# Experimental
# Mobile IPv6

# Self Test Specification
# for Home Agent with IKEv1

## Technical Document
## Version 1.0.2

*IPv6 Forum* *http://www.ipv6forum.org*
*IPv6 Logo Committee* *http://www.ipv6ready.org*

# Modification Record

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Principle Authors:

- IPv6 Promotion Council, Certification Working Group

Commentators:

- IRISA-INRIA

# 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.

This document is an experimental enhancing part of “Mobile IPv6” test specification.
“Mobile IPv6 with IKEv1” is experimental and IPv6 Ready Logo doesn't include IKE right now. However, we have sorted out the documents about IKE and we want to publish them here.

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# 6. Test Specification: Home Agent operation

There are experimental enhancing parts.

## 6.3 Primary Care-of Address Registration

### 6.3.1 Valid Registration

#### 6.3.1.1 Real Home Link

##### 6.3.1.1.7 HA_2_1_10 - Receiving valid BU K=0

**[PURPOSE]**
HA_2_1_10 - Valid Registration (Receiving valid BU K=0)

**[CATEGORY]**
ROUTER : ADVANCED FUNCTION(IKE)

**[REQUIREMENT OF TEST]**
NONE

**[TOPORGY]**
Refer to 2.1 Common Topology-1

**[TEST SETUP]**
Refer to 3.1 Common Setup-1

**[INITIALIZATION]**
Refer to 4.1 Common Initialization-1

**[PROCEDURE]**

```
  RUT      MN0
   |        |
   |       MN0X
   |        |
   | <===> | IKE phase1                          (*1)
   | <===> | IKE phase2                          (*2)
   |        |
   | <---- | BU (sequence=15, A=1, K=0) w/ Ha0
   | ----> | BA (sequence=15, K=0)      w/ RH   (*3)
   |        |
   | <---- | Echo Request               w/ Ha0
   | ----> | Echo Reply                 w/ RH   (*4)
```

```
|       |
|      MN0Y
|       |
| <---- | BU (sequence=16, A=1, K=0) w/ HaO
| ----> | BA (sequence=16, K=0)      w/ RH  (*5)
|       |
| <---- | Echo Request               w/ HaO
| ----> | Echo Reply                 w/ RH  (*6)
|       |
| <===> | IKE phase1                        (*7)
| <===> | IKE phase2                        (*8)
|       |
| <---- | BU (sequence=17, A=1, K=0) w/ HaO
| ----> | BA (sequence=17, K=0)      w/ RH  (*9)
|       |
| <---- | Echo Request               w/ HaO
| ----> | Echo Reply                 w/ RH  (*10)
|       |
V       V
```

1. IKE phase-1 negotiation (*1)
2. IKE phase-2 negotiation (*2)
3. MN0X sends BU w/ HaO (Refer to 5.9.1)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | MN0X(global) |
| | Destination Address | | RUT (Link0,global) |
| Destination Option Header | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA1_SPI |
| Mobility Header | MH Type | | 5 |
| | Sequence Number | | 15 |
| | A Flag | | 1 |
| | H Flag | | 1 |
| | L Flag | | 0 |
| | K Flag | | 0 |
| | Lifetime | | 105 |
| Mobility options | PadN | Option Length | 0 |
| | Alternate CoA | address | MN0X(global) |

4. MN0X receives BA w/ RH (*3) (Refer to 5.10.1, 5.10.2)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN0X(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | 0 |
| | Sequence | | 15 |
| | Lifetime | | <=105 |
| Mobility options | Binding Refresh Advice | Interval | <=105 |

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN0X(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | 0 |

| | | | |
|---|---|---|---|
| | Sequence | | 15 |
| | Lifetime | | <=105 |
| Mobility options | PadN | length | 2 |

5. MN0X sends Echo Request w/ HaO (Refer to 5.5.2)

| | | |
|---|---|---|
| IPv6 Header | Source Address | MN0X(global) |
| | Destination Address | RUT(Link0,global) |
| Destination Option Header | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA5_SPI: SA1_SPI |
| ICMPv6 | Type | 128 |

6. MN0X receives Echo Reply w/ RH (*4) (Refer to 5.6.3)

| | | |
|---|---|---|
| IPv6 Header | Source Address | RUT(Link0,global) |
| | Destination Address | MN0X(global) |
| Type 2 Routing Header | Length | 2 |
| | Type | 2 |
| | Segments left | 1 |
| | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA6_SPI: SA2_SPI |
| ICMPv6 | Type | 129 |

7. MN0Y sends BU w/ HaO (Refer to 5.9.1)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | MN0Y(global) |
| | Destination Address | | RUT (Link0,global) |
| Destination Option Header | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA1_SPI |
| Mobility Header | MH Type | | 5 |
| | Sequence Number | | 16 |
| | A Flag | | 1 |
| | H Flag | | 1 |
| | L Flag | | 0 |
| | K Flag | | 0 |
| | Lifetime | | 105 |
| Mobility options | PadN | Option Length | 0 |
| | Alternate CoA | address | MN0Y(global) |

8. MN0Y receives BA w/ RH (*5) (Refer to 5.10.1, 5.10.2)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN0Y(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | 0 |
| | Sequence | | 16 |
| | Lifetime | | <=105 |
| Mobility options | Binding Refresh Advice | Interval | <=105 |

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN0Y(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | 0 |
| | Sequence | | 16 |
| | Lifetime | | <=105 |
| Mobility options | PadN | length | 2 |

9. MN0Y sends Echo Request w/ HaO (Refer to 5.5.2)

| | | |
|---|---|---|
| IPv6 Header | Source Address | MN0Y(global) |
| | Destination Address | RUT(Link0,global) |
| Destination Option Header | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA5_SPI: SA1_SPI |
| ICMPv6 | Type | 128 |

10. MN0Y receives Echo Reply w/ RH (*6) (Refer to 5.6.3)

| | | |
|---|---|---|
| IPv6 Header | Source Address | RUT(Link0,global) |
| | Destination Address | MN0Y(global) |
| Type 2 Routing Header | Length | 2 |
| | Type | 2 |
| | Segments left | 1 |
| | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA6_SPI: SA2_SPI |
| ICMPv6 | Type | 129 |

11. IKE phase-1 negotiation (*7)

12. IKE phase-2 negotiation (*8)

13. MN0Y sends BU w/ HaO (Refer to 5.9.1)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | MN0Y(global) |
| | Destination Address | | RUT (Link0,global) |
| Destination Option Header | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA1_SPI |
| Mobility Header | MH Type | | 5 |
| | Sequence Number | | 17 |
| | A Flag | | 1 |
| | H Flag | | 1 |
| | L Flag | | 0 |
| | K Flag | | 0 |
| | Lifetime | | 105 |
| Mobility options | PadN | Option Length | 0 |
| | Alternate CoA | address | MN0Y(global) |

14. MN0Y receives BA w/ RH (*9) (Refer to 5.10.1, 5.10.2)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN0Y(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | NH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | 0 |
| | Sequence | | 17 |
| | Lifetime | | <=105 |
| Mobility options | Binding Refresh Advice | Interval | <=105 |

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN0Y(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | 0 |
| | Sequence | | 17 |
| | Lifetime | | <=105 |
| Mobility options | PadN | length | 2 |

15. MN0Y sends Echo Request w/ HaO (Refer to 5.5.2)

| | | |
|---|---|---|
| IPv6 Header | Source Address | MN0Y(global) |
| | Destination Address | RUT(Link0,global) |
| Destination Option Header | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA5_SPI: SA1_SPI |
| ICMPv6 | Type | 128 |

16. MN0Y receives Echo Reply w/ RH (*10) (Refer to 5.6.3)

| | | |
|---|---|---|
| IPv6 Header | Source Address | RUT(Link0,global) |
| | Destination Address | MN0Y(global) |
| Type 2 Routing Header | Length | 2 |
| | Type | 2 |
| | Segments left | 1 |
| | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA6_SPI: SA2_SPI |

| | | |
|---|---|---|
| ICMPv6 | Type | 129 |

**[JUDGMENT]**

(*1) PASS: IKE phase-1 negotiation is complete
(*2) PASS: IKE phase-2 negotiation is complete
(*3) PASS: MN0X receives BA w/ RH
(*4) PASS: MN0X receives Echo Reply w/ RH
(*5) PASS: MN0Y receives BA w/ RH
(*6) PASS: MN0Y receives Echo Reply w/ RH
(*7) PASS: IKE phase-1 negotiation is complete
(*8) PASS: IKE phase-2 negotiation is complete
(*9) PASS: MN0Y receives BA w/ RH
(*10) PASS: MN0Y receives Echo Reply w/ RH

**[REFERENCES]**

RFC3775 Mobility Support in IPv6
See Section 10.3.1

#### 6.3.1.1.8 HA_2_1_11 - Receiving valid BU K=1

**[PURPOSE]**

HA_2_1_11 - Valid Registration (Receiving valid BU K=1)

**[CATEGORY]**

ROUTER : ADVANCED FUNCTION(IKE)

**[REQUIREMENT OF TEST]**

NONE

**[TOPORGY]**

Refer to 2.1 Common Topology-1

**[TEST SETUP]**

Refer to 3.1 Common Setup-1

**[INITIALIZATION]**

Refer to 4.1 Common Initialization-1

**[PROCEDURE]**

```
  RUT      MN0
   |        |
   |       MN0X
   |        |
   | <===>  | IKE phase1                        (*1)
   | <===>  | IKE phase2                        (*2)
   |        |
   | <----  | BU (sequence=15, A=1, K=1) w/ Ha0
   | ---->  | BA (sequence=15, K=any)    w/ RH  (*3)
   |        |
   | <----  | Echo Request               w/ Ha0
   | ---->  | Echo Reply                 w/ RH  (*4)
   |        |
   |       MN0Y
   |        |
   | <----  | BU (sequence=16, A=1, K=1) w/ Ha0
   | ---->  | BA (sequence=16, K=any)    w/ RH  (*5)
   |        |
   | <----  | Echo Request               w/ Ha0
   | ---->  | Echo Reply                 w/ RH  (*6)
   |        |
   | <===>  | IKE phase1 (if BA has K=0)        (*7)
   | <===>  | IKE phase2                        (*8)
   |        |
```

```
| <---- | BU (sequence=17, A=1, K=1) w/ HaO
| ----> | BA (sequence=17, K=any)    w/ RH  (*9)
|       |
| <---- | Echo Request               w/ HaO
| ----> | Echo Reply                 w/ RH  (*10)
|       |
V       V
```

1. IKE phase-1 negotiation (*1)
2. IKE phase-2 negotiation (*2)
3. MN0X sends BU w/ HaO (Refer to 5.9.1)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | MN0X(global) |
| | Destination Address | | RUT (Link0,global) |
| Destination Option Header | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA1_SPI |
| Mobility Header | MH Type | | 5 |
| | Sequence Number | | 15 |
| | A Flag | | 1 |
| | H Flag | | 1 |
| | L Flag | | 0 |
| | K Flag | | 1 |
| | Lifetime | | 105 |
| Mobility options | PadN | Option Length | 0 |
| | Alternate CoA | address | MN0X(global) |

4. MN0X receives BA w/ RH (*3) (Refer to 5.10.1, 5.10.3)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN0X(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | Any |
| | Sequence | | 15 |
| | Lifetime | | <=105 |
| Mobility options | Binding Refresh Advice | Interval | <=105 |

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN0X(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | Any |
| | Sequence | | 15 |
| | Lifetime | | <=105 |
| Mobility options | PadN | length | 2 |

5. MN0X sends Echo Request w/ HaO (Refer to 5.5.2)

| | | |
|---|---|---|
| IPv6 Header | Source Address | MN0X(global) |
| | Destination Address | RUT(Link0,global) |
| Destination Option Header | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA5_SPI: SA1_SPI |
| ICMPv6 | Type | 128 |

6. MN0X receives Echo Reply w/ RH (*4) (Refer to 5.6.3)

| | | |
|---|---|---|
| IPv6 Header | Source Address | RUT(Link0,global) |
| | Destination Address | MN0X(global) |
| Type 2 Routing Header | Length | 2 |
| | Type | 2 |
| | Segments left | 1 |
| | Home Address | MN0(global) |
| Encapsulating | Security Parameters Index | UNIQ_TRANS_SA? |

| | | | |
|---|---|---|---|
| Security Payload | | | SA6_SPI: SA2_SPI |
| ICMPv6 | Type | | 129 |

7. MN0Y sends BU w/ HaO (Refer to 5.9.1)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | MN0Y(global) |
| | Destination Address | | RUT (Link0,global) |
| Destination Option Header | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA1_SPI |
| Mobility Header | MH Type | | 5 |
| | Sequence Number | | 16 |
| | A Flag | | 1 |
| | H Flag | | 1 |
| | L Flag | | 0 |
| | K Flag | | 1 |
| | Lifetime | | 105 |
| Mobility options | PadN | Option Length | 0 |
| | Alternate CoA | address | MN0Y(global) |

8. MN0Y receives BA w/ RH (*5) (Refer to 5.10.1, 5.10.2)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN0Y(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | Any |
| | Sequence | | 16 |
| | Lifetime | | <=105 |
| Mobility options | Binding Refresh Advice | Interval | <=105 |

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN0Y(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | Any |
| | Sequence | | 16 |
| | Lifetime | | <=105 |
| Mobility options | PadN | length | 2 |

9. MN0Y sends Echo Request w/ HaO (Refer to 5.5.2)

| | | |
|---|---|---|
| IPv6 Header | Source Address | MN0Y(global) |
| | Destination Address | RUT(Link0,global) |
| Destination Option Header | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA5_SPI: SA1_SPI |
| ICMPv6 | Type | 128 |

10. MN0Y receives Echo Reply w/ RH (*6) (Refer to 5.6.3)

| | | |
|---|---|---|
| IPv6 Header | Source Address | RUT(Link0,global) |
| | Destination Address | MN0Y(global) |
| Type 2 Routing Header | Length | 2 |
| | Type | 2 |
| | Segments left | 1 |
| | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA6_SPI: SA2_SPI |
| ICMPv6 | Type | 129 |

11. IKE phase-1 negotiation, if BA has K=0 (*7)

12. IKE phase-2 negotiation (*8)

13. MN0Y sends BU w/ HaO (Refer to 5.9.1)

| | | |
|---|---|---|
| IPv6 Header | Source Address | MN0Y(global) |
| | Destination Address | RUT (Link0,global) |
| Destination Option Header | Home Address | MN0(global) |
| Encapsulating | Security Parameters Index | SA1_SPI |

| | | | |
|---|---|---|---|
| Security Payload | | | |
| Mobility Header | MH Type | | 5 |
| | Sequence Number | | 17 |
| | A Flag | | 1 |
| | H Flag | | 1 |
| | L Flag | | 0 |
| | K Flag | | 1 |
| | Lifetime | | 105 |
| Mobility options | PadN | Option Length | 0 |
| | Alternate CoA | address | MN0Y(global) |

14. MN0Y receives BA w/ RH (*9) (Refer to 5.10.1, 5.10.2)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN0Y(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | Any |
| | Sequence | | 17 |
| | Lifetime | | <=105 |
| Mobility options | Binding Refresh Advice | Interval | <=105 |

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN0Y(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | Status | | 0 or 1 |
| | K Flag | | Any |
| | Sequence | | 17 |
| | Lifetime | | <=105 |
| Mobility options | PadN | length | 2 |

15. MN0Y sends Echo Request w/ HaO (Refer to 5.5.2)

| | | |
|---|---|---|
| IPv6 Header | Source Address | MN0Y(global) |
| | Destination Address | RUT(Link0,global) |
| Destination Option Header | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA5_SPI: SA1_SPI |
| ICMPv6 | Type | 128 |

16. MN0Y receives Echo Reply w/ RH (*10) (Refer to 5.6.3)

| | | |
|---|---|---|
| IPv6 Header | Source Address | RUT(Link0,global) |
| | Destination Address | MN0Y(global) |
| Type 2 Routing Header | Length | 2 |
| | Type | 2 |
| | Segments left | 1 |
| | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA6_SPI: SA2_SPI |
| ICMPv6 | Type | 129 |

**[JUDGMENT]**

(*1) PASS: IKE phase-1 negotiation is complete

(*2) PASS: IKE phase-2 negotiation is complete

(*3) PASS: MN0X receives BA w/ RH

(*4) PASS: MN0X receives Echo Reply w/ RH

(*5) PASS: MN0Y receives BA w/ RH

(*6) PASS: MN0Y receives Echo Reply w/ RH

(*7) PASS: IKE phase-1 negotiation is complete, if BA has K=0
IKE phase-1 negotiation isn't performed, if BA has K=1

(*8) PASS: IKE phase-2 negotiation is complete

(*9) PASS: MN0Y receives BA w/ RH

(*10) PASS: MN0Y receives Echo Reply w/ RH

**[REFERENCES]**

RFC3775 Mobility Support in IPv6

See Section 10.3.1

#### 6.3.1.2 Virtual Home Link

##### 6.3.1.2.6 HA_2_1_12 - Receiving valid BU K=0

**[PURPOSE]**
HA_2_1_12 – Valid Registration (Receiving valid BU K=0)

**[CATEGORY]**
ROUTER : ADVANCED FUNCTION(IKE)

**[REQUIREMENT OF TEST]**
NONE

**[TOPORGY]**
Refer to 2.1 Common Topology-1

**[TEST SETUP]**
Refer to 3.1 Common Setup-1

**[INITIALIZATION]**
Refer to 4.1 Common Initialization-1

**[PROCEDURE]**

```
  RUT      MN0
   |        |
   |       MN1X
   |        |
   | <===>  | IKE phase1                          (*1)
   | <===>  | IKE phase2                          (*2)
   |        |
   | <----  | BU (sequence=15, A=1, K=0) w/ HaO
   | ---->  | BA (sequence=15, K=0)      w/ RH   (*3)
   |        |
   | <----  | Echo Request               w/ HaO
   | ---->  | Echo Reply                 w/ RH   (*4)
   |        |
   |       MN1Y
   |        |
   | <----  | BU (sequence=16, A=1, K=0) w/ HaO
   | ---->  | BA (sequence=16, K=0)      w/ RH   (*5)
   |        |
   | <----  | Echo Request               w/ HaO
   | ---->  | Echo Reply                 w/ RH   (*6)
   |        |
   | <===>  | IKE phase1                          (*7)
```

```
| <===> | IKE phase2                          (*8)
|       |
| <---- | BU (sequence=17, A=1, K=0) w/ HaO
| ----> | BA (sequence=17, K=0)      w/ RH  (*9)
|       |
| <---- | Echo equest                w/ HaO
| ----> | Echo Reply                 w/ RH  (*10)
|       |
V       V
```

1. phase-1 negotiation (*1)
2. IKE phase-2 negotiation (*2)
3. MN1X sends BU w/ HaO (Refer to 5.9.1)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | MN1X(global) |
| | Destination Address | | RUT (Link0,global) |
| Destination Option Header | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA1_SPI |
| Mobility Header | MH Type | | 5 |
| | Sequence Number | | 15 |
| | A Flag | | 1 |
| | H Flag | | 1 |
| | L Flag | | 0 |
| | K Flag | | 0 |
| | Lifetime | | 105 |
| Mobility options | PadN | Option Length | 0 |
| | Alternate CoA | address | MN1X(global) |

4. MN1X receives BA w/ RH (*3) (Refer to 5.10.1, 5.10.2)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN1X(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | 0 |
| | Sequence | | 15 |
| | Lifetime | | <=105 |
| Mobility options | Binding Refresh Advice | Interval | <=105 |

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN1X(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | 0 |
| | Sequence | | 15 |
| | Lifetime | | <=105 |
| Mobility options | PadN | length | 2 |

5. MN1X sends Echo Request w/ HaO (Refer to 5.5.2)

| | | |
|---|---|---|
| IPv6 Header | Source Address | MN1X(global) |
| | Destination Address | RUT(Link0,global) |
| Destination Option Header | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA5_SPI: SA1_SPI |
| ICMPv6 | Type | 128 |

6. MN1X receives Echo Reply w/ RH (*4) (Refer to 5.6.3)

| | | |
|---|---|---|
| IPv6 Header | Source Address | RUT(Link0,global) |
| | Destination Address | MN1X(global) |

| | | | |
|---|---|---|---|
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segments left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | UNIQ_TRANS_SA? SA6_SPI: SA2_SPI |
| ICMPv6 | Type | | 129 |

7. MN1Y sends BU w/ HaO (Refer to 5.9.1)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | MN1Y(global) |
| | Destination Address | | RUT (Link0,global) |
| Destination Option Header | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA1_SPI |
| Mobility Header | MH Type | | 5 |
| | Sequence Number | | 16 |
| | A Flag | | 1 |
| | H Flag | | 1 |
| | L Flag | | 0 |
| | K Flag | | 0 |
| | Lifetime | | 105 |
| Mobility options | PadN | Option Length | 0 |
| | Alternate CoA | address | MN1Y(global) |

8. MN1Y receives BA w/ RH (*5) (Refer to 5.10.1, 5.10.2)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN1Y(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | 0 |
| | Sequence | | 16 |
| | Lifetime | | <=105 |
| Mobility options | Binding Refresh Advice | Interval | <=105 |

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN1Y(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | 0 |
| | Sequence | | 16 |
| | Lifetime | | <=105 |
| Mobility options | PadN | length | 2 |

9. MN1Y sends Echo Request w/ HaO (Refer to 5.5.2)

| | | |
|---|---|---|
| IPv6 Header | Source Address | MN1Y(global) |
| | Destination Address | RUT(Link0,global) |
| Destination Option Header | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA5_SPI: SA1_SPI |
| ICMPv6 | Type | 128 |

10. MN1Y receives Echo Reply w/ RH (*6) (Refer to 5.6.3)

| | | |
|---|---|---|
| IPv6 Header | Source Address | RUT(Link0,global) |
| | Destination Address | MN1Y(global) |
| Type 2 Routing Header | Length | 2 |
| | Type | 2 |
| | Segments left | 1 |
| | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA6_SPI: SA2_SPI |
| ICMPv6 | Type | 129 |

11. IKE phase-1 negotiation (*7)
12. IKE phase-2 negotiation (*8)
13. MN1Y sends BU w/ HaO (Refer to 5.9.1)

| | | |
|---|---|---|
| IPv6 Header | Source Address | MN1Y(global) |

| | | | |
|---|---|---|---|
| | Destination Address | | RUT (Link0,global) |
| Destination Option Header | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA1_SPI |
| Mobility Header | MH Type | | 5 |
| | Sequence Number | | 17 |
| | A Flag | | 1 |
| | H Flag | | 1 |
| | L Flag | | 0 |
| | K Flag | | 0 |
| | Lifetime | | 105 |
| Mobility options | PadN | Option Length | 0 |
| | Alternate CoA | address | MN1Y(global) |

14. MN1Y receives BA w/ RH (*9) (Refer to 5.10.1, 5.10.2)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN1Y(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | NH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | 0 |
| | Sequence | | 17 |
| | Lifetime | | <=105 |
| Mobility options | Binding Refresh Advice | Interval | <=105 |

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN1Y(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | 0 |
| | Sequence | | 17 |
| | Lifetime | | <=105 |
| Mobility options | PadN | length | 2 |

15. MN1Y sends Echo Request w/ HaO (Refer to 5.5.2)

| | | |
|---|---|---|
| IPv6 Header | Source Address | MN1Y(global) |
| | Destination Address | RUT(Link0,global) |
| Destination Option Header | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA5_SPI: SA1_SPI |
| ICMPv6 | Type | 128 |

16. MN1Y receives Echo Reply w/ RH (*10) (Refer to 5.6.3)

| | | |
|---|---|---|
| IPv6 Header | Source Address | RUT(Link0,global) |
| | Destination Address | MN1Y(global) |
| Type 2 Routing Header | Length | 2 |
| | Type | 2 |
| | Segments left | 1 |
| | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA6_SPI: SA2_SPI |
| ICMPv6 | Type | 129 |

**[JUDGMENT]**

(*1) PASS: IKE phase-1 negotiation is complete

(*2) PASS: IKE phase-2 negotiation is complete

(*3) PASS: MN1X receives BA w/ RH

(*4) PASS: MN1X receives Echo Reply w/ RH

(*5) PASS: MN1Y receives BA w/ RH

(*6) PASS: MN1Y receives Echo Reply w/ RH

(*7) PASS: IKE phase-1 negotiation is complete

(*8) PASS: IKE phase-2 negotiation is complete

(*9) PASS: MN1Y receives BA w/ RH
(*10) PASS: MN1Y receives Echo Reply w/ RH

**[REFERENCES]**

RFC3775 Mobility Support in IPv6
See Section 10.3.1

#### 6.3.1.2.7 HA_2_1_13 - Receiving valid BU K=1

**[PURPOSE]**

HA_2_1_13 - Valid Registration (R–ceiving valid BU K=1)

**[CATEGORY]**

ROUTER : ADVANCED FUNCTION(IKE)

**[REQUIREMENT OF TEST]**

NONE

**[TOPORGY]**

Refer to 2.1 Common Topology-1

**[TEST SETUP]**

Refer to 3.1 Common Setup-1

**[INITIALIZATION]**

Refer to 4.1 Common Initialization-1

**[PROCEDURE]**

```
  RUT      MN0
   |        |
   |       MN1X
   |        |
   | <===> | IKE phase1                          (*1)
   | <===> | IKE phase2                          (*2)
   |        |
   | <---- | BU (sequence=15, A=1, K=1) w/ HaO
   | ----> | BA (sequence=15, K=any)    w/ RH   (*3)
   |        |
   | <---- | Echo Request               w/ HaO
   | ----> | Echo Reply                 w/ RH   (*4)
   |        |
   |       MN1Y
   |        |
   | <---- | BU (sequence=16, A=1, K=1) w/ HaO
   | ----> | BA (sequence=16, K=any)    w/ RH   (*5)
   |        |
   | <---- | Echo Request               w/ HaO
   | ----> | Echo Reply                 w/ RH   (*6)
   |        |
   | <===> | IKE phase1 (if BA has K=0)         (*7)
   | <===> | IKE phase2                          (*8)
   |        |
```

```
|  <----  |  BU (sequence=17, A=1, K=1)  w/ HaO
|  ---->  |  BA (sequence=17, K=any)     w/ RH   (*9)
|         |
|  <----  |  Echo Request                w/ HaO
|  ---->  |  Echo Reply                  w/ RH   (*10)
|         |
V         V
```

1. IKE phase-1 negotiation (*1)
2. IKE phase-2 negotiation (*2)
3. MN1X sends BU w/ HaO (Refer to 5.9.1)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | MN1X(global) |
| | Destination Address | | RUT (Link0,global) |
| Destination Option Header | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA1_SPI |
| Mobility Header | MH Type | | 5 |
| | Sequence Number | | 15 |
| | A Flag | | 1 |
| | H Flag | | 1 |
| | L Flag | | 0 |
| | K Flag | | 1 |
| | Lifetime | | 105 |
| Mobility options | PadN | Option Length | 0 |
| | Alternate CoA | address | MN1X(global) |

4. MN1X receives BA w/ RH (*3) (Refer to 5.10.1, 5.10.2)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN1X(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | Any |
| | Sequence | | 15 |
| | Lifetime | | <=105 |
| Mobility options | Binding Refresh Advice | Interval | <=105 |

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN1X(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | Any |
| | Sequence | | 15 |
| | Lifetime | | <=105 |
| Mobility options | PadN | length | 2 |

5. MN1X sends Echo Request w/ HaO (Refer to 5.5.2)

| | | |
|---|---|---|
| IPv6 Header | Source Address | MN1X(global) |
| | Destination Address | RUT(Link0,global) |
| Destination Option Header | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA5_SPI: SA1_SPI |
| ICMPv6 | Type | 128 |

6. MN1X receives Echo Reply w/ RH (*4) (Refer to 5.6.3)

| | | |
|---|---|---|
| IPv6 Header | Source Address | RUT(Link0,global) |
| | Destination Address | MN1X(global) |
| Type 2 Routing Header | Length | 2 |
| | Type | 2 |
| | Segments left | 1 |
| | Home Address | MN0(global) |
| Encapsulating | Security Parameters Index | UNIQ_TRANS_SA? |

| | | | |
|---|---|---|---|
| Security Payload | | | SA6_SPI: SA2_SPI |
| ICMPv6 | Type | | 129 |

7. MN1Y sends BU w/ HaO (Refer to 5.9.1)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | MN1Y(global) |
| | Destination Address | | RUT (Link0,global) |
| Destination Option Header | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA1_SPI |
| Mobility Header | MH Type | | 5 |
| | Sequence Number | | 16 |
| | A Flag | | 1 |
| | H Flag | | 1 |
| | L Flag | | 0 |
| | K Flag | | 1 |
| | Lifetime | | 105 |
| Mobility options | PadN | Option Length | 0 |
| | Alternate CoA | address | MN1Y(global) |

8. MN1Y receives BA w/ RH (*5) (Refer to 5.10.1, 5.10.2)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN1Y(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | Any |
| | Sequence | | 16 |
| | Lifetime | | <=105 |
| Mobility options | Binding Refresh Advice | Interval | <=105 |

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN1Y(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | Any |
| | Sequence | | 16 |
| | Lifetime | | <=105 |
| Mobility options | PadN | length | 2 |

9. MN1Y sends Echo Request w/ HaO (Refer to 5.5.2)

| | | |
|---|---|---|
| IPv6 Header | Source Address | MN1Y(global) |
| | Destination Address | RUT(Link0,global) |
| Destination Option Header | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA5_SPI: SA1_SPI |
| ICMPv6 | Type | 128 |

10. MN1Y receives Echo Reply w/ RH (*6) (Refer to 5.6.1)

| | | |
|---|---|---|
| IPv6 Header | Source Address | RUT(Link0,global) |
| | Destination Address | MN1Y(global) |
| Type 2 Routing Header | Length | 2 |
| | Type | 2 |
| | Segments left | 1 |
| | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA6_SPI: SA2_SPI |
| ICMPv6 | Type | 129 |

11. IKE phase-1 negotiation, if BA has K=0 (*7)
12. IKE phase-2 negotiation (*8)
13. MN1Y sends BU w/ HaO (Refer to 5.9.1)

| | | |
|---|---|---|
| IPv6 Header | Source Address | MN1Y(global) |
| | Destination Address | RUT (Link0,global) |
| Destination Option Header | Home Address | MN0(global) |
| Encapsulating | Security Parameters Index | SA1_SPI |

| | | | |
|---|---|---|---|
| Security Payload | | | |
| Mobility Header | MH Type | | 5 |
| | Sequence Number | | 17 |
| | A Flag | | 1 |
| | H Flag | | 1 |
| | L Flag | | 0 |
| | K Flag | | 1 |
| | Lifetime | | 105 |
| Mobility options | PadN | Option Length | 0 |
| | Alternate CoA | address | MN1Y(global) |

14. MN1Y receives BA w/ RH (*9) (Refer to 5.10.1, 5.10.2)

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN1Y(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | MH Type | | 6 |
| | Status | | 0 or 1 |
| | K Flag | | Any |
| | Sequence | | 17 |
| | Lifetime | | <=105 |
| Mobility options | Binding Refresh Advice | Interval | <=105 |

| | | | |
|---|---|---|---|
| IPv6 Header | Source Address | | RUT (Link0,global) |
| | Destination Address | | MN1Y(global) |
| Type 2 Routing Header | Length | | 2 |
| | Type | | 2 |
| | Segment left | | 1 |
| | Home Address | | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | | SA2_SPI |
| Mobility Header | Status | | 0 or 1 |
| | K Flag | | Any |
| | Sequence | | 17 |
| | Lifetime | | <=105 |
| Mobility options | PadN | length | 2 |

15. MN1Y sends Echo Request w/ HaO (Refer to 5.5.2)

| | | |
|---|---|---|
| IPv6 Header | Source Address | MN1Y(global) |
| | Destination Address | RUT(Link0,global) |
| Destination Option Header | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA5_SPI: SA1_SPI |
| ICMPv6 | Type | 128 |

16. MN1Y receives Echo Reply w/ RH (*10) (Refer to 5.6.3)

| | | |
|---|---|---|
| IPv6 Header | Source Address | RUT(Link0,global) |
| | Destination Address | MN1Y(global) |
| Type 2 Routing Header | Length | 2 |
| | Type | 2 |
| | Segments left | 1 |
| | Home Address | MN0(global) |
| Encapsulating Security Payload | Security Parameters Index | UNIQ_TRANS_SA? SA6_SPI: SA2_SPI |
| ICMPv6 | Type | 129 |

**[JUDGMENT]**

(*1) PASS: IKE phase-1 negotiation is complete

(*2) PASS: IKE phase-2 negotiation is complete

(*3) PASS: MN1X receives BA w/ RH

(*4) PASS: MN1X receives Echo Reply w/ RH

(*5) PASS: MN1Y receives BA w/ RH

(*6) PASS: MN1Y receives Echo Reply w/ RH

(*7) PASS: IKE phase-1 negotiation is complete, if BA has K=0
IKE phase-1 negotiation isn't performed, if BA has K=1

(*8) PASS: IKE p'ase-2 negotiation is complete

(*9) PASS: MN1Y receives BA w/ RH

(*10) PASS: MN1Y receives Echo Reply w/ RH

**[REFERENCES]**

RFC3775 Mobility Support in IPv6

See Section 10.3.1

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