|  |  |
| --- | --- |
| Project | **IEEE 802.16 Broadband Wireless Access Working Group <**<http://ieee802.org/16>**>** |
| Title | **Clarification of MAC control messages on direct communication over IEEE 802.16.1a**  |
| Date Submitted | **2012-05-08** |
| Source(s) | Hyun Lee, Miyoung Yun, Seokki Kim, Won-Ik Kim, Eunkyung Kim, Sungkyung Kim, Chulsik Yoon, Sungcheol ChangETRI | E-mail: hyunlee@etri.re.krscchang@etri.re.kr |
| Re: | “IEEE 802.16-12-271,” in response to Letter Ballot Recirc #38a on P802.16.1a/D2 |
| Abstract | Changes are provided to accommodate Correction on MAC control messages on direct communication over IEEE 802.16.1a |
| Purpose | To discuss and adopt the proposed text in the draft amendment document on GRIDMAN |
| Notice | *This document does not represent the agreed views of the IEEE 802.16 Working Group or any of its subgroups*. It represents only the views of the participants listed in the “Source(s)” field above. It is offered as a basis for discussion. It is not binding on the contributor(s), who reserve(s) the right to add, amend or withdraw material contained herein. |
| Copyright Policy | The contributor is familiar with the IEEE-SA Copyright Policy <http://standards.ieee.org/IPR/copyrightpolicy.html>. |
| Patent Policy | The contributor is familiar with the IEEE-SA Patent Policy and Procedures:<<http://standards.ieee.org/guides/bylaws/sect6-7.html#6>> and <<http://standards.ieee.org/guides/opman/sect6.html#6.3>>.Further information is located at <<http://standards.ieee.org/board/pat/pat-material.html>> and <<http://standards.ieee.org/board/pat>>. |

**Clarification of MAC control messages on direct communication over IEEE 802.16.1a**

Hyun Lee, Miyoung Yun, Seokki Kim, Won-Ik Kim, Eunkyung Kim, Sungkyung Kim, Chulsik Yoon, Sungcheol Chang

ETRI

# Introduction

This document provides Clarification of MAC control messages on direct communication over IEEE 802.16.1a.

Changes are provided to accommodate Correction on the value/descripion of dirct communication MAC control messges as the following proposed texts.

# References

[1] IEEE 802.16-12-0132-00, GRIDMAN System Requirement Document including SARM annex, January 2012.

[2] IEEE P802.16.1aTM/D2, WirelessMAN-Advanced Air Interface for Broadband Access Systems - Draft Amendment: Higher Reliability Networks, April 2012.

# Proposed Text for the 802.16.1a AWD

Note:

The text in **BLACK** color: the existing text in the 802.16.1a AWD

The text in **~~RED~~** color: the removal of existing 802.16.1a AWD

The text in **BLUE** color: the new text added to the 802.16.1a AWD

[-----------------------------------------------Start of Text Proposal----------------------------------------------]

**[Remedy #1: Adopt the following proposed modification from page 68, Table 106u]**

6.2.3.65.21 AAI-DC-LEST-REQ

An HR-MS transmits a AAI-DC-LEST-REQ message to establish a one way peer-to-peer TDC link.

Table 106 – AAI-DC-LEST-REQ message field description

| **Field** | **Size (bits)** | **Value/Description** | **Condition** |
| --- | --- | --- | --- |
| Link Change Count | 4 | The change count of this transaction assigned by the sender. If new transaction is started, Link Change Count is incremented by one (modulo 16) by the sender. | Shall always be present |
| For (i=0; i<N\_Flow\_Est; i++) { |  | N\_Flow\_Est is the number of flows on which the sender of this message sends MAC PDUs.Range [0..1] |  |
| FID | 4 | Flow identifier assigned by the sink of packets on the flow |  |
| Traffic Priority | 3 | 0 to 7: Higher numbers indicate higher priorityDefault: 0 |  |
| CS Specification Parameters | 8 | 0–15: *Reserved*16: Voice Codec G.729A17: Voice Codec AMR18–255: *Reserved* |  |
| MAC Header Type | 1 | Indicates whether AGMH or SPMH is presented at the start of MAC PDUs of the service flow.~~0 : AGMH (Advanced Generic MAC Header)~~~~1 : SPMH (Short-Packet MAC header)~~0 : SPMH (Short-Packet MAC header)1 : AGMH (Advanced Generic MAC Header)default value is 0. |  |
| } |  |  |  |
| *Reserved* |  |  |  |

**[Remedy #2: Adopt the following proposed modification from page 69, Table 106w]**

6.2.3.65.23 AAI-DC-MES-REP

An HR-MS transmits a AAI-DC-MES-REP message to report the measurement results if a report trigger condition is met.

Table 106w – AAI-DC-MES-REP message field description

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Size (bits) | Value/Description | Condition |
| For (i=0; i<N\_DCH\_CINR; i++) { |  | N\_DCH\_CINR is the number of dedicated channels which are used for receiving packets and selected for CINR report | Present if 0 < N\_DCH\_CINR |
| Direct Mode Zone Type | 2 | Direct mode zone type for measurement0x0: Common direct mode zone (CDMZ)0x1: Common direct mode zone extended (CDMZ-E)0x2: Cell specific direct mode zone (CSDMZ)0x3: Reserved. |  |
| DCH number | 6 | DCH number for measurement |  |
| DCH CINR mean | 8 | CINR mean of the dedicated channel |  |
| } |  |  |  |
| For (i=0; i<N\_DCH\_NI; i++) { |  | N\_DCH\_NI is the number of dedicated channels which are not used for receiving and packets and selected for NI report Range [0..36] | Present if 0 < N\_DCH\_NI |
| Direct Mode Zone Type | 2 | Direct mode zone type for measurement0x0: Common direct mode zone (CDMZ)0x1: Common direct mode zone extended (CDMZ-E)0x2: Cell specific direct mode zone (CSDMZ)0x3 ~~to 0xF~~: Reserved. |  |
| DCH Number | 6 | DCH number for measurement |  |
| Noise and Interference Level Mean | 8 | Noise and Interference mean. This is noise plus interference power level that is divided by the number of subcarriers in the frequency domain and averaged over the dedicated channel.-134dBm to -30dBm in units of 1dB.-134 dBm is encoded as 0x00,-30 dB is encoded as 0x69,0x69 to 0xFF is reserved. |  |
| Noise and Interference Level Variance | 4 | Noise and Interference variance.0 dB to 15 dB in units of 1dB. |  |
| } |  |  |  |

**[Remedy #3: Adopt the following proposed modification from page 70, Table 106x]**

6.2.3.65.24 AAI-DC-RCHG-REQ

An HR-MS transmits an AAI-DC-RCHG-REQ message to change radio resource for dedicated channel.

Table 106x – AAI-DC-RCHG-REQ message field description

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Size (bits)** | **Value/Description** | **Condition** |
| For (i=0; i<N\_DCH; i++) { |  | N\_DCH is the number of dedicated channelsRange [0..36] |  |
| Old Direct Mode Zone Type | 2 | Direct mode zone type for old DCH0x0: Common direct mode zone (CDMZ)0x1: Common direct mode zone extended (CDMZ-E)0x2: Cell specific direct mode zone (CSDMZ)0x3 ~~to 0xF~~: *Reserved*. |  |
| Old DCH Number | 4 | Indicates old DCH number. |  |
| New Direct Mode Zone Type | 2 | Direct mode zone type for new DCH0x0: Common direct mode zone (CDMZ)0x1: Common direct mode zone extended (CDMZ-E)0x2: Cell specific direct mode zone (CSDMZ)0x3: *Reserved*. |  |
|  |  |  |  |
| New DCH Number | 4 | Indicates new DCH number. |  |
| } |  |  |  |
| For (i=0; i<N\_DCH\_NI; i++) { |  | N\_DCH\_NI is the number of recommended dedicated channels for candidates of new DCHs Range [0..36] | Present if 0 < N\_DCH\_NI |
| Direct Mode Zone Type | 2 | Direct mode zone type of a recommended DCH0x0: Common direct mode zone (CDMZ)0x1: Common direct mode zone extended (CDMZ-E)0x2: Cell specific direct mode zone (CSDMZ)0x3: *Reserved*. |  |
| DCH Number | 6 | DCH number of a candidate |  |
| Noise and Interference Level Mean | 8 | Noise and Interference mean. This is noise plus interference power level that is divided by the number of subcarriers in the frequency domain and averaged over the dedicated channel.-134dBm to -30dBm in units of 1dB.-134 dBm is encoded as 0x00,-30 dB is encoded as 0x69,0x69 to 0xFF is *reserved*. |  |
| Noise and Interference Level Variance | 4 | Noise and Interference variance.0 dB to 15 dB in units of 1dB. |  |
| } |  |  |  |

**[Remedy #4: Adopt the following proposed modification from page 71, Table 106y]**

* + - * 1. AAI-DC-RCHG-RSP

An HR-MS transmits a AAI-DC-RCHG-RSP message in response to a received AAI-DC-RCHG-REQ.

Table 106y – DC-RCHG-~~REQ~~RSP message field description

| **Field** | **Size (bits)** | **Value/Description** | **Condition** |
| --- | --- | --- | --- |
| Confirmation Code | 4 | Zero indicates the request was successful.Nonzero indicates failure0x0: accept with new mapping of DCHs0x1: reject (continue to use current DCHs)0x2 to 0xF: *reserved* | Shall always be present |
| For (i=0; i<N\_DCH; i++) { |  | N\_ DCH is the number of DCHs which are changed to new DCHsRange [0..36] | Present if Confirmation Code == 0x0 |
| Old Direct Mode Zone Type | 2 | Direct mode zone type for old DCH0x0: Common direct mode zone (CDMZ)0x1: Common direct mode zone extended (CDMZ-E)0x2: Cell specific direct mode zone (CSDMZ)0x3: Reserved. |  |
| Old DCH Number | 4 | Indicates old DCH number. |  |
| New Direct Mode Zone Type | 2 | Direct mode zone type for new DCH0x0: Common direct mode zone (CDMZ)0x1: Common direct mode zone extended (CDMZ-E)0x2: Cell specific direct mode zone (CSDMZ)0x3: Reserved. |  |
| New DCH Number | 4 | Indicates new DCH number. |  |
| } |  |  |  |

**[Remedy #5: Adopt the following proposed modification from page 72, Table 106cc]**

6.2.3.65.29 AAI-DC-LEST-CMD

An HR-MS transmits an AAI-DC-LEST-CMD message to establish a point-to-multipoint link.

Table 106 – AAI-DC-LEST-CMD message field description

| **Field** | **Size (bits)** | **Value/Description** | **Condition** |
| --- | --- | --- | --- |
| Link Change Count | 4 | The change count of this transaction assigned by the sender. If new transaction is started, Link Change Count is incremented by one (modulo 16) by the sender. | Shall always be present |
| For (i=0; i<N\_Flow\_Est; i++) { |  | N\_Flow\_Est is the number of flows on which the sender of this message sends MAC PDUs.Range [0..1] |  |
| FID | 4 | Flow identifier assigned by the source of packets on the flow |  |
| Traffic Priority | 3 | 0 to 7: Higher numbers indicate higher priorityDefault: 0 |  |
| CS Specification Parameters | 8 | 0–15: *Reserved*16: Voice Codec G.729A17: Voice Codec AMR18–255: *Reserved* |  |
| MAC Header Type | 1 | Indicates whether AGMH or SPMH is presented at the start of MAC PDUs of the service flow.~~0 : AGMH (Advanced Generic MAC Header)~~~~1 : SPMH (Short-Packet MAC header)~~0 : SPMH (Short-Packet MAC header)1 : AGMH (Advanced Generic MAC Header)default value is 0. |  |
| } |  |  |  |

**[Remedy #6: Adopt the following proposed modification from page 73, Table 106ee]**

* + - * 1. AAI-DC-DSA-CMD

An HR-MS transmits an AAI-DC-DSA-CMD message to create a new service flow on one-way point-to-point and point-to-multipoint TDC links.

Table 106ee – AAI-DC-DSA-CMD message field description

| **Field** | **Size (bits)** | **Value/Description** | **Condition** |
| --- | --- | --- | --- |
| FID Change Count | 4 | The change count of this transaction assigned by the sender. If new transaction is started, FID Change Count is incremented by one (modulo 16) by the sender. | Shall always be present |
| For (i=0; i<N\_Flow\_Est; i++) { |  | N\_Flow\_Est is the number of flows on which the sender of this message sends MAC PDUs.Range [0..12] |  |
| FID | 4 | Flow identifier assigned by the source of packets on the flow |  |
| Traffic Priority | 3 | 0 to 7: Higher numbers indicate higher priorityDefault: 0 |  |
| CS Specification Parameters | 8 | 0–15: *Reserved*16: Voice Codec G.729A17: Voice Codec AMR18–255: *Reserved* |  |
| MAC Header Type | 1 | Indicates whether AGMH or SPMH is presented at the start of MAC PDUs of the service flow.~~0 : AGMH (Advanced Generic MAC Header)~~~~1 : SPMH (Short-Packet MAC header)~~0 : SPMH (Short-Packet MAC header)1 : AGMH (Advanced Generic MAC Header)default value is 0. |  |
| } |  |  |  |
| *Reserved* |  |  |  |

**[Remedy #7: Adopt the following proposed modification from page 74, Table 106ff]**

* + - * 1. AAI-DC-DSC-CMD

An HR-MS transmits an AAI-DC-DSC-CMD message to change the parameters of an existing service flow on one-way point-to-point and point-to-multipoint TDC links.

Table 106ff – AAI-DC-DSC-CMD message field description

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Size (bits)** | **Value/Description** | **Condition** |
| FID Change Count | 4 | The change count of this transaction assigned by the sender. If new transaction is started, FID Change Count is incremented by one (modulo 16) by the sender. | Shall always be present |
| For (i=0; i<N\_Flow\_Chg; i++) { |  | N\_Flow\_Chg is the number of flows on which the sender of this message sends MAC PDUs.Range [0..12] | Present if 0 < N\_Flow\_Chg |
| FID | 4 | Flow identifier assigned by the source of packets on the flow |  |
| Traffic Priority | 3 | 0 to 7: Higher numbers indicate higher priorityDefault: 0 |  |
| CS Specification Parameters | 8 | 0–15: Reserved16: Voice Codec G.729A17: Voice Codec AMR18–255: Reserved |  |
| MAC Header Type | 1 | Indicates whether AGMH or SPMH is presented at the start of MAC PDUs of the service flow.~~0 : AGMH (Advanced Generic MAC Header)~~~~1 : SPMH (Short-Packet MAC header)~~0 : SPMH (Short-Packet MAC header)1 : AGMH (Advanced Generic MAC Header)default value is 0. |  |
| } |  |  |  |

**[Remedy #8: Adopt the following proposed modification from page 76, Table 106ii]**

6.2.3.65.35 AAI-DC-RCHG-CMD

An HR-MS transmits an AAI-DC-RCHG-CMD message to change communication resource on one-way point-to-point and point-to-multipoint TDC links.

Table 106ii – AAI-DC-RCHG-CMD message field description

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Size (bits)** | **Value/Description** | **Condition** |
| For (i=0; i<N\_DCH; i++) { |  | N\_ DCH is the number of DCHs which are changed to new DCHsRange [0..36] |  |
| Old Direct Mode Zone Type | 2 | Direct mode zone type for old DCH0x0: Common direct mode zone (CDMZ)0x1: Common direct mode zone extended (CDMZ-E)0x2: Cell specific direct mode zone (CSDMZ)0x3: Reserved. |  |
| Old DCH Number | 4 | Indicates old DCH number. |  |
| New Direct Mode Zone Type | 2 | Direct mode zone type for new DCH0x0: Common direct mode zone (CDMZ)0x1: Common direct mode zone extended (CDMZ-E)0x2: Cell specific direct mode zone (CSDMZ)0x3: Reserved. |  |
| New DCH Number | 4 | Indicates new DCH number. |  |
| } |  |  |  |

**[Remedy #9: Adopt the following proposed modification from page 77, Table 106jj]**

* + - * 1. AAI-DC-TKV-ADV

An HR-MS transmits an AAI-DC-TKN-ADV message to advertise status of a token for half duplex communication on a point-to-multipoint TDC link.

Table 106jj – AAI-DC-TKN-REQ message field description

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Size (bits)** | **Value/Description** | **Condition** |
| Direct Mode Zone Type | 2 | Direct mode zone type of DCH for advertising that the PTT token is available.0x0: Common direct mode zone (CDMZ)0x1: Common direct mode zone extended (CDMZ-E)0x2: Cell specific direct mode zone (CSDMZ)0x3: *Reserved*. |  |
| DCH Number | 4 | Indicates DCH number for the advertisement. |  |
| PTT Token Status | 2 | Zero indicates that the PTT token is available.~~Nonzero~~ One indicates unavailable0x0: PTT token is available.0x1: PTT token is unavailable.0x2~0x3: *Reserved* |  |
| Destination DCGID  | 24 | Indicates a destination HR-MS (Group) address. |  |

**[Remedy #10: Adopt the following proposed modification from page 77, Table 106kk]**

6.2.3.65.37 AAI-DC-RTS

An HR-MS transmits an AAI-DC-RTS message to reserve a dedicated channel in a distributed way.

Table 106kk – AAI-DC-RTS message field description

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Size (bits)** | **Value/Description** | **Condition** |
| Source DCTID | 24 | Indicates a source HR-MS address |  |
| Destination DCTID or DCGID  | 24 | Indicates a destination HR-MS (Group) address. |  |
| Maximum Index of Burst Size  | 8 | Indicates a maximum index of burst size that the sending HR-MS suggests the receiving HR-MS to recommend. The receiving HR-MS selects burst size that is less than  |  |
| Maximum Number of HARQ Retransmission | 2 | Indicates maximum number of PHY burst retransmission for HARQ operation.0: HARQ retransmission is disabled1~3: HARQ retransmission is enabled |  |
| Destination Address Type | 1 | Indicates type of destination address.0: DCTID1: DCGID |  |
| Piggyback Message Indicator | 1 | Indicates whether a control message is piggybacked or not0: no piggyback1: MAC control message |  |
| *Reserved* | 4 |  |  |
| MAC Control Message | *variable* | MAC control message~~s in Table 1216 except AAI-DC-RTS and AAI-DC-CTS messages~~ is AAI-DC-LEST-REQ, AAI-DC-MES-REP, AAI-DC-RCHG-REQ, AAI-DC-LEST-CMD or AAI-DC-RELAY-REQ. | Present if Piggyback message indicator is set to 1 |

**[Remedy #11: Adopt the following proposed modification from page 78, Table 106ll]**

6.2.3.65.38 AAI-DC-CTS

An HR-MS transmits an AAI-DC-CTS message in response to AAI-DC-RTS message.

Table 106ll – AAI-DC-CTS message field description

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Size (bits)** | **Value/Description** | **Condition** |
| Source DCTID | 24 | Indicates a source HR-MS address |  |
| Destination DCTID or DCGID  | 24 | Indicates a destination HR-MS (Group) address. |  |
| Recommended Index of Burst Size  | 8 | Indicates a recommended index of burst size for a dedicated channel |  |
| Maximum Number of HARQ Retransmission | 2 | Indicates maximum number of PHY burst retransmission for HARQ operation |  |
| Piggyback Message Indicator | 1 | Indicates whether a control message is piggybacked or not0: no piggyback1: MAC control message |  |
| *Reserved* | 5 |  |  |
| MAC Control Message | *variable* | MAC control message~~s in Table 1216 except AAI-DC-RTS and AAI-DC-CTS messages~~ is AAI-DC-LEST-RSP, AAI-DC-RCHG-RSP, or AAI-DC-RELAY-RSP. | Present if Piggyback message indicator is set to 1 |

**[Remedy #12: Adopt the following proposed modification from page 79, Table 106nn]**

6.2.3.65.40 AAI-DC-RELAY-ADV

A relaying HR-MS transmits an AAI-DC-RELAY-ADV message to broadcast its information.

Table 106nn – AAI-DC-RELAY-ADV message field description

| **Field** | **Size (bits)** | **Value/Description** | **Condition** |
| --- | --- | --- | --- |
| Relay DCTID | 24 | DC Terminal Identifier.Indicate the HR-MS which relays packets between two TDC links |  |
| Relay Status | 1 | Indicate that the relaying HR-MS is available for two-hop operation.0x0: available0x1: relaying packets |  |
| Relay Traffic Priority | 3 | Indicate the traffic priority for relaying packets0 to 7: Higher numbers indicate higher priorityDefault: 0 |  |
| For (i=0; i<N\_Reserved\_DCH; i++) {  |  | N\_Reserved\_DCH is the number of dedicated channels for reservationRange [0..36] |  |
| Direct Mode Zone Type for Reservation | 2 | Direct mode zone type of a reserved DCH0x0: Common direct mode zone (CDMZ)0x1: Common direct mode zone extended (CDMZ-E)0x2: Cell specific direct mode zone (CSDMZ)0x3 to 0xF: *Reserved*. |  |
| DCH Number for Reservation | 6 | Reserved DCH number on the zone of Direct Mode Zone Type |  |
| } |  |  |  |

**[Remedy #13: Adopt the following proposed modification from page 80, Table 106pp]**

6.2.3.65.42 AAI-DC-RELAY-RSP

An HR-MS transmits a AAI- DC-RELAY-RSP message in response to a received AAI- DC-RELAY-REQ message.

Table 106pp – AAI-DC-RELAY-RSP message field description

| **Field** | **Size (bits)** | **Value/Description** | **Condition** |
| --- | --- | --- | --- |
| Link Change Count | 4 | Link Change Count from the corresponding AAI-DCRELAY-REQ | Shall always be present |
| Confirmation Code | 4 | Zero indicates the request was successful. Nonzero indicates failure.0x0: accept0x1: reject with a recommended DCH0x2: wait next response message0x3 to 0xF: *reserved* | Shall always be present |
| Direct Mode Zone Type | 2 | Direct mode zone type of a recommended DCH0x0: Common direct mode zone (CDMZ)0x1: Common direct mode zone extended (CDMZ-E)0x2: Cell specific direct mode zone (CSDMZ)0x3 ~~to 0xF~~: *Reserved*. | Present if Confirmation Code == 0x1 |
| DCH Number | 6 | Recommended DCH number on zone of Direct Mode Zone Type | Present if Confirmation Code == 0x1 |

[----------------------------------------------End of Text Proposal------------------------------------------------]