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| --- | --- |
| Project | **IEEE 802.21 Media Independent Handover Services****IEEE 802.21d: Multicast Group Management****<**[**http://www.ieee802.org/21/**](http://www.ieee802.org/21/)**>** |
| Title | **Proposal for IEEE 802.21d solution regarding the Generic Link ID parameter** |
| Date Submitted | February 2013 |
| Source(s) |  |
| Re: | IEEE 802.21d TG |
| Authors: | Daniel Corujo (ITAv), Carlos Guimarães (ITAv), Antonio de la Oliva (UC3M), |
| Abstract | This contribution provides a solution for the IEEE 802.21d |
| Purpose | Task Group Discussion and Acceptance |
| Notice | This document has been prepared to assist the IEEE 802.21 Working Group. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein. |

**NOTE**

**1 –** In this contribution we provide an example of the application of the Generic Link ID concept, into a MIH\_Configure\_Thresholds. The intent is to generate discussion, in order to reach a consensus solution.

In order to support a Generic Link ID concept, there can be the need to specify a group of interfaces/technologies as intended target of the link command. The rationale is explained as follows.

**Rationale for including a NET\_TYPE\_INC to support a Generic Link ID behavior**

A multicast message may be destined to several links from different entities in order to perform the same operation in all of them (e.g. configure a specific threshold in all WLAN interfaces). For that, the reutilization of the **NET\_TYPE\_INC data type into the command, into a field named MulticastLinkIdentifier**, allows the specification of a group of destination links identified by its technology. The presented solution allows backwards compatibility.

When a message/primitive contains a LinkIdentifier/LinkIdentifierListor MulticastLinkIdentifier, one and only one must be presented in the message.

**2** – When the MIHF receives a remote command towards several of its Link layers, how does he manage the responses of the separate link layers, in regards to its MIH response towards the requester MIHF? To explain the problem, lets assume the following example:

1. The MIHF1 sends a multicast MIH\_Link\_Configure\_Thresholds.request with a Generic Link ID to the MIHF2.
2. The MIHF2 forwards the request to both Link SAPs.



The question is: **How will the MIHF2 handle the responses from the Link SAPs?** The state machines from the destination MIHF do not allow it to send several messages belonging to the same Transaction ID. Also, the available messages do not allow the MIHF to group all responses in a single response message.

1. **Proposal A:** As a solution, for each response from the Link SAP the MIHF2 sends a response message to the MIHF1. This solution requires some changes to the state machine, which are shown in this document in the proposed changes affecting the respective section.
2. **Proposal B:** As a solution, the MIHF2 will collect all responses from each Link SAP, sending a single response message to the MIHF1. This solution requires some changes to the MIH protocol messages, which are shown in this document in the proposed changes affecting the respective section.

|  |  |
| --- | --- |
| **Proposal A** | **Proposal B** |
| **Pros** | **Cons** | **Pros** | **Cons** |
| Backwards compatibility (in terms of already existing messages) | Changes in the state machine | No changes in the state machine | No backwards compatibility (non-optional fields need to be added) |
| Changes only in the request messages (only an optional field is added) | Multiple responses for each request (allows aggregation in Link\_Action and Link\_Get\_Parameters messages) | Single response for each request | Changes in the request and response messages |
| Supported by the addition of new TLVs in the MIH messages |  |  | Supported by modification of TLVs in the MIH messages |
| Allows aggregation in Link\_Action and Link\_Get\_Parameters messages (i.e., the response already features a list of interfaces in the request, and aggregate all responses in a single response) |  |  |  |

Proposal A

All changes are explicitly marked in green.

NOTE: Here we only illustrate the request changes, because, for this proposal, only changes to these messages are required. Note that these changes consider only the addition of optional fields, which ensures backwards compatibility.

**7.4.2 MIH\_Register**

**7.4.2.1 MIH\_Register.request**

**7.4.2.1.1 Function**

This primitive is used by an MIH user to register the local MIHF with remote MIHF.

**7.4.2.1.2 Semantics of service primitive**

MIH\_Register.request (

DestinationIdentifier,

LinkIdentifierList,

**MulticastLinkIdentifier,**

RequestCode

)

Parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Description** |
| DestinationIdentifier | MIHF\_ID | This identifies the local MIHF or a remote MIHF that will be the destination of this request. |
| LinkIdentifierLista | LIST(LINK\_ID) | **(Optional)** List of local link identifiers. |
| **MulticastLinkIdentifiera** | **NET\_TYPE\_INC** | **(Optional) Identifier of a group of links.** |
| RequestCode | REG\_REQUEST\_CODE | Registration request code. Depending on the request code, the MIH user can choose to either register or re-register with the remote MIHF. |

**aThe primitive must contain the LinkIdentifierList parameter or MulticastLinkIdentifier parameter.**

**7.4.2.1.3 When generated**

This primitive is invoked by the MIH user when it needs to register the local MIHF with a remote MIHF.

**7.4.2.1.4 Effect on receipt**

On receipt, the local MIHF sends an MIH\_Register request message to the destination MIHF.

**7.4.2.2 MIH\_Register.indication**

**7.4.2.2.1 Function**

This primitive is used by an MIHF to notify an MIH user that an MIH\_Register request message has been received.

**7.4.2.2.2 Semantics of service primitive**

MIH\_Register.indication (

SourceIdentifier,

LinkIdentifierList,

**MulticastLinkIdentifier,**

RequestCode

)

Parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Description** |
| SourceIdentifier | MIHF\_ID | This identifies the invoker of this primitive, which is a remote MIHF. |
| LinkIdentifierLista | LIST(LINK\_ID) | **(Optional)** List of link identifiers of the remote MIHF. |
| **MulticastLinkIdentifiera** | **NET\_TYPE\_INC** | **(Optional) Identifier of a group of links.** |
| RequestCode | REG\_REQUEST\_CODE | Registration request code. Depending on the request code, the MIH user can choose to either register or re-register with the remote MIHF. |

**aThe primitive must contain the LinkIdentifierList parameter or MulticastLinkIdentifierparameter.**

**7.4.2.2.3 When generated**

This primitive is generated by the remote MIHF when an MIH\_Register request message is received.

**7.4.2.2.4 Effect on receipt**

The remote MIH user will perform necessary actions to process the registration request and respond with an MIH\_Register.response.

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**7.4.4 MIH\_Event\_Subscribe**

**7.4.4.1 MIH\_Event\_Subscribe.request**

**7.4.4.1.1 Function**

This primitive is used by an MIH user (the subscriber) to subscribe an interest in one or more MIH event types from the local or a remote MIHF. Optionally, the subscriber indicates a list of specific configuration information applicable for various events being subscribed. If configured, the event must be triggered only when all the criteria set in the parameters are met.

**7.4.4.1.2 Semantics of service primitive**

MIH\_Event\_Subscribe.request (

DestinationIdentifier,

LinkIdentifier,

**MulticastLinkIdentifier,**

RequestedMihEventList,

EventConfigurationInfoList

)

Parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Description** |
| DestinationIdentifier | MIHF\_ID | This identifies the local MIHF or a remote MIHF that will be the destination of this request. |
| LinkIdentifiera | LINK\_TUPLE\_ID | **(Optional)** Identifier of the link for event subscription. For local event subscription, PoA link address need not be present if the link type lacks such a value. |
| **MulticastLinkIdentifiera** | **NET\_TYPE\_INC** | **(Optional) Identifier of a group of links for event subscription.** |
| RequestedMIHEventList | MIH\_EVT\_LIST | List of MIH events that the endpoint would like to receive indications for, from the Event Source. |
| EventConfigurationInfoList | LIST(EVT\_CFG\_INFO) | (Optional) List of additional configuration informa-tion for event subscription. |

**aThe primitive must contain the LinkIdentifier parameter or MulticastLinkIdentifierparameter.**

**7.4.4.1.3 When generated**

This primitive is invoked by an MIH user when it wants to receive indications on a set of specific MIH events from the local MIHF or a remote MIHF.

**7.4.4.1.4 Effect on receipt**

If the destination of the request is the local MIHF itself, the local MIHF responds immediately with an MIH\_Event\_Subscribe.confirm primitive. If the destination of the request is a remote MIHF, the local MIHF generates and sends an MIH\_Event\_Subscribe request message to the remote MIHF.

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**7.4.5 MIH\_Event\_Unsubscribe**

**7.4.5.1 MIH\_Event\_Unsubscribe.request**

**7.4.5.1.1 Function**

This primitive is used by an MIH user (the subscriber) to unsubscribe from a set of previous subscribed MIH events.

**7.4.5.1.2 Semantics of service primitive**

MIH\_Event\_Unsubscribe.request (

DestinationIdentifier,

LinkIdentifier,

**MulticastLinkIdentifier,**

RequestedMihEventList

)

Parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Description** |
| DestinationIdentifier | MIHF\_ID | This identifies the local MIHF or a remote MIHF, which will be the destination of this request. |
| LinkIdentifiera | LINK\_TUPLE\_ID | **(Optional)** Identifier of the link for event unsubscription. For local event unsubscription, PoA address in the Link Identifier need not be present if the link type lacks such a value. |
| **MulticastLinkIdentifiera** | **NET\_TYPE\_INC** | **(Optional) Identifier of a group of links for event unsubscription.** |
| RequestedMIHEventList | MIH\_EVT\_LIST | List of MIH events for which indications need to be unsubscribed from the Event Source. |

**aThe primitive must contain the LinkIdentifier parameter or MulticastLinkIdentifierparameter.**

**7.4.5.1.3 When generated**

This primitive is invoked by an MIH user (subscriber) that is seeking to unsubscribe from an already subscribed set of events from the local MIHF or a remote MIHF.

**7.4.5.1.4 Effect on receipt**

If the destination of the request is the local MIHF itself, the local MIHF responds immediately with MIH\_Event\_Unsubscribe.confirm primitive. If the destination of the request is a remote MIHF, the local MIHF generates and sends an MIH\_Event\_Unsubscribe request message to the remote MIHF.

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**7.4.14 MIH\_Link\_Get\_Parameters**

**7.4.14.1 General**

An MIH\_Link\_Get\_Parameters command is issued by upper layer entities to discover and monitor the status of the currently connected and potentially available links. This command is also used to get device state information. The destination of an MIH\_Link\_Get\_Parameters command is local or remote. For example, an MIH\_Link\_Get\_Parameters request issued by a local upper layer helps the policy function that resides out of the MIH to make optimal handover decisions for different applications when multiple links are available in an MN. However, a remotely initiated MIH\_Link\_Get\_Parameters request from the network side enables the network to collect the status information on multiple links in an MN through the currently connected link.

**7.4.14.2 MIH\_Link\_Get\_Parameters.request**

**7.4.14.2.1 Function**

This primitive is invoked by an MIH user to discover the status of the currently connected and potentially available links.

**7.4.14.2.2 Semantics ofthe service primitive**

MIH\_Link\_Get\_Parameters.request (

 DestinationIdentifier,

 DeviceStatesRequest,

 LinkIdentifierList,

 **MulticastLinkIdentifier,**

 GetStatusRequestSet

 )

Parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Description** |
| DestinationIdentifier | MIHF\_ID | This identifies the local MIHF or a remote MIHF that will be the destination of this request. |
| DeviceStatesRequest | DEV\_STATES\_REQ | (Optional)List of device states being requested. |
| LinkIdentifierLista | LIST(LINK\_ID) | **(Optional)** List of link identifiers for which status is requested. If the list is empty, return the status of all available links. |
| **MulticastLinkIdentifiera** | **NET\_TYPE\_INC** | **(Optional) Identifier of a group of links for which status is requested.** |
| GetStatusRequestSet | LINK\_STATUS\_REQ | Indicate which link status(es) is being requested |

**aThe primitive must contain the LinkIdentifierList parameter or MulticastLinkIdentifierparameter.**

**7.4.14.2.3 When generated**

This primitive is invoked by an MIH user when it wants to request the status information of a set of local or remote links.

**7.4.14.2.4 Effect of receipt**

If the destination of the request is the local MIHF itself, the local MIHF gets the requested information on the status of the specified local links and responds with an MIH\_Link\_Get\_Parameters.confirm. If the destination of the request is a remote MIHF, the local MIHF generates and sends an MIH\_Link\_Get\_Parameters request message to the remote MIHF.

**-----------------------**

**7.4.15 MIH\_Link\_Configure\_Thresholds**

**7.4.15.1 General**

The MIH\_Link\_Configure\_Thresholds is issued by an upper layer entity to configure parameter report thresholds of a lower layer. The destination of an MIH\_Link\_Configure\_Thresholds command is local or remote. This command configures one or more thresholds on a link. When a given threshold is crossed, an MIH\_Link\_Parameters\_Report notification shall be sent to all MIH users that are subscribed to this threshold-crossing event.

**7.4.15.2 MIH\_Link\_Configure\_Threshold.request**

**7.4.15.1.1 Function**

This primitive is issued by an MIH user to configure thresholds of a lower layer link.

**7.4.15.1.2 Semantics of service primitive**

MIH\_Link\_Configure\_Thresholds.request (

DestinationIdentifier,

LinkIdentifier,

**MulticastLinkIdentifier,**

ConfigureRequestList

)

Parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Description** |
| DestinationIdentifier | MIHF\_ID | This identifies the local MIHF or a remote MIHF that will be the destination of this request. |
| LinkIdentifiera | LINK\_TUPLE\_ID | **(Optional)** Identifier of the link to be configured. |
| **MulticastLinkIdentifiera** | **NET\_TYPE\_INC** | **(Optional) Identifier of a group of links to be configured** |
| RequestedMIHEventList | LIST(LINK\_CFG\_PARAM) | A list of link threshold parameters. |

**aThe primitive must contain the LinkIdentifier parameter or MulticastLinkIdentifierparameter.**

**7.4.15.1.3 When generated**

This primitive is invoked by an MIH user when it attempts to configure thresholds of a local or remote lower layer link.

**7.4.15.1.4 Effect on receipt**

If the destination of the request is the local MIHF itself, the local MIHF issues a Link\_Configure\_Thresholds request to the lower layer link to set the thresholds for the link according to the specified configuration parameters.

If the destination of the request is a remote MIHF, the local MIHF generates and sends an MIH\_Link\_Configure\_Thresholds request message to the remote MIHF. Upon the receipt of the message, the remote MIHF then issues a Link\_Configure\_Thresholds request to the lower layer link to set the thresholds for the link according to the specified configuration parameters.

**-----------------------**

**7.4.16 MIH\_Link\_Actions**

**<<NOTE: Here a new type was created, MULTICAST\_ACTION\_REQ. the original message has already a list of link action requests. As such, to endure backwards compatibility, we replicated that for the optional multicast mechanism.>>**

**7.4.16.1 MIH\_Link\_Actions.request**

**7.4.16.1.1 Function**

This primitive is used by an MIH user to control the behavior of a set of local or remote lower layer links.

**7.4.16.1.2 Semantics of service primitive**

The parameters of the service primitive are as follows:

MIH\_Link\_Actions.request (

Destination Identifier,

LinkActionsList,

**MulticastLinkActionsList**

)

Parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Description** |
| DestinationIdentifier | MIHF\_ID | This identifies the local MIHF or a remote MIHF that will be the destination of this request. |
| LinkActionsLista | LIST(LINK\_ACTION\_REQ) | **(Optional)** Specifies the suggested actions. |
| **MulticastLinkActionsLista** | **LIST(MULTICAST\_ACTION\_REQ)** | **(Optional) Specifies the suggested actions for a group of links.** |

**aThe primitive must contain the LinkActionsList****parameter or MulticastLinkActionsListparameter.**

**7.4.16.1.3 When generated**

This primitive is invoked by an MIH user when it attempts to control the behavior of a set of local or remote lower layer links.

**7.4.16.1.4 Effect on receipt**

If the destination of the request is the local MIHF itself, the local MIHF issues Link\_Action.request(s) to the specified lower layer link(s).

If the destination of the request is a remote MIHF, the local MIHF generates and sends an MIH\_Link\_Actions request message to the remote MIHF. Upon the receipt of the message, the remote MIHF then issues Link\_Action.request(s) to the specified lower layer link(s)

CHANGE SECTION 8 ACCORDINGLY

**<<NOTE: The changes to the state machine are, in fact, quite simple to implement and only become active when multicast messages are involved.>>**

**8.2.3.7.1 Intra-state-machine procedures**

**a) IsMulticast.—This variable’s type is BOOLEAN. When its value is TRUE, it indicates that a message has a broadcast or multicast destination MIHF\_ID. Otherwise, its value is FALSE.**

**b) ResponseSent – This variable’s type is BOOLEAN. When its value is TRUE, it indicates that a Response message has been sent. Otherwise, its value is FALSE.**

**8.2.3.7.4 Transaction destination state machine**

The transaction destination state machine (see Figure 24) is started, and related transaction initiated, when a message related to a new transaction is received (MsgInAvail is TRUE).

The transaction terminates when it transits to the FAILURE state or SUCCESS state and any ACK related state machines, if started, were terminated. An instance of transaction destination state machine can cease to exist once the value of TransactionStatus is set to either SUCCESS or FAILURE.



**8.6.3 MIH messages for service management**

**8.6.1.3 MIH\_Register request**

The corresponding MIH primitive of this message is defined in 7.4.2.1.

This message is transmitted to the remote MIHF to perform a registration or re-registration. **The message must contain the Link identifier TLV or Multicast link identifier TLV.**

|  |
| --- |
| **MIH Header Fixed Fields (SID=1, Opcode=1, AID=2)** |
| **Source Identifier =** sending MIHF ID(Source MIHF ID TLV) |
| **Destination Identifier** = receiving MIHF ID(Destination MIHF ID TLV) |
| LinkIdentifier **(optional)**(Link identifier TLV) |
| **MulticastLinkIdentifier (optional)****(Multicast link identifier TLV)** |
| RequestCode(Register request code TLV) |

**8.6.1.7 MIH\_Event\_Subscribe request**

The corresponding MIH primitive of this message is defined in 7.4.4.1.

This message is sent by a remote MIHF (the subscriber) to subscribe to one or more event types from a particular event origination point. **The message must contain the Link identifier TLV or Multicast link identifier TLV.**

|  |
| --- |
| **MIH Header Fixed Fields (SID=1, Opcode=1, AID=4)** |
| **Source Identifier =** sending MIHF ID(Source MIHF ID TLV) |
| **Destination Identifier** = receiving MIHF ID(Destination MIHF ID TLV) |
| LinkIdentifier **(optional)**(Link identifier TLV) |
| **MulticastLinkIdentifier (optional)****(Multicast link identifier TLV)** |
| RequestedMihEventList(MIH event list TLV) |
| EventConfigurationInfoList (optional)(Event configuration info list TLV) |

**8.6.1.9 MIH\_Event\_Unsubscribe request**

The corresponding MIH primitive of this message is defined in 7.4.5.1.

This message is sent by a remote MIHF (the subscriber) to unsubscribe from a set of link-layer events. **The message must contain the Link identifier TLV or Multicast link identifier TLV.**

|  |
| --- |
| **MIH Header Fixed Fields (SID=1, Opcode=1, AID=5)** |
| **Source Identifier =** sending MIHF ID(Source MIHF ID TLV) |
| **Destination Identifier** = receiving MIHF ID(Destination MIHF ID TLV) |
| LinkIdentifier **(optional)**(Link identifier TLV) |
| **MulticastLinkIdentifier (optional)****(Multicast link identifier TLV)** |
| RequestedMihEventList(MIH event list TLV) |

**8.6.3 MIH messages for command service**

**8.6.3.1 MIH\_Link\_Get\_Parameters request**

The corresponding MIH primitive of this message is defined in 7.4.14.2.

This message is used to discover the status of currently available links. **The message must contain the Link identifier list TLV or Multicast link identifier TLV.**

|  |
| --- |
| **MIH Header Fixed Fields (SID=3, Opcode=1, AID=1)** |
| **Source Identifier =** sending MIHF ID(Source MIHF ID TLV) |
| **Destination Identifier** = receiving MIHF ID(Destination MIHF ID TLV) |
| DeviceStatesRequest (optional)(Device states request TLV) |
| LinkIdentifierList **(optional)**(Link identifier list TLV) |
| **MulticastLinkIdentifier (optional)****(Multicast link identifier TLV)** |
| GetStatusRequestSet(Get status request set TLV) |

**8.6.3.3 MIH\_Link\_Configure\_Thresholds request**

The corresponding MIH primitive of this message is defined in 7.4.15.2.

This message is used to configure thresholds of the lower layer link. **The message must contain the Link identifier TLV or Multicast link identifier TLV.**

|  |
| --- |
| **MIH Header Fixed Fields (SID=3, Opcode=1, AID=2)** |
| **Source Identifier =** sending MIHF ID(Source MIHF ID TLV) |
| **Destination Identifier** = receiving MIHF ID(Destination MIHF ID TLV) |
| LinkIdentifier **(optional)**(Link identifier TLV) |
| **MulticastLinkIdentifier (optional)****(Multicast link identifier TLV)** |
| ConfigureRequestList(Register request code TLV) |

**8.6.3.5 MIH\_Link\_Actions request**

The corresponding MIH primitive of this message is defined in 7.4.16.1.

This message is used to control the behavior of a set of lower layer links. **The message must contain the Link action list TLV or Multicast link action identifier TLV.**

|  |
| --- |
| **MIH Header Fixed Fields (SID=3, Opcode=1, AID=3)** |
| **Source Identifier =** sending MIHF ID(Source MIHF ID TLV) |
| **Destination Identifier** = receiving MIHF ID(Destination MIHF ID TLV) |
| LinkActionList **(optional)**(Link action list TLV) |
| **MulticastLinkActionIdentifier (optional)****(Multicast link action list TLV)** |

**Annex F**

(normative)

***Change Table F.4 as follows:***

**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. |

**Annex L**

(normative)

***Change Table L.2 as follows:***

**Table L.2—Type values for TLV encoding**

|  |  |  |
| --- | --- | --- |
| **TLV type name** | **TLV** **type value** | **Data type** |
| Requested resource set | 63 | REQ\_RES\_SET |
| Broadcast multimedia program ID | 76 | BCST\_MMP\_ID |
| Broadcast multimedia service ID | 77 | BCST\_MMS\_ID |
| Target MN group information | 78 | GROUP\_INFO |
| Supported link actions list | 79 | SUPPORTED\_LINK\_ACTIONS\_LIST |
| **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)** |
| (Reserved) | ~~64~~ 82- 99 | (Reserved) |
| Vendor specific TLV | 100 | (Vendor specific) |
| (Reserved for experimental TLVs) | 101 - 255 | (Used for experimental purposes) |

Proposal B

All changes are explicitly marked in green.

**7.4.2 MIH\_Register**

**7.4.2.1 MIH\_Register.request**

**7.4.2.1.1 Function**

This primitive is used by an MIH user to register the local MIHF with remote MIHF.

**7.4.2.1.2 Semantics of service primitive**

MIH\_Register.request (

DestinationIdentifier,

LinkIdentifierList,

**MulticastLinkIdentifier,**

RequestCode

)

Parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Description** |
| DestinationIdentifier | MIHF\_ID | This identifies the local MIHF or a remote MIHF that will be the destination of this request. |
| LinkIdentifierLista | LIST(LINK\_ID) | **(Optional)** List of local link identifiers. |
| **MulticastLinkIdentifiera** | **NET\_TYPE\_INC** | **(Optional) Identifier of a group of links.** |
| RequestCode | REG\_REQUEST\_CODE | Registration request code. Depending on the request code, the MIH user can choose to either register or re-register with the remote MIHF. |

**aThe primitive must contain the LinkIdentifierList parameter or MulticastLinkIdentifier parameter.**

**7.4.2.1.3 When generated**

This primitive is invoked by the MIH user when it needs to register the local MIHF with a remote MIHF.

**7.4.2.1.4 Effect on receipt**

On receipt, the local MIHF sends an MIH\_Register request message to the destination MIHF.

**7.4.2.2 MIH\_Register.indication**

**7.4.2.2.1 Function**

This primitive is used by an MIHF to notify an MIH user that an MIH\_Register request message has been received.

**7.4.2.2.2 Semantics of service primitive**

MIH\_Register.indication (

SourceIdentifier,

LinkIdentifierList,

**MulticastLinkIdentifier,**

RequestCode

)

Parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Description** |
| SourceIdentifier | MIHF\_ID | This identifies the invoker of this primitive, which is a remote MIHF. |
| LinkIdentifierLista | LIST(LINK\_ID) | **(Optional)** List of link identifiers of the remote MIHF. |
| **MulticastLinkIdentifiera** | **NET\_TYPE\_INC** | **(Optional) Identifier of a group of links.** |
| RequestCode | REG\_REQUEST\_CODE | Registration request code. Depending on the request code, the MIH user can choose to either register or re-register with the remote MIHF. |

**aThe primitive must contain the LinkIdentifierList parameter or MulticastLinkIdentifierparameter.**

**7.4.2.2.3 When generated**

This primitive is generated by the remote MIHF when an MIH\_Register request message is received.

**7.4.2.2.4 Effect on receipt**

The remote MIH user will perform necessary actions to process the registration request and respond with an MIH\_Register.response.

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**7.4.4 MIH\_Event\_Subscribe**

**7.4.4.1 MIH\_Event\_Subscribe.request**

**7.4.4.1.1 Function**

This primitive is used by an MIH user (the subscriber) to subscribe an interest in one or more MIH event types from the local or a remote MIHF. Optionally, the subscriber indicates a list of specific configuration information applicable for various events being subscribed. If configured, the event must be triggered only when all the criteria set in the parameters are met.

**7.4.4.1.2 Semantics of service primitive**

MIH\_Event\_Subscribe.request (

DestinationIdentifier,

LinkIdentifier,

**MulticastLinkIdentifier,**

RequestedMihEventList,

EventConfigurationInfoList

)

Parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Description** |
| DestinationIdentifier | MIHF\_ID | This identifies the local MIHF or a remote MIHF that will be the destination of this request. |
| LinkIdentifiera | LINK\_TUPLE\_ID | **(Optional)** Identifier of the link for event subscription. For local event subscription, PoA link address need not be present if the link type lacks such a value. |
| **MulticastLinkIdentifiera** | **NET\_TYPE\_INC** | **(Optional) Identifier of a group of links for event subscription.** |
| RequestedMIHEventList | MIH\_EVT\_LIST | List of MIH events that the endpoint would like to receive indications for, from the Event Source. |
| EventConfigurationInfoList | LIST(EVT\_CFG\_INFO) | (Optional) List of additional configuration informa-tion for event subscription. |

**aThe primitive must contain the LinkIdentifier parameter or MulticastLinkIdentifierparameter.**

**7.4.4.1.3 When generated**

This primitive is invoked by an MIH user when it wants to receive indications on a set of specific MIH events from the local MIHF or a remote MIHF.

**7.4.4.1.4 Effect on receipt**

If the destination of the request is the local MIHF itself, the local MIHF responds immediately with an MIH\_Event\_Subscribe.confirm primitive. If the destination of the request is a remote MIHF, the local MIHF generates and sends an MIH\_Event\_Subscribe request message to the remote MIHF.

**7.4.4.2 MIH\_Event\_Subscribe.confirm**

**7.4.4.2.1 Function**

This primitive returns the result of an MIH event subscription request.

**7.4.4.2.2 Semantics of service primitive**

**MIH\_Event\_Subscribe.confirm (**

SourceIdentifier,

**~~Status~~**

**~~LinkIdentifier~~**

**~~ResponseMIHEventList~~**

**SubscriptionResponseList**

)

Parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Description** |
| SourceIdentifier | MIHF\_ID | This identifies the invoker of this primitive, which can be either the local MIHF or a remote MIHF. |
| **~~Status~~** | **~~STATUS~~** | **~~Status of operation.~~** |
| **~~LinkIdentifier~~** | **~~LINK\_TUPLE\_ID~~** | **~~Identifier of the link for event subscription.~~** |
| **~~ResponseMIHEventList~~** | **~~MIH\_EVT\_LIST~~** | **~~List of successfully subscribed MIH events.~~** |
| **SubscriptionResponseList** | **LIST(** **STATUS,** **LINK\_TUPLE\_ID,** **CHOICE(NULL,**  **MIH\_EVT\_LIST)****)** | **List of link subscription responses.** |

**7.4.4.2.3 When generated**

This primitive is generated by the local MIHF at the completion of processing an MIH\_Event\_Subscribe.request primitive from a local MIH user or in response to the receiving of an MIH\_Event\_Subscribe response message from a peer MIHF.

**7.4.4.2.4 Effect on receipt**

The recipient MIH user examines the returned event list and learns about the subscription status of different events. However, if Status does not indicate “Success,” the recipient performs appropriate error handling.

**-----------------------**

**7.4.5 MIH\_Event\_Unsubscribe**

**7.4.5.1 MIH\_Event\_Unsubscribe.request**

**7.4.5.1.1 Function**

This primitive is used by an MIH user (the subscriber) to unsubscribe from a set of previous subscribed MIH events.

**7.4.5.1.2 Semantics of service primitive**

MIH\_Event\_Unsubscribe.request (

DestinationIdentifier,

LinkIdentifier,

**MulticastLinkIdentifier,**

RequestedMihEventList

)

Parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Description** |
| DestinationIdentifier | MIHF\_ID | This identifies the local MIHF or a remote MIHF, which will be the destination of this request. |
| LinkIdentifiera | LINK\_TUPLE\_ID | **(Optional)** Identifier of the link for event unsubscription. For local event unsubscription, PoA address in the Link Identifier need not be present if the link type lacks such a value. |
| **MulticastLinkIdentifiera** | **NET\_TYPE\_INC** | **(Optional) Identifier of a group of links for event unsubscription.** |
| RequestedMIHEventList | MIH\_EVT\_LIST | List of MIH events for which indications need to be unsubscribed from the Event Source. |

**aThe primitive must contain the LinkIdentifier parameter or MulticastLinkIdentifierparameter.**

**7.4.5.1.3 When generated**

This primitive is invoked by an MIH user (subscriber) that is seeking to unsubscribe from an already subscribed set of events from the local MIHF or a remote MIHF.

**7.4.5.1.4 Effect on receipt**

If the destination of the request is the local MIHF itself, the local MIHF responds immediately with MIH\_Event\_Unsubscribe.confirm primitive. If the destination of the request is a remote MIHF, the local MIHF generates and sends an MIH\_Event\_Unsubscribe request message to the remote MIHF.

**7.4.5.2 MIH\_Event\_Unsubscribe.confirm**

**7.4.5.2.1 Function**

This primitive returns the result of an MIH event unsubscription request.

**7.4.5.2.2 Semantics of service primitive**

MIH\_Event\_Unsubscribe.confirm (

SourceIdentifier,

**~~Status~~**

**~~LinkIdentifier~~**

**~~ResponseMIHEventList~~**

**UnsubscriptionResponseList**

)

Parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Description** |
| SourceIdentifier | MIHF\_ID | This identifies the invoker of this primitive, which can be either the local MIHF or a remote MIHF. |
| **~~Status~~** | **~~STATUS~~** | **~~Status of operation.~~** |
| **~~LinkIdentifier~~** | **~~LINK\_TUPLE\_ID~~** | **~~Identifier of the link for event unsubscription.~~** |
| **~~ResponseMIHEventList~~** | **~~MIH\_EVT\_LIST~~** | **~~List of successfully unsubscribed link events.~~** |
| **UnsubscriptionResponseList** | **LIST(** **STATUS,** **LINK\_TUPLE\_ID,** **CHOICE(NULL,**  **MIH\_EVT\_LIST)****)** | **List of link unsubscription responses.** |

**7.4.5.2.3 When generated**

This primitive is generated by the local MIHF at the completion of processing an MIH\_Event\_Unsubscribe.request primitive from a local MIH user or in response to the receiving of an MIH\_Event\_Unsubscribe response message from a peer MIHF.

**7.4.5.2.4 Effect on receipt**

The recipient MIH user can examine the returned event list and learn about the unsubscription status of different events. However, if Status does not indicate “Success,” the recipient performs appropriate error handling.

**-----------------------**

**7.4.14 MIH\_Link\_Get\_Parameters**

**7.4.14.1 General**

An MIH\_Link\_Get\_Parameters command is issued by upper layer entities to discover and monitor the status of the currently connected and potentially available links. This command is also used to get device state information. The destination of an MIH\_Link\_Get\_Parameters command is local or remote. For example, an MIH\_Link\_Get\_Parameters request issued by a local upper layer helps the policy function that resides out of the MIH to make optimal handover decisions for different applications when multiple links are available in an MN. However, a remotely initiated MIH\_Link\_Get\_Parameters request from the network side enables the network to collect the status information on multiple links in an MN through the currently connected link.

**7.4.14.2 MIH\_Link\_Get\_Parameters.request**

**7.4.14.2.1 Function**

This primitive is invoked by an MIH user to discover the status of the currently connected and potentially available links.

**7.4.14.2.2 Semantics ofthe service primitive**

MIH\_Link\_Get\_Parameters.request (

 DestinationIdentifier,

 DeviceStatesRequest,

 LinkIdentifierList,

 **MulticastLinkIdentifier,**

 GetStatusRequestSet

 )

Parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Description** |
| DestinationIdentifier | MIHF\_ID | This identifies the local MIHF or a remote MIHF that will be the destination of this request. |
| DeviceStatesRequest | DEV\_STATES\_REQ | (Optional)List of device states being requested. |
| LinkIdentifierLista | LIST(LINK\_ID) | **(Optional)** List of link identifiers for which status is requested. If the list is empty, return the status of all available links. |
| **MulticastLinkIdentifiera** | **NET\_TYPE\_INC** | **(Optional) Identifier of a group of links for which status is requested.** |
| GetStatusRequestSet | LINK\_STATUS\_REQ | Indicate which link status(es) is being requested |

**aThe primitive must contain the LinkIdentifierList parameter or MulticastLinkIdentifierparameter.**

**7.4.14.2.3 When generated**

This primitive is invoked by an MIH user when it wants to request the status information of a set of local or remote links.

**7.4.14.2.4 Effect of receipt**

If the destination of the request is the local MIHF itself, the local MIHF gets the requested information on the status of the specified local links and responds with an MIH\_Link\_Get\_Parameters.confirm. If the destination of the request is a remote MIHF, the local MIHF generates and sends an MIH\_Link\_Get\_Parameters request message to the remote MIHF.

**-----------------------**

**7.4.15 MIH\_Link\_Configure\_Thresholds**

**7.4.15.1 General**

The MIH\_Link\_Configure\_Thresholds is issued by an upper layer entity to configure parameter report thresholds of a lower layer. The destination of an MIH\_Link\_Configure\_Thresholds command is local or remote. This command configures one or more thresholds on a link. When a given threshold is crossed, an MIH\_Link\_Parameters\_Report notification shall be sent to all MIH users that are subscribed to this threshold-crossing event.

**7.4.15.2 MIH\_Link\_Configure\_Threshold.request**

**7.4.15.1.1 Function**

This primitive is issued by an MIH user to configure thresholds of a lower layer link.

**7.4.15.1.2 Semantics of service primitive**

MIH\_Link\_Configure\_Thresholds.request (

DestinationIdentifier,

LinkIdentifier,

**MulticastLinkIdentifier,**

ConfigureRequestList

)

Parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Description** |
| DestinationIdentifier | MIHF\_ID | This identifies the local MIHF or a remote MIHF that will be the destination of this request. |
| LinkIdentifiera | LINK\_TUPLE\_ID | **(Optional)** Identifier of the link to be configured. |
| **MulticastLinkIdentifiera** | **NET\_TYPE\_INC** | **(Optional) Identifier of a group of links to be configured** |
| RequestedMIHEventList | LIST(LINK\_CFG\_PARAM) | A list of link threshold parameters. |

**aThe primitive must contain the LinkIdentifier parameter or MulticastLinkIdentifierparameter.**

**7.4.15.1.3 When generated**

This primitive is invoked by an MIH user when it attempts to configure thresholds of a local or remote lower layer link.

**7.4.15.1.4 Effect on receipt**

If the destination of the request is the local MIHF itself, the local MIHF issues a Link\_Configure\_Thresholds request to the lower layer link to set the thresholds for the link according to the specified configuration parameters.

If the destination of the request is a remote MIHF, the local MIHF generates and sends an MIH\_Link\_Configure\_Thresholds request message to the remote MIHF. Upon the receipt of the message, the remote MIHF then issues a Link\_Configure\_Thresholds request to the lower layer link to set the thresholds for the link according to the specified configuration parameters.

**7.4.15.3 MIH\_Link\_Configure\_Thresholds.confirm**

**7.4.15.3.1 Function**

This primitive is issued by an MIHF to report the result of anMIH\_Link\_Configure\_Thresholds request.

**7.4.15.3.2 Semantics of the service primitive**

**MIH\_Link\_Configure\_Thresholds.confirm (**

 SourceIdentifier,

 **~~Status,~~**

 **~~LinkIdentifier,~~**

 **~~ConfigureResponseList,~~**

 **ConfigureThesholdsResponseList,**

 )

Parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Description** |
| SourceIdentifier | MIHF\_ID | This identifies the invoker of this primitive, which can be either the local MIHF or a remote MIHF. |
| **~~Status~~** | **~~STATUS~~** | **~~Status of operation.~~** |
| **~~LinkIdentifier~~** | **~~LINK\_TUPLE\_ID~~** | **~~Identifier of the link configured.~~** |
| **~~ConfigureResponseList~~** | **~~LIST(LINK\_CFG\_STATUS)~~** | **~~A list of the configuration status for each requested~~** **~~link threshold parameter~~** |
| **ConfigureThesholdsResponseList** | **LIST(** **STATUS,** **LINK\_TUPLE\_ID,** **CHOICE(NULL,** **LIST(LINK\_CFG\_STATUS)****)** | **List of link configure thresholds responses.** |

**-----------------------**

**7.4.16 MIH\_Link\_Actions**

**7.4.16.1 MIH\_Link\_Actions.request**

**7.4.16.1.1 Function**

This primitive is used by an MIH user to control the behavior of a set of local or remote lower layer links.

**7.4.16.1.2 Semantics of service primitive**

The parameters of the service primitive are as follows:

MIH\_Link\_Actions.request (

Destination Identifier,

LinkActionsList,

**MulticastLinkActionsList**

)

Parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Data type** | **Description** |
| DestinationIdentifier | MIHF\_ID | This identifies the local MIHF or a remote MIHF that will be the destination of this request. |
| LinkActionsLista | LIST(LINK\_ACTION\_REQ) | **(Optional)** Specifies the suggested actions. |
| **MulticastLinkActionsLista** | **LIST(MULTICAST\_ACTION\_REQ)** | **(Optional) Specifies the suggested actions for a group of links.** |

**aThe primitive must contain the LinkActionsList****parameter or MulticastLinkActionsListparameter.**

**7.4.16.1.3 When generated**

This primitive is invoked by an MIH user when it attempts to control the behavior of a set of local or remote lower layer links.

**7.4.16.1.4 Effect on receipt**

If the destination of the request is the local MIHF itself, the local MIHF issues Link\_Action.request(s) to the specified lower layer link(s).

If the destination of the request is a remote MIHF, the local MIHF generates and sends an MIH\_Link\_Actions request message to the remote MIHF. Upon the receipt of the message, the remote MIHF then issues Link\_Action.request(s) to the specified lower layer link(s)

CHANGE SECTION 8 ACCORDINGLY

**8.2.3.7.1 Intra-state-machine procedures**

**a) IsMulticast.—This variable’s type is BOOLEAN. When its value is TRUE, it indicates that a message has a broadcast or multicast destination MIHF\_ID. Otherwise, its value is FALSE.**

**8.6.3 MIH messages for service management**

**8.6.1.3 MIH\_Register request**

The corresponding MIH primitive of this message is defined in 7.4.2.1.

This message is transmitted to the remote MIHF to perform a registration or re-registration. **The message must contain the Link identifier TLV or Multicast link identifier TLV.**

|  |
| --- |
| **MIH Header Fixed Fields (SID=1, Opcode=1, AID=2)** |
| **Source Identifier =** sending MIHF ID(Source MIHF ID TLV) |
| **Destination Identifier** = receiving MIHF ID(Destination MIHF ID TLV) |
| LinkIdentifier **(optional)**(Link identifier TLV) |
| **MulticastLinkIdentifier (optional)****(Multicast link identifier TLV)** |
| RequestCode(Register request code TLV) |

**8.6.1.7 MIH\_Event\_Subscribe request**

The corresponding MIH primitive of this message is defined in 7.4.4.1.

This message is sent by a remote MIHF (the subscriber) to subscribe to one or more event types from a particular event origination point. **The message must contain the Link identifier TLV or Multicast link identifier TLV.**

|  |
| --- |
| **MIH Header Fixed Fields (SID=1, Opcode=1, AID=4)** |
| **Source Identifier =** sending MIHF ID(Source MIHF ID TLV) |
| **Destination Identifier** = receiving MIHF ID(Destination MIHF ID TLV) |
| LinkIdentifier **(optional)**(Link identifier TLV) |
| **MulticastLinkIdentifier (optional)****(Multicast link identifier TLV)** |
| RequestedMihEventList(MIH event list TLV) |
| EventConfigurationInfoList (optional)(Event configuration info list TLV) |

**8.6.1.8 MIH\_Event\_Subscribe response**

The corresponding MIH primitive of this message is defined in 7.4.4.2.

The response indicates which of the event types were successfully subscribed.

|  |
| --- |
| **MIH Header Fixed Fields (SID=1, Opcode=2, AID=4)** |
| **Source Identifier =** sending MIHF ID(Source MIHF ID TLV) |
| **Destination Identifier** = receiving MIHF ID(Destination MIHF ID TLV) |
| **~~Status~~****~~(Status TLV)~~** |
| **~~LinkIdentifier~~****~~(Link identifier TLV)~~** |
| **~~ResponseMihEventList (not included if Status does not indicate “Success”)~~****~~(MIH event list TLV)~~** |
| **SubscriptionResponseList****(Subscription Response List TLV)** |

**8.6.1.9 MIH\_Event\_Unsubscribe request**

The corresponding MIH primitive of this message is defined in 7.4.5.1.

This message is sent by a remote MIHF (the subscriber) to unsubscribe from a set of link-layer events. **The message must contain the Link identifier TLV or Multicast link identifier TLV.**

|  |
| --- |
| **MIH Header Fixed Fields (SID=1, Opcode=1, AID=5)** |
| **Source Identifier =** sending MIHF ID(Source MIHF ID TLV) |
| **Destination Identifier** = receiving MIHF ID(Destination MIHF ID TLV) |
| LinkIdentifier **(optional)**(Link identifier TLV) |
| **MulticastLinkIdentifier (optional)****(Multicast link identifier TLV)** |
| RequestedMihEventList(MIH event list TLV) |

**8.6.1.10 MIH\_Event\_Unsubscribe response**

The corresponding MIH primitive ofthis message is defined in 7.4.5.2.

The response indicates which of the event types were successfully unsubscribed.

|  |
| --- |
| **MIH Header Fixed Fields (SID=1, Opcode=2, AID=5)** |
| **Source Identifier =** sending MIHF ID(Source MIHF ID TLV) |
| **Destination Identifier** = receiving MIHF ID(Destination MIHF ID TLV) |
| **~~Status~~****~~(Status TLV)~~** |
| **~~LinkIdentifier~~****~~(Link identifier TLV)~~** |
| **~~ResponseMihEventList (not included if Status does not indicate “Success”)~~****~~(MIH event list TLV)~~** |
| **UnsubscriptionResponseList****(Unsubscription Response List TLV)** |

**8.6.3 MIH messages for command service**

**8.6.3.1 MIH\_Link\_Get\_Parameters request**

The corresponding MIH primitive of this message is defined in 7.4.14.2.

This message is used to discover the status of currently available links. **The message must contain the Link identifier list TLV or Multicast link identifier TLV.**

|  |
| --- |
| **MIH Header Fixed Fields (SID=3, Opcode=1, AID=1)** |
| **Source Identifier =** sending MIHF ID(Source MIHF ID TLV) |
| **Destination Identifier** = receiving MIHF ID(Destination MIHF ID TLV) |
| DeviceStatesRequest (optional)(Device states request TLV) |
| LinkIdentifierList **(optional)**(Link identifier list TLV) |
| **MulticastLinkIdentifier (optional)****(Multicast link identifier TLV)** |
| GetStatusRequestSet(Get status request set TLV) |

**8.6.3.3 MIH\_Link\_Configure\_Thresholds request**

The corresponding MIH primitive of this message is defined in 7.4.15.2.

This message is used to configure thresholds of the lower layer link. **The message must contain the Link identifier TLV or Multicast link identifier TLV.**

|  |
| --- |
| **MIH Header Fixed Fields (SID=3, Opcode=1, AID=2)** |
| **Source Identifier =** sending MIHF ID(Source MIHF ID TLV) |
| **Destination Identifier** = receiving MIHF ID(Destination MIHF ID TLV) |
| LinkIdentifier **(optional)**(Link identifier TLV) |
| **MulticastLinkIdentifier (optional)****(Multicast link identifier TLV)** |
| ConfigureRequestList(Register request code TLV) |

**8.6.3.4 MIH\_Link\_Configure\_Thresholds response**

The corresponding MIH primitive of this message is defined in 7.4.15.3.

This message returns the status of a thresholds configuration request. The MIHF generating this message generates MIH\_Link\_Parameters\_Report indication message when the configured threshold is crossed.

|  |
| --- |
| **MIH Header Fixed Fields (SID=3, Opcode=2, AID=2)** |
| **Source Identifier =** sending MIHF ID(Source MIHF ID TLV) |
| **Destination Identifier** = receiving MIHF ID(Destination MIHF ID TLV) |
| **~~Status~~****~~(Status TLV)~~** |
| **~~LinkIdentifier~~****~~(Link identifier TLV)~~** |
| **~~ConfigureResponseList (not included if Status does not indicate “Success”)~~****~~(Configure response list TLV)~~** |
| **ConfigureThresholdsResponseList****(Configure Thresholds Response List TLV)** |

**8.6.3.5 MIH\_Link\_Actions request**

The corresponding MIH primitive of this message is defined in 7.4.16.1.

This message is used to control the behavior of a set of lower layer links. **The message must contain the Link action list TLV or Multicast link action identifier TLV.**

|  |
| --- |
| **MIH Header Fixed Fields (SID=3, Opcode=1, AID=3)** |
| **Source Identifier =** sending MIHF ID(Source MIHF ID TLV) |
| **Destination Identifier** = receiving MIHF ID(Destination MIHF ID TLV) |
| LinkActionList **(optional)**(Link action list TLV) |
| **MulticastLinkActionIdentifier (optional)****(Multicast link action list TLV)** |

**Annex F**

(normative)

***Change Table F.4 as follows:***

**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. |

**Annex L**

(normative)

***Change Table L.2 as follows:***

**Table L.2—Type values for TLV encoding**

|  |  |  |
| --- | --- | --- |
| **TLV type name** | **TLV** **type value** | **Data type** |
| Requested resource set | 63 | REQ\_RES\_SET |
| Broadcast multimedia program ID | 76 | BCST\_MMP\_ID |
| Broadcast multimedia service ID | 77 | BCST\_MMS\_ID |
| Target MN group information | 78 | GROUP\_INFO |
| Supported link actions list | 79 | SUPPORTED\_LINK\_ACTIONS\_LIST |
| **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)** |
| **Subscription Response List TLV** | **84** | **LIST(** **STATUS,** **LINK\_TUPLE\_ID,** **CHOICE(NULL, MIH\_EVT\_LIST)****)** |
| **Unsubscription Response List TLV** | **85** | **LIST(** **STATUS,** **LINK\_TUPLE\_ID,** **CHOICE(NULL, MIH\_EVT\_LIST)****)** |
| **Configure Thresholds Response List TLV** | **86** | **LIST(** **STATUS,** **LINK\_TUPLE\_ID,** **CHOICE(NULL,**  **LIST(LINK\_CFG\_STATUS)****)** |
| (Reserved) | ~~64~~ 82- 99 | (Reserved) |
| Vendor specific TLV | 100 | (Vendor specific) |
| (Reserved for experimental TLVs) | 101 - 255 | (Used for experimental purposes) |