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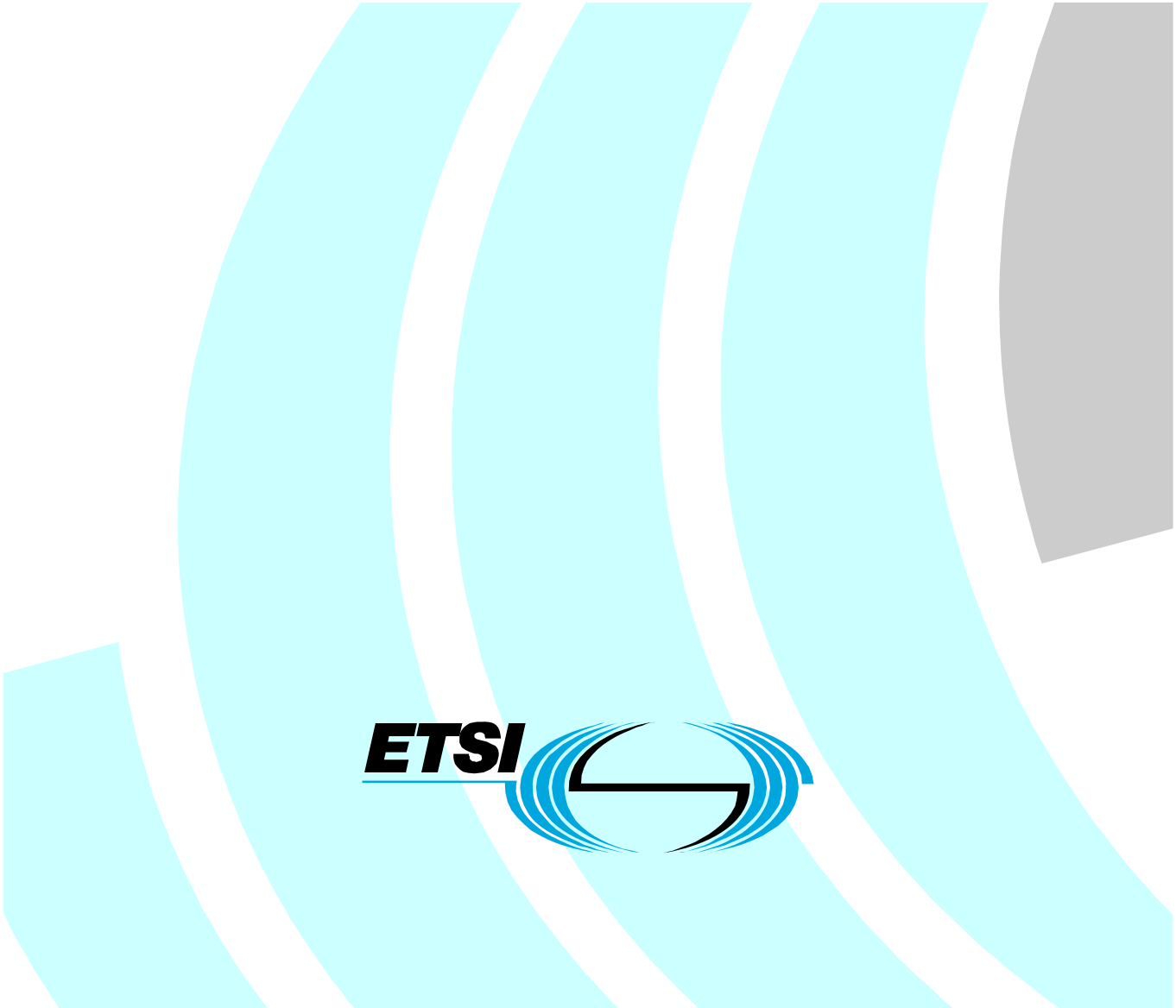
Technical Specification

Methods for Testing and Specification (MTS);
Internet Protocol Testing (IPT);
IPv6 Mobility;
Conformance Test Suite Structure and
Test Purposes (TSS&TP)



Reference
RTS/MTS-IPT-015[2]IPv6-MobTSST

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IP, IPv6, mobility, testing, TSS&TP

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Contents

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Methods for Testing and Specification (MTS).

1 Scope

The purpose of the present document is to provide Test Suite Structure and Test Purposes (TSS&TP) for conformance tests of the mobility IPv6 protocol based on the requirements defined in the IPv6 requirements catalogue (TS 102 559 [2]) and written according to the guidelines of TS 102 351 [1], ISO/IEC 9646-2 [4] and ETS 300 406 [5].

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

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2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[1] ETSI TS 102 351: "Methods for Testing and Specification (MTS); Internet Protocol Testing (IPT); IPv6 Testing: Methodology and Framework".

[2] ETSI TS 102 559: "Methods for Testing and Specification (MTS); Internet Protocol Testing (IPT): IPv6 Mobility; Requirements Catalogue".

[3] ISO/IEC 9646-1: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts".

[4] ISO/IEC 9646-2: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 2: Abstract Test Suite specification".

[5] ETSI ETS 300 406: "Methods for Testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

[6] IETF RFC 3775: "Mobility Support in IPv6".

[7] IETF RFC 4068: "Fast Handovers for Mobile IPv6".

2.2 Informative references

Not applicable.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

abstract test case: Refer to ISO/IEC 9646-1 [3].

Abstract Test Suite (ATS): Refer to ISO/IEC 9646-1 [3].

Implementation Under Test (IUT): Refer to ISO/IEC 9646-1 [3].

Test Purpose (TP): Refer to ISO/IEC 9646-1 [3].

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ATS	Abstract Test Suite
IETF	Internet Engineering Task Force
IPv6	Internet Protocol version 6
IUT	Implementation Under Test
RC	Requirements Catalogue
RQ	Requirement
TP	Test Purpose
TSS	Test Suite Structure

4 Test Suite Structure (TSS)

Test Purposes have been written for IPv6 mobile nodes, correspondent nodes and home agents according to the Requirements (RQ) of the Requirements Catalogue (RC) in TS 102 559 [2]. Test Purposes have been written for behaviours requested with "MUST" or "SHOULD", optional behaviour described with "MAY" or similar wording indicating an option has not been turned into Test Purposes.

The Test Purposes have been divided into two groups:

Group 1: IPv6 Mobility - RFC 3775 [6].

Group 2: IPv6 Mobility - RFC 4068 [7].

The sub-grouping of these two group follows the structure of the RC.

Group 1 RFC 3775 [6].

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Group 1.6.3 Movement.

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Group 1.6.5.3 Receiving Binding Refresh Requests.

Group 2 RFC 4068 [7].

Group 2.1 Protocol Operation of Network-initiated Handover.

Group 2.2 Protocol Details.

Group 2.3 Miscellaneous.

Group 2.3.1 Handover Capability Exchange.

Group 2.3.2 Fast or Erroneous Movement.

Annex A (normative): Test Purposes (TP)

The Test Purposes have been written in the formal notation TPlan as described in annex A of TS 102 351 [1]. This original textual output file ASCII file (MOB.tplan) is contained in archive TS_102595v010200p0.zip which accompanies the present document. The raw text file has been converted to a table format in this annex to allow better readability.

The two formats shall be considered equivalent. In the event that there appears to be syntactical or semantic differences between the two then the textual TPlan representation takes precedence over the table format in this annex.

A.1 IPv6 Mobility - RFC 3775

A.1.1 Overview of mobile IPv6 security

A.1.1.1 Return routability procedure

Test Purpose			
Identifier:	**TP_MOB_1048_01**		
Summary:	Test of Return Routability Procedure at mobile node		
References:	RQ_001_1048, RQ_001_1049, RQ_001_1047, RQ_001_1053,RQ_001_1054, RQ_001_1709, RQ_001_1711, RQ_001_1712		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1048_01

```
with { IUT away_from_home
       IUT 'assigned a care-of address'
       IUT ready to start Return_Routability_Procedure
     }
ensure that
     { when {     IUT is requested to start Return_Routability_Procedure }
       then {     IUT sends Home_Test_Init to Home_Agent in tunneled_mode
                      containing source_address
                          set to home_address
                  and containing destination_address
                          set to Correspondent_Node_address
                  and containing home_init_cookie
              and IUT sends Care_of_Test_Init to Correspondent_Node
                      containing source_address
                          set to care_of_address
                  and containing destination_address
                          set to Correspondent_Node_address
                  and containing care_of_init_cookie }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1050_01**		
Summary:	Test of Return Routability Procedure at correspondent node		
References:	RQ_001_1050, RQ_001_1051, RQ_001_1056, RQ_001_1057,RQ_001_1058, RQ_001_1059, RQ_001_1046, RQ_001_1033,RQ_001_1034, RQ_001_1035		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1050_01

```
with { IUT ready for Return_Routability_Procedure
     }
ensure that
     { when {      IUT receives Home_Test_Init from Home_Agent
                       containing source_address
                           set to home_address
                   and containing destination_address
                           set to Correspondent_Node_address
                   and containing home_init_cookie
               and IUT receives Care_of_Test_Init from Mobile_Node
                       containing source_address
                           set to care_of_address
                   and containing destination_address
                           set to Correspondent_Node_address
                   and containing care_of_init_cookie }
       then {      IUT sends Home_Test to Home_Agent
                       containing source_address
                           set to Correspondent_Node_address
                   and containing destination_address
                           set to home_address
                   and containing home_init_cookie
                   and containing home_keygen_token
                           set to 'First (64, HMAC_SHA1 (Kcn,
                                          (home address | nonce | 0)))'
                   and containing home_nonce_index
               and IUT sends Care_of_Test to Mobile_Node
                       containing source_address
                           set to Correspondent_Node_address
                   and containing destination_address
                           set to care_of_address
                   and containing care_of_init_cookie
                   and containing care_of_keygen_token
                           set to 'First (64, HMAC_SHA1 (Kcn,
                                          (care-of address | nonce | 1)))'
                   and containing care_of_nonce_index }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1052_01**		
Summary:	Test of answers of Return Routability Procedure at mobile node		
References:	RQ_001_1052, RQ_001_1061, RQ_001_2014, RQ_001_2034		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1052_01

```
with { IUT away_from_home
       and IUT having sent Home_Test_Init
       and IUT having sent Care_of_Test_Init
     }
ensure that
     { when { IUT receives home_test from Home_Agent in tunneled_mode
                  containing source_address
                      set to Correspondent_Node_address
              and containing destination_address
                      set to home_address
              and containing ESP_header
              and containing home_init_cookie
              and containing home_keygen_token
              and containing home_nonce_index
            and IUT receives Care_of_Test_Init from Correspondent_Node
                  containing source_address
                      set to Correspondent_Node_address
              and containing destination_address
                      set to care_of_address
              and containing care_of_init_cookie
              and containing Care_of_keygen_token
              and containing care_of_nonce_index }
       then { IUT sends Binding_Update to Correspondent_Node }
     }
```

A.1.1.2 Authorizing binding management messages

Test Purpose			
Identifier:	**TP_MOB_1063_01**		
Summary:	Test of binding update sent by mobile node		
References:	RQ_001_1063, RQ_001_1064, RQ_001_1744, RQ_001_1745,RQ_001_1750, RQ_001_1751, RQ_001_1754, RQ_001_1759		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1063_01

```
with { IUT away_from_home
       and IUT completed Return_Routability_Procedure
     }
ensure that
     { when { IUT is requested to send a Binding_Update }
       then { IUT sends Binding_Update to Correspondent_Node
                  containing source_address
                      set to care_of_address
              and containing destination_address
                      set to Correspondent_Node_address
              and containing a sequence_number
              and containing (nonce_indices_option
                               containing home_nonce_index
                           and containing care_of_nonce_index)
              and containing binding_authorization_data_option
                      set to 'First (96, HMAC_SHA1 (Kbn,
                                    (care-of address | correspondent | BU)))' }
     }
```

A.1.1.3 Updating node keys and nonces

Test Purpose			
Identifier:	**TP_MOB_1075_01**		
Summary:	Test of reaction to unrecognized home nonce in binding update sent by mobile node		
References:	RQ_001_1075, RQ_001_1072		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1075_01

```
with { IUT having completed Return_Routability_Procedure
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing nonce_indices_option
                  set to an unrecognized home_nonce_index }
       then { IUT sends Binding_Acknowledgement to Mobile_Node
                  containing status
                      set to 136 expired_home_nonce_index
                   or set to 138 expired_nonces }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1075_02**		
Summary:	Test of reaction to unrecognized care-of nonce in binding update sent by mobile node		
References:	RQ_001_1075, RQ_001_1072		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1075_02

```
with { IUT having completed Return_Routability_Procedure
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
          containing nonce_indices_option
              set to unrecognized care_of_nonce_index }
       then { IUT sends Binding_Acknowledgement to Mobile_Node
                  containing status
                      set to 137 expired_care_of_nonce_index
                   or set to 138 expired_nonces }
     }
```

A.1.2 New IPv6 protocol, message types, and destination option

A.1.2.1 Home address option

Test Purpose			
Identifier:	**TP_MOB_1208_01**		
Summary:	Test reaction on home address option when this option is not recognized		
References:	RQ_001_1208, RQ_001_1211		
IUT Role:	Node	**Test case:**	TC_MOB_1208_01

```
with { IUT configured 'so that it does not recognise the Home Address option'
     }
ensure that
     { when {     IUT receives an IPv6Packet
                       containing destination_address
                         set to a multicast_address
                  and containing Home_Address_option }
       then {     IUT discards IPv6Packet
              and IUT sends no response }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1209_01**		
Summary:	Test reaction on home address option when this option is not recognized		
References:	RQ_001_1208		
IUT Role:	Node	**Test case:**	TC_MOB_1209_01

```
with { IUT configured 'so that it does not recognise Home Address option'
     }
ensure that
     { when {      IUT receives IPv6Packet
                        containing destination_address
                            not set to a multicast_address
                     and containing Home_Address_option }
       then {      IUT discards the IPv6Packet
                  and IUT sends ICMP_Parameter_Problem
            containing code indicating 2 unrecognized_IPv6_option_encountered }
     }
```

A.1.3 Modifications to IPv6 neighbor discovery

A.1.3.1 Modified router advertisement message format

Test Purpose			
Identifier:	**TP_MOB_1293_01**		
Summary:	Test of modified router advertisement message format		
References:	RQ_001_1293, RQ_001_1294, RQ_001_1295, RQ_001_1296,RQ_001_1297, RQ_001_1298, RQ_001_1299, RQ_001_1339		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1293_01

```
with { IUT ready to send Router_Advertisement
     }
ensure that
     { when { IUT is requested to send Router_Advertisement }
       then { IUT sends modified Router_Advertisement
                   containing H_bit
                       set to 1 home_agent
              and containing (modified Prefix_Information_option
                                containing R_Bit set to 1
                             and containing prefix_field
                                    set to the IP_address of the Home_Agent)
              and containing Source_Link_Layer_Address_option}
     }
```

A.1.3.2 New advertisement interval option format

Test Purpose			
Identifier:	**TP_MOB_1310_01**		
Summary:	Ignore advertisement interval option format in messages other than Router Advertisement messages		
References:	RQ_001_1310		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1310_01

```
with { IUT ready to receive Router_Solicitation
     }
ensure that
     { when {     IUT receives Router_Solicitation
                      containing Advertisement_Interval_option }
       then {     IUT sends a modified Router_Advertisement
              and IUT ignores Advertisement_Interval_option }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1310_02**		
Summary:	Ignore advertisement interval option format in messages other than Router Advertisement messages		
References:	RQ_001_1310		
IUT Role:	Mobile_Node, Correspondent_Node, Home_Agent	**Test case:**	TC_MOB_1310_02

```
with { IUT ready to receive Neighbor_Solicitation
     }
ensure that
     { when {     IUT receives Neighbor_Solicitation
                    containing Advertisement_Interval_option }
       then {     IUT sends Neighbor_Advertisement
              and IUT ignores Advertisement_Interval_option }
     }
```

A.1.3.3 New home agent information option format

Test Purpose			
Identifier:	**TP_MOB_1315_01**		
Summary:	Ignore reserved field in home agent information option		
References:	RQ_001_1315		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1315_01

```
with { IUT ready to receive router_advertisement
     }
ensure that
     { when { IUT receives a modified Router_Advertisement
                  containing Home_Agent_Information_option
                             containing a reserved_field
                               not set to 0 }
       then { IUT ignores the reserved_field }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1328_01**		
Summary:	Ignore home agent information option format in messages other than Router Advertisement messages		
References:	RQ_001_1328		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1328_01

```
with { IUT ready to receive router_solicitation
     }
ensure that
     { when {     IUT receives Router_Solicitation
                      containing a Home_Agent_Information_option }
       then {     IUT sends a modified Router_Advertisement
              and IUT ignores the Home_Agent_Information_option }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1328_02**		
Summary:	Ignore home agent information option format in messages other than Router Advertisement messages		
References:	RQ_001_1328		
IUT Role:	Mobile_Node, Correspondent_Node, Home_Agent	**Test case:**	TC_MOB_1328_02

```
with { IUT ready to receive Neighbor_Solicitation
     }
ensure that
     { when {     IUT receives Neighbor_Solicitation
                  containing a Home_Agent_Information_option }
       then {     IUT sends Neighbor_Advertisement
              and IUT ignores Home_Agent_Information_option }
     }
```

A.1.4 Correspondent_Node operation

A.1.4.1 Processing mobility headers

Test Purpose			
Identifier:	**TP_MOB_1399_01**		
Summary:	Ignore message with checksum error in mobility header: Home Test Init at Correspondent Node		
References:	RQ_001_1398, RQ_001_1399		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1399_01

```
with { IUT ready for Return_Routability_Procedure
     }
ensure that
     { when { IUT receives home_test_init from Home_Agent
                  containing incorrect checksum }
       then { IUT ignores home_test_init }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1399_02**		
Summary:	Ignore message with checksum error in mobility header: care-of test Init at Correspondent Node		
References:	RQ_001_1398, RQ_001_1399		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1399_02

```
with { IUT ready for Return_Routability_Procedure
     }
ensure that
     { when { IUT receives Care_of_Test_Init from Mobile_Node
                    containing incorrect checksum }
       then { IUT ignores Care_of_Test_Init }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1399_03**		
Summary:	Ignore message with checksum error in mobility header: binding update at Correspondent Node		
References:	RQ_001_1398, RQ_001_1399		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1399_03

```
with { IUT having completed Return_Routability_Procedure
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                    containing incorrect checksum }
       then { IUT ignores Binding_Update }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1399_04**		
Summary:	Ignore message with checksum error in mobility header: binding update at Home Agent		
References:	RQ_001_1398, RQ_001_1399		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1399_04

```
with { IUT ready to receive Binding_Update
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                    containing incorrect checksum }
       then { IUT ignores Binding_Update }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1399_05**		
Summary:	Ignore message with checksum error in mobility header: Home Test at Mobile Node		
References:	RQ_001_1398, RQ_001_1399		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1399_05

```
with { IUT having sent Home_Test_Init
     }
ensure that
     { when { IUT receives home_test from Home_Agent in tunneled_mode
                    containing incorrect checksum }
       then { IUT ignores home_test }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1399_06**		
Summary:	Ignore message with checksum error in mobility header: care-of test at Mobile Node		
References:	RQ_001_1398, RQ_001_1399		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1399_06

```
with { IUT having sent Care_of_Test_Init
     }
ensure that
     { when { IUT receives Care_of_Test from Correspondent_Node
                  containing incorrect checksum }
       then { IUT ignores Care_of_Test }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1401_01**		
Summary:	Reaction to message with unknown MH type field mobility header		
References:	RQ_001_1401, RQ_001_1400, RQ_001_1427		
IUT Role:	Correspondent_Node, Home_Agent, Mobile_Node	**Test case:**	TC_MOB_1401_01

```
with { IUT ready to receive Mobility_Header in an IPv6Packet
     }
ensure that
     { when {      IUT receives an IPv6Packet
                       containing a Mobility_Header
                       containing an unrecognized MH_type_field }
       then {      IUT discards IPv6Packet
              and IUT sends Binding_Error
                       containing status
                           set to 2 unrecognized_MH_Type
                   and containing home_address_field
                           set to unspecified_address }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1404_01**		
Summary:	Ignore Home Test Init message with payload proto other than 59		
References:	RQ_001_1404, RQ_001_1403, RQ_001_1405, RQ_001_1406		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1404_01

```
with { IUT ready for Return_Routability_Procedure
     }
ensure that
     { when { IUT receives Home_Test_Init from Home_Agent
                  containing payload_proto_field
                  not set to 59 }
       then { IUT ignores Home_Test_Init
              and optionally
             (IUT sends ICMP_Parameter_Problem to Home_Agent
                  containing code
                      set to 0 erroneous_header_field_encountered
              and containing pointer
                  indicating payload_proto_field) }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1404_02**		
Summary:	Ignore care-of test Init message with payload proto other than 59		
References:	RQ_001_1404, RQ_001_1403, RQ_001_1405, RQ_001_1406		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1404_02

```
with { IUT ready for Return_Routability_Procedure
     }
ensure that
     { when { IUT receives Care_of_Test_Init from Mobile_Node
                   containing payload_proto_field
                   not set to 59 }
       then { IUT ignores Care_of_Test_Init
                and optionally
              (IUT sends ICMP_Parameter_Problem to Mobile_Node
                   containing code
                       set to 0 erroneous_header_field_encountered
                and containing pointer
                   indicating payload_proto_field) }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1404_03**		
Summary:	Ignore binding update message with payload proto other than 59		
References:	RQ_001_1404, RQ_001_1403, RQ_001_1405, RQ_001_1406		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1404_03

```
with { IUT having completed Return_Routability_Procedure
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                   containing payload_proto_field
                   not set to 59 }
       then { IUT ignores Binding_Update
                and optionally
              (IUT sends ICMP_Parameter_Problem to Mobile_Node
                   containing code
                       set to 0 erroneous_header_field_encountered
                and containing pointer
                   indicating payload_proto_field) }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1404_04**		
Summary:	Ignore binding update message with payload proto other than 59		
References:	RQ_001_1404, RQ_001_1403, RQ_001_1405, RQ_001_1406		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1404_04

```
with { IUT ready to receive Binding_Update
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                   containing payload_proto_field
                   not set to 59 }
       then { IUT ignores Binding_Update
                and optionally
              (IUT sends ICMP_Parameter_Problem to Mobile_Node
                   containing code
                       set to 0 erroneous_header_field_encountered
                and containing pointer
                   indicating payload_proto_field) }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1404_05**		
Summary:	Ignore Home Test message with payload proto other than 59		
References:	RQ_001_1404, RQ_001_1403, RQ_001_1405, RQ_001_1406		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1404_05

```
with { IUT having sent Home_Test_Init
     }
ensure that
     { when { IUT receives home_test from Home_Agent in tunneled_mode
                   containing payload_proto_field
                   not set to 59 }
       then { IUT ignores home_test
                and optionally
              (IUT sends ICMP_Parameter_Problem to Home_Agent
                   containing code
                       set to 0 erroneous_header_field_encountered
                and containing pointer
                   indicating payload_proto_field) }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1404_06**		
Summary:	Ignore care-of test message with payload proto other than 59		
References:	RQ_001_1404, RQ_001_1403, RQ_001_1405, RQ_001_1406		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1404_06

```
with { IUT having sent Care_of_Test_Init
     }
ensure that
     { when { IUT receives Care_of_Test from Correspondent_Node
                   containing payload_proto_field
                   not set to 59 }
       then { IUT ignores home_test
                and optionally
              (IUT sends ICMP_Parameter_Problem to Correspondent_Node
                   containing code
                       set to 0 erroneous_header_field_encountered
                and containing pointer
                   indicating payload_proto_field) }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1408_01**		
Summary:	Ignore Home Test Init message with erroneous length field		
References:	RQ_001_1408, RQ_001_1407, RQ_001_1409, RQ_001_1410		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1408_01

```
with { IUT ready for Return_Routability_Procedure
     }
ensure that
     { when { IUT receives Home_Test_Init from Home_Agent
                   containing header_length_field
                   set to less than the required_length }
       then { IUT ignores Home_Test_Init
                and optionally
              (IUT sends ICMP_Parameter_Problem to Home_Agent
                   containing code
                       set to 0 erroneous_header_field_encountered
                and containing pointer
                   indicating header_length_field) }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1408_02**		
Summary:	Ignore care-of test Init message with erroneous length field		
References:	RQ_001_1408, RQ_001_1407, RQ_001_1409, RQ_001_1410		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1408_02

```
with { IUT ready for Return_Routability_Procedure
     }
ensure that
     { when { IUT receives Care_of_Test_Init from Mobile_Node
                  containing header_length_field
                  set to less than the required_length }
       then { IUT ignores Care_of_Test_Init
                and optionally
              (IUT sends ICMP_Parameter_Problem to Mobile_Node
                  containing code
                      set to 0 erroneous_header_field_encountered
               and containing pointer
                  indicating header_length_field) }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1408_03**		
Summary:	Ignore binding update message with erroneous length field		
References:	RQ_001_1408, RQ_001_1407, RQ_001_1409, RQ_001_1410		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1408_03

```
with { IUT having completed Return_Routability_Procedure
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing header_length_field
                  set to less than the required_length }
       then { IUT ignores Binding_Update
                and optionally
              (IUT sends ICMP_Parameter_Problem to Mobile_Node
                  containing code
                      set to 0 erroneous_header_field_encountered
               and containing pointer
                  indicating header_length_field) }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1408_04**		
Summary:	Ignore binding update message with erroneous length field		
References:	RQ_001_1408, RQ_001_1407, RQ_001_1409, RQ_001_1410		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1408_04

```
with { IUT ready to receive Binding_Update
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing header_length_field
                  set to less than the required_length }
       then { IUT ignores Binding_Update
                and optionally
              (IUT sends ICMP_Parameter_Problem to Mobile_Node
                  containing code
                      set to 0 erroneous_header_field_encountered
               and containing pointer
                  indicating header_length_field) }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1408_05**		
Summary:	Ignore Home Test message with erroneous length field		
References:	RQ_001_1408, RQ_001_1407, RQ_001_1409, RQ_001_1410		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1408_05

```
with { IUT having sent Home_Test_Init
     }
ensure that
     { when { IUT receives home_test from Home_Agent in tunneled_mode
                   containing header_length_field
                   set to less than the required_length }
       then { IUT ignores home_test
                and optionally
              (IUT sends ICMP_Parameter_Problem to Home_Agent
                   containing code
                       set to 0 erroneous_header_field_encountered
                and containing pointer
                   indicating header_length_field) }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1408_06**		
Summary:	Ignore care-of test message with erroneous length field		
References:	RQ_001_1408, RQ_001_1407, RQ_001_1409, RQ_001_1410		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1408_06

```
with { IUT having sent Care_of_Test_Init
     }
ensure that
     { when { IUT receives Care_of_Test from Correspondent_Node
                   containing header_length_field
                   set to less than the required_length }
       then { IUT ignores home_test
                and optionally
              (IUT sends ICMP_Parameter_Problem to Correspondent_Node
                   containing code
                       set to 0 erroneous_header_field_encountered
                and containing pointer
                   indicating header_length_field) }
     }
```

A.1.4.2 Packet processing

A.1.4.2.1 Receiving packets with home address option

Test Purpose			
Identifier:	**TP_MOB_1411_01**		
Summary:	Test reaction on home address option indicating non-unicast address		
References:	RQ_001_1411		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1411_01

```
with { IUT configured 'not recognize Home Address option'
     }
ensure that
     { when { IUT receives IPv6Packet
                   containing Home_Address_option
                   not indicating a unicast_address}
       then { IUT discards IPv6Packet }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1413_01**		
Summary:	Test reaction on home address option without existing binding		
References:	RQ_001_1413, RQ_001_1427		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1413_01

```
with {      IUT ready to receive Home_Address_option
       and IUT having no Binding_Cache_entry
     }
ensure that
     { when {      IUT receives IPv6Packet
                       not containing binding_update_option
                   and containing Home_Address_option }
       then {      IUT discards IPv6Packet
              and IUT sends Binding_Error
                       containing status
                       set to 1 unknown_binding_for_Home_Address_destination_option
                   and containing home_address
                           set to home_address from Home_Address_option }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1414_01**		
Summary:	Test reaction on home address option without corresponding binding		
References:	RQ_001_1414, RQ_001_1427		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1414_01

```
with {      IUT ready to receive Home_Address_option
       and IUT having 1 or more Binding_Cache_entry
     }
ensure that
     { when {      IUT receives IPv6Packet
                   not containing binding_update_option
                   and containing Home_Address_option
                       indicating 'address for which no binding exists' }
       then {      IUT discards IPv6Packet
              and IUT sends Binding_Error
                       containing status
                       set to 1 unknown_binding_for_Home_Address_destination_option
                   and containing home_address
                           set to home_address from Home_Address_option }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1415_01**		
Summary:	Test reaction on home address option from source that is not a known care-of address		
References:	RQ_001_1415, RQ_001_1427		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1415_01

```
with {      IUT ready to receive Home_Address_option
       and IUT having a registered care_of_address
     }
ensure that
     { when {      IUT receives IPv6Packet
                       containing source_address
                       not set to registered care_of_address
                   and not containing binding_update_option
                   and containing Home_Address_option
                       indicating 'address for which no binding exists' }
       then {      IUT discards IPv6Packet
              and IUT sends Binding_Error
                       containing status
                           set to 1
                              unknown_binding_for_Home_Address_destination_option
                   and containing home_address
                           set to home_address from Home_Address_option }
     }
```

A.1.4.3 Sending binding error messages

Test Purpose			
Identifier:	**TP_MOB_1426_01**		
Summary:	Test reaction to message with unknown MH type field mobility header from non-unicast address		
References:	RQ_001_1426		
IUT Role:	Correspondent_Node, Home_Agent, Mobile_Node	**Test case:**	TC_MOB_1426_01

```
with { IUT ready to receive a Mobility_Header
     }
ensure that
     { when { IUT receives IPv6Packet
                  containing Mobility_Header
                             containing an unrecognized MH_type_field
              and containing source_address
                  not set to a unicast_address }
       then { IUT sends no response 'does not send a Binding Error message' }
     }
```

A.1.4.4 Return routability procedure

A.1.4.4.1 Receiving home test init messages

Test Purpose			
Identifier:	**TP_MOB_1430_01**		
Summary:	Test reaction on home test Init message with Home Address destination option		
References:	RQ_001_1430		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1430_01

```
with { IUT ready for Return_Routability_Procedure
     }
ensure that
     { when { IUT receives Home_Test_Init from Home_Agent
                  containing home_address_destination_option }
       then { IUT discards Home_Test_Init }
     }
```

A.1.4.4.2 Receiving care-of test init messages

Test Purpose			
Identifier:	**TP_MOB_1431_01**		
Summary:	Test reaction on care-of test Init message with Home Address destination option		
References:	RQ_001_1431		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1431_01

```
with { IUT ready for Return_Routability_Procedure
     }
ensure that
     { when { IUT receives Care_of_Test_Init from Mobile_Node
                  containing home_address_destination_option }
       then { IUT discards Care_of_Test_Init }
     }
```

A.1.4.5 Processing bindings

A.1.4.5.1 Receiving binding updates

Test Purpose			
Identifier:	**TP_MOB_1432_01**		
Summary:	Test reaction on binding update message without unicast routable home address		
References:	RQ_001_1432, RQ_001_1448		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1432_01

```
with { IUT having completed Return_Routability_Procedure
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing Home_Address_option
                             containing home_address
                             not set to a unicast_routable_address }
       then { IUT discards Binding_Update }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1432_02**		
Summary:	Test reaction on binding update message without unicast routable home address		
References:	RQ_001_1432, RQ_001_1448, RQ_001_1478, RQ_001_1479		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1432_02

```
with { IUT having completed Return_Routability_Procedure
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing source_address
                  not set to a unicast_routable_address
            and not containing Home_Address_option }
       then { IUT discards Binding_Update }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1433_01**		
Summary:	Test reaction on binding update message when there are no Binding Cache entries		
References:	RQ_001_1433, RQ_001_1470		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1433_01

```
with {     IUT having completed Return_Routability_Procedure
       and IUT having no binding_cache_entry
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing any sequence_number
            and containing the A_Bit set to 0 }
       then { IUT sends no response }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1433_02**		
Summary:	Test reaction on binding update message when there are no Binding Cache entries		
References:	RQ_001_1433, RQ_001_1470		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1433_02

```
with {     IUT having completed Return_Routability_Procedure
       and IUT having no binding_cache_entry
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing any sequence_number
            and containing the A_Bit set to 1 }
       then { IUT sends Binding_Acknowledgement }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1436_01**		
Summary:	Test reaction on binding update message when authentication fails		
References:	RQ_001_1436, RQ_001_1437, RQ_001_1448		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1436_01

```
with { IUT having completed Return_Routability_Procedure
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing the H_bit set to 0
              and containing binding_authorization_data_option
                             containing an invalid authenticator_field }
       then { IUT discards Binding_Update }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1437_01**		
Summary:	Test reaction on binding update message when authentication fails		
References:	RQ_001_1437, RQ_001_1438, RQ_001_1448		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1437_01

```
with { IUT having completed Return_Routability_Procedure
     }
ensure that
     { when {     IUT receives Binding_Update from Mobile_Node
                      containing H_Bit set to 0
              and not containing binding_authorization_data_option }
       then {     IUT discards Binding_Update }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1439_01**		
Summary:	Test reaction on binding update message when authentication fails		
References:	RQ_001_1439, RQ_001_1448		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1439_01

```
with { IUT having completed Return_Routability_Procedure
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing H_Bit set to 0
              and containing Binding_Authorization_Data_option
                  not set to the previous Binding_Authorization_Data_option }
       then { IUT discards Binding_Update }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1440_01**		
Summary:	Test reaction on binding update message when authentication fails		
References:	RQ_001_1440, RQ_001_1448		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1440_01

```
with { IUT having completed Return_Routability_Procedure
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing H_Bit set to 0
     and containing binding_authorization_data_option
                 not containing trailing_padding }
       then { IUT discards Binding_Update }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1441_01**		
Summary:	Test reaction on binding update message with Nonce Indices option		
References:	RQ_001_1441, RQ_001_1448		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1441_01

```
with { IUT having completed Return_Routability_Procedure
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing H_Bit set to 1
              and containing nonce_indices_option }
       then { IUT discards Binding_Update }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1442_01**		
Summary:	Test reaction on binding update message when there are Binding Cache entries		
References:	RQ_001_1434, RQ_001_1442, RQ_001_1811		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1442_01

```
with {     IUT having completed Return_Routability_Procedure
       and IUT having a binding_cache_entry for the mobile_node
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing sequence_number
                        less than or equal to the previous sequence_number }
       then { IUT sends Binding_Acknowledgement
                  containing status
                  set to 135 sequence_number_out_of_window
              and containing sequence_number
                  indicating previous accepted sequence_number }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1443_01**		
Summary:	Test reaction on binding update message when there are Binding Cache entries		
References:	RQ_001_1434, RQ_001_1443, RQ_001_1444		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1443_01

```
with {    IUT having completed Return_Routability_Procedure
       and IUT having a binding_cache_entry for the home_address
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing H_Bit
                  not set to previous received H_Bit for this home_address }
       then { IUT sends Binding_Acknowledgement
                  containing status
                      set to 139 registration_type_change_disallowed }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1445_01**		
Summary:	Test reaction on binding update message when nonces have expired		
References:	RQ_001_1445, RQ_001_1435, RQ_001_1471, RQ_001_1474, RQ_001_1475		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1445_01

```
with { IUT having completed Return_Routability_Procedure
       and IUT having a binding_cache_entry for the home_address
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing expired home_nonce_index
              and containing valid care_of_nonce_index }
       then { IUT sends Binding_Acknowledgement
                  containing status
                      set to 136 expired_home_nonce_index
          and not containing binding_authorization_data_mobility_option }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1446_01**		
Summary:	Test reaction on binding update message when nonces have expired		
References:	RQ_001_1446, RQ_001_1435, RQ_001_1471, RQ_001_1474, RQ_001_1475		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1446_01

```
with { IUT having completed Return_Routability_Procedure
       and IUT having a binding_cache_entry for the home_address
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing a valid home_nonce_index
              and containing an expired care_of_nonce_index }
       then { IUT sends Binding_Acknowledgement
                  containing status
                      set to 137 expired_care_of_nonce_index
              and not containing binding_authorization_data_mobility_option }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1447_01**		
Summary:	Test reaction on binding update message when nonces have expired		
References:	RQ_001_1447, RQ_001_1435, RQ_001_1471, RQ_001_1474, RQ_001_1475		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1447_01

```
with { IUT having completed Return_Routability_Procedure
       and IUT having a binding_cache_entry for the home_address
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing an expired home_nonce_index
              and containing an expired care_of_nonce_index }
       then { IUT sends Binding_Acknowledgement
                  containing status
                      set to 138 Expired_nonces
              and not containing binding_authorization_data_mobility_option }
     }
```

A.1.4.5.2 Requests to delete a binding

Test Purpose			
Identifier:	**TP_MOB_1465_01**		
Summary:	Test reaction on binding update message with zero lifetime		
References:	RQ_001_1465, RQ_001_1466, RQ_001_1470		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1465_01

```
with { IUT having completed Return_Routability_Procedure
       and IUT having 1 or more binding_cache_entry
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing H_Bit set to 0
              and containing lifetime set to 0
              and containing A_Bit set to 0 }
       then { IUT sends no response }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1465_02**		
Summary:	Test reaction on binding update message with zero lifetime		
References:	RQ_001_1465, RQ_001_1466, RQ_001_1470		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1465_02

```
with { IUT having completed Return_Routability_Procedure
       and IUT having 1 or more binding_cache_entry
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing H_Bit set to 0
              and containing lifetime set to 0
              and containing A_Bit set to 1 }
       then { IUT sends Binding_Acknowledgement }
     }
```

A.1.4.5.3 Sending binding acknowledgements

Test Purpose			
Identifier:	**TP_MOB_1470_01**		
Summary:	Test sending of Binding Acknowledgement message to accept binding update message		
References:	RQ_001_1470, RQ_001_1473, RQ_001_1476, RQ_001_1477,RQ_001_1480, RQ_001_1066, RQ_001_1067		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1470_01

```
with { IUT having completed Return_Routability_Procedure
     }
ensure that
     { when { IUT receives a valid Binding_Update from Mobile_Node
                  containing source_address
                      set to a unicast_address not equal to the home_address
              and containing A_Bit set to 1 }
       then { IUT sends Binding_Acknowledgement
                  containing destination_address
                      set to the received source_address
              and containing status set to less than 128
              and containing sequence_number
                      set to sequence_number received in the Binding_Update
              and containing type_2_routing_header
              and containing binding_authorization_data_mobility_option
                      containing authenticator_field
                          set to
                            'First (96, HMAC_SHA1 (Kbm,
                                   (care-of address | correspondent | BA)))' }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1481_01**		
Summary:	Test sending of Binding Acknowledgement message to accept binding update message from home address		
References:	RQ_001_1470, RQ_001_1473, RQ_001_1476, RQ_001_1477,RQ_001_1481, RQ_001_1066, RQ_001_1067		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1481_01

```
with { IUT having completed Return_Routability_Procedure
     }
ensure that
     { when { IUT receives valid Binding_Update from Mobile_Node
                  containing source_address
                      set to home_address
              and containing A_Bit set to 1 }
       then { IUT sends Binding_Acknowledgement
                  containing destination_address
                      set to received source_address
              and containing status set to less than 128
              and containing sequence_number
                      set to sequence_number received in the Binding_Update
          and not containing type_2_routing_header
              and containing binding_authorization_data_mobility_option
                      containing authenticator_field
                          set to
                            'First (96, HMAC_SHA1 (Kbm,
                                   (care-of address | correspondent | BA)))' }
     }
```

A.1.4.5.4 Sending binding refresh requests

Test Purpose			
Identifier:	**TP_MOB_1483_01**		
Summary:	Test generation of Binding Refresh Request message		
References:	RQ_001_1483		
IUT Role:	Correspondent_Node	**Test case:**	TC_MOB_1483_01

```
with {     IUT having completed Return_Routability_Procedure
       and IUT having a binding_cache_entry for the Mobile_Node
           IUT ready to send Binding_Refresh_Request
     }
ensure that
     { when { IUT is requested to send a Binding_Refresh_Request }
       then { IUT sends Binding_Refresh_Request
                  containing destination_address
                      set to home_address of mobile_node }
     }
```

A.1.5 Home agent operation

A.1.5.1 Processing bindings

A.1.5.1.1 Primary care-of address registration

Test Purpose			
Identifier:	**TP_MOB_1432_03**		
Summary:	Test reaction on binding update message without unicast routable home address		
References:	RQ_001_1432, RQ_001_1448		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1432_03

```
with { IUT ready to receive Binding_Update
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing source_address
                      set to care_of_address
              and containing a Home_Address_option
                              containing home_address
                              not set to a unicast_routable_address }
       then { IUT discards Binding_Update }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1441_02**		
Summary:	Test reaction on binding update message with Nonce Indices option		
References:	RQ_001_1441, RQ_001_1448		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1441_02

```
with { IUT ready to receive Binding_Update
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing source_address
                      set to care_of_address
              and containing H_Bit set to 1
              and containing nonce_indices_option }
       then { IUT discards Binding_Update }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1442_02**		
Summary:	Test reaction on binding update message when there are Binding Cache entries		
References:	RQ_001_1434, RQ_001_1442, RQ_001_1811		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1442_02

```
with { IUT having a binding_cache_entry for the Mobile_Node
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing source_address
                      set to care_of_address
              and containing sequence_number
                      less than or equal to the previous sequence_number
                                          received from the Mobile_Node }
       then { IUT sends Binding_Acknowledgement
                  containing status
                      set to 135 sequence_number_out_of_window
              and containing sequence_number
                      set to previous accepted sequence_number }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1493_01**		
Summary:	Test reaction on binding update message when there are Binding Cache entries		
References:	RQ_001_1493		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1493_01

```
with { IUT ready to receive Binding_Update
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing source_address
                      set to care_of_address
              and containing Home_Address_option
                      set to 'non on-link address' }
       then { IUT discards Binding_Update
              and optionally
                  (IUT sends Binding_Acknowledgement
                       containing status
                           set to 132 not_home_subnet) }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1496_01**		
Summary:	Test reaction on binding update message when Home Agent functionaliy is not implemented		
References:	RQ_001_1496		
IUT Role:	Correspondent_Node, Mobile_Node	**Test case:**	TC_MOB_1496_01

```
with { IUT ready to receive IPv6packet's'
     }
ensure that
     { when { IUT receives valid Binding_Update from a Node }
       then { IUT sends Binding_Acknowledgement
                  containing status
                      set to 131 home_registration_not_supported }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1502_01**		
Summary:	Test reaction on binding update message when Duplicate Address Detection fails		
References:	RQ_001_1502, RQ_001_1501, RQ_001_1503		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1502_01

```
with { IUT ready to receive Binding_Update
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing source_address
                      set to care_of_address }
       then  { IUT sends Neighbor_Solicitation      -- IUT starts
                    containing source_address       -- Duplicate
                        set to unspecified_address  -- Address
              and containing destination_address    -- Detection (DAD)
                        set to care_of_address }
        when { IUT receives Neighbor_Advertisement        -- DAD fails
                    containing source_address
                        set to care_of_address}
        then { IUT sends Binding_Acknowledgement
                    containing status
                        set to 134 Duplicate_Address_Detection_failed }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1510_01**		
Summary:	Test reaction on binding update message when Duplicate Address Detection succeeds		
References:	RQ_001_1510, RQ_001_1501, RQ_001_1511, RQ_001_1516,RQ_001_1517, RQ_001_2002, RQ_001_2013, RQ_001_2029		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1510_01

```
with { IUT ready to receive Binding_Update
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing source_address
                      set to care_of_address
                and containing A_Bit set to 1 }
       then { IUT sends Neighbor_Solicitation          -- IUT starts
                  containing source_address            -- Duplicate
                   set to an unspecified_address       -- Address
                and containing destination_address     -- Detection (DAD)
                      set to care_of_address }
       when { IUT receives no Neighbor_Advertisement  -- DAD succeeds
                  containing source_address
                      set to care_of_address }
       then { IUT sends Binding_Acknowledgement
                  containing source_address
                      set to address of Home_Agent
                and containing destination_address
                      set to care_of_address
                and containing Type_2_Routing_header
                    indicating home_address
                and containing ESP_header
                and containing status
                      set to 0 Binding_Update_accepted
                and containing sequence_number
                      set to sequence_number received in Binding_Update
                and containing a valid lifetime }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1510_02**		
Summary:	Test reaction on binding update message when Duplicate Address Detection succeeds, A = 0		
References:	RQ_001_1510, RQ_001_1501, RQ_001_1511, RQ_001_1516,RQ_001_1517, RQ_001_2002, RQ_001_2013, RQ_001_2029		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1510_02

```
with { IUT ready to receive Binding_Update
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing source_address
                      set to care_of_address
                and containing A_Bit set to 0 }
       then { IUT sends Neighbor_Solicitation          -- IUT starts
                  containing source_address            -- Duplicate
                  set to an unspecified_address        -- Address
                and containing destination_address     -- Detection (DAD)
                      set to care_of_address }
       when { IUT receives no Neighbor_Advertisement  -- DAD succeeds
                  containing source_address
                      set to care_of_address }
       then { IUT sends Binding_Acknowledgement
                  containing source_address
                      set to address of Home_Agent
                and containing destination_address
                      set to care_of_address
                and containing Type_2_Routing_header
                      indicating home_address
                and containing ESP_header
                and containing status
                      set to 0 Binding_Update_accepted
                and containing sequence_number
                      set to sequence_number received in Binding_Update
                and containing a valid lifetime }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1512_01**		
Summary:	Test reaction on binding update message when Duplicate Address Detection succeeds, deprecated subnet prefix		
References:	RQ_001_1512, RQ_001_1510, RQ_001_1501, RQ_001_1511		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1512_01

```
with { IUT ready to receive Binding_Update
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing source_address
                      set to care_of_address
                  and containing A_Bit set to 1
                  and containing Home_Address_option
                      indicating home_address having deprecated subnet_prefix }
       then { IUT sends Neighbor_Solicitation          -- IUT starts
                  containing source_address            -- Duplicate
                      set to unspecified_address       -- Address
                and containing destination_address
                      set to care_of_address }
       when { IUT receives no Neighbor_Advertisement  -- DAD succeeds
                  containing source_address
                      set to care_of_address }
       then { IUT sends Binding_Acknowledgement
                  containing status
                      set to 1 Accepted_but_prefix_discovery_necessary }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1513_01**		
Summary:	Test reaction on binding update message when Duplicate Address Detection succeeds, K = 1		
References:	RQ_001_1513, RQ_001_1501, RQ_001_1510		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1513_01

```
with { IUT ready to receive Binding_Update
       IUT dynamically established IPsec_security_association with Home_Agent
       IUT configured to 'update its endpoint in the used key management protocol to the
new care-of address every time it moves'

     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing source_address
                      set to care_of_address
                and containing A_Bit set to 1
                and containing K_Bit set to 1 }
       then { IUT sends Neighbor_Solicitation          -- IUT starts
                  containing source_address            -- Duplicate
                      set to unspecified_address       -- Address
                and containing destination_address
                      set to care_of_address }
       when { IUT receives no Neighbor_Advertisement   -- DAD succeeds
                  containing source_address
                      set to care_of_address }
       then { IUT sends Binding_Acknowledgement
                  containing status
                      set to 0 Binding_Update_accepted
                and containing K_Bit set to 1 }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1518_01**		
Summary:	Test reaction on binding update message when Duplicate Address Detection succeeds, Binding Cache in non-volatile storage		
References:	RQ_001_1518, RQ_001_1501, RQ_001_1510		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1518_01

```
with {    IUT ready to receive Binding_Update
       and IUT 'storing Binding Cache entries in non-volatile storage'
     }
ensure that
     { when {     IUT receives Binding_Update from Mobile_Node
                     containing source_address
                         set to care_of_address
                  and containing A_Bit set to 1 }
       then {     IUT sends Neighbor_Solicitation          -- IUT starts
                      containing source_address            -- Duplicate
                          set to unspecified_address       -- Address
                  and containing destination_address
                          set to care_of_address }
       when {     IUT receives no Neighbor_Advertisement   -- DAD succeeds
                      containing source_address
                          set to care_of_address }
       then {     IUT sends Binding_Acknowledgement
                      containing status
                          set to 0 Binding_Update_accepted
              and not containing Binding_Refresh_Advice_mobility_option }
     }
```

A.1.5.1.2 Primary care-of address de-registration

Test Purpose			
Identifier:	**TP_MOB_1526_01**		
Summary:	Test reaction on binding update message for De-Registration when no Binding Cache entry exists		
References:	RQ_001_1526, RQ_001_1527, RQ_001_1535		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1526_01

```
with { IUT ready to receive Binding_Update
       IUT having no binding_cache_entry for the Mobile_Node
     }
ensure that
     { when { IUT receives Binding_Update from Mobile_Node
                  containing source_address
                      set to home_address
              and containing A_Bit set to 1
              and containing H_Bit set to 1
              and containing lifetime set to 0 }
       then { IUT rejects Binding_Update
                  and optionally
                     (IUT sends Binding_Acknowledgement
                          containing destination_address
                              set to Mobile_Node link_layer_address
                           and containing status
                              set to 133 not_home_agent_for_this_mobile_node) }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1529_01**		
Summary:	Test reaction on binding update message for De-Registration		
References:	RQ_001_1529, RQ_001_1527, RQ_001_1530, RQ_001_1531, RQ_001_1532, RQ_001_1533, RQ_001_2004, RQ_001_2013		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1529_01

```
with { IUT ready to receive Binding_Update
       IUT having a binding_cache_entry for the Mobile_Node
     }
ensure that
     { when {      IUT receives Binding_Update from Mobile_Node
                       containing source_address
                           set to home_address
                   and containing A_Bit set to 1
                   and containing H_Bit set to 1
                   and containing lifetime set to 0 }
       then {      IUT sends Binding_Acknowledgement
                       containing source_address
                           set to address of Home_Agent
                   and containing destination_address
                           set to home_address
                   and containing ESP_header
                   and containing status
                           set to 0 Binding_Update_accepted
                   and containing sequence_number
                           set to sequence_number received in Binding_Update
                   and containing lifetime set to 0
              and not containing Binding_Refresh_Advice_mobility_option }
     }
```

A.1.5.2 Packet processing

A.1.5.2.1 Intercepting packets for a mobile node

Test Purpose			
Identifier:	**TP_MOB_1537_01**		
Summary:	Test generation of Neighbor Advertisement message after creating binding		
References:	RQ_001_1537, RQ_001_1539, RQ_001_1540, RQ_001_1541, RQ_001_1542, RQ_001_1543, RQ_001_1544		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1537_01

```
with { IUT having a new binding_cache_entry for a specific Mobile_Node
     }
ensure that
     { when { IUT is requested to send Neighbor_Advertisement }
       then { IUT sends Neighbor_Advertisement
                   containing destination_address
                       set to multicast_address
              and containing target_address
                       set to address of Mobile_Node
              and containing R_Bit set to 0
              and containing S_Flag set to 0
              and containing O_Flag set to 1
              and containing Target_Link_layer_Address_option
                       set to link_layer_address of Home_Agent }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1538_01**		
Summary:	Test generation of Neighbor Advertisement message after creating binding		
References:	RQ_001_1538, RQ_001_1539, RQ_001_1540, RQ_001_1541, RQ_001_1542, RQ_001_1543, RQ_001_1544		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1538_01

```
with {     IUT having new binding_Cache_entry for a specific Mobile_Node
               '(L bit was set)'
     }
ensure that
     { when { IUT is requested to send Neighbor_Advertisement }
       then { IUT sends Neighbor_Advertisement
                   containing destination_address
                       set to multicast_address
              and containing target_address
                       set to link_local_address of Mobile_Node
              and containing R_Bit set to 0
              and containing S_Flag set to 0
              and containing O_Flag set to 1
              and containing Target_Link_layer_Address_option
                       set to link_layer_address of Home_Agent }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1547_01**		
Summary:	Test reaction to Neighbor Solicitation message		
References:	RQ_001_1547, RQ_001_1548, RQ_001_1549		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1547_01

```
with { IUT having a binding_cache_entry for a specific Mobile_Node
     }
ensure that
     { when { IUT receives Neighbor_Solicitation
                  containing target_address
                      set to address of Mobile_Node }
       then { IUT sends Neighbor_Advertisement
                  containing target_address
                      set to address of Mobile_Node
              and containing R_Bit set to 0
              and containing Target_Link_layer_Address_option
                  indicating link_layer_address of Home_Agent }
     }
```

A.1.5.2.2 Processing intercepted packets

Test Purpose			
Identifier:	**TP_MOB_1551_01**		
Summary:	Test tunnelling of intercepted packets		
References:	RQ_001_1551, RQ_001_1550		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1551_01

```
with { IUT having a binding_cache_entry for a specific Mobile_Node
     }
ensure that
     { when { IUT receives an IPv6Packet
                  containing destination_address
                      set to address of Mobile_Node }
       then { IUT sends an IPv6Packet in tunneled_mode to Mobile_Node
                  containing source_address
                      set to address of Home_Agent
              and containing destination_address
                      set to primary_care_of_address of Mobile_Node }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1552_01**		
Summary:	Test discard of packets to Mobile_Node link local address		
References:	RQ_001_1552, RQ_001_1553		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1552_01

```
with { IUT having a binding_cache_entry for a specific Mobile_Node
     }
ensure that
     { when { IUT receives an IPv6Packet
                  containing destination_address
                      set to link_local_address of Mobile_Node }
       then { IUT discards IPv6Packet
              and optionally
                  (IUT sends ICMP_Destination_Unreachable
                       containing code
                           set to 3 address_unreachable
                   and containing destination_address
                           set to source_address of received IPv6Packet) }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1555_01**		
Summary:	Test discard of multicast packets with link local scope		
References:	RQ_001_1555, RQ_001_1556		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1555_01

```
with { IUT having a binding_cache_entry for a specific Mobile_Node
       and IUT 'having obtained Mobile_Node multicast group membership'
     }
ensure that
     { when { IUT receives an IPv6Packet
                  containing destination_address
                      set to link_local_multicast_address }
       then { IUT discards the IPv6Packet }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1557_01**		
Summary:	Test tunnelling of intercepted multicast packets with global scope		
References:	RQ_001_1557		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1557_01

```
with {     IUT having a binding_cache_entry for a specific Mobile_Node
       and IUT 'having obtained Mobile_Node multicast group membership'
     }
ensure that
     { when { IUT receives an IPv6Packet
                  containing destination_address
                      set to global_multicast_address 'to which Mobile_Node is subscribed'
}
       then { IUT sends IPv6Packet in tunneled_mode to Mobile_Node
                  containing source_address
                      set to address of Home_Agent
              and containing destination_address
                      set to primary_care_of_address of Mobile_Node }
     }
```

A.1.5.2.3 Multicast membership control

Test Purpose			
Identifier:	**TP_MOB_1562_01**		
Summary:	Test generation of MLD Query message		
References:	RQ_001_1562		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1562_01

```
with {     IUT having a binding_cache_entry for a specific Mobile_Node
       and IUT 'able to perform Multicast Membership Control'
     }
ensure that
     { when { IUT is requested to send MLD_Query }
       then { IUT sends MLD_Query in tunneled_mode to Mobile_Node }
     }
```

A.1.5.2.4 Handling reverse tunnelled packets

Test Purpose			
Identifier:	**TP_MOB_1568_01**		
Summary:	Test reverse tunnelling support		
References:	RQ_001_1568, RQ_001_1569		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1568_01

```
with { IUT having a binding_cache_entry for a specific Mobile_Node
     }
ensure that
     { when {      IUT receives an IPv6Packet in tunneled_mode from Mobile_Node
                       containing source_address
                           set to primary_care_of_address of Mobile_Node
              and containing a valid ESP_header }
       then {      IUT sends IPv6Packet not in tunneled_mode }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1570_01**		
Summary:	Test reverse tunnelling support		
References:	RQ_001_1570		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1570_01

```
with { IUT having a binding_cache_entry for a specific Mobile_Node
     }
ensure that
     { when {      IUT receives an IPv6Packet in tunneled_mode from Mobile_Node
                       containing source_address
                           not set to primary_care_of_address of Mobile_Node
              and not containing an ESP_header }
       then {      IUT discards IPv6Packet }
     }
```

A.1.5.3 Dynamic home agent address discovery

A.1.5.3.1 Receiving router advertisement messages

Test Purpose			
Identifier:	**TP_MOB_1576_01**		
Summary:	Test of home agent list administration, no entry created		
References:	RQ_001_1576, RQ_001_1588		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1576_01

```
with { IUT having Home_Agents_list_entry for a specific Home_Agent
     }
ensure that
     { when {      IUT receives Router_Advertisement from Home_Agent
                       containing H_Bit set to 0
              and IUT receives ICMP_Home_Agent_Address_Discovery_Request
                           from Mobile_Node
                       containing destination_address
                           set to anycast_address of Home_Agent }
       then {      IUT sends ICMP_Home_Agent_Address_Discovery_Reply
                       containing source_address
                           set to global_unicast_address of Home_Agent
                       and containing Home_Agent_Addresses
                           not set to address of Home_Agent
                                   that sent Router_Advertisement
              or IUT sends no response }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1582_01**		
Summary:	Test of home agent list administration, no entry created		
References:	RQ_001_1582, RQ_001_1588		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1582_01

```
with { IUT having Home_Agents_list_entry for a specific Home_Agent
     }
ensure that
     { when {      IUT receives Router_Advertisement from Home_Agent
                       containing H_Bit set to 1
                   and containing router_lifetime set to 0
               and IUT receives ICMP_Home_Agent_Address_Discovery_Request
                           from Mobile_Node
                       containing destination_address
                           set to anycast_address of Home_Agent }
       then {      IUT sends ICMP_Home_Agent_Address_Discovery_Reply
                       containing source_address
                           set to global_unicast_address of Home_Agent
                   and containing Home_Agent_Addresses
                       not set to address of Home_Agent
                         that sent Router_Advertisement
                or IUT sends no response }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1588_01**		
Summary:	Test of home agent list administration, entry created		
References:	RQ_001_1588		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1588_01

```
with { IUT having Home_Agents_list_entry for a specific Home_Agent
     }
ensure that
     { when {      IUT receives valid Router_Advertisement from Home_Agent
                       containing H_Bit set to 1
               and IUT receives ICMP_Home_Agent_Address_Discovery_Request
                           from Mobile_Node
                       containing destination_address
                           set to anycast_address of Home_Agent }
       then {      IUT sends ICMP_Home_Agent_Address_Discovery_Request
                       containing source_address
                           set to global_unicast_address of Home_Agent
                or IUT sends no response }
     }
```

A.1.5.4 Sending prefix information to the mobile node

A.1.5.4.1 Scheduling prefix deliveries

Test Purpose			
Identifier:	**TP_MOB_1591_01**		
Summary:	Test generation of unsolicited Mobile Prefix Advertisement message		
References:	RQ_001_1591, RQ_001_1595, RQ_001_1812, RQ_001_1606		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1591_01

```
with { IUT having a binding_cache_entry for a specific Mobile_Node
       and IUT ready to send Mobile_Prefix_Advertisement }
       -- a change of the state of the flags for the prefix of the Mobile_Node
       -- home address occurred or a prefix matching the Mobile_Node home
       -- registration is added or its information changed or the preferred
       -- lifetime is reconfigured. To be discussed, if this can be triggered!

ensure that
     { when { IUT is requested to send Mobile_Prefix_Advertisement }
       then { IUT sends Mobile_Prefix_Advertisement to Mobile_Node
                    containing source_address
                        set to address of Home_Agent
              and containing destination_address
                        set to home_address of Mobile_Node
              and containing type_2_routing_header
                    indicating home_address of Mobile_Node }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1594_01**		
Summary:	Test generation of solicited Mobile Prefix Advertisement message		
References:	RQ_001_1594, RQ_001_1813, RQ_001_1606, RQ_001_2016, RQ_001_2029, RQ_001_2030		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1594_01

```
with { IUT having a binding_cache_entry for a specific Mobile_Node
     }
ensure that
     { when { IUT receives Mobile_Prefix_Solicitation from Mobile_Node
                    containing home_address_destination_option
                    indicating home_address of Mobile_Node
              and containing ESP_header }
       then { IUT sends Mobile_Prefix_Advertisement to Mobile_Node
                    containing source_address
                        set to address of Home_Agent
              and containing destination_address
                        set to home_address of Mobile_Node
              and containing type_2_routing_header
                    indicating home_address of Mobile_Node }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1595_01**		
Summary:	Test sending of Mobile Prefix Advertisement message after MaxMobPfxAdvInterval		
References:	RQ_001_1595, RQ_001_1606		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1595_01

```
with { IUT having a binding_cache_entry for a specific Mobile_Node
     }
ensure that
     { when { IUT is requested to send Mobile_Prefix_Advertisement
                  after MaxMobPfxAdvInterval expires }
       then { IUT sends Mobile_Prefix_Advertisement to Mobile_Node
                  containing source_address
                      set to address of Home_Agent
                and containing destination_address
                      set to home_address of Mobile_Node
                and containing type_2_routing_header
                      indicating home_address of Mobile_Node }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1601_01**		
Summary:	Test repetition of sending of Mobile Prefix Advertisement message		
References:	RQ_001_1601, RQ_001_1606		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1601_01

```
with {     IUT having a binding_cache_entry for a specific Mobile_Node
       and IUT having sent Mobile_Prefix_Advertisement
                to this specific Mobile_Node
     }
ensure that
     { when { IUT not receives Mobile_Prefix_Solicitation from Mobile_Node}
       then { IUT sends Mobile_Prefix_Advertisement to Mobile_Node
                  after PREFIX_ADV_TIMEOUT }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1601_02**		
Summary:	Test repetition of sending of Mobile Prefix Advertisement message		
References:	RQ_001_1601, RQ_001_1606		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1601_02

```
with {     IUT having a binding_cache_entry for a specific Mobile_Node
       and IUT 'having repeated Mobile Prefix Advertisement
                to this specific Mobile_Node once'
     }
ensure that
     { when { IUT receives no Mobile_Prefix_Solicitation from Mobile_Node }
       then { IUT sends Mobile_Prefix_Advertisement to Mobile_Node
                  after 2 times PREFIX_ADV_TIMEOUT }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1601_03**		
Summary:	Test repetition of sending of Mobile Prefix Advertisement message		
References:	RQ_001_1601, RQ_001_1606		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1601_03

```
with {     IUT having a binding_cache_entry for a specific Mobile_Node
       and IUT 'having repeated Mobile Prefix Advertisement
                to this specific Mobile_Node twice'
     }
ensure that
     { when { IUT receives no Mobile_Prefix_Solicitation from Mobile_Node}
       then { IUT sends Mobile_Prefix_Advertisement to Mobile_Node
                  after 4 times PREFIX_ADV_TIMEOUT }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1602_01**		
Summary:	Test stop of sending of Mobile Prefix Advertisement message after binding expires		
References:	RQ_001_1601, RQ_001_1606		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1602_01

```
with {      IUT having a binding_cache_entry for a specific Mobile_Node
       and IUT 'having repeated Mobile Prefix Advertisement
                to this specific Mobile_Node once'
     }
ensure that
     { when {      IUT receives no Mobile_Prefix_Solicitation from Mobile_Node
              and binding of Mobile_Node expires
                  before 2 times PREFIX_ADV_TIMEOUT }
       then { IUT sends no Mobile_Prefix_Advertisement to Mobile_Node}
     }
```

A.1.6 Mobile node operation

A.1.6.1 Packet processing

A.1.6.1.1 Sending packets while away from home

Test Purpose			
Identifier:	**TP_MOB_1615_01**		
Summary:	Test generation of IPv6 packets when no binding to Correspondent_Node exists		
References:	RQ_001_1615, RQ_001_1819		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1615_01

```
with {      IUT away_from_home
       and IUT having a binding to Home_Agent
       and IUT having no binding with specific Correspondent_Node
       and IUT not configured to support Route_Optimization
     }
ensure that
     { when { IUT is requested to send an IPv6Packet to Correspondent_Node }
       then { IUT sends IPv6Packet in tunneled_mode
                  containing source_address
                      set to the primary_care_of_address of the Mobile_Node
              and containing destination_address
                      set to the address of the Home_Agent
              and containing an inner_IPv6Packet
                                containing source_address
                                    set to home_address of Mobile_Node
                            and containing destination_address
                                    set to Correspondent_Node_address }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1820_01**		
Summary:	Test processing of reverse tunnelled IPv6 packets		
References:	RQ_001_1820		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1820_01

```
with { IUT having a binding to Mobile_Node
     }
ensure that
     { when { IUT receives IPv6Packet in tunneled_mode from Mobile_Node
                  containing source_address
                      set to the primary_care_of_address of the Mobile_Node
              and containing destination_address
                      set to address of Home_Agent
              and containing an inner_IPv6Packet
                              containing source_address
                                  set to home_address of Mobile_Node
                          and containing destination_address
                                  set to Correspondent_Node_address }
       then { IUT sends IPv6Packet to Correspondent_Node
                  containing source_address
                      set to home_address of Mobile_Node
              and containing destination_address
                      set to Correspondent_Node_address }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1619_01**		
Summary:	Test generation of IPv6 packets when binding to Correspondent_Node exists		
References:	RQ_001_1619, RQ_001_1614, RQ_001_1622		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1619_01

```
with {      IUT away_from_home
       and IUT having a binding to Home_Agent
       and IUT having a binding to specific Correspondent_Node
     }
ensure that
     { when { IUT is requested to send an IPv6Packet to Correspondent_Node}
       then { IUT sends IPv6Packet to Correspondent_Node
                  containing source_address
                      set to care_of_address
              and containing Home_Address_option
                  indicating home_address }
     }
```

A.1.6.1.2 Interaction with outbound ipsec processing

Test Purpose			
Identifier:	**TP_MOB_1625_01**		
Summary:	Test generation of IPv6 packets with outbound IPSec processing		
References:	RQ_001_1625, RQ_001_1626, RQ_001_1627		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1625_01

```
with {      IUT away_from_home
       and IUT 'using route optimisation'
       and IUT having a binding to specific Correspondent_Node
       and IUT 'is communicating with' Correspondent_Node 'using IPsec in transport mode'
     }
ensure that
     { when { IUT is requested to send an IPv6Packet to Correspondent_Node}
       then { IUT sends IPv6Packet to Home_Agent
                   containing Destination_Options_Header
                              after the Routing_Header
                          and before the IPsec_Header
              and containing home_address_destination_option
              and containing IPsec_header
                              containing 'correctly coded Authentication Data' }
     }
```

A.1.6.1.3 Receiving packets while away from home

Test Purpose			
Identifier:	**TP_MOB_1631_01**		
Summary:	Test processing of reverse tunnelled IPv6 packets		
References:	RQ_001_1631, RQ_001_1632		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1631_01

```
with {      IUT away_from_home
       and IUT having a binding to Home_Agent
       and IUT having no binding to specific Correspondent_Node
     }
ensure that
     { when { IUT receives IPv6Packet in tunneled_mode from Home_Agent
                   containing source_address
                       set to address of Home_Agent
              and containing destination_address
                       set to address of Mobile_Node
              and containing an inner_IPv6Packet
                              containing source_address
                                  set to Correspondent_Node_address
                          and containing destination_address
                                  set to address of Mobile_Node }
       then { IUT 'decapsulates and processes' inner_IPv6Packet }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1633_01**		
Summary:	Test processing of IPv6 packets received via route optimization		
References:	RQ_001_1633		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1633_01

```
with { IUT away_from_home
       and IUT having binding to specific Correspondent_Node
     }
ensure that
     { when { IUT receives IPv6Packet from Correspondent_Node
                  containing source_address
                      set to home_address of Correspondent_Node
              and containing destination_address
                      set to care_of_address of Mobile_Node
              and containing type_2_routing_header
                             containing length_field set to 2
                         and containing segments_left_field set to 1
                         and containing home_address_field
                                 set to unicast_home_address of Mobile_Node }
       then { IUT 'processes' IPv6Packet }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1633_02**		
Summary:	Test processing of IPv6 packets received via route optimization		
References:	RQ_001_1633		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1633_02

```
with { IUT away_from_home
       and IUT having a binding to a specific Correspondent_Node
     }
ensure that
     { when { IUT receives IPv6Packet from Correspondent_Node
                  containing source_address
                      set to home_address of Correspondent_Node
              and containing destination_address
                      set to care_of_address of Mobile_Node
              and containing type_2_routing_header
                             containing length_field not set to 2
                         and containing segments_left_field set to 1
                         and containing home_address_field
                                 set to unicast_home_address of Mobile_Node }
       then { IUT discards IPv6Packet }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1633_03**		
Summary:	Test processing of IPv6 packets received via route optimization		
References:	RQ_001_1633		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1633_03

```
with { IUT away_from_home
       and IUT having a binding to a specific Correspondent_Node
     }ensure that
     { when { IUT receives IPv6Packet from Correspondent_Node
                  containing source_address
                      set to home_address of Correspondent_Node
              and containing destination_address
                      set to care_of_address of Mobile_Node
              and containing type_2_routing_header
                             containing length_field set to 2
                         and containing segments_left_field not set to 1
                         and containing home_address_field
                                 set to unicast_home_address of Mobile_Node }
       then { IUT discards IPv6Packet }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1633_04**		
Summary:	Test processing of IPv6 packets received via route optimization		
References:	RQ_001_1633		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1633_04

```
with { IUT away_from_home
       and IUT having a binding to a specific Correspondent_Node
     }
ensure that
     { when { IUT receives IPv6Packet from Correspondent_Node
                  containing source_address
                      set to home_address of Correspondent_Node
              and containing destination_address
                      set to care_of_address of Mobile_Node
              and containing type_2_routing_header
                             containing length_field set to 2
                         and containing segments_left_field set to 1
                         and containing home_address_field
                                  not set to unicast_home_address of Mobile_Node }
       then { IUT discards IPv6Packet }
     }
```

A.1.6.1.4 Routing multicast packets

Test Purpose			
Identifier:	**TP_MOB_1634_01**		
Summary:	Test generation of MLD Report message		
References:	RQ_001_1634, RQ_001_1635		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1634_01

```
with { IUT 'ready to join multicast group on visited link'
     }
ensure that
     { when {     IUT is requested to send MLD_Report }
       then {     IUT sends MLD_Report
                      containing source_address
                          set to care_of_address
              and not containing home_address_destination_option }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1636_01**		
Summary:	Test generation of MLD Report message		
References:	RQ_001_1636		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1636_01

```
with { IUT having a binding to Home_Agent
       and IUT 'listening to a specific multicast address'
     }
ensure that
     { when { IUT receives MLD_Query in tunneled_mode from Home_Agent
                  containing multicast_address
                      set to 'listened-to' address
              and containing Maximum_Response_Delay set to 0 }
       then { IUT sends MLD_Report in tunneled_mode to Home_Agent }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1638_01**		
Summary:	Test generation of multicast packets		
References:	RQ_001_1638		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1638_01

```
with { IUT 'ready to send packets to multicast group on visited link'
     }
ensure that
     { when {     IUT is requested to send an IPv6Packet to a multicast_group }
       then {     IUT sends IPv6Packet
                      containing source_address
                          set to care_of_address
                  and not containing home_address_destination_option }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1639_01**		
Summary:	Test generation of multicast packets		
References:	RQ_001_1639		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1639_01

```
with {     IUT having a binding to Home_Agent
       and IUT 'ready to send packets to multicast group via Home_Agent'
     }
ensure that
     { when { IUT is requested to send an IPv6Packet in tunneled_mode
                                      to a multicast_group }
       then { IUT sends IPv6Packet to Home_Agent
                  containing an inner_IPv6Packet
                             containing source_address
                                 set to home_address }
     }
```

A.1.6.1.5 Receiving binding error messages

Test Purpose			
Identifier:	**TP_MOB_1645_01**		
Summary:	Test reaction on Binding Error message		
References:	RQ_001_1645		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1645_01

```
with {     IUT away_from_home
       and IUT having no binding to a specific Correspondent_Node
     }
ensure that
     { when { IUT receives Binding_Error from Correspondent_Node}
       then { IUT discards Binding_Error }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1648_01**		
Summary:	Test reaction on Binding Error message		
References:	RQ_001_1648, RQ_001_1649		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1648_01

```
with { IUT away_from_home
       and IUT having a binding to a specific Correspondent_Node
       and IUT 'having no upper layer progress information on packet exchange
                with Correspondent_Node'
     }
ensure that
     { when { IUT receives Binding_Error from Correspondent_Node
                 containing status
                 set to 1 unknown_binding_for_Home_Address_destination_option }
       then { IUT stops packet_exchange to Correspondent_Node
              and optionally
                 (IUT starts Return_Routability_procedure) }
     }
```

A.1.6.2 Home agent and prefix management

A.1.6.2.1 Dynamic home agent address discovery

Test Purpose			
Identifier:	**TP_MOB_1655_01**		
Summary:	Test generation of binding update message to register new care-of address		
References:	RQ_001_1655		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1655_01

```
with { IUT having a binding to a specific Home_Agent
     }
ensure that
     { when { IUT is requested to send Binding_Update 'to register new
                                                       care-of address' }
       then { IUT sends Binding_Update
                   containing destination_address
                       set to address of Home_Agent }
     }
```

A.1.6.2.2 Sending mobile prefix solicitations

Test Purpose			
Identifier:	**TP_MOB_1661_01**		
Summary:	Test generation of Mobile Prefix Solicitations message		
References:	RQ_001_1661, RQ_001_1662, RQ_001_1665		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1661_01

```
with { IUT having a binding with a specific Home_Agent
       and IUT ready to send Mobile_Prefix_Solicitation
     }
ensure that
     { when { IUT is requested to send Mobile_Prefix_Solicitation }
       then { IUT sends Mobile_Prefix_Solicitation to Home_Agent
                   containing home_address_destination_option
                   indicating home_address of Mobile_Node
              and containing identifier
                       set to a random_value }
     }
```

A.1.6.2.3 Receiving mobile prefix advertisements

Test Purpose			
Identifier:	**TP_MOB_1669_01**		
Summary:	Test reaction to unsolicited Mobile Prefix Advertisement message		
References:	RQ_001_1669, RQ_001_1672, RQ_001_1677, RQ_001_2016		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1669_01

```
with { IUT having a binding to a specific Home_Agent
     }
ensure that
     { when { IUT receives Mobile_Prefix_Advertisement from Home_Agent
                  containing source_address
                      set to address of Home_Agent
              and containing type_2_routing_header
              and containing ESP_header }
       then { IUT accepts Mobile_Prefix_Advertisement }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1670_01**		
Summary:	Test reaction to unsolicited Mobile Prefix Advertisement message		
References:	RQ_001_1670, RQ_001_1672, RQ_001_1677		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1670_01

```
with {     IUT having no binding to a specific Home_Agent
       and IUT having stored home_address of specific Home_Agent
     }
ensure that
     { when { IUT receives Mobile_Prefix_Advertisement from Home_Agent
                  containing source_address
                      set to address of Home_Agent
              and containing type_2_routing_header }
       then { IUT accepts Mobile_Prefix_Advertisement }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1671_01**		
Summary:	Test reaction to unsolicited Mobile Prefix Advertisement message		
References:	RQ_001_1671		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1671_01

```
with {     IUT having no binding to a specific Home_Agent
       and IUT not having stored home_address of specific Home_Agent
     }
ensure that
     { when { IUT receives Mobile_Prefix_Advertisement from Home_Agent
                  containing source_address
                      set to address of Home_Agent
              and containing type_2_routing_header }
       then { IUT discards Mobile_Prefix_Advertisement }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1672_01**		
Summary:	Test reaction to unsolicited Mobile Prefix Advertisement message		
References:	RQ_001_1672		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1672_01

```
with { IUT having a binding to a specific Home_Agent
     }
ensure that
     { when {     IUT receives Mobile_Prefix_Advertisement from Home_Agent
                      containing source_address
                          set to address of Home_Agent
              and not containing type_2_routing_header }
       then { IUT discards Mobile_Prefix_Advertisement }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1674_01**		
Summary:	Test reaction to solicited Mobile Prefix Advertisement message		
References:	RQ_001_1674		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1674_01

```
with { IUT having a binding to a specific Home_Agent
       and IUT sent Mobile_Prefix_Solicitation
     }
ensure that
     { when { IUT receives Mobile_Prefix_Advertisement from Home_Agent
                  containing source_address
                      set to address of Home_Agent
              and containing type_2_routing_header
              and containing identifier
                      set to identifier in sent Mobile_Prefix_Solicitation }
       then { IUT accepts Mobile_Prefix_Advertisement }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1674_02**		
Summary:	Test reaction to solicited Mobile Prefix Advertisement message		
References:	RQ_001_1674		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1674_02

```
with { IUT having a binding to a specific Home_Agent
       and IUT having sent Mobile_Prefix_Solicitation
     }
ensure that
     { when { IUT receives Mobile_Prefix_Advertisement from Home_Agent
                  containing source_address
                      set to address of Home_Agent
              and containing type_2_routing_header
              and containing identifier
                      set to identifier in sent Mobile_Prefix_Solicitation }
       then { IUT discards Mobile_Prefix_Advertisement }
     }
```

A.1.6.3 Movement

A.1.6.3.1 Using multiple care-of addresses

Test Purpose			
Identifier:	**TP_MOB_1690_01**		
Summary:	Test of binding update sent by mobile node		
References:	RQ_001_1690, RQ_001_1689, RQ_001_1691, RQ_001_1727		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1690_01

```
with { IUT away_from_home
       and IUT having new primary_care_of_address
     }
ensure that
     { when { IUT is requested to send Binding_Update }
       then { IUT sends Binding_Update to Home_Agent
                  containing source_address
                      set to new primary_care_of_address
              and containing H_Bit set to 1
              and containing A_Bit set to 1 }
     }
```

A.1.6.3.2 Returning home

Test Purpose			
Identifier:	**TP_MOB_1695_01**		
Summary:	Test of binding update sent by mobile node		
References:	RQ_001_1695, RQ_001_1696, RQ_001_2003, RQ_001_2013		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1695_01

```
with { IUT 'detects home subnet prefix is on-link'
       and IUT ready to send Binding_Update 'on returning home'
     }
ensure that
     { when { IUT is requested to send Binding_Update }
       then { IUT sends Binding_Update to Home_Agent
                    containing source_address
                        set to home_address
              and containing destination_address
                        set to address of Home_Agent
              and containing ESP_header
              and containing H_Bit set to 1
              and containing A_Bit set to 1
              and containing lifetime set to 0 }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1698_01**		
Summary:	Test of binding update sent by mobile node		
References:	RQ_001_1698, RQ_001_1697		
IUT Role:	Home_Agent	**Test case:**	TC_MOB_1698_01

```
with { IUT having a binding_cache_entry for a specific Mobile_Node
     }
ensure that
     { when { IUT receives Neighbor_Solicitation from Mobile_Node
                    containing source_address
                        set to unspecified_address
              and containing destination_address
                        set to multicast_address of Mobile_Node
              and containing target_address
                        set to home_address of Mobile_Node }
       then { IUT sends Neighbor_Advertisement to Mobile_Node
                    containing destination_address
                        set to multicast_address
              and containing S_Flag set to 0 }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1702_01**		
Summary:	Test reaction on Neighbor Solicitation after coming home		
References:	RQ_001_1702, RQ_001_1703		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1702_01

```
with { IUT 'having detected home subnet prefix is on-link'
       and IUT having sent Binding_Update 'on returning home'
     }
ensure that
     { when { IUT receives Neighbor_Solicitation }
       then { IUT sends Neighbor_Advertisement
                    containing destination_address
                        set to unicast_link_layer_address }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1704_01**		
Summary:	Test of Neighbor Advertisement after coming home		
References:	RQ_001_1704, RQ_001_1705, RQ_001_1706		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1704_01

```
with { IUT 'having detected home subnet prefix is on-link'
       and IUT having sent Binding_Update 'on returning home'
     }
ensure that
     { when { IUT receives Binding_Acknowledgement }
       then { IUT sends 1 Neighbor_Advertisement for each home_address
                   containing destination_address
                       set to all_nodes_multicast_address
              and containing target_address
                       set to home_address of Mobile_Node
              and containing Target_Link_layer_Address_option
                   indicating link_layer_address of Mobile_Node
              and containing S_Flag set to 0
              and containing O_Flag set to 1 }
     }
```

A.1.6.4 Return routability procedure

A.1.6.4.1 Receiving test messages

Test Purpose			
Identifier:	**TP_MOB_1716_01**		
Summary:	Test reaction on invalid Home Test message		
References:	RQ_001_1716, RQ_001_1715		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1716_01

```
with { IUT away_from_home
       and IUT having sent Home_Test_Init and Care_of_Test_Init
     }
ensure that
     { when { IUT receives home_test in tunneled_mode from Home_Agent
                   containing source_address
                       set to 'address with which no Return Routability Procedure
                               is in progress' }
       then { IUT discards home_test }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1716_02**		
Summary:	Test reaction on invalid Home Test message		
References:	RQ_001_1716, RQ_001_1715		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1716_02

```
with { IUT away_from_home
       and IUT having sent Home_Test_Init and Care_of_Test_Init
     }
ensure that
     { when { IUT receives home_test in tunneled_mode from Home_Agent
                   containing destination_address
                   not set to home_address }
       then { IUT discards home_test }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1716_03**		
Summary:	Test reaction on invalid Home Test message		
References:	RQ_001_1716, RQ_001_1715		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1716_03

```
with { IUT away_from_home
       and IUT having sent Home_Test_Init and Care_of_Test_Init
     }
ensure that
     { when { IUT receives home_test not in tunneled_mode from Home_Agent }
       then { IUT discards home_test }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1716_04**		
Summary:	Test reaction on invalid Home Test message		
References:	RQ_001_1716, RQ_001_1715		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1716_04

```
with { IUT away_from_home
       and IUT having sent Home_Test_Init and Care_of_Test_Init
     }
ensure that
     { when { IUT receives home_test in tunneled_mode from Home_Agent
                  containing invalid home_init_cookie }
       then { IUT discards home_test }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1720_01**		
Summary:	Test reaction on invalid care-of test message		
References:	RQ_001_1720, RQ_001_1719		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1720_01

```
with { IUT away_from_home
       and IUT having sent Home_Test_Init and Care_of_Test_Init
     }
ensure that
     { when { IUT receives Care_of_Test from Correspondent_Node
                  containing source_address
                      set to 'address with which no Return Routability Procedure
                              is in progress' }
       then { IUT discards Care_of_Test }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1720_02**		
Summary:	Test reaction on invalid care-of test message		
References:	RQ_001_1720, RQ_001_1719		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1720_02

```
with { IUT away_from_home
       and IUT having sent Home_Test_Init and Care_of_Test_Init
     }
ensure that
     { when { IUT receives Care_of_Test from Correspondent_Node
                  containing destination_address
                  not set to care_of_address }
       then { IUT discards Care_of_Test }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1720_03**		
Summary:	Test reaction on invalid care-of test message		
References:	RQ_001_1720, RQ_001_1719		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1720_03

```
with { IUT away_from_home
       and IUT having sent Home_Test_Init and Care_of_Test_Init
     }
ensure that
     { when { IUT receives Care_of_Test from Correspondent_Node
                  containing invalid care_of_init_cookie }
       then { IUT discards Care_of_Test }
     }
```

A.1.6.5 Processing bindings

A.1.6.5.1 Sending binding updates to the home agent

Test Purpose			
Identifier:	**TP_MOB_1730_01**		
Summary:	Test of binding update sent by mobile node		
References:	RQ_001_1730, RQ_001_1736, RQ_001_2001, RQ_001_2013, RQ_001_2028		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1730_01

```
with { IUT away_from_home
       and IUT 'ready to register or refresh Care-of address'
     }
ensure that
     { when { IUT is requested to send Binding_Update }
       then { IUT sends Binding_Update
                  containing source_address
                      set to care_of_address
                and containing destination_address
                      set to address of Home_Agent
                and containing home_address_destination_option
                    indicating home_address of Mobile_Node
                and containing ESP_header
                and containing lifetime not set to 0
                and containing H_Bit set to 1
                and containing A_Bit set to 1
                and containing alternate_Care_of_Address_mobility_option
            to Home_Agent }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1739_01**		
Summary:	Test of binding update sent by mobile node		
References:	RQ_001_1739, RQ_001_1760		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1739_01

```
with { IUT away_from_home
       and IUT having sent Binding_Update 'messages to register or refresh
                                           Care-of address'
     }
ensure that
     { when { IUT receives Binding_Acknowledgement
                  containing status
                      set to 135 Sequence_number_out_of_window
                and containing sequence_number
                      set to the previous accepted sequence_number }
       then { IUT sends more than 1 Binding_Update to Home_Agent
                  containing sequence_number
                      set to 1 plus the sequence_number from
                               the received Binding_Acknowledgement }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1742_01**		
Summary:	Test of binding update sent by mobile node		
References:	RQ_001_1742, RQ_001_1770		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1742_01

```
with {      IUT away_from_home
       and IUT sent Binding_Update 'messages to register or refresh
                                    Care-of address'
     }
ensure that
     { when { IUT receives Binding_Acknowledgement
                  containing status
                      set to 134 Duplicate_Address_Detection_failed }
       then { IUT 'does not send the same binding update message again' }
     }
```

A.1.6.5.2 Receiving binding acknowledgements

Test Purpose			
Identifier:	**TP_MOB_1764_01**		
Summary:	Test reaction on Binding Acknowledgement		
References:	RQ_001_1764, RQ_001_1763		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1764_01

```
with {      IUT away_from_home
       and IUT having sent Binding_Update to Home_Agent
     }
ensure that
     { when { IUT receives Binding_Acknowledgement from Home_Agent
                  containing unrecognized sequence_number }
       then { IUT discards Binding_Acknowledgement }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1764_02**		
Summary:	Test reaction on Binding Acknowledgement		
References:	RQ_001_1764, RQ_001_1763		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1764_02

```
with {      IUT away_from_home
       and IUT having sent Binding_Update to Correspondent_Node
     }
ensure that
     { when { IUT receives Binding_Acknowledgement from Correspondent_Node
                  containing unrecognized sequence_number }
       then { IUT discards Binding_Acknowledgement }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1764_03**		
Summary:	Test reaction on Binding Acknowledgement		
References:	RQ_001_1764, RQ_001_1763		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1764_03

```
with {      IUT away_from_home
       and IUT having sent Binding_Update to Correspondent_Node
     }
ensure that
     { when { IUT receives Binding_Acknowledgement from Correspondent_Node
                  not containing binding_authorization_data_mobility_option }
       then { IUT discards Binding_Acknowledgement }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1765_01**		
Summary:	Test reaction on Binding Acknowledgement		
References:	RQ_001_1765, RQ_001_1766		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1765_01

```
with {      IUT away_from_home
       and IUT having sent Binding_Update with A_Bit set to 1 to Home_Agent
     }
ensure that
     { when {      IUT receives Binding_Acknowledgement from Home_Agent
                       containing status
                           set to 0 Binding_Update_accepted }
       then {      IUT accepts Binding_Acknowledgement
              and IUT 'does not send the same binding update message again' }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1765_02**		
Summary:	Test reaction on Binding Acknowledgement		
References:	RQ_001_1765, RQ_001_1766		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1765_02

```
with {      IUT away_from_home
       and IUT having sent Binding_Update with A_Bit set to 1 to Correspondent_Node
     }
ensure that
     { when {      IUT receives Binding_Acknowledgement from Correspondent_Node
                       containing status
                           set to 0 Binding_Update_accepted }
       then {      IUT accepts Binding_Acknowledgement
              and IUT 'does not send the same
                        binding update message again' }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1769_01**		
Summary:	Test reaction on Binding Acknowledgement		
References:	RQ_001_1769, RQ_001_1765		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1769_01

```
with {      IUT away_from_home
       and IUT having sent Binding_Update to Home_Agent
     }
ensure that
     { when {      IUT receives Binding_Acknowledgement from Home_Agent
                       containing status
                           set to 1 Accepted_but_prefix_discovery_necessary }
       then {      IUT accepts Binding_Acknowledgement
              and optionally
                 (IUT sends Mobile_Prefix_Solicitation) }
     }
```

Test Purpose			
Identifier:	**TP_MOB_1769_02**		
Summary:	Test reaction on Binding Acknowledgement		
References:	RQ_001_1769, RQ_001_1765		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1769_02

```
with {      IUT away_from_home
       and IUT having sent Binding_Update to Correspondent_Node
     }
ensure that
     { when { IUT receives Binding_Acknowledgement from Correspondent_Node
                  containing status
                      set to 1 Accepted_but_prefix_discovery_necessary }
       then { IUT accepts Binding_Acknowledgement
              and optionally
                 (IUT sends Mobile_Prefix_Solicitation) }
     }
```

A.1.6.5.3 Receiving binding refresh requests

Test Purpose			
Identifier:	**TP_MOB_1776_02**		
Summary:	Test reaction on Binding Refresh		
References:	RQ_001_1776		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_1776_02

```
with {      IUT away_from_home
       and IUT having a binding to a specific Correspondent_Node
     }
ensure that
     { when {      IUT receives Binding_Refresh_request from Correspondent_Node }
       then {      IUT accepts Binding_Refresh_request
              and optionally
                 (IUT starts Return_Routability_Procedure) }
     }
```

A.2 IPv6 Mobility - RFC 4068

A.2.1 Protocol operation of network-initiated handover

Test Purpose			
Identifier:	**TP_MOB_3018_01**		
Summary:	Test reaction on unsolicited Proxy Router Advertisement		
References:	RQ_001_3018, RQ_001_3019, RQ_001_3164, RQ_001_3167		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_3018_01

```
with {      IUT away_from_home
       and IUT ready for handover to New_Access_Router
     }
ensure that
     { when { IUT receives Proxy_Router_Advertisement
                  containing New_Access_Point_link_local_address_option
                      set to link_layer_address of New_Access_Router
              and containing code
                      set to 1 message_sent_unsolicited }
       then { IUT sends Fast_Binding_Update
                  containing destination_address
                      set to address of Previous_Access_Router
              and containing Home_Address_option
              and containing alternate_Care_of_Address_mobility_option }
     }
```

A.2.2 Protocol details

Test Purpose			
Identifier:	**TP_MOB_3021_01**		
Summary:	Test generation of Router Solicitation for Proxy Advertisement		
References:	RQ_001_3021, RQ_001_3079		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_3021_01

```
with {      IUT away_from_home
       and IUT 'able to recognize nearby access points'
     }
ensure that
     { when { IUT is requested to send
                      Router_Solicitation_for_Proxy_Advertisement }
       then { IUT sends Router_Solicitation_for_Proxy_Advertisement
                  containing New_Access_Point_link_local_address_option }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3022_01**		
Summary:	Test reaction on Router Solicitation for Proxy Advertisement		
References:	RQ_001_3022, RQ_001_3102, RQ_001_3103		
IUT Role:	Router	**Test case:**	TC_MOB_3022_01

```
with {      IUT established as Previous_Access_Router
       and IUT 'having no entry corresponding to new endpoint'
     }
ensure that
     { when {      IUT receives Router_Solicitation_for_Proxy_Advertisement
                       containing an unknown
                                    New_Access_Point_link_local_address_option }
       then {      IUT sends Proxy_Router_Advertisement
                       containing code
                           set to 2 no_new_router_information_present
                   and containing (New_Access_Point_link_local_address_option
                                    containing option_code
                                        set to 6 'No prefix information
                                                  available for the access point
                                                  identified by the LLA') }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3024_01**		
Summary:	Test reaction on Router Solicitation for Proxy Advertisement		
References:	RQ_001_3024, RQ_001_3102, RQ_001_3103		
IUT Role:	Router	**Test case:**	TC_MOB_3024_01

```
with { IUT established as Previous_Access_Router
     }
ensure that
     { when { IUT receives Router_Solicitation_for_Proxy_Advertisement
                  containing New_Access_Point_link_local_address_option
                  indicating 'an endpoint on the same interface'}
       then { IUT sends Proxy_Router_Advertisement
                  containing code
                      set to 2 no_new_router_information_present
              and containing (New_Access_Point_link_local_address_option
                               containing option_code
                                   set to 5 'The access point identified by
                                             the LLA belongs to the current
                                             interface of the router') }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3025_01**		
Summary:	Test reaction on Router Solicitation for Proxy Advertisement		
References:	RQ_001_3025, RQ_001_3102, RQ_001_3103, RQ_001_3105, RQ_001_3106, RQ_001_3107		
IUT Role:	Router	**Test case:**	TC_MOB_3025_01

```
with {      IUT established as Previous_Access_Router
     }
ensure that
     { when { IUT receives Router_Solicitation_for_Proxy_Advertisement
                  containing New_Access_Point_link_local_address_option
                  indicating 'endpoint on different interface'}
       then { IUT sends Proxy_Router_Advertisement
                  containing code set to 1
              and containing (New_Access_Point_link_local_address_option
                               containing option_code
                                   set to 1 'Link-Layer Address of the New
                                             Access Point'
                           and containing link_layer_address of new Router
                           and containing IP_address of new Router
                           and containing Prefix_Information_Option
                                          of new Router) }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3025_02**		
Summary:	Test reaction on Router Solicitation for Proxy Advertisement		
References:	RQ_001_3025		
IUT Role:	Router	**Test case:**	TC_MOB_3025_02

```
with { IUT established as Previous_Access_Router
     }
ensure that
     { when { IUT receives Router_Solicitation_for_Proxy_Advertisement
                  containing New_Access_Point_link_local_address_option
                  indicating 'endpoint that does not support fast handover'}
       then { IUT sends Proxy_Router_Advertisement
                  containing code set to 3 }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3029_01**		
Summary:	Test generation of Fast binding update		
References:	RQ_001_3029, RQ_001_3164		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_3029_01

```
with {     IUT 'having successfully completed exchange of RtSolPr and PrRtAdv'
       and IUT 'aware of the existence of an NAR'
       and IUT connected on Previous_Access_Router_link
     }
ensure that
     { when { IUT is requested to send Fast_Binding_Update }
       then { IUT sends Fast_Binding_Update on Previous_Access_Router_link
                  containing destination_address
                      set to address of Previous_Access_Router
              and containing Home_Address_option
              and containing alternate_Care_of_Address_mobility_option
                  indicating the new Care_of_address }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3030_01**		
Summary:	Test generation of Fast binding update		
References:	RQ_001_3030, RQ_001_3041, RQ_001_3167, RQ_001_3184		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_3030_01

```
with {     IUT 'having successfully completed exchange of RtSolPr and PrRtAdv'
       and IUT connected on New_Access_Router_link
     }
ensure that
     { when { IUT is requested to send Fast_Binding_Update }
       then { IUT sends Fast_Neighbor_Advertisement on New_Access_Router_link
                  containing destination_address
                      set to address of New_Access_Router
              and containing Mobility_Header_Link_Layer_Address_Option
              and containing (inner_Fast_Binding_Update
                           containing destination_address
                               set to address of Previous_Access_Router
                      and containing Home_Address_option) }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3030_02**		
Summary:	Test tunnelling of Fast binding update		
References:	RQ_001_3030		
IUT Role:	Router	**Test case:**	TC_MOB_3030_02

```
with {      IUT established as New_Access_Router of Mobile_Node
     }
ensure that
     { when { IUT receives Fast_Neighbor_Advertisement from Mobile_Node
                  containing (inner_Fast_Binding_Update
                              containing destination_address
                                  set to address of Previous_Access_Router) }
       then { IUT sends Fast_Binding_Update to Previous_Access_Router
                  containing destination_address
                      set to address of Previous_Access_Router }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3031_01**		
Summary:	Test reaction to Fast binding update		
References:	RQ_001_3031, RQ_001_3054, RQ_001_3132, RQ_001_3117, RQ_001_3129		
IUT Role:	Router	**Test case:**	TC_MOB_3031_01

```
with {      IUT established as Previous_Access_Router of Mobile_Node
       and IUT 'having successfully completed exchange of RtSolPr and PrRtAdv'
     }
ensure that
     { when { IUT receives Fast_Binding_Update from Mobile_Node
                  containing source_address
                      set to previous Care_of_address
                  and containing alternate_Care_of_Address_mobility_option
                  indicating a new Care_of_address }
       then { IUT sends Handover_Initiate to New_Access_Router
                  containing Authentication_Header
              and containing link_layer_address_of_Mobile_Node_option
                  indicating link_layer_address_of_Mobile_Node
              and containing code set to 0
              and containing new_Care_of_Address_option
                  indicating received new Care_of_address }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3031_02**		
Summary:	Test reaction to Fast binding update		
References:	RQ_001_3031, RQ_001_3133, RQ_001_3117, RQ_001_3124, RQ_001_3129		
IUT Role:	Router	**Test case:**	TC_MOB_3031_02

```
with {      IUT established as Previous_Access_Router of Mobile_Node
       and IUT 'having successfully completed exchange of RtSolPr and PrRtAdv'
     }
ensure that
     { when { IUT receives Fast_Binding_Update from Mobile_Node
                  containing source_address
                  not set to previous Care_of_address }
       then { IUT sends Handover_Initiate to New_Access_Router
                  containing Authentication_Header
              and containing link_layer_address_of_Mobile_Node_option
                  indicating link_layer_address_of_Mobile_Node
              and containing code set to 1
              and containing S_flag set to 0 }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3035_01**		
Summary:	Test reaction to Handover Initiate		
References:	RQ_001_3035, RQ_001_3135, RQ_001_3139, RQ_001_3148, RQ_001_3150		
IUT Role:	Router	**Test case:**	TC_MOB_3035_01

```
with { IUT established as New_Access_Router of Mobile_Node
     }
ensure that
     { when { IUT receives Handover_Initiate from Previous_Access_Router
                  containing code set to 0
              and containing S_flag set to 1 }
       then { IUT sends Handover_Acknowledge to Previous_Access_Router
                  containing Authentication_Header
              and containing new_Care_of_Address_option
                  indicating new Care_of_Address }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3035_02**		
Summary:	Test reaction to Handover Initiate		
References:	RQ_001_3035, RQ_001_3135, RQ_001_3139, RQ_001_3150		
IUT Role:	Router	**Test case:**	TC_MOB_3035_02

```
with { IUT established as New_Access_Router of Mobile_Node
       and IUT 'having tunnelled Fast binding update to PAR'
     }
ensure that
     { when { IUT receives Handover_Initiate from Previous_Access_Router
                  containing code set to 1 }
       then { IUT sends Handover_Acknowledge to Previous_Access_Router
                  containing Authentication_Header }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3036_01**		
Summary:	Test reaction to Handover Acknowledge		
References:	RQ_001_3036, RQ_001_3031, RQ_001_3056, RQ_001_3179		
IUT Role:	Router	**Test case:**	TC_MOB_3036_01

```
with { IUT established as Previous_Access_Router of Mobile_Node
       and IUT having received Fast_Binding_Update from Mobile_Node
       and IUT having sent Handover_Initiate to New_Access_Router
     }
ensure that
     { when { IUT receives Handover_Acknowledge from New_Access_Router
                  containing code set to 3 'Handover Accepted, NCoA assigned' }
       then { IUT sends Fast_Binding_Acknowledgement to Mobile_Node
                  containing status set to 1 'Fast binding update accepted
                                              but NCoA is invalid'
              and containing alternate_Care_of_Address }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3036_02**		
Summary:	Test reaction to Handover Acknowledge		
References:	RQ_001_3036, RQ_001_3031		
IUT Role:	Router	**Test case:**	TC_MOB_3036_02

```
with { IUT established as Previous_Access_Router of Mobile_Node
       and IUT having received Fast_Binding_Update from Mobile_Node
       and IUT having sent Handover_Initiate to New_Access_Router
     }
ensure that
     { when { IUT receives Handover_Acknowledge from New_Access_Router
                  containing code indicating 0 'Handover Accepted, NCoA valid' }
       then { IUT sends Fast_Binding_Acknowledgement to Mobile_Node
                  containing status set to 0 'Fast binding update accepted' }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3037_01**		
Summary:	Test reaction to Fast Binding Acknowledgement		
References:	RQ_001_3037, RQ_001_3040, RQ_001_3184		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_3037_01

```
with { IUT away_from_home
       IUT having sent Fast_Binding_Update
     }
ensure that
     { when { IUT receives Fast_Binding_Acknowledgement
                  containing status set to 1 'Fast binding update accepted
                                              but NCoA is invalid'
              and containing alternate_Care_of_address}
       then { IUT accepts Fast_Binding_Acknowledgement
              and optionally
                 (IUT sends Fast_Neighbor_Advertisement
                      containing destination_address
                          set to address of New_Access_Router
                  and containing Mobility_Header_Link_Layer_Address_Option) }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3039_01**		
Summary:	Test repetition of sending of Fast binding update		
References:	RQ_001_3039		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_3039_01

```
with { IUT away_from_home
       IUT having sent Fast_Binding_Update
     }
ensure that
     { when { IUT receives no Fast_Binding_Acknowledgement }
       then { IUT sends Fast_Binding_Update FBU_RETRIES times }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3043_01**		
Summary:	Test reaction to Fast Neighbor Advertisement		
References:	RQ_001_3043, RQ_001_3045, RQ_001_3221		
IUT Role:	Router	**Test case:**	TC_MOB_3043_01

```
with {     IUT established as New_Access_Router of Mobile_Node
       and IUT 'having finished Fast Binding procedure with Mobile_Node'
     }
ensure that
     { when { IUT receives Fast_Neighbor_Advertisement
                  containing source_address
                      set to unacceptable Care_of_address }
       then { IUT sends Router_Advertisement
                  containing destination_address
                      set to received Care_of_address
              and containing Neighbor_Advertisement_Acknowledgement_option }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3046_01**		
Summary:	Test reaction on Router Advertisement in response to Fast Neighbor Advertisement		
References:	RQ_001_3046, RQ_001_3049, RQ_001_3222		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_3046_01

```
with { IUT away_from_home
       IUT 'having finished Fast Binding procedure with NAR'
       IUT having sent Fast_Neighbor_Advertisement
     }
ensure that
     { when {      IUT receives Router_Advertisement
                       containing (Neighbor_Advertisement_Acknowledgement_option
                                   containing option_code
                                       set to 2 'The new CoA is invalid;
                                                 use the supplied CoA'
                                  and containing new Care_of_address) }
       then {      IUT sends IPv6Packet
                       containing source_address
                           set to received new Care_of_address
              and IUT sends no Fast_Binding_Update }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3048_01**		
Summary:	Test reaction on Router Advertisement in response to Fast Neighbor Advertisement		
References:	RQ_001_3048, RQ_001_3047		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_3048_01

```
with { IUT away_from_home
       IUT 'having finished Fast Binding procedure with NAR'
       IUT having sent Fast_Neighbor_Advertisement
     }
ensure that
     { when { IUT receives Router_Advertisement
                  containing Neighbor_Advertisement_Acknowledgement_option
                             containing option_code set to 1 'The new CoA
                                                              is invalid'
                    and not containing new Care_of_address }
       then { IUT optionally sends Fast_Neighbor_Advertisement
                              containing inner_Fast_Binding_Update }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3223_01**		
Summary:	Test reaction on Router Advertisement in response to Fast Neighbor Advertisement		
References:	RQ_001_3223		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_3223_01

```
with { IUT away_from_home
       IUT 'having finished Fast Binding procedure with NAR'
       IUT having sent Fast_Neighbor_Advertisement
     }
ensure that
     { when { IUT receives Router_Advertisement
                  containing (Neighbor_Advertisement_Acknowledgement_option
                              containing option_code
                                set to 128 'Link Layer Address unrecognized') }
       then { IUT sends no IPv6Packet
                          containing source_address
                              set to previous Care_of_Address
                           or set to new Care_of_Address }
     }
```

A.2.3 Miscellaneous

A.2.3.1 Handover capability exchange

Test Purpose			
Identifier:	**TP_MOB_3053_01**		
Summary:	Test repetition of sending of Router Solicitation for Proxy Advertisement		
References:	RQ_001_3053		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_3053_01

```
with { IUT away_from_home
       IUT having sent Router_Solicitation_for_Proxy_Advertisement
     }
ensure that
     { when { IUT receives no Proxy_Router_Advertisement }
       then { IUT sends Router_Solicitation_for_Proxy_Advertisement
                       for RTSOLPR_RETRIES times }
     }
```

Test Purpose			
Identifier:	**TP_MOB_3053_02**		
Summary:	Test repetition of sending of Router Solicitation for Proxy Advertisement		
References:	RQ_001_3053		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_3053_02

```
with { IUT away_from_home
       IUT having sent Router_Solicitation_for_Proxy_Advertisement
       for RTSOLPR_RETRIES times
     }
ensure that
     { when { IUT receives no Proxy_Router_Advertisement }
       then { IUT sends no Router_Solicitation_for_Proxy_Advertisement }
     }
```

A.2.3.2 Fast or erroneous movement

Test Purpose			
Identifier:	**TP_MOB_3058_01**		
Summary:	Test generation of Fast binding update on early return to PAR		
References:	RQ_001_3058		
IUT Role:	Mobile_Node	**Test case:**	TC_MOB_3058_01

```
with { IUT 'having successfully completed exchange of RtSolPr and PrRtAdv'
       IUT having no binding to New_Access_Router
     }
ensure that
     { when { IUT receives unsolicited Proxy_Router_Advertisement
                  containing New_Access_Point_link_local_address_option
                  indicating link_layer_address of Previous_Access_Router
                            (containing option_code
                                 set to 1 'message sent unsolicited') }
     -- this tells the Mobile_Node that it is back on the PAR link
       then { IUT sends Fast_Binding_Update
                  containing destination_address
                      set to address of Previous_Access_Router
              and containing Home_Address_option
                  indicating previous Care_of_Address
              and containing lifetime set to 0 }
     }
```

Annex B (informative): Bibliography

- IETF RFC 2473: "Generic Packet Tunnelling in IPv6 Specification".
- IETF RFC 3776: "Using IPsec to Protect Mobile IPv6 Signalling Between Mobile Nodes and Home Agents".

History

Document history		
V1.1.1	May 2007	Publication
V1.2.0	April 2008	Publication