Layer Address	NUTX (ether)

[JUDGMENT]

(*1) PASS: NODE1 receives Neighbor Advertisement from Mobile Router.
Then, check whether this packet fills all of the following,
- The Router flag (R) is set to 0.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.6

6.7.4.7 NEMO-MR-1-4-1-4-009 - Sending NA(when receiving AR-NS(Target address = global(CoA))) on the egress interface in foreign-link

[PURPOSE]

NEMO-MR-1-4-1-4-009 - Sending NA(when receiving AR-NS(Target address = global(CoA))) on the egress interface in foreign-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

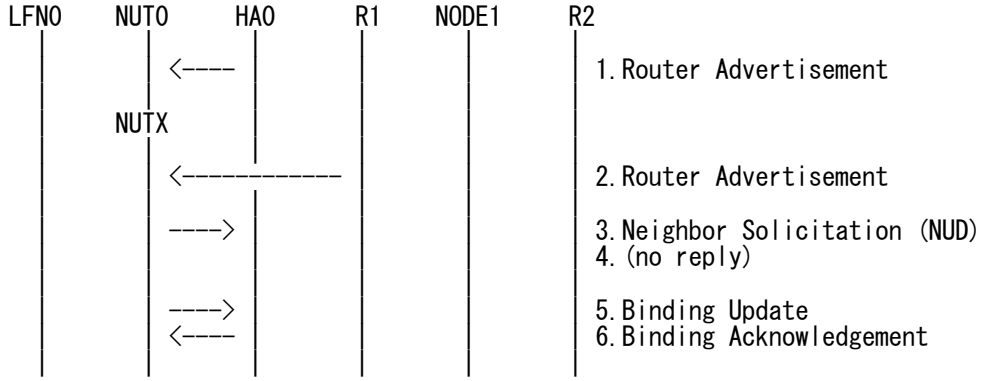
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

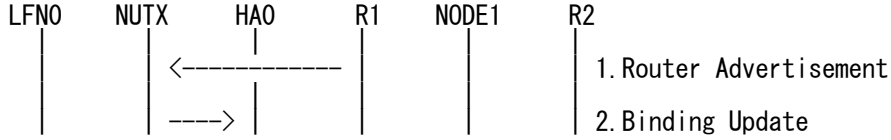
[INITIALIZATION]

- In the case of Real Home Link



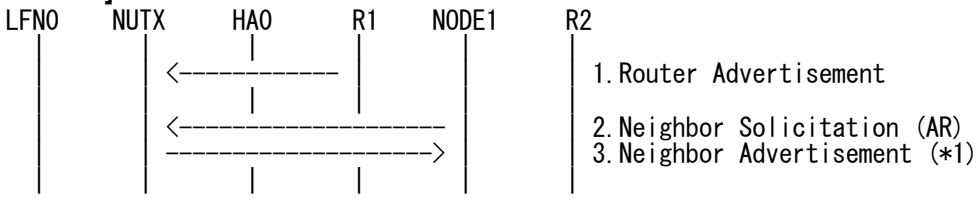
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Send Neighbor Solicitation (AR). (NODE1 -> NUTX) (Refer to 5.3.2)

IPv6 Header	Source Address	NODE1 (LinkX, global)
	Destination Address	NUTX (LinkX, Solicited-node multicast address)
ICMPv6 Header	Type	135
	Target Address	NUTX (LinkX, global)
Source Link Layer Option	Link Layer Address	NODE1 (ether)

3. Receive Neighbor Advertisement. (NUTX -> NODE1) (*1) (Refer to 5.4.2)

IPv6 Header	Source Address	NUTX (LinkX, link-local/global)
	Destination Address	NODE1 (LinkX, global)
ICMPv6 Header	Type	136
	R Flag	0
	S Flag	1
	Target Address	NUTX (LinkX, global)
Target Link Layer Option	Link Layer Address	NUTX (ether)

[JUDGMENT]

(*1) PASS: NODE1 receives Neighbor Advertisement from Mobile Router.
Then, check whether this packet fills all of the following,
- The Router flag (R) is set to 0.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.6

6.7.4.8 NEMO-MR-1-4-1-4-010 - Sending NA(when receiving AR-NS(Target address = link-local(egress of nutx))) on the egress interface in foreign-link

[PURPOSE]

NEMO-MR-1-4-1-4-010 - Sending NA(when receiving AR-NS(Target address = link-local(egress of nutx))) on the egress interface in foreign-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

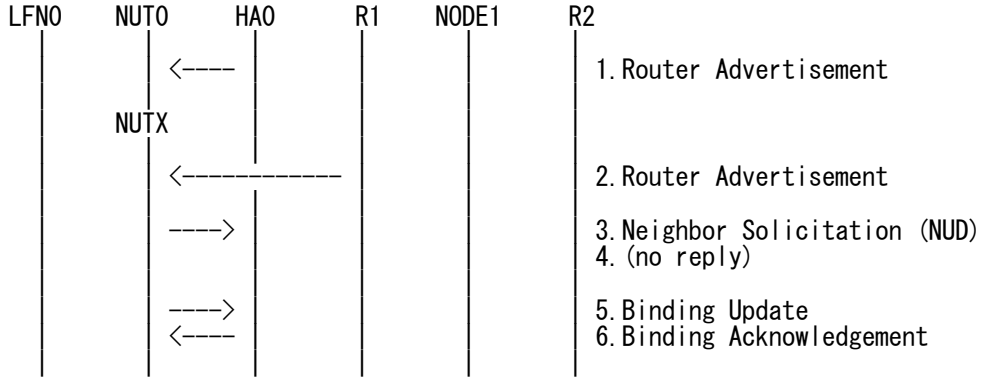
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

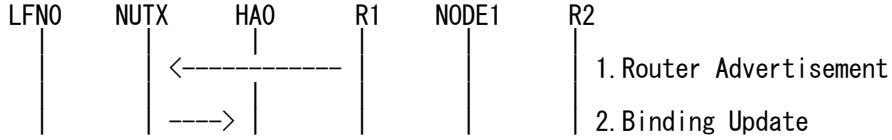
[INITIALIZATION]

- In the case of Real Home Link



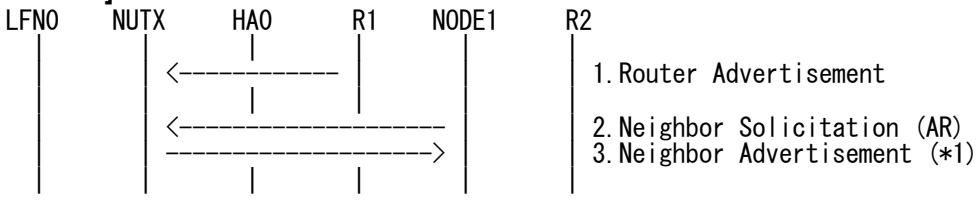
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi)(Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0)(Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0)(Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX)(Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi)(Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0)(Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX)(Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Send Neighbor Solicitation (AR). (NODE1 -> NUTX) (Refer to 5.3.2)

IPv6 Header	Source Address	NODE1 (LinkX, link-local)
	Destination Address	NUTX (LinkX, Solicited-node multicast address)
ICMPv6 Header	Type	135
	Target Address	NUTX (LinkX, link-local)
Source Link Layer Option	Link Layer Address	NODE1 (ether)

3. Receive Neighbor Advertisement. (NUTX -> NODE1) (*1) (Refer to 5.4.2)

IPv6 Header	Source Address	NUTX (LinkX, link-local/global)
	Destination Address	NODE1 (LinkX, link-local)
ICMPv6 Header	Type	136
	R Flag	0
	S Flag	1
	Target Address	NUTX (LinkX, link-local)
Target Link Layer Option	Link Layer Address	NUTX (ether)

[JUDGMENT]

(*1) PASS: NODE1 receives Neighbor Advertisement from Mobile Router.
Then, check whether this packet fills all of the following,
- The Router flag (R) is set to 0.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.6

6.7.5 Receiving NS by Egress interface

6.7.5.1 NEMO-MR-1-3-2-4-010 - Discard receiving AR-NS(Target address = global(HoA)) on the egress interface in foreign-link

[PURPOSE]

NEMO-MR-1-3-2-4-010 - Discard receiving AR-NS(Target address = global(HoA)) on the egress interface in foreign-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

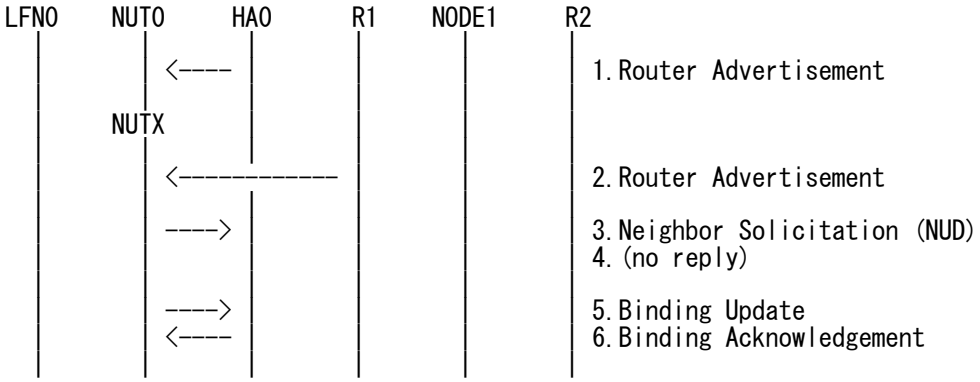
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

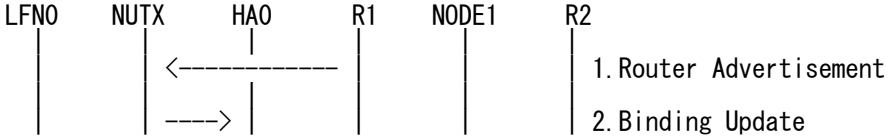
[INITIALIZATION]

- In the case of Real Home Link



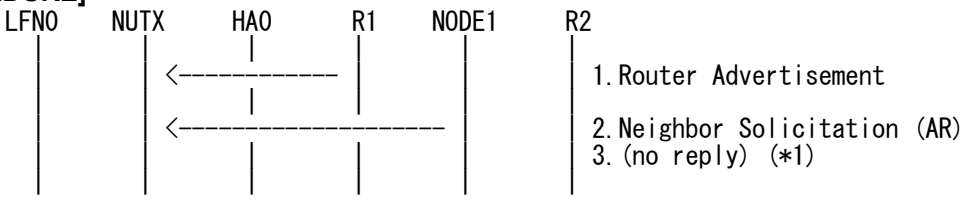
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Send Neighbor Solicitation (AR). (NODE1 -> NUT0) (Refer to 5.3.2)

IPv6 Header	Source Address	NODE1 (LinkX, global)
	Destination Address	NUTX (LinkX, Solicited-node multicast address)
ICMPv6 Header	Type	135
	Target Address	NUT0 (Link0, global)
Source Link Layer Option	Link Layer Address	NODE1 (ether)

3. (no reply) (*1)

[JUDGMENT]

(*1) PASS: NODE1 does not receive Neighbor Advertisement from Mobile Router.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

6.7.5.2 NEMO-MR-1-3-2-4-007 - Discard receiving DAD(Target address = global(HoA)) on the egress interface in foreign-link

[PURPOSE]

NEMO-MR-1-3-2-4-007 - Discard receiving DAD(Target address = global(HoA)) on the egress interface in foreign-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

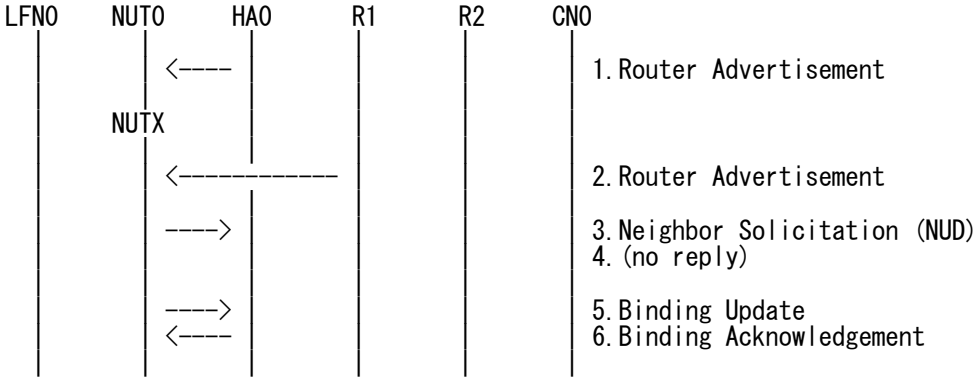
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

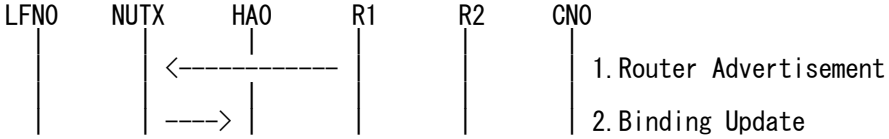
[INITIALIZATION]

- In the case of Real Home Link



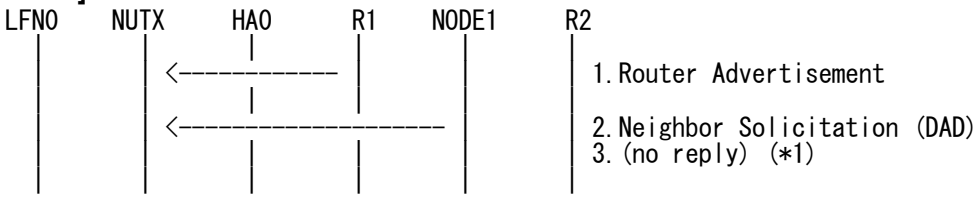
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Send Neighbor Solicitation (DAD). (0 -> solicited-node multicast)
   (Refer to 5.3.1)

IPv6 Header	Source Address	0::0 (Unspecified address)
	Destination Address	NUTX (LinkX, Solicited-node multicast address)
ICMPv6 Header	Type	135
	Target Address	NUT0 (Link0, global)

3. (no reply) (*1)

[JUDGMENT]

(*1) PASS: NODE1 does not receive Neighbor Advertisement from Mobile Router.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

6.8 Dynamic Home Agent Address Discovery

6.8.1 Sending HAAD-Request

6.8.1.1 NEMO-MR-5-1-1-1-001 - Sending HAAD-Request at home-link

[PURPOSE]
NEMO-MR-5-1-1-1-001 - Sending HAAD-Request at home-link

[CATEGORY]
ROUTER : ADVANCED FUNCTION (DHAAD)

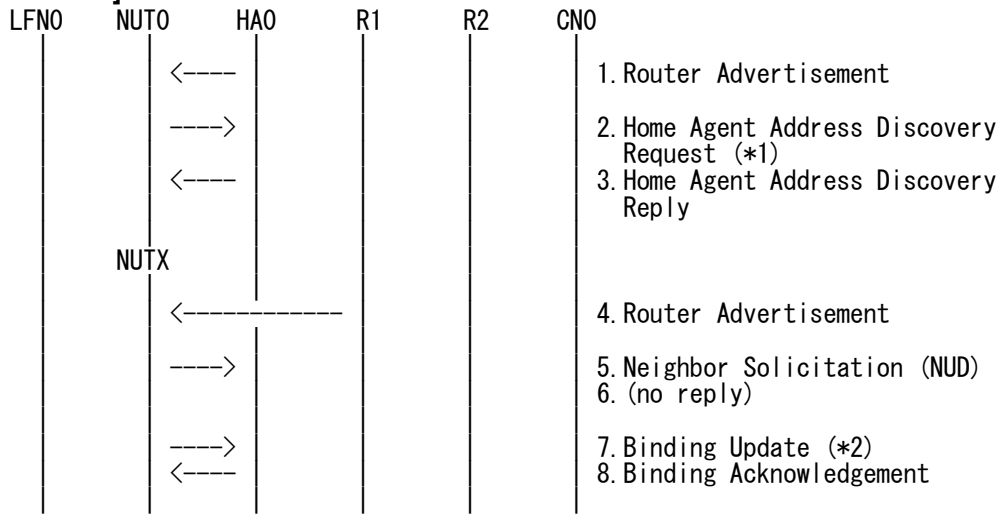
[REQUIREMENT OF TEST]
Function of Real Home Link: YES
Function of Dynamic Home Agent Address Discovery: YES
NUT transmits HAAD Request on Home Link: YES

[TOPOLOGY]
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]
Refer to 3.1 Common Setup-1

[INITIALIZATION]
NONE

[PROCEDURE]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.1)
   # The Home Agent (H) bit is clear.
2. Receive Home Agent Address Discovery Request. (NUT0 -> NUT0_ha_any)

(*1) (Refer to 5.17.1)
The Mobile Router Support Flag (R) is set to 1.

IPv6 Header	Source Address	NUT0 (Link0, global)
	Destination Address	(Home-Agents anycast address)
Mobility Header	Type	144
	R Flag	1
	Reserved	0

3. Send Home Agent Address Discovery Reply. (HA0 -> NUT0) (Refer to 5.18.1)
The Mobile Router Support Flag (R) is set to 1.
The Home Agent Addresses field contains global IP address for HA0.
4. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
5. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
6. (no reply)
Wait during a maximum of 3 seconds(RFC2461).
7. Receive Binding Update. (NUTX -> HA0) (*2) (Refer to 5.14.1)
The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

8. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
The Mobile Router Flag (R) is set to 1.

[JUDGMENT]

(*1) PASS: HA0 receives Home Agent Address Discovery Request.
Then, check whether this packet fills all of the following.
- The destination address is set to a home Agents anycast address.
- The Mobile Router Support Flag (R) bit is set to 1.
- The reserved field is cleared.

(*2) PASS: HA0 receives Binding Update.
Then, check whether this packet fills all of the following.
- The Mobile Router Flag (R) is set to 1.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 7.1

RFC3775 Mobility Support in IPv6
See Section 11.4.1

6.8.1.2 NEMO-MR-5-1-1-1-005 - Sending HAAD-Request at foreign-link

[PURPOSE]

NEMO-MR-5-1-1-1-005 - Sending HAAD-Request at foreign-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION (DHAAD)

[REQUIREMENT OF TEST]

Function of Dynamic Home Agent Address Discovery: YES

[TOPOLOGY]

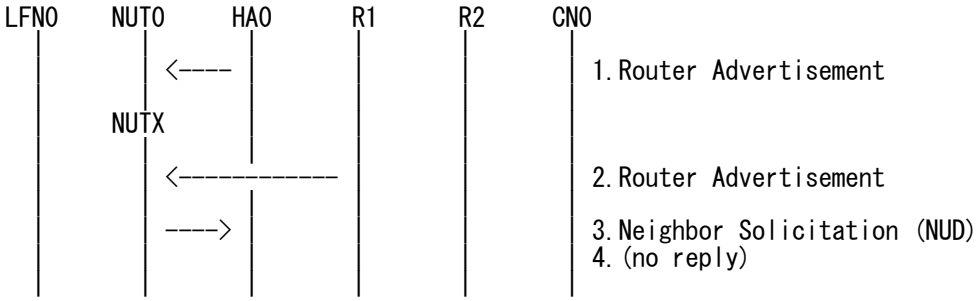
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

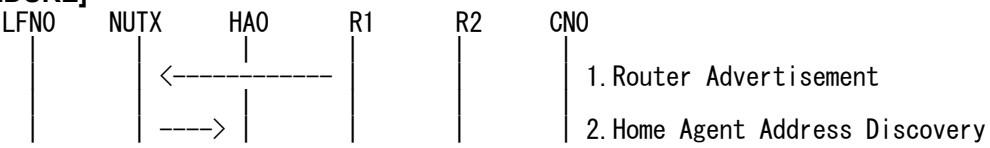


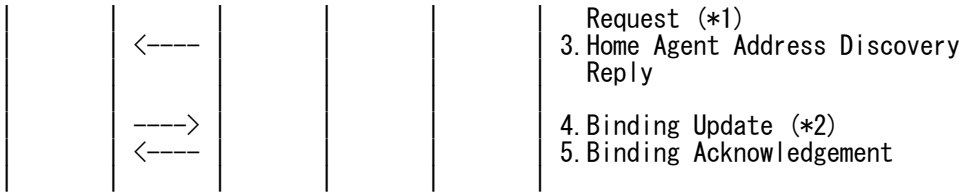
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.1)
   # The Home Agent (H) bit is clear.
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation. (NUD)(NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Home Agent Address Discovery Request. (NUTX -> NUT0_ha_any) (*1) (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) is set to 1.

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	(Home-Agents anycast address)
Mobility Header	Type	144
	R flag	1
	Reserved	0

3. Send Home Agent Address Discovery Reply. (HA0 -> NUTX) (Refer to 5.18.1)
   # The Mobile Router Support Flag (R) is set to 1.
   # The Home Agent Addresses field contains global IP address for HA0.
4. Receive Binding Update. (NUTX -> HA0) (*2) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

5. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[JUDGMENT]

(*1) PASS: HA0 receives Home Agent Address Discovery Request.
Then, check whether this packet fills all of the following.
- The source address is set to a Care-of Address.
- The destination address is set to a home Agents anycast address.
- The Mobile Router Support (R) bit is set to 1.
- The reserved field is cleared.

(*2) PASS: HA0 receives Binding Update.
- The Mobile Router Flag (R) is set to 1.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 7.1

RFC3775 Mobility Support in IPv6
See Section 11.4.1

6.8.1.3 NEMO-MR-5-1-1-1-006 - Retransmissions & Back off (Use INITIAL_DHAAD_TIMEOUT as the initial retransmission timer)

[PURPOSE]

NEMO-MR-5-1-1-1-006 - Retransmissions & Back off (Use INITIAL_DHAAD_TIMEOUT as the initial retransmission timer)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (DHAAD)

[REQUIREMENT OF TEST]

Function of Dynamic Home Agent Address Discovery: YES
NUT re-transmits HAAD Request for valuable HAAD Reply: YES/NO

[TOPOLOGY]

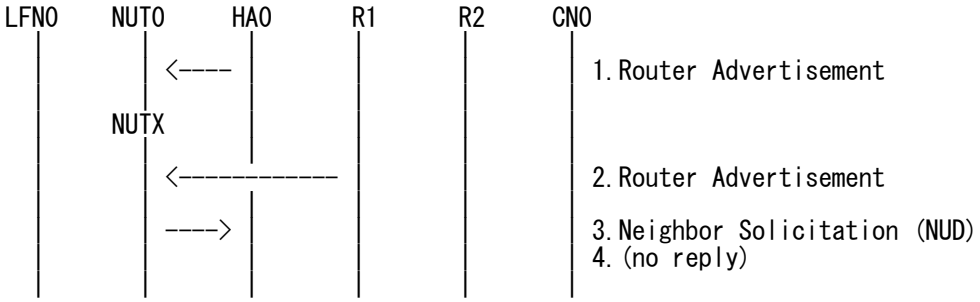
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link



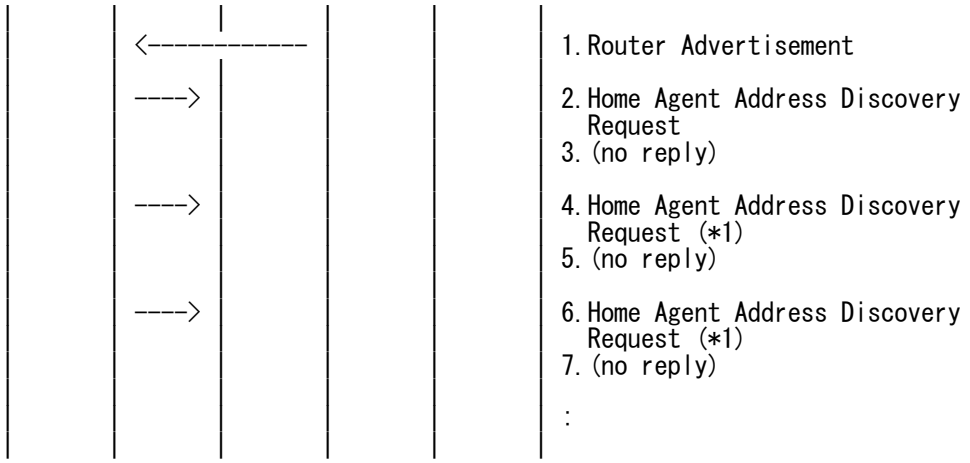
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.1)
   # The Home Agent (H) bit is clear.
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]

LFN0 NUTX HA0 R1 R2 CN0



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Home Agent Address Discovery Request. (NUTX -> NUT0_ha_any) (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) is set to 1.
3. (no reply)
4. Receive Home Agent Address Discovery Request. (NUTX -> NUT0_ha_any) (*1) (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) is set to 1.

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	(Home-Agents anycast address)
Mobility Header	Type	144
	R flag	1

5. (no reply)
6. Receive Home Agent Address Discovery Request. (NUTX -> NUT0_ha_any) (*1) (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) is set to 1.
7. (no reply)

[JUDGMENT]

The judgment changes by the following settings of "REQUIREMENT of TEST".

- NUT re-transmits HAAD Request for valuable HAAD Reply: YES

(*1) PASS: HA0 receives the retransmitted Home Agent Address Discovery Request.

Then, check whether this packet fills all of the following.
- The Mobile Router Support Flag (R) is set to 1.
- The initial retransmission timer is set to INITIAL_DHAAD_TIMEOUT.
- Timeout period is doubled upon each retransmission.
- This retransmission MAY be repeated up to a maximum of DHAAD_RETRIES attempts.

- NUT re-transmits HAAD Request for valuable HAAD Reply: NO

(*1) PASS: HA0 does not receive the retransmitted Home Agent Address Discovery

Request.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 7.1

RFC3775 Mobility Support in IPv6
See Section 11.4.1

6.8.2 Receiving HAAD-Reply

6.8.2.1 NEMO-MR-5-1-2-1-002 - Receiving HAAD-Reply at home-link

[PURPOSE]
NEMO-MR-5-1-2-1-002 - Receiving HAAD-Reply at home-link

[CATEGORY]
ROUTER : ADVANCED FUNCTION (DHAAD)

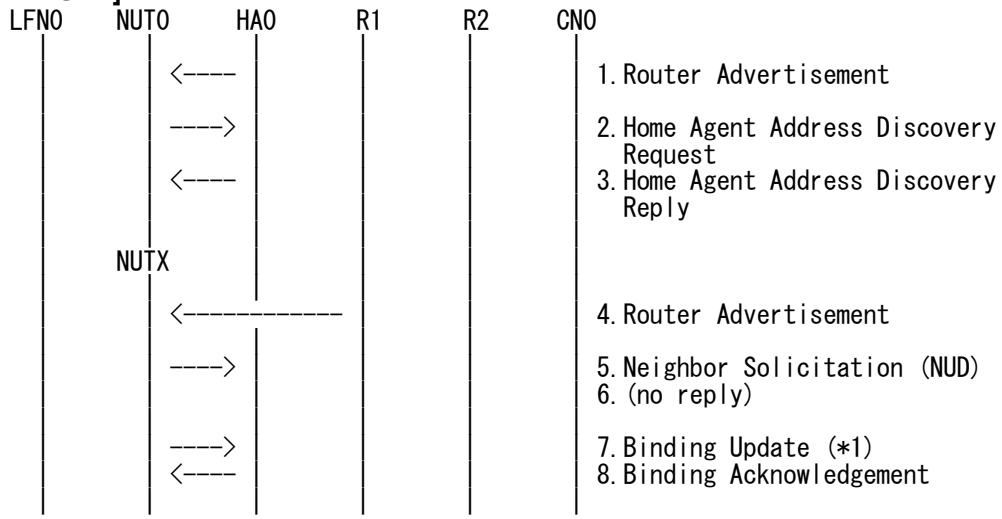
[REQUIREMENT OF TEST]
Function of Real Home Link: YES
Function of Dynamic Home Agent Address Discovery: YES
NUT transmits HAAD Request on Home Link: YES

[TOPOLOGY]
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]
Refer to 3.1 Common Setup-1

[INITIALIZATION]
NONE

[PROCEDURE]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.1)
   # The Home Agent (H) bit is clear.
2. Receive Home Agent Address Discovery Request. (NUT0 -> NUT0_ha_any) (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) is set to 1.
3. Send Home Agent Address Discovery Reply. (HA0 -> NUT0) (Refer to 5.18.1)

The Mobile Router Support Flag (R) is set to 1.
The Home Agent Addresses field contains global IP address for HA0.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUT0 (Link0, global)
Mobility Header	Type	145
	Code	0
	Checksum	Any
	Identifier	Any
	R flag	1
	Reserved	0
	Home agent Addresses	HA0 (Link0, global)

4. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
5. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
6. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
7. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

8. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update.
Then, check whether this packet fills all of the following.
- The destination address is set to HA address of Home Agent Address Discovery Reply[3].
- The Mobile Router Flag (R) is set to 1.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 7

RFC3775 Mobility Support in IPv6
See Section 11.4.1

6.8.2.2 NEMO-MR-5-1-2-1-016 - Receiving HAAD-Reply at foreign-link

[PURPOSE]

NEMO-MR-5-1-2-1-016 - Receiving HAAD-Reply at foreign-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION (DHAAD)

[REQUIREMENT OF TEST]

Function of Dynamic Home Agent Address Discovery: YES

[TOPOLOGY]

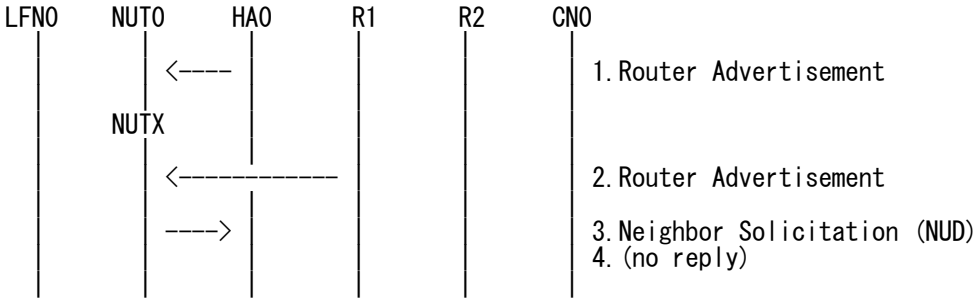
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

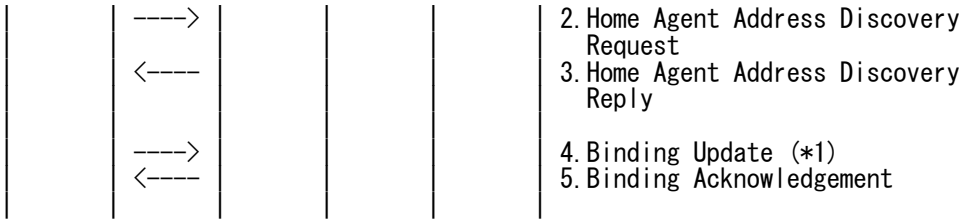


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.1)
   # The Home Agent (H) bit is clear.
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Home Agent Address Discovery Request. (NUTX -> NUT0_ha_any) (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) is set to 1.
3. Send Home Agent Address Discovery Reply. (HA0 -> NUTX) (Refer to 5.18.1)
   # The Mobile Router Support Flag (R) is set to 1.
   # The Home Agent Addresses field contains global IP address for HA0.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Mobility Header	Type	145
	Code	0
	Checksum	Any
	Identifier	Any
	R flag	1
	Reserved	0
	Home agent Addresses	HA0 (Link0, global)

4. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

5. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update.
Then, check whether this packet fills all of the following.
- The destination address is set to HA address of Home Agent Address Discovery Reply[3].
- The Mobile Router Flag (R) is set to 1.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 7

RFC3775 Mobility Support in IPv6
See Section 11.4.1

6.8.2.3 NEMO-MR-5-1-2-1-021 - Receiving HAAD-Reply (Invalid ICMP Header Reserved)

[PURPOSE]

NEMO-MR-5-1-2-1-021 - Receiving HAAD-Reply (Invalid ICMP Header Reserved)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (DHAAD)

[REQUIREMENT OF TEST]

Function of Dynamic Home Agent Address Discovery: YES

[TOPOLOGY]

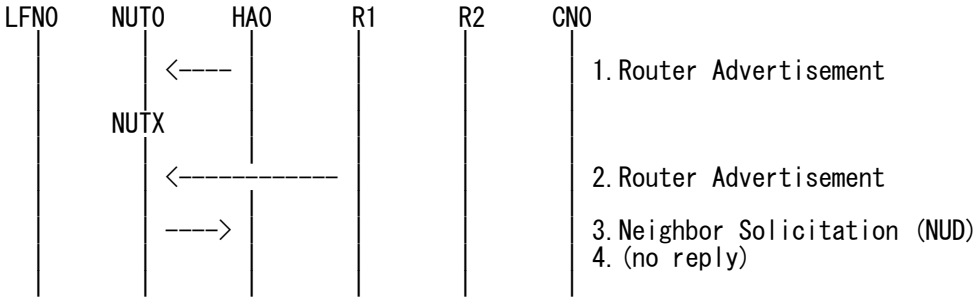
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

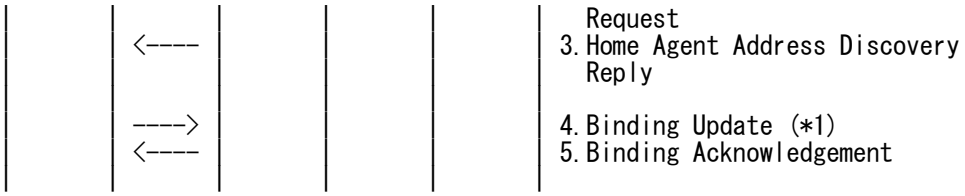


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.1)
   # The Home Agent (H) bit is clear.
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Home Agent Address Discovery Request. (NUTX -> NUT0_ha_any) (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) is set to 1.
3. Send Home Agent Address Discovery Reply. (HA0 -> NUTX) (Refer to 5.18.1)
   # The Mobile Router Support Flag (R) is set to 1.
   # The Reserved field is not set to 0.
   # The Home Agent Addresses field contains global IP address for HA0.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Mobility Header	Type	145
	Code	0
	Checksum	Any
	Identifier	Any
	R flag	1
	Reserved	/=0
	Home agent Addresses	HA0 (Link0, global)

4. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

5. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update.
Then, check whether this packet fills all of the following.
- The destination address is set to HA address of Home Agent Address Discovery Reply[3].
- The Mobile Router Flag (R) is set to 1.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 7

RFC3775 Mobility Support in IPv6
See Section 6.6, 11.4.1

6.8.2.4 NEMO-MR-5-1-2-1-026 - Receiving HAAD-Reply from the 1st HA of HAAD-Reply(1st=HA0 & 2nd = HA1)

[PURPOSE]

NEMO-MR-5-1-2-1-026 - Receiving HAAD-Reply from the 1st HA of HAAD-Reply(1st=HA0 & 2nd = HA1)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (DHAAD)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

Function of Dynamic Home Agent Address Discovery: YES

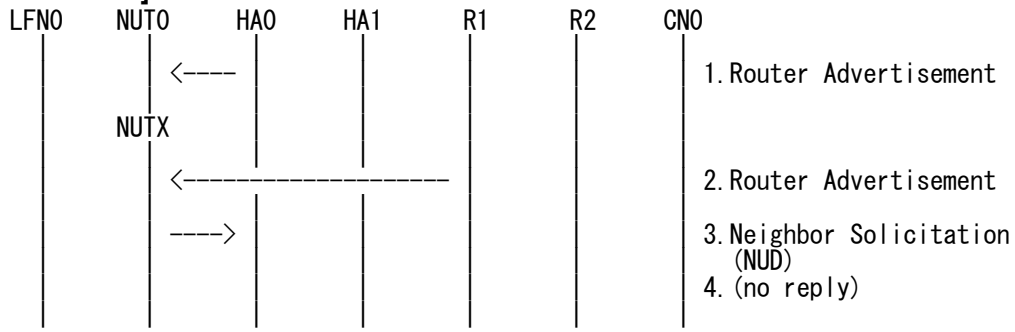
[TOPOLOGY]

Refer to 2.1.1.3 Common Topology-3

[TEST SETUP]

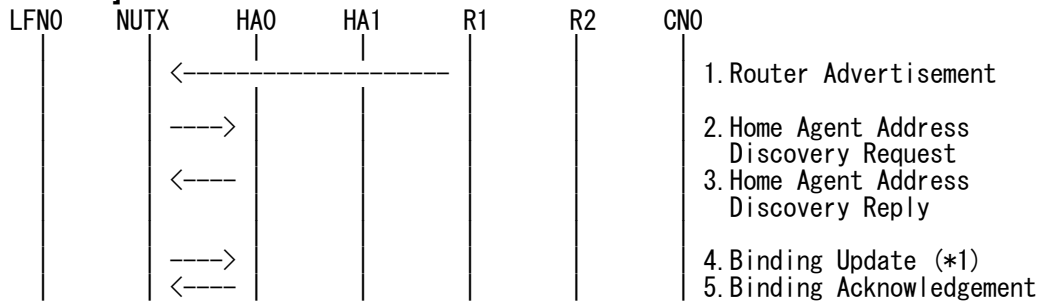
Refer to 3.1 Common Setup-1

[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.1)
   # The Home Agent (H) bit is clear.
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

[PROCEDURE]



| | | | | | | |

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Home Agent Address Discovery Request. (NUTX -> NUT0_ha_any) (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) is set to 1.
3. Send Home Agent Address Discovery Reply. (HA0 -> NUTX) (Refer to 5.18.1)
   # The Mobile Router Support Flag (R) is set to 1.
   # The Home Agent Addresses field contains global IP address for HA0.
   # The Home Agent Addresses field contains global IP address for HA1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Mobility Header	Type	145
	Code	0
	Checksum	Any
	Identifier	Any
	R flag	1
	Reserved	0
	Home agent Addresses	HA0 (Link0, global)
	Home agent Addredsfss	HA1 (Link0, global)

4. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

5. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update.
Then, check whether this packet fills all of the following.
- The destination address is set to HA0 address of Home Agent Address Discovery Reply[3].
- The Mobile Router Flag (R) is set to 1.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.4.1

6.8.2.5 NEMO-MR-5-1-2-1-032 - Receiving HAAD-Reply(R = ON & HA(MR supported))from HA(MR not supported)

[PURPOSE]

NEMO-MR-5-1-2-1-032 - Receiving HAAD-Reply(R = ON & HA(MR supported))from HA(MR not supported)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (DHAAD)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

Function of Dynamic Home Agent Address Discovery: YES

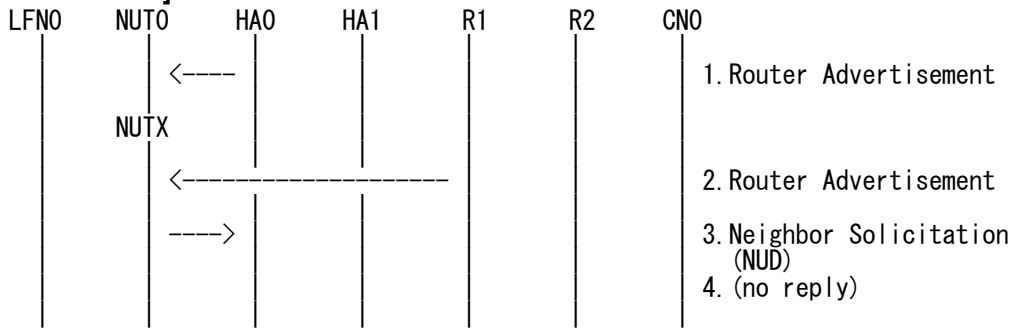
[TOPOLOGY]

Refer to 2.1.1.3 Common Topology-3

[TEST SETUP]

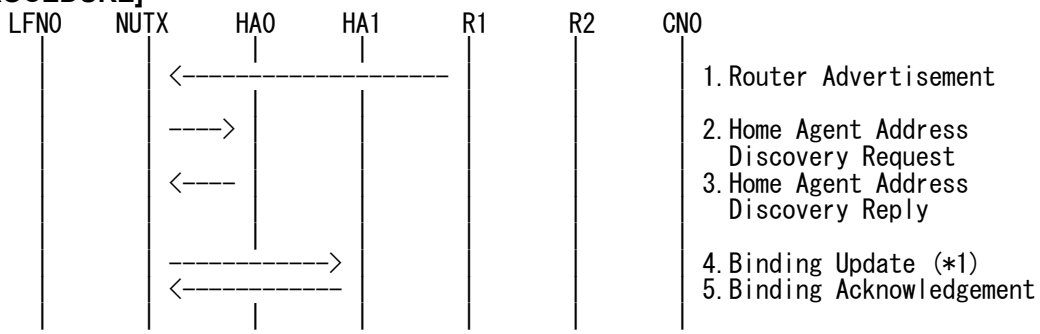
Refer to 3.1 Common Setup-1

[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi)
   # The Home Agent (H) bit is clear.
2. Send Router Advertisement. (R1 -> R1_allnode_multi)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0)
4. (no reply)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Home Agent Address Discovery Request. (NUTX -> NUT0_ha_any) (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) is set to 1.
3. Send Home Agent Address Discovery Reply. (HA0 -> NUTX) (Refer to 5.18.1)
   # The Mobile Router Support Flag (R) is set to 1.
   # The Home Agent Addresses field contains global IP address for HA1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Mobility Header	Type	145
	R Flag	1
	Home agent Addresses	HA1 (Link0, global)

4. Receive Binding Update. (NUTX -> HA1) (*1)(Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R Flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R Flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Option Type	6
	Option Length	18
	Reserved	0
	Prefix Length	64
	Prefix	MNP

5. Send Binding Acknowledgement. (HA1 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload/	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	R Flag	1

[JUDGMENT]

(*1) PASS: HA1 receives Binding Update.
Then, check whether this packet fills all of the following.
- The destination address is set to HA0 address of Home Agent Address Discovery Reply[3].
- The Mobile Router Flag (R) is set to 1.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.4.1

6.8.2.6 NEMO-MR-5-1-2-1-027 - Receiving HAAD-Reply from the 2nd HA of HAAD-Reply (1st=HA1 & 2nd = HA0)

[PURPOSE]

NEMO-MR-5-1-2-1-027 - Receiving HAAD-Reply from the 2nd HA of HAAD-Reply (1st=HA1 & 2nd = HA0)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (DHAAD)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

Function of Dynamic Home Agent Address Discovery: YES

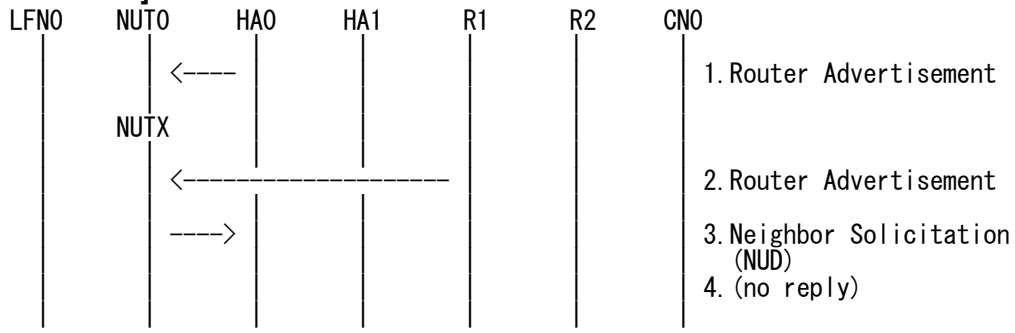
[TOPOLOGY]

Refer to 2.1.1.3 Common Topology-3

[TEST SETUP]

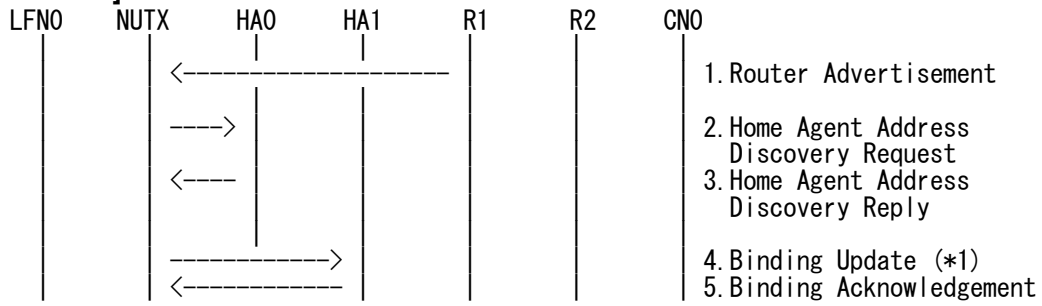
Refer to 3.1 Common Setup-1

[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.1)
   # The Home Agent (H) bit is clear.
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

[PROCEDURE]



| | | | | | | |

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Home Agent Address Discovery Request. (NUTX -> NUT0_ha_any) (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) is set to 1.
3. Send Home Agent Address Discovery Reply. (HA0 -> NUTX) (Refer to 5.18.1)
   # The Mobile Router Support Flag (R) is set to 1.
   # The Home Agent Addresses field contains global IP address for HA1.
   # The Home Agent Addresses field contains global IP address for HA0.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Mobility Header	Type	145
	R flag	1
	Home agent Addresses	HA1 (Link0, global)
	Home agent Addredsfss	HA0 (Link0, global)

4. Receive Binding Update. (NUTX -> HA1) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mpde

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

5. Send Binding Acknowledgement. (HA1 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[JUDGMENT]

(*1) PASS: HA1 receives Binding Update.
Then, check whether this packet fills all of the following.
- The destination address is set to HA1 address of Home Agent Address Discovery Reply[3].
- The Mobile Router Flag (R) is set to 1.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.4.1

6.8.2.7 NEMO-MR-5-1-2-1-028 - Trying instead the next home agent returned during dynamic home agent address discovery

[PURPOSE]

NEMO-MR-5-1-2-1-028 - Trying instead the next home agent returned during dynamic home agent address discovery

[CATEGORY]

ROUTER : ADVANCED FUNCTION (DHAAD)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

Function of Dynamic Home Agent Address Discovery: YES

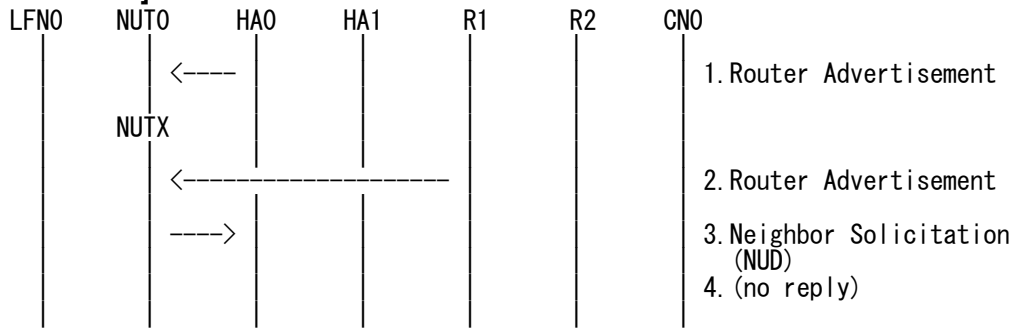
[TOPOLOGY]

Refer to 2.1.1.3 Common Topology-3

[TEST SETUP]

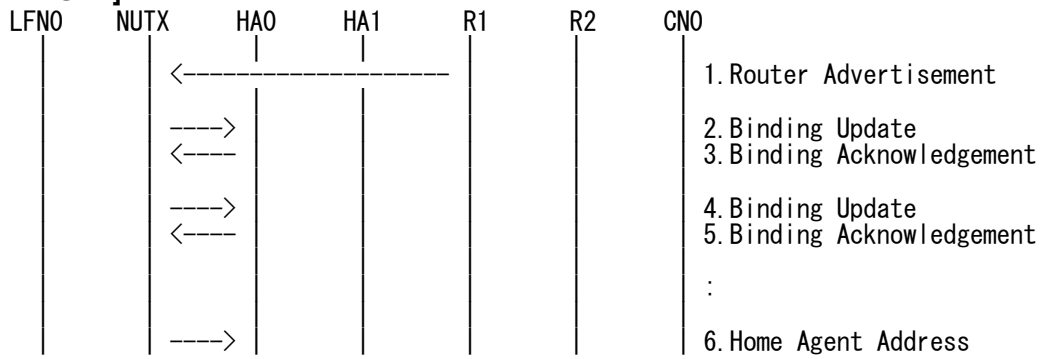
Refer to 3.1 Common Setup-1

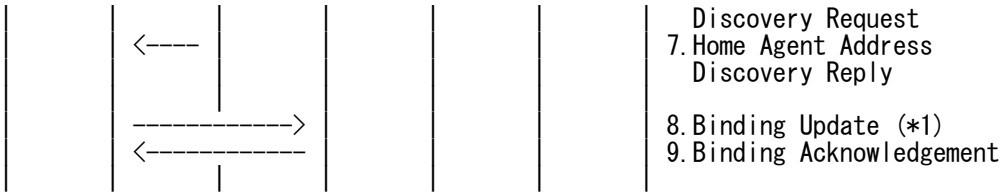
[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation. (NUD) (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 130(Insufficient resources).
   # The Mobile Router Flag (R) is set to 1.
4. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
5. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 130(Insufficient resources).
   # The Mobile Router Flag (R) is set to 1.
6. Receive Home Agent Address Discovery Request. (NUTX -> NUT0_ha_any) (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) is set to 1.

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	(Home-Agents anycast address)
Mobility Header	Type	144
	R flag	1

7. Send Home Agent Address Discovery Reply. (HA0 -> NUTX) (Refer to 5.18.1)
   # The Mobile Router Support Flag (R) is set to 1.
   # The Home Agent Addresses field contains global IP address for HA1.
   # The Home Agent Addresses field contains global IP address for HA0.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Mobility Header	Type	145
	Rflag	1
	Home agent Addresses	HA1 (Link0, global)
	Home agent Addredsfss	HA0 (Link0, global)

8. Receive Binding Update. (NUTX -> HA1) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mpde

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

9. Send Binding Acknowledgement. (HA1 -> NUTX) (Refer to 5.15.1)

The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA1 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	R flag	1
	Status	0
	R flag	1

[JUDGMENT]

(*1) PASS: HA1 receives Binding Update.

- The Mobile Router Flag (R) is set to 1.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.4.1

6.8.2.8 NEMO-MR-5-1-2-1-029 - Sending BU to the 2nd HA of HAAD-Reply(1st=HA0(failed in binding) & 2nd = HA1)

[PURPOSE]

NEMO-MR-5-1-2-1-029 - Sending BU to the 2nd HA of HAAD-Reply(1st=HA0(failed in binding) & 2nd = HA1)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (DHAAD)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

Function of Dynamic Home Agent Address Discovery: YES

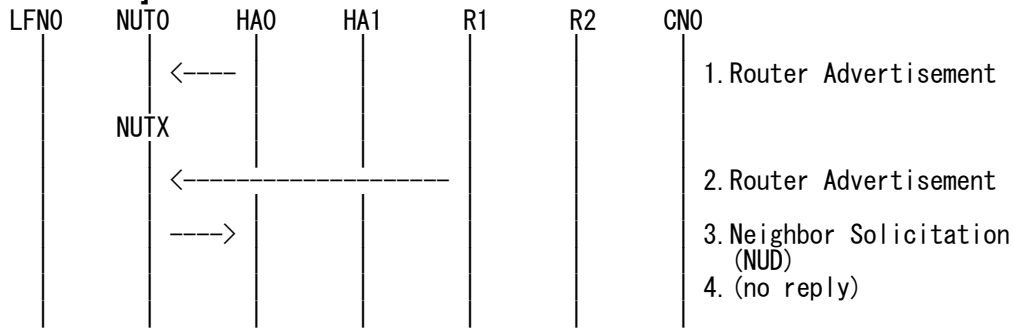
[TOPOLOGY]

Refer to 2.1.1.3 Common Topology-3

[TEST SETUP]

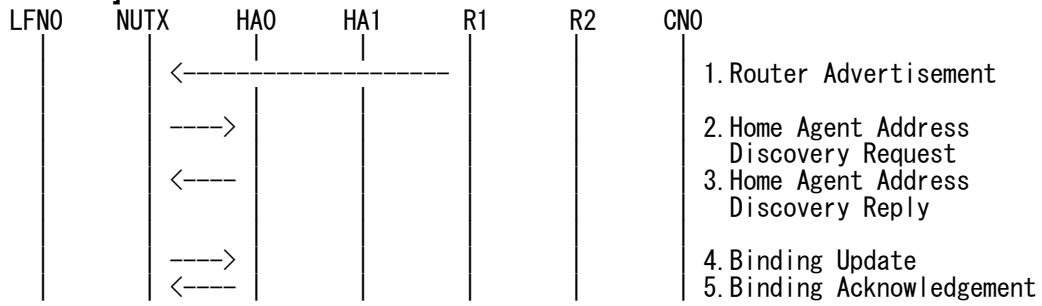
Refer to 3.1 Common Setup-1

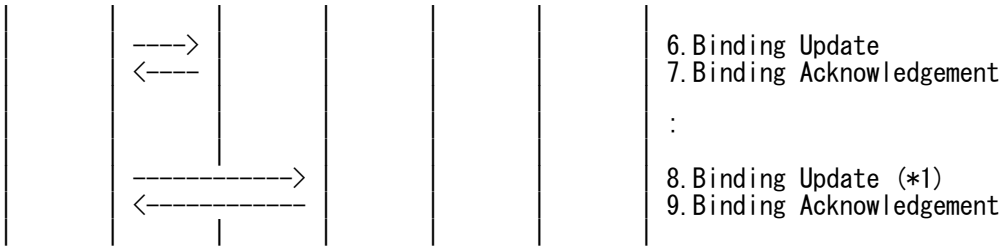
[INITIALIZATION]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.1)
   # The Home Agent (H) bit is clear.
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Home Agent Address Discovery Request. (NUTX -> NUT0_ha_any) (Refer to 5.17.1)
   # The Mobile Router Support Flag (R) is set to 1.

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	(Home-Agents anycast address)
Mobility Header	Type	144
	R flag	1

3. Send Home Agent Address Discovery Reply. (HA0 -> NUTX) (Refer to 5.18.1)
   # The Mobile Router Support Flag (R) is set to 1.
   # The Home Agent Addresses field contains global IP address for HA0.
   # The Home Agent Addresses field contains global IP address for HA1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Mobility Header	Type	145
	R flag	1
	Home agent Addresses	HA0 (Link0, global)
	Home agent Addresses	HA1 (Link0, global)

4. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
5. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 130(Insufficient resources).
   # The Mobile Router Flag (R) is set to 1.
6. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
7. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 130(Insufficient resources).
   # The Mobile Router Flag (R) is set to 1.
8. Receive Binding Update. (NUTX -> HA1) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA1 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

9. Send Binding Acknowledgement. (HA1 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0.
   # The Mobile Router Flag (R) is set to 1.

[JUDGMENT]

(*1) PASS: HA1 receives Binding Update.
Then, check whether this packet fills all of the following.
- InitialBindackTimeoutFirstReg seconds pass before sending a Binding Update to the next home agent.
- The Mobile Router Flag (R) is set to 1.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.4.1, 11.7.1

6.9 Mobile Prefix Discovery

6.9.1 Sending MPS

6.9.1.1 NEMO-MR-4-1-1-1-001 - Sending MPS (before the HoA becomes invalid)

[PURPOSE]

NEMO-MR-4-1-1-1-001 - Sending MPS (before the HoA becomes invalid)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (MPD)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

Function of Mobile Prefix Discovery: YES

[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

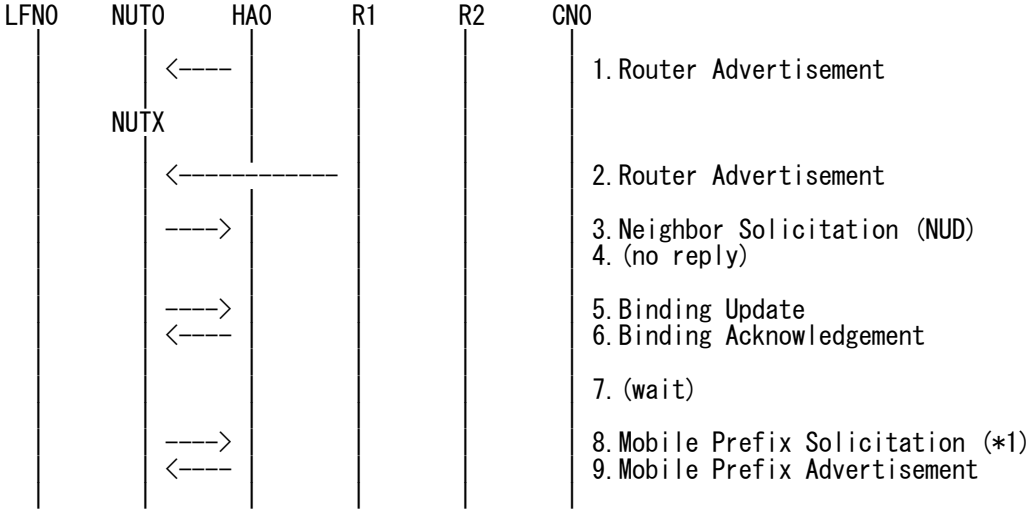
[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

NONE

[PROCEDURE]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
   # The Prefix Information option is included, and,
   # - The Preferred Lifetime field is set to 90 seconds.
   # - The Valid Lifetime field is set to 90 seconds.
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
5. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
7. (wait)
   # Wait during a maximum of the remaining valid lifetime of the Home Address.
8. Receive Mobile Prefix Solicitation. (NUTX -> HA0) (*1) (Refer to 5.19.1)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address of Mobile Node	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
Mobility Header	Type	146
	Reserved	0

9. Send Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)

[JUDGMENT]

(*1) PASS: HA0 receives Mobile Prefix Solicitation,
Then, check whether this packet fills all of the following,
- The lifetime of the Home Address does not expire.
- The Source Address is set to Care-of Address.
- The Destination Address is set to HA address.
- The Reserved field is cleared.
- The Home Address destination option is included, and,
- This option is placed as the right location.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.4.2, 6.7

RFC2462 IPv6 Stateless Address Autoconfiguration
See Section 5.5.3

RFC3776 Using IPsec to Protect Mobile IPv6 Signaling Between Mobile Nodes and Home Agents
See Section 4.1, 4.2, 4.3, 4.4

6.9.1.2 NEMO-MR-4-1-1-1-002 - Sending MPS (after receiving unsolicited MPA)

[PURPOSE]

NEMO-MR-4-1-1-1-002 - Sending MPS (after receiving unsolicited MPA)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (MPD)

[REQUIREMENT OF TEST]

Function of Mobile Prefix Discovery: YES

[TOPOLOGY]

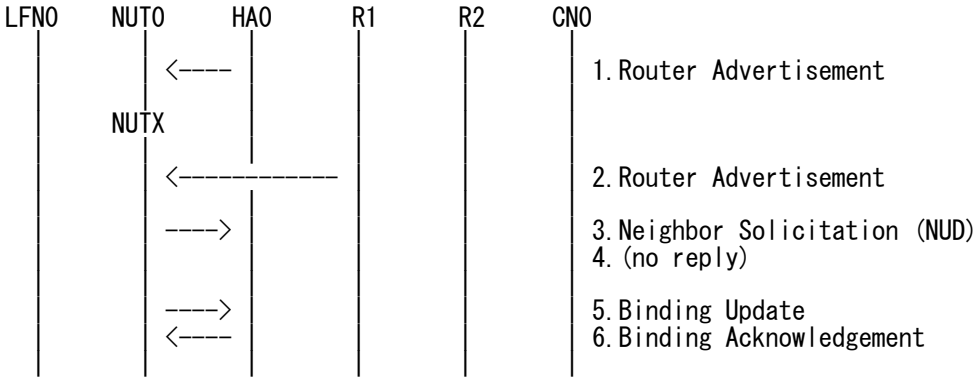
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

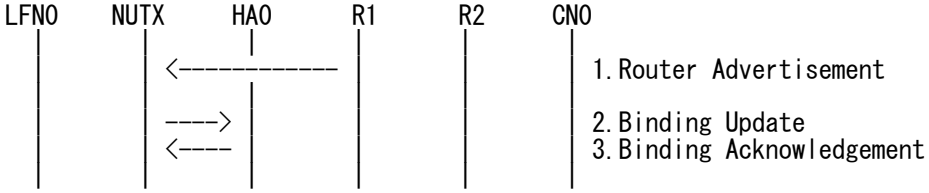
[INITIALIZATION]

- In the case of Real Home Link



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

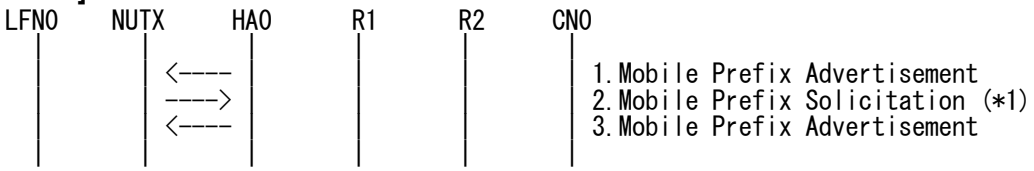
- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)

3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

[PROCEDURE]



1. Send unsolicited Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)
   # The Identifier field is set to the random value.
2. Receive Mobile Prefix Solicitation. (NUTX -> HA0) (*1) (Refer to 5.19.1)

IPv6 Header	Source Address	NIUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address of Mobile Node	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
Mobility Header	Type	146

3. Send Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)

[JUDGMENT]

(*1) PASS: HA0 receives Mobile Prefix Solicitation.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 9

RFC3775 Mobility Support in IPv6
See Section 11.4.3

6.9.1.3 NEMO-MR-4-1-1-1-004 - Retransmissions & Back off (Use INITIAL_SOLICIT_TIMER as the initial retransmission timer)

[PURPOSE]

NEMO-MR-4-1-1-1-004 - Retransmissions & Back off (Use INITIAL_SOLICIT_TIMER as the initial retransmission timer)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (MPD)

[REQUIREMENT OF TEST]

Function of Mobile Prefix Discovery: YES
Function of Real Home Link: YES
NUT re-transmits MPS for valuable MPA: YES/NO

[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

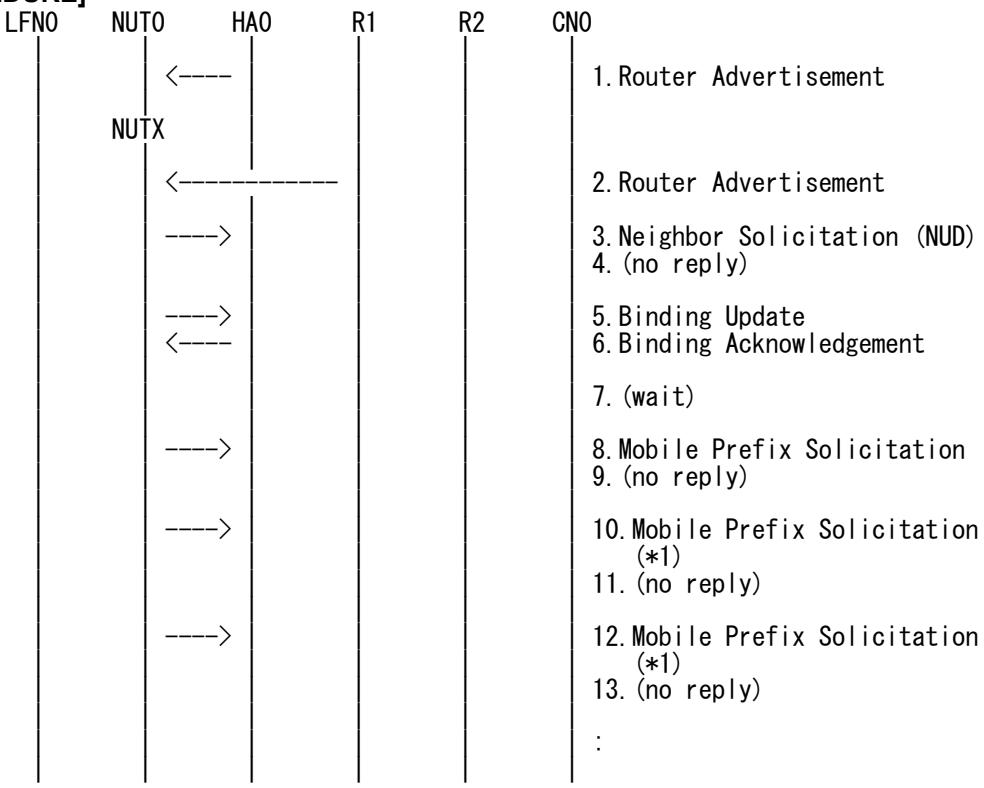
[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

NONE

[PROCEDURE]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
   # The Prefix Information option is included, and,
   # - The Preferred Lifetime field is set to 90 seconds.
   # - The Valid Lifetime field is set to 90 seconds.
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
5. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
7. (wait)
   # Wait during a maximum of the remaining valid lifetime of the Home Address.
8. Receive Mobile Prefix Solicitation. (NUTX -> HA0) (Refer to 5.19.1)
9. (no reply)
   # Wait during a maximum of the remaining valid lifetime of the Home Address.
10. Receive Mobile Prefix Solicitation. (NUTX -> HA0) (*1) (Refer to 5.19.1)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address of Mobile Node	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
Mobility Header	Type	146

11. (no reply)
    # Wait during a maximum of the remaining valid lifetime of the Home Address.
12. Receive Mobile Prefix Solicitation. (NUTX -> HA0) (*1) (Refer to 5.19.1)
13. (no reply)

[JUDGMENT]

The judgment changes by the following settings of "REQUIREMENT of TEST".

- NUT re-transmits MPS for valuable MPA: YES
  (*1) PASS: HA0 receives the retransmitted Mobile Prefix Solicitation.
  Then, check whether this packet fills all of the following,
  - The initial retransmission timer is set to INITIAL_SOLICIT_TIMER.
  - Timeout period is doubled upon each retransmission.

- NUT re-transmits MPS for valuable MPA: NO
  (*1) PASS: HA0 does not receive the retransmitted Mobile Prefix Solicitation.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.8, 12

RFC2462 IPv6 Stateless Address Autoconfiguration
See Section 5.5.3

6.9.2 Receiving MPA

6.9.2.1 NEMO-MR-4-2-1-1-001 - Receiving solicited MPA

[PURPOSE]

NEMO-MR-4-2-1-1-001 - Receiving solicited MPA

[CATEGORY]

ROUTER : ADVANCED FUNCTION (MPD)

[REQUIREMENT OF TEST]

Function of Mobile Prefix Discovery: YES

[TOPOLOGY]

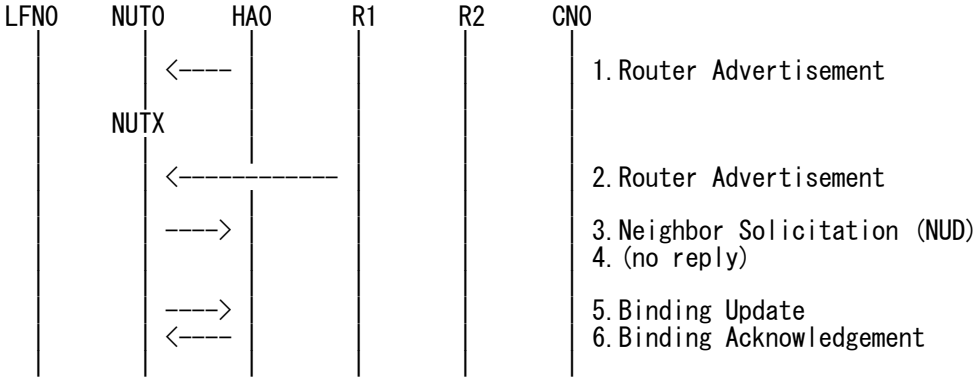
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

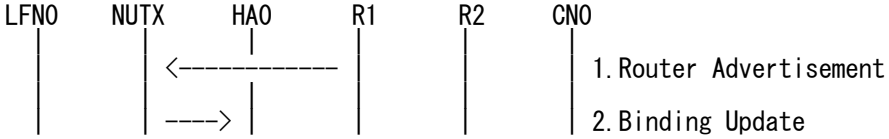
[INITIALIZATION]

- In the case of Real Home Link



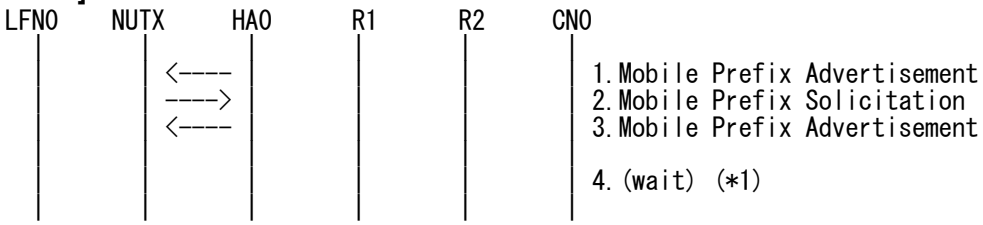
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[PROCEDURE]



1. Send unsolicited Mobile Prefix Advertisement. (HA0 -> NUTX)
   (Refer to 5.20.1)
   # The Identifier field is set to the random value.
2. Receive Mobile Prefix Solicitation. (NUTX -> HA0) (Refer to 5.19.1)
3. Send Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)
   # The Source Address is set to HA address.
   # The Destination Address matches Source Address in the Mobile Prefix Solicitation.
   # The Type2 Routing Header is included.
   # The Identifier field matches the Identifier field in the Mobile Prefix Solicitation.
   # The Prefix Information option is included, and,
   # - The Router Address(R) flag is set to ON.
   # - The Valid Lifetime is not changed.
   # - The Preferred Lifetime is not changed.

IPv6 Header	Source Address (Home Agent Address)	HA0 (Link0, global)
	Destination Address (Source Address of an invoking Mobile Prefix Solicitation)	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
Mobility Header	Type	147
	Identifier	=MPS
Prefix Information Option	R flag	1
	Valid life time	Not changed
	Preferred lifetime	Not changed

4. (wait) (*1)
   # Wait during enough retransmission timer.

[JUDGMENT]

(*1) PASS: HA0 does not receive the retransmitted Mobile Prefix Solicitation.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 9

RFC3775 Mobility Support in IPv6
See Section 11.4.3, 6.8

RFC3776 Using IPsec to Protect Mobile IPv6 Signaling Between Mobile Nodes and Home Agents
See Section 4.1, 4.2, 4.3, 4.4

6.9.2.2 NEMO-MR-4-2-1-1-015 - Receiving solicited MPA (Invalid ICMP Header Reserved)

[PURPOSE]

NEMO-MR-4-2-1-1-015 - Receiving solicited MPA (Invalid ICMP Header Reserved)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (MPD)

[REQUIREMENT OF TEST]

Function of Mobile Prefix Discovery: YES

[TOPOLOGY]

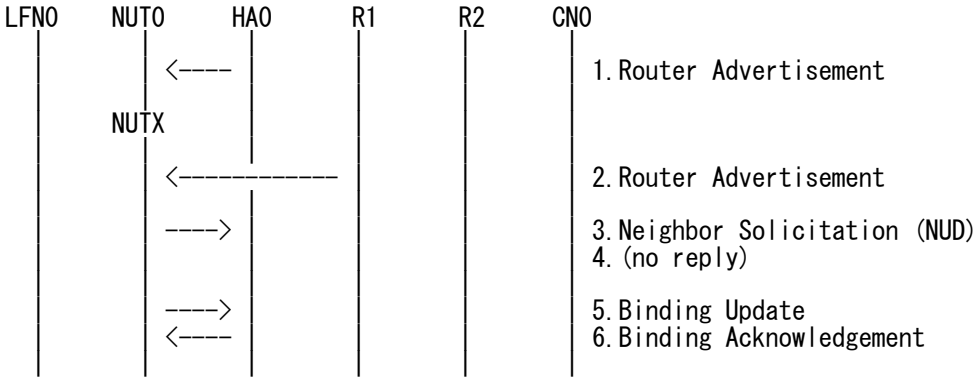
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

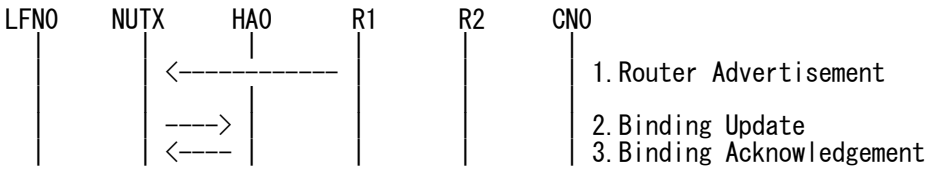
- In the case of Real Home Link



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)

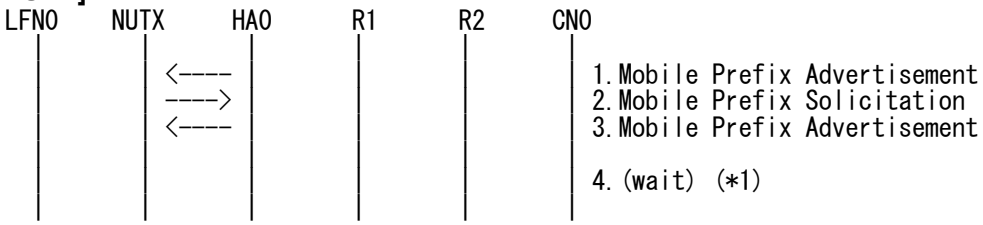
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[PROCEDURE]



1. Send unsolicited Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)
   # The Identifier field is set to the random value.
2. Receive Mobile Prefix Solicitation. (NUTX -> HA0) (Refer to 5.19.1)
3. Send Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)
   # The Source Address is set to HA address.
   # The Destination Address matches Source Address in the Mobile Prefix Solicitation.
   # The Type2 Routing Header is included.
   # The Identifier field matches the Identifier field in the Mobile Prefix Solicitation.
   # The Reserved field is not set to 0.
   # The Prefix Information option is included, and,
   # - The Router Address(R) flag is set to ON.
   # - The Valid Lifetime is not changed.
   # - The Preferred Lifetime is not changed.

IPv6 Header	Source Address (Home Agent Address)	HA0 (Link0, global)
	Destination Address (Source Address of an invoking Mobile Prefix Solicitation)	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
Mobility Header	Type	147
	Identifier	=MPS
	Reserved	/=0
Prefix Information Option	R flag	1
	Valid life time	Not changed
	Preferred lifetime	Not changed

4. (wait) (*1)
   # Wait during enough retransmission timer.

[JUDGMENT]

(*1) PASS: HA0 does not receive the retransmitted Mobile Prefix Solicitation.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 6.8, 11.4.3

6.9.2.3 NEMO-MR-4-2-1-1-004 - Valid solicited MPA (the change of Valid and Preferred Lifetime)

[PURPOSE]

NEMO-MR-4-2-1-1-004 - Valid solicited MPA (the change of Valid and Preferred Lifetime)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (MPD)

[REQUIREMENT OF TEST]

Function of Mobile Prefix Discovery: YES

[TOPOLOGY]

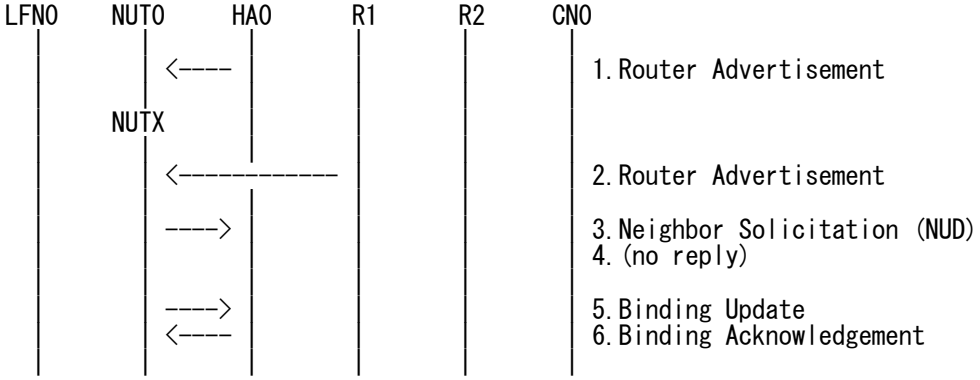
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

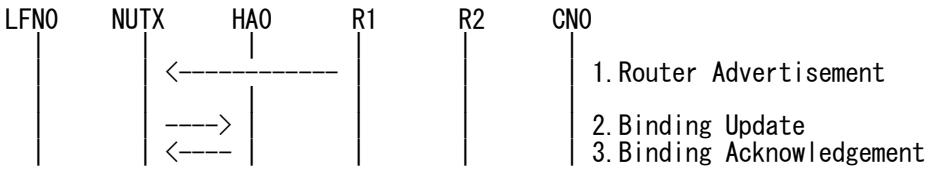
[INITIALIZATION]

- In the case of Real Home Link



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

- In the case of Virtual Home Link

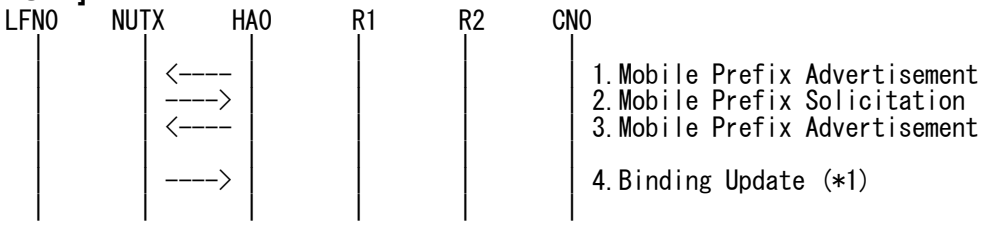


```
|        |        |        |        |        |
```

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[PROCEDURE]

```
LFN0    NUTX     HA0      R1      R2     CN0
  |       |       |       |       |       |
  |       | <---- |       |       |       | 1.Mobile Prefix Advertisement
  |       | ----> |       |       |       | 2.Mobile Prefix Solicitation
  |       | <---- |       |       |       | 3.Mobile Prefix Advertisement
  |       |       |       |       |       |
  |       | ----> |       |       |       | 4.Binding Update (*1)
  |       |       |       |       |       |
```



1. Send unsolicited Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)
2. Receive Mobile Prefix Solicitation. (NUTX -> HA0) (Refer to 5.19.1)
3. Send Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)
   # The Prefix Information option is included, and,
   # - The Valid Lifetime is set less than the remaining lifetime of the home registration.
   # - The Preferred Lifetime is set less than the remaining lifetime of the home registration.

IPv6 Header	Source Address (Home Agent Address)	HA0 (Link0, global)
	Destination Address (Source Address of an invoking Mobile Prefix Solicitation)	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
Mobility Header	Type	147
Prefix Information option	R flag	1
	Valid life time	Any
	Preferred lifetime	Any

4. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
	Lifetime	Any
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
	Lifetime	Any
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update,
Then, check whether this packet fills all of the following,
- The Lifetime field is set less than Valid and Preferred Lifetime in the solicited Mobile Prefix Advertisement[3].
- The Mobile Router Flag (R) is set to 1.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.4.3, 11.4.2, 6.4, 6.4.1, 6.8, 7.2

6.9.2.4 NEMO-MR-4-2-1-1-012 - Receiving solicited MPA from unknown HA

[PURPOSE]

NEMO-MR-4-2-1-1-012 - Receiving solicited MPA from unknown HA

[CATEGORY]

ROUTER : ADVANCED FUNCTION (MPD)

[REQUIREMENT OF TEST]

Function of Mobile Prefix Discovery: YES

NUT re-transmits MPS for valuable MPA: YES/NO

[TOPOLOGY]

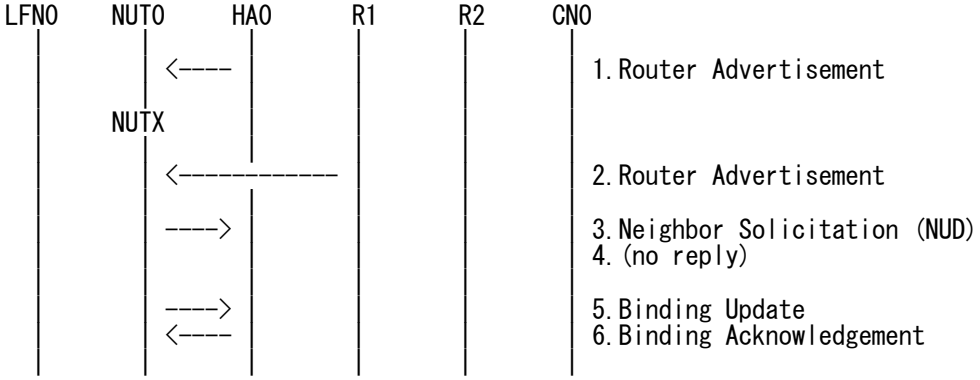
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

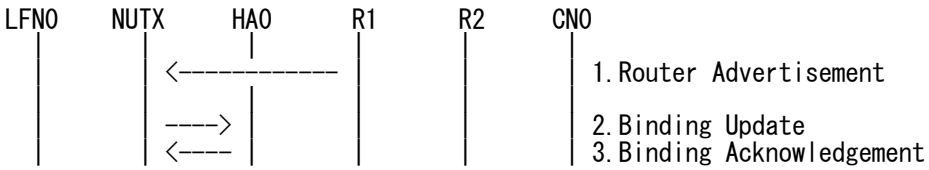
[INITIALIZATION]

- In the case of Real Home Link



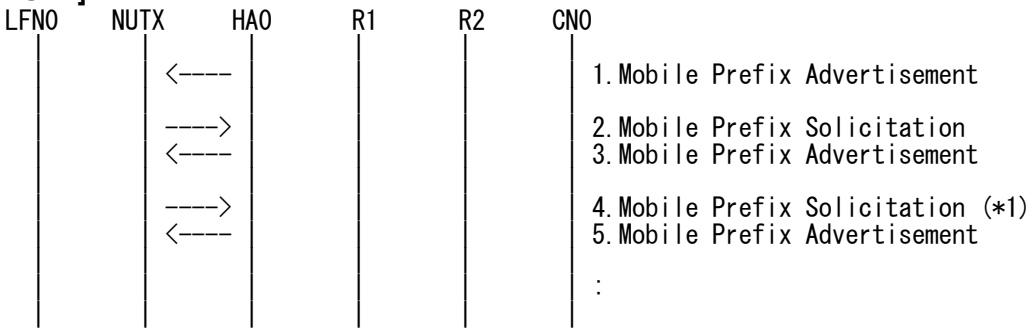
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[PROCEDURE]



1. Send unsolicited Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)
   # The Identifier field is set to the random value.
2. Receive Mobile Prefix Solicitation. (NUTX -> HA0) (Refer to 5.19.1)
3. Send Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)
   # The Source Address is not set to HA address.

IPv6 Header	Source Address	/=HA0
	Destination Address (Source Address of an invoking Mobile Prefix Solicitation)	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
Mobility Header	Type	147

4. Receive Mobile Prefix Solicitation. (NUTX -> HA0) (*1) (Refer to 5.19.1)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address of Mobile Node	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
Mobility Header	Type	146
	Code	0

5. Send Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)
   # The Source Address is not set to HA address.

[JUDGMENT]

The judgment changes by the following settings of "INITIALIZATION 1. Requirement of Test".

- NUT re-transmits MPS for valuable MPA: YES
  (*1) PASS: HA0 receives the retransmitted Mobile Prefix Solicitation.

- NUT re-transmits MPS for valuable MPA: NO
  (*1) PASS: HA0 does not receive the retransmitted Mobile Prefix Solicitation.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.4.3

6.9.2.5 NEMO-MR-4-2-1-1-013 - Invalid solicited MPA (no Type2 Routing Header)

[PURPOSE]

NEMO-MR-4-2-1-1-013 - Invalid solicited MPA (no Type2 Routing Header)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (MPD)

[REQUIREMENT OF TEST]

Function of Mobile Prefix Discovery: YES

NUT re-transmits MPS for valuable MPA: YES/NO

[TOPOLOGY]

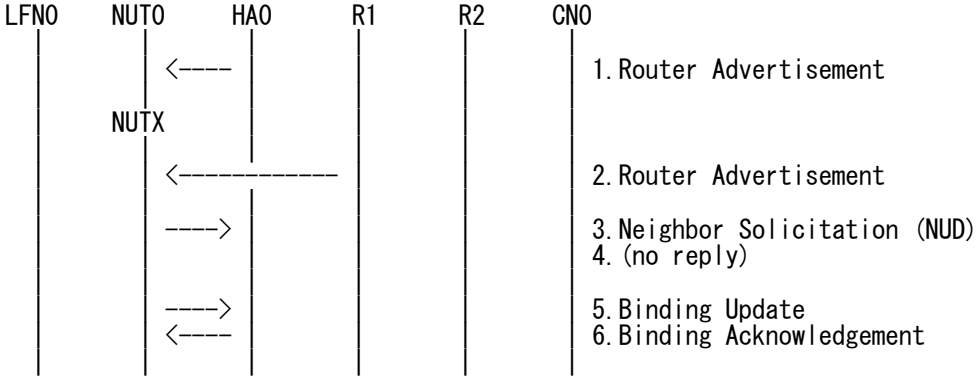
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

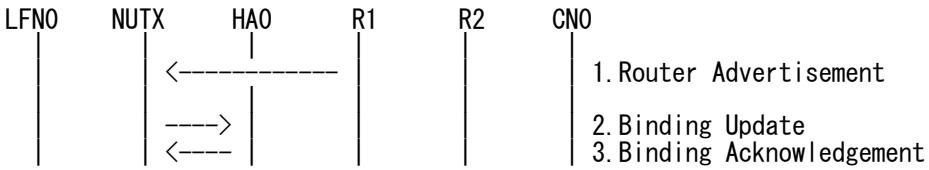
[INITIALIZATION]

- In the case of Real Home Link



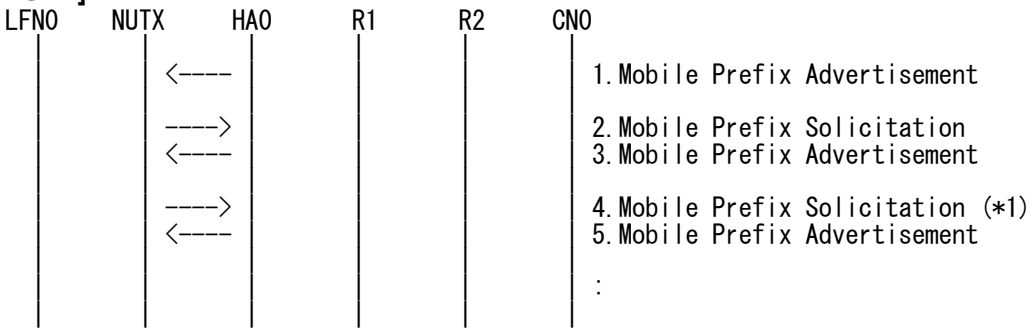
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[PROCEDURE]



1. Send unsolicited Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)
   # The Identifier field is set to the random value.
2. Receive Mobile Prefix Solicitation. (NUTX -> HA0) (Refer to 5.19.1)
3. Send Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)
   # without Type2 Routing Header.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address (Source Address of an invoking Mobile Prefix Solicitation)	NUTX (LinkX, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
Mobility Header	Type	147

4. Receive Mobile Prefix Solicitation. (NUTX -> HA0) (*1) (Refer to 5.19.1)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address of Mobile Node	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
Mobility Header	Type	146
	Code	0

5. Send Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)
   # without Type2 Routing Header.

[JUDGMENT]

The judgment changes by the following settings of "INITIALIZATION 1. Requirement of Test".

- NUT re-transmits MPS for valuable MPA: YES
  (*1) PASS: HA0 receives the retransmitted Mobile Prefix Solicitation.

- NUT re-transmits MPS for valuable MPA: NO
  (*1) PASS: HA0 does not receive the retransmitted Mobile Prefix Solicitation.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.4.3

6.9.2.6 NEMO-MR-4-2-1-1-014 - Invalid Identifier (MPS != MPA)

[PURPOSE]

NEMO-MR-4-2-1-1-014 - Invalid Identifier (MPS != MPA)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (MPD)

[REQUIREMENT OF TEST]

Function of Mobile Prefix Discovery: YES

NUT re-transmits MPS for valuable MPA: YES/NO

[TOPOLOGY]

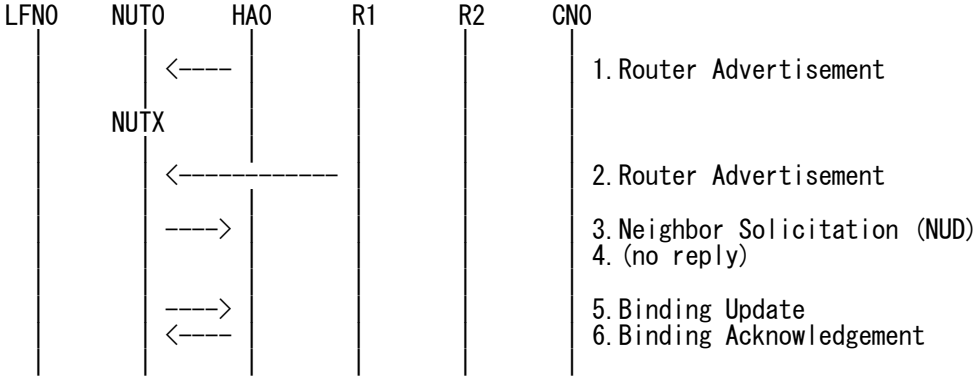
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

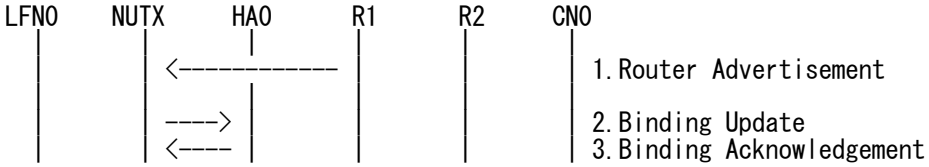
[INITIALIZATION]

- In the case of Real Home Link



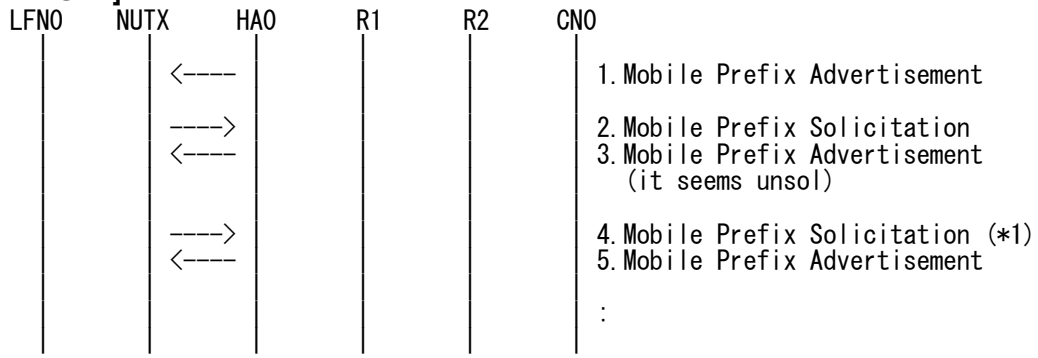
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[PROCEDURE]



1. Send unsolicited Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)
   # The Identifier field is set to the random value.
2. Receive Mobile Prefix Solicitation. (NUTX -> HA0) (Refer to 5.19.1)
3. Send Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)
   # The Identifier field does not match the Identifier field in the Mobile Prefix Solicitation[2].

IPv6 Header	Source Address (Home Agent Address)	HA0 (Link0, global)
	Destination Address (Source Address of an invoking Mobile Prefix Solicitation)	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
Mobility Header	Type	147
	Identifier	/=MPS[2]

4. Receive Mobile Prefix Solicitation. (NUTX -> HA0) (Refer to 5.19.1)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address of Mobile Node	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
Mobility Header	Type	146

5. Send Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)
   # The Identifier field does not match the Identifier field in the Mobile Prefix Solicitation[4].

[JUDGMENT]

(*1) PASS: HA0 receives the Mobile Prefix Solicitation for unsolicited Mobile Prefix Advertisement.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.4.3

6.9.2.7 NEMO-MR-4-2-1-1-019 - Unrecognized option (the option other than Prefix Information option)

[PURPOSE]

NEMO-MR-4-2-1-1-019 - Unrecognized option (the option other than Prefix Information option)

[CATEGORY]

ROUTER : ADVANCED FUNCTION (MPD)

[REQUIREMENT OF TEST]

Function of Mobile Prefix Discovery: YES

[TOPOLOGY]

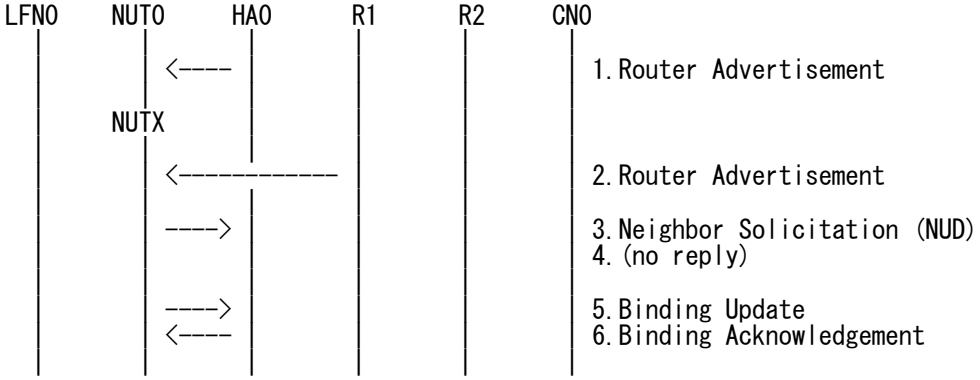
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

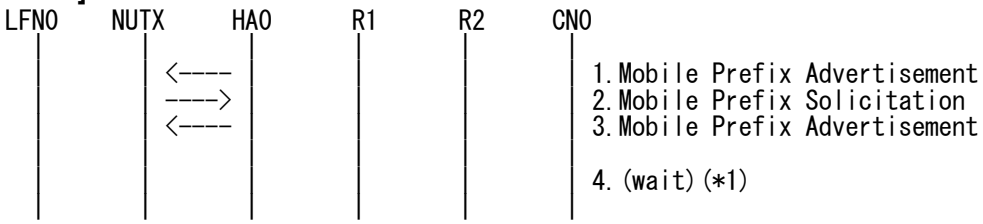


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[PROCEDURE]



1. Send unsolicited Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)
   # The Identifier field is set to the random value.
2. Receive Mobile Prefix Solicitation. (NUTX -> HA0) (Refer to 5.19.1)
3. Send Mobile Prefix Advertisement. (HA0 -> NUTX) (Refer to 5.20.1)
   # The option other than Prefix Information option is included.

IPv6 Header	Source Address (Home Agent Address)	HA0 (Link0, global)
	Destination Address (Source Address of an invoking Mobile Prefix Solicitation)	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
Mobility Header	Type	147
	Code	0
	Checksum	Any
	Identifier	Any
	M flag	0
	O flag	0
	Reserved	0
Other than Prefix Information Option	Any	Any

4. (wait) (*1)
   # Wait during enough retransmission timer.

[JUDGMENT]

(*1) PASS: HA0 does not receive the retransmitted Mobile Prefix Solicitation.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 6.8

6.10 Binding Error

6.10.1 Sending BE

6.10.1.1 NEMO-MR-6-2-1-1-003 - Receiving invalid BA (invalid MH Type) from HA

[PURPOSE]

NEMO-MR-6-2-1-1-003 - Receiving invalid BA (invalid MH Type) from HA

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

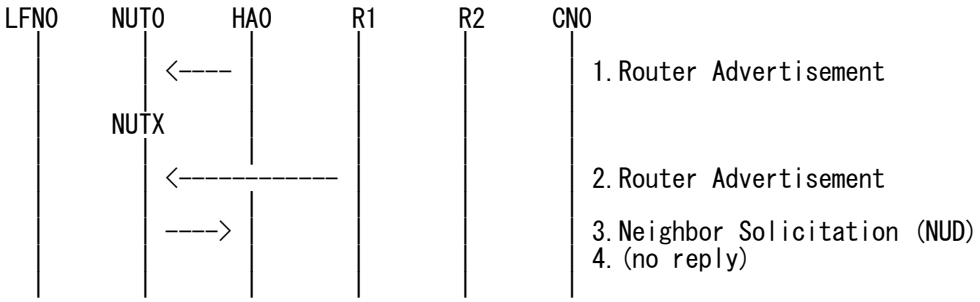
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

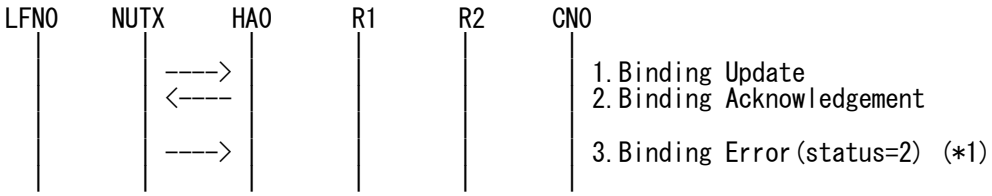


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
2. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The MH Type field in Mobility Header is set invalid value.
   # The Mobile Router Flag (R) is set to 1.
3. Receive Binding Error. (NUTX -> HA0) (*1) (Refer to 5.16.1)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Mobility Header	MH Type	7
	Status	2
	Home Address of Mobile Node#A	Unspecified

[JUDGMENT]

(*1) PASS: HA0 receives Binding Error.
Then, check whether this packet fills all of the following.
- The Status field is set to 2(unrecognized MH Type value).
- The Home Address field is set to the unspecified address.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.2, 9.2, 9.3.3

6.11 ICMP Error

6.11.1 Sending ICMP ERROR

6.11.1.1 NEMO-MR-6-2-1-1-004 - Receiving invalid BA (invalid checksum) from HA

[PURPOSE]

NEMO-MR-6-2-1-1-004 - Receiving invalid BA (invalid checksum) from HA

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NUT re-transmits BU to HA for valuable BA: YES/NO

[TOPOLOGY]

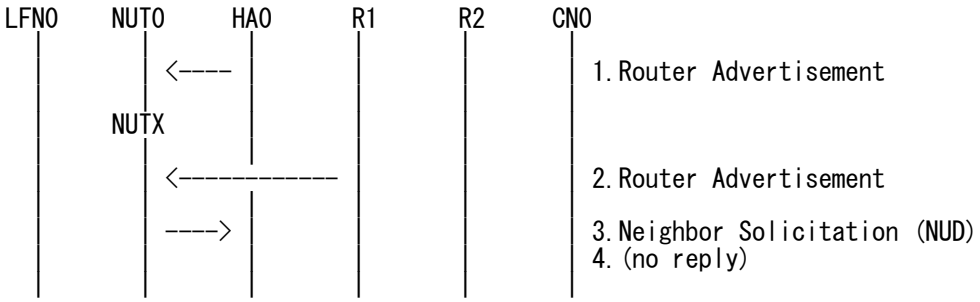
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

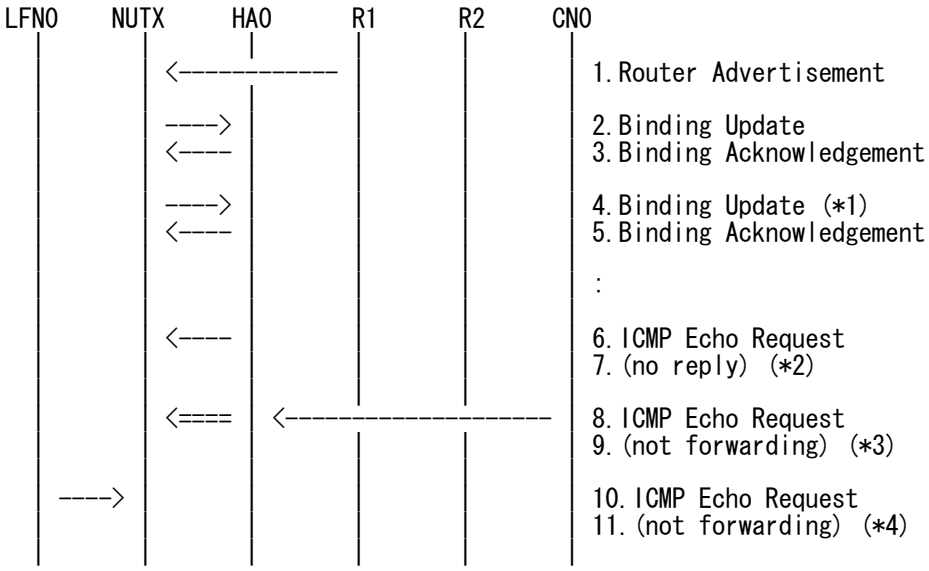


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Checksum field in Mobility Header has the invalid values.
   # The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	Checksum	Invalid value
	Status	0
	R Flag	1

4. Receive Binding Update. (NUTX -> HA0) (*1) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	R flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

5. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Checksum field in Mobility Header has the invalid values.
   # The Mobile Router Flag (R) is set to 1.
6. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header)
   (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

7. (no reply) (*2)
8. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> LFN0) (Refer to 5.7.2)

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

9. (not forwarding) (*3)
10. Send ICMP Echo Request. (LFN0 -> CN0) (Refer to 5.7.1)

IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128

11. (not forwarding) (*4)

[JUDGMENT]

The judgment changes by the following settings of "REQUIREMENT of TEST".

- NUT re-transmits BU to HA for valuable BA: YES
  (*1) PASS: HA0 receives the retransmitted Binding Update.
  Then, check whether this packet fills all of the following.
  - The Mobile Router Flag (R) is set to 1.
  (*2) PASS: HA0 does not receive ICMP Echo reply.
  (*3) PASS: LFN0 does not receive ICMP Echo Request.
  (*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

- NUT re-transmits BU to HA for valuable BA: NO
  (*1) PASS: HA0 does not receive the retransmitted Binding Update.
  (*2) PASS: HA0 does not receive ICMP Echo reply.
  (*3) PASS: LFN0 does not receive ICMP Echo Request.
  (*4) PASS: HA0 does not receive ICMP Echo Request by reversed tunnel.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.2, 9.2

6.12 Payload Packet

6.12.1 Sending Payload Packet

6.12.1.1 NEMO-MR-4-1-1-2-001 - Sending the packets via HA

[PURPOSE]

NEMO-MR-4-1-1-2-001 - Sending the packets via HA

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

Function of Return Routability: NO

[TOPOLOGY]

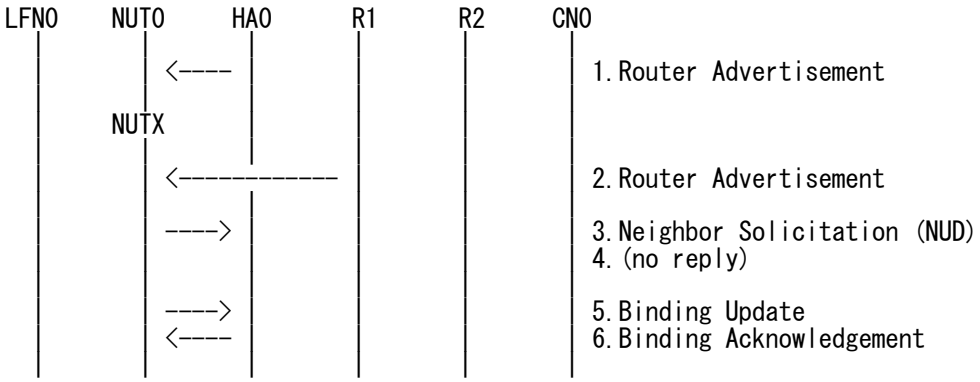
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

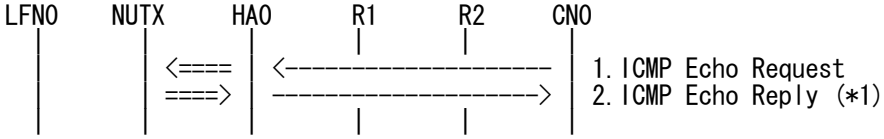


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.

[PROCEDURE]



1. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> NUT0)
   (Refer to 5.7.2)
2. Receive ICMP Echo Reply. (out: NUTX -> HA0, in: NUT0 -> CN0) (*1)
   (Refer to 5.8.2)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
IPv6 Header	Source Address	NUT0 (Link0, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129

[JUDGMENT]

(*1) PASS: CN0 receives ICMP Echo Reply by reverse tunneling.
Then, check whether this packet fills all of the following.
- The Destination Address(outer) is set to HA address.
- The Source Address(outer) is set to Care-of Address.
- The Destination Address(inner) is set to CN address.
- The Source Address(inner) is set to Home Address.
- Home Address destination option is not included.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.3.1, 9.3.1, 11.3.2, 11.3.3

RFC3776 Using IPsec to Protect Mobile IPv6 Signaling Between Mobile Nodes and Home Agents
See Section 4.1, 4.3, 4.4

6.12.1.2 NEMO-MR-4-1-1-2-004 - Sending the packets while it is at home-link

[PURPOSE]

NEMO-MR-4-1-1-2-004 - Sending the packets while it is at home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION (REAL HOME LINK)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

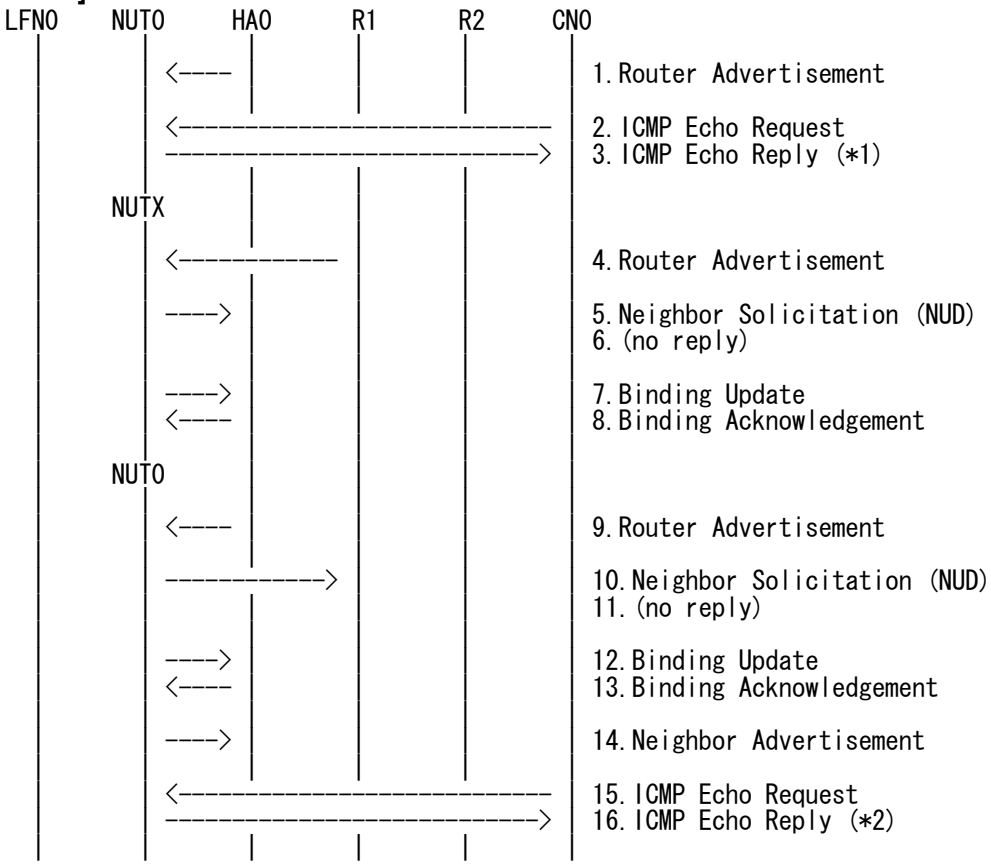
[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

NONE

[PROCEDURE]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)

2. Send ICMP Echo Request. (CN0 -> NUT0) (Refer to 5.7.1)
3. Receive ICMP Echo Reply. (NUT0 -> CN0) (*1) (Refer to 5.8.1)

IPv6 Header	Source Address	NUT0 (Link0, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129

4. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
5. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
6. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
7. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
8. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.
9. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
10. Receive Neighbor Solicitation (NUD). (NUTX -> R1) (Refer to 5.3.3)
11. (no reply)
    # Wait during a maximum of 3 seconds(RFC2461).
12. Receive Binding Update to HA0. (NUT0 -> HA0) (Refer to 5.14.1)
    # The Status field is set to 0 .
    # The Mobile Router Flag (R) is set to 1.
13. Send Binding Acknowledgement. (HA0 -> NUT0) (Refer to 5.15.1)
    # The Mobile Router Flag (R) is set to 1.
14. Receive Neighbor Advertisement. (NUT0 -> NUT0_allnode_multi)
    (Refer to 5.4.1)
15. Send ICMP Echo Request. (CN0 -> NUT0) (Refer to 5.7.1)
16. Receive ICMP Echo Reply. (NUT0 -> CN0) (*2) (Refer to 5.8.1)

IPv6 Header	Source Address	NUT0 (Link0, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129

[JUDGMENT]

(*1) PASS: CN0 receives ICMP Echo Reply.
Then, check whether this packet fills all of the following.
- The Source Address is set to Home Address.
- Home Address destination option is not included.

(*2) PASS: CN0 receives ICMP Echo Reply.
Then, check whether this packet fills all of the following.
- The Source Address is set to Home Address.
- Home Address destination option is not included.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.8

RFC3775 Mobility Support in IPv6
See Section 11.3.1, 11.5.4

6.12.2 Receiving Payload Packet

6.12.2.1 NEMO-MR-4-1-2-2-007 - Receiving the packets in home-link

[PURPOSE]

NEMO-MR-4-1-2-2-007 - Receiving the packets in home-link

[CATEGORY]

ROUTER : ADVANCED FUNCTION (REAL HOME LINK)

[REQUIREMENT OF TEST]

Function of Real Home Link: YES

[TOPOLOGY]

Refer to 2.1.1.1 Common Topology-1

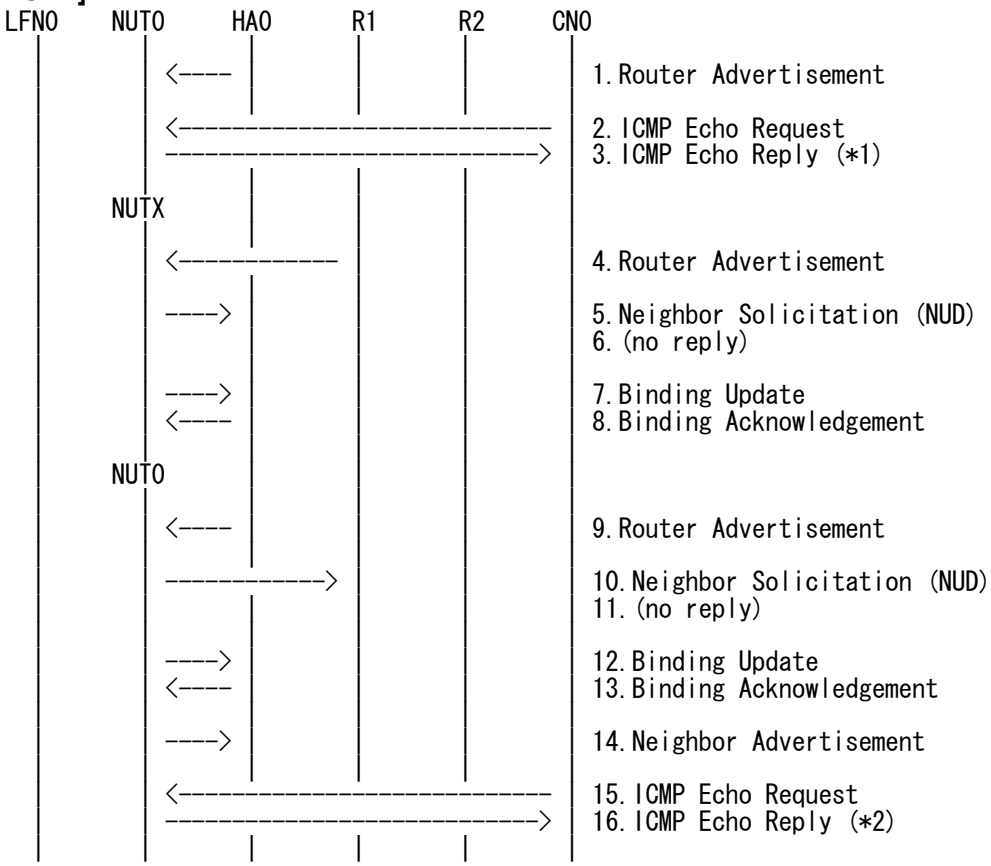
[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

NONE

[PROCEDURE]



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi)　(Refer to 5.2.2)
2. Send ICMP Echo Request. (CN0 -> NUT0) (Refer to 5.7.1)
3. Receive ICMP Echo Reply. (NUT0 -> CN0) (*1) (Refer to 5.8.1)

IPv6 Header	Source Address	NUT0 (Link0, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129
	Code	0
	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

4. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
5. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
6. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
7. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
8. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
9. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
10. Receive Neighbor Solicitation (NUD). (NUTX -> R1) (Refer to 5.3.3)
11. (no reply)
    # Wait during a maximum of 3 seconds(RFC2461).
12. Receive Binding Update to HA0. (NUT0 -> HA0) (Refer to 5.14.1)
13. Send Binding Acknowledgement. (HA0 -> NUT0) (Refer to 5.15.1)
14. Receive Neighbor Advertisement. (NUT0 -> NUT0_allnode_multi)
    (Refer to 5.4.1)
15. Send ICMP Echo Request. (CN0 -> NUT0) (Refer to 5.7.1)
16. Receive ICMP Echo Reply. (NUT0 -> CN0) (*2) (Refer to 5.8.1)

IPv6 Header	Source Address	NUT0 (Link0, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129
	Code	0
	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

[JUDGMENT]

(*1) PASS: CN0 receives ICMP Echo Reply.
Then, check whether this packet fills all of the following.
- The Source Address is set to Home Address.
- Home Address destination option is not included.

(*2) PASS: CN0 receives ICMP Echo Reply.
Then, check whether this packet fills all of the following.
- The Source Address is set to Home Address.
- Home Address destination option is not included.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5.8

RFC3775 Mobility Support in IPv6
See Section 11.3.1, 11.5.4

6.12.2.2 NEMO-MR-4-1-2-2-006 - Receiving the packets link-local(nutx) in foreign-link

[PURPOSE]

NEMO-MR-4-1-2-2-006 - Receiving the packets link-local(nutx) in foreign-link

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

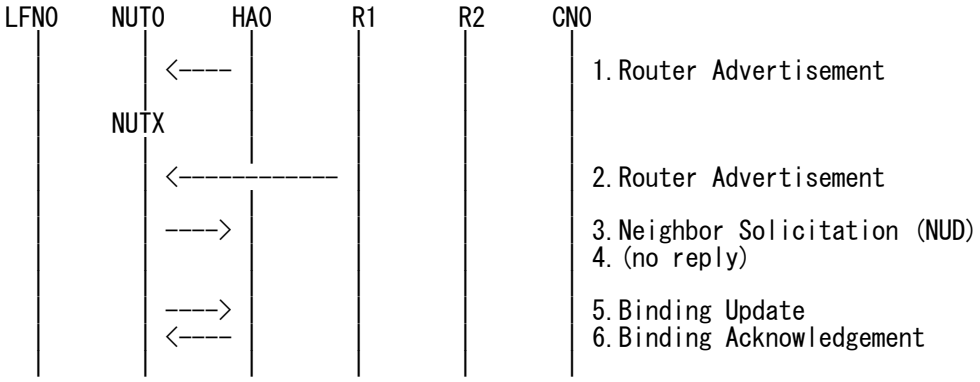
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

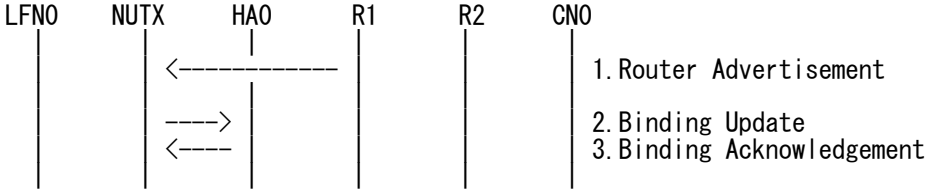
[INITIALIZATION]

- In the case of Real Home Link



1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

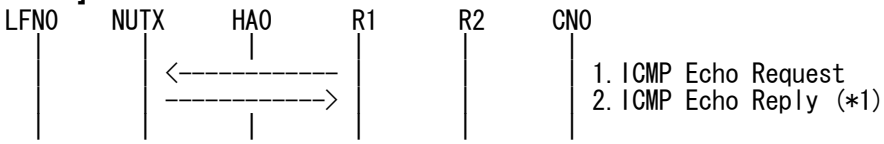
- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)

3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)

[PROCEDURE]



1. Send ICMP Echo Request. (R1 -> NUTX) (Refer to 5.7.1)
   # The Destination Address is set to link-local address(Care-of Address).

IPv6 Header	Source Address	R1 (LinkX, Link-local)
	Destination Address	NUTX (LinkX, Link-local)
ICMPv6 Header	Type	128

2. Receive ICMP Echo Reply. (NUTX -> R1) (*1) (Refer to 5.8.1)

IPv6 Header	Source Address	NUTX (LinkX, Link-local)
	Destination Address	R1 (LinkX, Link-local)
ICMPv6 Header	Type	129

[JUDGMENT]

(*1) PASS: R1 receives ICMP Echo Reply.
Then, check whether this packet fills all of the following.
- The Source Address is link-local address in foreign-link.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol
See Section 5

RFC3775 Mobility Support in IPv6
See Section 11.3.1

6.12.3 Fowarding Payload Packet(Visited Network to Mobile Network)

6.12.3.1 NEMO-MR-2-1-1-4-002 - Forwarding BA(IPsec-transport packet) HA-VMN to VMN

[PURPOSE]

NEMO-MR-2-1-1-4-002 - Forwarding BA(IPsec-transport packet) HA-VMN to VMN

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

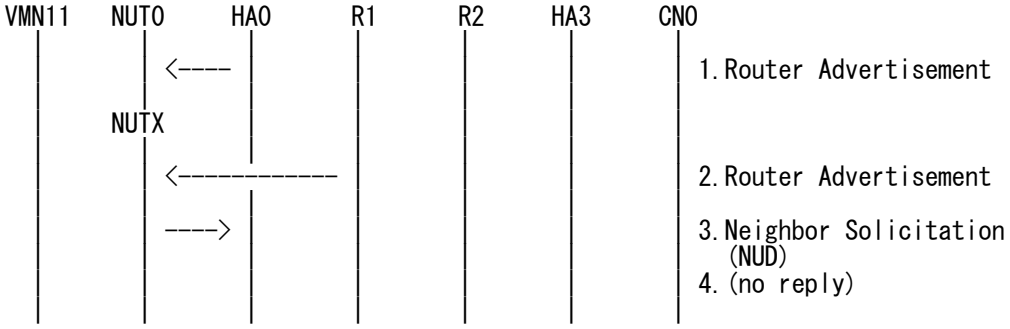
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

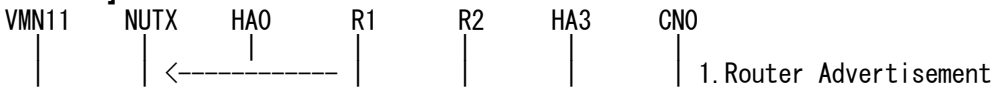


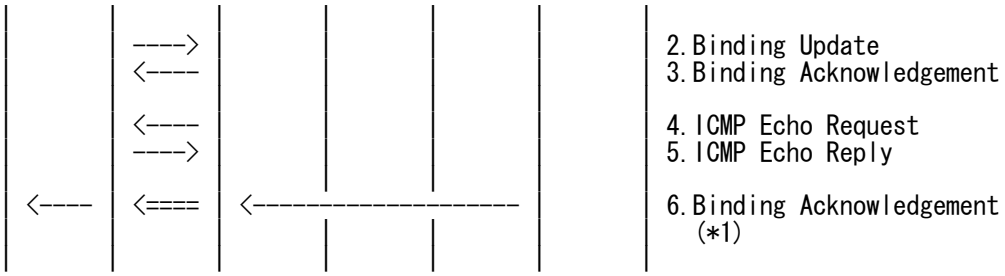
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0(Binding Update accepted).
   # The Mobile Router Flag (R) is set to 1.
4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced function “fine-grain”

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced function “fine-grain”

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. Send Binding Acknowledgement. (out:HA0 -> NUTX, in: HA3 -> VMN11) (Refer to 5.15.6)

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
IPv6 Header	Source Address	HA3 (LinkZ, global)
	Destination Address	VMN11 (Link1, global)
Type2 Routing Header	Home Address	VMN1 (Link Z, global)
Mobility Header	MH Type	6
	R Flag	0
Binding Authorization Data Option	Option Type	5
	Option Length	12
	Authenticator	Any

Receive Binding Acknowledgement. (HA3 -> VMN11) (*1) (Refer to 5.15.6)

IPv6 Header	Source Address	HA3 (LinkZ, global)
	Destination Address	VMN11 (Link1, global)
Type2 Routing Header	Home Address	VMN1 (Link Z, global)
Mobility Header	MH Type	6
	R Flag	0
Binding Authorization Data Option	Option Type	5
	Option Length	12

	Authenticator	Any

[JUDGMENT]

(*1) PASS: VMN11 receives Binding Acknowledgement.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5, 5.5

6.12.3.2 NEMO-MR-2-1-1-4-005 - Forwarding HoT(IPsec-tunnel packet) HA-VMN to VMN

[PURPOSE]

NEMO-MR-2-1-1-4-005 - Forwarding HoT(IPsec-tunnel packet) HA-VMN to VMN

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

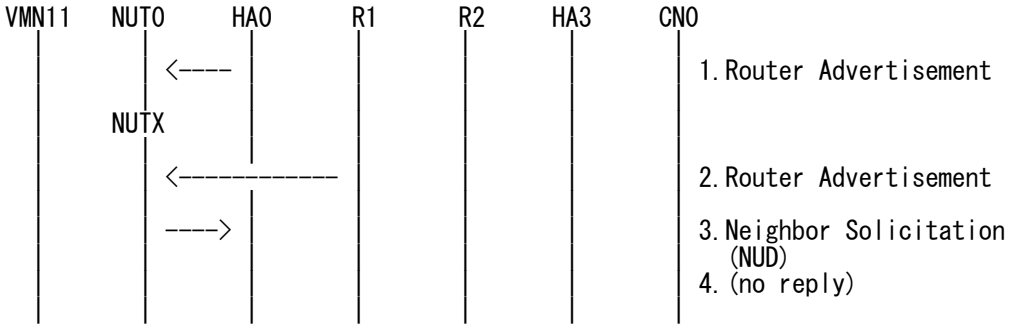
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

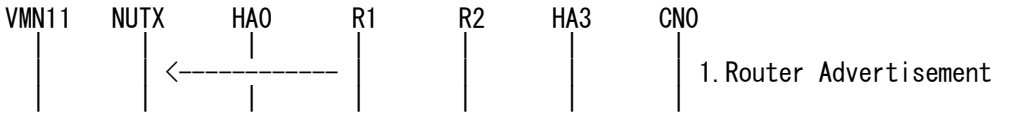
[INITIALIZATION]

- In the case of Real Home Link



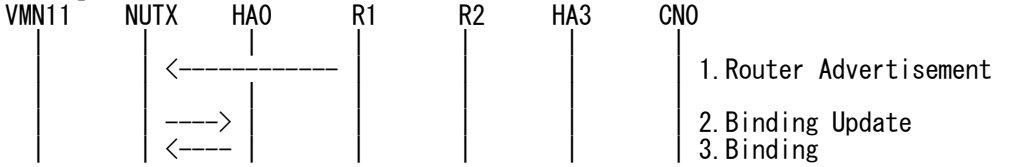
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

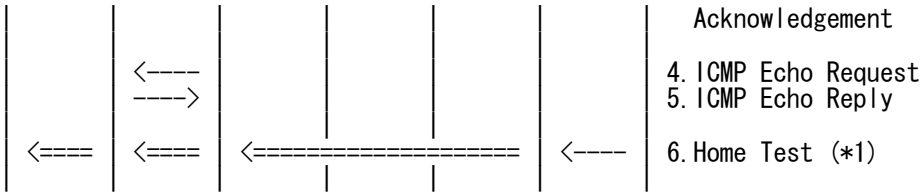
- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0(Binding Update accepted).
   # The Mobile Router Flag (R) is set to 1.
4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. Send Home Test. (out:HA0 -> NUTX, in:(out:HA3 -> VMN11, in:CN0 -> VMN1)) (Refer to 5.12.3)

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
IPv6 Header	Source Address	HA3 (LinkZ, global)
	Destination Address	VMN11 (Link1, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	VMN1 (LinkZ, global)
Mobility Header	Payload Prot	59
	Header Len	2
	MH Type	3
	Reserved	0
	Checksum	Any
	Home Nonce Index	Any
	Home Init Cookie	0
	Home Keygen Token	Any

Receive Home Test. (out:HA3 -> VMN11, in:CN0 -> VMN1) (*1) (Refer to 5.12.4)

IPv6 Header	Source Address	HA3 (LinkZ, global)
	Destination Address	VMN11 (Link1, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	VMN1 (LinkZ, global)
Mobility Header	Payload Prot	59
	Header Len	2

	MH Type	3
	Reserved	0
	Checksum	Any
	Home Nonce Index	Any
	Home Init Cookie	0
	Home Keygen Token	Any

[JUDGMENT]

(*1) PASS: VMN11 receives Home Test.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5.3, 5.5

6.12.3.3 NEMO-MR-2-1-1-4-012 - Sending ICMP ECHO Request CN to HoA of MR

[PURPOSE]

NEMO-MR-2-1-1-4-012 - Sending ICMP ECHO Request CN to HoA of MR

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

Function of Return Routability: NO

[TOPOLOGY]

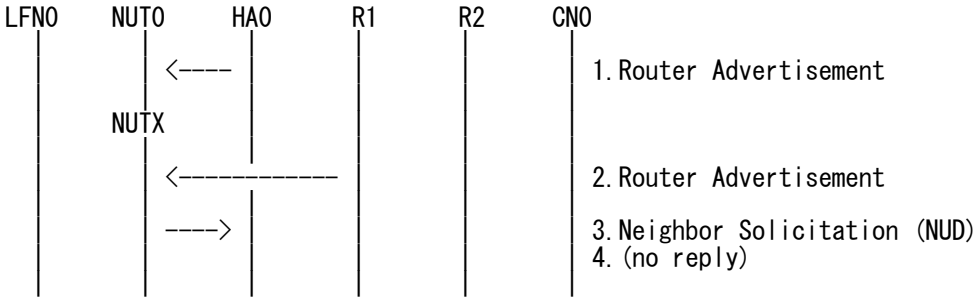
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

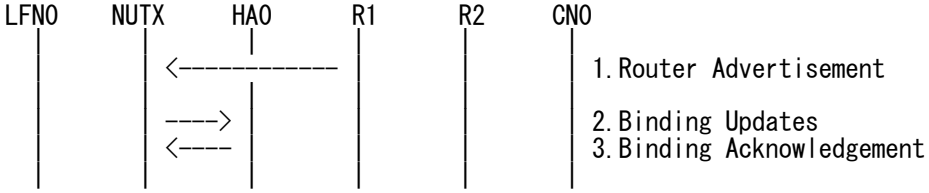


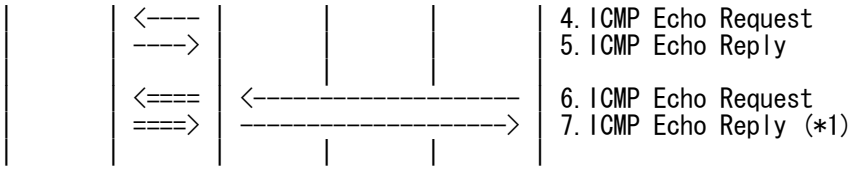
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]





1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0(Binding Update accepted).
   # The Mobile Router (R) bit is set to ON.
4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (Refer to 5.8.2)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> home address of nutx) (Refer to 5.7.4)
   Receive ICMP Echo Request. (CN0 -> home address of nutx) (Refer to 5.7.2)

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128
	Code	0
	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

7. Send ICMP Echo Reply. (home address of nutx -> CN0) (Refer to 5.8.)
   Receive ICMP Echo Reply. (out: NUTX -> HA0, in: home address of nutx -> CN0) (*1) (Refer to 5.8.2)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
IPv6 Header	Source Address	NUT0 (Link0, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129
	Code	0

	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

[JUDGMENT]

(*1) PASS: CN0 receives ICMP Echo Reply.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5.5

6.12.3.4 NEMO-MR-2-1-1-4-013 - Don't fowarding ICMP ECHO Request HA-MR to LFN(when Mobile Network Prefix registration failer)

[PURPOSE]

NEMO-MR-2-1-1-4-013 - Don't fowarding ICMP ECHO Request HA-MR to LFN(when Mobile Network Prefix registration failer)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

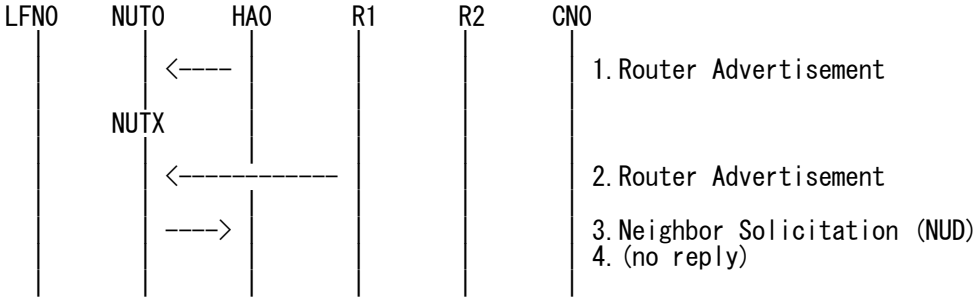
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

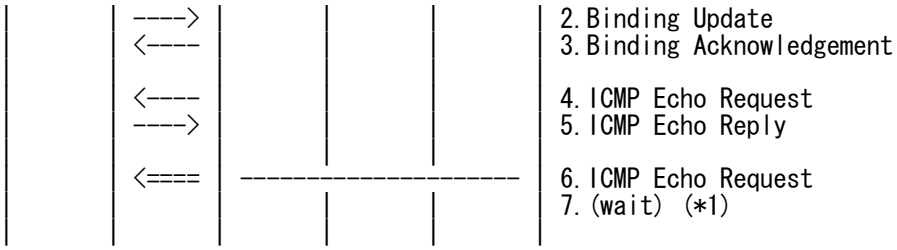


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0(Binding Update accepted).
   # The Mobile Router (R) bit is set to OFF.
4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (Refer to 5.8.2)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. Send ICMP Echo Request. (CN0 -> LFN0) (Refer to 5.7.2)

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128
	Code	0
	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

7. (wait) (*1)

[JUDGMENT]

(*1) PASS: LFN0 does not receive ICMP Echo Request.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5.3

6.12.4 Fowarding Payload Packet(Mobile Network to Visited Network)

6.12.4.1 NEMO-MR-2-2-1-4-006 - Forwarding HoTI(IPsec-tunnel) VMN to HA-VMN by reversed tunnel

[PURPOSE]

NEMO-MR-2-2-1-4-006 - Forwarding HoTI(IPsec-tunnel) VMN to HA-VMN by reversed tunnel

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

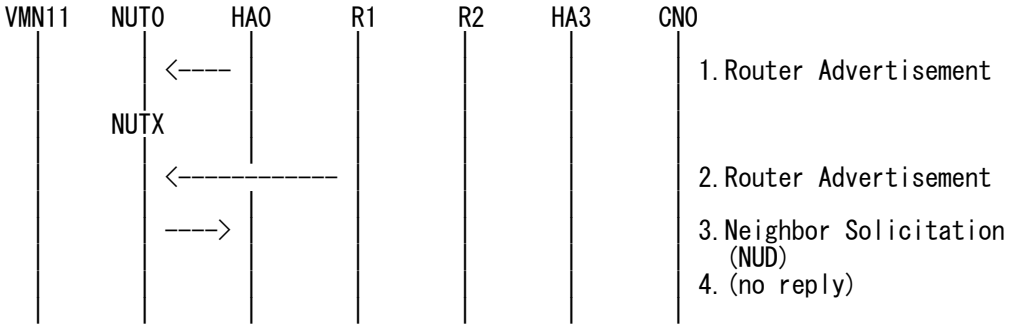
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

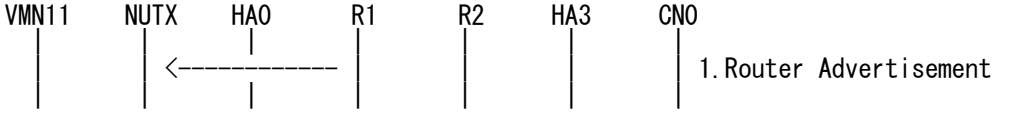
[INITIALIZATION]

- In the case of Real Home Link



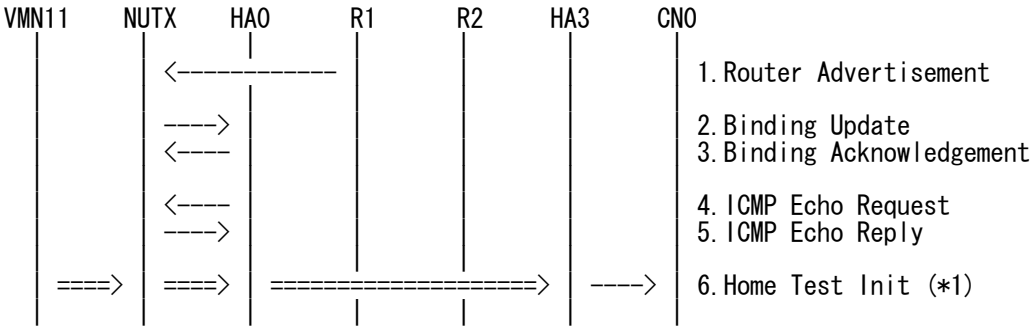
1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0(Binding Update accepted).
   # The Mobile Router Flag (R) is set to 1.
4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. Send Home Test Init. (out: VMN11 -> HA3, in VMN1 -> CN0) (Refer to 5.10.3)
   Receive Home Test Init. (out: NUTX -> HA0, in:(out: VMN11 -> HA3, in VMN1 -> CN0)) (*1) (Refer to 5.10.4)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
IPv6 Header	Source Address	VMN11 (Link1, global)
	Destination Address	HA3 (LinkZ, global)
IPv6 Header	Source Address	VMN1 (LinkZ, global)
	Destination Address	CN0 (LinkZ, global)
Mobility Header	MH Type	1

[JUDGMENT]

(*1) PASS: HA0 receives Home Test Init.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5, 5.3, 5.5, 9

6.12.4.2 NEMO-MR-2-2-1-4-013 - Don't forwarding ICMP ECHO Request LFN to CN(when src address != Mobile Network Prefix)

[PURPOSE]

NEMO-MR-2-2-1-4-013 - Don't forwarding ICMP ECHO Request LFN to CN(when src address != Mobile Network Prefix)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

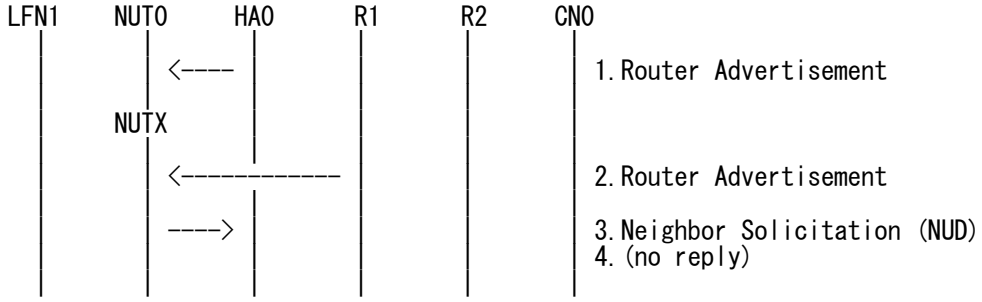
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

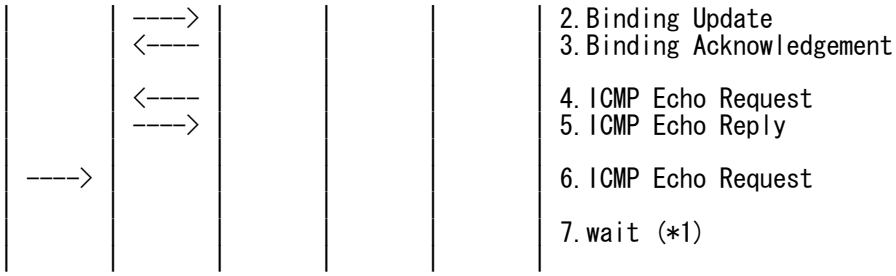


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0(Binding Update accepted).
   # The Mobile Router Flag (R) is set to 1.
4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header)
   (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option)
   (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. Send ICMP Echo Request. (LFN -> CN0) (Refer to 5.7.1)
   # Source Address does not belong to the range of Mobile Network Prefix.

IPv6 Header	Source Address	LFN (does not belong to the range of Mobile Network Prefix, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128
	Code	0
	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

7. (wait) (*1)
   # Wait during 30 seconds.

[JUDGMENT]

(*1) PASS: HA0 does not receive ICMP ECHO Request.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5, 9

6.12.4.3 NEMO-MR-2-2-1-4-014 - Don't forwarding ICMP ECHO Request LFN to CN(when src address = Ingress interface address of MR)

[PURPOSE]

NEMO-MR-2-2-1-4-014 - Don't forwarding ICMP ECHO Request LFN to CN(when src address = Ingress interface address of MR)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

NONE

[TOPOLOGY]

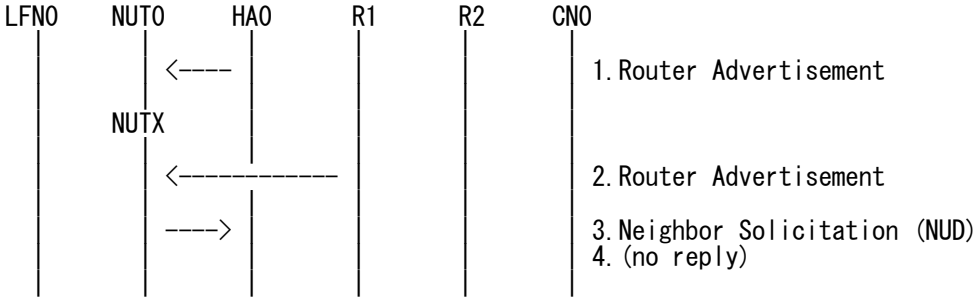
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

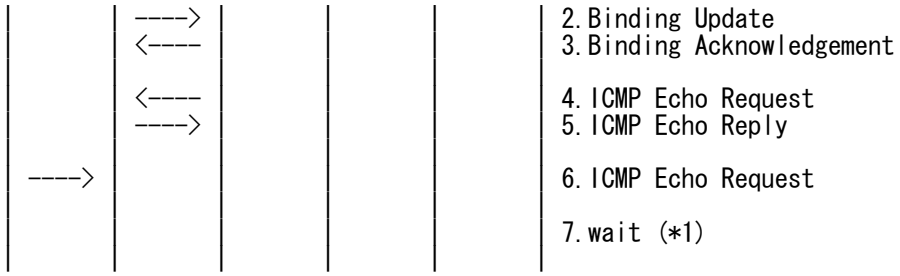


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router (R) flag is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0(Binding Update accepted).
   # The Mobile Router (R) flag is set to 1.
4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. Send ICMP Echo Request. (LFN -> CN0) (Refer to 5.7.1)
   # Source Address and Ingress interface address of Mobile Router is set to the same.

IPv6 Header	Source Address	LFN(NUT1) (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128
	Code	0
	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

7. (wait) (*1)
   # Wait during 30 seconds.

[JUDGMENT]

(*1) PASS: HA0 does not receive ICMP ECHO Request.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5, 9

6.12.4.4 NEMO-MR-2-2-1-4-015 - Don't forwarding ICMP ECHO Request LFN to CN(when IP-in-IP tunnel packet outer-src address != Mobile Network Prefix)

[PURPOSE]

NEMO-MR-2-2-1-4-015 - Don't forwarding ICMP ECHO Request LFN to CN(when IP-in-IP tunnel packet outer-src address != Mobile Network Prefix)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

Used IP-in-IP tunnel between LFN to MR: YES

[TOPOLOGY]

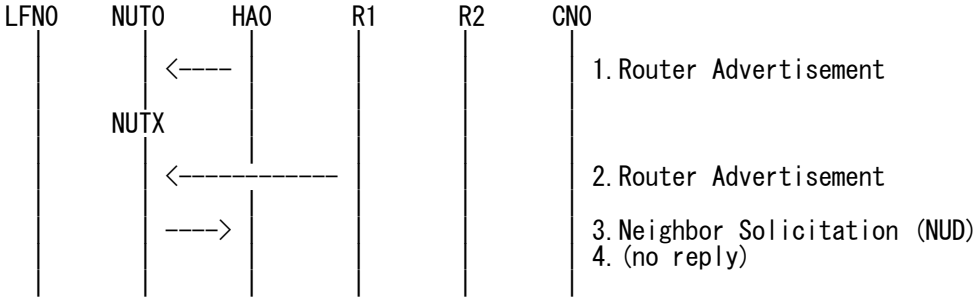
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

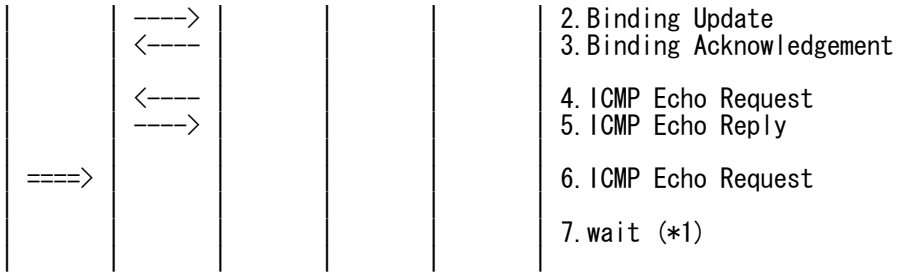


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation. (NUD) (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router (R) flag is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0(Binding Update accepted).
   # The Mobile Router (R) flag is set to 1.
4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)
   - Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

   - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (Refer to 5.8.3)
   - Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

   - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. Send ICMP Echo Request. (out:LFN -> NUT1, in:LFN0 -> CN0) (Refer to 5.7.2)
   # Outer Source Address dose not belong to the range of Mobile Network Prefix.

IPv6 Header	Source Address	LFN (does not belong to the range of Mobile Network Prefix, global)
	Destination Address	NUT1 (Link1, global)
IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128
	Code	0
	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

7. (wait) (*1)
   # Wait during 30 seconds.

[JUDGMENT]

(*1) PASS: HA0 does not receive ICMP ECHO Request.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5, 9

6.12.4.5 NEMO-MR-2-2-1-4-016 - Don't forwarding ICMP ECHO Request LFN to CN(when IP-in-IP tunnel packet outer-src address = ingress interface address of MR)

[PURPOSE]

NEMO-MR-2-2-1-4-016 - Don't forwarding ICMP ECHO Request LFN to CN(when IP-in-IP tunnel packet outer-src address = ingress interface address of MR)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

Used IP-in-IP tunnel between LFN to MR: YES

[TOPOLOGY]

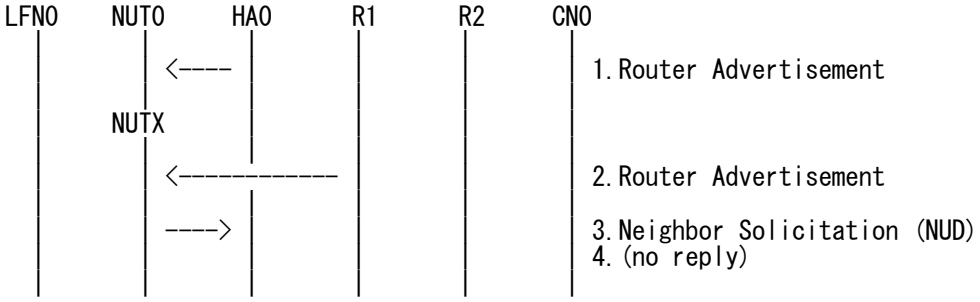
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

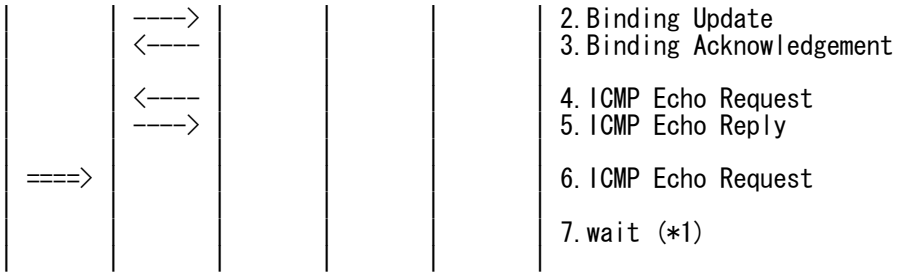


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router (R) flag is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0(Binding Update accepted).
   # The Mobile Router (R) flag is set to 1.
4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. Send ICMP Echo Request. (out:LFN -> NUT1, in:LFN0 -> CN0) (Refer to 5.7.2)
   # Outer Source Address and Ingress interface address of Mobile Router is set to the same.

IPv6 Header	Source Address	LFN(NUT1) (Link1, global)
	Destination Address	NUT1 (Link1, global)
IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128
	Code	0
	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

7. (wait) (*1)
   # Wait during 30 seconds.

[JUDGMENT]

(*1) PASS: HA0 does not receive ICMP ECHO Request.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5, 9

6.12.4.6 NEMO-MR-2-2-1-4-017 - Don't forwarding ICMP ECHO Request LFN to CN(when IP-in-IP tunnel packet inner-src address != Mobile Network Prefix)

[PURPOSE]

NEMO-MR-2-2-1-4-017 - Don't forwarding ICMP ECHO Request LFN to CN(when IP-in-IP tunnel packet inner-src address != Mobile Network Prefix)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

Used IP-in-IP tunnel between LFN to MR: YES

[TOPOLOGY]

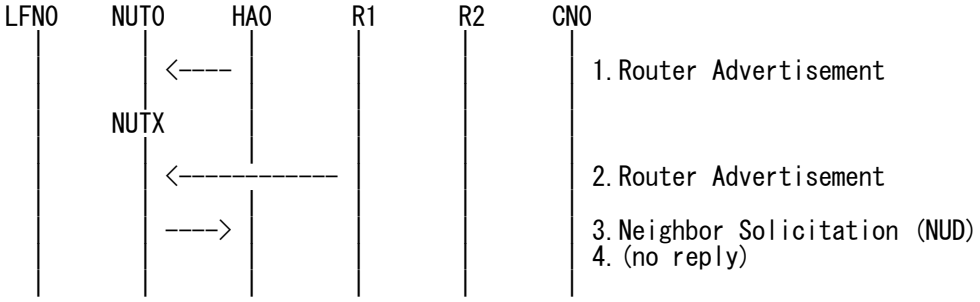
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

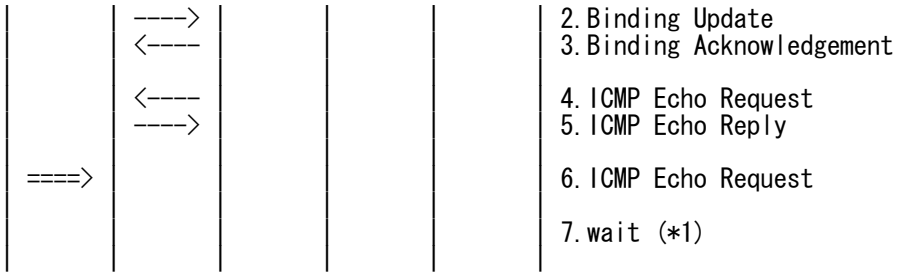


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router (R) flag is set to 1.
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0(Binding Update accepted).
   # The Mobile Router (R) flag is set to 1.
4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. Send ICMP Echo Request. (out:LFN0 -> NUT1, in:LFN -> CN0) (Refer to 5.7.2)
   # Inner Source Address dose not belong to the range of Mobile Network Prefix.

IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	NUT1 (Link1, global)
IPv6 Header	Source Address	LFN (dose not belong to the range of Mobile NetworkPrefix, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128
	Code	0
	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

7. (wait) (*1)
   # Wait during 30 seconds.

[JUDGMENT]

(*1) PASS: HA0 does not receive ICMP ECHO Request.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5, 9

6.12.4.7 NEMO-MR-2-2-1-4-018 - Don't forwarding ICMP ECHO Request LFN to CN(when IP-in-IP tunnel packet inner-src address = ingress interface address of MR)

[PURPOSE]

NEMO-MR-2-2-1-4-018 - Don't forwarding ICMP ECHO Request LFN to CN(when IP-in-IP tunnel packet inner-src address = ingress interface address of MR)

[CATEGORY]

ROUTER : BASIC FUNCTION

[REQUIREMENT OF TEST]

Used IP-in-IP tunnel between LFN to MR: YES

[TOPOLOGY]

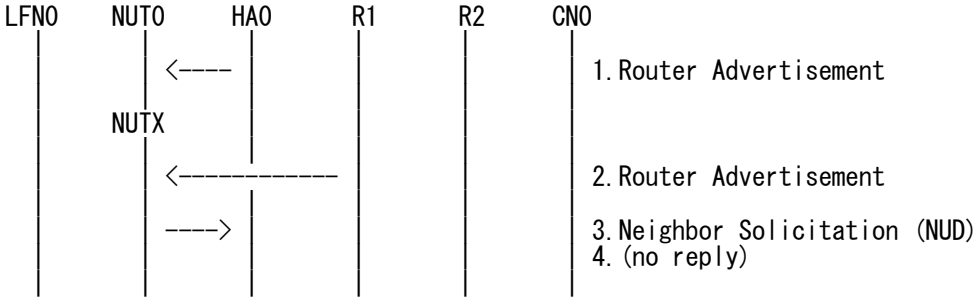
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]

Refer to 3.1 Common Setup-1

[INITIALIZATION]

- In the case of Real Home Link

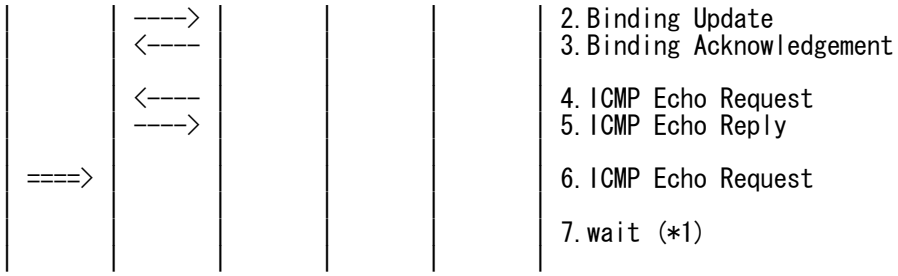


1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)

- In the case of Virtual Home Link

1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)

[PROCEDURE]



1. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
2. Receive Binding Update. (NUTX -> HA0) (Refer to 5.14.1)
3. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Status field is set to 0(Binding Update accepted).
   # The Mobile Router (R) bit is set to ON.
4. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)
   - Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

   - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

5. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (Refer to 5.8.3)
   - Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

   - Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

6. Send ICMP Echo Request. (out:LFN0 -> NUT1, in:LFN -> CN0) (Refer to 5.7.2)
   # Inner Source Address and Ingress interface address of Mobile Router is set to the same.

IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	NUT1 (Link1, global)
IPv6 Header	Source Address	LFN(NUT1) (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	128
	Code	0
	Identifier	Any
	Sequence Number	Any
	Payload Data	Any

7. (wait) (*1)
   # Wait during 30 seconds.

[JUDGMENT]

(*1) PASS: HA0 does not receive ICMP ECHO Request.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 5, 9

6.13 IPsec SA

6.13.1 manual configuration

6.13.1.1 NEMO-MR-1-1-2-1-001 - Use the manual configuration of security association between MR and HA

[PURPOSE]
NEMO-MR-1-1-2-1-001 - Use the manual configuration of security association between MR and HA

[CATEGORY]
ROUTER : ADVANCED FUNCTION (REAL HOME LINK)

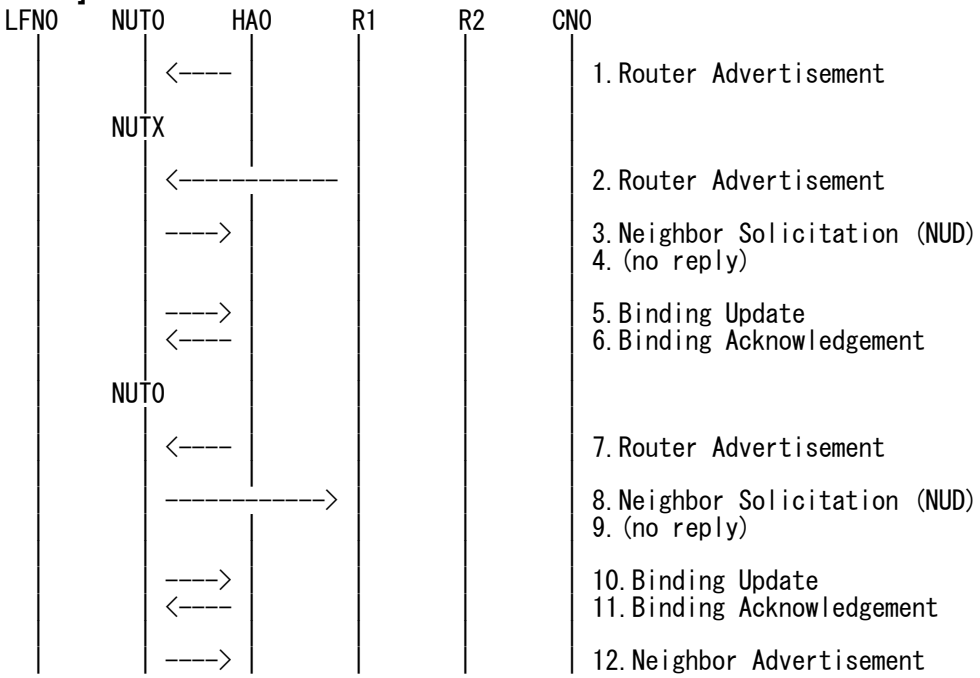
[REQUIREMENT OF TEST]
Function of Real Home Link: YES

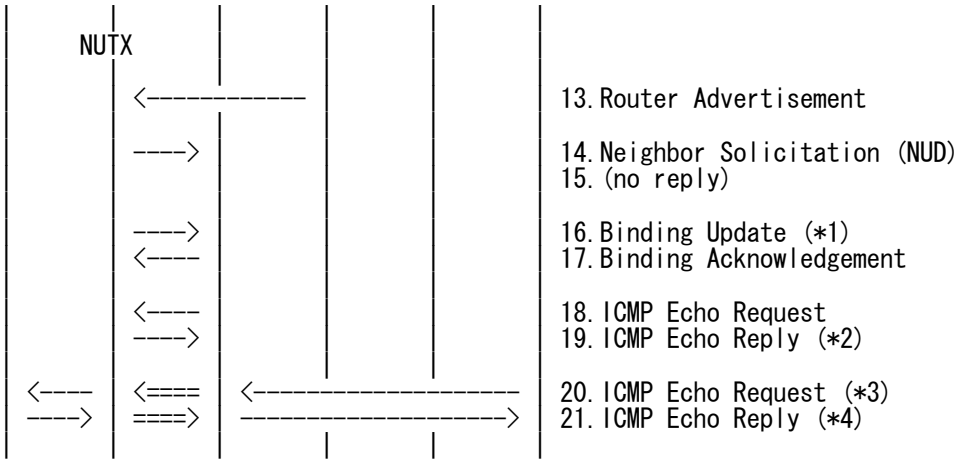
[TOPOLOGY]
Refer to 2.1.1.1 Common Topology-1

[TEST SETUP]
Refer to 3.1 Common Setup-1

[INITIALIZATION]
NONE

[PROCEDURE]





1. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
2. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
3. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
4. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
5. Receive Binding Update to HA0. (NUTX -> HA0) (Refer to 5.14.1)
   # The Mobile Router Flag (R) is set to 1.
6. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
   # The Mobile Router Flag (R) is set to 1.
7. Send Router Advertisement. (HA0 -> HA0_allnode_multi) (Refer to 5.2.2)
8. Receive Neighbor Solicitation (NUD). (NUTX -> R1) (Refer to 5.3.3)
9. (no reply)
   # Wait during a maximum of 3 seconds(RFC2461).
10. Receive Binding Update to HA0. (NUT0 -> HA0) (Refer to 5.14.2)
    # The Mobile Router Flag (R) is set to 1.
    # The Lifetime field is set to 0.
11. Send Binding Acknowledgement. (HA0 -> NUT0) (Refer to 5.15.1)
    # The Mobile Router Flag (R) is set to 1.
12. Receive Neighbor Advertisement. (NUT0 -> NUT0_allnode_multi)
    (Refer to 5.4.1)
13. Send Router Advertisement. (R1 -> R1_allnode_multi) (Refer to 5.2.1)
14. Receive Neighbor Solicitation (NUD). (NUT0 -> HA0) (Refer to 5.3.3)
15. (no reply)
    # Wait during a maximum of 3 seconds(RFC2461).
16. Receive Binding Update to HA0. (NUTX -> HA0) (*1) (Refer to 5.14.1)
    # The Mobile Router Flag (R) is set to 1.

- Implicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	A Flag	1
	H Flag	1
	L Flag	Any
	K Flag	0
	R Flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)

- Explicit mode

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA1_SPI
Mobility Header	MH Type	5
	A Flag	1
	H Flag	1
	L Flag	Any
	K Flag	0
	R Flag	1
Alternate Care-of Address Option	Type	3
	Option Length	16
	Address	NUTX (LinkX, global)
Mobile Network Prefix Option	Prefix Length	64
	Prefix	MNP

17. Send Binding Acknowledgement. (HA0 -> NUTX) (Refer to 5.15.1)
The Mobile Router Flag (R) is set to 1.

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameter Index	SA2_SPI
Mobility Header	MH Type	6
	R Flag	1

18. Send ICMP Echo Request. (HA0 -> NUTX with Type2 Routing Header) (Refer to 5.7.3)

- Basic

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA6_SPI
ICMPv6 Header	Type	128

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	HA0 (Link0, global)
	Destination Address	NUTX (LinkX, global)
Type 2 Routing Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	128

19. Receive ICMP Echo Reply. (NUTX -> HA0 with Home Address Option) (*2) (Refer to 5.8.3)

- Basic

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
Encapsulating Security Payload	Security Parameters Index	SA5_SPI
ICMPv6 Header	Type	129

- Advanced Function "Fine-Grain Selectors"

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
Destination Option Header	Home Address	NUT0 (Link0, global)
ICMPv6 Header	Type	129

20. Send ICMP Echo Request. (out: HA0 -> NUTX, in: CN0 -> LFN0) (*3) (Refer to 5.7.2)
Receive ICMP Echo Request. (CN0 -> LFN0) (Refer to 5.)

IPv6 Header	Source Address	CN0 (LinkZ, global)
	Destination Address	LFN0 (Link1, global)
ICMPv6 Header	Type	128

21. Send ICMP Echo Reply. (LFN0 -> CN0) (Refer to 5.8.1)
Receive ICMP Echo Reply. (out: NUTX -> HA0, in: LFN0 -> CN0) (*4) (Refer to 5.8.2)

IPv6 Header	Source Address	NUTX (LinkX, global)
	Destination Address	HA0 (Link0, global)
IPv6 Header	Source Address	LFN0 (Link1, global)
	Destination Address	CN0 (LinkZ, global)
ICMPv6 Header	Type	129

[JUDGMENT]

(*1) PASS: HA0 receives Binding Update.

Then, check whether this packet fills all of the following.

- The ESP header is included.
- The Acknowledge(A) bit is set to ON.
- The Home Registration(H) bit is set to ON.
- The Link-Local Address Compatibility(L) bit is set up normally.
- NUT implement IKE: NO
  - The Key Management Mobility Capability (K) bit is set to OFF.
- The Mobile Router Flag (R) is set to 1.
- The Alternate Care-of Address mobility option is included.
  - The Care-of Address field is set to the Care-of Address.

(*2) PASS: HA0 receives ICMP Echo Reply with Home Address Option.

(*3) PASS: LFN0 receives ICMP Echo Request.

(*4) PASS: CN0 receives ICMP Echo Reply.

[REFERENCES]

RFC3963 NEMO Basic Support Protocol

See Section 9

RFC3775 Mobility Support in IPv6

See Section 11.7.1, 6.1.7

RFC3776 Using IPsec to Protect Mobile IPv6 Signaling Between Mobile Nodes and Home Agents

See Section 4.2

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