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| --- | --- | --- | --- | --- |
| IEEE P802.21 Media Independent Handover Services Merged Proposal to IEEE 802.21d | | | | |
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Abstract

This proposal addresses the MN initiated Multicast Group join procedure.

### MIH\_MN\_Group\_Manipulate

#### MIH\_MN\_Group\_Manipulate.request

##### Function

This primitive is generated by an MN to manipulate its own group membership.

##### Semantics of service primitive

MIH\_MN\_Group\_Manipulate.request (

DestinationIdentifier,

GroupIdentifier,

GroupAction,

)

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Description |
| DestinationIdentifier | MIHF\_ID | Specifies group MIHF-ID of the remote MIHFs. DestinationIdentifier may be different from GroupIdentifier. |
| GroupIdentifier | MIHF\_ID, | The target group identifier for the group operation. |
| GroupAction | GROUP\_MGT\_ACTION | The action to be taken: Join/Leave the group. |

##### When generated

The MIH user generates this primitive to request joining or leaving a group.

##### Effect on receipt

Upon receipt of this primitive, MIHF on the MN sends the corresponding MIH\_MN\_Group\_Manipulate request message to the PoS.

#### MIH\_MN\_Group\_Manipulate.indication

##### Function

This primitive is used by an MIHF to notify an MIH User that a MIH\_MN\_Group\_Manipulate request message has been received.

##### Semantics of service primitive

MIH\_MN\_Group\_Manipulate.indication(

SourceIdentifier,

GroupIdentifier,

GroupAction,

)

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Description |
| SourceIdentifier | MIHF\_ID | Specifies MIHF-ID of the remote MIHF that issued MIH\_MN\_Group\_Manipulate.request. |
| GroupIdentifier | MIHF\_ID, | The target group identifier for the group operation. |
| GroupAction | GROUP\_MGT\_ACTION | The action to be taken: Join/Leave the group. |

##### When generated

This primitive is generated by an MIHF on a PoS when receiving an MIH\_MN\_Group\_Manipulate request message from a remote MIHF.

##### Effect on receipt

Upon receipt of this primitive, an MIH user on a PoS may take the required actions in order to perform the action specified in GroupAction.

#### MIH\_MN\_Group\_Manipulate.response

##### Function

This primitive is generated by an MIH User to acknowledge result of an MIH\_MN\_Group\_Manipulate request from an MN.

##### Semantics of service primitive

MIH\_MN\_Group\_Manipulate.response (

DestinationIdentifier,

GroupIdentifier,

MulticastAddress,

GKBRange,

VerifyGroupKey,

AuxData,

CompleteSubtree,

GroupKeyData

GroupStatus

)

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Description |
| DestinationIdentifier | MIHF\_ID | Specifies the MIHF ID of the destination of the primitive |
| GroupIdentifier | MIHF\_ID, | The target group identifier for the group operation. |
| MulticastAddress | TRANSPORT\_ADDR | (optional) Multicast address corresponding with the target group identifier. |
| GKBRange | GKB\_RANGE | (optional) Valid range of Command. |
| VerifyGroupKey | OCTET\_STRING | (optional) Verification data for group key. |
| AuxData | OCTET\_STRING | (optional) Auxiliary data. |
| CompleteSubtree | OCTET\_STRING | (Optional) Complete Subtree data. |
| GroupKeyData | ENCR\_BLOCK | (Optional )Encrypted group key. |
| GroupStatus | GROUP\_STATUS | Status of the group operation |

##### When generated

An MIH User at the PoS generates this primitive after receipt and processing of MIH\_MN\_Group\_Manipulate request. This primitive returns the status of the action asked in the request. Optionally, it may respond with the security mechanisms required by the group.

##### Effect on receipt

MIH\_MN\_Group\_Manipulate response message is sent back to the group manipulate requester.

#### MIH\_MN\_Group\_Manipulate.confirm

##### Function

This primitive is generated by an MIHF that receives an MIH\_MN\_Group\_Manipulate response to indicate the status of the group manipulation.

##### Semantics of service primitive

MIH\_MN\_Group\_Manipulate.confirm (

SourceIdentifier,

GroupIdentifier,

GroupStatus

)

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Description |
| SourceIdentifier | MIHF\_ID | Specifies the MIHF ID of the remote MIHF |
| GroupIdentifier | MIHF\_ID, | The target group identifier for the group operation. |
| GroupStatus | GROUP\_STATUS | Status of the group operation |

##### When generated

This primitive is sent to the MIH User after the MIHF receives an MIH\_MN\_Group\_Manipulate response message.

##### Effect on receipt

The status of the group operation is noted.

### MIH\_Net\_Group\_Manipulate

#### MIH\_Net\_Group\_Manipulate.request

##### Function

This primitive is generated by a PoS to manipulate group membership of one or more MN(s) or other PoS(es).

##### Semantics of service primitive

MIH\_Net\_Group\_Manipulate.request (

DestinationIdentifier,

ResponseFlag,

GroupKeyUpdateFlag,

GroupIdentifier,

MulticastAddress,

GKBRange,

VerifyGroupKey,

AuxData,

CompleteSubtree,

GroupKeyData)

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Description |
| DestinationIdentifier | MIHF\_ID | Specifies group MIHF-ID of the remote MIHFs. DestinationIdentifier may be different from GroupIdentifier. |
| ResponseFlag | OCTET\_STRING | Flag which represents whether response is needed or not |
| GroupKeyUpdateFlag | OCTET\_STRING | Flag which represents whether a group key in GroupKeyData is updated or not. |
| GroupIdentifier | MIHF\_ID, | The target group identifier for the group operation. |
| MulticastAddress | TRANSPORT\_ADDR | (optional) Multicast address corresponding with the target group identifier. |
| CommandRange | Command\_Range | (optional) Valid range of Command. |
| VerifyGroupKey | OCTET\_STRING | (optional) Verification data for group key. |
| AuxData | OCTET\_STRING | (optional) Auxiliary data. |
| CompleteSubtree | OCTET\_STRING | Complete Subtree data. |
| GroupKeyData | ENCR\_BLOCK | Encrypted group key. |

##### When generated

The MIH user generates this primitive to create, delete or modify a group.

##### Effect on receipt

Upon receipt of this primitive, MIHF on the PoS sends the corresponding MIH\_Net\_Group\_Manipulate indication message or MIH\_Net\_Group\_Manipulate request message to the MN(s) or other PoS(es). The ResponseFlag TLV indicates that which message shall be sent.

#### MIH\_Net\_Group\_Manipulate.indication

##### Function

This primitive is used by an MIHF to notify an MIH User that a MIH\_Net\_Group\_Manipulate indication message or an MIH\_Net\_Group\_Manipulate request message has been received.

##### Semantics of service primitive

MIH\_Net\_Group\_Manipulate.indication(

SourceIdentifier,

ResponseFlag,

GroupIdentifier,

AuxData,

GroupStatus,

)

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Description |
| SourceIdentifier | MIHF\_ID | Specifies MIHF-ID of the remote MIHF that issued MIH\_Net\_Group\_Manipulate.request. |
| ResponseFlag | OCTET\_STRING | Flag which represents whether response is needed or not |
| GroupIdentifier | MIHF\_ID, | The target group identifier for the group operation. |
| MulticastAddress | TRANSPORT\_ADDR | (optional) Multicast address corresponding with the target group |
| AuxData | OCTET\_STRING | (optional) Auxiliary data. |
| GroupStatus | GROUP\_STATUS | Status of the group. |

##### When generated

This primitive is generated by an MIHF on a MN or a PoS when receiving an MIH\_Net\_Group\_Manipulate indication message or an MIH\_Net\_Group\_Manipulate request message from a remote MIHF.

##### Effect on receipt

Upon receipt of this primitive, an MIH user on a MN or a PoS may join or leave a group specified in GroupIdentifier parameter. When the MIH User may also decrypt and install an encrypted group key that is associated with the specific group and contained in the GroupKeyData. The detailed procedure is described in 9.4.

#### MIH\_Net\_Group\_Manipulate.response

##### Function

This primitive is generated by an MIH User to acknowledge result of an MIH\_Net\_Group\_Manipulate request from a PoS.

##### Semantics of service primitive

MIH\_Net\_Group\_Manipulate.response (

DestinationIdentifier,

GroupIdentifier,

GroupStatus

)

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Description |
| DestinationIdentifier | MIHF\_ID | Specifies the requestor of the group manipulation. |
| GroupIdentifier | MIHF\_ID, | The target group identifier for the group operation. |
| GroupStatus | GROUP\_STATUS | Status of the group |

##### When generated

An MIH User generates this primitive after receipt and processing of MIH\_Net\_Group\_Manipulate request.

##### Effect on receipt

MIH\_Net\_Group\_Manipulate response message is sent back to the group manipulate requester.

#### MIH\_Net\_Group\_Manipulate.confirm

##### Function

This primitive is generated by a MIHF that receives an MIH\_Net\_Group\_Manipulate response to indicate the status of the group manipulation.

##### Semantics of service primitive

MIH\_Net\_Group\_Manipulate.confirm (

SourceIdentifier,

GroupIdentifier,

GroupStatus

)

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Description |
| SourceIdentifier | MIHF\_ID | Specifies the responder of the group manipulation. |
| GroupIdentifier | MIHF\_ID, | The target group identifier for the group operation. |
| GroupStatus | GROUP\_STATUS | Status of the group |

##### When generated

An MIH User generates this primitive after receipt and processing of MIH\_Net\_Group\_Manipulate request.

##### Effect on receipt

MIH\_Net\_Group\_Manipulate response message is sent back to the group manipulate requester.

#### MIH\_MN\_Group\_Manipulate request

The corresponding MIH primitive of this message is defined in 7.4.30.

This message is used by the MIHF to manipulate group membership of MIH node(s) identified by the Destination Identifier.

|  |
| --- |
| **MIH Header Fields (SID=3, Opcode=3, AID=XX)** |
| Source Identifier = sending MIHF ID  (Source MIHF ID TLV) |
| Destination Identifier = receiving MIHF ID  (Destination MIHF ID TLV) |
| GroupIdentifier  (Group Identifier TLV) |
| GroupAction  (Group Action TLV) |

#### MIH\_MN\_Group\_Manipulate response

The corresponding MIH primitive of this message is defined in 7.4.30.

This message is used by the MIHF to inform group status of MIH node(s) identified by the Source Identifier.

|  |
| --- |
| **MIH Header Fields (SID=3, Opcode=3, AID=XX)** |
| Source Identifier = sending MIHF ID  (Source MIHF ID TLV) |
| Destination Identifier = receiving MIHF ID  (Destination MIHF ID TLV) |
| GroupIdentifier  (Group Identifier TLV) |
| SequenceNumber (optional)  (Sequence Number TLV) |
| MulticastAddress (optional)  (Multicast Address TLV) |
| GKBRange (optinal)  (GKB\_Range TLV) |
| VerifyGroupKey (optional)  (Verify Group Key TLV) |
| AuxData (optional)  (Aux Data TLV) |
| CompleteSubtree  (Complete Subtree TLV) |
| GroupKeyData  (Group Key Data TLV) |
| GroupStatus  (Group Status TLV) |

#### MIH\_Net\_Group\_Manipulate indication

The corresponding MIH primitive of this message is defined in 7.4.30.

This message is used by the MIHF to manipulate group membership of MIH node(s) identified by the Destination Identifier.

|  |
| --- |
| **MIH Header Fields (SID=3, Opcode=3, AID=XX)** |
| Source Identifier = sending MIHF ID  (Source MIHF ID TLV) |
| Destination Identifier = receiving MIHF ID  (Destination MIHF ID TLV) |
| GroupIdentifier  (Group Identifier TLV) |
| SequenceNumber (optional)  (Sequence Number TLV) |
| MulticastAddress (optional)  (Multicast Address TLV) |
| CommandRange (optinal)  (Command Range TLV) |
| VerifyGroupKey (optional)  (Verify Group Key TLV) |
| AuxData (optional)  (Aux Data TLV) |
| CompleteSubtree  (Complete Subtree TLV) |
| GroupKeyData  (Group Key Data TLV) |

#### MIH\_Net\_Group\_Manipulate request

The corresponding MIH primitive of this message is defined in 7.4.30.

This message is used by the MIHF to manipulate group membership of MIH node(s) identified by the Destination Identifier.

|  |
| --- |
| **MIH Header Fields (SID=3, Opcode=3, AID=XX)** |
| Source Identifier = sending MIHF ID  (Source MIHF ID TLV) |
| Destination Identifier = receiving MIHF ID  (Destination MIHF ID TLV) |
| ResponseFlag  (Response Flag TLV) |
| GroupKeyUpdateFlag  (Group Key Update TLV) |
| GroupIdentifier  (Group Identifier TLV) |
| SequenceNumber (optional)  (Sequence Number TLV) |
| MulticastAddress (optional)  (Multicast Address TLV) |
| CommandRange (optinal)  (Command Range TLV) |
| VerifyGroupKey (optional)  (Verify Group Key TLV) |
| AuxData (optional)  (Aux Data TLV) |
| CompleteSubtree  (Complete Subtree TLV) |
| GroupKeyData  (Group Key Data TLV) |

#### MIH\_Net\_Group\_Manipulate response

The corresponding MIH primitive of this message is defined in 7.4.30.

This message is used by the MIHF to inform group status of MIH node(s) identified by the Source Identifier.

|  |
| --- |
| **MIH Header Fields (SID=3, Opcode=3, AID=XX)** |
| Source Identifier = sending MIHF ID  (Source MIHF ID TLV) |
| Destination Identifier = receiving MIHF ID  (Destination MIHF ID TLV) |
| ResponseFlag  (Response Flag TLV) |
| GroupIdentifier  (Group Identifier TLV) |
| AuxData  (Aux Data TLV) |
| GroupStatus (Group Status TLV) |

# Annex F Data type definition

### F.3.11 Data type for MIHF identification

### Modify table F.19

### Table F.19 -- Data type for MIHF identification

|  |  |  |
| --- | --- | --- |
| Data type name | Derived from | Definition |
| MIHF\_ID | OCTET\_STRING | The MIHF Identifier: MIHF\_ID is a network access identifier (NAI). NAI shall be unique as per IETF RFC 4282. If L3 communication is used and MIHF entity resides in the network node, then MIHF\_ID is  the fully qualified domain name or NAI-encoded IP address (IP4\_ADDR or IP6\_ADDR) of the entity that hosts the MIH Services.  If L2 communication is used then MIHF\_ID is the NAI-encoded linklayer address (LINK\_ADDR) of the entity that hosts the MIH services.  In an NAI-encoded IP address or link-layer address, each octet of binary-encoded IP4\_ADDR, IP6\_ADDR and LINK\_ADDR data is encoded in the username part of the NAI as .“\.” followed by the octet value. A **broadcast** MIHF identifier is defined as an MIHF ID of zero length. **A multicast MIHF identifier is defined as a NAI-encoded multicast link-layer address in the case L2 communication is used, a NAI-encoded IP address (IP4\_ADDR or IP6\_ADDR) in case L3 communication is used or the fully qualified domain name preceded by the prefic “\_G\_”, for example** [**\_*G\_*sensornodes\_area\_A@foo.bar**](mailto:_G_sensornodes_area_A@foo.bar)**.**  When an MIH protocol message with **broadcast** MIHF ID is transmitted over the L2 data plane, a group MAC address (01-80-C2-00-00-0E) shall be used (see IEEE P802.1aj/D2.2). The maximum length is 253 octets. |

**Table F.4—Data types for links**

|  |  |  |
| --- | --- | --- |
| **Data type name** | **Derived from** | **Definition** |
| LINK\_ACTION\_REQ | SEQUENCE(  LINK\_ID,  CHOICE(NULL, LINK\_ADDR),  LINK\_ACTION,  LINK\_AC\_EX\_TIME  ) | A set of handover action request parameters. The choice of LINK\_ADDR is to provide PoA address information when the LINK\_ACTION contains the attribute for DATA\_FWD\_REQ. |
| **MULTICAST\_LINK\_ACTION\_REQ** | **SEQUENCE(**  **NET\_TYPE\_INC,**  **CHOICE(NULL, LINK\_ADDR),**  **LINK\_ACTION,**  **LINK\_AC\_EX\_TIME**  **)** | **A set of handover action request parameters destined to a group of links. The choice of LINK\_ADDR is to provide PoA address information when the LINK\_ACTION contains the attribute for DATA\_FWD\_REQ.** |
| LINK\_ACTION\_RSP | SEQUENCE(  LINK\_ID,  LINK\_AC\_RESULT,  CHOICE(NULL,  LIST(LINK\_SCAN\_RSP)  ) | A set of link action returned results. |

### F.3.16 Data type for security

***Add a new ID\_TYPE enumeration defined in 802.21a-2012 as follows:***

|  |  |  |
| --- | --- | --- |
| ID\_TYPE | ENUMERATED | The type of security association.  0: TLS-generated;  1: EAP-generated  2: GKB-generated |

***Add the following data types:***

|  |  |  |
| --- | --- | --- |
| SIGNATURE | OCTET\_STRING | A digital signature data. |
| MIH\_SEC\_CAP | SEQUENCE(  TLS\_CAP,  EAP\_CAP,  MULTICAST\_CAP,  ) | Represents the MIH security capabilities. |
| MULTICAST\_CAP | UNSIGNED\_INT(2) | A multicast ciphersuite. Available multicast ciphersuites are defined in 9.6. |
| CERTIFICATE | OCTET\_STRING | Provides a X.509 Certificate |
| CERT\_SERIAL\_NUMBER | OCTET\_STRING | Provides X.509 formatted certificate serial number which are unique by certificate authority. |
| CERT\_STATUS | ENUMERATED | This indicates the status of the certificate being pushed or revoked  0 – Not Present – indicates that certificate is not present  1 – Certificate Valid – indicates that certificate is present and that associated public key is being used to verify signatures  2 – Certificate Revoked  3 - Certificate Expired |
| GKB\_RANGE | CHOICE(  SEQUENCE(  UNSIGNED\_INT(1),  UNSIGNED\_INT(1)),  SEQUENCE(  UNSIGNED\_INT(2),  UNSIGNED\_INT(2)),  SEQUENCE(  UNSIGNED\_INT(3),  UNSIGNED\_INT(3)),  SEQUENCE(  UNSIGNED\_INT(4),  UNSIGNED\_INT(4))) | A range of valid leaf identifiers in a complete subtree of a GKB. The first integer indicates the lowest value of the range. The second integer indicates the highest value of the range. |
| GROUP\_STATUS | ENUMERATED | This indicates a status of group manipulation command.  0: Joined in the group.  1: Leaved the group.  2: Group key is updated. |
| GROUP\_MGT\_ACTION | ENUMERATED | This indicates a manipulation command.  0: Join in the group.  1: Leave the group. |

# Annex L MIH protocol message code assignment

***Allocate the following AIDs:***

|  |  |
| --- | --- |
| MIH messages | AID |
| MIH messages for Command Service | |
| MIH\_Configuration\_Change | TBD |
| MIH\_Group\_Manipulate | TBD |
| MIH\_Push\_Certificate | TBD |
| MIH\_Revoke\_Certificate | TBD |

***Allocate the following TLV types:***

|  |  |  |
| --- | --- | --- |
| TLV type name | TLV type value | Data Type |
| Multicast Ciphersuite | TBD | MULTICAST\_CAP |
| Configuration Data | TBD | OCTET\_STRING |
| Group Identiifer | TBD | CHOICE(MIHF\_ID, ENCR\_DATABLOCK) |
| Verify Group Key | TBD | OCTET\_STRING |
| Aux Data | TBD | OCTET\_STRING |
| Complete Subtree | TBD | OCTET\_STRING |
| Group Key Data | TBD | ENCR\_DATABLOCK |
| Multicast Address | TBD | CHOICE(TRANSPORT\_ADDRESS, ENCR\_BLOCKDATA) |
| GKB Range | TBD | GKB\_RANGE |
| Signature | TBD | SIGNATURE |
| Certificate | TBD | CERTIFICATE |
| Certificate Serial Number | TBD | CERT\_SERIAL\_NUMBER |
| Certificate Status | TBD | CERT\_STATUS |
| Sequence Number | TBD | OCTET\_STRING |
| **Multicast Groups list TLV** | **80** | **LIST(MULTICAST\_GRP)** |
| **Group\_Status TLV** | **81** | LIST(  SEQUENCE(MIHF\_ID,  STATUS,  VALID\_TIMEa)) |
| **Multicast link identifier** | **82** | **NET\_TYPE\_INC** |
| **Multicast link action list** | **83** | **LIST(MULTICAST\_ACTION\_REQ)** |

# Annex P MKB Toy Example

TBD.