DCN 16-17-0003-00-000s

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| --- | --- | --- |
| Project | **IEEE 802.16 Broadband Wireless Access Working Group <**<http://ieee802.org/16>**>** | |
| Title | **MAC Layer Amendments to Section 8 for channel bandwidth below 1.25 MHz (v1.0)** | |
| Date Submitted | **2017-01-04** | |
| Source(s) | Menashe Shahar Full Spectrum Inc. 687 N. Pastoria Ave. Sunnyvale, CA. 94085. USA | Voice: (650) 814-7377  E-mail: mshahar@fullspectrumnet.com |
| Re: | Call for Contributions: IEEE 802.16 Working Group on Broadband Wireless Access GRIDMAN Task Group: Project 802.16s  IEEE 802.16-16-0035-01-000s | |
| Abstract | Describes proposed amendments to Section 8 for channel bandwidth below 1.25 MHz. | |
| Purpose | For consideration during Working Group Session #107 | |
| 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. | |
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**8.4.5 Map message fields and IEs**

**8.4.5.1 DL-MAP PHY Synchronization field**

The format of the PHY Synchronization field of the DL-MAP message, as described in 6.3.2.3.2 or Compressed\_DL-MAP, as defined in 8.4.5.6, is given in Table 8-112. The frame duration codes are given in Table 8-113. The frame number is incremented by one each frame and eventually wraps around to zero.

**Table 8-112a—OFDMA PHY Synchronization Field**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| PHY\_synchronization\_field() { | — | — |
|  |  |  |
|  |  |  |
|  |  |  |
| **Frame Number** | 16 | — |
|  |  |  |
| } | — | — |
|  |  |  |

A BS shall generate DL-MAP messages in the format shown in Table 6-53, including all of the following parameters:

**Frame number**

The frame number is incremented by 1 MOD 216 each frame.

.

**8.4.5.2 Frame duration codes**

Table 8-113 defines the various frame durations that are allowed. The frame durations defined in the table indicate the periodicity of the DL frame start preamble in both FDD and TDD cases.

**Table 8-113a—OFDMA frame duration (*TF* ms) codes**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Code** | **Frame duration** | **Frames per second** |
|  | **(N)** | **(ms)** |
|  |  |
|  |  |  |  |
|  | 0 | *Reserved* | N/A |
|  |  |  |  |
|  | 1 | 2 | 500 |
|  |  |  |  |
|  | 2 | 2.5 | 400 |
|  |  |  |  |
|  | 3 | 4 | 250 |
|  |  |  |  |
|  | 4 | 5 | 200 |
|  |  |  |  |
|  | 5 | 8 | 125 |
|  |  |  |  |
|  | 6 | 10 | 100 |
|  |  |  |  |
|  | 7 | 12.5 | 80 |
|  |  |  |  |
|  | 8 | 20 | 50 |
|  |  |  |  |

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**Table 8-113a—OFDMA frame duration (*TF* ms) codes**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Code** | **Frame duration** | **Frames per second** |
|  | **(N)** | **(ms)** |
|  |  |
|  |  |  |  |
|  | 9 | 25 | 40 |
|  | 10 | 40 | 25 |
|  | 11 | 50 | 20 |
|  | 12-254 | *Reserved* | |
|  |  |  |  |
|  | 255 | Infinity | 0 |
|  |  |  |  |

Note that the frame durations indicated in Table 8-113a typically are not integer multiples of one OFDMA symbol duration. Therefore some time padding may be necessary between the last useful OFDMA symbol of a frame and the beginning of the next frame. In addition, in the TDD case, note that the RTG and TTG guard intervals shall be included in a frame. Both RTG and TTG shall be no less than 5 s in duration.

The code 255 is used for HR-MS direct communication without infrastructure station only.

**8.4.5.3 DL-MAP IE format**

The OFDMA DL-MAP IE defines a two-dimensional allocation pattern as defined in Table 8-114.

The code 255 is used for HR-MS direct communication without infrastructure station only.

**Table 8-114a—OFDMA DL-MAP IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| DL-MAP\_IE() { | — | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| if (DIUC == 14) { | — | — |
|  |  |  |
| **Extended-2 DIUC dependent IE** | — | — |
|  |  |  |
| } Else if (DIUC == 15) { | — | — |
|  |  |  |
| **Extended DIUC dependent IE** | *variable* | See 8.4.5.3.2 and 8.4.5.3.2.1 |
|  |  |  |
| } else { | — | — |
|  |  |  |

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**Table 8-114a—OFDMA DL-MAP IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
| **No of slots** | 8 | — |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
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**Table 8-114—OFDMA DL-MAP IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

**DIUC**

DIUC used for the burst.

**CID**

The connection identifier that represents the assignment of the IE to a broadcast, multicast, or unicast address.

.

**No. of slots**

The number of slots that are used to carry the DL PHY burst.

.

.

**8.4.5.3.1 DIUC allocation**

Table 8-115 defines the DIUC encoding that shall be used in the DL-MAP IEs.

DIUC = 0 shall have burst profile parameters that are the same as those used for transmission of the DL-MAP message.

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**Table 8-115a—OFDMA DIUC values**

|  |  |
| --- | --- |
| **DIUC** | **Usage** |
|  |  |
| 0–12 | Different burst profiles including QPSK ½ repetition 2 |
|  |  |
| 13 | Reserved |
|  |  |
| 14 | Extended-2 DIUC IE |
|  |  |
| 15 | Extended DIUC |
|  |  |

The SS shall ignore the received signal in the GAP/PAPR reduction region.

**8.4.5.3.2 DL-MAP Extended IE format**

A DL-MAP IE entry with a DIUC = 15 indicates that the IE carries special information and conforms to the structure shown in Table 8-116. A station shall ignore an extended IE entry with an extended DIUC value for which the station has no knowledge. In the case of a known extended DIUC value but with a length field longer than expected, the station shall process information up to the known length and ignore the remainder of the IE.

**Table 8-116—DL-MAP Extended IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| DL\_Extended\_IE() { | — | — |
|  |  |  |
| **Extended DIUC** | 4 | 0x0..0xF |
|  |  |  |
| **Length** | 4 | Length in bytes of Unspecified Data field |
|  |  |  |
| **Unspecified data** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.3.2.1 DL-MAP Extended IE encoding format**

Table 8-117 defines the encoding for extended DIUC that shall be used by DL-MAP Extended IEs.

**Table 8-117—Extended DIUC code assignment for DIUC = 15**

|  |  |
| --- | --- |
| **Extended DIUC** | **Usage** |
| **(hexadecimal)** |
|  |
|  |  |
| 0x0 | Channel Measurement IE |
|  |  |
| 0x1 | STC Zone IE |
|  |  |
| 0x2 | AAS DL IE |
|  |  |
| 0x3 | Data Location in Another BS IE |
|  |  |
| 0x4 | CID Switch IE |
|  |  |
| 0x5 | *Reserved* |
|  |  |

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**Table 8-117—Extended DIUC code assignment for DIUC = 15 *(CONTINUED)***

|  |  |
| --- | --- |
| **Extended DIUC** | **Usage** |
| **(hexadecimal)** |
|  |
|  |  |
| 0x6 | *Reserved* |
|  |  |
| 0x7 | HARQ Map Pointer IE |
|  |  |
| 0x8 | PHYMOD DL IE |
|  |  |
| 0x9 | *Reserved* |
|  |  |
| 0xA | Broadcast Control Pointer IE |
|  |  |
| 0xB | DL PUSC Burst Allocation in Other Segment IE |
|  |  |
| 0xC | PUSC ASCA ALLOC IE |
|  |  |
| 0xD | H-FDD Group Switch IE |
|  |  |
| 0xE | Extended Broadcast Control Pointer IE |
|  |  |
| 0xF | UL Interference and Noise Level IE |
|  |  |

**8.4.5.3.2.2 DL-MAP Extended-2 IE encoding format**

A DL-MAP IE entry with a DIUC = 14 indicates that the IE carries special information and conforms to the structure shown in Table 8-118. A station shall ignore an extended-2 IE entry with an extended-2 DIUC value for which the station has no knowledge. In the case of a known extended-2 DIUC value but with a length field longer than expected, the station shall process information up to the known length and ignore the remainder of the IE.

**Table 8-118—OFDMA DL-MAP Extended-2 IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| DL\_Extended-2\_IE() { | — | — |
|  |  |  |
| **Extended-2 DIUC** | 4 | 0x0 … 0xF |
|  |  |  |
| **Length** | 8 | Length in bytes of Unspecified Data field |
|  |  |  |
| **Unspecified data** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |

The Unspecified Data field shall be padded with bits set to zero to get an integer number of bytes, specified by Length, in the data field of the IE.

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Table 8-119 defines the encoding for extended-2 DIUC that shall be used by DL-MAP Extended-2 IEs.

**Table 8-119—Extended-2 DIUC code assignment for DIUC = 14**

|  |  |
| --- | --- |
| **Extended-2 DIUC** | **Usage** |
| **(hexadecimal)** |
|  |
|  |  |
| 0x0 | MBS MAP IE |
|  |  |
| 0x1 | HO Anchor Active DL MAP IE |
|  |  |
| 0x2 | HO Active Anchor DL MAP IE |
|  |  |
| 0x3 | HO CID Translation MAP IE |
|  |  |
| 0x4 | MIMO in Another BS IE |
|  |  |
| 0x5 | Macro-MIMO DL Basic IE |
|  |  |
| 0x6 | Skip IE |
|  |  |
| 0x7 | HARQ DL MAP IE |
|  |  |
| 0x8 | HARQ ACK IE |
|  |  |
| 0x9 | Enhanced DL MAP IE |
|  |  |
| 0xA | Closed-loop MIMO DL Enhanced IE |
|  |  |
| 0xB | MIMO DL Basic IE |
|  |  |
| 0xC | MIMO DL Enhanced IE |
|  |  |
| 0xD | Persistent HARQ DL MAP IE |
|  |  |
| 0xE | AAS SDMA DL IE |
|  |  |
| 0xF | Extended-3 DIUC |
|  |  |

**8.4.5.3.2.3 DL-MAP Extended-3 IE encoding format**

A DL-MAP IE entry with an Extended-2 DIUC = 0xF indicates that the IE carries special information and conforms to the structure shown in Table 8-120. A station shall ignore an extended-3 IE entry with an extended-3 DIUC value for which the station has no knowledge. In the case of a known extended-3 DIUC

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value but with a length field longer than expected, the station shall process information up to the known length and ignore the remainder of the IE.

**Table 8-120—DL-MAP Extended-3 IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| DL\_Extended-3\_IE() { | — | — |
|  |  |  |
| **Extended-2 DIUC** | 4 | 0xF |
|  |  |  |
| **Length** | 8 | Length in bytes of the unspecified data field plus the |
|  |  | extended-3 DIUC field |
|  |  |  |
| **Extended-3 DIUC** | 4 | 0x0 … 0xF |
|  |  |  |
| **Unspecified data** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |

Table 8-121 defines the encoding for extended-3 DIUC that shall be used by DL-MAP Extended-3 IEs.

**Table 8-121—Extended-3 DIUC code assignment for Extended-2 DIUC = 15**

|  |  |
| --- | --- |
| **Extended-3 DIUC** | **Usage** |
| **(hexadecimal)** |
|  |
|  |  |
| 0x0 | Power Boosting IE |
|  |  |
| 0x1 | MR DL-MAP Monitor IE |
|  |  |
| 0x2 | DL\_Burst\_Transmit\_IE |
|  |  |
| 0x3 | OFDMA Periodic\_Channel\_Measurement\_IE |
|  |  |
| 0x4 | HR Multicast DL MAP IE |
|  |  |
| 0x5 – 0xF | *Reserved* |
|  |  |

**8.4.5.3.3 AAS DL IE format**

Within a frame, the switch from non-AAS to AAS-enabled traffic is marked by using the extended DIUC = 15 with the AAS\_DL\_IE() (see Table 8-122). The AAS DL IE defines a DL AAS zone that spans continuous OFDMA symbols until terminated by a Zone Switch IE, another AAS DL IE, or the end of the DL frame. Multiple AAS zones can exist within the same frame. For the HARQ MAP, the last AAS IE is relevant until the beginning of the broadcast region if defined in the HARQ Format Configuration IE. When used, the CID in the DL-MAP\_IE() shall be set to the Broadcast CID. All DL bursts in the AAS portion of

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the frame may be preceded by an AAS preamble based on the Downlink\_Preamble\_Config field in the AAS\_DL\_IE(). The preamble is defined in 8.4.4.7.4.1.

**Table 8-122—OFDMA AAS DL IE**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| AAS\_DL\_IE() { | — | — |
|  |  |  |
| **Extended DIUC** | 4 | AAS = 0x2 |
|  |  |  |
| **Length** | 4 | Length = 0x3 |
|  |  |  |
| **OFDMA symbol offset** | 8 | Denotes the start of the zone (counting from |
|  |  | the frame preamble and starting from 0) |
|  |  |  |
| **Permutation** | 3 | 0b00: PUSC permutation |
|  |  | 0b01: FUSC permutation |
|  |  | 0b10: Optional FUSC permutation |
|  |  | 0b11: AMC |
|  |  | 0b100: TUSC1 |
|  |  | 0b101: TUSC2 |
|  |  | 0b110–0b111: *Reserved* |
|  |  |  |
| **DL\_PermBase** | 6 | — |
|  |  |  |
| **Downlink\_preamble\_config** | 2 | 0b00: 0 symbols |
|  |  | 0b01: 1 symbol |
|  |  | 0b10: 2 symbols |
|  |  | 0b11: 3 symbols |
|  |  |  |
| **Preamble type** | 1 | 0: Frequency shifted preamble is used in this |
|  |  | DL AAS zone |
|  |  | 1: Time shifted preamble is used in this DL |
|  |  | AAS zone |
|  |  |  |
| **PRBS\_ID** | 2 | Values: 0...2. Refer to 8.4.9.4.1 |
|  |  |  |
| **Diversity Map** | 1 | 0: Not supported in this AAS zone |
|  |  | 1: Supported in this AAS zone |
|  |  |  |
| *Reserved* | 1 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

**Permutation**

Defines the permutation used within the DL AAS zone.

**DL\_PermBase**

Permutation base for specified DL AAS zone.

**OFDMA Symbol offset**

The offset of the OFDMA symbol in which the AAS zone starts, measured in OFDMA symbols from beginning of the current DL frame.

**Downlink\_preamble\_config**

Defines the number of DL AAS preambles to be used before each DL burst in the AAS zone.

Following an AAS IE indicating AMC permutation, the AMC type shall be 2x3 (2 bins by 3 symbols).

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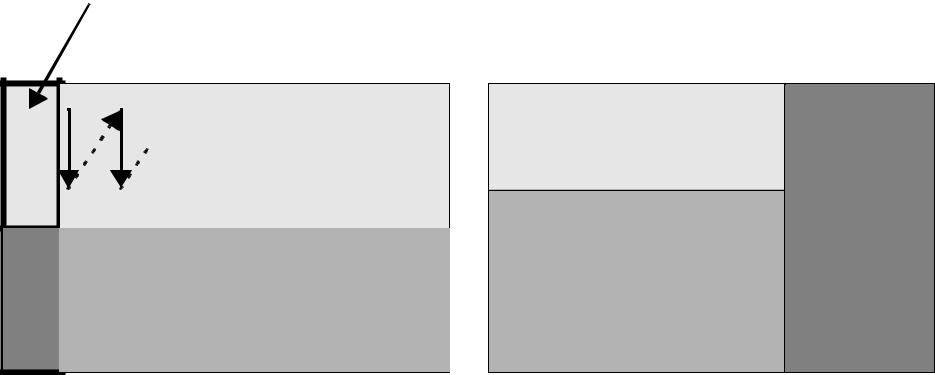
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Figure 8-65 shows the burst allocations in the DL AAS zone.

DL AAS preamble



 DL burst #1

DL burst #2



DL AAS Zone 1

with preamble

DL burst #3

DL burst #5

DL burst #4



DL AAS Zone 1 without preamble

**Figure 8-65—Burst allocations in DL AAS zone**

**8.4.5.3.4 STC DL Zone IE format**

In the DL-MAP, a BS may transmit DIUC = 15 with the STC\_DL\_Zone\_IE() to indicate that the subsequent allocations shall use a specific permutation and/or use a specific Tx diversity mode. The DL frame shall start in PUSC mode with no Tx diversity. Allocations subsequent to this IE shall use the permutation and Tx diversity mode it instructs, until the next STC DL Zone IE, AAS DL IE or MBS\_MAP\_IE with MBS permutation zone defined = 1. Allocation for a STC-capable SS shall be done through either DL\_MAP\_IE() or any one of the MIMO-related IEs (MIMO\_DL\_Basic\_IE(), MIMO\_DL\_Enhanced\_IE(), MIMO\_DL\_Chase\_HARQ\_sub-burst\_IE, MIMO\_DL\_IR\_HARQ\_sub-burst\_IE, MIMO\_DL\_IR\_HARQ\_ for\_CC\_sub-burst\_IE, or MIMO\_DL\_STC\_HARQ\_sub-burst\_IE). If DL\_MAP\_IE() is used, the matrix indicator in STC\_DL\_Zone\_IE() shall be used for the allocation with the number of individually encoded streams being 1. If any one of the MIMO-related IEs is used, the matrix indicator in these IEs shall override the matrix indicator in STC\_DL\_Zone\_IE(). A DL zone can be a coordinated zone between the serving BS and all its neighbor BSs that has the same zone boundary, the same zone permutation type e.g., PUSC, STC PUSC, AMC, and STC AMC, and the same values for the parameters, Use All SC and Dedicated Pilots. Within a coordinated DL zone, all the allocations shall have the parameter “boosting” set to 0b000, i.e., not boosted. A frame can have zero, one, or multiple coordinated DL zones. The first PUSC zone can also be a coordinated DL zone. When the first PUSC zone is a coordinated zone, serving BS coordinates with its neighbor BSs have the same zone boundary and use the same “used-subchannel bitmap.” The format for the STC DL Zone IE is shown in Table 8-123.

The MR-BS or RS may transmit STC\_DL\_Zone\_IE with dedicated pilot bit set to 1 in the access zone for MS not to process the signal transmitted in the downlink relay zone.

**Permutation**

Indicates the permutation that shall be used by the transmitter for allocations following this IE. Permutation changes are only allowed on a zone boundary. The IDcell indicated by the IE shall be used as the basis of the permutation (see 8.4.6.1).

**Use All SC**

When set, this field indicates transmission on all available subchannels. For FUSC permutation, transmission is always on all subchannels.

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**Table 8-123—OFDMA STC DL Zone IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| STC\_DL\_Zone\_IE() { | — | — |
|  |  |  |
| **Extended DIUC** | 4 | STC/DL\_Zone\_SWITCH = 0x1 |
|  |  |  |
| **Length** | 4 | Length = 0x4 |
|  |  |  |
| **OFDMA symbol offset** | 8 | Denotes the start of the zone (counting from the frame |
|  |  | preamble and starting from 0) |
|  |  |  |
| **Permutation** | 2 | 0b00: PUSC permutation |
|  |  | 0b01: FUSC permutation |
|  |  | 0b10: Optional FUSC permutation |
|  |  | 0b11: Adjacent subcarrier permutation |
|  |  |  |
| **Use All SC** | 1 | 0: Do not use all subchannels |
|  |  | 1: Use all subchannels |
|  |  |  |
| **STC** | 2 | 0b00: No STC |
|  |  | 0b01: STC using 2/3 antennas |
|  |  | 0b10: STC using 4 antennas |
|  |  | 0b11: FHDC using 2 antennas |
|  |  |  |
| **Matrix Indicator** | 2 | STC matrix (see 8.4.8.1.4) |
|  |  | if (STC == 0b01 or STC == 0b10) |
|  |  | { |
|  |  | 0b00 = Matrix A |
|  |  | 0b01 = Matrix B |
|  |  | 0b10 = Matrix C |
|  |  | 0b11 = *Reserved* |
|  |  | } |
|  |  | else if (STC == 0b11) |
|  |  | { |
|  |  | 0b00 = Matrix A |
|  |  | 0b01 = Matrix B |
|  |  | 0b10–11 = *Reserved* |
|  |  | } |
|  |  |  |
| **DL\_PermBase** | 5 | — |
|  |  |  |
| **PRBS\_ID** | 2 | Values: 0..2. Refer to 8.4.9.4.1 |
|  |  |  |
| **AMC type** | 2 | Indicates the AMC type in case permutation type = 0b11, |
|  |  | otherwise shall be set to 0. |
|  |  | AMC type (NxM = N bins by M symbols): |
|  |  | 0b00: 1x6 |
|  |  | 0b01: 2x3 |
|  |  | 0b10: 3x2 |
|  |  | 0b11: *Reserved* |
|  |  | Note that only 2x3 band AMC subchannel type (AMC |
|  |  | Type = 0b01) is supported by MS |
|  |  |  |
| **Midamble presence** | 1 | 0: Not present |
|  |  | 1: MIMO midamble present at the first symbol in STC |
|  |  | zone |
|  |  |  |
| **Midamble boosting** | 1 | 0: No boost |
|  |  | 1: Boosting (3 dB) |
|  |  |  |
| **2/3 antennas select** | 1 | 0: STC using 2 antennas |
|  |  | 1: STC using 3 antennas |
|  |  | Selects 2/3 antennas when STC = 0b01 |
|  |  |  |

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**Table 8-123—OFDMA STC DL Zone IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Dedicated Pilots** | 1 | 0: Pilot symbols are broadcast |
|  |  | 1: Pilot symbols are dedicated. An MS should use only |
|  |  | pilots specific to its burst for channel estimation |
|  |  |  |
| Transparent | 4 | Unsigned integer in the range +7 dB to –21 dB with 2 dB |
| relay transmit power |  | intervals indicating power adjustment for transparent |
| adjustment |  | relay to be applied relative to the assigned EIRP (see |
|  |  | 8.4.4.8.1.2). Power adjustment (dB) = 7 - unsigned 4 bit |
|  |  | value × 2 |
|  |  | The value 1111 is used as Relay zone indicator for Non- |
|  |  | transparent relay. If the value is set to 1111, Transparent |
|  |  | RS shall ignore it. |
|  |  |  |
| } | — | — |
|  |  |  |

**STC**

Indicates the STC mode that shall be used by the transmitter for allocations following this IE (see 8.4.8). All allocations with STC = 0b00 shall be transmitted with non-STC pilot pattern. All allocations with STC not set to 0b00 shall be transmitted with the corresponding pilot pattern in 8.4.8. The STC mode change is allowed only on a zone boundary.

**DL\_PermBase**

DL Permutation base for the specified DL zone. When the zone defined by this STC\_DL\_Zone\_IE() is a DL coordinated zone, the DL\_PermBase field shall be set to the 5 LSBs of IDcell as indicated by the frame preamble.

**PRBS\_ID**

Values: 0..2. Refer to 8.4.9.4.1. When the zone defined by this STC\_DL\_Zone\_IE() is a DL coordinated zone, the PRBS\_ID field shall be set to mod(segment number + 1, 3) as indicated by the frame preamble.

**Use All SC**

Indicates if all subchannels are used. Applies to PUSC only. When set to 0, do not use all subchannels. When set to 1, use all subchannels. When the zone defined by this STC\_DL\_Zone\_IE() is a DL coordinated zone, the Use All SC field shall be set to the same value as that in the corresponding DL coordinated zones of all its neighbor BSs.

**Dedicated Pilots**

When the data allocations are precoded/beamformed, then setting the Dedicated Pilots bit to 1 means the pilot symbols are precoded/beamformed in the same way as are the corresponding data subcarriers. In this case, an MS should use only the pilots that are specific to its allocation for channel estimations. In addition, a BS shall toggle CID-Switch IE() such that INC\_CID = 1 in all non-HARQ DL-MAP IEs that allocate dedicated pilot zones.

For the PUSC permutation, the pilot symbols belonging to a major group shall be precoded/ beamformed along with all of the data allocations made within the major group. For the FUSC or optional FUSC permutation, all of the pilot symbols and data subcarriers within an OFDM symbol shall be precoded/beamformed. The minimum time duration of any allocation in a DL STC zone with dedicated pilots is equal to the pilot period.

For backward compatibility, for the FUSC or optional FUSC permutation, multiple SS units that do not support dedicated pilots shall not be allocated in TD zones in which pilots are dedicated. However, a single legacy SS unit can be allocated to a TD zone in which the pilots are dedicated as long as no other SS units are also allocated to that TD zone. For the PUSC

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permutation, only a single legacy SS can be allocated to one or more major groups and only when the major groups extend across the entire zone.

Allocations with single antenna pilot pattern can coexist with allocations with multiple antennas pilot pattern in AMC STC zones with dedicated pilots. All allocations with the STC field not set to 0b00 and Dedicated Pilots set to 1 shall transmit the pilots using the pattern (see 8.4.6.1.2 for one antenna and see 8.4.8 for multiple antennas) corresponding to the number of streams instead of the actual number of transmit antennas. By default, the number of streams shall be equal to the number of antennas specified by the STC Zone Switch IE and may be overridden by the burst allocations given in the Num\_Streams field of the CL\_MIMO\_DL\_Enhanced\_IE or Dedicated\_MIMO\_DL\_Control\_IE.

When the zone defined by this STC\_DL\_Zone\_IE() is a DL coordinated zone, the Dedicated Pilots field shall be set to the same value as that in the corresponding DL coordinated zones of all its neighbor BSs.

**Permutation**

Indicates the permutation that shall be used by the transmitter for allocations following this IE. Permutation changes are only allowed on a zone boundary. The DL PermBase indicated by the IE shall be used as the basis of the permutation.

**Midamble presence**

When set, midamble shall be transmitted in the first symbol of the zone with the corresponding antenna configuration specified in the STC zone IE (see 8.4.8.5).

This IE should not be used within SUB-DL-UL-MAP.

**8.4.5.3.5 Channel Measurement IE**

An extended IE with an extended DIUC = 0x00 is issued by the BS to request a channel measurement report (see 6.4.1.2). The IE includes an 8-bit Channel Nr value as shown in Table 8-124.

**Table 8-124—OFDMA Channel Measurement IE**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Channel\_Measurement\_IE() { | — | — |
|  |  |  |
| **Extended DIUC** | 4 | CHM = 0x0 |
|  |  |  |
| **Length** | 4 | Length = 0x4 |
|  |  |  |
| **Channel Nr** | 8 | Channel number (see 8.5.1) |
|  |  | Set to zero for bands outside the 5GHz to |
|  |  | 6GHz band and licensed bands within the |
|  |  | 5GHz to 6GHz band. |
|  |  |  |
| **OFDMA symbol offset** | 8 | — |
|  |  |  |
| **CID** | 16 | Basic CID of the SS for which the Channel |
|  |  | Measurement IE is directed. |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.3.6 Data Location In Another BS IE**

In the DL-MAP, a BS may transmit DIUC = 15 with the Data\_Location\_in\_Another\_BS\_IE() to indicate that data are transmitted to the SS through another BS. This IE shall be sent right after the IE defining the

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same data received in the current BS, but it may be sent alone without the IE defining the same data received in the current BS only if the data are to be transmitted in the current frame.

**Table 8-125—OFDMA Data Location in another BS IE**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Data\_Location\_in\_Another\_BS\_IE() { | — | — |
|  |  |  |
| **Extended DIUC** | 4 | Data\_location\_in\_another\_BS = 0x3 |
|  |  |  |
| **Length** | 4 | Length = 0x9 |
|  |  |  |
| **Segment** | 2 | Segment number |
|  |  |  |
| **Used subchannels** | 6 | Used subchannel groups at other BS |
|  |  | Bit 0: Subchannel group 0 |
|  |  | Bit 1: Subchannel group 1 |
|  |  | Bit 2: Subchannel group 2 |
|  |  | Bit 3: Subchannel group 3 |
|  |  | Bit 4: Subchannel group 4 |
|  |  | Bit 5: Subchannel group 5 |
|  |  |  |
| **DIUC** | 4 | DIUC used for the burst in the other BS |
|  |  |  |
| **Frame Advance** | 3 | The number of frames offset from the next |
|  |  | frame where the data will be transmitted |
|  |  | (0 = Next frame) |
|  |  |  |
| *Reserved* | 1 | Shall be set to zero |
|  |  |  |
| **OFDMA Symbol offset** | 8 | — |
|  |  |  |
| **Subchannel offset** | 6 | — |
|  |  |  |
| **Boosting** | 3 | 000: Normal (not boosted); 001: +6 dB; |
|  |  | 010: –6 dB; 011: +9 dB; 100: +3 dB; |
|  |  | 101: –3 dB; 110: –9 dB; 111: –12 dB; |
|  |  |  |
| **Preamble index** | 7 | Preamble index of the other BS |
|  |  |  |
| **No. OFDM Symbols** | 8 | — |
|  |  |  |
| **No. Subchannels** | 6 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 00: No repetition coding |
|  |  | 01: Repetition coding of 2 used |
|  |  | 10: Repetition coding of 4 used |
|  |  | 11: Repetition coding of 6 used |
|  |  |  |
| **CID** | 16 | — |
|  |  |  |
| } |  | — |
|  |  |  |

**8.4.5.3.7 CID Switch IE**

In the DL-MAP, a BS may transmit DIUC = 15 with the CID-Switch\_IE() to toggle the inclusion of the CID parameter in DL-MAP allocations. The DL-MAP and SUB-DL-UL-MAP shall begin in the mode where CIDs are not included. The first appearance of the CID-Switch\_IE() shall toggle the DL-MAP mode to include CIDs. Any subsequent appearance of the CID-Switch\_IE() shall toggle the DL-MAP CID inclusion mode.

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The format for the DL CID Switch IE is shown in Table 8-126.

**Table 8-126—OFDMA DL CID Switch IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| CID-Switch\_IE() { | — | — |
|  |  |  |
| **Extended DIUC** | 4 | CID-Switch = 0x4 |
|  |  |  |
| **Length** | 4 | Length = 0x0 |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.3.8 MIMO DL Basic IE format**

In the DL-MAP, a MIMO-enabled BS may transmit DIUC = 14 with the MIMO\_DL\_Basic\_IE() to describe DL allocations assigned to MIMO-enabled SSs. The MIMO mode indicated in the MIMO\_DL\_Basic\_IE() shall only apply to the allocations indicated in the IE. The format for the MIMO DL Basic IE is shown in Table 8-127. The allowed combinations of number of antennas, matrices, number of encoded streams, and CIDs are listed in Table 8-128.

**Table 8-127—MIMO DL Basic IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| MIMO\_DL\_Basic\_IE() { | — | — |
|  |  |  |
| **Extended DIUC** | 4 | MIMO = 0xB |
|  |  |  |
| **Length** | 8 | *Variable* |
|  |  |  |
| **Num\_Region** | 4 | “Number of assigned regions” is this field |
|  |  | value plus 1. |
|  |  |  |
| for ( *i* = 0; *i* < Number of assigned | — | — |
| regions; *i*++) { |  |  |
|  |  |  |
| **OFDMA Symbol offset** | 8 | — |
|  |  |  |
| If (Permutation = 0b11 and | — | — |
| (AMC type is 2x3 or 1x6)) { |  |  |
|  |  |  |
| **Subchannel offset** | 8 | — |
|  |  |  |
| **Boosting** | 3 | — |
|  |  |  |
| **No. OFDMA Symbols** | 5 | — |
|  |  |  |
| **No. subchannels** | 6 | — |
|  |  |  |
| Else { | — | — |
|  |  |  |
| **Subchannel offset** | 6 | — |
|  |  |  |
| **Boosting** | 3 | — |
|  |  |  |
| **No. OFDMA Symbols** | 7 | — |
|  |  |  |

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**Table 8-127—MIMO DL Basic IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **No. subchannels** | 6 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Matrix\_indicator** | 2 | STC matrix (see 8.4.8.1.4) |
|  |  | if (STC == 0b01 or STC == 0b10) |
|  |  | { |
|  |  | 0b00 = Matrix A |
|  |  | 0b01 = Matrix B |
|  |  | 0b10 = Matrix C |
|  |  | 0b11 = *Reserved* |
|  |  | } |
|  |  | else if (STC == 0b11) |
|  |  | { |
|  |  | 0b00 = Matrix A |
|  |  | 0b01 = Matrix B |
|  |  | 0b10–11 = *Reserved* |
|  |  | } |
|  |  |  |
| **Num\_layers** | 2 | 0b00 = 1 layer; 0b01 = 2 layers; 0b10 = 3 |
|  |  | layers, 0b11 = 4 layers. |
|  |  |  |
| *Reserved* | 2 | Shall be set to zero |
|  |  |  |
| for ( *j* = 0; *j* < Number of Layers; | — | — |
| *j*++) { |  |  |
|  |  |  |
| if (INC\_CID == 1) { | — | — |
|  |  |  |
| **CID** | 16 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Layer\_index** | 2 | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition coding indication** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Number of bits required to align to byte |
|  |  | length; shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

**Num\_Region**

This field indicates the number of the regions defined by the OFDMA Symbol Offset, Subchannel Offset, Boosting, No. OFDMA Symbols, and No. Subchannels fields in this IE. The actual number of assigned regions is this field value plus 1.

**Matrix\_indicator**

The values of these 2 bits indicate the STC matrix (see 8.4.8.1.4).

**Num\_layer**

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Number of individually encoded streams allocated in the region. The layer is defined as a separate coding/modulation path.

**Layer\_index**

This field specifies the layer index.

Table 8-128 defines the modes of operation specified by MIMO\_DL\_Basic\_IE() and MIMO\_DL\_Enhanced\_IE(). For each information element, the table details the number of antennas (as indicated by the latest STC\_DL\_Zone\_IE()), the type of matrix, the number of encoded streams (i.e., the number of different CIDs stated in the Num\_layers “for” loop in Table 8-127), and the implicit type and rate of coding. The cases of either Broadcast CID or (INC\_CID == 0) correspond to single CID rows, but should be decoded by all SSs on a BE basis. An SS that does not support decoding of multiple overlapping bursts shall attempt to decode the first burst relevant to it, according to the stream ordering. If Dedicated Pilots is set to 1, all references to the number of Tx antennas in this subclause apply to the number of streams.

**Table 8-128—DL MIMO operation modes**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Number** |  |  | **Mapping of** |  |
| **Number** |  |  |  |  | **encoded** |  |
| **Matrix** | **Num\_** | **of** |  |  |  |
| **of Tx** | **Encoding type** | **Rate** | **stream to** | **Remark** |
| **indicator** | **layers** | **different** |
| **antennas** |  |  | **matrix** |  |
|  |  | **SSs** |  |  |  |
|  |  |  |  |  | **entries** |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| 2 | A | 1 | 1 | STTD | 1 | Encoded | — |
|  |  |  |  |  |  | stream #0: |  |
|  |  |  |  |  |  | S1, S2 |  |
|  |  |  |  |  |  |  |  |
| 2 | B | 1 | 1 | Vertical encoding | 2 | Encoded | — |
|  |  |  |  |  |  | stream #0: |  |
|  |  |  |  |  |  | S1, S2 |  |
|  |  |  |  |  |  |  |  |
| 2 | B | 2 | 1 | Horizontal encoding | 2 | Encoded | Two |
|  |  |  |  | for a single SS |  | stream #0: S1 | overlapping |
|  |  |  |  |  |  | Encoded | layers |
|  |  |  |  |  |  | stream #1: S2 |  |
|  |  |  |  |  |  |  |  |
| 2 | B | 2 | 2 | Horizontal encoding | 2 | Encoded | Two |
|  |  |  |  | for two different SSs |  | stream #0: S1 | overlapping |
|  |  |  |  |  |  | Encoded | layers |
|  |  |  |  |  |  | stream #1: S2 |  |
|  |  |  |  |  |  |  |  |
| 4 | A | 1 | 1 | STTD | 1 | Encoded | — |
|  |  |  |  |  |  | stream #0: |  |
|  |  |  |  |  |  | S1, S2, S3, S4 |  |
|  |  |  |  |  |  |  |  |
| 4 | B | 1 | 1 | Vertical encoding | 2 | Encoded | — |
|  |  |  |  |  |  | stream #0: |  |
|  |  |  |  |  |  | S1, S2, S3, S4 |  |
|  |  |  |  |  |  |  |  |
| 4 | B | 2 | 1 | Horizontal encoding | 2 | Encoded | Two |
|  |  |  |  | for a single SS |  | stream #0: | overlapping |
|  |  |  |  |  |  | S1, S2, S5, S7 | layers |
|  |  |  |  |  |  | Encoded |  |
|  |  |  |  |  |  | stream #1: |  |
|  |  |  |  |  |  | S3, S4, S6, S8 |  |
|  |  |  |  |  |  |  |  |
| 4 | B | 2 | 2 | Horizontal encoding | 2 | Encoded | Two |
|  |  |  |  | for two different SSs |  | stream #0: | overlapping |
|  |  |  |  |  |  | S1, S2, S5, S7 | layers |
|  |  |  |  |  |  | Encoded |  |
|  |  |  |  |  |  | stream #1: |  |
|  |  |  |  |  |  | S3, S4, S6, S8 |  |
|  |  |  |  |  |  |  |  |

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**Table 8-128—DL MIMO operation modes *(CONTINUED)***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Number** |  |  | **Mapping of** |  |
| **Number** |  |  |  |  | **encoded** |  |
| **Matrix** | **Num\_** | **of** |  |  |  |
| **of Tx** | **Encoding type** | **Rate** | **stream to** | **Remark** |
| **indicator** | **layers** | **different** |
| **antennas** |  |  | **matrix** |  |
|  |  | **SSs** |  |  |  |
|  |  |  |  |  | **entries** |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| 4 | C | 1 | 1 | Vertical encoding | 4 | Encoded | — |
|  |  |  |  |  |  | stream #0: |  |
|  |  |  |  |  |  | S1, S2, S3, S4 |  |
|  |  |  |  |  |  |  |  |
| 4 | C | 4 | 1 | Horizontal encoding | 4 | Encoded | Four |
|  |  |  |  | for a single SS |  | stream #0: S1 | overlapping |
|  |  |  |  |  |  | Encoded | layers |
|  |  |  |  |  |  | stream #1: S2 |  |
|  |  |  |  |  |  | Encoded |  |
|  |  |  |  |  |  | stream #2: S3 |  |
|  |  |  |  |  |  | Encoded |  |
|  |  |  |  |  |  | stream #3: S4 |  |
|  |  |  |  |  |  |  |  |
| 4 | C | 4 | > 1 | Horizontal encoding | 4 | Encoded | Four |
|  |  |  |  | for two or more |  | stream #0: S1 | overlapping |
|  |  |  |  | different SSs |  | Encoded | layers |
|  |  |  |  |  |  | stream #1: S2 |  |
|  |  |  |  |  |  | Encoded |  |
|  |  |  |  |  |  | stream #2: S3 |  |
|  |  |  |  |  |  | Encoded |  |
|  |  |  |  |  |  | stream #3: S4 |  |
|  |  |  |  |  |  |  |  |

**Vertical encoding**

Indicates transmitting a single FEC-encoded stream over multiple antennas. The number of encoded streams is always 1.

**Horizontal encoding**

Indicates transmitting multiple separately FEC-encoded streams over multiple antennas. The number of encoded streams is more than 1.

**Rate**

The number of QAM symbols signaled per array channel use.

**8.4.5.3.9 MIMO DL Enhanced IE format**

In the DL-MAP, a MIMO-enabled BS may transmit DIUC = 14 with the MIMO\_DL\_Enhanced\_IE(), as shown in Table 8-129, to describe DL allocations assigned to MIMO-enabled SSs, each identified by the CQICH\_ID previously assigned to the SS. The MIMO mode indicated in the MIMO\_DL\_Enhanced\_IE() shall only apply to the allocations indicated in the IE. The allowed combinations of number of antennas, matrices, number of encoded streams, and CIDs are listed in Table 8-128.

**Table 8-129—MIMO DL Enhanced IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| MIMO\_DL\_Enhanced\_IE() { | — | — |
|  |  |  |
| **Extended-2 DIUC** | 4 | EN\_MIMO = 0xC |
|  |  |  |
| **Length** | 8 | — |
|  |  |  |

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**Table 8-129—MIMO DL Enhanced IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Num\_Region** | 4 | “Number of assigned regions” is this field |
|  |  | value plus 1. |
|  |  |  |
| for ( *i* = 0; *i* < Number of assigned | — | — |
| regions; *i*++) { |  |  |
|  |  |  |
| **OFDMA Symbol offset** | 8 | — |
|  |  |  |
| If (Permutation = 0b11 and (AMC | — | — |
| type is 2x3 or 1x6)) { |  |  |
|  |  |  |
| **Subchannel offset** | 8 | — |
|  |  |  |
| **Boosting** | 3 | — |
|  |  |  |
| **No. OFDMA Symbols** | 5 | — |
|  |  |  |
| **No. subchannels** | 6 | — |
|  |  |  |
| else { | — | — |
|  |  |  |
| **Subchannel offset** | 6 | — |
|  |  |  |
| **Boosting** | 3 | — |
|  |  |  |
| **No. OFDMA Symbols** | 7 | — |
|  |  |  |
| **No. subchannels** | 6 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Matrix\_indicator** | 2 | STC matrix (see 8.4.8.1.4) |
|  |  | if (STC == 0b01 or STC == 0b10) |
|  |  | { |
|  |  | 0b00 = Matrix A |
|  |  | 0b01 = Matrix B |
|  |  | 0b10 = Matrix C |
|  |  | 0b11 = *Reserved* |
|  |  | } |
|  |  | else if (STC == 0b11) |
|  |  | { |
|  |  | 0b00 = Matrix A |
|  |  | 0b01 = Matrix B |
|  |  | 0b10–11 = *Reserved* |
|  |  | } |
|  |  |  |
| **Num\_layers** | 2 | 0b00 = 1 layer, 0b01 = 2 layers, |
|  |  | 0b10 = 3 layers, 0b11 = 4 layers |
|  |  |  |
| *Reserved* | 2 | Shall be set to zero |
|  |  |  |
| for ( *j* = 0; *j* < Number of Layers; | — | — |
| *j*++) { |  |  |
|  |  |  |
| if (INC\_CID == 1) { | — | — |
|  |  |  |
| **CQICH\_ID** | *variable* | Index to uniquely identify the CQICH |
|  |  | resource assigned to the SS. |
|  |  | The size of this field is dependent on system |
|  |  | parameter defined in UCD (see Table 11-15). |
|  |  |  |
| } | — | — |
|  |  |  |

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**Table 8-129—MIMO DL Enhanced IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Layer\_index** | 2 | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition coding indication** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Number of bits required to align to byte |
|  |  | length, shall be set to zero. |
|  |  |  |
| } | — | — |
|  |  |  |

**Num\_Region**

This field indicates the number of the regions defined by OFDMA Symbol Offset, Subchannel Offset, Boosting, No. OFDMA Symbols, and No. Subchannels fields in this IE. The actual number of assigned regions is this field value plus 1.

**Matrix\_indicator**

The values of these 2 bits indicate the STC matrix (see 8.4.8.1.4).

**CQICH\_ID**

This is the CQICH\_ID assigned to an SS in the CQICH\_Alloc\_IE(). The CQICH\_ID is used to uniquely identify an SS that is assigned a CQICH.

**Num\_layers**

Number of individually encoded streams allocated in the region. The layer is defined as a separate coding/modulation path.

**Layer\_index**

This field specifies the layer index.

**8.4.5.3.10 HARQ, Sub-MAP, and R-MAP Pointer IE**

This IE shall only be used by a BS supporting HARQ of SUB-DL-MAP for MSs supporting HARQ, or transmitting R-MAP to RS in DL access zone. There shall be at most four HARQ MAP Pointer IEs in the DL-MAP. There shall be at most 3 SUB-DL-UL-MAP pointer IEs per frame, as specified in 6.3.2.3.55. Table 8-130 shows the format for the HARQ, Sub-MAP, and R-MAP Pointer IE.

**Table 8-130—HARQ, Sub-MAP, and R-MAP Pointer IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| HARQ\_and\_Sub-MAP\_and\_R- | — | — |
| MAP\_Pointer\_IE() { |  |  |
|  |  |  |
| **Extended DIUC** | 4 | HARQ\_P = 0x7 |
|  |  |  |
| **Length** | 4 | — |
|  |  |  |

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**Table 8-130—HARQ, Sub-MAP, and R-MAP Pointer IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| While (data remains) { | — | — |
|  |  |  |
| **DIUC** | 4 | Indicates the MCS level of the burst containing a |
|  |  | HARQ MAP message, Sub-DL-UL-MAP mes- |
|  |  | sage, or R-MAP message. |
|  |  |  |
| **No. Slots** | 8 | The number of slots allocated for the burst con- |
|  |  | taining a HARQ MAP message, Sub-DL-UL- |
|  |  | MAP message, or R-MAP message |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| **MAP Version** | 2 | 0b00: HARQ MAPv1 |
|  |  | 0b01: Submap |
|  |  | 0b10: Submap with CID mask included |
|  |  | 0b11: R-MAP |
|  |  |  |
| If (MAP Version == 0b10) { | — | — |
|  |  |  |
| **Idle users** | 1 | Bursts for idle users included in the submap |
|  |  |  |
| **Sleep users** | 1 | Bursts for sleep users included in the submap |
|  |  |  |
| **CID Mask Length** | 2 | 0b00: 12 bits |
|  |  | 0b01: 20 bits |
|  |  | 0b10: 36 bits |
|  |  | 0b11: 52 bits |
|  |  |  |
| **CID mask** | *n* | *n* = The number of bits of CID mask is |
|  |  | determined by CID Mask Length. When the |
|  |  | MAP message pointed by this pointer IE includes |
|  |  | any MAP IE for an MS that is not in either sleep |
|  |  | mode or idle mode, the bit index corresponding |
|  |  | to [(Basic CID of the MS) MOD *n*] in this CID |
|  |  | Mask field shall be set to 1. Otherwise, it shall be |
|  |  | set to 0. |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

**DIUC**

Indicates the burst profile used for the HARQ MAP message or Sub-DL-UL-MAP message.

**No. Slots**

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The number of OFDMA slots allocated for the burst containing a HARQ MAP message or Sub-DL-UL-MAP message. The HARQ MAP message, if any, shall immediately follow the Compressed MAP with the number of the slots allocated for the HARQ MAP message. The specification on the allocation of Sub-DL-UL-MAPs is described in 6.3.2.3.55.

**Repetition Coding Indication**

Indicates the repetition code used inside the allocated burst.

**MAP Version**

Indicates the version of the HARQ MAP, Sub-MAP, or R-MAP.

**8.4.5.3.11 DL-MAP Physical Modifier IE**

The Physical Modifier Information Element indicates that the subsequent allocations shall utilize a preamble, which is either cyclically delayed in time or cyclically rotated in frequency. The physical modifier type defined in this IE applies to all the subsequent allocations until terminated by a Zone\_Switch\_IE, AAS\_DL\_IE, a SUB-DL-UL-MAP or the end of the DL subframe. This IE applies to operation in AAS mode.

In the case when the preamble is cyclically delayed in time by *K* samples, the preamble will contribute a component s'(t) to the transmitted waveform as defined in Equation (8-56). This IE applies to operation in AAS mode.

*s*'( *t*)

where

*cm*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **** | ( *Nused* – 1) ⁄ 2 |  |  | **** |  |
|  | 2*j*π *fct***¨¨** | **¦** |  | 2*j*π *m f* ( *t* – *Tg* | – *K* ⁄ *Fs*)**¸¸** |  |
| = Re *e* | **¨** | c*m* × *e* |  | **¸** | (8-56) |
|  | **¨** |  |  |  | **¸** |  |
|  | **©***m*= –(*Nused*– 1) ⁄2 | |  |  | **¹** |  |

are the preamble tone values

* is the time, elapsed since the beginning of the OFDMA symbol, with 0 < *t* < *Ts*

The PHYMOD DL IE can appear anywhere in the DL-MAP, and it shall remain in effect until another PHYMOD DL IE is encountered, or until the end of the DL-MAP.

In the case when the preamble is cyclically shifted in frequency, the preamble subcarriers will be shifted so that

|  |  |  |
| --- | --- | --- |
| *CNew*  *K* | = ( *COriginal* + 5 × *K*) mod *NUsed* | (8-57) |
| where |  |  |
| *CNew,K* | is the new subcarrier index |  |
| *COriginal* | is the original subcarrier index |  |
| *K* | is the frequency shift index indicated in the PHYMOD DL IE |  |

The format for the DL-MAP Physical Modifier IE is shown in Table 8-131.

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**Table 8-131—OFDMA DL-MAP Physical Modifier IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| PHYMOD\_DL\_IE() { | — | — |
|  |  |  |
| **Extended DIUC** | 4 | PHYMOD = 0x8 |
|  |  |  |
| **Length** | 4 | Length = 0x1 |
|  |  |  |
| **Preamble Modifier Type** | 1 | 0: Frequency-shifted preamble |
|  |  | 1: Time-shifted preamble |
|  |  |  |
| if (Preamble Modifier Type == 0) { | — | — |
|  |  |  |
| **Preamble frequency shift index** | 4 | Indicates the value of *K* in Equation (8-57) |
|  |  |  |
| } else { | — | — |
|  |  |  |
| **Preamble Time Shift Index** | 4 | Specifies the cyclic time shift in Equation (8- |
|  |  | 56): |
|  |  | For PUSC, |
|  |  | 0 – 0 sample cyclic shift |
|  |  | 1 – *NFFT*/14 sample cyclic shift |
|  |  | …. |
|  |  | 13 – *NFFT*/14×13 sample cyclic shift |
|  |  | 14–15 – *Reserved* |
|  |  | For AMC permutation, |
|  |  | 0 – 0 sample cyclic shift |
|  |  | 1 – *NFFT*/9 sample cyclic shift |
|  |  | …. |
|  |  | 8 – *NFFT*/9×8 sample cyclic shift |
|  |  | 9–15 – *Reserved* |
|  |  |  |
| } | — | — |
|  |  |  |
| **Pilot Pattern Modifier** | 1 | 0: Not applied |
|  |  | 1: Applied |
|  |  |  |
| **Pilot Pattern Index** | 2 | Pilot pattern used for this allocation [see |
|  |  | 8.4.6.3.3 (AMC), 8.4.6.1.2.6 (TUSC)]: |
|  |  | 0b00 – Pilot pattern A |
|  |  | 0b01 – Pilot pattern B |
|  |  | 0b10 – Pilot pattern C |
|  |  | 0b11 – Pilot pattern D |
|  |  |  |
| } | — | — |
|  |  |  |

**Preamble Modifier Type**

This parameter defines whether the preamble will be cyclically shifted in time or in frequency.

**Preamble frequency shift index**

This parameter effects the cyclic shift of the preamble in frequency axis, as defined by Equation (8-57).

**Preamble Time Shift Index**

This parameter defines how many samples of cyclic shift shall be introduced into the preamble symbols. The unit of cyclic shift depends on the subchannel permutation to ensure the frequency-domain orthogonality between the different preambles in the same subchannel.

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**8.4.5.3.12 MBS MAP IE**

In the DL-MAP, a BS may transmit DIUC = 14 with the MBS\_MAP\_IE() to indicate when the next data for a multicast and broadcast service flow will be transmitted. The offset value is associated with a CID value, and indicates the frame that the next data will be transmitted in by using the CID value. (See Table 8-132.) The MBS MAP message allocation parameters shall be included in the MBS MAP IE at regular intervals and if the MBS MAP message allocation parameters change. MBS MAP IE is used to specify the MBS permutation zone. When an MBS permutation zone exists in a frame, BS shall transmit MBS\_MAP\_IE with MBS permutation zone defined = 1. The MBS permutation zone shall not use Adjacent subcarrier permutation.

When a BS needs to transmit Emergency Alert Service Message in an MBS region, the BS shall transmit an MBS\_MAP\_IE() with MBS permutation zone defined = 1 and Existence of Emergency Alert Service Message = 1. If there is MBS\_MAP IE in a DL-MAP message, MS shall decode it and check whether Emergency Alert Service Message(s) will be transmitted or not through an MBS permutation zone. If the MS supporting the CS type used for ES detects the existence of Emergency Service Message(s) in the MBS region, the MS shall decode the MBS-MAP message in order to identify the MBS data burst on which MAC PDU containing Emergency Alert Service Message(s) will be transmitted.

**Table 8-132—MBS MAP IE**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| MBS\_MAP\_IE() { | — | — |
|  |  |  |
| **Extended-2 DIUC** | 4 | MBS MAP IE = 0x0 |
|  |  |  |
| **Length** | 8 | — |
|  |  |  |
| **MBS Zone identifier** | 7 | MBS Zone identifier corresponds to the |
|  |  | identifier provided by the BS at connection |
|  |  | initiation |
|  |  |  |
| **MBS permutation zone defined** | 1 | 0: MBS data burst is defined |
|  |  | 1: MBS permutation zone is defined |
|  |  |  |
| If(MBS permutation zone defined = 1){ | — | — |
|  |  |  |
| **Permutation** | 2 | 0b00: PUSC permutation |
|  |  | 0b01: FUSC permutation |
|  |  | 0b10: Optional FUSC permutation |
|  |  | 0b11: Adjacent subcarrier permutation |
|  |  |  |
| **DL\_PermBase** | 5 | — |
|  |  |  |
| **PRBS\_ID** | 2 | — |
|  |  |  |
| **OFDMA Symbol Offset** | 7 | The offset of the OFDMA symbol measured |
|  |  | in OFDMA symbols from beginning of the |
|  |  | DL frame in which the DL-MAP is |
|  |  | transmitted. Counting from the frame |
|  |  | preamble and starting from 0 |
|  |  |  |
| **MBS MAP message allocation included** | 1 | Used to indicate if the MBS MAP message |
| **indication** |  | allocation parameters are included |
|  |  |  |

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**Table 8-132—MBS MAP IE *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Existence of Emergency Alert Service** | 1 | 0: Indicates that there is no Emergency Alert |
| **Message** |  | Service Message(s) in MBS region |
|  |  | 1: Indicates that there is MBS\_DATA\_IE for |
|  |  | Emergency Alert Service Message in an |
|  |  | MBS-MAP message |
|  |  |  |
| *Reserved* | 2 | Shall be set to zero |
|  |  |  |
| if (MBS MAP message allocation | — | — |
| included indication = 1) { |  |  |
|  |  |  |
| *Reserved* | 3 | — |
|  |  |  |
| **Boosting** | 3 | Refer to Table 8-114 |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **No. Subchannels** | 6 | Indication of burst size of MBS MAP |
|  |  | message with the number of subchannels |
|  |  |  |
| **NO. OFDMA symbols** | 6 | Indication of burst size of MBS MAP |
|  |  | message with the number of OFDMA |
|  |  | symbols |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00—No repetition coding |
|  |  | 0b01—Repetition coding of 2 used |
|  |  | 0b10—Repetition coding of 4 used |
|  |  | 0b11—Repetition coding of 6 used |
|  |  |  |
| } | — | — |
|  |  |  |
| } else { | — | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **CID** | 16 | CID for Single BS MBS service |
|  |  |  |
| **OFDMA Symbol Offset** | 8 | The offset of the first OFDMA symbol of |
|  |  | the MBS region measured in OFDMA |
|  |  | symbols from beginning of this DL frame |
|  |  |  |
| **Subchannel offset** | 6 | The lowest index OFDMA subchannel used |
|  |  | for carrying the burst, starting from |
|  |  | subchannel 0 |
|  |  |  |
| **Boosting** | 3 | Refer to Table 8-114 |
|  |  |  |
| **SLC\_3\_indication** | 1 | Used to notify sleep mode class 3 is used for |
|  |  | single BS MBS service |
|  |  |  |
| **NO. OFDMA Symbols** | 6 | — |
|  |  |  |
| **NO. Subchannels** | 6 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00—No repetition coding |
|  |  | 0b01—Repetition coding of 2 used |
|  |  | 0b10—Repetition coding of 4 used |
|  |  | 0b11—Repetition coding of 6 used |
|  |  |  |
| if (SLC 3\_indication = 1) { | — | — |
|  |  |  |

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**Table 8-132—MBS MAP IE *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Next MBS\_MAP\_IE Frame Offset** | 8 | The Next MBS\_MAP\_IE Frame Offset |
|  |  | value is lower 8 bits of the frame number in |
|  |  | which the BS shall transmit the next MBS |
|  |  | MAP IE frame |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if !(byte boundary) { | — | — |
|  |  |  |
| **Padding Nibble** | *variable* | Padding to reach byte boundary |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

**MBS permutation zone defined**

Specifies method of allocation and location of MBS data bursts. If this value is 1, an MBS permutation zone is defined in the frame and MBS data burst allocations occur via MBS MAP message located in the MBS permutation zone. If this value is 0, a single MBS data burst allocation is specified directly by the MBS MAP IE.

**Next MBS\_MAP\_IE Frame Offset**

The Next MBS\_MAP\_IE Frame Offset value is the lower 8 bits of the frame number in which the BS shall transmit the next MBS MAP IE frame.

The burst carrying MBS MAP message shall be located at the first subchannel and first OFDMA symbol of the DL permutation zone designated for the MBS zone that is specified by the MBS MAP IE. This burst shall be located in the same frame as the MBS MAP IE that specifies it. The location of this DL permutation zone designated for the MBS zone within the frame is specified by ‘OFDMA Symbol Offset’ in MBS MAP IE.

The MS should read the DL MAP for any frame in which it expects to receive MBS bursts or MBS MAP messages to capture any possible change in the location of MBS permutation zone.

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**8.4.5.3.13 DL PUSC Burst Allocation in Other Segment IE**

In the DL-MAP, a BS may transmit DIUC = 15 with the DL\_PUSC\_Burst\_Allocation\_in\_Other\_ Segment\_IE() to indicate that data is transmitted to the MS in other segment through other BS. (See Table 8-133.)

**Table 8-133—DL PUSC Burst Allocation in Other Segment IE**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| DL\_PUSC\_Burst\_Allocation\_in\_Other\_Segment\_IE() { | — | — |
|  |  |  |
| **Extended DIUC** | 4 | DL PUSC Burst Allocation in Other |
|  |  | Segment IE = 0xB |
|  |  |  |
| **Length** | 4 | Length = 0xA |
|  |  |  |
| **CID** | 16 | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Segment** | 2 | Segment number for other BS’s sector |
|  |  |  |
| **Boosting** | 3 | Refer to Table 8-114 |
|  |  |  |
| **IDcell** | 5 | Cell ID for other BS’s sector |
|  |  |  |
| **DL\_PermBase** | 5 | — |
|  |  |  |
| **PRBS\_ID** | 2 | — |
|  |  |  |
| **Repetition coding indication** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| **Used Subchannels** | 6 | Used subchannels groups at other |
|  |  | BS’s sector: |
|  |  | Bit 0: Subchannel group 0 |
|  |  | Bit 1: Subchannel group 1 |
|  |  | Bit 2: Subchannel group 2 |
|  |  | Bit 3: Subchannel group 3 |
|  |  | Bit 4: Subchannel group 4 |
|  |  | Bit 5: Subchannel group 5 |
|  |  |  |
| **OFDMA symbol offset** | 8 | — |
|  |  |  |
| *Reserved* | 1 | Shall be set to zero |
|  |  |  |
| **# OFDMA symbols** | 7 | — |
|  |  |  |
| **Subchannel offset** | 6 | — |
|  |  |  |
| **# subchannels** | 6 | — |
|  |  |  |
| *Reserved* | 7 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

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**8.4.5.3.14 HO Anchor Active DL MAP IE**

This MAP IE is in the DL-MAP of active non-anchor BS and indicates the burst from Anchor BS. When an MS receives an HO Anchor Active DL-MAP IE on DL-MAP message from an active non-anchor BS, it can decode a data burst transmitted from Anchor BS by using the anchor preamble in HO Anchor Active DL-MAP IE. (See Table 8-134.)

**Table 8-134—HO Anchor Active DL MAP IE**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| HO\_Anchor\_Active\_DL\_MAP\_IE() { | — | — |
|  |  |  |
| **Extended-2 DIUC** | 4 | HO Anchor Active MAP IE = 0x2 |
|  |  |  |
| **Length** | 8 | *variable* |
|  |  |  |
| for (each bursts) { | — | — |
|  |  |  |
| **Anchor Preamble** | 8 | Preamble of anchor BS |
|  |  |  |
| **Anchor CID** | 16 | Basic CID in anchor BS |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **OFDMA symbol offset** | 8 | — |
|  |  |  |
| **Subchannel offset** | 6 | — |
|  |  |  |
| **Repetition coding indication** | 2 | 0b00—No repetition coding |
|  |  | 0b01—Repetition coding of 2 used |
|  |  | 0b10—Repetition coding of 4 used |
|  |  | 0b11—Repetition coding of 6 used |
|  |  |  |
| } | — | — |
|  |  |  |
| *padding nibble* | 0 or 4 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.3.15 HO Active Anchor DL MAP IE**

This MAP IE is in the DL-MAP of the anchor BS and indicates the burst from active non-anchor BS. When an MS receives an HO Active Anchor DL-MAP IE on DL-MAP message from an Anchor BS, it can decode a data burst transmitted from the active non-anchor BS by using the active preamble in HO Active Anchor DL-MAP IE. (See Table 8-135.)

**Table 8-135—HO Active Anchor DL MAP IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| HO\_Active\_Anchor\_DL\_MAP\_IE() { | — | — |
|  |  |  |
| **Extended-2 DIUC** | 4 | HO Active Anchor MAP IE = 0x1 |
|  |  |  |
| **Length** | 8 | *Variable* |
|  |  |  |

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**Table 8-135—HO Active Anchor DL MAP IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| for (each bursts) { | — | — |
|  |  |  |
| **Active Preamble** | 8 | Preamble of active BS |
|  |  |  |
| **Anchor CID** | 16 | Basic CID in anchor BS |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **OFDMA symbol offset** | 8 | — |
|  |  |  |
| **Repetition coding indication** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| **Subchannel offset** | 6 | — |
|  |  |  |
| **# OFDMA symbols** | 7 | — |
|  |  |  |
| **# subchannels** | 6 | — |
|  |  |  |
| **Boosting** | 3 | Refer to Table 8-114 |
|  |  |  |
| } | — | — |
|  |  |  |
| *padding nibble* | 0 or 4 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.3.16 HO CID Translation MAP IE**

The HO burst from active non-anchor BS is indicated by the MAP IE in DL-MAP of that BS with an Active CID. The Active CID is the CID assigned by the active non-anchor BS to translate the CID given by the Anchor BS.

Because the CID is different from the anchor CID, the CID Translation MAP IE should provide translation of the Active CID into the Anchor CID. This translation IE is transmitted by Active non-anchor BS and applied on both DL and UL IEs. The translation is valid only in the current frame. (See Table 8-136.)

**Table 8-136—HO CID Translation MAP IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| HO\_CID\_Translation\_MAP\_IE() { | — | — |
|  |  |  |
| **Extended-2 DIUC** | 4 | CID Translation MAP IE = 0x3 |
|  |  |  |
| **Length** | 8 | *Variable* |
|  |  |  |
| for (each bursts) { | — | — |
|  |  |  |
| **Anchor Preamble** | 8 | Preamble of anchor BS |
|  |  |  |
| **Anchor CID** | 16 | Basic CID in anchor BS |
|  |  |  |

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**Table 8-136—HO CID Translation MAP IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Active CID** | 16 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.3.17 MIMO in Another BS IE**

In the DL-MAP, a BS may transmit MIMO\_in\_Another\_BS\_IE() to indicate that data is transmitted to the MS through other BS at the same frame. This IE shall be right after the IE defining the same data or data region received in the anchor BS. (See Table 8-137.)

**Table 8-137—MIMO in Another BS IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| MIMO\_in\_Another\_BS\_IE() { | — | — |
|  |  |  |
| **Extended-2 DIUC** | 4 | MIMO in Another BS IE = 0x4 |
|  |  |  |
| **Length** | 8 | *variable* |
|  |  |  |
| **Segment** | 2 | Segment number |
|  |  |  |
| **Used subchannels groups** | 6 | Used subchannels groups at other BS |
|  |  | Bit 0: Subchannel group 0 |
|  |  | Bit 1: Subchannel group 1 |
|  |  | Bit 2: Subchannel group 2 |
|  |  | Bit 3: Subchannel group 3 |
|  |  | Bit 4: Subchannel group 4 |
|  |  | Bit 5: Subchannel group 5 |
|  |  |  |
| **IDCell** | 5 | Cell ID of other BS |
|  |  |  |
| **Num\_Region** | 4 | — |
|  |  |  |
| *Reserved* | 3 | Shall be set to zero |
|  |  |  |
| for ( *i* = 0; *i* < Num\_Region; *i*++) { | — | — |
|  |  |  |
| **OFDMA Symbol offset** | 8 | — |
|  |  |  |
| if(Permutation == 0b11 and (AMC type | — | — |
| is 2x3 or 1x6)) { |  |  |
|  |  |  |
| **Subchannel offset** | 8 | — |
|  |  |  |
| **Boosting** | 3 | Refer to Table 8-114 |
|  |  |  |
| **No. OFDMA Symbols** | 5 | — |
|  |  |  |
| **No. subchannels** | 6 | — |
|  |  |  |
| } else { | — | — |
|  |  |  |
| **Subchannel offset** | 6 | — |
|  |  |  |

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**Table 8-137—MIMO in Another BS IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Boosting** | 3 | Refer to Table 8-114 |
|  |  |  |
| **No. OFDMA Symbols** | 7 | — |
|  |  |  |
| **No. subchannels** | 6 | — |
|  |  |  |
| } |  |  |
|  |  |  |
| **Matrix indicator** | 2 | See matrix indicator defined in STC\_DL\_Zone\_IE |
|  |  |  |
| **Num\_layer** | 2 | 0b00 = 1 layer, 0b01 = 2 layers |
|  |  | 0b10 = 3 layers, 0b11 = 4 layers |
|  |  |  |
| for (*j* = 0; *j* < Number of Layers; *j*++) { | — | — |
|  |  |  |
| if (INC\_CID == 1) { | — | — |
|  |  |  |
| **CID** | 16 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Layer\_index** | 2 | — |
|  |  |  |
| **DIUC** | 4 | 0–11 burst profiles |
|  |  |  |
| **Repetition coding indication** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to byte; shall be set to 0 |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.3.18 Macro-MIMO DL Basic IE format**

Table 8-138 specifies DL-MAP IE for Macro-MIMO in MDHO mode, which benefits from a combination of RF, diversity combining, and soft data combining.

**Table 8-138—Macro MIMO DL Basic IE()**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Macro\_MIMO\_DL\_Basic\_IE() { | — | — |
|  |  |  |
| **Extended-2 DIUC** | 4 | Macro MIMO DL Basic IE = 0x5 |
|  |  |  |
| **Length** | 8 | *Variable* |
|  |  |  |
| **Segment** | 2 | Segment number |
|  |  |  |

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**Table 8-138—Macro MIMO DL Basic IE() *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Used subchannels** | 6 | Used subchannels groups at other BS’s sector: |
|  |  | Bit 0: Subchannel group 0 |
|  |  | Bit 1: Subchannel group 1 |
|  |  | Bit 2: Subchannel group 2 |
|  |  | Bit 3: Subchannel group 3 |
|  |  | Bit 4: Subchannel group 4 |
|  |  | Bit 5: Subchannel group 5 |
|  |  |  |
| **Num\_Region** | 4 | — |
|  |  |  |
| for (*i* = 0; *i* < Num\_Region; *i*++) { | — | — |
|  |  |  |
| **OFDMA Symbol offset** | 8 | — |
|  |  |  |
| if(Permutation == 0b11 and (AMC type is | — | — |
| 2x3 or 1x6)) { |  |  |
|  |  |  |
| **Subchannel offset** | 8 | — |
|  |  |  |
| **Boosting** | 3 | Refer to Table 8-114 |
|  |  |  |
| **No. OFDMA symbols** | 5 | — |
|  |  |  |
| **No. Subchannels** | 6 | — |
|  |  |  |
| } else { | — | — |
|  |  |  |
| **Subchannel offset** | 6 | — |
|  |  |  |
| **Boosting** | 3 | Refer to Table 8-114 |
|  |  |  |
| **No. OFDMA symbols** | 7 | — |
|  |  |  |
| **No. Subchannels** | 6 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Packet index** | 4 | Packet index for each region |
|  |  |  |
| **Matrix indicator** | 2 | See matrix indicator defined in STC DL Zone IE |
|  |  |  |
| **Num\_layer** | 2 | 0b00 = 1 layer, 0b01 = 2 layers |
|  |  | 0b10 = 3 layers, 0b11 = 4 layers |
|  |  |  |
| *Reserved* | 2 | Shall be set to zero |
|  |  |  |
| for (*j* = 0; *j* < Number of Layers; *j*++) { | — | — |
|  |  |  |
| if (INC\_CID == 1) { | — | — |
|  |  |  |
| **CID** | 16 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Layer\_index** | 2 | — |
|  |  |  |
| **DIUC** | 4 | 0–11 burst profiles |
|  |  |  |
| **Repetition coding indication** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |

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**Table 8-138—Macro MIMO DL Basic IE() *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to byte; shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

**Packet Index**

Indicates the packet index for the particular region. The regions with the same packet index shall be diversity combined at MS.

**8.4.5.3.19 UL Noise and Interference Level IE format**

For the open-loop power control, UL interference and noise level shall be broadcast to MSs in the given BS coverage by BS. UL interference and noise level IE broadcast the UL interference and noise level (dBm) estimated in BS. All the UL interference and noise level are quantized in 0.5 dBm steps from –150 dBm (encoded 0x00) to –22.5 dBm (encoded 0xFF). (See Table 8-139.)

**Table 8-139—UL Interference and Noise Level Extended IE format**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Syntax** | **Size** | **Notes** |
|  | **(bit)** |
|  |  |  |
|  |  |  |  |
|  | UL\_Interference\_and\_Noise\_Level\_IE() { | — | — |
|  |  |  |  |
|  | **Extended DIUC** | 4 | UL NI = 0xF |
|  |  |  |  |
|  | **Length** | 4 | *Variable* |
|  |  |  |  |
|  | **Bitmap** | 8 | LSB indicates the there exists a CQI/ACK/Periodic |
|  |  |  | Ranging Region NI field (1). Otherwise, it is 0. |
|  |  |  | The 2nd LSB indicates the there exists a PUSC Region |
|  |  |  | NI field (1). Otherwise, it is 0. |
|  |  |  | The 3rd LSB indicates the there exists a Optional |
|  |  |  | PUSC Region NI field (1). Otherwise, it is 0. |
|  |  |  | The 4th LSB indicates the there exists an AMC Region |
|  |  |  | NI field (1). Otherwise, it is 0. |
|  |  |  | The 5th LSB indicates the there exists an AAS Region |
|  |  |  | NI field (1). Otherwise, it is 0. |
|  |  |  | The 6th LSB indicates the there exists a Periodic |
|  |  |  | Ranging Region NI field (1). Otherwise, it is 0. |
|  |  |  | The 7th LSB indicates the there exists a Sounding |
|  |  |  | Region NI field (1). Otherwise, it is 0. |
|  |  |  | The 8th LSB indicates the there exists a MIMO |
|  |  |  | Region NI field (1). Otherwise, it is 0. |
|  |  |  |  |
|  | if (LSB of Bitmap = 1) { | — | — |
|  |  |  |  |
|  | **CQI/ACK/Periodic Ranging Region NI** | 8 | Estimated average power level (dBm) per a subcarrier |
|  |  |  | in CQI/ACK/periodic ranging region. |
|  |  |  |  |
|  | } | — | — |
|  |  |  |  |
|  | if (The 2nd LSB of Bitmap = 1) { | — | — |
|  |  |  |  |

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**Table 8-139—UL Interference and Noise Level Extended IE format *(CONTINUED)***

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Syntax** | **Size** | **Notes** |
|  | **(bit)** |
|  |  |  |
|  |  |  |  |
|  | **PUSC region NI** | 8 | Estimated average power level (dBm) per a subcarrier |
|  |  |  | in PUSC region. |
|  |  |  |  |
|  | } | — | — |
|  |  |  |  |
|  | if (The 3rd LSB of Bitmap = 1) { | — | — |
|  |  |  |  |
|  | **Optional PUSC region NI** | 8 | Estimated average power level (dBm) per a subcarrier |
|  |  |  | in optional PUSC region. |
|  |  |  |  |
|  | } | — | — |
|  |  |  |  |
|  | if (The 4th LSB of Bitmap = 1) { | — | — |
|  |  |  |  |
|  | **AMC region NI** | 8 | Estimated average power level (dBm) per a subcarrier |
|  |  |  | in AMC region. |
|  |  |  |  |
|  | } | — | — |
|  |  |  |  |
|  | if (The 5th LSB of Bitmap = 1) { | — | — |
|  |  |  |  |
|  | **AAS region NI** | 8 | Estimated average power level (dBm) per a subcarrier |
|  |  |  | in AAS region. The interference and noise level shall |
|  |  |  | be estimated before the beam forming. |
|  |  |  |  |
|  | } | — | — |
|  |  |  |  |
|  | if (The 6th LSB of Bitmap = 1) { | — | — |
|  |  |  |  |
|  | **Periodic ranging region NI** | 8 | Estimated average power level (dBm) per a subcarrier |
|  |  |  | in Periodic ranging region. The interference and noise |
|  |  |  | level shall be estimated before the beam forming. |
|  |  |  | When this field is present, the value for the periodic |
|  |  |  | ranging region indicated in CQI/ACK/Periodic |
|  |  |  | Ranging Region NI field shall be ignored. Instead, the |
|  |  |  | value of this field shall be used for NI level of the |
|  |  |  | periodic ranging region. |
|  |  |  |  |
|  | } | — | — |
|  |  |  |  |
|  | if (The 7th LSB of Bitmap = 1) { | — | — |
|  |  |  |  |
|  | **Sounding region NI** | 8 | Estimated average power level (dBm) per a subcarrier |
|  |  |  | in sounding region. |
|  |  |  |  |
|  | } | — | — |
|  |  |  |  |
|  | if (The 8th LSB of Bitmap = 1) { | — | — |
|  |  |  |  |
|  | **MIMO region NI** | 8 | Estimated average power level (dBm) per a subcarrier |
|  |  |  | in MIMO region. |
|  |  |  |  |
|  | } | — | — |
|  |  |  |  |
|  | } | — | — |
|  |  |  |  |

The UL interference and noise level that is indicated in the latest IE shall be used if necessary. The MS that supports open loop power control shall decode the UL noise and interference level IE even if it is in closed loop power control mode and save the values for future use (i.e., BS changes the MS’s power control mode to open loop). The BS should ensure that the MS has had a chance to receive the fields required for proper power control mode change in the UL noise and interference IE by properly setting the start-frame field in the PMC-RSP message to point after the frame that contains a transmission of the noise and interference IE

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following the MS’s network entry (the transmission of the UL noise and interference level IE might be before the frame in which the PMC-RSP was sent). After the first reception of the UL noise and interference IE, the MS may use the same noise and interference levels until it receives updated noise and interference levels. If the MS is in open loop power control mode and receives an UL allocation before a successful reception of any noise and interference IE, the MS may transmit by using the transmission power level calculated with Equation (8-134), where the noise and interference levels are estimated from the last transmission power level in closed loop using the equation for the corresponding UIUC.

**8.4.5.3.20 Dedicated DL Control IE**

Dedicated DL Control IE contains additional control information for each sub-burst in the Table 8-143. Because each sub-burst may have its own control information format dependent on the MS capability, the length of the Dedicated DL Control IE is variable. (See Table 8-140.)

**Table 8-140—Dedicated DL Control IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Dedicated\_DL\_Control\_IE() { | — | — |
|  |  |  |
| **Length** | 4 bits | Length of following control information in |
|  |  | Nibble. |
|  |  |  |
| **Control header** | 4 bits | Bit 0: SDMA Control InfoBit |
|  |  | Bits #1–3: *Reserved* |
|  |  |  |
| If ( SDMA Control Info Bit == 1){ | — | — |
|  |  |  |
| **Num SDMA layers** | 2 bits | This value plus one indicates the total number |
|  |  | of SDMA layers associated with the HARQ |
|  |  | DL MAP IE. |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding bits** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |

**SDMA Control Info**

The Dedicated DL Control IE with SDMA Control Info = 1 shall be present within the first sub-burst allocation of each layer of SDMA allocations (including the first layer). Each SDMA layer has is own pilot pattern (layer *n* uses the pilot pattern defined for antenna *n*, see 8.4.8). When the SDMA control info is present, the OFDMA Symbol offset and Subchannel offset shall be reset to the beginning of the two dimensional data region defined in the HARQ DL MAP IE.

For allocations specified in an AAS zone with PUSC permutation, the Num SDMA Layers value shall be identical in all Dedicated DL Control IEs that describe allocations in the same major group.

**8.4.5.3.20.1 Reduced CID IE**

Table 8-141 presents the format of reduced CID. BS may use reduced CID instead of basic CID or multicast CID to reduce the size of HARQ MAP message. The type of reduced CID is determined by BS considering the range of basic CIDs of SS connected with the BS and specified by the RCID\_Type field of the Format Configuration IE.

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The reduced CID is composed of 1 bit of prefix and *n*-bits of LSB of CID of SS. The prefix is set to 1 for the Broadcast CID or Multicast Polling CID and set to 0 for basic CID. The reduced CID cannot be used instead of Transport, Primary Management, or Secondary Management CID.

Figure 8-66 shows the decoding of reduced CID when the RCID\_Type is set to 1.

**Table 8-141—RCID IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| RCID\_IE() { | — | — |
|  |  |  |
| if (RCID\_Type == 0){ | — | — |
|  |  |  |
| **CID** | 16 | Normal CID |
|  |  |  |
| }else{ | — | — |
|  |  |  |
| **Prefix** | 1 | For multicast, AAS, Padding and broadcast burst |
|  |  | temporary disable RCID |
|  |  |  |
| if ( Prefix == 1){ | — | — |
|  |  |  |
| **RCID 11** | 11 | 11 LSBs of multicast, AAS, or Broadcast CID |
|  |  |  |
| }else{ | — | — |
|  |  |  |
| if (RCID\_Type == 1){ | — | — |
|  |  |  |
| **RCID 11** | 11 | 11 LSBs of basic CID |
|  |  |  |
| } else if (RCID\_Type == 2){ | — | — |
|  |  |  |
| **RCID 7** | 7 | 7 LSBs of Basic CID |
|  |  |  |
| } else if (RCID\_Type == 3){ | — | — |
|  |  |  |
| **RCID 3** | 3 | 3 LSBs of Basic CID |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

**CID**

Normal 16 bits CID

**Prefix**

A value of one indicates that 11 bits RCID for broadcast and multicast follows the prefix. Otherwise, the *n*-bits RCID for basic CID follows the prefix. The value of *n* is determined by the RCID\_Type field in Format Configuration IE.

**RCID n**

*n*-bits LSB of CID

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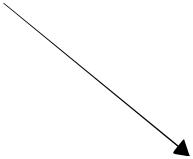
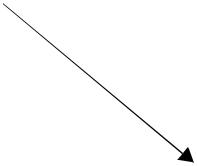
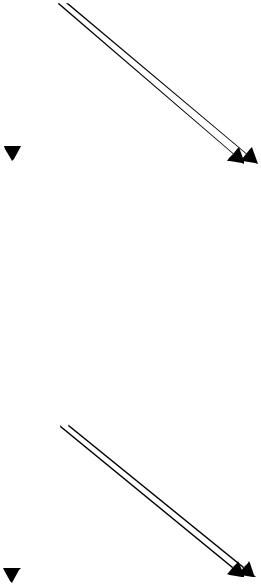
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Prefix = 0, Basic CID

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RCID 11 |  | 0 |  | 1 |  | 0 |  | 1 |  | 1 |  | 0 | 0 | | 1 | | 1 | 1 | 1 |  | 0 |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| CID |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0 |  | 0 |  | 0 |  | 0 |  | 0 |  | 1 |  | 0 |  | 1 | 1 | 0 | 0 |  | 1 | 1 | 1 | 1 | 0 |
|  |  |  | |  |  |  |  |  |  |  |  |  | |  | |  |  |  |  |  |  |  |  |  |  |
|  | Prefix = 1, Multicast or Broadcast CID | | | | | | | | | | | | | | | | | |  |  |  |  |  |  |  |
| RCID 11 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 1 |  | 0 |  | 0 |  | 0 |  | 0 |  | 0 |  | 0 |  | 0 | 0 | 0 | 0 |  | 0 |  |  |  |  |
| CID |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 1 |  | 1 |  | 1 |  | 1 |  | 1 |  | 0 |  | 0 |  | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 | 0 |
|  |  |  |  |  |  | |  | |  | |  |  | |  | |  |  |  |  |  |  |  |  |  |  |
|  |  |  | **Figure 8-66—Reduced CID decoding** | | | | | | | | | | | | | | | | | |  |  |  |  |  |



**8.4.5.3.20.2 Skip IE**

This IE may be sent by BS in the mandatory DL-MAP as a broadcast IE. This IE is used to indicate to mobility enabled MS (negotiated through capability exchange in REG-REQ and REG-RSP, defined in 11.7.12.1) whether to process subsequent IEs following the Skip IE. There are two modes of operation. At the beginning of each DL-MAP, the processing of IEs is always enabled. When a Skip IE is encountered, and if Mode is set to 1, the mobility enabled MS may skip the processing of all subsequent IEs in the DL-MAP. However, when a Skip IE with Mode set to 0 is encountered, the mobility enabled MS may disable the processing of subsequent IEs until the next Skip IE is encountered in the DL-MAP. When the next Skip IE with Mode set to 0 is encountered, the MS shall enable the processing of subsequent IEs. This process continues until the end of the DL-MAP. (See Table 8-142.)

**Table 8-142—Skip IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Skip\_IE() { | — | — |
|  |  |  |
| **Extended-2 DIUC** | 4 | Skip IE = 0x6 |
|  |  |  |
| **Length** | 8 | Length = 0x1 |
|  |  |  |
| **Mode** | 1 | If set to 1, the MS can skip the processing of all subsequent IEs in |
|  |  | the DL-MAP. |
|  |  | If set to 0, the MS toggle the enabling and disabling of processing |
|  |  | of IEs following the Skip IE, until the next Skip IE is encountered. |
|  |  |  |
| *Reserved* | 7 | — |
|  |  |  |
| } | — | — |
|  |  |  |

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**8.4.5.3.21 HARQ DL MAP IE**

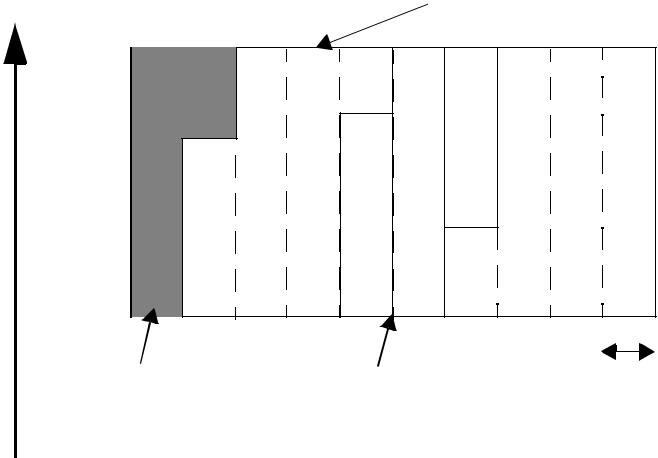
The following modes of HARQ shall be supported by the HARQ DL MAP IE:

1. Chase combining HARQ for all FEC types (HARQ Chase). In this mode, the burst profile is indicated by a DIUC.
2. Incremental redundancy HARQ with CTC (HARQ IR). In this mode, the burst profile is indicated by the parameters *NEP*, *NSCH*.
3. Incremental redundancy HARQ for convolutional code (HARQ CC-IR).
4. HR Multicast DL burst. In this mode, the burst profile is indicated by a DIUC.

The IE may also be used to indicate a non-HARQ transmission when ACK disable = 1.

The HARQ DL MAP IE defines one or more two-dimensional data regions (a number of symbols by a number of subchannels). These allocations are further partitioned into bursts, termed sub-bursts, by allocating a specified number of slots to each burst. All sub-bursts of a data region shall only support one of the HARQ modes. The number of slots is indicated by duration or *NSCH* fields. The slots are allocated in a frequency-first order, starting from the slot with the smallest symbol number and smallest subchannel, and continuing to slots with increasing subchannel number. When the edge of the allocation is reached, the symbol number is increased by a slot duration, as depicted in Figure 8-67. Each sub-burst is separately encoded.

DL allocation



|  |
| --- |
| frequency |

|  |  |  |  |
| --- | --- | --- | --- |
| First HARQ | HARQ | Slot |  |
| sub-burst | sub-burst | duration |  |
|  |  |  |  |

time

**Figure 8-67—HARQ DL allocation**

The enhanced feedback 6-bit channel type or mandatory feedback channel type shall be used for CQI channels allocated through any of the DL HARQ sub-burst IEs.

Each HARQ Map IE and sub-burst IE shall be nibble-aligned. When there is an if-else clause, regardless of whether the if clause or the else clause is executed, the resulting Map IE shall be nibble-aligned. When there is a loop, nibble-alignment shall be required before the loop starts and inside the loop. (See Table 8-143 and Table 8-144.)

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**Table 8-143—HARQ DL MAP IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| HARQ\_DL\_MAP\_IE() { | — | — |
|  |  |  |
| **Extended-2 DIUC** | 4 | HARQ\_DL\_MAP\_IE() = 0x7 |
|  |  |  |
| **Length** | 8 | Length in bytes |
|  |  |  |
| **RCID\_Type** | 2 | 0b00: Normal CID |
|  |  | 0b01: RCID11 |
|  |  | 0b10: RCID7 |
|  |  | 0b11: RCID3 |
|  |  | For HR Multicast, RCID\_Type is set to 0b00 and |
|  |  | Normal CID is replaced by HR Multicast Group ID |
|  |  |  |
| **ACK region index** | 1 | The index of the ACK region associated with all |
|  |  | sub-bursts (except HR multicast DL burst) defined |
|  |  | in this HARQ DL map IE (FDD/ H-FDD only). |
|  |  | 0: first ACK region |
|  |  | 1: second ACK region |
|  |  | This bit shall be set to 0 for TDD mode. |
|  |  |  |
| *Reserved* | 1 | — |
|  |  |  |
| While (data remains) { | — | — |
|  |  |  |
| **Boosting** | 3 | 0b000: Normal (not boosted) |
|  |  | 0b001: +6 dB |
|  |  | 0b010: –6 dB |
|  |  | 0b011: +9 dB |
|  |  | 0b100: +3 dB |
|  |  | 0b101: –3 dB |
|  |  | 0b110: –9 dB |
|  |  | 0b111: –12 dB; |
|  |  |  |
| **Region\_ID use indicator** | 1 | 0: not use Region\_ID |
|  |  | 1: use Region\_ID |
|  |  |  |
| If (Region\_ID use indicator == 0 ) { |  |  |
|  |  |  |
| **OFDMA symbol offset** | 8 | Offset from the start symbol of DL subframe |
|  |  |  |
| **Subchannel offset** | 7 | — |
|  |  |  |
| **Number of OFDMA symbols** | 7 | — |
|  |  |  |
| **Number of subchannels** | 7 | — |
|  |  |  |
| **Rectangular sub-burst Indication** | 1 | Indicates sub-burst allocations are time-first |
|  |  | rectangular. The duration field in each sub-burst IE |
|  |  | specifies the number of subchannels for each |
|  |  | rectangular allocation. This is only valid for AMC |
|  |  | allocations and all allocations with dedicated pilots. |
|  |  | When this field is clear, sub-bursts shall be |
|  |  | allocated in frequency-first manner and the duration |
|  |  | field reverts to the default operation. |
|  |  |  |
| *Reserved* | 2 | — |
|  |  |  |
| } else { | — | — |
|  |  |  |
| **Region\_ID** | 8 | Index to the DL region defined in DL region |
|  |  | definition TLV in DCD |
|  |  |  |

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**Table 8-143—HARQ DL MAP IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **Mode** | 4 | Indicates the mode of this HARQ region: |
|  |  | 0b0000: Chase HARQ |
|  |  | 0b0001: Incremental redundancy HARQ for CTC |
|  |  | 0b0010: Incremental redundancy HARQ for Con- |
|  |  | volutional Code 0b0011: MIMO Chase HARQ |
|  |  | 0b0100: MIMO IR HARQ |
|  |  | 0b0101: MIMO IR HARQ for Convolutional Code |
|  |  | 0b0110: MIMO STC HARQ |
|  |  | 0b0111: HR Multicast DL sub-burst |
|  |  | 0b1000–0b1111: *Reserved* |
|  |  |  |
| **Sub-burst IE Length** | 8 | Length, in nibbles, to indicate the size of the sub- |
|  |  | burst IE in this HARQ mode. |
|  |  | The MS may skip DL HARQ Sub-burst IE if it does |
|  |  | not support the HARQ mode. However, the MS |
|  |  | shall decode N ACK Channel field from each DL |
|  |  | HARQ Sub-burst IE to determine the UL ACK |
|  |  | channel it shall use for its DL HARQ burst. |
|  |  |  |
| If (Mode == 0b0000) { | — | — |
|  |  |  |
| **DL\_HARQ\_Chase\_sub-burst\_IE()** | *variable* | — |
|  |  |  |
| } else if (Mode == 0b0001) { | — | — |
|  |  |  |
| **DL\_HARQ\_IR\_CTC\_sub-** | *variable* | — |
| **burst\_IE()** |  |  |
|  |  |  |
| } else if (Mode == 0b0010) { | — | — |
|  |  |  |
| **DL\_HARQ\_IR\_CC\_sub-** | *variable* | — |
| **burst\_IE()** |  |  |
|  |  |  |
| } else if (Mode == 0b0011) { | — | — |
|  |  |  |
| **MIMO\_DL\_Chase\_HARQ\_sub-** | *variable* | — |
| **burst\_IE()** |  |  |
|  |  |  |
| } else if (Mode == 0b0100) { | — | — |
|  |  |  |
| **MIMO\_DL\_IR\_HARQ\_sub-** | *variable* | — |
| **burst\_IE()** |  |  |
|  |  |  |
| } else if (Mode == 0b0101) { | — | — |
|  |  |  |
| **MIMO\_DL\_IR\_HARQ\_for\_CC\_** | *variable* | — |
| **sub-burst\_IE()** |  |  |
|  |  |  |
| } else if (Mode == 0b0110) { | — | — |
|  |  |  |
| **MIMO\_DL\_STC\_HARQ\_sub-** | *variable* | — |
| **burst\_IE()** |  |  |
|  |  |  |
| } else if (Mode == 0b0111){ | — | — |
|  |  |  |
| **HR Multicast DL sub-burst IE** | *variable* | Table 16-5 |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

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**Table 8-143—HARQ DL MAP IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Padding** | *variable* | Padding to byte for the unspecified portion of this |
|  |  | IE, i.e., not including the first two fields, |
|  |  | “Extended-2 DIUC” and “Length”; shall be set to 0 |
|  |  |  |
| } | — | — |
|  |  |  |

**Table 8-144—DL HARQ Chase Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| DL\_HARQ\_Chase\_sub-burst\_IE() { | — | — |
|  |  |  |
| **N sub-burst** | 4 | Number of sub-bursts in the 2D rectangular |
|  |  | region is this field value plus 1 |
|  |  |  |
| **N ACK channel** | 4 | Number of HARQ ACK enabled sub-bursts in the |
|  |  | 2D region |
|  |  |  |
| For (*j* = 0; *j* < Number of sub-bursts; *j*++){ | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| **Duration** | 10 | Duration in slots |
|  |  |  |
| **sub-burst DIUC Indicator** | 1 | If sub-burst DIUC Indicator is 1, it indicates that |
|  |  | DIUC is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same |
|  |  | DIUC as the previous sub-burst |
|  |  | If j is 0 then this indicator shall be 1 |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the |
|  |  | group assignment of the MS (see 8.4.4.2 and |
|  |  | 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| If( sub-burst DIUC Indicator == 1){ | — | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| *Reserved* | 2 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |

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**Table 8-144—DL HARQ Chase Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **ACK disable** | 1 | When ACK Disable == 1, the allocated sub-burst |
|  |  | does not require an ACK to be transmitted by the |
|  |  | SS in the ACKCH Region (see 8.4.5.4.53). In this |
|  |  | case, no ACK channel is allocated for the sub- |
|  |  | burst in the ACKCH Region. For TDD SS, for the |
|  |  | burst, BS shall not perform HARQ retransmission |
|  |  | and MS shall ignore ACID, AI\_SN and SPID, |
|  |  | which shall be set to 0 by BS if they exist. For |
|  |  | FDD SS, for the burst, BS shall not perform |
|  |  | HARQ retransmission and MS shall ignore |
|  |  | AI\_SN and SPID, which shall be set to 0 by BS if |
|  |  | they exist. For FDD SS, the BS may set the ACID |
|  |  | to a value other than 0 if that ACID is listed in the |
|  |  | Aggregated HARQ Channels TLV. The CRC |
|  |  | shall be appended at the end of each sub-burst |
|  |  | regardless of the ACK disable bit. |
|  |  |  |
| **Dedicated DL Control Indicator** | 2 | LSB #0 indicates inclusion of CQI control |
|  |  | LSB #1 indicates inclusion of Dedicated DL |
|  |  | Control IE. |
|  |  |  |
| If( LSB #0 of Dedicated DL Control | — | — |
| Indicator == 1){ |  |  |
|  |  |  |
| **Duration (d)** | 4 | A CQI feedback is transmitted on the CQI |
|  |  | channels indexed by the (CQI Channel Index) by |
|  |  | the SS for 2(d–1) frames. If d is 0b0000, |
|  |  | deallocates all CQI feedback when the current |
|  |  | ACID is completed successfully. |
|  |  | If d is 0b1111, the MS should report until the BS |
|  |  | command for the MS to stop. |
|  |  |  |
| If (Duration != 0b0000){ | — | — |
|  |  |  |
| **Allocation Index** | 6 | Index to the channel in a frame the CQI report |
|  |  | should be transmitted by the SS. |
|  |  |  |
| **Period (p)** | 3 | A CQI feedback is transmitted on the CQI |
|  |  | channels indexed by the (CQI Channel Index) by |
|  |  | the SS in every 2*p* frames. |
| **Frame offset** | 3 | The MS starts reporting at the frame of which the |
|  |  | number has the same 3 LSB as the specified |
|  |  | frame offset. If the current frame is specified, the |
|  |  | MS should start reporting in eight frames. |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| If (LSB #1 of Dedicated DL Control | — | — |
| Indicator ==1) { |  |  |
|  |  |  |
| **Dedicated DL Control IE ()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

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**Group Indicator**

If the Group Indicator field is not equal to the current H-FDD group index that the MS is associated with, the MS shall switch to the group index indicated by the Group Indicator field. BS can request explicit acknowledgment from MS by setting the LSB #0 of the Dedicated DL Control Indicator to 1 in this IE, in which case MS shall use the assigned CQICH channel indicated in Allocation Index field (see 8.4.4.2.1).

**Table 8-145—DL HARQ IR CTC Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| DL\_HARQ\_IR\_CTC\_sub-burst\_IE() { | — | — |
|  |  |  |
| **N sub-burst** | 4 | “Number of sub-bursts” in the 2D region is this |
|  |  | field value plus 1 |
|  |  |  |
| **N ACK channel** | 4 | Number of HARQ ACK enabled sub-bursts in the |
|  |  | 2D region |
|  |  |  |
| For (*j* = 0; *j* < Number of sub-bursts; *j*++){ | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| **NEP** | 4 | — |
| **NSCH** | 4 | — |
| **SPID** | 2 | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| **ACK disable** | 1 | When ACK Disable == 1, the allocated sub-burst |
|  |  | does not require an ACK to be transmitted by the |
|  |  | SS in the ACKCH Region (see 8.4.5.4.53). In this |
|  |  | case, no ACK channel is allocated for the sub- |
|  |  | burst in the ACKCH Region. For TDD SS, for the |
|  |  | burst, BS shall not perform HARQ retransmission |
|  |  | and MS shall ignore ACID, AI\_SN and SPID, |
|  |  | which shall be set to 0 by BS if they exist. For |
|  |  | FDD SS, for the burst, BS shall not perform |
|  |  | HARQ retransmission and MS shall ignore |
|  |  | AI\_SN and SPID, which shall be set to 0 by BS if |
|  |  | they exist. For FDD SS, the BS may set the ACID |
|  |  | to a value other than 0 if that ACID is listed in the |
|  |  | Aggregated HARQ Channels TLV. The CRC |
|  |  | shall be appended at the end of each sub-burst |
|  |  | regardless of the ACK disable bit. |
|  |  |  |
| *Reserved* | 1 | Shall be set to zero |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the |
|  |  | group assignment of the MS (see 8.4.4.2 and |
|  |  | 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| **Dedicated DL Control Indicator** | 2 | LSB #0 indicates inclusion of CQI control |
|  |  | LSB #1 indicates inclusion of Dedicated DL |
|  |  | Control IE |
|  |  |  |

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**Table 8-145—DL HARQ IR CTC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| If( LSB #0 of Dedicated DL Control | — | — |
| Indicator == 1){ |  |  |
|  |  |  |
| **Duration (*d*)** | 4 | A CQI feedback is transmitted on the CQI |
|  |  | channels indexed by the (CQI Channel Index) by |
|  |  | the SS for 2(*d*–1) frames. If d is 0b0000, |
|  |  | deallocates all CQI feedback when the current |
|  |  | ACID is completed successfully. |
|  |  | If *d* is 0b1111, the MS should report until the BS |
|  |  | command for the MS to stop |
|  |  |  |
| If (Duration != 0b0000){ | — | — |
|  |  |  |
| **Allocation index** | 6 | Index to the channel in a frame the CQI report |
|  |  | should be transmitted by the SS |
|  |  |  |
| **Period(p)** | 3 | A CQI feedback is transmitted on the CQI |
|  |  | channels indexed by the (CQI Channel Index) by |
|  |  | the SS in every 2p frames. |
| **Frame offset** | 3 | The MS starts reporting at the frame of which the |
|  |  | number has the same 3 LSB as the specified |
|  |  | frame offset. If the current frame is specified, the |
|  |  | MS should start reporting in eight frames. |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| If (LSB #1 of Dedicated DL Control | — | — |
| Indicator ==1) { |  |  |
|  |  |  |
| **Dedicated DL Control IE ()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

**Group Indicator**

If the Group Indicator field is not equal to the current H-FDD group index that the MS is associated with, the MS shall switch to the group index indicated by the Group Indicator field. BS can request explicit acknowledgment from MS by setting the LSB #0 of the Dedicated DL Control Indicator to 1 in this IE, in which case MS shall use the assigned CQICH channel indicated in Allocation Index field (see 8.4.4.2.1).

**Group Indicator**

If the Group Indicator field is not equal to the current H-FDD group index that the MS is associated with, the MS shall switch to the group index indicated by the Group Indicator field.

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**Table 8-146—DL HARQ IR CC Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| DL\_HARQ\_IR\_CC\_sub-burst\_IE() { | — | — |
|  |  |  |
| **N sub-burst** | 4 | “Number of sub-bursts” in the 2D region is this |
|  |  | field value plus 1 |
|  |  |  |
| **N ACK channel** | 4 | Number of HARQ ACK enabled sub-bursts in the |
|  |  | 2D region |
|  |  |  |
| For (*j* = 0; *j* < Number of sub-bursts; *j*++) { | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| **Duration** | 10 | — |
|  |  |  |
| **sub-burst DIUC Indicator** | 1 | If sub-burst DIUC Indicator is 1, it indicates that |
|  |  | DIUC is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same |
|  |  | DIUC as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the |
|  |  | group assignment of the MS (see 8.4.4.2 and |
|  |  | 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| If( sub-burst DIUC Indicator == 1){ | — | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| *Reserved* | 2 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| **SPID** | 2 | — |
|  |  |  |

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**Table 8-146—DL HARQ IR CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **ACK disable** | 1 | When ACK Disable == 1, the allocated sub-burst |
|  |  | does not require an ACK to be transmitted by the |
|  |  | SS in the ACKCH Region (see 8.4.5.4.53). In this |
|  |  | case, no ACK channel is allocated for the sub- |
|  |  | burst in the ACKCH Region. For TDD SS, for the |
|  |  | burst, BS shall not perform HARQ retransmission |
|  |  | and MS shall ignore ACID, AI\_SN and SPID, |
|  |  | which shall be set to 0 by BS if they exist. For |
|  |  | FDD SS, for the burst, BS shall not perform |
|  |  | HARQ retransmission and MS shall ignore |
|  |  | AI\_SN and SPID, which shall be set to 0 by BS if |
|  |  | they exist. For FDD SS, the BS may set the ACID |
|  |  | to a value other than 0 if that ACID is listed in the |
|  |  | Aggregated HARQ Channels TLV. The CRC |
|  |  | shall be appended at the end of each sub-burst |
|  |  | regardless of the ACK disable bit. |
|  |  |  |
| **Dedicated DL Control Indicator** | 2 | LSB #0 indicates inclusion of CQI control |
|  |  | LSB #1 indicates inclusion of Dedicated DL |
|  |  | Control IE |
|  |  |  |
| *Reserved* | 2 | Shall be set to zero. |
|  |  |  |
| If (LSB #0 of Dedicated DL Control | — | — |
| Indicator == 1) { |  |  |
|  |  |  |
| **Duration (d)** | 4 | A CQI feedback is transmitted on the CQI |
|  |  | channels indexed by the (CQI Channel Index) by |
|  |  | the SS for 2(d–1) frames. If d is 0b0000, |
|  |  | deallocates all CQI feedback when the current |
|  |  | ACID is completed successfully. |
|  |  | If d is 0b1111, the MS should report until the BS |
|  |  | command for the MS to stop |
|  |  |  |
| If (Duration != 0b0000){ | — | — |
|  |  |  |
| **Allocation index** | 6 | Index to the channel in a frame the CQI report |
|  |  | should be transmitted by the SS |
|  |  |  |
| **Period(p)** | 3 | A CQI feedback is transmitted on the CQI |
|  |  | channels indexed by the (CQI Channel Index) by |
|  |  | the SS in every 2p frames. |
| **Frame offset** | 3 | The MS starts reporting at the frame of which the |
|  |  | number has the same 3 LSB as the specified |
|  |  | frame offset. If the current frame is specified, the |
|  |  | MS should start reporting in eight frames. |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| If ((LSB #1 of Dedicated DL Control | — | — |
| Indicator == 1) { |  |  |
|  |  |  |
| **Dedicated DL Control IE ()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |

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|  |  |  |  |
| --- | --- | --- | --- |
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| **Table 8-146—DL HARQ IR CC Sub-burst IE format *(CONTINUED)*** | | | |
|  |  |  |  |
| **Syntax** |  | **Size** | **Notes** |
|  | **(bit)** |
|  |  |  |
|  |  |  |  |
| } |  | — | — |
|  |  |  |  |
| } |  | — | — |
|  |  |  |  |

BS can request explicit acknowledgment from MS by setting the LSB #0 of the Dedicated DL Control Indicator to 1 in this IE, in which case MS shall use the assigned CQICH channel indicated in Allocation Index field (see 8.4.4.2.1).

**Table 8-147—MIMO DL Chase HARQ Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| MIMO\_DL\_Chase\_HARQ\_sub-burst\_IE() { | — | — |
|  |  |  |
| **N sub-burst** | 4 | “Number of sub-bursts” in the 2D region is this |
|  |  | field value plus 1 |
|  |  |  |
| **N ACK channel** | 6 | Number of HARQ ACK enabled sub-bursts in |
|  |  | the 2D region |
|  |  |  |
| For (*j* = 0; *j* < Number of sub-bursts; *j*++){ | — | — |
|  |  |  |
| **MU Indicator** | 1 | Indicates whether this DL burst is intended for |
|  |  | multiple SS |
|  |  |  |
| **Dedicated MIMO DL Control Indicator** | 1 | — |
|  |  |  |
| **ACK Disable** | 1 | When ACK Disable == 1, the allocated sub- |
|  |  | burst does not require an ACK to be transmitted |
|  |  | by the SS in the ACKCH Region (see |
|  |  | 8.4.5.4.53). In this case, no ACK channel is |
|  |  | allocated for the sub-burst in the ACKCH |
|  |  | Region. For TDD SS, for the burst, BS shall not |
|  |  | perform HARQ retransmission and MS shall |
|  |  | ignore ACID, AI\_SN and SPID, which shall be |
|  |  | set to 0 by BS if they exist. For FDD SS, for the |
|  |  | burst, BS shall not perform HARQ |
|  |  | retransmission and MS shall ignore AI\_SN and |
|  |  | SPID, which shall be set to 0 by BS if they exist. |
|  |  | For FDD SS, the BS may set the ACID to a |
|  |  | value other than 0 if that ACID is listed in the |
|  |  | Aggregated HARQ Channels TLV. The CRC |
|  |  | shall be appended at the end of each sub-burst |
|  |  | regardless of the ACK disable bit. |
|  |  |  |
| If (MU indicator == 0) { | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Dedicated MIMO DL Control Indicator == 1) | — | — |
| { |  |  |
|  |  |  |
| **Dedicated MIMO DL Control IE ()** | *variable* | — |
|  |  |  |

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**Table 8-147—MIMO DL Chase HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **Duration** | 10 | — |
|  |  |  |
| For (*i* = 0; *i* < N\_layer; *i*++) { | — | — |
|  |  |  |
| if (MU indicator == 1) { | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00 – No repetition coding |
|  |  | 0b01 – Repetition coding of 2 used |
|  |  | 0b10 – Repetition coding of 4 used |
|  |  | 0b11 – Repetition coding of 6 used |
|  |  |  |
| If (ACK Disable == 0) { | — | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| *Padding* | *variable* | Padding to nibble; shall be set to 0 |
|  |  |  |
| } | — | — |
|  |  |  |

When an MS encounters a MIMO HARQ burst allocation with Dedicated MIMO DL Control Indicator set to 1 in the current sub-burst IE, the information in Dedicated MIMO DL Control IE shall override the information 1) in STC DL zone IE (e.g., matrix type indication) for the current DL zone, and 2) in the previous Dedicated MIMO DL Control IE in the same sub-burst IE. In addition, this information is used for all following sub-burst allocations with Dedicated MIMO DL Control Indicator = 0 until the next occurrence of the Dedicated MIMO DL control IE in the same sub-burst IE.

For MIMO HARQ allocation specified in the MIMO DL Chase HARQ Sub-burst IE, MIMO DL IR HARQ Sub-burst IE, or the MIMO DL IR HARQ for CC Sub-burst IE, each layer shall be allocated its associated ACK channel. The number of ACK channels associated with the sub-burst IE may be greater than N\_sub\_burst.

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For each multi-SS sub-burst (MU Indicator = 1), if the dedicated pilot bit is set to 1 in the STC Zone IE (8.4.5.3.4) for the zone in which the sub-burst allocations are being made, N\_layer for this sub-burst selects the pilot format for the sub-burst by interpreting N\_layer as the number of Tx antennas (as defined in 8.4.8), and the SS with the first RCID shall be assigned the pilot pattern corresponding to antenna 1, of 8.4.8, the second to the pilot pattern corresponding to antenna 2, and so on. (See Table 8-148, Table 8-149, and Table 8-150.)

**Table 8-148—MIMO DL IR HARQ Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| MIMO\_DL\_IR\_HARQ\_sub-burst\_IE() { | — | — |
|  |  |  |
| **N sub-burst** | 4 | “Number of sub-bursts” in the 2D region is |
|  |  | this field value plus 1 |
|  |  |  |
| **N ACK channel** | 6 | Number of HARQ ACK enabled sub-bursts |
|  |  | in the 2D region |
|  |  |  |
| For (*j* = 0; *j* < Number of sub-bursts; *j*++){ | — | — |
|  |  |  |
| **MU Indicator** | 1 | Indicates whether this DL burst is intended |
|  |  | for multiple SS |
|  |  |  |
| **Dedicated MIMO DL Control Indicator** | 1 | — |
|  |  |  |
| **ACK Disable** | 1 | When ACK Disable == 1, the allocated |
|  |  | sub-burst does not require an ACK to be |
|  |  | transmitted by the SS in the ACKCH |
|  |  | Region (see 8.4.5.4.53). In this case, no |
|  |  | ACK channel is allocated for the sub-burst |
|  |  | in the ACKCH Region. For TDD SS, for |
|  |  | the burst, BS shall not perform HARQ |
|  |  | retransmission and MS shall ignore ACID, |
|  |  | AI\_SN and SPID, which shall be set to 0 by |
|  |  | BS if they exist. For FDD SS, for the burst, |
|  |  | BS shall not perform HARQ retransmission |
|  |  | and MS shall ignore AI\_SN and SPID, |
|  |  | which shall be set to 0 by BS if they exist. |
|  |  | For FDD SS, the BS may set the ACID to a |
|  |  | value other than 0 if that ACID is listed in |
|  |  | the Aggregated HARQ Channels TLV. The |
|  |  | CRC shall be appended at the end of each |
|  |  | sub-burst regardless of the ACK disable bit. |
|  |  |  |
| If (MU indicator == 0) { | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Dedicated MIMO DL Control Indicator == 1) { | — | — |
|  |  |  |
| **Dedicated MIMO DL Control IE ()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **NSCH** | 4 | In the case of vertical encoding, this value |
|  |  | shall be half of an even numbered value |
|  |  | based on 8.4.9.2.3.5.6 |
|  |  |  |
| For (*i* = 0; *i* < N\_layer; *i*++) { | — | — |
|  |  |  |

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**Table 8-148—MIMO DL IR HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| if (MU indicator == 1) { | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **NEP** | 4 | — |
| If (ACK Disable == 0) { | — | — |
|  |  |  |
| **SPID** | 2 | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| *Padding* | *variable* | Padding to nibble; shall be set to 0 |
|  |  |  |
| } | — | — |
|  |  |  |

**Table 8-149—MIMO DL IR HARQ for CC Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| MIMO\_DL\_IR\_HARQ\_for\_CC\_sub-burst\_IE() { | — | — |
|  |  |  |
| **N sub-burst** | 4 | “Number of sub-bursts” in the 2D |
|  |  | region is this field value plus 1 |
|  |  |  |
| **N ACK channel** | 6 | Number of HARQ ACK enabled |
|  |  | sub-bursts in the 2D region |
|  |  |  |
| For (*j* = 0; *j* < Number of sub-bursts; *j*++){ | — | — |
|  |  |  |
| **MU Indicator** | 1 | Indicates whether this DL burst is |
|  |  | intended for multiple SS |
|  |  |  |
| **Dedicated MIMO DL Control Indicator** | 1 | — |
|  |  |  |

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**Table 8-149—MIMO DL IR HARQ for CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **ACK Disable** | 1 | When ACK Disable == 1, the |
|  |  | allocated sub-burst does not require |
|  |  | an ACK to be transmitted by the SS |
|  |  | in the ACKCH Region (see |
|  |  | 8.4.5.4.53). In this case, no ACK |
|  |  | channel is allocated for the sub- |
|  |  | burst in the ACKCH Region. For |
|  |  | TDD SS, for the burst, BS shall not |
|  |  | perform HARQ retransmission and |
|  |  | MS shall ignore ACID, AI\_SN and |
|  |  | SPID, which shall be set to 0 by BS |
|  |  | if they exist. For FDD SS, for the |
|  |  | burst, BS shall not perform HARQ |
|  |  | retransmission and MS shall ignore |
|  |  | AI\_SN and SPID, which shall be set |
|  |  | to 0 by BS if they exist. For FDD |
|  |  | SS, the BS may set the ACID to a |
|  |  | value other than 0 if that ACID is |
|  |  | listed in the Aggregated HARQ |
|  |  | Channels TLV. The CRC shall be |
|  |  | appended at the end of each sub- |
|  |  | burst regardless of the ACK disable |
|  |  | bit. |
|  |  |  |
| If (MU indicator == 0) { | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Dedicated MIMO DL Control Indicator == 1) { | — | — |
|  |  |  |
| **Dedicated MIMO DL Control IE ()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Duration** | 10 | — |
|  |  |  |
| For (*i* = 0; *i* < N\_layer; *i*++) { | — | — |
|  |  |  |
| if (MU indicator == 1) { | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| If (ACK Disable == 0) { | — | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| **SPID** | 2 | — |
|  |  |  |
| } | — | — |
|  |  |  |

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**Table 8-149—MIMO DL IR HARQ for CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| *Padding* | *variable* | Padding to nibble; shall be set to 0. |
|  |  |  |
| } | — | — |
|  |  |  |

**Table 8-150—MIMO DL STC HARQ Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| MIMO\_DL\_STC\_HARQ\_sub-burst\_IE() { | — | — |
|  |  |  |
| **N sub-burst** | 4 | “Number of sub-bursts” in the 2D region |
|  |  | is this field value plus 1 |
|  |  |  |
| **N ACK channel** | 6 | Number of HARQ ACK enabled sub- |
|  |  | bursts in the 2D region |
|  |  |  |
| For (*j* = 0; *j* < Number of sub-bursts; *j*++){ | — | — |
|  |  |  |
| **Tx count** | 2 | 0b00: initial transmission |
|  |  | 0b01: odd retransmission |
|  |  | 0b10: even retransmission |
|  |  | 0b11: *Reserved* |
|  |  |  |
| **Duration** | 10 | — |
|  |  |  |
| **Sub-burst offset indication** | 1 | Indicates the inclusion of sub-burst offset |
|  |  |  |
| *Reserved* | 3 | — |
|  |  |  |
| If (Sub-burst offset indication == 1) { | — | — |
|  |  |  |
| **Sub-burst offset** | 8 | Offset in slots with respect to the previous |
|  |  | sub-burst defined in this data region. If |
|  |  | this is the first sub-burst within the data |
|  |  | region, this offset is with respect to slot 0 |
|  |  | of the data region. |
|  |  |  |
| } | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |

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**Table 8-150—MIMO DL STC HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **ACK Disable** | 1 | When ACK Disable == 1, the allocated |
|  |  | sub-burst does not require an ACK to be |
|  |  | transmitted by the SS in the ACKCH |
|  |  | Region (see 8.4.5.4.53). In this case, no |
|  |  | ACK channel is allocated for the sub- |
|  |  | burst in the ACKCH Region. For TDD |
|  |  | SS, for the burst, BS shall not perform |
|  |  | HARQ retransmission and MS shall |
|  |  | ignore ACID, AI\_SN and SPID, which |
|  |  | shall be set to 0 by BS if they exist. For |
|  |  | FDD SS, for the burst, BS shall not |
|  |  | perform HARQ retransmission and MS |
|  |  | shall ignore AI\_SN and SPID, which |
|  |  | shall be set to 0 by BS if they exist. For |
|  |  | FDD SS, the BS may set the ACID to a |
|  |  | value other than 0 if that ACID is listed in |
|  |  | the Aggregated HARQ Channels TLV. |
|  |  | The CRC shall be appended at the end of |
|  |  | each sub-burst regardless of the ACK |
|  |  | disable bit. |
|  |  |  |
| if (Tx count == 00) { | — | — |
|  |  |  |
| **Dedicated MIMO DL Control Indicator** | 1 | — |
|  |  |  |
| If (Dedicated MIMO DL Control Indicator == 1) { | — | — |
|  |  |  |
| **Dedicated MIMO DL Control IE ()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| } | — | — |
|  |  |  |
| If (ACK Disable == 0) { | — | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| *Padding* | *variable* | Padding to nibble; shall be set to 0 |
|  |  |  |
| } | — | — |
|  |  |  |

When the Rectangular sub-burst Indication field is set, this indicates that all sub-burst allocations are time-first rectangular allocations that are “Duration” number of subchannels x “Number of Symbols.” When this indicator is set, the “Duration” field specified in the sub-burst IE indicates the number of sub-channels for each rectangular allocation. The time duration of all rectangular allocations is always “Number of Symbols” defined in the HARQ\_DL\_MAP\_IE(). Each sub-burst is separately encoded. This rectangular indicator bit is

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only valid for AMC allocations and all allocations with dedicated pilots. When this field is clear, sub-bursts shall be allocated in frequency-first manner and the duration field reverts to the default operation.

This IE is used to support the STC subpacket retransmission.

**8.4.5.3.21.1 Dedicated MIMO DL Control IE format**

Dedicated DL Control IE for MIMO contains additional control information for each sub-burst. Because each sub-burst may have its own control information format dependent on the MS capability, the length of the Dedicated DL Control IE for MIMO is variable. (See Table 8-151.)

**Table 8-151—Dedicated MIMO DL Control IE format**

|  |  |  |  |
| --- | --- | --- | --- |
| **Syntax** | **Size** |  | **Notes** |
| **(bit)** |  |
|  |  |  |
|  |  |  |  |
| Dedicated\_MIMO\_DL\_Control\_IE() { | — | — |  |
|  |  |  | |
| **Length** | 5 | Length of control information in Nibbles, | |
|  |  | including this field | |
|  |  |  | |
| **Control header** | 3 | Bit 0: MIMO Control Info | |
|  |  | Bit 1: CQI Control Info | |
|  |  | Bit 2: Closed MIMO Control Info | |
|  |  |  | |
| **N\_layer** | 2 | Number of coding/modulation layers | |
|  |  | 0b00 | = 1 layer |
|  |  | 0b01 | = 2 layers |
|  |  | 0b10 | = 3 layers |
|  |  | 0b11 = 4 layers | |
|  |  |  |  |
| if( MIMO Control Info == 1){ | — | — |  |
|  |  |  | |
| **Matrix** | 2 | Indicates transmission matrix (See 8.4.8) | |
|  |  | 0b00 | = Matrix A |
|  |  | 0b01 | = Matrix B |
|  |  | 0b10 | = Matrix C |
|  |  | 0b11 = Codebook | |
|  |  |  | |
| if (Dedicated Pilots == 1) { | — | Dedicated Pilots field in STC\_Zone\_IE() | |
|  |  |  | |
| **Num\_Streams** | 2 | Indicates the number of beamformed streams | |
|  |  | which is equal to the number of pilot patterns | |
|  |  | 0b00 | = 1 stream |
|  |  | 0b01 | = 2 streams |
|  |  | 0b10 | = 3 streams |
|  |  | 0b11 = 4 streams | |
|  |  |  |  |
| } | — | — |  |
|  |  |  |  |
| } | — | — |  |
|  |  |  |  |
| If( CQICH Control Info == 1){ | — | — |  |
|  |  |  | |
| **Period** | 3 | Period (in frame) = 2 period | |
|  |  |  |  |
| **Frame offset** | 3 | — |  |
|  |  |  | |
| **Duration** | 4 | A CQI feedback is transmitted on the CQI | |
|  |  | channels indexed by the Allocation index for | |
|  |  | 10 × 2d frames | |
| For (*j* = 0; N\_layer + 1; *j*++) { | — | — |  |
|  |  |  | |
| **Allocation index1** | 6 | Index to CQICH assigned to this layer | |

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**Table 8-151—Dedicated MIMO DL Control IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **CQICH\_Num** | 2 | Number of additional CQICHs assigned to |
|  |  | this SS (0–3) |
|  |  |  |
| for (*i* = 0; *i* < CQICH\_Num; *i*++) { | — | — |
|  |  |  |
| **Feedback type** | 3 | Type of feedback on this CQICH |
|  |  |  |
| **Allocation index** | 6 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if (Closed MIMO Control Info == 1){ | — | — |
|  |  |  |
| if (MIMO Control Info == 1) { | — | — |
|  |  |  |
| **MIMO mode = Matrix** | — |  |
|  |  |  |
| } Else { | — | — |
|  |  |  |
| **MIMO mode = Matrix in STC\_Zone\_IE()** | — |  |
|  |  |  |
| } | — | — |
|  |  |  |
| If (MIMO mode == 00 or 01) { | — | — |
|  |  |  |
| **Antenna Grouping Index** | 3 | Indicates the index of antenna grouping. See |
|  |  | 8.4.8.3.4 and 8.4.8.3.5 |
|  |  | If((Matrix\_indicator == 00) |
|  |  | 000~010 = 0b101110~0b110000 in |
|  |  | Table 8-67 |
|  |  | else |
|  |  | 000~101 = 0b110001~0b110110 in |
|  |  | Table 8-67 |
|  |  |  |
| } elseif (MIMO mode == 10) { | — | — |
|  |  |  |
| **Num\_stream** | 2 | Indicates the number of streams in Table 8- |
|  |  | 16 for 3 Tx and Table 8-17 for 4 Tx |
|  |  |  |
| **Antenna Selection Index** | 3 | Indicates the index of antenna selection. See |
|  |  | 8.4.8.3.4 and 8.4.8.3.5 |
|  |  | 000 ~ 110 = 0b110000 ~ 0b110101 in |
|  |  | Table 8-65 |
|  |  |  |
| } elseif (MIMO mode == 11) { | — | — |
|  |  |  |
| **Num\_stream** | 2 | Indicates number of streams |
|  |  |  |
| **Codebook Precoding Index** | 6 | Indicates the index of precoding matrix W in |
|  |  | the codebook (see 8.4.8.3.6) |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to Nibble; shall be set to 0 |
|  |  |  |
| } | — | — |
|  |  |  |

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**Control header**

Four bits are used to indicate the following control information. If the first bit is set to 1, this means that MIMO Control information follows. If the second bit is set to 1, this IE shall contain CQI control information. Other bits are reserved for future extension. CQICH Control Info=1 shall be used only if MU indicator (as defined in Table 8-149)equals zero.

**N\_layer**

Specifies the number of layers contained in this burst. The layer is defined as a separate coding/ modulation path.

**Matrix Indicator**

This field indicates MIMO matrix for the burst. For all single stream allocations with dedicated pilots (Dedicated Pilots = 1 and Num\_Streams = 1), Matrix indicator field shall be set to 0b11.

**Period**

Informs the SS of the period of CQI reports. A CQI feedback is transmitted on the CQICH every 2p frames.

**Frame Offset**

Informs the SS when to start transmitting reports. The SS starts reporting at the frame number which has the same 3 LSBs as the specified Frame Offset. If the current frame is specified, the SS shall start reporting in eight frames.

**Duration**

Indicates when the SS should stop reporting unless the CQICH allocation is refreshed beforehand. If Duration is set to 0b0000, the BS shall deallocate the CQICH. If Duration is set to 0b1111, the CQICH is allocated indefinitely and the SS should report until it receives another MAP IE with Duration set to 0b0000.

**Allocation Index1**

Indicates position from the start of the CQICH region.

**Feedback Type**

Indicates the type of feedback content on the allocated CQICH from SS. Its mapping shall be 0b000 = Fast DL measurement/Default Feedback with antenna grouping

0b001 = Fast DL measurement/Default Feedback with antenna selection

0b010 = Fast DL measurement/Default Feedback with reduced codebook

0b011 = Quantized precoding weight feedback

0b100 = Index to precoding matrix in codebook

0b101 = Channel Matrix Information 0b110–0b111 = *Reserved*

**8.4.5.3.22 DL HARQ ACK IE**

The DL HARQ ACK IE is used by BS to send HARQ acknowledgment to UL HARQ-enabled traffic. The bit position in the bitmap is determined by the order of the HARQ-enabled UL bursts in the UL-MAP. The frame offset *j* between the UL burst and the HARQ ACK-BITMAP is specified by “HARQ\_ACK\_Delay\_for UL Burst” field in the DCD message. For example, when an MS transmits a HARQ-enabled burst at frame i and the burst is the *n*-th HARQ-enabled burst in the MAP, the MS should receive HARQ ACK at *n*-th bit of the BITMAP which is sent by the BS at frame (*i+j*).

The existence of this IE shall be optional.

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If the HARQ ACK BITMAP is omitted, the HARQ MS should retain the transmitted HARQ burst and retransmit it when the BS request retransmission with AI\_SN. This IE may only exist in the DL-MAP message or the compressed DL-MAP message. (See Table 8-152.)

**Table 8-152—HARQ \_ACK IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| HARQ\_ACK\_IE() { | — | — |
|  |  |  |
| **Extended-2 DIUC** | 4 | HARQ\_ACK\_IE() = 0x8 |
|  |  |  |
| **Length** | 8 | Length in bytes |
|  |  |  |
| **Bitmap** | *variable* | Bitmap size is determined by Length field |
|  |  |  |
| } | — | — |
|  |  |  |

**Bitmap**

Includes HARQ ACK information for HARQ-enabled UL bursts. The size of the BITMAP shall be equal or larger than the number of HARQ-enabled UL bursts. Each byte carries 8 ACK indications ordered from LSB (smallest index ACK channel) to MSB. An acknowledgment bit shall be 0 (ACK) if the corresponding UL packet has been successfully received; otherwise, it shall be 1 (NAK).

**8.4.5.3.23 Enhanced DL MAP IE**

The Enhanced DL Map IE may be used for BS to indicate to the MS the DL resource allocation based on the channel definition specified in the DL channel definition TLV in the DCD. (See Table 8-153.)

**Table 8-153—Enhanced DL MAP IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Enhanced\_DL\_MAP\_IE() { | — | — |
|  |  |  |
| **Extended-2 DIUC** | 4 | Enhanced\_DL\_MAP\_IE() = 0x9 |
|  |  |  |
| **Length** | 8 | Length in bytes |
|  |  |  |
| **Num\_Assignment** | 4 | Number of assignments in this IE |
|  |  |  |
| For (*i* = 0; *i* < Num\_Assignment; *i*++) { | — | — |
|  |  |  |
| if (INC\_CID == 1) { | — | The DL-MAP starts with INC\_CID = 0. |
|  |  | INC\_CID is toggled between 0 and 1 by the |
|  |  | CID\_SWITCH\_IE() (8.4.5.3.7) |
|  |  |  |
| **N\_CID** | 8 | Number of CIDs |
|  |  |  |
| For (*n* = 0; *n* < N\_CID; *n*++) { | — | — |
|  |  |  |
| **CID** | 16 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

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**Table 8-153—Enhanced DL MAP IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Boosting** | 3 | Refer to Table 8-114 |
|  |  |  |
| **Repetition Coding Indication** | 2 | — |
|  |  |  |
| **Region\_ID** | 8 | Index to the DL region defined in DL |
|  |  | channel definition TLV in DCD |
|  |  |  |
| *Reserved* | 3 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |
| *Padding* | *variable* | Shall be set to zero. The size shall be 4 bits |
|  |  | for even-numbered Num Assignments and 0 |
|  |  | bits for odd-numbered Num Assignments. |
|  |  |  |
| } | — | — |
|  |  |  |

**Num\_Assignment**

Number of assignments in this IE

**Region\_ID**

Index to the DL region defined in DL channel definition TLV in DCD message

**8.4.5.3.24 Closed-loop MIMO DL enhanced IE format**

The Closed-loop MIMO DL enhanced IE may be used by BS to assign resource to close loop MIMO enabled MSs. (See Table 8-154.)

**Table 8-154—Closed-Loop MIMO DL Enhanced IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| CL\_MIMO\_DL\_Enhanced\_IE() { | — | — |
|  |  |  |
| **Extended-2 DIUC** | 4 | CL\_MIMO\_DL\_Enhanced\_IE() = 0xA |
|  |  |  |
| **Length** | 8 | Length in bytes |
|  |  |  |
| **Num\_Region** | 4 | — |
|  |  |  |
| for ( *i* = 0; *i* < Num\_Region; *i*++) { | — | — |
|  |  |  |
| **OFDMA Symbol offset** | 8 | — |
|  |  |  |
| **Subchannel offset** | 6 | — |
|  |  |  |
| **Boosting** | 3 | Refer to Table 8-114 |
|  |  |  |
| **No. OFDMA Symbols** | 7 | — |
|  |  |  |
| **No. subchannels** | 6 | — |
|  |  |  |

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**Table 8-154—Closed-Loop MIMO DL Enhanced IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Matrix\_indicator** | 2 | Indicates transmission matrix (see 8.4.8) |
|  |  | 0b00 = Matrix A (Transmission diversity) |
|  |  | 0b01 = Matrix B (Hybrid Scheme) |
|  |  | 0b10 = Matrix C (Spatial Multiplexing) |
|  |  | 0b11 = Codebook |
|  |  |  |
| if ( Matrix\_indicator != 0b10) { | — | — |
|  |  |  |
| **RCID\_IE** | *variable* | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition\_Coding\_indication** | 2 | — |
|  |  |  |
| If (Matrix indicator == 0b00 or | — | — |
| 0b01) |  |  |
|  |  |  |
| **Antenna Grouping Index** | 3 | Indicating the index of the antenna grouping index |
|  |  | If ((Matrix\_indicator == 0b00) |
|  |  | 0b000~0b010 = 0b101110~0b110000 in Table 8-67 |
|  |  | else |
|  |  | 0b000~0b101 = 0b110001~0b110110 in Table 8-67 |
|  |  |  |
| *Reserved* | 3 | Shall be set to zero. |
|  |  |  |
| Elseif (Matrix\_indicator == 0b11) | — | — |
| { |  |  |
|  |  |  |
| **Num stream** | 2 | Indicates number of streams |
|  |  |  |
| **Codebook Precoding Index** | 6 | Indicate the index of the precoding matrix in the |
|  |  | codebook |
|  |  |  |
| *Reserved* | 2 | Shall be set to zero |
|  |  |  |
| }Else { | — | — |
|  |  |  |
| **Num\_MS** | 2 | Number of MSs who are assigned DL resource when |
|  |  | antenna selection is used |
|  |  |  |
| *Reserved* | 2 | Shall be set to zero |
|  |  |  |
| for (*i* = 0; *i* < Num\_MS; *i*++) { | — | — |
|  |  |  |
| **RCID\_IE** | *variable* | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition\_Coding\_indication** | 2 | — |
|  |  |  |
| **Num\_stream** | 2 | Indicates the number of streams in |
|  |  | Table 8-16 for 3 Tx antenna and |
|  |  | Table 8-17 for 4 Tx antenna |
|  |  |  |
| **Antenna Selection index** | 3 | Indicates the index of antenna selection |
|  |  | See 8.4.8.3.4 and 8.4.8.3.5 |
|  |  | 0b000~0b010 = 0b110000~0b110010 in Table 8-16 |
|  |  | 0b000~0b101 = 0b110000~0b110101 in Table 8-17 |
|  |  |  |
| *Reserved* | 1 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

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**Table 8-154—Closed-Loop MIMO DL Enhanced IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to byte; shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

**Num\_Region**

A field that indicates the number of the regions defined by OFDMA\_Symbol\_offset, Subchannel\_offset, Boosting, No.\_OFDMA\_Symbols and No.\_subchannels in this IE

**Matrix\_indicator**

The values of these 2 bits indicate the STC matrix (see 8.4.8)

**Antenna Grouping Index**

A field that indicates the index of the antenna grouping index

**Antenna Selection Index**

A field that indicates the index of the selected antenna

**Codebook Precoding Index**

A field that indicates the index of the precoding matrix in the codebook

**Num\_stream**

The value of these 2 bits plus one indicate the number of MIMO transmission streams

**Stream\_index**

A field that specifies the stream index

**8.4.5.3.25 Broadcast Control Pointer IE**

The structure of this IE is captured in Table 8-155.

**Table 8-155—Broadcast Control Pointer IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Broadcast\_Control\_Pointer\_IE() { | — | — |
|  |  |  |
| **Extended DIUC** | 4 | Broadcast\_Control\_Pointer\_IE() = 0xA |
|  |  |  |
| **Length** | 4 | Length in bytes |
|  |  |  |
| **DCD\_UCD Transmission Frame** | 7 | The most significant bits of the frame |
|  |  | number’s least 9 significant bits of the next |
|  |  | DCD and/or UCD transmission |
|  |  |  |
| **Skip Broadcast\_System\_Update** | 1 | — |
|  |  |  |
| If (Skip Broadcast\_System\_Update == 0) { | — | — |
|  |  |  |
| **Broadcast\_System\_Update\_Type** | 1 | Shows the type of Broadcast\_System\_Update |
|  |  | 0: For MOB\_NBR-ADV Update |
|  |  | 1: For Emergency Alert Services Message |
|  |  |  |

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**Table 8-155—Broadcast Control Pointer IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Broadcast\_System\_Update\_Transmis-** | 7 | The least significant bits of the frame number |
| **sion\_Frame** |  | of the next Broadcast\_System\_Update |
|  |  | transmission |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.3.26 AAS SDMA DL IE format**

The format for AAS SDMA DL IE is captured in Table 8-156.

**Table 8-156—AAS SDMA DL IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| AAS\_SDMA\_DL\_IE(){ | — | — |
|  |  |  |
| **Extended-2 DIUC** | 4 | AAS\_SDMA\_DL\_IE() = 0xE |
|  |  |  |
| **Length** | 8 | *variable* |
|  |  |  |
| **RCID\_Type** | 2 | 0b00 = Normal CID |
|  |  | 0b01 = RCID11 |
|  |  | 0b10 = RCID7 |
|  |  | 0b11 = RCID3 |
|  |  |  |
| **Num Burst Region** | 4 | — |
|  |  |  |
| *Reserved* | 2 | Shall be set to zero |
|  |  |  |
| For (ii = 1: Num Region) { | — | — |
|  |  |  |
| **OFDMA symbol offset** | 8 | Starting symbol offset referenced to DL |
|  |  | preamble of the DL frame specified by the |
|  |  | Frame Offset |
|  |  |  |
| If (Zone Permutation is AMC, TUSC1, | — | — |
| or TUSC2) { |  |  |
|  |  |  |
| **Subchannel offset** | 8 | — |
|  |  |  |
| **No. OFDMA triple symbols** | 5 | Number of OFDMA symbols is given in |
|  |  | multiples of 3 |
|  |  |  |
| **No. subchannels** | 6 | — |
|  |  |  |
| } Else { | — | — |
|  |  |  |
| **Subchannel offset** | 6 | — |
|  |  |  |
| **No. OFDMA symbols** | 7 | — |
|  |  |  |
| **No. subchannels** | 6 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Number of Users** | 3 | SDMA users for the assigned region |
|  |  |  |
| *Reserved* | 2 | Shall be set to zero |
|  |  |  |
| For (jj = 1: Num\_Users) { | — | — |
|  |  |  |

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**Table 8-156—AAS SDMA DL IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| **Encoding Mode** | 2 | 0b00: No HARQ |
|  |  | 0b01: HARQ Chase Combining |
|  |  | 0b10: HARQ Incremental Redundancy |
|  |  | 0b11: HARQ Conv. Code Incremental |
|  |  | Redundancy |
|  |  |  |
| **CQICH Allocation** | 1 | 0: Not included |
|  |  | 1: Included |
|  |  |  |
| **ACKCH Allocation** | 1 | 0: Not included |
|  |  | 1: Optionally included for HARQ users |
|  |  |  |
| **Pilot Pattern Modifier** | 1 | 0: Not applied |
|  |  | 1: Applied |
|  |  | Shall be set to 0 if PUSC AAS zone |
|  |  |  |
| If (AAS DL Preamble Used) { | — | — |
|  |  |  |
| **Preamble Modifier Index** | 4 | Preamble Modifier Index |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Pilot Pattern Modifier) { | — | — |
|  |  |  |
| **Pilot Pattern** | 2 | See 8.4.6.3.3 (AMC), 8.4.6.1.2.6 (TUSC) |
|  |  | 0b00: Pattern #A |
|  |  | 0b01: Pattern #B |
|  |  | 0b10: Pattern #C |
|  |  | 0b11: Pattern #D |
|  |  |  |
| *Reserved* | 1 | Shall be set to zero |
|  |  |  |
| } Else { | — | — |
|  |  |  |
| *Reserved* | 3 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Encoding Mode == 00) { | — | No HARQ |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00: No repetition |
|  |  | 0b01: Repetition of 2 |
|  |  | 0b10: Repetition of 4 |
|  |  | 0b11: Repetition of 6 |
|  |  |  |
| *Reserved* | 2 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Encoding Mode == 01) { | — | HARQ Chase Combining |
|  |  |  |
| If (ACKCH Allocation) { | — | — |
|  |  |  |
| **ACK CH Index** | 5 | — |
|  |  |  |
| } Else { | — | — |
|  |  |  |
| *Reserved* | 1 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00: No repetition |
|  |  | 0b01: Repetition of 2 |
|  |  | 0b10: Repetition of 4 |
|  |  | 0b11: Repetition of 6 |
|  |  |  |

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**Table 8-156—AAS SDMA DL IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Encoding Mode == 10) { | — | HARQ Incremental Redundancy |
|  |  |  |
| If (ACKCH Allocation) { | — | — |
|  |  |  |
| **ACK CH Index** | 5 | See DL Ack channel index in 8.4.5.4.53 |
|  |  |  |
| } Else { | — | — |
|  |  |  |
| *Reserved* | 1 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |
| **NEP** | 4 | — |
| **NSCH** | 4 | Indicator for the number of first slots used for |
|  |  | data encoding in this SDMA allocation |
|  |  | region |
|  |  |  |
| **SPID** | 2 | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Encoding Mode == 11) { | — | HARQ Conv. Code Incremental Redundancy |
|  |  |  |
| If (ACKCH Allocation) { | — | — |
|  |  |  |
| **ACK CH Index** | 5 | See DL Ack channel index in 8.4.5.4.52 |
|  |  |  |
| *Reserved* | 2 | Shall be set to zero |
|  |  |  |
| } Else { | — | — |
|  |  |  |
| *Reserved* | 3 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00: No repetition |
|  |  | 0b01: Repetition of 2 |
|  |  | 0b10: Repetition of 4 |
|  |  | 0b11: Repetition of 6 |
|  |  |  |
| **SPID** | 2 | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| If (CQICH Allocation Included) { | — | — |
|  |  |  |
| **Allocation Index** | 6 | Index to the channel in a frame the CQI |
|  |  | report should be transmitted by the SS |
|  |  |  |
| **Period (p)** | 3 | A CQI feedback is transmitted on the CQI |
|  |  | channels indexed by the (CQI Channel |
|  |  | Index) by the SS in every 2p frames |

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**Table 8-156—AAS SDMA DL IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Frame offset** | 3 | The MS starts reporting at the frame of which |
|  |  | the number has the same 3 LSB as the |
|  |  | specified frame offset. If the current frame is |
|  |  | specified, the MS should start reporting in |
|  |  | eight frames |
|  |  |  |
| **Duration (d)** | 4 | A CQI feedback is transmitted on the CQI |
|  |  | channels indexed by the (CQI Channel |
|  |  | Index) by the SS for 2(d–1) frames. If d is |
|  |  | 0b0000, the CQICH is deallocated. If d is |
|  |  | 0b1111, the MS should report until the BS |
|  |  | command for the MS to stop. |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | End of User loop |
|  |  |  |
| } | — | End of Burst Region Loop |
|  |  |  |
| **Padding** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |

In an AAS zone with PUSC permutation, all AAS SDMA DL IEs that define allocations in a given major group shall contain the same value for the Number of Users field. In AAS zone with PUSC, user #*n* uses the pilot pattern as defined for antenna #*n* in 8.4.8.

**8.4.5.3.27 PUSC ASCA Allocation IE**

In the DL-MAP, a BS may transmit DIUC = 15 with the PUSC\_ASCA\_Alloc\_IE() to indicate that data is transmitted to a PUSC-ASCA supporting MS using the PUSC-ASCA permutation. (See Table 8-157.)

**Table 8-157—PUSC ASCA Allocation IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| PUSC\_ASCA\_Alloc\_IE() { | — | — |
|  |  |  |
| **Extended DIUC** | 4 | PUSC ASCA allocate IE() = 0xC |
|  |  |  |
| **Length** | 4 | Length = 0x7 |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Short Basic CID** | 12 | 12 LSBs of the Basic CID |
|  |  |  |
| **OFDMA Symbol offset** | 8 | — |
|  |  |  |
| **Subchannel offset** | 6 | — |
|  |  |  |
| **No. OFDMA Symbols** | 7 | — |
|  |  |  |
| **No. Subchannels** | 6 | — |
|  |  |  |
| **Repetition Coding Information** | 2 | 0b00 = No repetition coding |
|  |  | 0b01 = Repetition coding of 2 used |
|  |  | 0b10 = Repetition coding of 4 used |
|  |  | 0b11 = Repetition coding of 6 used |
|  |  |  |
| **Permutation ID** | 4 | — |
|  |  |  |

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**Table 8-157—PUSC ASCA Allocation IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| *Reserved* | 7 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

**DIUC**

DIUC used for the burst.

**Short Basic CID**

Twelve LSBs of the Basic CID.

**OFDMA Symbol offset**

The offset of the OFDMA symbol in which the burst starts, measured in OFDMA symbols from beginning of the DL frame in which the DL-MAP is transmitted.

**Subchannel offset**

The lowest index OFDMA subchannel used for carrying the burst, starting from subchannel 0.

**No. OFDMA Symbols**

The number of OFDMA symbols that are used (fully or partially) to carry the DL PHY Burst.

**No. of subchannels**

The number of subchannels with subsequent indexes, used to carry the burst.

**Repetition coding Indication**

Indicates the repetition code used inside the allocated burst.

**Permutation ID**

Identifies the PUSC ASCA permutation used to carry the burst.

**8.4.5.3.28 H-FDD Group Switch IE**

In FDD, for H-FDD MS, H-FDD Group Switch IE, as shown in Table 8-158, may be used by the BS to signal one or more MS to switch H-FDD groups.

**Table 8-158—H-FDD Group Switch IE Format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| H-FDD\_Group\_Switch\_IE() { | — | — |
|  |  |  |
| **Extended DIUC** | 4 | H-FDD Group Switch IE() = 0xD |
|  |  |  |
| **Length** | 4 | — |
|  |  |  |
| **RCID\_Type** | 2 | 0b00: Normal CID |
|  |  | 0b01: RCID11 |
|  |  | 0b10: RCID7 |
|  |  | 0b11: RCID3 |
|  |  |  |
| While (data remains) { | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| **Group Indicator** | 1 | Indicates the group assignment of the MS (see 8.4.4.2 |
|  |  | for FDD frame structure and group definition) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| **CQICH Allocation Included** | 1 | 0b0: CQICH Allocation not included |
|  |  | 0b1: CQICH Allocation included |
|  |  |  |

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**Table 8-158—H-FDD Group Switch IE Format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| if (CQICH Allocation | — | — |
| Included==1) { |  |  |
|  |  |  |
| **Allocation Index** | 6 | Index to the channel in a frame the CQI code should be |
|  |  | transmitted by the SS |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to byte; shall be set to 0 |
|  |  |  |
| } | — | — |
|  |  |  |

**Group Indicator**

The MS shall compare the Group Indicator field to its current H-FDD group index and if the values are not identical, the MS shall switch to the group as indicated by the Group Indicator field (see 8.4.4.2.1)

**CQICH Allocation Included**

If the CQICH Allocation Included field is set to 1, the MS shall respond with an acknowledgment of the group change, using the assigned CQICH channel indexed by the Allocation Index (see 8.4.4.2.1)

**8.4.5.3.29 Persistent HARQ DL MAP Allocation IE**

Downlink persistent allocations are used by the BS to make downlink time-frequency resource assignments which repeat periodically. The logical time-frequency resource assigned using the Persistent HARQ DL MAP IE repeats at a periodic interval. For downlink persistent allocations, the BS transmits the Persistent HARQ DL MAP IE, with the mode field set to one of the following values:

— 0b0000: Persistent DL Chase HARQ

— 0b0001: Persistent DL Incremental redundancy HARQ for CTC

— 0b0010: Persistent DL Incremental redundancy HARQ for Convolutional Code

— 0b0011: Persistent MIMO DL Chase HARQ

— 0b0100: Persistent MIMO DL IR HARQ

— 0b0101: Persistent MIMO DL IR HARQ for Convolutional Code

— 0b0110: Persistent MIMO DL STC HARQ

— 0b0111: HR Multicast DL sub-burst

The Persistent HARQ DL MAP IE may be used for non persistent allocations by setting the persistent flag in the sub-burst IE to 0.

**Table 8-159—Persistent HARQ DL MAP allocation IE**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Persistent\_HARQ\_DL\_MAP\_IE() { | — | — |
|  |  |  |
| **Extended-2 DIUC** | 4 | Persistent\_HARQ\_DL\_MAP\_IE = 0xD |
|  |  |  |
| **Length** | 8 | Length in bytes |
|  |  |  |

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**Table 8-159—Persistent HARQ DL MAP allocation IE *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **RCID\_Type** | 2 | 0b00: Normal CID |
|  |  | 0b01: RCID11 |
|  |  | 0b10: RCID7 |
|  |  | 0b11: RCID3 |
|  |  | For HR Multicast, RCID\_Type is set to 0b00 and |
|  |  | Normal CID is replaced by HR Multicast Group ID |
|  |  |  |
| **ACK Region Index** | 1 | The index of the ACK region associated with all sub- |
|  |  | bursts (except HR multicast DL burst) defined in this |
|  |  | Persistent HARQ DL MAP (FDD/H-FDD only) |
|  |  |  |
| while (data\_remains){ | — | — |
|  |  |  |
| **Region ID use indicator** | 1 | 0: Region ID not used |
|  |  | 1: Region ID used |
|  |  |  |
| **Persistent Region ID** | 5 | — |
|  |  |  |
| **Change Indicator** | 1 | 0: No change occurred |
|  |  | 1: Change occurred |
|  |  |  |
| if (Region ID use indicator == 0){ | — | — |
|  |  |  |
| **OFDMA Symbol offset** | 8 | Offset from the start of DL subframe |
|  |  |  |
| **Subchannel offset** | 7 | — |
|  |  |  |
| **Number of OFDMA symbols** | 7 | — |
|  |  |  |
| **Number of subchannels** | 7 | — |
|  |  |  |
| **Rectangular sub-burst** | 1 | Indicates sub-burst allocations are time-first |
| **indication** |  | rectangular. The duration field in each sub-burst IE |
|  |  | specifies the number of subchannels for each |
|  |  | rectangular allocation. The slot offset field in each sub- |
|  |  | burst IE specifies the subchannel offset from the first |
|  |  | subchannel for each rectangular allocation. When this |
|  |  | field is clear, sub-bursts shall be allocated in frequency- |
|  |  | first manner and the duration field reverts to the default |
|  |  | operation |
|  |  |  |
| } | — | — |
|  |  |  |
| else{ | — | — |
|  |  |  |
| **Region ID** | 8 | Index to the DL region defined in DL region definition |
|  |  | TLV in DCD |
|  |  |  |
| } | — | — |
|  |  |  |
| **Power boost per sub-burst** | 1 | Set to 1 to signal power boost per sub-burst. This field |
|  |  | shall be set to 0 if Rectangular sub-burst indication is |
|  |  | set to 0 |
|  |  |  |
| if (Power boost per sub-burst == 0){ | — | — |
|  |  |  |

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**Table 8-159—Persistent HARQ DL MAP allocation IE *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Boosting** | 3 | 0b000: Normal (not boosted) |
|  |  | 0b001: +6 dB |
|  |  | 0b010: –6 dB |
|  |  | 0b011: +9 dB |
|  |  | 0b100: +3 dB |
|  |  | 0b101: –3 dB |
|  |  | 0b110: –9 dB |
|  |  | 0b111: –12 dB |
|  |  | Note that if the Persistent flag is set, the boosting value |
|  |  | applies to each allocation instance of the persistent |
|  |  | allocation |
|  |  |  |
| } | — | — |
|  |  |  |
| **Mode** | 4 | Indicates the mode in this HARQ region |
|  |  | 0b0000: Persistent DL Chase HARQ |
|  |  | 0b0001: Persistent DL Incremental redundancy HARQ |
|  |  | for CTC |
|  |  | 0b0010: Persistent DL Incremental redundancy HARQ |
|  |  | for Convolutional Code |
|  |  | 0b0011: Persistent MIMO DL Chase HARQ |
|  |  | 0b0100: Persistent MIMO DL IR HARQ |
|  |  | 0b0101: Persistent MIMO DL IR HARQ for |
|  |  | Convolutional Code |
|  |  | 0b0110: Persistent MIMO DL STC HARQ |
|  |  | 0b0111: HR Multicast DL sub-burst |
|  |  | 0b1000 to 0b1111: *Reserved* |
|  |  |  |
| **Sub-burst IE Length** | 8 | Length, in nibbles, to indicate the size of the sub-burst |
|  |  | IE in this HARQ mode. The MS may skip DL HARQ |
|  |  | Sub-burst IE if it does not support the HARQ mode. |
|  |  | However, the MS shall decode NACK Channel field |
|  |  | from each DL HARQ Sub-burst IE to determine the UL |
|  |  | ACK channel it shall use for its DL HARQ burst |
|  |  |  |
| if( Mode == 0b0000){ | — | — |
|  |  |  |
| **Persistent DL Chase HARQ** | *variable* | — |
| **sub-burst IE** |  |  |
|  |  |  |
| } elseif (Mode == 0b0001){ | — | — |
|  |  |  |
| **Persistent DL Incremental** | *variable* | — |
| **redundancy HARQ for CTC** |  |  |
| **sub-burst IE** |  |  |
|  |  |  |
| } elseif (Mode == 0b0010){ | — | — |
|  |  |  |
| **Persistent DL Incremental** | *variable* | — |
| **redundancy HARQ for Convo-** |  |  |
| **lutional Code** |  |  |
|  |  |  |
| } elseif (Mode == 0b0011){ | — | — |
|  |  |  |
| **Persistent MIMO DL Chase** | *variable* | — |
| **HARQ** |  |  |
|  |  |  |
| } elseif (Mode == 0b0100){ | — | — |
|  |  |  |
| **Persistent MIMO DL IR** | *variable* | — |
| **HARQ** |  |  |
|  |  |  |

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**Table 8-159—Persistent HARQ DL MAP allocation IE *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } else if (Mode == 0b0101){ | — | — |
|  |  |  |
| **Persistent MIMO DL IR** | *variable* | — |
| **HARQ for Convolutional Code** |  |  |
|  |  |  |
| } else if (Mode == 0b0110){ | — | — |
|  |  |  |
| **Persistent MIMO DL STC** | *variable* | — |
| **HARQ** |  |  |
|  |  |  |
| **}** else if (Mode == 0b0111){ | — | — |
|  |  |  |
| **HR Multicast DL sub-burst IE** | *variable* | Table 16-5 |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to byte for the unspecified portion of this IE |
|  |  | (i.e., not including the first two fields, “Extended-2 |
|  |  | DIUC” and “Length”); shall be set to 0. |
|  |  |  |
| } | — | — |
|  |  |  |

**Persistent Region ID**

The identifier of specific Persistent HARQ region. The operation commanded by the IE is applied to sub-bursts in the region.

**Change Indicator**

The change indicator can be set to 0 or 1. It is used by MSs to decide if they can resume using their DL persistent allocations. See 6.3.25.4.5 for details.

**Table 8-160—Persistent DL HARQ Chase Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Persistent\_DL\_HARQ\_Chase\_Sub-burst\_IE() | — | — |
| { |  |  |
|  |  |  |
| **N sub-burst** | 4 | Number of changed sub-bursts in the 2D |
|  |  | rectangular region is this field value plus 1 |
|  |  |  |
| **Resource shifting indicator** | 1 | 0 = No Resource Shifting |
|  |  | 1 = Resource Shifting |
|  |  |  |
| for ( *j* = 0; *j* < Number of changed sub- | — | — |
| bursts; *j*++) { |  |  |
|  |  |  |
| **Allocation Flag** | 1 | 1 = allocate |
|  |  | 0 = de-allocate |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the |
|  |  | group assignment of the MS (see 8.4.4.2 and |
|  |  | 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| if( Allocation Flag == 0){ | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |

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**Table 8-160—Persistent DL HARQ Chase Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast |
|  |  | Feedback region. When MAP ACK Channel |
|  |  | Index = 0b111111, it indicates NO MAP ACK |
|  |  | channel is assigned to this de-allocation |
|  |  |  |
| if (Resource shifting indicator ==1) { | — | — |
|  |  |  |
| **Duration** | *variable* | Duration in slots. OFDMA Frame duration |
|  |  | dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in |
|  |  | OFDMA slots, with respect to the lowest |
|  |  | numbered OFDM symbol and the lowest |
|  |  | numbered subchannel in the HARQ region. |
|  |  | OFDMA Frame duration dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Retransmission Flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in |
|  |  | Relevant Frame – Allocation Period |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if( Allocation Flag == 1 ){ | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| **Persistent Flag** | 1 | 0 = Non-persistent |
|  |  | 1 = Persistent |
|  |  |  |
| if( Power boost per sub-burst == 1 ){ | — | — |
|  |  |  |
| **Boosting** | 1 | 0b000: Normal (not boosted) |
|  |  | 0b001: +6 dB |
|  |  | 0b010: –6 dB |
|  |  | 0b011: +9 dB |
|  |  | 0b100: +3 dB |
|  |  | 0b101: –3 dB |
|  |  | 0b110: –9 dB |
|  |  | 0b111: –12 dB; |
|  |  | Note that if the Persistent flag is set, the boosting |
|  |  | value applies to each instance of the persistent |
|  |  | allocation |
|  |  |  |
| } | — | — |
|  |  |  |
| **Duration Indicator** | 1 | If Duration Indicator is 1, it indicates that |
|  |  | Duration is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same |
|  |  | Duration as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if( Duration Indicator == 1 ){ | — | — |
|  |  |  |

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**Table 8-160—Persistent DL HARQ Chase Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Duration** | *variable* | Duration in slots. OFDMA Frame duration |
|  |  | dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| } |  |  |
|  |  |  |
| **Slot Offset** | *variable* | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| if( Persistent Flag == 1){ | — | — |
|  |  |  |
| **Allocation Period and N\_ACID** | 1 | If Allocation Period and N\_ACID Indicator is 1, it |
| **Indicator** |  | indicates that allocation information (allocation |
|  |  | period, Number of ACID (N\_ACID) is explicitly |
|  |  | assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same allocation period as the |
|  |  | previous sub-burst. |
|  |  | If j is 0 then this indicator shall be 1. |
|  |  |  |
| If(Allocation Period and |  |  |
| N\_ACID Indicator == 1){ |  |  |
|  |  |  |
| **Allocation Period (ap)** | 5 | Period of the persistent allocation is this field |
|  |  | value plus 1 (unit is frame) |
|  |  |  |
| **Number of ACID (N ACID)** | 3 | Number of HARQ channels associated with this |
|  |  | persistent assignment is this field value plus 1 |
|  |  |  |
| } |  |  |
|  |  |  |
| **MAP NACK Channel Index** | 6 | Index to a shared MAP NACK channel within the |
|  |  | Fast Feedback region. When MAP NACK |
|  |  | Channel Index = 0b111111, it indicates NO MAP |
|  |  | NACK channel is assigned to this allocation |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast |
|  |  | Feedback region |
|  |  |  |
| } | — | — |
|  |  |  |
| **Sub-burst DIUC indicator** | 1 | If sub-burst DIUC Indicator is 1, it indicates that |
|  |  | DIUC is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same |
|  |  | DIUC as the previous sub-burst. If j is 0 then this |
|  |  | indicator shall be 1 |
|  |  |  |
| if( Sub-burst DIUC indicator == 1 ){ | — | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00: No Repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| } | — | — |
|  |  |  |
| **ACID** | 4 | Initial value of HARQ channel identifier |
|  |  |  |
| **AI\_SN** | 1 | Initial AI\_SN for each ACID |
|  |  |  |

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**Table 8-160—Persistent DL HARQ Chase Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **ACK disable** | 1 | When ACK Disable == 1, the allocated sub-burst |
|  |  | does not require an ACK to be transmitted by the |
|  |  | SS in the ACKCH Region (see 8.4.5.4.53). In this |
|  |  | case, no ACK channel is allocated for the sub- |
|  |  | burst in the ACKCH Region. For TDD SS, for the |
|  |  | burst, BS shall not perform HARQ retransmission |
|  |  | and MS shall ignore ACID, AI\_SN and SPID, |
|  |  | which shall be set to 0 by BS if they exist. For |
|  |  | FDD SS, for the burst, BS shall not perform |
|  |  | HARQ retransmission and MS shall ignore |
|  |  | AI\_SN and SPID, which shall be set to 0 by BS if |
|  |  | they exist. For FDD SS, the BS may set the ACID |
|  |  | to a value other than 0 if that ACID is listed in the |
|  |  | Aggregated HARQ Channels TLV. The CRC shall |
|  |  | be appended at the end of each sub-burst |
|  |  | regardless of the ACK disable bit. |
|  |  |  |
| if( ACK disable == 0 ){ | — | — |
|  |  |  |
| **ACK channel** | 8 | Indicates the ACK channel to be used for this |
|  |  | sequence of sub-bursts as defined in 8.4.5.4.53 |
|  |  |  |
| } | — | — |
|  |  |  |
| **Dedicated DL control Indicator** | 2 | LSB #0 indicates inclusion of CQI control |
|  |  | LSB #1 indicates inclusion of Dedicated DL |
|  |  | Control IE. |
|  |  |  |
| if( LSB #0 of dedicated DL control | — | — |
| indicator == 1 ){ |  |  |
|  |  |  |
| **Duration (d)** | 4 | A CQI feedback is transmitted on the CQI |
|  |  | channels indexed by the (CQI Channel Index) by |
|  |  | the SS for 2(d–1) frames. If d is 0b0000, |
|  |  | deallocates all CQI feedback when the current |
|  |  | ACID is completed successfully. If d is 0b1111, |
|  |  | the MS should report until the BS command for |
|  |  | the MS to stop. |
|  |  |  |
| if( Duration != 0b0000 ){ | — | — |
|  |  |  |
| **Allocation index** | 6 | Index to the channel in a frame the CQI report |
|  |  | should be transmitted by the SS |
|  |  |  |
| **Period (p)** | 3 | A CQI feedback is transmitted on the CQI |
|  |  | channels indexed by the (CQI Channel Index) by |
|  |  | the SS in every 2p frames |
| **Frame offset** | 3 | The MS starts reporting at the frame of which the |
|  |  | number has the same 3 LSB as the specified |
|  |  | frame offset. If the current frame is specified, the |
|  |  | MS should start reporting in eight frames |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if( LSB #1 of dedicated DL control | — | — |
| indicator == 1 ){ |  |  |
|  |  |  |
| **Dedicated DL control IE()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

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**Table 8-160—Persistent DL HARQ Chase Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to nibble; shall be set to 0 |
|  |  |  |
| } | — | — |
|  |  |  |

**Allocation Flag**

The allocation flag shall be set to 1 if the sub-burst IE is allocating time-frequency resources and shall be set to 0 if the sub-burst IE is de-allocating resources.

**Resource Shifting Indicator**

If the resource shifting indicator is set to ‘1’, the MS shall shift its persistent resource position by the accumulated slots as indicated by de-allocation commands with slot offsets smaller than its own.

**Retransmission Flag**

The Retransmission Flag shall be set to 0 if the de-allocation occurs in *K*, where *K* is the current frame and shall be set to 1 if the de-allocation occurred in frame *K – allocation period*. The MS, who correctly received the DL-MAP in frame *K – allocation period*, shall ignore the deallocation command with Retransmission Flag equal to 1. The MS, who failed to receive the DL-MAP in frame *K – allocation period*, shall process the deallocation command with Retransmission Flag equal to 1.

The BS is allowed to retransmit de-allocation commands with the retransmission flag not set. This may cause the MS to receive a duplicated de-allocation command. The MS shall ignore a de-allocation command for which it does not have a corresponding persistent resource allocation.

**Persistent Flag**

The persistent flag shall be set to 1 if the assignment is persistent and shall be set to 0 if the assignment is non-persistent.

**Slot Offset**

The slot offset shall be set to the first slot in the time-frequency resource assignment with respect to the lowest numbered OFDM symbol and the lowest numbered subchannel in the HARQ region.

**Duration Indicator**

Duration Indicator flag determines whether or not Duration is specified for a sub-burst. If this flag is 1, it indicates that Duration is explicitly assigned for a sub-burst. Otherwise, the sub-burst has the same Duration as the previous sub-burst. This flag shall be 1 for the first sub-burst in a HARQ region.

**Duration**

Duration specifies the size (# slots) of an allocation/de-allocation in a HARQ region.

**Allocation Period and N\_ACID Indicator**

If Allocation Period and N\_ACID Indicator is 1, it indicates that allocation period and Number of ACID (N\_ACID) is explicitly assigned for this sub-burst. Otherwise, this sub-burst will use the same allocation period and N\_ACID as the previous sub-burst. This flag shall be 1 for the first sub-burst in a HARQ region.

**Allocation Period**

The allocation period value shall be set to (*ap*–1) where *ap* is the period of the persistent allocation, in units of frames. For example, as illustrated in Figure 8-68, if *ap*=0b00011, then the period of the persistent allocation is four frames, and the time-frequency resource assignment is valid in frames N, N + 4, N +8, etc.

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**4 frames** **4 frames** **4 frames** **4 frames**

****

**DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL**

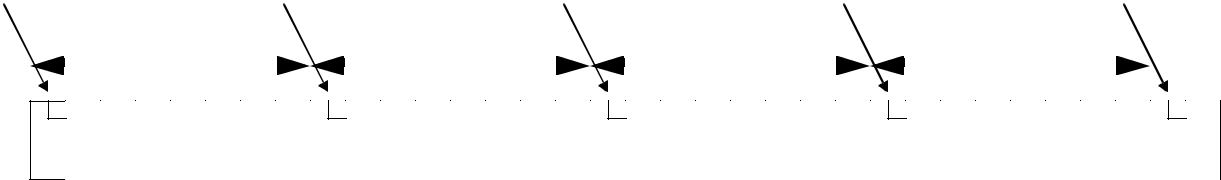
**Figure 8-68—Allocation Period example (ap=0b00011)**

**N ACID**

The values of ACID field (N0) and N\_ACID field (N) are used together to specify an implicit cycling of HARQ channel identifiers as follows. N0 is used as the HARQ channel identifier corresponding to the first occurrence of the persistent allocation. For each next allocation this value is incremented modulo (N + 1).

As illustrated in Figure 8-69, if N\_ACID = 0b011 (meaning Num\_HARQ\_Chan = 4), and if ACID = 2, the HARQ channel identifier follows the pattern 2, 3, 4, 5, 2, 3, 4, 5, etc.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ACID: 2** | | **ACID: 3** |  |  | **ACID: 4** |  |  | **ACID: 5** |  |  | **ACID: 2** |  |  |
|  |  | **4 frames** |  |  | **4 frames** |  |  | **4 frames** |  |  | **4 frames** |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |



**DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL**

**Figure 8-69—HARQ channel identifier example (N\_ACID=0b011)**

**ACID**

The ACID field shall be set to the initial value of HARQ channel identifier as described above.

**AI\_SN**

The AI\_SN field value shall be set to the initial ARQ identifier sequence number for each HARQ channel. The AI\_SN toggles between 0 and 1 for each particular HARQ channel. For example, if the period equals 4 frames, N\_ACID = 0b011, ACID = 2, and AI\_SN = 0, the ACID follows the pattern 2, 3, 4, 5, 2, 3, 4, 5, etc, and the AI\_SN follows the pattern 0, 0, 0, 0, 1, 1, 1, 1, etc.

**ACK channel**

The ACK channel field shall be set to the number of the ACK channel within the HARQ ACK Region. The mobile station shall use the indicated ACK channel for transmitting acknowledgment information for each packet received using the time-frequency resource referred to by this persistent allocation.

**MAP NACK Channel Index**

The MAP NACK channel index is persistently allocated within the Fast Feedback region. The mobile station shall use the indicated MAP NACK channel to report MAP decoding error in frames where it has a persistent resource allocation assigned. When MAP NACK Channel Index = 0b111111, it indicates NO MAP NACK channel is assigned to this allocation.

**MAP ACK Channel Index**

The MAP ACK channel is allocated non-persistently within the Fast Feedback region. The mobile station shall use the indicated MAP ACK channel to report successful receipt of the persistent allocation IE. If the allocation flag is set to 0, when MAP ACK Channel Index = 0b111111, it indicates NO MAP ACK channel is assigned to this deallocation.

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**Table 8-161—Persistent DL HARQ IR CTC Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Persistent\_DL\_HARQ\_IR\_CTC\_Sub-burst\_IE() | — | — |
| { |  |  |
|  |  |  |
| **N sub-burst** | 4 | Number of changed sub-bursts in the 2D |
|  |  | rectangular region is this field value plus 1 |
|  |  |  |
| **Resource shifting indicator** | 1 | 0 = No Resource Shifting |
|  |  | 1 = Resource Shifting |
|  |  |  |
| for ( *j* = 0; *j* < Number of changed sub-bursts; | — | — |
| *j*++) { |  |  |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the |
|  |  | group assignment of the MS (see 8.4.4.2 and |
|  |  | 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| **Allocation Flag** | 1 | 1 = allocate |
|  |  | 0 = de-allocate |
|  |  |  |
| if( Allocation Flag == 0){ | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast |
|  |  | Feedback region. When MAP ACK Channel |
|  |  | Index = 0b111111, it indicates NO MAP ACK |
|  |  | channel is assigned to this de-allocation. |
|  |  |  |
| if (Resource shifting indicator ==1) { | — | — |
|  |  |  |
| **NEP** | 4 | — |
| **NSCH** | 4 | — |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in |
|  |  | OFDMA slots, with respect to the lowest |
|  |  | numbered OFDM symbol and the lowest |
|  |  | numbered subchannel in the HARQ region. |
|  |  | OFDMA Frame duration dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Retransmission Flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in |
|  |  | Relevant Frame – Allocation Period |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if( Allocation Flag == 1 ){ | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| **Persistent Flag** | 1 | 0 = non-persistent |
|  |  | 1 = persistent |
|  |  |  |
| if( Power boost per sub-burst == 1 ){ | — | — |
|  |  |  |

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**Table 8-161—Persistent DL HARQ IR CTC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Boosting** | 3 | 0b000: Normal (not boosted) |
|  |  | 0b001: +6 dB |
|  |  | 0b010: –6 dB |
|  |  | 0b011: +9 dB |
|  |  | 0b100: +3 dB |
|  |  | 0b101: –3 dB |
|  |  | 0b110: –9 dB |
|  |  | 0b111: –12 dB |
|  |  | Note that if the Persistent flag is set, the boosting |
|  |  | value applies to each instance of the persistent |
|  |  | allocation. |
|  |  |  |
| } | — | — |
|  |  |  |
| **Duration Indicator** | 1 | If Duration Indicator is 1, it indicates that |
|  |  | Duration is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same |
|  |  | Duration as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if( Duration Indicator == 1 ){ | — | — |
|  |  |  |
| **NEP** | 4 | — |
| **NSCH** | 4 | — |
| } | — | — |
|  |  |  |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in |
|  |  | OFDMA slots, with respect to the lowest |
|  |  | numbered OFDM symbol and the lowest |
|  |  | numbered subchannel in the HARQ region. |
|  |  | OFDMA Frame duration dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| if( Persistent Flag == 1){ | — | — |
|  |  |  |
| **Allocation Period and N\_ACID** | 1 | If Allocation Period and N\_ACID Indicator is 1, it |
| **Indicator** |  | indicates that allocation information (allocation |
|  |  | period, Number of ACID (N\_ACID) is explicitly |
|  |  | assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same allocation period as the |
|  |  | previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if( Allocation Period and N\_ACID | — | — |
| Indicator == 1){ |  |  |
|  |  |  |
| **Allocation Period (*ap*)** | 5 | Period of the persistent allocation is this field |
|  |  | value plus 1 (unit is frame). |
|  |  |  |
| **Number of ACID (N ACID)** | 3 | Number of HARQ channels associated with this |
|  |  | persistent assignment is this field value plus 1. |
|  |  |  |
| } |  |  |
|  |  |  |
| **MAP NACK Channel Index** | 6 | Index to a shared MAP NACK channel within the |
|  |  | Fast Feedback region. When MAP NACK |
|  |  | Channel Index = 0b111111, it indicates NO MAP |
|  |  | NACK channel is assigned to this allocation. |
|  |  |  |

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**Table 8-161—Persistent DL HARQ IR CTC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast |
|  |  | Feedback region. |
|  |  |  |
| } | — | — |
|  |  |  |
| **SPID** | 2 | — |
|  |  |  |
| **ACID** | 4 | Initial value of HARQ channel identifier. |
|  |  |  |
| **AI\_SN** | 1 | Initial AI\_SN for each ACID. |
|  |  |  |
| **ACK disable** | 1 | When ACK Disable == 1, the allocated sub-burst |
|  |  | does not require an ACK to be transmitted by the |
|  |  | SS in the ACKCH Region (see 8.4.5.4.53). In this |
|  |  | case, no ACK channel is allocated for the sub- |
|  |  | burst in the ACKCH Region. For TDD SS, for the |
|  |  | burst, BS shall not perform HARQ retransmission |
|  |  | and MS shall ignore ACID, AI\_SN and SPID, |
|  |  | which shall be set to 0 by BS if they exist. For |
|  |  | FDD SS, for the burst, BS shall not perform |
|  |  | HARQ retransmission and MS shall ignore |
|  |  | AI\_SN and SPID, which shall be set to 0 by BS if |
|  |  | they exist. For FDD SS, the BS may set the ACID |
|  |  | to a value other than 0 if that ACID is listed in the |
|  |  | Aggregated HARQ Channels TLV. The CRC shall |
|  |  | be appended at the end of each sub-burst |
|  |  | regardless of the ACK disable bit. |
|  |  |  |
| if( ACK disable == 0 ){ | — | — |
|  |  |  |
| **ACK channel** | 8 | Indicates the ACK channel to be used for this |
|  |  | sequence of sub-bursts as defined in 8.4.5.4.53. |
|  |  |  |
| } | — | — |
|  |  |  |
| **Dedicated DL control Indicator** | 2 | LSB #0 indicates inclusion of CQI control |
|  |  | LSB #1 indicates inclusion of Dedicated DL |
|  |  | Control IE. |
|  |  |  |
| if( LSB #0 of dedicated DL control | — | — |
| indicator == 1 ){ |  |  |
|  |  |  |
| **Duration (d)** | 4 | A CQI feedback is transmitted on the CQI |
|  |  | channels indexed by the (CQI Channel Index) by |
|  |  | the SS for 2(d–1) frames. If d is 0b0000, |
|  |  | deallocates all CQI feedback when the current |
|  |  | ACID is completed successfully. If d is 0b1111, |
|  |  | the MS should report until the BS command for |
|  |  | the MS to stop. |
|  |  |  |
| if( Duration != 0b0000 ){ | — | — |
|  |  |  |
| **Allocation index** | 6 | Index to the channel in a frame the CQI report |
|  |  | should be transmitted by the SS. |
|  |  |  |
| **Period (p)** | 3 | A CQI feedback is transmitted on the CQI |
|  |  | channels indexed by the (CQI Channel Index) by |
|  |  | the SS in every 2p frames. |
| **Frame offset** | 3 | The MS starts reporting at the frame of which the |
|  |  | number has the same 3 LSB as the specified |
|  |  | frame offset. If the current frame is specified, the |
|  |  | MS should start reporting in eight frames. |
|  |  |  |
| } | — | — |
|  |  |  |

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**Table 8-161—Persistent DL HARQ IR CTC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| if( LSB #1 of dedicated DL control | — | — |
| indicator == 1 ){ |  |  |
|  |  |  |
| **Dedicated DL control IE()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to nibble; shall be set to 0. |
|  |  |  |
| } | — | — |
|  |  |  |

**SPID**

Defines subpacket identifier, which is used to identify the four subpackets generated from an encoder packet. The SPID field only applies to FEC modes supporting incremental redundancy. The SPID numbering shall follow the rules for subpacket generation in 6.3.15.1.

**Table 8-162—Persistent DL HARQ IR CC Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Persistent\_DL\_HARQ\_IR\_CC\_Sub-burst\_IE() { | — | — |
|  |  |  |
| **N sub-burst** | 4 | Number of changed sub-bursts in the 2D |
|  |  | rectangular region is this field value plus 1. |
|  |  |  |
| **Resource shifting indicator** | 1 | 0 = No Resource Shifting |
|  |  | 1 = Resource Shifting |
|  |  |  |
| for ( *j* = 0; *j* < Number of changed sub-bursts; | — | — |
| *j*++) { |  |  |
|  |  |  |
| **Allocation Flag** | 1 | 1 = allocate |
|  |  | 0 = de-allocate |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the |
|  |  | group assignment of the MS (see 8.4.4.2 and |
|  |  | 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| if( Allocation Flag == 0){ | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast |
|  |  | Feedback region. When MAP ACK Channel |
|  |  | Index = 0b111111, it indicates NO MAP ACK |
|  |  | channel is assigned to this de-allocation. |
|  |  |  |
| if (Resource shifting indicator ==1) { | — | — |
|  |  |  |

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**Table 8-162—Persistent DL HARQ IR CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Duration** | *variable* | Duration in slots. OFDMA Frame duration |
|  |  | dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in |
|  |  | OFDMA slots, with respect to the lowest |
|  |  | numbered OFDM symbol and the lowest |
|  |  | numbered subchannel in the HARQ region. |
|  |  | OFDMA Frame duration dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Retransmission Flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in |
|  |  | Relevant Frame – Allocation Period |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if( Allocation Flag == 1 ){ | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| **Persistent Flag** | 1 | 0 = non-persistent |
|  |  | 1 = persistent |
|  |  |  |
| if (Power boost per sub-burst ==1) { | — | — |
|  |  |  |
| **Boosting** | 3 | 0b000: Normal (not boosted) |
|  |  | 0b001: +6 dB |
|  |  | 0b010: –6 dB |
|  |  | 0b011: +9 dB |
|  |  | 0b100: +3 dB |
|  |  | 0b101: –3 dB |
|  |  | 0b110: –9 dB |
|  |  | 0b111: –12 dB |
|  |  | Note that if the Persistent flag is set, the boosting |
|  |  | value applies to each instance of the persistent |
|  |  | allocation. |
|  |  |  |
| } |  |  |
|  |  |  |
| **Duration Indicator** | 1 | If Duration Indicator is 1, it indicates that |
|  |  | Duration is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same |
|  |  | Duration as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Duration Indicator ==1) { | — | — |
|  |  |  |
| **Duration** | *variable* | Duration in slots. OFDMA Frame duration |
|  |  | dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |

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**Table 8-162—Persistent DL HARQ IR CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in |
|  |  | OFDMA slots, with respect to the lowest |
|  |  | numbered OFDM symbol and the lowest |
|  |  | numbered subchannel in the HARQ region. |
|  |  | OFDMA Frame duration dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| if( Persistent Flag == 1){ | — | — |
|  |  |  |
| **Allocation Period and N\_ACID** | 1 | If Allocation Period and N\_ACID Indicator is 1, it |
| **Indicator** |  | indicates that allocation information (allocation |
|  |  | period, Number of ACID (N\_ACID) is explicitly |
|  |  | assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same allocation period as the |
|  |  | previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if( Allocation Period and N\_ACID | — | — |
| Indicator == 1){ |  |  |
|  |  |  |
| **Allocation Period (ap)** | 5 | Period of the persistent allocation is this field |
|  |  | value plus 1 (unit is frame). |
|  |  |  |
| **Number of ACID (N ACID)** | 3 | Number of HARQ channels associated with this |
|  |  | persistent assignment is this field value plus 1. |
|  |  |  |
| } | — | — |
|  |  |  |
| **MAP NACK Channel Index** | 6 | Index to a shared MAP NACK channel within the |
|  |  | Fast Feedback region. When MAP NACK |
|  |  | Channel Index = 0b111111, it indicates NO MAP |
|  |  | NACK channel is assigned to this allocation. |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast |
|  |  | Feedback region. |
|  |  |  |
| } | — | — |
|  |  |  |
| **Sub-burst DIUC indicator** | 1 | If sub-burst DIUC Indicator is 1, it indicates that |
|  |  | DIUC is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same |
|  |  | DIUC as the previous sub-burst. If j is 0 then this |
|  |  | indicator shall be 1. |
|  |  |  |
| if( Sub-burst DIUC indicator == 1 ){ | — | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00: No Repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| **}** | — | — |
|  |  |  |
| **ACID** | 4 | Initial value of HARQ channel identifier |
|  |  |  |
| **AI\_SN** | 1 | Initial AI\_SN for each ACID |
|  |  |  |
| **SPID** | 2 | — |
|  |  |  |

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**Table 8-162—Persistent DL HARQ IR CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **ACK disable** | 1 | When ACK Disable == 1, the allocated sub-burst |
|  |  | does not require an ACK to be transmitted by the |
|  |  | SS in the ACKCH Region (see 8.4.5.4.53). In this |
|  |  | case, no ACK channel is allocated for the sub- |
|  |  | burst in the ACKCH Region. For TDD SS, for the |
|  |  | burst, BS shall not perform HARQ retransmission |
|  |  | and MS shall ignore ACID, AI\_SN and SPID, |
|  |  | which shall be set to 0 by BS if they exist. For |
|  |  | FDD SS, for the burst, BS shall not perform |
|  |  | HARQ retransmission and MS shall ignore |
|  |  | AI\_SN and SPID, which shall be set to 0 by BS if |
|  |  | they exist. For FDD SS, the BS may set the ACID |
|  |  | to a value other than 0 if that ACID is listed in the |
|  |  | Aggregated HARQ Channels TLV. The CRC shall |
|  |  | be appended at the end of each sub-burst |
|  |  | regardless of the ACK disable bit. |
|  |  |  |
| if( ACK disable == 0 ){ | — | — |
|  |  |  |
| **ACK channel** | 8 | Indicates the ACK channel to be used for this |
|  |  | sequence of sub-bursts as defined in 8.4.5.4.53. |
|  |  |  |
| } | — | — |
|  |  |  |
| **Dedicated DL control Indicator** | 2 | LSB #0 indicates inclusion of CQI control |
|  |  | LSB #1 indicates inclusion of Dedicated DL |
|  |  | Control IE. |
|  |  |  |
| if( LSB #0 of dedicated DL control | — | — |
| indicator == 1 ){ |  |  |
|  |  |  |
| **Duration (d)** | 4 | A CQI feedback is transmitted on the CQI |
|  |  | channels indexed by the (CQI Channel Index) by |
|  |  | the SS for 2(d–1) frames. If d is 0b0000, |
|  |  | deallocates all CQI feedback when the current |
|  |  | ACID is completed successfully. If d is 0b1111, |
|  |  | the MS should report until the BS command for |
|  |  | the MS to stop. |
|  |  |  |
| if( Duration != 0b0000 ){ | — | — |
|  |  |  |
| **Allocation index** | 6 | Index to the channel in a frame the CQI report |
|  |  | should be transmitted by the SS. |
|  |  |  |
| **Period (p)** | 3 | A CQI feedback is transmitted on the CQI |
|  |  | channels indexed by the (CQI Channel Index) by |
|  |  | the SS in every 2p frames. |
| **Frame offset** | 3 | The MS starts reporting at the frame of which the |
|  |  | number has the same 3 LSB as the specified |
|  |  | frame offset. If the current frame is specified, the |
|  |  | MS should start reporting in eight frames. |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if( LSB #1 of dedicated DL control | — | — |
| indicator == 1 ){ |  |  |
|  |  |  |
| **Dedicated DL control IE()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

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**Table 8-162—Persistent DL HARQ IR CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to nibble; shall be set to 0. |
|  |  |  |
| } | — | — |
|  |  |  |

**Table 8-163—Persistent MIMO DL Chase HARQ Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Persistent\_MIMO\_ DL\_Chase\_HARQ\_Sub- | — | — |
| burst\_IE() { |  |  |
|  |  |  |
| **N sub-burst** | 4 | Number of changed sub-bursts in the 2D |
|  |  | rectangular region is this field value plus 1. |
|  |  |  |
| **Resource shifting indicator** | 1 | 0 = No Resource Shifting |
|  |  | 1 = Resource Shifting |
|  |  |  |
| for ( *j* = 1; *j* < Number of changed sub-bursts; | — | — |
| *j*++) { |  |  |
|  |  |  |
| **MU Indicator** | 1 | Indicates whether this DL burst is intended for |
|  |  | multiple MS |
|  |  | 0 = Single MS |
|  |  | 1 = multiple MS |
|  |  |  |
| **Allocation Flag** | 1 | 1 = allocate |
|  |  | 0 = de-allocate |
|  |  |  |
| **Dedicated MIMO DL Control Indicator** | 1 | 0 = MS shall use the stored Dedicated MIMO DL |
|  |  | Control information from the last burst allocation |
|  |  | where this information was included. |
|  |  | 1 = MS uses the Dedicated MIMO DL control |
|  |  | information in this IE. |
|  |  |  |
| if( MU Indicator == 0){ | — | — |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the |
|  |  | group assignment of the MS (see 8.4.4.2 and |
|  |  | 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| if( Allocation flag == 0){ | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| if(Resource shifting indicator==1) { | — | — |
|  |  |  |
| **Duration** | *variable* | Duration in slots. OFDMA Frame duration |
|  |  | dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |

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**Table 8-163—Persistent MIMO DL Chase HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in |
|  |  | OFDMA slots, with respect to the lowest |
|  |  | numbered OFDM symbol and the lowest |
|  |  | numbered subchannel in the HARQ region. |
|  |  | OFDMA Frame duration dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Retransmission Flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in |
|  |  | Relevant Frame – Allocation Period |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if( Allocation Flag == 1 ){ | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| if( Dedicated MIMO DL Control |  |  |
| indicator == 1 ){ |  |  |
|  |  |  |
| **Dedicated MIMO DL Control** |  |  |
| **IE()** |  |  |
|  |  |  |
| } |  |  |
|  |  |  |
| **Persistent Flag** | 1 | 0 = non-persistent |
|  |  | 1 = persistent |
|  |  |  |
| **Duration Indicator** | 1 | If Duration Indicator is 1, it indicates that |
|  |  | Duration is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same |
|  |  | Duration as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| If (Duration Indicator == 1) { | — | — |
|  |  |  |
| **Duration** | *variable* | See definition above in this IE. |
|  |  |  |
| } | — | — |
|  |  |  |
| if (Power boost per sub-burst ==1) { | — | — |
|  |  |  |
| **Boosting** | 3 | 0b000: Normal (not boosted) |
|  |  | 0b001: +6 dB |
|  |  | 0b010: –6 dB |
|  |  | 0b011: +9 dB |
|  |  | 0b100: +3 dB |
|  |  | 0b101: –3 dB |
|  |  | 0b110: –9 dB |
|  |  | 0b111: –12 dB |
|  |  | Note that if the Persistent flag is set, the boosting |
|  |  | value applies to each instance of the persistent |
|  |  | allocation. |
|  |  |  |
| } | — | — |
|  |  |  |
| **Slot Offset** | *variable* | See definition above in this IE. |
|  |  |  |

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**Table 8-163—Persistent MIMO DL Chase HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **ACK Disable** | 1 | When ACK Disable == 1, the allocated sub-burst |
|  |  | does not require an ACK to be transmitted by the |
|  |  | SS in the ACKCH Region (see 8.4.5.4.53). In this |
|  |  | case, no ACK channel is allocated for the sub- |
|  |  | burst in the ACKCH Region. For TDD SS, for the |
|  |  | burst, BS shall not perform HARQ retransmission |
|  |  | and MS shall ignore ACID, AI\_SN and SPID, |
|  |  | which shall be set to 0 by BS if they exist. For |
|  |  | FDD SS, for the burst, BS shall not perform |
|  |  | HARQ retransmission and MS shall ignore |
|  |  | AI\_SN and SPID, which shall be set to 0 by BS if |
|  |  | they exist. For FDD SS, the BS may set the ACID |
|  |  | to a value other than 0 if that ACID is listed in the |
|  |  | Aggregated HARQ Channels TLV. The CRC shall |
|  |  | be appended at the end of each sub-burst |
|  |  | regardless of the ACK disable bit. |
|  |  |  |
| if( Persistent Flag == 1){ | — | — |
|  |  |  |
| **Allocation Period and** | 1 | If Allocation Period and N\_ACID Indicator is 1, it |
| **N\_ACID Indicator** |  | indicates that allocation information (allocation |
|  |  | period, Number of ACID (N\_ACID) is explicitly |
|  |  | assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same allocation period as the |
|  |  | previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| If (Allocation Period and | — | — |
| N\_ACID Indicator == 1) { |  |  |
|  |  |  |
| **Allocation Period (ap)** | 5 | Period of the persistent allocation is this field |
|  |  | value plus 1 (unit is frame). |
|  |  |  |
| **Number of ACID (N ACID)** | 3 | Number of HARQ channels associated with this |
|  |  | persistent assignment is this field value plus 1. |
|  |  |  |
| } | — | — |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a shared MAP ACK channel within the |
|  |  | Fast Feedback region. |
|  |  |  |
| **MAP NACK Channel Index** | 6 | Index to a MAP NACK channel within the Fast |
|  |  | Feedback region. When MAP NACK Channel |
|  |  | Index = 0b111111, it indicates NO MAP NACK |
|  |  | channel is assigned to this allocation. |
|  |  |  |
| } | — | — |
|  |  |  |
| for( *i* = 0; *i* < N Layers; *i*++ ){ | — | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00: No Repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| if( ACK disable == 0 ){ | — | — |
|  |  |  |
| **ACK Channel** | 8 | Indicates the ACK channel to be used for this |
|  |  | sequence of sub-bursts as defined in 8.4.5.4.53. |
|  |  |  |
| } | — | — |
|  |  |  |
| **ACID** | 4 | Initial value of HARQ channel identifier. |
|  |  |  |

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**Table 8-163—Persistent MIMO DL Chase HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **AI\_SN** | 1 | Initial AI\_SN for each ACID. |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if( MU Indicator == 1 ){ | — | — |
|  |  |  |
| if( Dedicated MIMO DL Control indi- | — | — |
| cator == 1 ){ |  |  |
|  |  |  |
| **Dedicated MIMO DL Control** | *variable* | — |
| **IE()** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **Layer Relevance Bitmap** | 4 | 4 bit bitmap indicating if layer processing should |
|  |  | be skipped. The bit position indicates the layer. |
|  |  | The bit value: |
|  |  | 0 = skip the layer |
|  |  | 1 = process the layer |
|  |  |  |
| for( *i* =0; *i* < N Layers; *i*++ ){ | — | For each instance of the for-loop, when the |
|  |  | corresponding bit in the Layer Relevance Bitmap |
|  |  | is set to 0, the subsequent fields within this |
|  |  | instance of for-loop are omitted. |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the |
|  |  | group assignment of the MS (see 8.4.4.2 and |
|  |  | 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| if( Allocation flag == 0 ){ | — | De-allocate |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| if( Resource Shifting Indicator | — | — |
| == 1){ |  |  |
|  |  |  |
| **Slot Offset** | *variable* | See definition above in this IE. |
|  |  |  |
| **Duration** | *variable* | See definition above in this IE. |
|  |  |  |
| **Retransmission Flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in |
|  |  | Relevant Frame – Allocation Period |
|  |  |  |
| } | — | — |
|  |  |  |
| **}** | — | — |
|  |  |  |
| if( Allocation Flag == 1 ){ | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| **Persistent flag** | 1 | — |
|  |  |  |
| **Slot Offset** | *variable* | See definition above in this IE. |
|  |  |  |
| **Duration Indicator** | 1 | If Duration Indicator is 1, it indicates that |
|  |  | Duration is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same |
|  |  | Duration as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |

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**Table 8-163—Persistent MIMO DL Chase HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| if (Duration Indicator == 1) { | — | — |
|  |  |  |
| **Duration** | *variable* | See definition above in this IE. |
|  |  |  |
| } | — | — |
|  |  |  |
| **ACK Disable** | 1 | See definition above in this IE. |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | See definition above in this IE. |
|  |  |  |
| if( ACK Disable == 0 ){ | — | — |
|  |  |  |
| **ACK Channel** | 8 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| if( Persistent Flag == 1 ){ | — | — |
|  |  |  |
| **Allocation Period and** | 1 | If Allocation Period and N\_ACID Indicator is 1, it |
| **N\_ACID Indicator** |  | indicates that allocation information (allocation |
|  |  | period, Number of ACID (N\_ACID) is explicitly |
|  |  | assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same allocation period as the |
|  |  | previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Allocation Period and | — | — |
| N\_ACID Indicator == 1) { |  |  |
|  |  |  |
| **Allocation Period** | 5 | See definition above in this IE. |
|  |  |  |
| **Number of ACID (N** | 3 | See definition above in this IE. |
| **ACID)** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **MAP ACK Channel Index** | 6 | See definition above in this IE. |
|  |  |  |
| **MAP NACK Channel** | 6 | See definition above in this IE. |
| **Index** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to nibble; shall be set to 0. |
|  |  |  |
| } | — | — |
|  |  |  |

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**Table 8-164—Persistent MIMO DL IR HARQ Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Persistent\_MIMO\_ DL\_Chase\_HARQ\_Sub- | — | — |
| burst\_IE() { |  |  |
|  |  |  |
| **N sub-burst** | 4 | Number of changed sub-bursts in the 2D |
|  |  | rectangular region is this field value plus 1 |
|  |  |  |
| **Resource Shifting Indicator** | 1 | 0 = No Resource Shifting |
|  |  | 1 = Resource Shifting |
|  |  |  |
| for (*j* = 0;*j* < Number of changed sub-bursts; | — | — |
| *j*++) { |  |  |
|  |  |  |
| **MU indicator** | 1 | Indicates whether this DL burst is intended for |
|  |  | multiple MS |
|  |  | 0 = Single MS |
|  |  | 1 = multiple MS |
|  |  |  |
| **Allocation Flag** | 1 | 1 = allocate |
|  |  | 0 = de-allocate |
|  |  |  |
| **Dedicated MIMO DL Control Indicator** | 1 | 0 == MS shall use the stored Dedicated MIMO |
|  |  | DL Control information from the last burst |
|  |  | allocation where this information was included. |
|  |  | 1 = MS uses the Dedicated MIMO DL control |
|  |  | information is this IE |
|  |  |  |
| If (MU Indicator == 0) { | — | — |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the |
|  |  | group assignment of the MS (see 8.4.4.2 and |
|  |  | 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| If (Allocation flag == 0) { | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast |
|  |  | Feedback region. When MAP ACK Channel |
|  |  | Index = 0b111111, it indicates NO MAP ACK |
|  |  | channel is assigned to this de-allocation |
|  |  |  |
| if(Resource Shifting Indicator | — | — |
| == 1){ |  |  |
|  |  |  |
| **NEP** | 4 | — |
| **NSCH** | 4 | — |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in |
|  |  | OFDMA slots, with respect to the lowest |
|  |  | numbered OFDM symbol and the lowest |
|  |  | numbered subchannel in the HARQ region. |
|  |  | OFDMA Frame duration dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Retransmission Flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in |
|  |  | Relevant Frame – Allocation Period |
|  |  |  |

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**Table 8-164—Persistent MIMO DL IR HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if( Allocation Flag == 1 ){ | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| **Persistent flag** | 1 | 0 = non-persistent allocation |
|  |  | 1 = persistent allocation |
|  |  |  |
| if (Power boost per sub-burst ==1) { | — | — |
|  |  |  |
| **Boosting** | 3 | 0b000: Normal (not boosted) |
|  |  | 0b001: +6 dB |
|  |  | 0b010: –6 dB |
|  |  | 0b011: +9 dB |
|  |  | 0b100: +3 dB |
|  |  | 0b101: –3 dB |
|  |  | 0b110: –9 dB |
|  |  | 0b111: –12 dB |
|  |  | Note that if the Persistent flag is set, the boosting |
|  |  | value applies to each instance of the persistent |
|  |  | allocation. |
|  |  |  |
| } | — | — |
|  |  |  |
| **Duration Indicator** | 1 | If Duration Indicator is 1, it indicates that |
|  |  | Duration is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same |
|  |  | Duration as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Duration Indicator == 1) { | — | — |
|  |  |  |
| **NEP** | 4 | — |
| **NSCH** | 4 | — |
| } | — | — |
|  |  |  |
| **Slot Offset** | *variable* | See definition above in this IE |
|  |  |  |
| if( Dedicated MIMO DL Control | — | — |
| indicator == 1 ) { |  |  |
|  |  |  |
| **Dedicated MIMO DL Control** | *variable* | — |
| **IE ()** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |

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**Table 8-164—Persistent MIMO DL IR HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **ACK Disable** | 1 | When ACK Disable == 1, the allocated sub-burst |
|  |  | does not require an ACK to be transmitted by the |
|  |  | SS in the ACKCH Region (see 8.4.5.4.53). In this |
|  |  | case, no ACK channel is allocated for the sub- |
|  |  | burst in the ACKCH Region. For TDD SS, for the |
|  |  | burst, BS shall not perform HARQ retransmission |
|  |  | and MS shall ignore ACID, AI\_SN and SPID, |
|  |  | which shall be set to 0 by BS if they exist. For |
|  |  | FDD SS, for the burst, BS shall not perform |
|  |  | HARQ retransmission and MS shall ignore |
|  |  | AI\_SN and SPID, which shall be set to 0 by BS if |
|  |  | they exist. For FDD SS, the BS may set the ACID |
|  |  | to a value other than 0 if that ACID is listed in the |
|  |  | Aggregated HARQ Channels TLV. The CRC shall |
|  |  | be appended at the end of each sub-burst |
|  |  | regardless of the ACK disable bit. |
|  |  |  |
| if (Persistent Flag ==1){ | — | — |
|  |  |  |
| **Allocation Period and** | 1 | If Allocation Period and N\_ACID Indicator is 1, it |
| **N\_ACID Indicator** |  | indicates that allocation information (allocation |
|  |  | period, Number of ACID (N\_ACID) is explicitly |
|  |  | assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same allocation period as the |
|  |  | previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Allocation Period and | — | — |
| N\_ACID Indicator == 1) { |  |  |
|  |  |  |
| **Allocation Period** | 5 | Period of the persistent allocation is this field |
|  |  | value plus 1 (unit is frame). |
|  |  |  |
| **Number of ACID** | 3 | Number of HARQ channels associated with this |
| **(N\_ACID)** |  | persistent assignment is this field value plus 1. |
|  |  |  |
| } | — | — |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast |
|  |  | Feedback region. |
|  |  |  |
| **MAP NACK Channel Index** | 6 | Index to a shared MAP NACK channel within the |
|  |  | Fast Feedback region. When MAP NACK |
|  |  | Channel Index = 0b111111, it indicates NO MAP |
|  |  | NACK channel is assigned to this allocation. |
|  |  |  |
| } | — | — |
|  |  |  |
| for( *i* = 0; *i* < N\_Layers; *i*++){ | — | — |
|  |  |  |
| **NEP** | 4 | — |
| **NSCH** | 4 | — |
| if( ACK Disable == 0 ){ | — | — |
|  |  |  |
| **ACK Channel** | 8 | Indicates the ACK channel to be used for this |
|  |  | sequence of sub-bursts as defined in 8.4.5.4.53. |
|  |  |  |
| } | — | — |
|  |  |  |
| **SPID** | 2 | — |
|  |  |  |
| **ACID** | 4 | Initial value of HARQ channel identifier. |
|  |  |  |
| **AI\_SN** | 1 | Initial AI\_SN for each ACID. |
|  |  |  |

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**Table 8-164—Persistent MIMO DL IR HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| if( MU Indicator == 1 ){ | — | — |
|  |  |  |
| if(Dedicated MIMO DL Control | — | — |
| indicator == 1 ){ |  |  |
|  |  |  |
| **Dedicated MIMO DL Con-** | *variable* | — |
| **trol IE ()** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **Layer Relevance Bitmap** | 4 | 4 bit bitmap indicating if layer processing should |
|  |  | be skipped. The bit position indicates the layer. |
|  |  | The bit value: |
|  |  | 0 = skip the layer; |
|  |  | 1 = process the layer |
|  |  |  |
| for( *i* = 0; *i* < N\_Layers; *i*++ ){ | — | For each instance of the for-loop, when the |
|  |  | corresponding bit in the Layer Relevance Bitmap |
|  |  | is set to 0, the subsequent fields within this |
|  |  | instance of for-loop are omitted. |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the |
|  |  | group assignment of the MS (see 8.4.4.2 and |
|  |  | 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| if( Allocation flag == 0 ){ | — | — |
|  |  |  |
| **RCID IE ()** | *variable* | — |
|  |  |  |
| **MAP ACK Channel** | 6 | Index to a MAP ACK channel within the Fast |
| **Index** |  | Feedback region. When MAP ACK Channel |
|  |  | Index = 0b111111, it indicates NO MAP ACK |
|  |  | channel is assigned to this de-allocation. |
|  |  |  |
| if (Resource Shifting | — | — |
| Indicator == 1) { |  |  |
|  |  |  |
| **NEP** | 4 | — |
| **NSCH** | 4 | — |
| **Slot Offset** | *variable* | See definition above in this IE. |
|  |  |  |
| **Retransmission Flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in |
|  |  | Relevant Frame – Allocation Period |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if( Allocation Flag == 1 ){ | — | — |
|  |  |  |
| **RCID IE ()** | *variable* | — |
|  |  |  |
| **Persistent flag** | 1 | — |
|  |  |  |
| **Slot Offset** | variable | See definition above in this IE. |
|  |  |  |
| **ACK Disable** | 1 | See definition above in this IE. |
|  |  |  |

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**Table 8-164—Persistent MIMO DL IR HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Duration Indicator** | 1 | If Duration Indicator is 1, it indicates that |
|  |  | Duration is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same |
|  |  | Duration as the previous sub-burst. |
|  |  | If j is 0 then this indicator shall be 1. |
|  |  |  |
| if (Duration Indicator == 1) { | — | — |
|  |  |  |
| **NEP** | 4 | — |
| **NSCH** | 4 | — |
| } |  |  |
|  |  |  |
| if( ACK Disable == 0 ){ | — | — |
|  |  |  |
| **ACK Channel** | 8 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **SPID** | 2 | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| if( Persistent Flag == 1 ){ | — | — |
|  |  |  |
| **Allocation Period and** | 1 | If Allocation Period and N\_ACID Indicator is 1, it |
| **N\_ACID Indicator** |  | indicates that allocation information (allocation |
|  |  | period, Number of ACID (N\_ACID) is explicitly |
|  |  | assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same allocation period as the |
|  |  | previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Allocation Period and | — | — |
| N\_ACID Indicator == 1) |  |  |
| { |  |  |
|  |  |  |
| **Allocation Period** | 5 | See definition above in this IE. |
|  |  |  |
| **Number of ACID** | 3 | See definition above in this IE. |
| **(N\_ACID)** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **MAP ACK Channel** | 6 | See definition above in this IE. |
| **Index** |  |  |
|  |  |  |
| **MAP NACK Channel** | 6 | See definition above in this IE. |
| **Index** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to nibble; shall be set to 0. |
|  |  |  |
| } | — | — |
|  |  |  |

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**Table 8-165—Persistent MIMO DL IR HARQ CC Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Persistent\_MIMO\_ DL\_IR\_HARQ\_Sub- | — | — |
| burst\_IE() { |  |  |
|  |  |  |
| **N sub-burst** | 4 | Number of changed sub-bursts in the 2D |
|  |  | rectangular region is this field value plus 1 |
|  |  |  |
| **Resource Shifting Indicator** | 1 | 0 = No Resource Shifting |
|  |  | 1 = Resource Shifting |
|  |  |  |
| for( *j* = 0; *j* < Number of changed sub-bursts; | — | — |
| *j*++ ){ |  |  |
|  |  |  |
| **MU indicator** | 1 | Indicates whether this DL burst is intended for |
|  |  | multiple MS |
|  |  | 0 = Single MS |
|  |  | 1 = multiple MS |
|  |  |  |
| **Allocation Flag** | 1 | 1 = allocate |
|  |  | 0 = de-allocate |
|  |  |  |
| **Dedicated MIMO DL Control Indicator** | 1 | 0 == MS shall use the stored Dedicated MIMO |
|  |  | DL Control information from the last burst |
|  |  | allocation where this information was included. |
|  |  | 1 = MS uses the Dedicated MIMO DL control |
|  |  | information is this IE |
|  |  |  |
| if( MU Indicator == 0 ){ | — | — |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the |
|  |  | group assignment of the MS (see 8.4.4.2 and |
|  |  | 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| if( Allocation flag == 0 ){ | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast |
|  |  | Feedback region. When MAP ACK Channel |
|  |  | Index = 0b111111, it indicates NO MAP ACK |
|  |  | channel is assigned to this de-allocation. |
|  |  |  |
| if( Resource Shifting Indicator | — | — |
| == 1){ |  |  |
|  |  |  |
| **Duration** | *variable* | Duration in slots. OFDMA Frame duration |
|  |  | dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in |
|  |  | OFDMA slots, with respect to the lowest |
|  |  | numbered OFDM symbol and the lowest |
|  |  | numbered subchannel in the HARQ region. |
|  |  | – 2.5 ms frame |
|  |  | – 10 ms frame |
|  |  | – 20 ms frame |
|  |  |  |
| **Retransmission Flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in |
|  |  | Allocation Period |
|  |  |  |

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**Table 8-165—Persistent MIMO DL IR HARQ CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| } |  | — |
|  |  |  |
| If (allocation Flag == 1) { | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| **Persistent flag** | 1 | 0 = non-persistent allocation |
|  |  | 1 = persistent allocation |
|  |  |  |
| if (Power boost per sub-burst ==1) { | — | — |
|  |  |  |
| **Boosting** | 3 | 0b000: Normal (not boosted) |
|  |  | 0b001: +6 dB |
|  |  | 0b010: –6 dB |
|  |  | 0b011: +9 dB |
|  |  | 0b100: +3 dB |
|  |  | 0b101: –3 dB |
|  |  | 0b110: –9 dB |
|  |  | 0b111: –12 dB |
|  |  | Note that if the Persistent flag is set, the boosting |
|  |  | value applies to each instance of the persistent |
|  |  | allocation. |
|  |  |  |
| } | — | — |
|  |  |  |
| if (Duration Indicator == 1) { | — | — |
|  |  |  |
| **Duration** | *variable* | See definition above in this IE. |
|  |  |  |
| } | — | — |
|  |  |  |
| **Slot Offset** | *variable* | See definition above in this IE. |
|  |  |  |
| **Dedicated MIMO DL Control** | 1 | — |
| **Indicator** |  |  |
|  |  |  |
| **ACK Disable** | 1 | When ACK Disable == 1, the allocated sub-burst |
|  |  | does not require an ACK to be transmitted by the |
|  |  | SS in the ACKCH Region (see 8.4.5.4.53). In this |
|  |  | case, no ACK channel is allocated for the sub- |
|  |  | burst in the ACKCH Region. For TDD SS, for the |
|  |  | burst, BS shall not perform HARQ retransmission |
|  |  | and MS shall ignore ACID, AI\_SN and SPID, |
|  |  | which shall be set to 0 by BS if they exist. For |
|  |  | FDD SS, for the burst, BS shall not perform |
|  |  | HARQ retransmission and MS shall ignore |
|  |  | AI\_SN and SPID, which shall be set to 0 by BS if |
|  |  | they exist. For FDD SS, the BS may set the ACID |
|  |  | to a value other than 0 if that ACID is listed in the |
|  |  | Aggregated HARQ Channels TLV. The CRC shall |
|  |  | be appended at the end of each sub-burst |
|  |  | regardless of the ACK disable bit. |
|  |  |  |
| if( Persistent Flag == 1 ){ | — | — |
|  |  |  |
| **Allocation Period and** | 1 | If Allocation Period and N\_ACID Indicator is 1, it |
| **N\_ACID Indicator** |  | indicates that allocation information (allocation |
|  |  | period, Number of ACID (N\_ACID) is explicitly |
|  |  | assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same allocation period as the |
|  |  | previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |

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**Table 8-165—Persistent MIMO DL IR HARQ CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| if (Allocation Period and | — | — |
| N\_ACID Indicator == 1) { |  |  |
|  |  |  |
| **Allocation Period** | 5 | Period of the persistent allocation is this field |
|  |  | value plus 1 (unit is frame). |
|  |  |  |
| **Number of ACID** | 3 | Number of HARQ channels associated with this |
| **(N\_ACID)** |  | persistent assignment is this field value plus 1. |
|  |  |  |
| } | — | — |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast |
|  |  | Feedback region. |
|  |  |  |
| **MAP NACK Channel Index** | 6 | Index to a shared MAP NACK channel within the |
|  |  | Fast Feedback region. When MAP NACK |
|  |  | Channel Index = 0b111111, it indicates NO MAP |
|  |  | NACK channel is assigned to this allocation. |
|  |  |  |
| } | — | — |
|  |  |  |
| for( *i* = 0; *i* < N\_Layers; *i*++ ){ | — | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00: No Repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| if( ACK Disable == 0 ){ | — | — |
|  |  |  |
| **ACK Channel** | 8 | Indicates the ACK channel to be used for this |
|  |  | sequence of sub-bursts as defined in 8.4.5.4.53. |
|  |  |  |
| } | — | — |
|  |  |  |
| **ACID** | 4 | Initial value of HARQ channel identifier. |
|  |  |  |
| **AI\_SN** | 1 | Initial AI\_SN for each ACID. |
|  |  |  |
| **SPID** | 2 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if( MU Indicator == 1 ){ | — | — |
|  |  |  |
| if( Dedicated MIMO DL Control | — | — |
| indicator == 1) { |  |  |
|  |  |  |
| **Dedicated MIMO DL Con-** | *variable* | — |
| **trol IE ()** |  |  |
|  |  |  |
| **}** | — | — |
|  |  |  |
| **Layer Relevance Bitmap** | 4 | 4 bit bitmap indicating if layer processing should |
|  |  | be skipped. The bit position indicates the layer. |
|  |  | The bit value: |
|  |  | 0 = skip the layer; |
|  |  | 1 = process the layer |
|  |  |  |
| for( *i* = 0; *i* < N\_Layers; *i*++ ){ | — | For each instance of the for-loop, when the |
|  |  | corresponding bit in the Layer Relevance Bitmap |
|  |  | is set to 0, the subsequent fields within this |
|  |  | instance of for-loop are omitted. |
|  |  |  |
| if( Allocation flag == 0 ){ | — | — |
|  |  |  |

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**Table 8-165—Persistent MIMO DL IR HARQ CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the |
|  |  | group assignment of the MS (see 8.4.4.2 and |
|  |  | 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| **RCID IE ()** | *variable* | — |
|  |  |  |
| **MAP ACK Channel** | 6 | Index to a MAP ACK channel within the Fast |
| **Index** |  | Feedback region. |
|  |  |  |
| if( Resource Shifting Indi- | — | — |
| cator == 1){ |  |  |
|  |  |  |
| **Slot Offset** | *variable* | See definition above in this IE. |
|  |  |  |
| **Duration** | *variable* | See definition above in this IE. |
|  |  |  |
| **Retransmission Flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in |
|  |  | Allocation Period |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if( Allocation Flag == 1 ){ | — | — |
|  |  |  |
| **RCID IE ()** | *variable* | — |
|  |  |  |
| **Persistent flag** | 1 | — |
|  |  |  |
| **Slot Offset** | *variable* | See definition above in this IE. |
|  |  |  |
| **ACK Disable** | 1 | See definition above in this IE. |
|  |  |  |
| **Duration Indicator** | 1 | If Duration Indicator is 1, it indicates that |
|  |  | Duration is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same |
|  |  | Duration as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Duration Indicator | — | — |
| == 1) { |  |  |
|  |  |  |
| **Duration** | *variable* | See definition above in this IE. |
|  |  |  |
| } | — | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition Coding** | 2 | See definition above in this IE. |
| **Indication** |  |  |
|  |  |  |
| if( ACK Disable == 0 ){ | — | — |
|  |  |  |
| **ACK Channel** | 8 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **ACID** | 4 | Initial value of HARQ channel identifier. |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| **SPID** | 2 | — |
|  |  |  |
| if( Persistent Flag == 1 ){ | — | — |
|  |  |  |

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**Table 8-165—Persistent MIMO DL IR HARQ CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Allocation Period** | 1 | If Allocation Period and N\_ACID Indicator is 1, it |
| **and N\_ACID** |  | indicates that allocation information (allocation |
| **Indicator** |  | period, Number of ACID (N\_ACID) is explicitly |
|  |  | assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same allocation period as the |
|  |  | previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Allocation Period | — | — |
| and N\_ACID Indicator |  |  |
| == 1) { |  |  |
|  |  |  |
| **Allocation Period** | 5 | See definition above in this IE. |
|  |  |  |
| **Number of ACID** | 3 | See definition above in this IE. |
| **(N\_ACID)** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **MAP ACK Channel** | 6 | See definition above in this IE. |
| **Index** |  |  |
|  |  |  |
| **MAP NACK Chan-** | 6 | See definition above in this IE. |
| **nel Index** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to nibble; shall be set to zero. |
|  |  |  |
| } | — | — |
|  |  |  |

**Table 8-166—Persistent MIMO DL STC HARQ CC Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Persistent\_MIMO\_ DL\_STC\_HARQ\_Sub- | — | — |
| burst\_IE() { |  |  |
|  |  |  |
| **N sub-burst** | 4 | Number of changed sub-bursts in the 2D |
|  |  | rectangular region is this field value plus 1. |
|  |  |  |
| **Resource Shifting Indicator** | 1 | 0 = No Resource Shifting |
|  |  | 1 = Resource Shifting |
|  |  |  |
| for( *j* = 0; *j* < Number of changed sub-bursts; | — | — |
| *j*++ ){ |  |  |
|  |  |  |
| **Allocation Flag** | 1 | — |
|  |  |  |

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**Table 8-166—Persistent MIMO DL STC HARQ CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the |
|  |  | group assignment of the MS (see 8.4.4.2 and |
|  |  | 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| if( Allocation Flag == 0 ){ | — | // De-allocate |
|  |  |  |
| **RCID\_IE ()** | *variable* | — |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast |
|  |  | Feedback region. When MAP ACK Channel |
|  |  | Index = 0b111111, it indicates NO MAP ACK |
|  |  | channel is assigned to this de-allocation. |
|  |  |  |
| if( Resource Shifting Indicator ==1 ){ | — | // resource shifting is allowed |
|  |  |  |
| **Duration** | *variable* | Duration in slots.OFDMA Frame duration |
|  |  | dependant |
|  |  | 7 bits–2.5 ms frame |
|  |  | 8 bits–5 ms frame |
|  |  | 9 bits–10 ms frame |
|  |  | 10 bits–20 ms frame |
|  |  |  |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in |
|  |  | OFDMA slots, with respect to the lowest |
|  |  | numbered OFDM symbol and the lowest |
|  |  | numbered subchannel in the HARQ region. |
|  |  | OFDMA Frame duration dependant |
|  |  | 7 bits–2.5 ms frame |
|  |  | 8 bits–5 ms frame |
|  |  | 9 bits–10 ms frame |
|  |  | 10 bits–20 ms frame |
|  |  |  |
| **Retransmission Flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in |
|  |  | Relevant Frame – Allocation Period |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if( Allocation Flag == 1 ) | — | // allocation |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| **Persistent Flag** | 1 | — |
|  |  |  |
| if (Power boost per sub-burst ==1) { | — | — |
|  |  |  |
| **Boosting** | 3 | 0b000: Normal (not boosted) |
|  |  | 0b001: +6 dB |
|  |  | 0b010: –6 dB |
|  |  | 0b011: +9 dB |
|  |  | 0b100: +3 dB |
|  |  | 0b101: –3 dB |
|  |  | 0b110: –9 dB |
|  |  | 0b111: –12 dB |
|  |  | Note that if the Persistent flag is set, the boosting |
|  |  | value applies to each instance of the persistent |
|  |  | allocation. |
|  |  |  |
| } |  |  |
|  |  |  |

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**Table 8-166—Persistent MIMO DL STC HARQ CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| if( Persistent Flag == 1 ){ | — | — |
|  |  |  |
| **Allocation Period and N\_ACID** | 1 | If Allocation Period and N\_ACID Indicator is 1, it |
| **Indicator** |  | indicates that allocation information (allocation |
|  |  | period, Number of ACID (N\_ACID) is explicitly |
|  |  | assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same allocation period as the |
|  |  | previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Allocation Period and N\_ACID | — | — |
| Indicator == 1) { |  |  |
|  |  |  |
| **Allocation period (ap)** | 5 | Period of the persistent allocation is this field |
|  |  | value plus 1 (unit is frame). |
|  |  |  |
| **MAP NACK Channel Index** | 6 | Index to a shared MAP NACK channel within the |
|  |  | Fast Feedback region. When MAP NACK |
|  |  | Channel Index = 0b111111, it indicates NO MAP |
|  |  | NACK channel is assigned to this allocation. |
|  |  |  |
| } |  |  |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast |
|  |  | Feedback region. |
|  |  |  |
| **Number of ACID (N\_ACID)** | 3 | Number of HARQ channels associated with this |
|  |  | persistent assignment is this field value plus 1. |
|  |  |  |
| **}** | — | — |
|  |  |  |
| **Tx count** | 2 | Tx count shall be set to ‘0’ when Persistent Flag is |
|  |  | set to ‘1’. |
|  |  |  |
| **Duration Indicator** | 1 | If Duration Indicator is 1, it indicates that |
|  |  | Duration is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same |
|  |  | Duration as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Duration Indicator == 1) { | — | — |
|  |  |  |
| **Duration** | *variable* | Duration in slots. OFDMA Frame duration |
|  |  | dependant |
|  |  | 7 bits–2.5 ms frame |
|  |  | 8 bits–5 ms frame |
|  |  | 9 bits–10 ms frame |
|  |  | 10 bits–20 ms frame |
|  |  |  |
| } | — | — |
|  |  |  |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in |
|  |  | OFDMA slots, with respect to the lowest |
|  |  | numbered OFDM symbol and the lowest |
|  |  | numbered subchannel in the HARQ region. |
|  |  | OFDMA Frame duration dependant |
|  |  | 7 bits–2.5 ms frame |
|  |  | 8 bits–5 ms frame |
|  |  | 9 bits–10 ms frame |
|  |  | 10 bits–20 ms frame |
|  |  |  |

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**Table 8-166—Persistent MIMO DL STC HARQ CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **ACK disable** | 1 | When ACK Disable == 1, the allocated sub-burst |
|  |  | does not require an ACK to be transmitted by the |
|  |  | SS in the ACKCH Region (see 8.4.5.4.53). In this |
|  |  | case, no ACK channel is allocated for the sub- |
|  |  | burst in the ACKCH Region. For TDD SS, for the |
|  |  | burst, BS shall not perform HARQ retransmission |
|  |  | and MS shall ignore ACID, AI\_SN and SPID, |
|  |  | which shall be set to 0 by BS if they exist. For |
|  |  | FDD SS, for the burst, BS shall not perform |
|  |  | HARQ retransmission and MS shall ignore |
|  |  | AI\_SN and SPID, which shall be set to 0 by BS if |
|  |  | they exist. For FDD SS, the BS may set the ACID |
|  |  | to a value other than 0 if that ACID is listed in the |
|  |  | Aggregated HARQ Channels TLV. The CRC shall |
|  |  | be appended at the end of each sub-burst |
|  |  | regardless of the ACK disable bit. |
|  |  |  |
| if( Tx count == 0 ){ | — | — |
|  |  |  |
| **Dedicated MIMO DL Control** | 1 | — |
| **indicator** |  |  |
|  |  |  |
| if( Dedicated MIMO DL Control | — | — |
| indictor ==1 ){ |  |  |
|  |  |  |
| **Dedicated MIMO DL Control** | *variable* | — |
| **IE ()** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indicator** | 2 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **ACID** | 4 | Initial value of HARQ channel identifier. |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to nibble; shall be set to zero. |
|  |  |  |
| } | — | — |
|  |  |  |

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**8.4.5.3.30 Power Boosting IE**

In the DL-MAP, BS may transmit the Power Boosting IE, as shown in Table 8-167, to signal the update of power boosting information for persistent allocations assigned to MSs by the Persistent HARQ DL MAP IE. The power boosting information in the Power Boosting IE shall be applied to persistent allocation associated with the R\_CID and ACID in the Power Boosting IE.

**Table 8-167—Power Boosting IE**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Power boosting IE{ | — | — |
|  |  |  |
| **Extended-2 DIUC** | 4 | Power boosting IE() = 0xF (Extended-3 DIUC) |
|  |  |  |
| **Length** | 8 | Length in bytes |
|  |  |  |
| **Extended-3 DIUC** | 4 | 0x00 |
|  |  |  |
| **RCID\_Type** | 2 | 0b00: Normal CID |
|  |  | 0b01: RCID11 |
|  |  | 0b10: RCID7 |
|  |  | 0b11: RCID3 |
|  |  |  |
| **Number of Risks** | 4 |  |
|  |  |  |
| for(*i* = 0; *i* < Number of RCIDs; *i*++){ | — |  |
|  |  |  |
| **R\_CID** | *variable* |  |
|  |  |  |
| **A\_CID** | 4 | Start of ACID |
|  |  |  |
| **Boosting** | 3 | 0b000: Normal (not boosted) |
|  |  | 0b001: +6 dB |
|  |  | 0b010: –6 dB |
|  |  | 0b011: +9 dB |
|  |  | 0b100: +3 dB |
|  |  | 0b101: –3 dB |
|  |  | 0b110: –9 dB |
|  |  | 0b111: –12 dB |
|  |  |  |
| } |  |  |
|  |  |  |
| **Padding** | *variable* | Padding to byte for the unspecified portion of this IE |
|  |  | (i.e., not including the first two fields, “Extended-2 |
|  |  | DIUC” and “Length”); shall be set to 0. |
|  |  |  |
| } | — | — |
|  |  |  |

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**8.4.5.3.31 Extended Broadcast Control Pointer IE**

In instead of Broadcast Control Pointer IE, BS may include an Extended Broadcast Control Pointer IE, as shown in Table 8-168, in one of Downlink MAP messages (see 8.4.5.3.25) in order to indicate the frame in which EASM(s) shall be transmitted.

**Table 8-168—Extended Broadcast Control Pointer IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Broadcast\_Control\_Pointer\_IE() { | — | — |
|  |  |  |
| **Extended DIUC** | 4 | Extended Broadcast\_Control\_Pointer\_IE() = 0xE |
|  |  |  |
| **Type** | 4 | Indicates the type of message. |
|  |  | 0x0: Emergency Alert Service Message |
|  |  | 0x1~0xF: *Reserved* |
|  |  |  |
| **Transmission Frame Offset** | 16 | A relative value from the current frame number in |
|  |  | which a BS will start to transmit Emergency Alert |
|  |  | Service Message. '0' means the current frame in which |
|  |  | this MAP IE is transmitted. |
|  |  |  |
| **Transmission Duration** | 8 | Indicates the period during which an MS in Idle Mode |
|  |  | or Sleep Mode shall keep awake to receive Emergency |
|  |  | Alert Service Message(s). The value '0' indicates that |
|  |  | the MS keeps awake during only Transmission Frame. |
|  |  | Its unit is frame. |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.3.32 MR\_DL-MAP MONITOR IE**

In RS-assisted HARQ as described in 6.3.15.4.2.2, the MR-BS shall send the MR\_DL-MAP MONITOR IE to RS. The MR\_DL-MAP MONITOR IE provides the list of CIDs of the MS whose transmissions need to be monitored in the DL part of the current frame. When an RS receives a MR\_DL-MAP Monitor IE, it shall store the CID list and uses for HARQ data forwarding until the list is updated by another MR\_DL-MAP Monitor IE (see Table 8-169).

**Table 8-169—MR\_DL-MAP MONITOR IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bits)** |
|  |  |
|  |  |  |
| MR\_DL-MAP MONITOR\_IE(){ | — | — |
|  |  |  |
| **Extended-2 DIUC** | 4 | 0x0F(Extended-3 DIUC) |
|  |  |  |
| **Length** | 8 | Length in bytes |
|  |  |  |
| **Extended-3 DIUC** | 4 | MR\_DL-MAP MONITOR IE = 0x01 |
|  |  |  |
| **Num\_RS** | 8 | Number of RSs |
|  |  |  |
| for(i=0; i<Num\_RS; i++){ | — | — |
|  |  |  |
| **RCID\_IE** | *variable* | RS CID |
|  |  |  |
| **N\_CID\_encoded** | 4 | Number of CIDs for which RS uses the |
|  |  | encoded ACK/NAK |
|  |  |  |

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**Table 8-169—MR\_DL-MAP MONITOR IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bits)** |
|  |  |
|  |  |  |
| **N\_CID\_direct** | 4 | Number of CIDs for which RS uses the |
|  |  | direct feedback |
|  |  |  |
| For(i=0; i<N\_CID\_encoded + | — | — |
| N\_CID\_direct; i++){ |  |  |
|  |  |  |
| **RCID\_IE(i)** | *variable* | The CIDs of the connections that RS |
|  |  | shall monitor in the current frame |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

**N\_CID\_encoded**

This field specifies the number of CIDs that shall use the encoded ACK/NAK among CIDs list in this IE. The CIDs from the beginning of the list to the value of this field use the encoded ACK/ NAK.

**N\_CID\_direct**

This field specifies the number of CIDs that shall use the direct ACK/NAK among CIDs list in this IE. The CIDs from the N\_CID\_encoded to the end of the list use the direct ACK/NAK.

**8.4.5.3.33 DL Burst Transmit IE format**

An MR-BS may send R-MAP including DL\_Burst\_Transmit IE to the subordinate RSs to indicate the bursts to be forwarded by Nr in the IE. The Lk included in DL\_Burst\_Transmit IE refers to the number of bytes in each burst that is forwarded by the RS (see Table 8-170).

**Table 8-170—DL Burst Transmit IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bits)** |
|  |  |
|  |  |  |
| DL\_Burst\_Transmit\_IE(){ | — | — |
|  |  |  |
| **Extended-2 DIUC** | 4 | 0x0F (Extended-3 DIUC) |
|  |  |  |
| **Length** | 8 | — |
|  |  |  |
| **Extended-3 DIuc** | 4 | DL\_Burst\_Transmit\_IE = 0x02 |
|  |  |  |
| If(included in SUB-DL-UL-MAP){ | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | Reduced RS basic CID |
|  |  |  |
| }else{ | — | — |
|  |  |  |
| **CID** | 16 | RS basic CID |
|  |  |  |
| } | — | — |
|  |  |  |
| **Nr** | 8 | Indicate the number of MAP IEs in DL- |
|  |  | MAP the transparent RS shall forward |
|  |  |  |

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**Table 8-170—DL Burst Transmit IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bits)** |
|  |  |
|  |  |  |
| for (k=0; k<Nr; k++) { | — | — |
|  |  |  |
| **Lk** | 16 | Burst length in bytes to be forwarded |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding to byte alignment** | *variable* | Shall be set to 0 |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.3.34 OFDMA Periodic\_Channel Measurement IE**

An extended IE with an extended-3 DIUC value of 0x03 is issued by the BS to request periodic channel measurement (see 15.1.3.2.1).

**Table 8-171—OFDMA Periodic Channel Measurement IE**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Periodic\_Channel\_Measurement\_IE() { |  |  |
|  |  |  |
| Extended-2 DIUC | 4 | 0x0F (Extended-3 DIUC) |
|  |  |  |
| Length | 4 | Length in bytes |
|  |  |  |
| Extended-3 DIUC | 4 | OFDMA Periodic\_Channel\_Measure- |
|  |  | ment\_IE=0x04 |
|  |  |  |
| ChCtrFr | 16 | Center frequency in 10kHz (WirelessMAN-UCP |
|  |  | and WirelessMAN-CX only) |
|  |  |  |
| CID | 16 | Basic CID of the SS for which the channel mea- |
|  |  | surement IE is directed. |
|  |  |  |
| Number of Measurement Request | 4 | The number, n, of periodic measurement requests |
|  |  | included in this IE. |
|  |  |  |
| For(i=0;i<n;i++) { |  |  |
|  |  |  |
| Measurement request index | 4 |  |
|  |  |  |
| Number of Frames between two Measurement | 12 | Number of frames between two available mea- |
| Intervals |  | surement frames |
|  |  |  |
| Number of Frames for Periodic Measurement | 16 | The total number of frames to perform periodic |
|  |  | measurement, in unit Frame |
|  |  | 0: indicate the periodic measurement shall con- |
|  |  | tinue all the time. |
|  |  |  |
| Start Frame Number Offset | 8 | The offset of frame that start measurement to the |
|  |  | current frame. |
|  |  |  |

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**Table 8-171—OFDMA Periodic Channel Measurement IE *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Start of Measurement Interval | 8 | OFDMA offset of the beginning of measurement |
|  |  | interval. |
|  |  |  |
| End of Measurement Interval | 8 | OFDMA offset of the end of measurement inter- |
|  |  | val. |
|  |  |  |
| } |  |  |
|  |  |  |
| } |  |  |
|  |  |  |

**8.4.5.4 UL-MAP IE format**

The OFDMA UL-MAP IE defines UL bandwidth allocations. UL bandwidth allocations are specified either as block allocations (subchannel by symbol) with an absolute offset or as an allocation with duration in slots with either a relative or absolute slot offset. Block allocations are used for fast feedback (UIUC = 0), HARQ ACK CH region (UIUC-11 (Extended-2 UIUC) with Type = 8), CDMA ranging and BR allocations (UIUC = 10 and 12) as well as PAPR/safety zone allocations (UIUC = 13). Slot allocations are used for all other UL bandwidth allocations. For UL allocations in non-AAS zones, the starting position for the allocation is determined considering the prior allocations appearing in the UL-MAP. For UL allocations in an AAS UL zone, the starting position is included in the UL IE indicating an absolute slot offset from the beginning of the AAS zone. If an OFDMA UL-MAP IE with UIUC = 0 or UIUC = 11, (Extended-2) with Type = 8 or UIUC = 10 or UIUC = 12 or UIUC = 13 exists, it shall always be allocated first. In FDD/H-FDD, if uplink allocation is made for FDD MSs in the other UL Group (that is, the UL Group different from the UL-MAP belongs to), OFDMA UL-MAP IE with UIUC 11 with Type = 13 shall be used to notify that allocation.

For the first OFDMA UL-MAP IE with UIUC other than 0, UIUC = 11 (Extended-2) with Type = 8, or UIUC =10 or UIUC = 12, or UIUC = 13, the allocation shall start at the lowest numbered nonallocated subchannel on the first nonallocated OFDMA symbol defined by the Allocation Start Time field of the UL-MAP message that is not allocated with UIUC = 0 or UIUC = 11 (Extended-2) with Type = 8 or UIUC = 12 or UIUC = 13 (see Figure 8-45 for an example). These IEs shall represent the number of slots provided for the allocation. For allocations not in an AAS zone, each allocation IE shall start immediately following the previous allocation and shall advance in the time axis. If the end of the UL zone has been reached, the allocation shall continue at the next subchannel at first OFDMA symbol allocated to that zone that is not allocated with UIUC = 0 or UIUC = 11 (Extended-2) with Type = 8 or or UIUC = 10 or UIUC = 12 or UIUC = 13. A UIUC shall be used to define the type of UL access and the burst type associated with that access. A burst descriptor shall be specified in the UCD for each UIUC to be used in the UL-MAP. For further details on allocations in an UL AAS zone, see 8.4.4.7.

The format of the UL-MAP IE is defined in Table 8-172a.

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**Table 8-172a—OFDMA UL-MAP IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| UL-MAP\_IE() { | — | — |
|  |  |  |
| **CID** | 16 | — |
|  |  |  |
| **UIUC** | 4 | — |
| if (UIUC == 9) { | — | — |
| **Power Correction** | 8 | In a step of .25 dB |
| } | — | — |
| else if (UIUC == 10) { |  |  |
|  |  | BR/periodic ranging over one symbol |
| } |  |  |
| Else if (UIUC == 11) { |  |  |
|  |  |  |
| **Extended UIUC 2 dependent IE** | *variable* | See 8.4.5.4.34.2 |
|  |  |  |
| } | — | — |
|  |  |  |
| else if (UIUC == 12) { | — | — |
|  |  |  |
|  |  | Initial ranging/Handover Ranging over two |
|  |  | symbols |
|  |  |  |
|  |  |  |
|  |  |  |
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|  |  |  |
|  |  |  |
|  |  |  |
| } else if (UIUC == 13) { | — | — |
|  |  |  |
| **PAPR\_Reduction\_and\_Safety\_-** | 8 |  |
| **Zone\_ \_IE** |  |  |
|  |  |  |
| } else if (UIUC == 14) { | — | — |
|  |  |  |
| **CDMA\_Allocation\_IE()** | 20 | — |
|  |  |  |
| } else if (UIUC == 15) { | — | — |
|  |  |  |
| **Extended UIUC-dependent IE** | *variable* | See 8.4.5.4.34.1. |
|  |  |  |
| } else if (UIUC == 0) { | — | — |
|  |  |  |
| **FAST-FEEDBACK\_Allocation\_IE()** | 32 | — |
|  |  |  |
| } else { | — | — |
|  |  |  |
| **Duration** | 10 | In OFDMA slots (see 8.4.3.1). |
|  |  |  |

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**Table 8-172a—OFDMA UL-MAP IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
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|  |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

**CID**

The CID shall be the SS’s Basic CID for UIUC 1~10, 11 or 15, when appropriate, and the broadcast or multicast CID for UIUC 0 and 11~15.

**UIUC**

UIUC used for the burst.

**OFDMA symbol offset**

The offset of the OFDMA symbol in which the burst starts, the offset value is defined in units of OFDMA symbols and is relevant to the Allocation Start Time field given in the UL-MAP message.

**Duration**

Indicates the duration, in units of OFDMA slots, of the allocation.

When a ranging region (UIUC = 10 or 12) is present in the UL subframe, and the SS is in ranging backoff state, it shall count the ranging opportunities present in the ranging region. Only ranging allocations allocated in permutation zones supported by the SS and matching the type of backoff the SS (ranging or BR) shall be considered as containing relevant ranging opportunities.

The subchannel offsets in all formats of UL-MAP IE are referred to logical subchannels before applying the mapping indicated by UL subchannel’s bitmap in UCD and rotation scheme (see 8.4.6.2.6) for the UL.

For SUB-UL-DL-MAPs, the current UL zone is automatically reset to the UL zone containing the OFDMA symbol whose offset is specified in the SUB-DL-UL-MAP. The current UL zone is thereafter updated whenever an UL-MAP IE contains an explicit OFDMA symbol offset.

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Some control regions may be defined in UCD via FastFeedback Region TLV, HARQ ACK Region TLV, Ranging Region TLV and Sounding Region TLV*.* These control regions include

— Initial/HO ranging region, Periodic Ranging/BW request region (UIUC = 10 or 12)

— FastFeedback region (UIUC = 0)

— DL HARQ ACK region (UIUC = 11 (Extended 2 UIUC with Type = 8)

— UL Sounding region (UIUC = 13 with Sounding Zone bit = 1)

These UCD TLVs specify a data region within UL subframe and frame numbers of UL MAP where the cor-responding control region IE would appear, however when such a control region is specified by a UCD TLV, the corresponding control region IE does not need to appear in the UL MAP. The frame numbers of UL MAP are described by periodicity and phase so that MS can identify the numbers as sum of phase and inte-ger multiples of periodicity. The actual UL subframes where MS transmit UL signals are further delayed by UL Allocation Start Time of UL MAP.

If certain TLV is present in UCD messages with certain value of the Configuration Change Count, the corre-sponding allocation shall be valid in all UL subframes specified by UL MAP messages with the same value of Configuration Change Count.

If UL MAP allocates one or more of the regions defined via UIUC=0, UIUC=11 (extended 2 UIUC with type=8), UIUC=12 or UIUC=13, these UIUC allocations override the corresponding allocations of the periodic regions defined by UCD in the specific frame.

**8.4.5.4.1 UIUC allocation**

Table 8-173a defines the UIUC encoding that shall be used in the UL-MAP\_IE().

|  |  |
| --- | --- |
|  | **Table 8-173a—OFDMA UIUC values** |
|  |  |
| **UIUC** | **Usage** |
|  |  |
| 0 | Fast-feedback channel |
|  |  |
| 1–8 | Different burst profiles (Data Grant Burst Type) Including QPSK ½ with repetition 2 |
| 9 | Power control IE |
| 10 | CDMA BR/PR |
|  |  |
| 11 | Extended UIUC 2 IE |
|  |  |
| 12 | CDMA Initial ranging/Handover ranging |
|  |  |
| 13 | PAPR reduction allocation, safety zone, Sounding Zone |
|  |  |
| 14 | CDMA Allocation IE |
|  |  |
| 15 | Extended UIUC |
|  |  |

The UIUC = 0 is used for allocation of fast-feedback channel region. There shall not be more than one UL-MAP IE with UIUC = 0 for a UL frame. The UIUC = 13 is used for allocation of Subchannels for PAPR reduction schemes. The data subcarriers within these subchannels may be used by all SSs to reduce PAPR of their transmissions. Alternatively, it can also be used by the BS to create coverage enhancing safety zones for UL. This is intended to provide reduced interference zones within the coverage area of the SS. The reduced interference zones are useful when the SS in the neighboring BS are near the cell edge and interfer-ing with SS in the current BS. In such situations, the reduced interference zones may be used by the SS in the neighboring BS so that the SS in the current BS do not suffer from interference.

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The CDMA allocation UIUC provides (among other things) a function similar to the initial ranging UIUC used in other PHY options; therefore, instructions that relate to messages transmitted in the initial ranging UIUC shall apply to messages transmitted in the CDMA allocation UIUC as well.

**8.4.5.4.2 PAPR Reduction/Safety Zone/Sounding Zone Allocation IE**

Table 8-174 defines the PAPR Reduction/Sounding Zone/Safety Zone Allocation IE. This IE is identified by UIUC = 13. When a UIUC 13 allocation is used to define a Sounding Zone, it shall occupy one or more entire OFDMA symbol(s) and be located in the last symbol(s) of a permutation zone.

**Table 8-174a—PAPR Reduction/Safety Zone Zone Allocation IE format**

|  |  |  |  |
| --- | --- | --- | --- |
| **Syntax** | **Size** |  | **Notes** |
| **(bit)** |  |
|  |  |  |
|  |  |  | |
| PAPR\_Reduction\_Safety\_ \_IE() { | — | — | |
|  |  |  | |
| **OFDMA symbol offset** | 8 | — | |
|  |  |  | |
|  |  |  | |
|  |  |  | |
|  |  |  | |
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|  |  |  | |
|  |  |  | |
|  |  |  | |
| } | — | — | |
|  |  |  |  |

**OFDMA symbol offset**

The offset of the OFDMA symbol in which the PAPR reduction/safety zone starts. The offset value is defined in units of OFDMA symbols and is relevant to the Allocation Start Time field given in the UL-MAP message.

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**8.4.5.4.3 CDMA Allocation UL-MAP IE format**

Table 8-175 defines the UL-MAP IE for allocation of bandwidth to a user that requested bandwidth using a CDMA request code. This IE is identified by UIUC =14.

**Table 8-175a—CDMA Allocation IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| CDMA\_Allocation\_IE() { | — | — |
|  |  |  |
| **Duration** | 4 | — |
|  |  |  |
| **UIUC** | 4 | UIUC for transmission |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
| **Frame Number Index** | 4 | LSBs of relevant frame number |
|  |  |  |
| **Ranging Code** | 8 | — |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
| } | — | — |
|  |  |  |

**Duration**

Indicates the duration, in units of OFDMA slots, of the allocation.

.

**Frame Number Index**

Identifies the frame in which the CDMA code to which this message responds was transmitted. The 4 LSBs of the frame number are used as the frame number index.

**Ranging Code**

Indicates the CDMA code sent by the SS.

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**8.4.5.4.33 M2M Ranging Allocation UL-MAP Extended IE format**

The M2M Ranging Allocation UL-MAP Extended IE is used to indicate if the allocated ranging channel is used for M2M devices or to restrict new ranging accesses from M2M devices.

**Table 8-225a—M2M Ranging Allocation UL-MAP Extended IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size (bit)** | **Notes** |
|  |  |  |
| M2M Ranging Allocation UL-MAP | — | — |
| Extended IE(){ |  |  |
|  |  |  |
| Extended UIUC | 4 | M2M Ranging Allocation UL- |
|  |  | MAP Extended = 0xC |
|  |  |  |
| Length | 4 | Length is 2 or 6 |
|  |  |  |
| Access restriction indicator | 1 | When this bit is set to 1, it indicates |
|  |  | that M2M devices are not allowed |
|  |  | to access this BS. |
|  |  | When this bit is set to 0, this IE |
|  |  | specifies the ranging allocation for |
|  |  | M2M devices. |
|  |  |  |
| *Padding* | 7 | Set to 0 for byte alignment |
|  |  |  |
| If (Access restriction indicator == 0) { |  |  |
|  |  |  |
| OFDMA Symbol offset | 8 | — |
|  |  |  |
| Subchannel offset | 7 | — |
|  |  |  |
| No. OFDMA Symbols | 7 | — |
|  |  |  |
| No. Subchannels | 7 | — |
|  |  |  |
| Ranging Method | 2 | 0b00: Initial ranging/Handover |
|  |  | Ranging over two symbols |
|  |  | 0b01: Initial ranging/Handover |
|  |  | Ranging over four symbols |
|  |  | 0b10–0b11: *Reserved* |
|  |  |  |
| Dedicated ranging indicator | 1 | 0: The OFDMA region and ranging |
|  |  | method defined are used for the |
|  |  | purpose of normal ranging |
|  |  | 1: The OFDMA region and ranging |
|  |  | method defined are used for the |
|  |  | purpose of ranging using dedicated |
|  |  | CDMA code and transmission |
|  |  | opportunities assigned in the |
|  |  | MOB\_PAG-ADV message |
|  |  |  |
| } |  |  |
|  |  |  |
| } |  |  |
|  |  |  |

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**8.4.5.4.34 UL-MAP Extended IE**

**8.4.5.4.34.1 UL-MAP Extended IE format**

A UL-MAP IE entry with a UIUC = 15 indicates that the IE carries special information and conforms to the structure shown in Table 8-226. A station shall ignore an extended IE entry with an extended UIUC value for which the station has no knowledge. In the case of a known extended UIUC value but with a length field longer than expected, the station shall process information up to the known length and ignore the remainder of the IE.

**Table 8-226—OFDMA UL-MAP Extended IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| UL\_Extended\_IE() { | — | — |
|  |  |  |
| **Extended UIUC** | 4 | 0x0..0xF |
|  |  |  |
| **Length** | 4 | Length in bytes of Unspecified Data field |
|  |  |  |
| **Unspecified data** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |

Table 8-227 defined the encoding for extended UIUC that shall be used by UL-MAP Extended IEs.

**Table 8-227—Extended UIUC code assignment for UIUC = 15**

|  |  |
| --- | --- |
| **Extended UIUC** | **Usage** |
| **(hexadecimal)** |
|  |
|  |  |
| 0x0 | Power Control IE |
|  |  |
| 0x1 | *Reserved* |
|  |  |
| 0x2 | AAS UL IE |
|  |  |
| 0x3 | CQICH Allocation IE |
|  |  |
| 0x4 | UL Zone IE |
|  |  |
| 0x5 | UL-MAP Physical Modifier IE |
|  |  |
| 0x6 | *Reserved* |
|  |  |
| 0x7 | UL-MAP Fast Tracking IE |
|  |  |
| 0x8 | UL PUSC Burst Allocation in Other Segment IE |
|  |  |
| 0x9 | Fast Ranging IE |
|  |  |
| 0xA | UL Allocation Start IE |
|  |  |
| 0xB | UL Burst Receive IE |
|  |  |
| 0xC | FTN Assignment IE |
|  |  |

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**Table 8-227—Extended UIUC code assignment for UIUC = 15**

|  |  |
| --- | --- |
| **Extended UIUC** | **Usage** |
| **(hexadecimal)** |
|  |
|  |  |
| 0xC | FTN Assignment IE |
|  |  |
| 0xD … 0xF | *Reserved* |
|  |  |

**8.4.5.4.34.2 UL-MAP Extended-2 IE format**

A UL-MAP IE entry with a UIUC = 11 indicates that the IE carries special information and conforms to the structure shown in Table 8-228. A station shall ignore an Extended-2 IE entry with an extended-2 UIUC value for which the station has no knowledge. In the case of a known extended-2 UIUC value but with a length field longer than expected, the station shall process information up to the known length and ignore the remainder of the IE.

The Unspecified Data field shall be padded with bits set to zero to get an integer number of bytes, specified by Length, in the data field of the IE.

**Table 8-228—UL-MAP Extended-2 IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Note** |
| **(bit)** |
|  |  |
|  |  |  |
| UL\_Extended-2\_IE() { | — | — |
|  |  |  |
| **Extended-2 UIUC** | 4 | 0x0 … 0xF |
|  |  |  |
| **Length** | 8 | Length in bytes of Unspecified Data field |
|  |  |  |
| **Unspecified Data** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |

Table 8-229 defines the encoding for extended-2 UIUC that shall be used by UL-MAP Extended-2 IEs.

**Table 8-229—Extended-2 UIUC code assignment for UIUC = 11**

|  |  |
| --- | --- |
| **Extended-2 Type** | **Usage** |
| **(hexadecimal)** |
|  |
|  |  |
| 0x0 | CQICH Enhanced Allocation IE |
|  |  |
| 0x1 | HO Anchor Active UL-MAP IE |
|  |  |
| 0x2 | HO Active Anchor UL-MAP IE |
|  |  |
| 0x3 | Anchor BS Switch IE |
|  |  |
| 0x4 | UL Sounding Command IE |
|  |  |
| 0x5 | Extended-3 UIUC |
|  |  |
| 0x6 | MIMO UL Enhanced IE |
|  |  |

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**Table 8-229—Extended-2 UIUC code assignment for UIUC = 11 *(CONTINUED)***

|  |  |
| --- | --- |
| **Extended-2 Type** | **Usage** |
| **(hexadecimal)** |
|  |
|  |  |
| 0x7 | HARQ UL MAP IE |
|  |  |
| 0x8 | HARQ ACKCH Region Allocation IE |
|  |  |
| 0x9 | MIMO UL Basic IE |
|  |  |
| 0xA | Mini-subchannel allocation IE |
|  |  |
| 0xB | UL\_PC\_Bitmap IE |
|  |  |
| 0xC | Persistent HARQ UL MAP IE |
|  |  |
| 0xD | FDD Paired Allocation IE |
|  |  |
| 0xE | AAS SDMA UL IE |
|  |  |
| 0xF | Feedback Polling IE |
|  |  |

**8.4.5.4.34.3 UL-MAP Extended-3 IE format**

A UL-MAP IE entry with an Extended-2 UIUC = 0x5 indicates that the IE carries special information and conforms to the structure shown in Table 8-230. A station shall ignore an Extended-3 IE entry with an extended-3 UIUC value for which the station has no knowledge. In the case of a known extended-3 UIUC value but with a length field longer than expected, the station shall process information up to the known length and ignore the remainder of the IE.

The Unspecified Data field shall be padded with bits set to zero to get an integer number of bytes, specified by Length, in the data field of the IE.

**Table 8-230—UL-MAP Extended-3 IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Note** |
| **(bit)** |
|  |  |
|  |  |  |
| UL\_Extended-3\_IE() { | — | — |
|  |  |  |
| **Extended-2 UIUC** | 4 | 0xF |
|  |  |  |
| **Length** | 8 | Length in bytes of the unspecified data field plus |
|  |  | the extended-3 UIUC field |
|  |  |  |
| **Extended-3 UIUC** | 4 | 0x00 … 0x0F |
|  |  |  |
| **Unspecified Data** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |

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Table 8-231 defines the encoding for extended-3 UIUC that shall be used by UL-MAP Extended-3 IEs.

**Table 8-231—Extended-3 UIUC code assignment for Extended-2 UIUC = 05**

|  |  |
| --- | --- |
| **Extended-3 UIUC** | **Usage** |
| **(hexadecimal)** |
|  |
|  |  |
| 00 | RS MIMO in UL IE |
|  |  |
| 01 | MR UL-MAP Monitor IE |
|  |  |
| 0x2–0F | *Reserved* |
|  |  |

**8.4.5.4.35 Power Control IE format**

When a power change for the SS is needed, the extended UIUC = 15 may be used with the subcode 0x00 and with 8-bit power control value as shown in Table 8-232. The power control value is an 8-bit signed integer expressing the change in power level (in 0.25 dB units) that the SS should apply to correct its current transmission power.

The CID used in the IE should be the Basic CID of the SS.

**Table 8-232—OFDMA Power Control IE**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Power\_Control\_IE() { | — | — |
|  |  |  |
| **Extended UIUC** | 4 | Fast power control = 0x0 |
|  |  |  |
| **Length** | 4 | Length = 0x2 |
|  |  |  |
| **Power control** | 8 | Signed integer, which expresses the change in |
|  |  | power level (in 0.25 dB units) that the SS should |
|  |  | apply to correct its current transmission power. |
|  |  |  |
| **Power measurement frame** | 8 | — |
|  |  |  |
| } | — | — |
|  |  |  |

**Power measurement frame**

The 8 LSB of the frame number in which the BS measured the power corrections referred to in the message.

**8.4.5.4.36 AAS UL IE format**

Within a frame, the switch from non-AAS to AAS-enabled traffic is marked by using the extended UIUC = 15 with the AAS\_UL\_IE() to indicate that the subsequent allocation shall be for AAS traffic. The AAS UL IE defines a UL AAS zone that spans continuous OFDMA symbols of length defined by the AAS zone Length field. Multiple UL AAS zones can exist within the same frame. When used, the CID in the UL-MAP\_IE() shall be set to the Broadcast CID. All UL bursts in the AAS portion of the frame may be

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preceded by an AAS preamble based on the indication in the AAS\_UL\_IE(). The preamble is defined in 8.4.4.7.4.2. Table 8-233 shows the format for the AAS UL IE.

**Table 8-233—OFDMA AAS UL IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| AAS\_UL\_IE() { | — | — |
|  |  |  |
| **Extended UIUC** | 4 | AAS = 0x2 |
|  |  |  |
| **Length** | 4 | Length = 0x3 |
|  |  |  |
| **Permutation** | 2 | 0b00: PUSC permutation |
|  |  | 0b01: Optional PUSC permutation |
|  |  | 0b10: adjacent-subcarrier permutation |
|  |  | 0b11: *Reserved* |
|  |  |  |
| **UL\_PermBase** | 7 | — |
|  |  |  |
| **OFDMA symbol offset** | 8 | — |
|  |  |  |
| **AAS zone length** | 8 | Number of OFDMA symbols in AAS zone |
|  |  |  |
| **Uplink\_preamble\_config** | 2 | 0b00: 0 symbols |
|  |  | 0b01: 1 symbols |
|  |  | 0b10: 2 symbols |
|  |  | 0b11: 3 symbols |
|  |  |  |
| *Reserved* | 5 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

**Permutation**

Defines the permutation used within the UL AAS zone.

**UL\_PermBase**

Permutation base for specified UL AAS zone.

**OFDMA Symbol offset**

The symbol offset of the UL AAS zone. This is referenced to the Allocation Start Time field in the UL-MAP.

**Uplink\_preamble\_config**

Defines the number of UL AAS preambles to be used before each UL burst in the AAS zone.

Following an AAS IE indicating AMC permutation, the AMC type shall be 2x3 (2 bins by 3 symbols).

**8.4.5.4.37 UL Zone Switch IE format**

In the UL-MAP, a BS may transmit UIUC = 15 with the UL\_Zone\_IE() to indicate that the subsequent allocations shall use a specific permutation. A UL\_Zone\_IE() may appear ahead of all UL Allocation IEs and indicate the permutation of the first and the following slots. If a UL\_Zone\_IE() does not appear ahead of all UL Allocation IEs, the UL frame shall start in PUSC mode with UL\_PermBase as indicated in the UCD message. Allocations subsequent to this IE shall use the permutation it instructs. No burst allocation or ranging channel allocation shall span multiple zones. Table 8-234 shows the format for a UL Zone IE.

When a relay zone is present in the UL subframe, the MR-BS or RS may transmit UL\_Zone\_IE in the access zone and shall not allocate burst for MS not to process in the uplink relay zone.

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In FDD/H-FDD, the UL Zone Switch IE can be included in the FDD\_Paired\_Allocation\_IE(). If the UL Zone Switch IE is included in the FDD\_Paired\_Allocation\_IE(), it indicates the configuration of the uplink zone in the other UL Group (that is, the UL Group different from the UL-MAP belongs to). UL-MAP IEs following the UL Zone Switch IE included in the FDD\_Paired\_Allocation\_IE() shall indicate uplink allocations made in the other UL Group. If the zone permutation of the last uplink zone in the first subframe (UL Group2) and that of the first uplink zone in the second subframe (UL Group1) are the same, BS may enable uplink burst allocation made over two consecutive subframes in the same frame by setting H-FDD Over\_subframe Allocation = 1. If the gap in-between two uplink subframes (UL\_gap) is multiple of uplink slot duration, BS may set H-FDD Inter-UL\_gap Allocation = 1 for the last uplink zone in UL Group2 to indicate F-FDD MS that the uplink allocation shall be made up to the slots in the UL\_gap.

**Table 8-234—OFDMA UL Zone IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| UL\_Zone\_IE() { | — | — |
|  |  |  |
| **Extended UIUC** | 4 | UL\_Zone = 0x4 |
|  |  |  |
| **Length** | 4 | Length = 0x3 |
|  |  |  |
| **OFDMA symbol offset** | 7 | — |
|  |  |  |
| **Permutation** | 2 | 0b00: PUSC permutation |
|  |  | 0b01: Optional PUSC permutation |
|  |  | 0b10: Adjacent subcarrier permutation |
|  |  | 0b11: *Reserved* |
|  |  |  |
| **UL\_PermBase** | 7 | — |
|  |  |  |
| **AMC type** | 2 | Indicates the AMC type in case permutation |
|  |  | type = 0b10, otherwise shall be set to 0. |
|  |  | AMC type (NxM = N bins by M symbols): |
|  |  | 0b00: 1x6 |
|  |  | 0b01: 2x3 |
|  |  | 0b10: 3x2 |
|  |  | 0b11: *Reserved* |
|  |  |  |
| **Use All SC indicator** | 1 | 0: Do not use all subchannels |
|  |  | 1: Use all subchannels |
|  |  |  |
| **Disable subchannel rotation** | 1 | Only applies to PUSC permutation (see |
|  |  | 8.4.6.2.6) |
|  |  | 0 = subchannel rotation enabled |
|  |  | 1 = subchannel rotation disabled |
|  |  |  |
| **H-FDD over-subframe allocation** | 1 | Only applies to FDD/H-FDD and shall be set |
|  |  | to zero for TDD. |
|  |  | 0b0: Disable UL over-subframe allocation |
|  |  | 0b1: Enable UL over-subframe allocation |
|  |  |  |
| **H-FDD Inter-UL\_gap allocation** | 1 | Only applies to FDD/H-FDD and shall be set |
|  |  | to zero for TDD. |
|  |  | 0b0: Disable inter-UL\_gap allocation |
|  |  | 0b1: Enable inter-UL\_gap allocation |
|  |  |  |
| *Reserved* | 2 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

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**OFDMA symbol offset**

The offset of the OFDMA symbol in which the zone starts, the offset value is defined in units of OFDMA symbols and is relevant to the Allocation Start Time field given in the UL-MAP message.

**Permutation**

Indicates the permutation that shall be used by the transmitter for allocations following this IE. Permutation changes are only allowed on a zone boundary. The UL\_PermBase indicated by the IE shall be used as the basis of the permutation (see 8.4.6.2.2 and 8.4.6.2.3).

**Use All SC indicator**

When the Use All SC indicator bit is set to 0, subchannels indicated by the allocated subchannel bitmap in UCD shall be used. Otherwise, all subchannels shall be used. This field shall be ignored in zones other than PUSC and O-PUSC.

This IE should not be used within SUB-DL-UL-MAP.

**8.4.5.4.38 Mini-Subchannel Allocation IE**

The Mini-Subchannel Allocation IE is used for subdividing subchannels into mini-subchannels. This IE uses the extended UIUC = 15 with the subcode 0x01 with the structure shown in Table 8-235. The CID in the UL-MAP when using the mini-subchannel allocation IE shall be set to the Broadcast CID.

**Table 8-235—Mini-Subchannel Allocation IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Mini\_Subchannel\_Allocation\_IE() { | — | — |
|  |  |  |
| **Extended-2 UIUC** | 4 | Mini subchannel allocation = 0xA |
|  |  |  |

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**Table 8-235—Mini-Subchannel Allocation IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Length** | 8 | Length(M) = 0x07 if *M* = 2 |
|  |  | 0x0A if *M* = 3 |
|  |  | 0x12 if *M* = 6 |
|  |  |  |
| **CType** | 2 | 0b00: 2 mini-subchannels (defines *M* = 2) |
|  |  | 0b01: 2 mini-subchannels (defines *M* = 2) |
|  |  | 0b10: 3 mini-subchannels (defines *M* = 3) |
|  |  | 0b11: 6 mini-subchannels (defines *M* = 6) |
|  |  |  |
| **Duration** | 6 | In OFDMA slots |
|  |  |  |
| For (*j* = 0; *j* < *M*; *j*++) { | — | — |
|  |  |  |
| **CID(*j*)** | 16 | — |
|  |  |  |
| **UIUC(*j*)** | 4 | Allowed values are 1–10 |
|  |  |  |
| **Repetition(*j*)** | 2 | Indicates the repetition code used inside the |
|  |  | allocated burst for mini-subchannel with index *j* |
|  |  | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  | Repetition shall be used only for *M* = 2 or *M* = 3 |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *n* | Padding bits shall be set to zero |
|  |  | *n* = 4 if *M* = 2 |
|  |  | 6 if *M* = 3 |
|  |  | 4 if *M* = 6 |
|  |  |  |
| } | — | — |
|  |  |  |

**Ctype**

Defines *M*, the number of mini-subchannels allocated by this IE.

**Duration**

Defines the allocation duration in OFDMA slots. The duration shall be an integer multiple of *M*.

**CID(*j*)**

CID to use for mini-subchannel with index j.

**UIUC(*j*)**

UIUC to use for mini-subchannel with index j. Allowed values are 1–10.

**Repetition(*j*)**

Indicates the repetition code used inside the allocated burst for mini-subchannel with index j.

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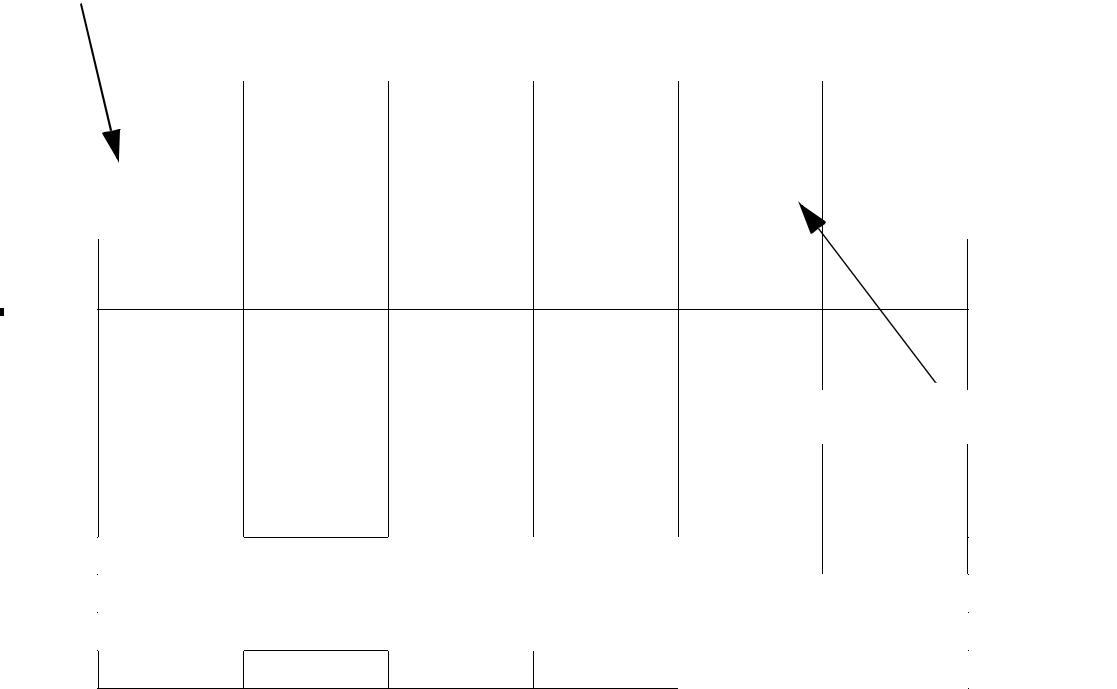
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**8.4.5.4.39 Fast-Feedback Allocation IE**

The Fast-feedback Allocation IE is used to specify allocations for the fast-feedback slots. Fast-feedback slots are mapped in to the region marked by UIUC = 0 in the UL-MAP, in a frequency-first order, as shown in Figure 8-70.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| UL frame region for | | | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| which UIUC = 0 | | | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | OFDMA | | | |  | OFDMA | | | |  | OFDMA | | | | OFDMA | | | OFDMA | | | |  | OFDMA | | | |
|  |  |  |  | symbol | | | |  | symbol | | | |  | symbol | | | | symbol | | |  | symbol | | |  | symbol | | | |
|  |  |  |  | #(*n*) | | | |  | #(*n*+1) | | | |  | #(*n*+2) | | | | #(*n*+3) | | |  | #(*n*+4) | | |  | #(*n*+5) | | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Subchannel #0 | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Subchannel #1 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Subchannel #2 | |  |  |  |  |  |  |  | #0 | | |  |  |  |  |  |  |  |  |  | #2 | | |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Subchannel #3 | |  |  |  |  |  |  |  | #1 | | |  |  |  |  |  |  |  |  |  | #3 | | |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Subchannel #4 | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Subchannel #5 | | |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |



Fast-feedback slot (size = 3 OFDMA symbols)



Subchannel #xx 



**Figure 8-70—Mapping order of fast-feedback messages to the fast-feedback region**

The fast-feedback region shall be allocated using the Fast-Feedback Allocation IE as defined in Table 8-236.

**Table 8-236—Fast-Feedback Allocation IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| FASTFEEDBACK\_Allocation\_IE() { | — | — |
|  |  |  |
| **OFDMA symbol offset** | 8 | — |
|  |  |  |
| **Subchannel offset** | 7 | — |
|  |  |  |
| **No. OFDMA symbols** | 7 | — |
|  |  |  |
| **No subchannels** | 7 | — |
|  |  |  |
| *Reserved* | 3 | — |
|  |  |  |
| } | — | — |
|  |  |  |

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**8.4.5.4.40 MIMO UL Basic IE format**

In the UL-MAP, a MIMO-enabled BS may transmit UIUC = 11 with the MIMO\_UL\_Basic\_IE() to indicate the MIMO mode of the UL allocations described in this IE (see Table 8-237). The MIMO mode indicated in the MIMO\_UL\_Basic\_IE() shall only apply to the UL allocation within the IE. This IE may be used either for a MIMO-enabled SS or for an SS that supports only collaborative SM. The IE may also be used to assign allocations in AAS zones to AAS-enabled SSs that are capable of collaborative SM.

**Table 8-237—MIMO UL Basic IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| MIMO\_UL\_Basic\_IE() { | — | — |
|  |  |  |
| **Extended-2 UIUC** | 4 | MIMO = 0x9 |
|  |  |  |
| **Length** | 8 | *variable* |
|  |  |  |
| **Num\_Assign** | 4 | “Number of assigned bursts” is this field |
|  |  | value plus 1 |
|  |  |  |
| For (*j* = 0; *j* < Number of assigned bursts; *j*++) { | — | — |
|  |  |  |
| **Collaborative\_SM \_Indication** | 1 | 0: Noncollaborative SM (vertical coding |
|  |  | assignment to a MIMO-capable SS) |
|  |  | 1: Collaborative SM (assignment to two |
|  |  | collaborative SM-capable SSs) |
|  |  |  |
| If ( Collaborative\_SM \_Indication == 0) { | — | — |
|  |  |  |
| **CID** | 16 | SS Basic CID |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |
| **Repetition coding indication** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| **MIMO\_Control** | 1 | For dual transmission capable SS |
|  |  | 0: STTD |
|  |  | 1: SM |
|  |  | For Collaborative SM capable SS |
|  |  | 0: Pilot pattern A |
|  |  | 1: Pilot pattern B |
|  |  |  |
| } else { | — | — |
|  |  |  |
| **CID\_A** | 16 | Basic CID of SS that shall use pilot pattern A |
|  |  |  |
| **UIUC\_A** | 4 | UIUC used for the allocation that uses pilot |
|  |  | pattern A |
|  |  |  |
| **Repetition coding indication A** | 2 | Repetition coding used for the allocation that |
|  |  | uses pilot pattern A |
|  |  | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| **CID\_B** | 16 | Basic CID of SS that shall use pilot pattern B |
|  |  |  |

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**Table 8-237—MIMO UL Basic IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **UIUC\_B** | 4 | UIUC used for the allocation that uses pilot |
|  |  | pattern B |
|  |  |  |
| **Repetition coding indication B** | 2 | Repetition coding used for the allocation that |
|  |  | uses pilot pattern B |
|  |  | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| } | — | — |
|  |  |  |
| **Duration** | 10 | In OFDMA slots (see 8.4.3.1) |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

**Num\_assign**

This field specifies the number of assignments in this IE. The actual number of assigned bursts is this field value plus 1.

**MIMO\_Control**

MIMO\_Control field specifies the MIMO mode of the corresponding UL burst.

Table 8-238 summarizes the modes of operation specified by MIMO\_UL\_Basic\_IE(). For each mode, it details the following:

— Number of antennas

— Values of Collaborative\_SM\_indication and MIMO\_control

— Number of different CIDs stated in the appropriate case of the “if” statement

— Implicit type and rate of coding

**Table 8-238—MIMO UL Basic IE operation modes**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Number** | **Collaborative\_** |  |  |  |  |
|  | **of Tx** | **MIMO\_** |  | **Coding** |  |
| **Mode** | **SM\_** | **CIDs** | **Rate** |
| **antennas** | **control** | **type** |
|  | **Indication** |  |  |
|  | **per SS** |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| Collaborative | 1 | 1 | N/A | CID\_A != CID\_B | Two SS, each | 1 |
| MIMO, 2 SSs |  |  |  |  | transmits from | per |
|  |  |  |  |  | antenna #0 | SS |
|  |  |  |  |  |  |  |
| Spatial | 2 | 0 | 1 | Single CID | SM with | 2 |
| multiplexing, |  |  |  |  | vertical coding |  |
| vertical coding |  |  |  |  | for single user |  |
|  |  |  |  |  |  |  |
| STTD | 2 | 0 | 0 | Single CID | STTD | 1 |
|  |  |  |  |  |  |  |

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**Vertical coding**

Indicates transmitting the same coded stream over multiple antennas.

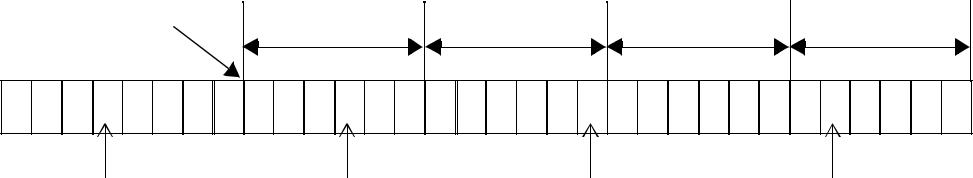
**Rate**

The number of QAM symbols signaled per array channel use.

**8.4.5.4.41 CQICH Allocation IE Format**

CQICH\_Alloc\_IE() is introduced to dynamically allocate or deallocate a CQICH to an SS. Once allocated, the SS transmits channel quality information on the assigned CQICH on subsequent frames until the SS receives a CQICH\_Alloc\_IE() to deallocate the assigned CQICH or until the MS receives a sleep control message (MOB\_SLP-RSP, RNG-RSP or DL sleep control extended subheader) with Stop\_CQI\_Alloca-tion\_Flag = 1. It is up to BS to decide whether CQI reported in sleep mode can be of use. Capability of using Stop\_CQI\_Allocation\_Flag for de-allocating CQI channel is optional for the BS. An MS in sleep mode (during the unavailability interval) shall not transmit on the assigned CQICH. If, while in sleep (with traffic triggered wakening flag = 1), the MS transmits a bandwidth request with respect to a connection belonging to the Power Saving Class, the MS shall continue to transmit on the CQI allocated to it. An MS in sleep mode during the availability interval shall continue to transmit on the CQICH slots allocated to the MS. An example is given in Figure 8-71.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Entering sleep |  |  |  |  |
| mode | Unavailability | Availability | Unavailability | Availability |
|  |



DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL DL UL



|  |  |  |  |
| --- | --- | --- | --- |
| CQI | CQI | CQI | CQI |
| Allocation | Allocation | Allocation | Allocation |
| MS transmits | MS does not transmit | MS transmits | MS transmits |

**Figure 8-71—CQI transmissions during sleep mode**

While in the scanning interval, an MS may transmit its allocated CQICH slots (see Table 8-239).

**Table 8-239—CQICH Allocation IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| CQICH\_Alloc\_IE() { | — | — |
|  |  |  |
| **Extended UIUC** | 4 | CQICH = 0x3 |
|  |  |  |
| **Length** | 4 | Length in bytes (*variable*). |
|  |  |  |
| **CQICH\_ID** | *variable* | Index to uniquely identify the CQICH resource |
|  |  | assigned to the SS. |
|  |  | The size of this field is dependent on system |
|  |  | parameter defined in UCD. |
|  |  |  |
| **Allocation offset** | 6 | Index to the fast feedback channel region |
|  |  | marked by UIUC = 0. |
|  |  |  |
| **Period (p)** | 2 | A CQI feedback is transmitted on the CQICH |
|  |  | every 2p frames. |

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**Table 8-239—CQICH Allocation IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Frame offset** | 3 | The SS starts reporting at the frame of which the |
|  |  | number has the same 3 LSB as the specified |
|  |  | frame offset. If the current frame is specified, |
|  |  | the SS should start reporting in eight frames. |
|  |  | Channel Quality Information reported by a MS |
|  |  | in Frame *n* pertains to measurements collected |
|  |  | in previous frames up to and including Frame |
|  |  | *n*–1, but excluding Frame *n*. The first CQICH |
|  |  | report following the CQICH allocation IE may |
|  |  | contain invalid CQI data if the CQICH report is |
|  |  | sent in the frame immediately following the |
|  |  | frame in which the CQICH allocation IE was |
|  |  | received. |
|  |  |  |
| **Duration (d)** | 3 | A CQI feedback is transmitted on the CQI |
|  |  | channels for 10 × 2*d* frames. |
|  |  | If *d* == 0, the CQI-CH is deallocated. |
|  |  | If *d* == 0b111, the SS should report until the BS |
|  |  | command for the SS to stop. |
|  |  |  |
| **Report configuration included** | 1 | Update to CINR report configuration is |
|  |  | included. |
|  |  |  |
| If (report configuration included == 1) { | — | — |
|  |  |  |
| **Feedback Type** | 2 | 0b00: Physical CINR feedback |
|  |  | 0b01: Effective CINR feedback |
|  |  | 0b10–0b11: *Reserved* |
|  |  |  |
| **Report type** | 1 | 0: Report for preamble |
|  |  | 1: Report for specific permutation zone |
|  |  |  |
| If (Report type == 0) { | — | — |
|  |  |  |
| **CINR preamble report type** | 1 | The type of preamble-based CINR report |
|  |  | 0: Frequency reuse factor = 1 configuration. |
|  |  | 1: Frequency reuse factor = 3 configuration. |
|  |  |  |
| } | — | — |
|  |  |  |
| Else { | — | Report for permutation zone. |
|  |  |  |
| **Zone permutation** | 3 | The type of zone for which to report |
|  |  | 0b000: PUSC with Use All SC = 0 or first DL |
|  |  | zone when not all subchannels are used |
|  |  | 0b001: PUSC with Use All SC = 1 or first DL |
|  |  | zone when all subchannels are used |
|  |  | 0b010: FUSC |
|  |  | 0b011: Optional FUSC |
|  |  | 0b100: Safety channel region |
|  |  | 0b101: AMC zone (for DL AAS zone or AMC |
|  |  | Zone with dedicated pilots) |
|  |  | 0b110–111: *Reserved* |
|  |  |  |
| **Zone type** | 2 | 0b00: Non-STC zone |
|  |  | 0b01: STC zone |
|  |  | 0b10: AAS zone or Non-STC zone with |
|  |  | dedicated pilots |
|  |  | 0b11: STC zone with dedicated pilots |
|  |  |  |

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**Table 8-239—CQICH Allocation IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Zone PRBS\_ID** | 2 | The PRBS\_ID of the zone on which to report or |
|  |  | the Segment number as indicated by the frame |
|  |  | preamble for the first DL Zone or DL AAS zone |
|  |  | with Diversity\_Map support. |
|  |  |  |
| If (Zone permutation== 0b000 or 0b001) | — | — |
| { |  |  |
|  |  |  |
| **Major group indication** | 1 | If 0, then the report may refer to any subchannel |
|  |  | in the PUSC zone. |
|  |  |  |
| If (Major group indication == 1) { | — | — |
|  |  |  |
| **PUSC Major group bitmap** | 6 | Reported CINR shall only apply to the |
|  |  | subchannels of PUSC major groups for which |
|  |  | the corresponding bit is set. |
|  |  | Bit *k* refers to major group *k*. |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **CINR zone measurement type** | 1 | 0: Measurement from pilot subcarriers and, if |
|  |  | AAS zone, from AAS preamble. |
|  |  | 1: Measurement from data subcarriers. |
|  |  |  |
| } | — | — |
|  |  |  |
| If (feedback type == 0b00) { |  | Physical CINR feedback |
|  |  |  |
| **Averaging parameter included** | 1 | — |
|  |  |  |
| If (Averaging parameter included == 1) { | — | — |
|  |  |  |
| **Averaging parameter** | 4 | Averaging parameter αavg used for deriving |
|  |  | physical CINR estimates reported through |
|  |  | CQICH. This value is given in multiples of 1/16 |
|  |  | in the range of [1/16..16/16] in increasing order. |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

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**Table 8-239—CQICH Allocation IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **MIMO\_permutation\_feedback\_cycle** | 2 | 0b00 = No MIMO and permutation mode |
|  |  | feedback |
|  |  | 0b01 = The MIMO and permutation mode |
|  |  | indication shall be transmitted on the |
|  |  | CQICH indexed by the CQICH\_ID |
|  |  | every four allocated CQICH |
|  |  | transmission opportunity. The first |
|  |  | indication is sent on the fourth allocated |
|  |  | CQICH transmission opportunity. |
|  |  | 0b10 = The MIMO mode and permutation |
|  |  | mode indication shall be transmitted on |
|  |  | the CQICH indexed by the CQICH\_ID |
|  |  | every eight allocated CQICH |
|  |  | transmission opportunity. The first |
|  |  | indication is sent on the eighth allocated |
|  |  | CQICH transmission opportunity. |
|  |  | 0b11 = The MIMO mode and permutation |
|  |  | mode indication shall be transmitted on |
|  |  | the CQICH indexed by the CQICH\_ID |
|  |  | every 16 allocated CQICH transmission |
|  |  | opportunity. The first indication is sent |
|  |  | on the 16th allocated CQICH |
|  |  | transmission opportunity. |
|  |  |  |
| **Padding** | *variable* | Number of bits required to align to byte length, |
|  |  | shall be set to zero. |
|  |  |  |
| } | — | — |
|  |  |  |

**CQICH\_ID**

The CQICH\_ID identifies the combination of fast feedback channel, Report Configuration and MIMO Permutation Feedback Cycle created by this IE.

**Period(p), Frame offset, and Duration(d)**

If the MS received the CQICH\_Alloc\_IE in frame #*N*, the MS should transmit periodic reports

in every 2*p* frames starting from frame #*M*first to frame #*M*last, where *M*first is the first frame number (excluding frame #*N*) with the 3 LSB equal to the 3 bits in Frame offset and where

#*M*last = (#*M*first + 10 × 2*d* – 1) mod 224.

**Report configuration included**

Indicates whether an update to the report configuration exists in the IE. A value of 0 indicates that the SS shall use the configuration defined in the last received CQICH\_Alloc\_IE with the same CQICH\_ID.

The CQICH\_Alloc\_IE with Report configuration included = 0 shall not be transmitted after the expiration defined in the Duration field for the designated CQICH\_ID.

**Report type**

Indicates whether the CINR metric shall be reported on the preamble (0) or on a permutation zone (1).

**Averaging parameter included**

Indicate whether a new averaging parameter αavg for physical CINR reports exists in the IE. A value of 0 indicates that the SS shall perform physical CINR measurements using the last known averaging parameter.

**MIMO\_permutation\_feedback\_cycle**

This field specifies the MIMO and permutation mode fast-feedback cycle. See 8.4.11.3 for fast-feedback channel payload encoding for MIMO and permutation feedback. When

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MIMO\_permutation\_feedback\_cycle is not equal to 0b00, the MIMO and permutation mode indication shall transmitted at certain CQICH frames instead of the normal CQI value.

For MIMO-capable SSs, the BS may allocate one or multiple CQICH channels to the SS in UL\_MAP. If one CQICH channel is allocated, the SS shall report the average post-processing SNR. If multiple CQICH channels are allocated, the SS shall report post-processing SNR of individual layers, and the order of CQICH channel allocation shall match the order of layer index.

**8.4.5.4.42 UL-MAP Physical Modifier IE**

For an SS that supports the AAS option (see 8.4.4.7), the Physical Modifier IE indicates that the subsequent allocations shall utilize a preamble, which is either cyclically rotated in frequency or cyclically delayed [see Equation (8-56) and Equation (8-57)]. The PHYMOD UL IE can appear anywhere in the UL map, and it shall remain in effect until another PHYMOD UL IE, a Zone-Switch-IE, AAS-UL-IE or SUB-DL-UL-MAP is encountered, or until the end of the UL map. When BS schedules more than one UL transmission for an SS it shall guarantee that the preamble modifier is the same for all UL bursts of the SS (see Table 8-66).

**Table 8-240—OFDMA UL-MAP Physical Modifier IE format**

|  |  |  |  |
| --- | --- | --- | --- |
| **Syntax** | **Size** |  | **Notes** |
| **(bit)** |  |
|  |  |  |
|  |  |  | |
| PHYMOD\_UL\_IE() { | — | — | |
|  |  |  | |
| **Extended UIUC** | 4 | PHYMOD = 0x5 | |
|  |  |  | |
| **Length** | 4 | Length = 0x1 | |
|  |  |  | |
| **Preamble Modifier Type** | 1 | 0: Frequency-shifted preamble | |
|  |  | 1: Time-shifted preamble | |
|  |  |  | |
| if (Preamble Modifier Type == 0) { | — | — | |
|  |  |  | |
| **Preamble frequency shift index** | 4 | Indicates the value of *K* in Equation (8-57) | |
|  |  |  | |
| } else { | — | — | |
|  |  |  | |
| **Preamble Time Shift Index** | 4 | Specifies the cyclic time shift in Equation (8-53): | |
|  |  | For PUSC, | |
|  |  | 0 | – 0 sample cyclic shift |
|  |  | 1 | – *NFFT*/4 sample cyclic shift |
|  |  | …. | |
|  |  | 3 | – *NFFT*/4×3 sample cyclic shift |
|  |  | 4–15 – *Reserved* | |
|  |  | For optional PUSC, | |
|  |  | 0 | – 0 sample cyclic shift |
|  |  | 1 | – *NFFT*/3 sample cyclic shift |
|  |  | 2 | – *NFFT*/3×2 sample cyclic shift |
|  |  | 3–15 – *Reserved* | |
|  |  | For AMC permutation, | |
|  |  | 0 | – 0 sample cyclic shift |
|  |  | 1 | – *NFFT*/9 sample cyclic shift |
|  |  | …. | |
|  |  | 8 | – *NFFT*/9×8 sample cyclic shift |
|  |  | 9–15 – *Reserved* | |
|  |  |  | |
| } | — | — | |
|  |  |  | |
| **Pilot Pattern Modifier** | 1 | 0: Not applied, 1: Applied | |
|  |  |  |  |

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**Table 8-240—OFDMA UL-MAP Physical Modifier IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Pilot Pattern Index** | 2 | Pilot pattern used for this allocation [see 8.4.8.1.5 |
|  |  | (Figure 8-14) and 8.4.6.3.3]: |
|  |  | 0b00: Pilot pattern A |
|  |  | 0b01: Pilot pattern B |
|  |  | 0b10: Pilot pattern C |
|  |  | 0b11: Pilot pattern D |
|  |  |  |
| } | — | — |
|  |  |  |

**Preamble Modifier Type**

This parameter defines whether the preamble will be cyclically shifted in time or in frequency.

**Preamble frequency shift index**

This parameter effects the cyclic shift of the preamble in frequency axis, as defined by Equation (8-57).

**Preamble Time Shift Index**

This parameter defines how many samples of cyclic shift shall be introduced into the preamble symbols. The unit of cyclic shift depends on the subchannel permutation to ensure the frequency-domain orthogonality between the different preambles in the same subchannel.

**8.4.5.4.43 UL Allocation Start IE**

The UL Allocation Start IE indicates the start offset of all subsequent UL allocation including allocation done by UL-MAP IE and extended UL-MAP IE. When this IE is included in UL-MAP or SUB-DL-UL-MAP, an SS shall determine all subsequent UL allocations based on the start offset defined in this IE except when the UL allocation already specified a start offset. This IE shall be supported by all SS. (See Table 8-241.)

If H-FDD UL Subframe Indicator is set to '0', the UL Allocation Start IE indicates the starting offset in the UL subframe (Group) that the UL-MAP including this UL Allocation Start IE is associated with. BS shall not use UL Allocation Start IE with H-FDD UL Subframe Indicator = 1 to an MS without capability of Full-Duplex (FDD), which is negotiated using SBC-REQ/RSP.

For FDD/H-FDD, if the UL Allocation Start IE with H-FDD UL Subframe Indicator = 1 is included in the FDD\_Paired\_Allocation\_IE(), the UL Allocation Start IE indicates the starting offset in the other UL subframe (Group) in the same frame, that is, the starting offset in the other H-FDD UL Group; namely, the one not associated with the UL-MAP in which the current UL Allocation Start IE is included.

**Table 8-241—UL Allocation Start IE format test**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| UL\_Allocation\_Start\_IE() { | — | — |
|  |  |  |
| **Extended UIUC** | 4 | UL\_Allocation\_Start\_IE() = 0xA |
|  |  |  |
| **Length** | 4 | Length = 0x2 |
|  |  |  |

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**Table 8-241—UL Allocation Start IE format test *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **OFDMA symbol offset** | 8 | This value indicates start symbol offset of all subsequent |
|  |  | UL allocations in this UL-MAP message (UL-MAP or |
|  |  | SUB-UL-DL-MAP). The reference point of this offset is |
|  |  | the start of UL subframe. |
|  |  |  |
| **Subchannel offset** | 7 | This value indicates start subchannel offset of all |
|  |  | subsequent UL data burst allocations in this message |
|  |  | (UL-MAP or SUB-UL-DL-MAP). |
|  |  |  |
| **H-FDD UL subframe indicator** | 1 | Only applies to FDD MS in FDD/H-FDD |
|  |  | 0b0: UL subframe relevant to current UL-MAP [or UL |
|  |  | subframe 2 (UL1)] |
|  |  | 0b1: The other UL subframe [or UL subframe 1 (UL2)] |
|  |  | Shall be set to zero for TDD and H-FDD only MS in |
|  |  | FDD/H-FDD. |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.4.44 CQICH Enhanced Allocation IE format**

CQICH\_Enhanced\_Alloc\_IE() is introduced to dynamically allocate or deallocate a CQICH to an SS. This IE shall only be used with enhanced fast-feedback channel in 8.4.11.4 and primary/secondary fast-feedback channel in 8.4.11.12. Once allocated, the SS transmit feedback information of the specified type on the assigned CQICH with the determined period, until the SS receives a CQICH\_Enhanced\_ Alloc\_IE() to deallocate the assigned CQICH. (See Table 8-242.)

**Table 8-242—CQICH Enhanced Allocation IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| CQICH\_Enhanced\_Alloc\_IE() { | — | — |
|  |  |  |
| **Extended-2 UIUC** | 4 | CQICH\_Enhance\_Alloc\_IE() = 0x0 |
|  |  |  |
| **Length** | 8 | Length in bytes of following fields |
|  |  |  |
| **CQICH\_ID** | *variable* | Identification of the CQICH reporting processes |
|  |  | initiated by this CQICH\_Enhanced\_Alloc\_IE. The |
|  |  | size of this field is dependent on system parameter |
|  |  | defined in UCD. |
|  |  |  |
| **Period (=p)** | 3 | A CQI feedback is transmitted on the CQICH |
|  |  | every 2p frames. |

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**Table 8-242—CQICH Enhanced Allocation IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Frame offset** | 3 | The SS starts reporting at the frame of which the |
|  |  | number has the same 3 LSB as the specified frame |
|  |  | offset. If the current frame is specified, the SS |
|  |  | should start reporting in eight frames. |
|  |  | Information reported by an SS in Frame *n* pertains |
|  |  | to measurements collected in previous frames up |
|  |  | to and including Frame *n*–1, but excluding Frame |
|  |  | *n*. |
|  |  | The first CQICH report following the CQICH |
|  |  | Enhanced allocation IE may contain invalid data if |
|  |  | the report is sent in the frame immediately |
|  |  | following the frame in which the CQICH |
|  |  | Enhanced allocation IE was received. |
|  |  |  |
| **Duration (=d)** | 3 | A CQI feedback is transmitted on the CQI |
|  |  | channels for 10 × 2*d* frames. |
|  |  | If *d* == 0b000, the CQICH is deallocated. |
|  |  | If *d* == 0b111, the MS should report until the BS |
|  |  | command for the MS to stop. |
|  |  |  |
| **CQICH\_Num** | 4 | Number of CQICHs assigned to this CQICH\_ID is |
|  |  | (CQICH\_Num +1) |
|  |  |  |
| for (*i* = 0; *i* < CQICH\_Num+1; *i*++) { | — | — |
|  |  |  |
| **Feedback Type** | 3 | 0b000–0b010: Fast DL measurement/Default |
|  |  | Feedback depending on CQICH types |
|  |  | 0b011: Quantized precoding weight feedback |
|  |  | 0b100: Index to precoding matrix in codebook |
|  |  | 0b101: Channel Matrix Information |
|  |  | 0b110: Index to precoding matrix in codebook and |
|  |  | Fast DL measurement |
|  |  | 0b111: *Reserved* |
|  |  |  |
| **Allocation index** | 6 | Index to the fast-feedback channel region marked |
|  |  | by UIUC = 0 |
|  |  |  |
| **CQICH Type** | 3 | 0b000: 6-bit CQI |
|  |  | 0b001: 18-bit CQI |
|  |  | 0b010: 3-bit CQI (even) |
|  |  | 0b011: 3-bit CQI (odd) |
|  |  | 0b100: 6-bit CQI (primary) |
|  |  | 0b101: 10-bit CQI (primary + secondary) |
|  |  | 0b110: 6-bit CQI (even) |
|  |  | 0b111: 6-bit CQI (odd) |
|  |  |  |
| **STTD indication** | 1 | This field is only valid for CQICH Type = 0b000. |
|  |  | 0 – CQICH is transmitted using normal 6 bit |
|  |  | format |
|  |  | 1 – CQICH is transmitted using STTD in PUSC |
|  |  | (see Figure 8-14) |
|  |  |  |
| } | — | — |
|  |  |  |

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**Table 8-242—CQICH Enhanced Allocation IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Band\_AMC\_Precoding\_Mode | 1 | 0 = One common precoder for all bands (for all |
|  |  | allocated bands if the dedicated pilot bit is set to |
|  |  | 1). |
|  |  | 1 = Distinct precoders for the bands with the |
|  |  | highest S/N values (or for the allocated bands if |
|  |  | the dedicated pilot bit is set to 1), up to the number |
|  |  | of short-term precoders fed back as specified by |
|  |  | Nr\_Precoders\_feedback |
|  |  |  |
| If (Band\_AMC\_Precoding\_Mode = 1) { | 3 | Nr of precoders feedback = N |
| Nr\_Precoders\_feedback (= N) |  |  |
| } |  |  |
|  |  |  |
| Padding | *variable* | The padding bits are used to ensure the IE size is |
|  |  | integer number of bytes. |
|  |  |  |
| } | — | — |
|  |  |  |

**Feedback Type**

For CQICH type = 0b000, 0b001 or 0b100:

0b000 = Fast DL measurement/Default Feedback with antenna grouping

0b001 = Fast DL measurement/Default Feedback with antenna selection

0b010 = Fast DL measurement/Default Feedback with reduced codebook

When the MS transmits the feedback of S/N using 5 LSBs of 6 bits on it assigned CQICH, the MSB is set to 0 (see 8.4.11.5). MS may transmit, on its assigned CQICH, the feedback information specified in 8.4.11.7.

For CQICH type = 0b010 or 0b011:

0b000 = Antenna grouping (see Table 8-67 of 8.4.11.7) 0b001 = Antenna selection (see Table 8-68 of 8.4.11.7) 0b010 = Reduced codebook (see Table 8-69 of 8.4.11.7)

For CQICH type = 0b101:

0b000 = Fast DL measurement (see 8.4.11.1 and 8.4.11.5)

0b001 = Default Feedback with antenna grouping (see Table 8-60 of 8.4.11.3) 0b010 = Antenna selection and reduced codebook (see Table 8-61 of 8.4.11.3) 0b011 = Quantized precoding weight feedback (see Figure 8-51 of 8.4.11.2)

When Feedback type = 0b100 and CQICH type = 0b101, primary CQICH is assigned for index to precoding matrix in codebook while secondary CQICH is assigned for CINR.

When Feedback type = 0b110 and CQICH type = 0b101, 10 bits CQI consists of primary CQICH(6 bits) and Secondary CQICH(4 bits) from MSB to LSB. The first bit of MSB is '0' if MS transmits 6 bit PMI or '1' if MS transmits 3 bit PMI. The remaining 9 bits indicate the below information.

If MS transmits 6 bit PMI, 6 bit PMI + 1 bit differential CINR per band for the 3 best bands (from MSB to LSB).

If MS transmits 3 bit PMI, 3 bit PMI + 1 bit differential CINR per band for the 3 best bands + 3 bits (set to zero) (from MSB to LSB).

When Feedback type = 0b100 and CQICH Type = 0b001 (18 bit CQI), MS feeds back for all 3 bands in the band bitmap in the order of lowest numbered band to highest.

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When Feedback type = 0b110 and CQICH Type = 0b001 (18 bit CQI), 2 bands are fed back (Nr\_Precoders\_feedback = 2). The first group of 6 bits carries the lowest AMC band 6-bit PMI, the second group of 6 bits carries the second AMC band 6-bit PMI, and the third group of 6 bits carries the 2-bit CINR of the 2 AMC band.

For Feedback type = 0b110 (index to precoding matrix in codebook), mapping into each group of 6 bits (CQICH types 0b000, 0b100, 0b110 or 0b111):

3 bit PMI mapped to MSB plus 1 bit RI plus 2 bit differential CINR as LSB

Mapping of the 2 bit differential CINR is as follows:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | 00 | –3 dB |
|  |  |  |  |
|  |  | 01 | –1 dB |
|  |  |  |  |
|  |  | 10 | 1 dB |
|  |  |  |  |
|  |  | 11 | 3 dB |
| where |  |  |  |
|  |  |  |
| PMI | is precoding matrix index | |  |
| RI | is rank information | |  |

**8.4.5.4.45 UL PUSC Burst Allocation in Other Segment IE**

In the UL-MAP, a BS may transmit UIUC = 15 with the UL\_PUSC\_Burst\_Allocation\_in\_Other\_Segment\_ IE() to define UL bandwidth allocation in other segment. (See Table 8-243.)

**Table 8-243—UL PUSC Burst Allocation in Other Segment IE**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| UL\_PUSC\_Burst\_Allocation\_in\_Other\_ | — | — |
| Segment\_IE() { |  |  |
|  |  |  |
| **Extended UIUC** | 4 | UL\_PUSC\_Burst\_Allocation\_in\_Other\_ |
|  |  | Segment\_IE() == 0x8 |
|  |  |  |
| **Length** | 4 | Length = 0x5 |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |
| **Segment** | 2 | Segment number for other BSs’ sector |
|  |  |  |
| **UL\_Permbase** | 7 | UL Permbase for other BSs’ sector |
|  |  |  |
| **OFDMA symbol offset** | 8 | — |
|  |  |  |
| **Subchannel offset** | 6 | — |
|  |  |  |
| **Duration** | 10 | — |
|  |  |  |

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**Table 8-243—UL PUSC Burst Allocation in Other Segment IE *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Repetition coding indication** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| *Reserved* | 1 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.4.46 HO Anchor Active UL-MAP IE**

This MAP IE is in the UL-MAP of an active non-anchor BS and indicates the burst from the Anchor BS. When an MS receives an HO Anchor Active UL-MAP IE on UL-MAP message from an active non-anchor BS, it can send a data burst to the Anchor BS by using the anchor preamble in HO Anchor Active UL-MAP IE. (See Table 8-244.)

**Table 8-244—HO Anchor Active UL-MAP IE**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| HO\_Anchor\_Active\_UL-MAP\_IE() { | — | — |
|  |  |  |
| **Extended-2 UIUC** | 4 | HO\_Anchor\_Active\_UL-MAP\_IE() = 0x1 |
|  |  |  |
| **Length** | 8 | — |
|  |  |  |
| for (each bursts) { | — | — |
|  |  |  |
| **Anchor Preamble** | 16 | Preamble of anchor BS |
|  |  |  |
| **Anchor CID** | 16 | Basic CID in anchor BS |
|  |  |  |
| **Start subchannel offset** | 12 | — |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |
| **Duration** | 10 | — |
|  |  |  |
| **Repetition coding indication** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| } | — | — |
|  |  |  |
| *padding nibble* | 0 or 4 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

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**8.4.5.4.47 HO Active Anchor UL MAP IE**

This MAP IE is in the UL-MAP of the anchor BS and indicates the burst from active non-anchor BS. When an MS receives an HO Active Anchor UL-MAP IE on UL-MAP message from an anchor BS, it can send a data burst to the active non-anchor BS by using the active preamble in HO Active Anchor UL-MAP IE. (See Table 8-245.)

**Table 8-245—HO Active Anchor UL-MAP IE**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| HO\_Active\_Anchor\_UL-MAP\_IE() { | — | — |
|  |  |  |
| **Extended-2 UIUC** | 4 | HO\_Active\_Anchor\_UL-MAP\_IE() = 0x2 |
|  |  |  |
| **Length** | 8 | — |
|  |  |  |
| for (each bursts) { | — | — |
|  |  |  |
| **Active Preamble** | 16 | Preamble of active BS |
|  |  |  |
| **Anchor CID** | 16 | Basic CID in anchor BS |
|  |  |  |
| **Start subchannel offset** | 12 | — |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |
| **Duration** | 10 | — |
|  |  |  |
| **Repetition coding indication** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| } | — | — |
|  |  |  |
| *padding nibble* | 0 or 4 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.4.48 MIMO UL Enhanced IE format**

In the UL-MAP, a MIMO-enabled BS may transmit MIMO\_UL\_Enhanced\_IE() to indicate the MIMO configuration and pilot patterns of the subsequent UL allocation to a specific MIMO-enabled MS CID. The MIMO mode indicated in the MIMO\_UL\_Basic\_IE() shall only apply to the UL allocation within the IE. (See Table 8-246.)

**Table 8-246—MIMO UL Enhanced IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| MIMO\_UL\_Enhanced\_IE() { | — | — |
|  |  |  |
| **Extended-2 UIUC** | 4 | MIMO\_UL\_Enhanced\_IE() = 0x6 |
|  |  |  |
| **Length** | 8 | Length in bytes |
|  |  |  |

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**Table 8-246—MIMO UL Enhanced IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Num\_Assign** | 4 | Number of burst assignment. “Number of |
|  |  | assigned bursts” is this field value plus 1 |
|  |  |  |
| for (*j* = 0; *j* < Number of assigned bursts; | — | — |
| *j*++){ |  |  |
|  |  |  |
| **Num\_CID** | 2 | — |
|  |  |  |
| for (*i* = 0; *i* < Num\_CID; *i*++){ | — | — |
|  |  |  |
| **CID** | 16 | MS basic CID |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |
| **Repetition coding indication** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| **Matrix\_Indicator** | 1 | For MS with dual antenna |
|  |  | 0: Matrix A (STTD, see 8.4.8.4.3) |
|  |  | 1: Matrix B (SM, see 8.4.8.4.3) |
|  |  | For MS with single antenna, skip this field |
|  |  |  |
| **Pilot Pattern Indicator** | 1 | For MS with single antenna |
|  |  | 0: Pilot pattern A |
|  |  | 1: Pilot pattern B |
|  |  | For MS with dual antenna (for PUSC only) |
|  |  | 0: Pilot pattern A/B |
|  |  | 1: Pilot pattern C/D |
|  |  |  |
| } | — | — |
|  |  |  |
| **Duration** | 10 | In OFDMA slots (see 8.4.3.1) |
|  |  |  |
| } | — | — |
|  |  |  |
| *Padding* | *variable* | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

**Num\_Assign**

A field that specifies the number of assignments in this IE. The actual number of assigned bursts is this field value plus 1.

**Matrix\_Indicator**

A field that specifies the MIMO mode of UL burst. For MS with dual antenna it indicates STC Matrix and for MS with single antenna it is skipped.

**Pilot Pattern Indicator**

A field that indicates pilot patterns to MS with single antenna or to MS with dual antenna (see 8.4.8.1.5).

**8.4.5.4.49 OFDMA Fast Ranging IE format**

A Fast Ranging IE may be placed in the UL-MAP message by a BS to provide a non-contention-based initial ranging opportunity. The Fast Ranging IE shall be placed in the extended UIUC within a UL-MAP IE.

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The format of the IE is PHY dependent as shown in Table 8-247.

**Table 8-247—OFDMA Fast Ranging IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Fast\_Ranging\_IE() { | — | — |
|  |  |  |
| **Extended UIUC** | 4 | Fast\_Ranging\_IE() = 0x9 |
|  |  |  |
| **Length** | 4 | — |
|  |  |  |
| **HO ID indicator** | 1 | 0: MAC Address is present |
|  |  | 1: HO ID is present |
|  |  |  |
| *Reserved* | 7 | Shall be set to zero |
|  |  |  |
| if (HO ID indicator == 1) { | — | — |
|  |  |  |
| **HO ID** | 8 | — |
|  |  |  |
| } else { | — | — |
|  |  |  |
| **MAC address** | 48 | MS MAC address as provided on the RNG-REQ |
|  |  | message on initial system entry |
|  |  |  |
| } | — | — |
|  |  |  |
| **UIUC** | 4 | UIUC ≠ 15. A four-bit code used to define the type of |
|  |  | UL access and the burst type associated with that |
|  |  | access |
|  |  |  |
| **Duration** | 10 | In OFDMA slots (see 8.4.3.1) |
|  |  |  |
| **Repetition coding indication** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| } | — | — |
|  |  |  |

**UIUC**

UIUC used for the burst.

**Duration**

Indicates the duration, in units of OFDMA slots, of the allocation.

**Repetition coding indication**

Indicates the repetition code used inside the allocated burst.

**HO ID indicator**

An indicator to indicate whether HO ID or MAC Address is being used to identify an MS during HO.

**HO ID**

An identifier assigned to an MS for use during initial ranging to the selected target BS.

**8.4.5.4.50 UL-MAP Fast Tracking IE**

In the UL-MAP, a BS may transmit UIUC = 15 with the UL-MAP\_Fast\_Tracking\_IE() to provide fast power, time and frequency indications/corrections to MSs that have transmitted in the frame before the previous frame.

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The CID used in the IE shall be a Broadcast CID. (See Table 8-248.)

**Table 8-248—UL-MAP Fast Tracking IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| UL-MAP\_Fast\_Tracking\_IE() { | — | — |
|  |  |  |
| **extended UIUC** | 4 | UL-MAP\_Fast\_Tracking\_IE() = 0x7 |
|  |  |  |
| **Length** | 4 | *Variable* |
|  |  |  |
| **Map Index** | 2 | Index of SUB-DL-UL-MAP to which this IE refers, or zero |
|  |  | if this IE refers to the mandatory UL-MAP. |
|  |  | Shall be set to zero. |
|  |  |  |
| *Reserved* | 6 | Shall be set to zero. |
|  |  |  |
| for (*i* = 1; *i <= n*; *i*++) { | — | For each Fast Indication bytes 1 to *n* (*n* = Length) |
|  |  |  |
| **Power correction** | 3 | Power correction indication: |
|  |  | 0b000: no change |
|  |  | 0b001: +2 dB |
|  |  | 0b010: –1 dB |
|  |  | 0b011: –2 dB |
|  |  | 0b100: –4 dB |
|  |  | 0b101: –6 dB |
|  |  | 0b110: +4 dB |
|  |  | 0b111: +6 dB |
|  |  |  |
| **Frequency correction** | 3 | The correction is 0.1% of the carrier spacing multiplied by |
|  |  | the 3-bit number interpreted as a signed integer (i.e., 0b100: |
|  |  | –4; … 0b000: 0; … 0b011: 3) |
|  |  |  |
| **Time correction** | 2 | The correction is floor(2 / Fs) multiplied by: |
|  |  | 0b00: 0 |
|  |  | 0b01: 1 |
|  |  | 0b10: –1 |
|  |  | 0b11: *Reserved* |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

The UL Fast Tracking IE is an optional field in the UL-MAP. When this IE is sent it provides an indication about corrections that should be applied by MSs that have transmitted in the frame before the previous UL frame. Each Indication byte shall correspond to one unicast allocation-IE or sub-IE that has specified an allocation of an UL transmission in the UL-MAP transmitted 2 frames before the previous frame. The order of the indication bytes shall be the same as the order of the unicast allocation IE in the UL-MAP.

The response time for corrections following receipt of this IE shall be equal to Ranging Response Processing Time as defined in 10.1.

**8.4.5.4.50.1 UL-MAP Fast Tracking IE handing in an MR system**

When RSs are operating in centralized scheduling mode, MR-BS may insert UL-MAP Fast-Tracking IEs with certain fields zeroed out into the UL-MAP that it assigns to that non-transparent RS to broadcast on the access link. The UL-MAP Fast-Tracking IEs shall have zeros in the fields for Power correction, Frequency correction, and Time correction. When the RS receives RS\_Access-MAP message from the MR-BS with an

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assigned UL-MAP containing UL-MAP Fast-Tracking IEs with zeroed out fields, the RS shall fill in these fields with the appropriate adjustment information and then broadcast this updated UL-MAP on the access link.

**8.4.5.4.51 Anchor BS Switch IE**

The Anchor BS Switch IE may be sent by a BS to indicate to one or more MS(s) to switch to a new specified Anchor BS at specific action time, or to cancel the switch. The Anchor BS Switch IE can also be used to allocate CQICH at the new Anchor BS. (See Table 8-249.)

**Table 8-249—Anchor BS Switch IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Anchor\_BS\_Switch\_IE() { | — | — |
|  |  |  |
| **Extended UIUC2** | 4 | Anchor\_BS\_Switch\_IE() = 0x3 |
|  |  |  |
| **Length** | 8 | Length in bytes |
|  |  |  |
| **N\_Anchor\_BS\_switch** | 4 | Number of Anchor BS switching indicated |
|  |  | in this IE |
|  |  |  |
| for (*i* = 0; *i* < N\_Anchor\_BS\_switch; *i*++) { | — | — |
|  |  |  |
| **Reduced CID** | 12 | LSB 12 bits of basic CID of an MS whose |
|  |  | anchor BS switching is indicated in this IE |
|  |  |  |
| **Action code** | 2 | 0b00 – The MS shall switch to the Anchor |
|  |  | BS specified in the fast Anchor BS |
|  |  | selection information in the fast-feedback |
|  |  | channel, at the default time specified by the |
|  |  | switching period defined in the DCD. |
|  |  | 0b01 – The MS shall switch to the Anchor |
|  |  | BS specified in this IE and at the action |
|  |  | time specified in this IE. |
|  |  | 0b10 – The MS shall cancel all anchor |
|  |  | switching procedure, stop switching timer |
|  |  | and remain on the current anchor BS. |
|  |  | 0b11 – *Reserved* |
|  |  |  |
| If (Action code == 01) { | — | — |
|  |  |  |
| **Action time (A)** | 3 | In units of frames. 0b000 means the MS |
|  |  | shall switch at the default time specified by |
|  |  | the switching period defined in the DCD. |
|  |  |  |
| **TEMP\_BS\_ID** | 3 | TEMP\_BS\_ID of the anchor BS to switch |
|  |  | to. (TEMP\_BS\_ID is the assigned ID to the |
|  |  | BS when it was added to the diversity set of |
|  |  | an MS). |
|  |  |  |
| *Reserved* | 2 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| If ( Action code == 00 || Action code == 01 ) { | — | — |
|  |  |  |

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**Table 8-249—Anchor BS Switch IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **AK Change Indicator** | 1 | To indicate whether the AK being used |
|  |  | should change when switching to a new |
|  |  | Anchor BS. If set to 0, the MS should |
|  |  | continue to use the AK currently in use. If |
|  |  | set to 1, the MS should use the AK derived |
|  |  | for use with the new Anchor BS. |
|  |  |  |
| **CQICH Allocation Indicator** | 1 | To indicate if CQICH allocation at the new |
|  |  | Anchor BS is included in this IE. |
|  |  |  |
| If (CQICH\_Allocation\_Indicator == 1) { | — | — |
|  |  |  |
| **CQICH\_ID** | *variable* | Index to uniquely identify he CQICH |
|  |  | resource assigned to the MS after the MS |
|  |  | switched to the new anchor BS. |
|  |  |  |
| **Feedback channel offset** | 6 | Index to the fast-feedback channel region |
|  |  | of the new Anchor BS marked by UIUC = |
|  |  | 0. |
|  |  |  |
| **Period (=p)** | 2 | A CQI feedback is transmitted on the |
|  |  | CQICH every 2p frames. |
| **Frame offset** | 3 | The MS starts reporting at the frame of |
|  |  | which the number has the same 3 LSB as |
|  |  | the specified frame offset. If the current |
|  |  | frame is specified, the MS should start |
|  |  | reporting in eight frames. |
|  |  |  |
| **Duration (=d)** | 3 | A CQI feedback is transmitted on the CQI |
|  |  | channels indexed by the CQICH\_ID for |
|  |  | 10 × 2d frames. |
|  |  | If d == 0b000, the CQI-CH is deallocated. |
|  |  | If d == 0b111, the MS should report until |
|  |  | the BS command for the MS to stop. |
|  |  |  |
| **MIMO\_permutation\_feedback\_cycle** | 2 | 0b00 = No MIMO and permutation mode |
|  |  | feedback |
|  |  | 0b01 = the MIMO and permutation mode |
|  |  | indication shall be transmitted on the |
|  |  | CQICH indexed by the CQICH\_ID every 4 |
|  |  | allocated CQICH transmission opportunity. |
|  |  | The first indication is sent on the 4th |
|  |  | allocated CQICH transmission opportunity. |
|  |  | 0b10 = the MIMO mode and permultation |
|  |  | mode indication shall be transmitted on the |
|  |  | CQICH indexed by the CQICH\_ID every 8 |
|  |  | allocated CQICH transmission opportunity. |
|  |  | The first indication is sent on the 8th |
|  |  | allocated CQICH transmission opportunity. |
|  |  | 0b11 = the MIMO mode and permultation |
|  |  | mode indication shall be transmitted on the |
|  |  | CQICH indexed by the CQICH\_ID every |
|  |  | 16 allocated CQICH transmission |
|  |  | opportunity. The first indication is sent on |
|  |  | the 16th CQICH allocated CQICH |
|  |  | transmission opportunity. |
|  |  |  |

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**Table 8-249—Anchor BS Switch IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| *Reserved* | *variable* | Number of bits required to align to byte |
|  |  | boundary from CQICH Allocation |
|  |  | Indicator bit field to the end of this field. |
|  |  | This value shall be set to zero. |
|  |  |  |
| } | — | — |
|  |  |  |
| }else{ | — | — |
|  |  |  |
| *Reserved* | 2 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| *Reserved* | 4 | — |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.4.52 HARQ UL-MAP IE**

The following modes of HARQ shall be supported by the HARQ UL-MAP IE:

1. Chase combining HARQ for all FEC types (HARQ Chase). In this mode, the burst profile is indicated by a UIUC.
2. Incremental redundancy HARQ for CTC (HARQ IR). In this mode, the burst profile is indicated by the parameters NEP, NSCH.
3. Incremental redundancy HARQ for convolutional code (HARQ CC-IR).

The IE may also be used to indicate a non-HARQ transmission when ACK disable=1.

The HARQ UL MAP IE defines one or more bursts. Each burst is separately encoded.

If MAC tunneling is used, tunnel CID shall be used instead of RCID in the related UL HARQ sub-burst IE for the corresponding sub-burst.

When the Allocation Start Indication is 1, the HARQ UL-MAP IE indicates the starting symbol and subchannel of the allocation. The starting symbol and subchannel shall indicate a valid slot location after the last allocation in the uplink zone in the UL subframe. The slots are allocated in a time-first order (as specified in 8.4.5.4). The starting symbol and subchannel are relevant only in the context of the HARQ UL-MAP IE in which they appear. Allocations made without the starting symbol and subchannel of the allocations specified (such as HARQ UL-MAP IE with Allocation Start Indication 0, or regular UL-MAP IE) shall immediately follow the last allocation in the uplink zone and shall advance in the time axis. (See Table 8-250 through Table 8-254.)

For FDD/H-FDD, if the HARQ UL-MAP IE with H-FDD UL Subframe Indicator = 1 is included in the FDD\_Paired\_Allocation\_IE(), the “OFDMA Symbol Offset” and “Subchannel Offset” fields in HARQ UL-MAP IE indicates the starting symbol and subchannel of the allocation in the other UL subframe (Group) in the same frame, that is, the UL Group different from that the UL-MAP including the current HARQ UL-MAP IE is associated with.

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If the H-FDD UL Subframe Indicator is set to '0', the HARQ UL-MAP IE indicates the starting symbol and subchannel of the allocation in the UL subframe (Group) that the UL-MAP including this HARQ UL-MAP IE is associated with. BS shall not use UL Allocation Start Indication = 1 with H-FDD UL Subframe Indicator=1 to an MS without capability of Full-Duplex (FDD), which is negotiated using SBC-REQ/RSP.

**Table 8-250—HARQ UL-MAP IE**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| HARQ\_UL-MAP\_IE() { | — | — |
|  |  |  |
| **Extended-2 UIUC** | 4 | HARQ\_UL-MAP\_IE() = 0x07 |
|  |  |  |
| **Length** | 8 | Length in bytes |
|  |  |  |
| **RCID\_Type** | 2 | 0b00: Normal CID |
|  |  | 0b01: RCID11 |
|  |  | 0b10: RCID7 |
|  |  | 0b11: RCID3 |
|  |  |  |
| *Reserved* | 2 | — |
|  |  |  |
| while (data remains) { | — | — |
|  |  |  |
| **Mode** | 3 | Indicates the mode of this IE: |
|  |  | 0b000: Chase HARQ |
|  |  | 0b001: Incremental redundancy HARQ |
|  |  | for CTC |
|  |  | 0b010: Incremental redundancy HARQ |
|  |  | for convolutional code |
|  |  | 0b011: MIMO Chase HARQ |
|  |  | 0b100: MIMO IR HARQ |
|  |  | 0b101: MIMO IR HARQ for |
|  |  | convolutional code |
|  |  | 0b110: MIMO STC HARQ |
|  |  | 0b111: *Reserved* |
|  |  |  |
| **Allocation Start Indication** | 1 | 0: No allocation start information |
|  |  | 1: Allocation start information follows |
|  |  |  |
| If (Allocation Start Indication == 1) { | — | — |
|  |  |  |
| **OFDMA Symbol offset** | 8 | This value indicates start Symbol offset of |
|  |  | subsequent sub-bursts in this HARQ |
|  |  | ULMAP IE with reference to the start of |
|  |  | the UL subframe |
|  |  |  |
| **Subchannel offset** | 7 | This value indicates start Subchannel |
|  |  | offset of subsequent sub-bursts in this |
|  |  | HARQUL MAP IE |
|  |  |  |
| **H-FDD UL subframe indicator** | 1 | Only applies to FDD MS in FDD/H-FDD |
|  |  | 0b0: UL subframe relevant to current UL- |
|  |  | MAP [or UL subframe 2 (UL1)] |
|  |  | 0b1: The other UL subframe [or UL |
|  |  | subframe 1 (UL2)] |
|  |  | Shall be set to zero for TDD and H-FDD |
|  |  | only MS in FDD/H-FDD |
|  |  |  |

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**Table 8-250—HARQ UL-MAP IE *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **N sub-bursts** | 4 | Number of sub-bursts in this HARQ UL |
|  |  | MAP IE is this field value plus 1 |
|  |  |  |
| For (*i* = 0; *i* < Number of sub-bursts; *i*++){ | — | — |
|  |  |  |
| If (Mode == 000) { | — | — |
|  |  |  |
| **UL HARQ Chase sub-burst IE ()** | — | — |
|  |  |  |
| } else if (Mode == 001) { | — | — |
|  |  |  |
| **UL HARQ IR CTC sub-burst IE ()** | — | — |
|  |  |  |
| } else if (Mode == 010) { | — | — |
|  |  |  |
| **UL HARQ IR CC sub-burst IE ()** | — | — |
|  |  |  |
| } else if (Mode == 011) { | — | — |
|  |  |  |
| **MIMO UL Chase HARQ sub-burst IE ()** | — | — |
|  |  |  |
| } else if (Mode == 100) { | — | — |
|  |  |  |
| **MIMO UL IR HARQ sub-burst IE ()** | — | — |
|  |  |  |
| } else if (Mode == 101) { | — | — |
|  |  |  |
| **MIMO UL IR HARQ for CC sub-burst IE ()** | — | — |
|  |  |  |
| } else if (Mode == 110) { | — | — |
|  |  |  |
| **MIMO UL STC HARQ sub-burst IE ()** | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to byte; shall be set to 0 |
|  |  |  |
| } | — | — |
|  |  |  |

**Table 8-251—UL HARQ Chase Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| HARQ Chase UL sub-burst IE { | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| **Dedicated UL Control Indicator** | 1 bit | — |
|  |  |  |
| If (Dedicated UL Control Indicator ==1) { | — | — |
|  |  |  |
| **Dedicated UL Control IE ()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |

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**Table 8-251—UL HARQ Chase Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| **Duration** | 10 | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| **ACK disable** | 1 | When ACK Disable == 1, the allocated sub- |
|  |  | burst does not require an ACK to be transmitted |
|  |  | by the BS in the HARQ ACK BITMAP (see |
|  |  | 8.4.5.3.22). In this case, no bit position is |
|  |  | allocated for the sub-burst in the HARQ ACK |
|  |  | BITMAP. For TDD SS, for the burst, MS shall |
|  |  | not perform HARQ retransmission and ignore |
|  |  | ACID, AI\_SN and SPID, which shall be set to 0 |
|  |  | by BS if they exist. For FDD SS, the BS may set |
|  |  | the ACID to a value other than 0 if that ACID is |
|  |  | listed in the Aggregated HARQ Channels TLV. |
|  |  | The CRC shall be appended at the end of each |
|  |  | sub-burst regardless of the ACK disable bit. |
|  |  |  |
| *Reserved* | 1 | — |
|  |  |  |
| } | — | — |
|  |  |  |

**Table 8-252—UL HARQ IR CTC Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| HARQ\_IR\_CTC\_UL\_sub-burst\_IE() { | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| **Dedicated UL Control Indicator** | 1 | — |
|  |  |  |
| If (Dedicated UL Control Indicator == 1) { | — | — |
|  |  |  |
| **Dedicated UL Control IE ()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **NEP** | 4 | — |
| **NSCH** | 4 | — |
| **SPID** | 2 | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |

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**Table 8-252—UL HARQ IR CTC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **ACK disable** | 1 | When ACK Disable == 1, the allocated sub- |
|  |  | burst does not require an ACK to be transmitted |
|  |  | by the BS in the HARQ ACK BITMAP (see |
|  |  | 8.4.5.3.22). In this case, no bit position is |
|  |  | allocated for the sub-burst in the HARQ ACK |
|  |  | BITMAP. For TDD SS, for the burst, MS shall |
|  |  | not perform HARQ retransmission and ignore |
|  |  | ACID, AI\_SN and SPID, which shall be set to 0 |
|  |  | by BS if they exist. For FDD SS, the BS may set |
|  |  | the ACID to a value other than 0 if that ACID is |
|  |  | listed in the Aggregated HARQ Channels TLV. |
|  |  | The CRC shall be appended at the end of each |
|  |  | sub-burst regardless of the ACK disable bit. |
|  |  |  |
| *Reserved* | 3 | — |
|  |  |  |
| } | — | — |
|  |  |  |

**Table 8-253—UL HARQ IR CC Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| HARQ\_IR\_CC\_UL\_sub-burst\_IE() { | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| **Dedicated UL Control Indicator** | 1 | — |
|  |  |  |
| If (Dedicated UL Control Indicator == 1) { | — | — |
|  |  |  |
| **Dedicated UL Control IE ()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Information** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| **Duration** | 10 | — |
|  |  |  |
| **SPID** | 2 | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |

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**Table 8-253—UL HARQ IR CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **ACK disable** | 1 | When ACK Disable == 1, the allocated sub- |
|  |  | burst does not require an ACK to be transmitted |
|  |  | by the BS in the HARQ ACK BITMAP (see |
|  |  | 8.4.5.3.22). In this case, no bit position is |
|  |  | allocated for the sub-burst in the HARQ ACK |
|  |  | BITMAP. For TDD SS, for the burst, MS shall |
|  |  | not perform HARQ retransmission and ignore |
|  |  | ACID, AI\_SN and SPID, which shall be set to 0 |
|  |  | by BS if they exist. For FDD SS, the BS may set |
|  |  | the ACID to a value other than 0 if that ACID is |
|  |  | listed in the Aggregated HARQ Channels TLV. |
|  |  | The CRC shall be appended at the end of each |
|  |  | sub-burst regardless of the ACK disable bit. |
|  |  |  |
| *Reserved* | 3 | — |
|  |  |  |
| } | — | — |
|  |  |  |

**Table 8-254—MIMO UL Chase HARQ Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| MIMO\_UL\_Chase\_HARQ\_sub-burst\_IE() { | — | — |
|  |  |  |
| **MU Indicator** | 1 | Indicates whether this UL burst is intended |
|  |  | for multiple SS. |
|  |  |  |
| **Dedicated MIMO UL Control Indicator** | 1 | — |
|  |  |  |
| **ACK Disable** | 1 | When ACK Disable == 1, the allocated |
|  |  | sub-burst does not require an ACK to be |
|  |  | transmitted by the BS in the HARQ ACK |
|  |  | BITMAP (see 8.4.5.3.22). In this case, no |
|  |  | bit position is allocated for the sub-burst in |
|  |  | the HARQ ACK BITMAP. For TDD SS, |
|  |  | for the burst, MS shall not perform HARQ |
|  |  | retransmission and ignore ACID, AI\_SN |
|  |  | and SPID, which shall be set to 0 by BS if |
|  |  | they exist. For FDD SS, the BS may set the |
|  |  | ACID to a value other than 0 if that ACID |
|  |  | is listed in the Aggregated HARQ |
|  |  | Channels TLV. The CRC shall be appended |
|  |  | at the end of each sub-burst regardless of |
|  |  | the ACK disable bit. |
|  |  |  |
| if (MU indicator == 0) { | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| If (Dedicated MIMO UL Control Indicator == 1) { | — | — |
|  |  |  |
| **Dedicated MIMO UL Control IE ()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } else { | — | — |
|  |  |  |

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**Table 8-254—MIMO UL Chase HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Matrix** | 1 | Indicates transmission matrix (see 8.4.8) |
|  |  | for MS with dual Tx antennas |
|  |  | 0 = Matrix A |
|  |  | 1 = Matrix B |
|  |  | Ignored by MS with single Tx antenna |
|  |  |  |
| } | — | — |
|  |  |  |
| **Duration** | 10 | — |
|  |  |  |
| For (*i* = 0; *i* < N\_layer; *i*++) { | — | N\_layer = 2 when MU Indicator is set to 1. |
|  |  | Otherwise, its value shall be delivered in |
|  |  | Dedicated MIMO UL Control IE(). |
|  |  |  |
| if (MU indicator == 1) { | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00: No repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| If (ACK Disable == 0) { | — | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

When an MS receives a MIMO HARQ burst allocation with Dedicated MIMO UL Control Indicator set to 1, the MS shall store the information in Dedicated MIMO UL Control IE. When an MS receives a MIMO HARQ burst allocation with Dedicated MIMO UL Control Indicator is set to 0, the MS shall use the stored Dedicated MIMO UL Control information from the last burst allocation where this information was included.

For the MIMO HARQ allocation specified in the MIMO UL Chase HARQ Sub-burst IE, MIMO UL IR HARQ Sub-burst IE, or the MIMO UL IR HARQ for CC Sub-burst IE, each layer shall be allocated its associated bit position in the ACK channel bitmap. The number of bits in the ACK channel bitmap associated with the sub-burst IE may be greater than N\_sub\_burst.

For each single MS sub-burst (MU indicator = 0) matrix and layer information shall be read from Dedicated MIMO UL Control IE, if set by the indicator bit, and be applied to the burst accordingly. For each multiple-SS sub-burst (MU Indicator = 1), N\_layer for this sub-burst shall be set to 2 and the first SS with the first RCID shall use the pilot pattern A for single antenna MS or the pilot pattern A/B for dual antenna MS in 8.4.8.1.5 and the first UIUC; whereas, the second MS with the second RCID shall use the pilot pattern B for single antenna MS or the pilot pattern C/D for dual antenna MS and the second UIUC. (See Table 8-255, Table 8-256, and Table 8-257.)

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**Table 8-255—MIMO UL IR HARQ Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| MIMO\_UL\_IR\_HARQ\_sub-burst\_IE() { | — | — |
|  |  |  |
| **MU Indicator** | 1 | Indicates whether this UL burst is |
|  |  | intended for multiple SSs |
|  |  |  |
| **Dedicated MIMO UL Control Indicator** | 1 | — |
|  |  |  |
| **ACK Disable** | 1 | When ACK Disable == 1, the allocated |
|  |  | sub-burst does not require an ACK to |
|  |  | be transmitted by the BS in the HARQ |
|  |  | ACK BITMAP (see 8.4.5.3.22). In this |
|  |  | case, no bit position is allocated for the |
|  |  | sub-burst in the HARQ ACK BITMAP. |
|  |  | For TDD SS, for the burst, MS shall |
|  |  | not perform HARQ retransmission and |
|  |  | ignore ACID, AI\_SN and SPID, which |
|  |  | shall be set to 0 by BS if they exist. For |
|  |  | FDD SS, the BS may set the ACID to a |
|  |  | value other than 0 if that ACID is listed |
|  |  | in the Aggregated HARQ Channels |
|  |  | TLV. The CRC shall be appended at the |
|  |  | end of each sub-burst regardless of the |
|  |  | ACK disable bit. |
|  |  |  |
| if (MU indicator == 0) { | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| If (Dedicated MIMO UL Control Indicator == 1) { | — | — |
|  |  |  |
| **Dedicated MIMO UL Control IE ()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } else { | — | — |
|  |  |  |
| **Matrix** | 1 | Indicates transmission matrix (see |
|  |  | 8.4.8) for MS with dual Tx antennas |
|  |  | 0 = Matrix A |
|  |  | 1 = Matrix B |
|  |  | Ignored by MS with single Tx antenna |
|  |  |  |
| } | — | — |
|  |  |  |
| **NSCH** | 4 | — |
| For (*i* = 0; *i* < N\_layer; *i*++) { | — | — |
|  |  |  |
| if (MU indicator == 1) { | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **NEP** | 4 | — |
| If (ACK Disable == 0) { | — | — |
|  |  |  |
| **SPID** | 2 | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |

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**Table 8-255—MIMO UL IR HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

**Table 8-256—MIMO UL IR HARQ for CC Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| MIMO UL IR HARQ for CC sub-burst IE{ | — | — |
|  |  |  |
| **MU Indicator** | 1 | Indicates whether this UL burst is |
|  |  | intended for multiple SS |
|  |  |  |
| **Dedicated MIMO UL Control Indicator** | 1 | — |
|  |  |  |
| **ACK Disable** | 1 | When ACK Disable == 1, the |
|  |  | allocated sub-burst does not require |
|  |  | an ACK to be transmitted by the BS |
|  |  | in the HARQ ACK BITMAP (see |
|  |  | 8.4.5.3.22). In this case, no bit |
|  |  | position is allocated for the sub- |
|  |  | burst in the HARQ ACK BITMAP. |
|  |  | For TDD SS, for the burst, MS shall |
|  |  | not perform HARQ retransmission |
|  |  | and ignore ACID, AI\_SN and |
|  |  | SPID, which shall be set to 0 by BS |
|  |  | if they exist. For FDD SS, the BS |
|  |  | may set the ACID to a value other |
|  |  | than 0 if that ACID is listed in the |
|  |  | Aggregated HARQ Channels TLV. |
|  |  | The CRC shall be appended at the |
|  |  | end of each sub-burst regardless of |
|  |  | the ACK disable bit. |
|  |  |  |
| if (MU indicator == 0) { | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| If (Dedicated MIMO UL Control Indicator == 1) { | — | — |
|  |  |  |
| **Dedicated MIMO UL Control IE ()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } else { | — | — |
|  |  |  |
| **Matrix** | 1 | Indicates transmission matrix |
|  |  | (see 8.4.8) for MS with dual Tx |
|  |  | antennas |
|  |  | 0 = Matrix A |
|  |  | 1 = Matrix B |
|  |  | Ignored by MS with single Tx |
|  |  | antenna |
|  |  |  |

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**Table 8-256—MIMO UL IR HARQ for CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **Duration** | 10 | — |
|  |  |  |
| For (*i* = 0; *i* < N\_layer; *i*++) { | — | — |
|  |  |  |
| if (MU indicator == 1) { | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00 – No repetition coding |
|  |  | 0b01 – Repetition coding of 2 used |
|  |  | 0b10 – Repetition coding of 4 used |
|  |  | 0b11 – Repetition coding of 6 used |
|  |  |  |
| If (ACK Disable == 0) { | — | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| **SPID** | 2 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

**Table 8-257—MIMO UL STC HARQ Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| MIMO\_UL\_STC\_HARQ\_sub-burst\_IE() { | — | — |
|  |  |  |
| **Tx count** | 2 | 0b00: Initial transmission |
|  |  | 0b01: Odd retransmission |
|  |  | 0b10: Even retransmission |
|  |  | 0b11: *Reserved* |
|  |  |  |
| **Duration** | 10 | — |
|  |  |  |
| **Sub-burst offset indication** | 1 | Indicates the inclusion of sub-burst |
|  |  | offset |
|  |  |  |
| *Reserved* | — | Shall be set to zero |
|  |  |  |
| **If (Sub-burst offset indication == 1) {** | — | — |
|  |  |  |
| **Sub-burst offset** | 8 | Offset in slots with respect to the |
|  |  | previous sub-burst defined in this |
|  |  | data region. If this is the first sub- |
|  |  | burst within the data region, this |
|  |  | offset is with respect to slot 0 of the |
|  |  | data region. |
|  |  |  |

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**Table 8-257—MIMO UL STC HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **}** | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| **ACK Disable** | 1 | When ACK Disable == 1, the |
|  |  | allocated sub-burst does not require |
|  |  | an ACK to be transmitted by the BS |
|  |  | in the HARQ ACK BITMAP (see |
|  |  | 8.4.5.3.22). In this case, no bit |
|  |  | position is allocated for the sub- |
|  |  | burst in the HARQ ACK BITMAP. |
|  |  | For TDD SS, for the burst, MS shall |
|  |  | not perform HARQ retransmission |
|  |  | and ignore ACID, AI\_SN and |
|  |  | SPID, which shall be set to 0 by BS |
|  |  | if they exist. For FDD SS, the BS |
|  |  | may set the ACID to a value other |
|  |  | than 0 if that ACID is listed in the |
|  |  | Aggregated HARQ Channels TLV. |
|  |  | The CRC shall be appended at the |
|  |  | end of each sub-burst regardless of |
|  |  | the ACK disable bit. |
|  |  |  |
| If (Tx count == 00) { | — | — |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Information** | 2 | 0b00 – No repetition coding |
|  |  | 0b01 – Repetition coding of 2 used |
|  |  | 0b10 – Repetition coding of 4 used |
|  |  | 0b11 – Repetition coding of 6 used |
|  |  |  |
| } | — | — |
|  |  |  |
| If (ACK Disable == 0) { | — | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.4.52.1 Dedicated UL Control IE**

The format for the Dedicated UL Control IE is shown in Table 8-258.

**Table 8-258—Dedicated UL Control IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Dedicated\_UL\_Control\_IE() { | — | — |
|  |  |  |
| **Length** | 4 | Length of following control information in |
|  |  | Nibble. |
|  |  |  |

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**Table 8-258—Dedicated UL Control IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Control header** | 4 | Bit 0: SDMA Control Info |
|  |  | Bit 1–3: *Reserved* |
|  |  |  |
| If( SDMA Control Info Bit == 1){ | — | — |
|  |  |  |
| **Num SDMA layers** | 2 | This value plus one indicates the total |
|  |  | number of SDMA layers associated with the |
|  |  | HARQ UL MAP IE |
|  |  |  |
| **Pilot pattern** | 2 | 0b00: Pattern A |
|  |  | 0b01: Pattern B |
|  |  | 0b10: Pattern C |
|  |  | 0b11: Pattern D |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

**Length**

A field that indicates the following control information.

**Control Information**

Variable size control information.

**SDMA control information**

The Dedicated UL Control IE with SDMA Control Info = 1 shall be present within the first sub-burst allocation of each layer of SDMA allocations. When the SDMA control info is present, the OFDMA Symbol offset and Subchannel offset shall be reset to the Start OFDMA Symbol offset and Start Subchannel offset of the HARQ UL MAP IE. The specified pilot pattern for PUSC (see 8.4.8.1.5) or for AMC (see 8.4.8.4.1) is used for all sub-burst allocations until the next occurrence of SDMA Control Info or until the end of the current HARQ UL MAP IE. The information specified in this SDMA control info is first applied to the same sub-burst allocation that contains the Dedicated UL Control IE.

**8.4.5.4.52.2 Dedicated MIMO UL Control IE format**

Dedicated MIMO UL Control IE contains additional control information for each sub-burst. (See Table 8-259.)

**Table 8-259—Dedicated MIMO UL Control IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Dedicated\_MIMO\_UL\_Control\_IE() { | — | — |
|  |  |  |
| **Matrix** | 2 | Indicates transmission matrix (see 8.4.8) |
|  |  | 0b00: Matrix A (Tx Diversity) |
|  |  | 0b01: Matrix B (Spatial Multiplexing) |
|  |  | 0b10–0b11: *Reserved* |
|  |  |  |

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**Table 8-259—Dedicated MIMO UL Control IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **N\_layer** | 2 | Number of coding/modulation layers |
|  |  | 0b00: 1 layer |
|  |  | 0b01: 2 layers |
|  |  | 0b10–0b11: *Reserved* |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.4.53 HARQ ACK Region Allocation IE**

This IE may be used by the BS to define a UL region to include one or more ACK channel(s) for HARQ supporting MS. The IE format is shown in Table 8-260. The slots in the ACKCH region are divided into two half-slots. The first half-slot is composed of tiles 0,2,4; the second half-slot is composed of tiles 1,3,5. In the ACKCH Region, ACK channel 2n is the first half of slot n; ACK channel (2*n*+1) is the second half of slot n. The slot number n is increased first along the subchannel axis until the end of the ACKCH region, and then along the time axis.

The HARQ-enabled MS that receives HARQ DL burst at frame *i* should transmit the ACK signal through the ACK channel in the ACKCH region at frame (*i+j*). The frame offset *j* is defined by the “HARQ ACK Delay for DL Burst” field in the UCD message. Due to different frame numbering, an H-FDD user in Group 2 shall transmit the ACK signal through the ACK channel in the ACKCH region at frame (*i*+*j*+1).

The half-subchannel offset in the ACKCH Region is determined by the order of HARQ-enabled DL burst in the DL MAP. For example, when an MS receives a HARQ-enabled burst at frame i, and the burst is the *n-*th HARQ-enabled burst among the HARQ related IEs, the MS should transmit HARQ ACK at *n-*th half-subchannel in ACKCH Region that is allocated by the BS at frame (*i+j*).

For TDD mode, at most one ACK region per frame may be defined. For FDD/H-FDD mode, at most two ACK regions per frame may be defined (by using up to two HARQ ACK Region Allocation IE-s or TLV-s). If more than one ACK region is defined, the index of the ACK region associated with each burst is specified in a HARQ DL MAP IE and/or a OFDMA SUB-DL-UL-MAP message. The MS accumulates the ACKCH index separately for each ACK region.

Each SS should specify support of “UL ACK” channel (see 11.8.3.5.11).

When the ACK Disable bit is set (in DL HARQ IR CTC Sub-burst IE format), no ACK channel is allocated for the sub-burst. (See Table 8-260.)

**Table 8-260—HARQ ACKCH Region Allocation IE**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| HARQ\_ACKCH\_Region\_IE() { | — | — |
|  |  |  |
| **Extended-2 UIUC** | 4 | HARQ\_ACKCH\_Region\_IE() = 0x8 |
|  |  |  |
| **Length** | 8 | Length in bytes = 0x3 |
|  |  |  |
| **OFDMA Symbol offset** | 8 | — |
|  |  |  |

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**Table 8-260—HARQ ACKCH Region Allocation IE *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Subchannel offset** | 7 | — |
|  |  |  |
| **No. OFDMA symbols** | 5 | — |
|  |  |  |
| **No. subchannels** | 4 | — |
|  |  |  |
| } | — | — |
|  |  |  |

**OFDMA Symbol offset Subchannel offset**

**No. OFDMA Symbols No. Subchannels**

Specify the start symbol offset, the start subchannel offset, the number of allocated symbols, and the number of subchannels for the HARQ acknowledgment region respectively.

The HARQ ACK Region Allocation IE may override fast-feedback region. This means that when the HARQ ACK Region Allocation IE indicates the same region that is allocated for CQICH, then the region shall be used for HARQ ACK region. In the case that the Fast-feedback region is overridden by an HARQ ACK region, the whole HARQ ACK region shall reside within the Fast-feedback region. The BS and MS shall treat the overridden part of the Fast-feedback region as an HARQ ACK region. The original CQICH allocation offsets remain unchanged. When allocating Fast-feedback slots, the BS shall skip the slots in the overridden region.

**8.4.5.4.54 UL Sounding Command IE**

UL Sounding Command IE is defined in Table 8-6 (in 8.4.6.2.7.1).

**8.4.5.4.55 AAS SDMA UL IE format**

The format for AAS SDMA UL IE is shown in Table 8-261.

**Table 8-261—AAS SDMA UL IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| AAS\_SDMA\_UL\_IE() { | — | — |
|  |  |  |
| **Extended-2 UIUC** | 4 | AAS\_SDMA\_UL\_IE() = 0xE |
|  |  |  |
| **Length** | 8 | *variable* |
|  |  |  |
| **RCID\_Type** | 2 | 0b00: Normal CID |
|  |  | 0b01: RCID11 |
|  |  | 0b10: RCID7 |
|  |  | 0b11: RCID3 |
|  |  |  |
| **Num Burst Region** | 4 | — |
|  |  |  |
| *Reserved* | 2 | Shall be set to zero |
|  |  |  |
| For (ii = 1: Num Region) { | — | — |
|  |  |  |

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**Table 8-261—AAS SDMA UL IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Slot offset** | 12 | Starting slot offset in AAS zone referenced to |
|  |  | right after UL AAS preamble |
|  |  |  |
| **Slot duration** | 10 | — |
|  |  |  |
| **Number of Users** | 3 | SDMA users for the assigned region |
|  |  |  |
| *Reserved* | 3 | Shall be set to zero |
|  |  |  |
| For (jj = 1: Num\_Users) { | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| **Encoding Mode** | 2 | 0b00: No HARQ |
|  |  | 0b01: HARQ Chase Combining |
|  |  | 0b10: HARQ Incremental Redundancy |
|  |  | 0b11: HARQ Conv. Code Incremental |
|  |  | Redundancy |
|  |  |  |
| **Power Adjust** | 1 | 0: Not Included |
|  |  | 1: Included; Signed integer in 0.25 dB Unit |
|  |  |  |
| **Pilot Pattern Modifier** | 1 | 0: Not Applied |
|  |  | 1: Applied |
|  |  |  |
| If (AAS UL Preamble Used) { | — | — |
|  |  |  |
| **Preamble Modifier Index** | 4 | Preamble Modifier Index |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Pilot Pattern Modifier) { | — | Pilots per beam |
|  |  |  |
| **Pilot Pattern** | 2 | See 8.4.8.1.5 (Figure 8-14) and 8.4.6.3.3 |
|  |  | 0b00: Pattern #A |
|  |  | 0b01: Pattern #B |
|  |  | 0b10: Pattern #C |
|  |  | 0b11: Pattern #D |
|  |  |  |
| *Reserved* | 2 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Encoding Mode == 0b00) { | — | — |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00: No repetition |
|  |  | 0b01: Repetition of 2 |
|  |  | 0b10: Repetition of 4 |
|  |  | 0b11: Repetition of 6 |
|  |  |  |
| *Reserved* | 2 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Encoding Mode == 0b01) { | — | HARQ Chase Combining |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00: No repetition |
|  |  | 0b01: Repetition of 2 |
|  |  | 0b10: Repetition of 4 |
|  |  | 0b11: Repetition of 6 |
|  |  |  |

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**Table 8-261—AAS SDMA UL IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| *Reserved* | 1 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Encoding Mode == 0b10) { | — | — |
|  |  |  |
| **NEP** | 4 | — |
| **NSCH** | 4 | Indicator for the number of first slots used for |
|  |  | data encoding in this SDMA allocation |
|  |  | region |
|  |  |  |
| **SPID** | 2 | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| *Reserved* | 1 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Encoding Mode == 0b11) { | — | HARQ Conv. Code Incremental Redundancy |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 2 | 0b00: No repetition |
|  |  | 0b01: Repetition of 2 |
|  |  | 0b10: Repetition of 4 |
|  |  | 0b11: Repetition of 6 |
|  |  |  |
| **SPID** | 2 | — |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| *Reserved* | 3 | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Power Adjust Included) { | — | — |
|  |  |  |
| **Power adjustment** | 8 | Signed integer in 0.25 dB Unit |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | End of User loop |
|  |  |  |
| } | — | End of Burst Region Loop |
|  |  |  |
| **Padding** | *variable* | Shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

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**8.4.5.4.56 Feedback Polling IE**

This IE may be used by BS to schedule feedback header transmission by the MS. When the Dedicated UL Allocation bit is set to 1, a dedicated UL allocation shall be included in this IE. The dedicated UL allocation shall be used by the MS to transmit feedback header at the designated feedback header transmission frame defined by this IE. When the Dedicated UL Allocation bit is set to 0, no dedicated UL allocation shall be included. Instead, at the designated transmission frame defined by this IE, the MS shall compose the feedback header and the BS shall include a dedicated UL allocation for the transmission using normal UL MAP IE. (See Table 8-262).

**Table 8-262—Feedback Polling IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Feedback\_Polling\_IE() { | — | — |
|  |  |  |
| **Extended-2 UIUC** | 4 | Feedback Polling IE() = 0xF |
|  |  |  |
| **Length** | 8 | Length in bytes of following fields |
|  |  |  |
| **Num\_Allocations** | 4 | “Number of allocated feedback channels” is this field value |
|  |  | plus 1 |
|  |  |  |
| **Dedicated UL Allocation Included** | 1 | 0: No dedicated UL resource is allocated in this feedback |
|  |  | polling IE. BS shall provide UL allocation for the feedback |
|  |  | header transmission through UL-MAP at each designated |
|  |  | transmitting frame defined by this IE |
|  |  | 1: Dedicated UL resource is included |
|  |  |  |
| *Reserved* | 3 | Shall be set to zero |
|  |  |  |
| for (*i* = 0; *i* < Number of allocated | — | — |
| feedback channels; *i*++) { |  |  |
|  |  |  |
| **Basic CID** | 16 | — |
|  |  |  |
| **Allocation Duration (d)** | 3 | The allocation is valid for 4(d–1) frame starting from the |
|  |  | frame defined by Frame\_offset |
|  |  | If d == 0b000, the prescheduled feedback header |
|  |  | transmission is released |
|  |  | If d == 0b111, the prescheduled feedback header |
|  |  | transmission shall be valid until the BS commands to |
|  |  | release it |
|  |  |  |
| If (d != 0b000) { | — | — |
|  |  |  |
| **Feedback type** | 4 | See Table 6-16. The MS can override the feedback type by |
|  |  | sending the feedback header with report type specifying the |
|  |  | feedback type |
|  |  |  |
| **Frame Offset** | 3 | The offset (in units of frames) from the current frame in |
|  |  | which the first UL feedback header shall be transmitted on |
|  |  | the allocated UL resource. The start value of frame offset |
|  |  | shall be 1 |
|  |  |  |
| **Period (p)** | 2 | The UL resource region is dedicated to the MS in every 2p |
|  |  | frame |
|  |  |  |
| If (Dedicated UL Allocation | — | — |
| Included == 1) { |  |  |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |

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**Table 8-262—Feedback Polling IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **OFDMA symbol offset** | 8 | — |
|  |  |  |
| **Subchannel offset** | 7 | — |
|  |  |  |
| **Duration** | 3 | In OFDMA Slots |
|  |  |  |
| **Repetition coding indica-** | 2 | 0b00 – No repetition coding |
| **tion** |  | 0b01 – Repetition coding of 2 used |
|  |  | 0b10 – Repetition coding of 4 used |
|  |  | 0b11 – Repetition coding of 6 used |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| *Padding bits* | *variable* | To align octet boundary |
|  |  |  |
| } | — | — |
|  |  |  |

**Feedback type**

See Table 6-16.

**Duration**

In OFDMA slots (see 8.4.3.1).

**Period (p)**

The UL resource region is dedicated to an MS in every 2p frame.

**Dedicated UL Allocation**

1. No dedicated UL resource is allocated in feedback polling IE. BS shall provide UL allocation for the feedback header transmission at each designated transmitting frame defined by this IE.
2. Dedicated UL resource is included.

**OFDMA symbol offset**

The offset of OFDMA symbol in which the burst starts, measured in OFDMA symbols from beginning of the designated transmission UL frame for feedback header.

**Subchannel offset**

The lowest index OFDMA subchannel used for carrying the burst, starting from subchannel 0.

**Allocation Duration (d)**

The allocation is valid for 4(d–1) frame starting from the frame defined by Frame offset If d == 0b000, the dedicated allocation is deallocated.

If d == 0b111, the dedicated resource shall be valid until the BS commands to deallocate the dedicated allocation.

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**8.4.5.4.57 Uplink Power Control Bitmap IE**

This IE defines uplink power control correction bitmaps (UL\_PC\_Bitmap\_IE). The value in the Power Control Bitmap is the change that MS applies to its transmit power by changing the offset value. (See Table 8-263).

**Table 8-263—UL\_PC\_Bitmap IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| UL\_PC\_Bitmap\_IE() { | — | — |
|  |  |  |
| **Extended-2 UIUC** | 4 | Uplink Power Control Bitmap IE() = 0xB |
|  |  |  |
| **Length** | 8 | Length in bytes of following fields |
|  |  |  |
| **CQICH based Power Correction** | 1 | 0: CQICH based power correction is not included |
| **Included** |  | 1: CQICH based power correction is included |
|  |  |  |
| **Data burst based Power Correction** | 1 | 0: Data burst based power correction is not included |
| **Included** |  | 1: Data burst based power correction is included |
|  |  |  |
| If (CQICH based Power Correction | — | — |
| Included == 1) { |  |  |
|  |  |  |
| **CQICH Power Control Bitmap** | *variable* | It is the sequence of C power control commands with |
|  |  | (Bq+1) bits each. |
|  |  | The i-th power control command is a power adjustment to |
|  |  | the MS that transmitted the i-th CQICH on CQICH region |
|  |  | in the (N – Frame\_offset\_CQICH)-th frame. |
|  |  | N is the frame number of the current frame carrying this |
|  |  | UL\_PC\_Bitmap\_IE. |
|  |  | No. PC command bits (Bq) and Frame\_offset\_CQICH are |
|  |  | sent in UCD. |
|  |  | C is the total number of CQICHs in CQICH region in frame |
|  |  | N – Frame\_offset\_CQICH. |
|  |  | Depending on ‘Bq’, (Bq+1) bits power control command |
|  |  | shall be interpreted as follows: |
|  |  | B=0x00: 1 bit, ‘0’:–0.5 dB, ‘1’:+0.5 dB; |
|  |  | B=0x01: 2 bits, ‘00’:–0.5 dB, ‘01’: 0 dB, ‘10’:+0.5 dB, |
|  |  | ‘11’:+1.0 dB |
|  |  | B=0x02: 3 bits, ‘000’:–1.5 dB ~ ‘111’:+2.0 dB, step |
|  |  | size=0.5 dB |
|  |  | B=0x03: 4 bits, ‘0000’:–3.5 dB ~‘1111’:+4.0 dB, step |
|  |  | size=0.5 dB |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Data burst based Power Correc- | — | — |
| tion Included == 1) { |  |  |
|  |  |  |
| **No. of PC commands (D)** | 1 | No. of PC commands in Data Burst Power Control |
|  |  |  |

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**Table 8-263—UL\_PC\_Bitmap IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Data Burst Power Control** | *variable* | It is the sequence of D power control commands with |
| **Bitmap** |  | (Bd+1) bits each. |
|  |  | The i-th power control command is a power adjustment to |
|  |  | the MS that transmitted a burst in the frame (N- |
|  |  | Frame\_offset\_Data) and the burst is the i-th allocation made |
|  |  | by the UL MAP in the frame (N-Frame\_offset\_Data-1). |
|  |  | No. PC command bits (Bd) and Frame\_offset\_Data are sent |
|  |  | in UCD. |
|  |  | Depending on ‘Bd’, (Bd+1) bits power control command |
|  |  | shall be interpreted as follows: |
|  |  | B=0x00: 1 bit, ‘0’:–0.5 dB, ‘1’:+0.5 dB; |
|  |  | B=0x01: 2 bits, ‘00’:–0.5 dB, ‘01’: 0 dB, ‘10’:+0.5 dB, |
|  |  | ‘11’:+1.0 dB |
|  |  | B=0x02: 3 bits, ‘000’:–1.5 dB ~ ‘111’:+2.0 dB, step |
|  |  | size=0.5 dB |
|  |  | B=0x03: 4 bits, ‘0000’:–3.5 dB ~‘1111’:+4.0 dB, step |
|  |  | size=0.5 dB |
|  |  |  |
| } | — | — |
|  |  |  |
| *Padding bits* | *variable* | To align octet boundary |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.4.58 Persistent HARQ UL MAP Allocation IE**

Uplink persistent allocations are used by the base station to make uplink time-frequency resource assignments which repeat periodically. The logical time-frequency resource assigned using the Persistent HARQ UL MAP IE repeats at a periodic interval. Uplink persistent allocations are not compatible with the HARQ ACK bitmap.

The Persistent HARQ UL MAP IE may be used for non persistent allocations by setting the persistent flag in the sub-burst IE to 0.

**Table 8-264—Persistent HARQ UL MAP IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Persistent HARQ\_UL-MAP\_IE() { | — | — |
|  |  |  |
| **Extended 2- UIUC** | 4 | Persistent HARQ\_UL-MAP\_IE() = 0xC |
|  |  |  |
| **Length** | 8 | Length of the IE |
|  |  |  |
| **RCID Type** | 2 | 0b00: Normal CID |
|  |  | 0b01: RCID11 |
|  |  | 0b10: RCID7 |
|  |  | 0b11: RCID3 |
|  |  |  |
| *Reserved* | 1 | — |
|  |  |  |
| while( data remains ){ | — | — |
|  |  |  |

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**Table 8-264—Persistent HARQ UL MAP IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Mode** | 3 | Indicates the mode of this IE: |
|  |  | 0b000: Persistent UL Chase HARQ |
|  |  | 0b001: Persistent UL Incremental redundancy HARQ |
|  |  | for CTC |
|  |  | 0b010: Persistent UL Incremental redundancy HARQ |
|  |  | for convolutional code |
|  |  | 0b011: Persistent MIMO UL Chase HARQ |
|  |  | 0b100: Persistent MIMO UL IR HARQ |
|  |  | 0b101: Persistent MIMO UL IR HARQ for convolutional |
|  |  | code |
|  |  | 0b110: Persistent MIMO UL STC HARQ |
|  |  | 0b111: *Reserved* |
|  |  |  |
| **Allocation Start Indication** | 1 | 0: No allocation start information |
|  |  | 1: Allocation start information follows |
|  |  |  |
| if( Allocation Start Indication | — | — |
| ==1) { |  |  |
|  |  |  |
| **OFDMA Symbol offset** | 8 | This value indicates start symbol offset of subsequent sub- |
|  |  | bursts in this Persistent HARQ UL MAP IE with reference |
|  |  | to the start of the UL subframe. |
|  |  |  |
| **Subchannel offset** | 7 | This value indicates start Subchannel offset of subsequent |
|  |  | sub-bursts in this Persistent HARQ UL MAP IE. |
|  |  |  |
| *Reserved* | 1 | Shall be set to zero. |
|  |  |  |
| } | — | — |
|  |  |  |
| **N sub-bursts** | 4 | Number of changed sub-bursts in this Persistent HARQ UL |
|  |  | MAP IE is this field value plus 1. |
|  |  |  |
| **Resource Shifting Indicator** | 1 | 0 = No Resource Shifting |
|  |  | 1 = Resource Shifting |
|  |  |  |
| **Persistent Region ID** | 5 |  |
|  |  |  |
| **Change Indicator** | 1 | 0: No Change Occurred |
|  |  | 1: Change Occurred |
|  |  |  |
| for( *i* = 0; *i* < Number of changed | — | — |
| sub-burst; *i*++ ) { |  |  |
|  |  |  |
| If (mode == 000) { | — | — |
|  |  |  |
| **Persistent UL HARQ** | — | — |
| **Chase sub-burst IE ()** |  |  |
|  |  |  |
| } else if (mode == 001) { | — | — |
|  |  |  |
| **Persistent UL HARQ IR** | — | — |
| **CTC sub-burst IE ()** |  |  |
|  |  |  |
| } else if (mode == 010) { | — | — |
|  |  |  |
| **Persistent UL HARQ IR** | — | — |
| **CC sub-burst IE ()** |  |  |
|  |  |  |
| } else if (mode == 011) { | — | — |
|  |  |  |

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**Table 8-264—Persistent HARQ UL MAP IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Persistent MIMO UL** | — | — |
| **Chase HARQ sub-burst** |  |  |
| **IE ()** |  |  |
|  |  |  |
| } else if (mode == 100) { | — | — |
|  |  |  |
| **Persistent MIMO UL IR** | — | — |
| **HARQ sub-burst IE ()** |  |  |
|  |  |  |
| } else if (mode == 101) { | — | — |
|  |  |  |
| **Persistent MIMO UL IR** | — | — |
| **HARQ for CC sub-burst** |  |  |
| **IE ()** |  |  |
|  |  |  |
| } else if (mode == 110) { | — | — |
|  |  |  |
| **Persistent MIMO UL** | — | — |
| **STC HARQ sub-burst IE** |  |  |
| **()** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding bits** | *variable* | To align octet boundary |
|  |  |  |
| } | — | — |
|  |  |  |

**Resource Shifting Indicator**

If the resource shifting indicator is set to 1, the MS shall shift its persistent resource position by the accumulated slots as indicated by de-allocation commands with slot offsets smaller than its own.

**Persistent Region ID**

The identifier of specific Persistent HARQ region. The operation commanded by the IE is applied to sub-bursts in the region.

**Change Indicator**

The change indicator can be set to 0 or 1. It is used by MSs to decide if they can resume using their UL persistent allocations. See 6.3.25.4.5 for details.

**Table 8-265—Persistent UL HARQ Chase Sub-burst IE format**

|  |  |  |  |
| --- | --- | --- | --- |
| **Syntax** | **Size** |  | **Notes** |
| **(bit)** |  |
|  |  |  |
|  |  |  | |
| Persistent UL HARQ Chase sub-burst | — | — | |
| IE{ |  |  |  |
|  |  |  |  |
| **Allocation Flag** | 1 | 1 | = allocate |
|  |  | 0 | = de-allocate |
|  |  |  |  |

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**Table 8-265—Persistent UL HARQ Chase Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the group |
|  |  | assignment of the MS (see 8.4.4.2 and 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| If (Allocation Flag == 0) { | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast Feedback |
|  |  | region. When MAP ACK Channel Index = 0b111111, it |
|  |  | indicates NO MAP ACK channel is assigned to this |
|  |  | de-allocation. |
|  |  |  |
| if (Resource Shifting Indicator | — | — |
| ==1) { |  |  |
|  |  |  |
| **Duration** | *variable* | Duration in slots. OFDMA Frame duration dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in OFDMA |
|  |  | slots, with respect to the start of the UL subframe if an |
|  |  | allocation start indication is not included in this IE and with |
|  |  | respect to OFDM symbol offset and subchannel offset if an |
|  |  | allocation start indication is included in this IE |
|  |  | OFDMA Frame duration dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Retransmission Flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in Allocation |
|  |  | Period |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Allocation Flag == 1) { | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| **Persistent Flag** | 1 | 0 = non-persistent |
|  |  | 1 = persistent |
|  |  |  |
| **Duration Indicator** | 1 | If Duration Indicator is 1, it indicates that Duration is |
|  |  | explicitly assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same Duration as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Duration Indicator == 1) { | — | — |
|  |  |  |

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**Table 8-265—Persistent UL HARQ Chase Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Duration** | *variable* | Duration in slots. OFDMA Frame duration dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| } | — | — |
|  |  |  |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in OFDMA |
|  |  | slots, with respect to the start of the UL subframe if an |
|  |  | allocation start indication is not included in this IE and with |
|  |  | respect to OFDM symbol offset and subchannel offset if an |
|  |  | allocation start indication is included in this IE. |
|  |  | OFDMA Frame duration dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| if (Persistent Flag == 1) { | — | — |
|  |  |  |
| **Allocation Period and** | 1 | If Allocation Period and N\_ACID Indicator is 1, it indicates |
| **N\_ACID Indicator** |  | that allocation information (allocation period, Number of |
|  |  | ACID (N\_ACID) is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same allocation |
|  |  | period as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Allocation Period and | — | — |
| N\_ACID Indicator == 1) { |  |  |
|  |  |  |
| **Allocation Period (ap)** | 5 | Period of the persistent allocation is this field value plus 1 |
|  |  | (unit is frame). |
|  |  |  |
| **Number of ACID** | 3 | Number of HARQ channels associated with this persistent |
| **(N\_ACID)** |  | assignment is this field value plus 1. |
|  |  |  |
| } | — | — |
|  |  |  |
| **MAP NACK Channel Index** | 6 | Index to a shared MAP NACK channel within the Fast |
|  |  | Feedback region. When MAP NACK Channel Index = |
|  |  | 0b111111, it indicates NO MAP NACK channel is assigned |
|  |  | to this allocation. |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast Feedback |
|  |  | region. |
|  |  |  |
| } | — | — |
|  |  |  |
| **Dedicated UL Control Indica-** | 1 | — |
| **tor** |  |  |
|  |  |  |
| If (Dedicated UL Control Indica- | — | — |
| tor ==1) { |  |  |
|  |  |  |
| **Dedicated UL Control IE ()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |

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**Table 8-265—Persistent UL HARQ Chase Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Repetition Coding Indication** | 1 | 0b00: No Repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| **ACID** | 4 | Initial value of HARQ channel identifier. |
|  |  |  |
| **AI\_SN** | 1 | Initial AI\_SN for each ACID. |
|  |  |  |
| **ACK Disable** | 1 | When ACK Disable == 1, the allocated sub-burst does not |
|  |  | require an ACK to be transmitted by the BS in the HARQ |
|  |  | ACK BITMAP (see 8.4.5.3.22). In this case, no bit position |
|  |  | is allocated for the sub-burst in the HARQ ACK BITMAP. |
|  |  | For TDD SS, for the burst, MS shall not perform HARQ |
|  |  | retransmission and ignore ACID, AI\_SN and SPID, which |
|  |  | shall be set to 0 by BS if they exist. For FDD SS, the BS |
|  |  | may set the ACID to a value other than 0 if that ACID is |
|  |  | listed in the Aggregated HARQ Channels TLV. The CRC |
|  |  | shall be appended at the end of each sub-burst regardless of |
|  |  | the ACK disable bit. |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to nibble; shall be set to 0. |
|  |  |  |
| } | — | — |
|  |  |  |

**Allocation flag**

The allocation flag shall be set to 1 if the sub-burst IE is allocating time-frequency resources and shall be set to 0 if the sub-burst IE is de-allocating resources.

**Retransmission Flag**

The Retransmission Flag shall be set to 0 if the de-allocation occurs in *K*, where *K* is the relevant frame and shall be set to 1 if the de-allocation occurred in frame *K – allocation period*. The MS, who correctly received the UL-MAP in the frame relevant to frame *K – allocation* *period*, shall ignore the deallocation command with Retransmission Flag equal to 1. The MS,who failed to receive the UL-MAP in the frame relevant to frame *K – allocation period*, shall process the deallocation command with Retransmission Flag equal to 1.

The BS is allowed to retransmit de-allocation commands with the retransmission flag not set. This may cause the MS to receive a duplicated de-allocation command. The MS shall ignore a de-allocation command for which it does not have a corresponding persistent resource allocation.

**Persistent Flag**

The persistent flag shall be set to 1 if the assignment is persistent and shall be set to 0 if the assignment is non-persistent.

**Slot Offset**

The slot offset shall be set to the first slot in the time-frequency resource assignment. The slot offset is defined with respect to the lowest numbered slot of the UL subframe if an allocation start indication is not included in this IE, and the slot offset is defined with respect to the indicated OFDM symbol offset and subchannel offset if an allocation start indication is included in this IE.

**Allocation Period**

The allocation period value shall be set to (*ap*–1) where ap is the period of the persistent allocation, in units of frames.

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**N\_ACID**

The values of ACID field (N0) and N\_ACID field (N) are used together to specify an implicit cycling of HARQ channel identifiers as follows. N0 is used as the HARQ channel identifier corresponding to the first occurrence of the persistent allocation. For each next allocation this value is incremented modulo (N + 1)

**MAP NACK Channel Index**

The MAP NACK channel index is persistently allocated within the Fast Feedback region. The mobile station shall use the indicated MAP NACK channel to report MAP decoding error in frames where it has a persistent resource allocation assigned. When MAP NACK Channel Index = 0b111111, it indicates NO MAP NACK channel is assigned to this allocation.

**MAP ACK Channel Index**

The MAP ACK channel is allocated non-persistently within the Fast Feedback region. The mobile station shall use the indicated MAP ACK channel to report successful receipt of the persistent allocation IE. If the allocation flag is set to 0, when MAP ACK Channel Index = 0b111111, it indicates NO MAP ACK channel is assigned to this deallocation.

**ACID**

The ACID field shall be set to the initial value of HARQ channel identifier as described above.

**AI\_SN**

The AI\_SN field value shall be set to the initial ARQ identifier sequence number for each HARQ channel. The AI\_SN toggles between 0 and 1 for each particular HARQ channel. For example, if the period equals 4 frames, N\_ACID = 0b011, ACID = 2, and AI\_SN = 0, the ACID follows the pattern 2, 3, 4, 5, 2, 3, 4, 5, etc, and the AI\_SN follows the pattern 0, 0, 0, 0, 1, 1, 1, 1, etc.

**Table 8-266—Persistent UL HARQ IR CTC Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Persistent UL HARQ IR CTC sub-burst | — | — |
| IE { |  |  |
|  |  |  |
| **Allocation Flag** | 1 | 1 = allocate |
|  |  | 0 = de-allocate |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the group |
|  |  | assignment of the MS (see 8.4.4.2 and 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| If (Allocation Flag == 0) { | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast Feedback |
|  |  | region. When MAP ACK Channel Index = 0b111111, it |
|  |  | indicates NO MAP ACK channel is assigned to this |
|  |  | de-allocation. |
|  |  |  |
| if (Resource Shifting Indicator | — | — |
| ==1) { |  |  |
|  |  |  |
| **NEP** | 4 | — |
| **NSCH** | 4 | — |

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**Table 8-266—Persistent UL HARQ IR CTC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in OFDMA |
|  |  | slots, with respect to the start of the UL subframe if an |
|  |  | allocation start indication is not included in this IE and with |
|  |  | respect to OFDM symbol offset and subchannel offset if an |
|  |  | allocation start indication is included in this IE |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Retransmission Flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in Allocation |
|  |  | Period |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if (Allocation Flag == 1) { | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| **Persistent Flag** | 1 | 0 = non-persistent |
|  |  | 1 = persistent |
|  |  |  |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in OFDMA |
|  |  | slots, with respect to the start of the UL subframe if an |
|  |  | allocation start indication is not included in this IE and with |
|  |  | respect to OFDM symbol offset and subchannel offset if an |
|  |  | allocation start indication is included in this IE |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| if (Persistent Flag == 1) { | — | — |
|  |  |  |
| **Allocation Period and** | 1 | If Allocation Period and N\_ACID Indicator is 1, it indicates |
| **N\_ACID Indicator** |  | that allocation information (allocation period, Number of |
|  |  | ACID (N\_ACID) is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same allocation |
|  |  | period as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Allocation Period and | — | — |
| N\_ACID Indicator == 1) { |  |  |
|  |  |  |
| **Allocation Period (ap)** | 5 | Period of the persistent allocation is this field value plus 1 |
|  |  | (unit is frame) |
|  |  |  |
| **Number of ACID** | 3 | Number of HARQ channels associated with this persistent |
| **(N\_ACID)** |  | assignment is this field value plus 1 |
|  |  |  |
| } | — | — |
|  |  |  |
| **MAP NACK Channel Index** | 6 | Index to a shared MAP NACK channel within the Fast |
|  |  | Feedback region. When MAP NACK Channel Index = |
|  |  | 0b111111, it indicates NO MAP NACK channel is assigned |
|  |  | to this allocation |
|  |  |  |

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**Table 8-266—Persistent UL HARQ IR CTC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast Feedback |
|  |  | region. |
|  |  |  |
| } | — | — |
|  |  |  |
| **Dedicated UL Control Indica-** | 1 | — |
| **tor** |  |  |
|  |  |  |
| if (Dedicated UL Control Indica- | — | — |
| tor ==1) { |  |  |
|  |  |  |
| **Dedicated UL Control IE ()** | *variable* |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **Duration Indicator** | 1 | If Duration Indicator is 1, it indicates that Duration is |
|  |  | explicitly assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same Duration as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Duration Indicator == 1) { | — | — |
|  |  |  |
| **NEP** | 4 | — |
| **NSCH** | 4 | — |
| } | — | — |
|  |  |  |
| **SPID** | 2 | — |
|  |  |  |
| **ACID** | 4 | Initial value of HARQ channel identifier |
|  |  |  |
| **AI\_SN** | 1 | Initial AI\_SN for each ACID |
|  |  |  |
| **ACK Disable** | 1 | When ACK Disable == 1, the allocated sub-burst does not |
|  |  | require an ACK to be transmitted by the BS in the HARQ |
|  |  | ACK BITMAP (see 8.4.5.3.22). In this case, no bit position |
|  |  | is allocated for the sub-burst in the HARQ ACK BITMAP. |
|  |  | For TDD SS, for the burst, MS shall not perform HARQ |
|  |  | retransmission and ignore ACID, AI\_SN and SPID, which |
|  |  | shall be set to 0 by BS if they exist. For FDD SS, the BS |
|  |  | may set the ACID to a value other than 0 if that ACID is |
|  |  | listed in the Aggregated HARQ Channels TLV. The CRC |
|  |  | shall be appended at the end of each sub-burst regardless of |
|  |  | the ACK disable bit. |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to nibble; shall be set to 0 |
|  |  |  |
| } | — | — |
|  |  |  |

**SPID**

Defines subpacket identifier, which is used to identify the four subpackets generated from an encoder packet. The SPID field only applies to FEC modes supporting incremental redundancy. The SPID numbering shall follow the rules for subpacket generation in 6.3.15.1.

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**Table 8-267—Persistent UL HARQ IR CC Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Persistent UL HARQ IR CC sub-burst | — | — |
| IE { |  |  |
|  |  |  |
| **Allocation Flag** | 1 | 1 = allocate |
|  |  | 0 = de-allocate |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the group |
|  |  | assignment of the MS (see 8.4.4.2 and 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| If (Allocation Flag == 0) { | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast Feedback |
|  |  | region. When MAP ACK Channel Index = 0b111111, it |
|  |  | indicates NO MAP ACK channel is assigned to this |
|  |  | de-allocation. |
|  |  |  |
| if (Resource Shifting Indicator | — | — |
| ==1) { |  |  |
|  |  |  |
| **Duration** | *variable* | Duration in slots. OFDMA Frame duration dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in OFDMA |
|  |  | slots, with respect to the start of the UL subframe if an |
|  |  | allocation start indication is not included in this IE and with |
|  |  | respect to OFDM symbol offset and subchannel offset if an |
|  |  | allocation start indication is included in this IE |
|  |  | OFDMA Frame duration dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Retransmission Flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in Allocation |
|  |  | Period |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if (Allocation Flag == 1) { | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| **Persistent Flag** | 1 | 0 = non-persistent |
|  |  | 1 = persistent |
|  |  |  |
| **Duration Indicator** | 1 | If Duration Indicator is 1, it indicates that Duration is |
|  |  | explicitly assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same Duration as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |

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**Table 8-267—Persistent UL HARQ IR CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| if (Duration Indicator == 1) { | — | — |
|  |  |  |
| **Duration** | *variable* | Duration in slots. OFDMA Frame duration dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| } | — | — |
|  |  |  |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in OFDMA |
|  |  | slots, with respect to the start of the UL subframe if an |
|  |  | allocation start indication is not included in this IE and with |
|  |  | respect to OFDM symbol offset and subchannel offset if an |
|  |  | allocation start indication is included in this IE. |
|  |  | OFDMA Frame duration dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| if (Persistent Flag == 1) { | — | — |
|  |  |  |
| **Allocation Period and** | 1 | If Allocation Period and N\_ACID Indicator is 1, it indicates |
| **N\_ACID Indicator** |  | that allocation information (allocation period, Number of |
|  |  | ACID (N\_ACID) is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same allocation |
|  |  | period as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Allocation Period and | — | — |
| N\_ACID Indicator == 1) { |  |  |
|  |  |  |
| **Allocation Period (ap)** | 5 | Period of the persistent allocation is this field value plus 1 |
|  |  | (unit is frame). |
|  |  |  |
| **Number of ACID** | 3 | Number of HARQ channels associated with this persistent |
| **(N\_ACID)** |  | assignment is this field value plus 1. |
|  |  |  |
| } | — | — |
|  |  |  |
| **MAP NACK Channel Index** | 6 | Index to a shared MAP NACK channel within the Fast |
|  |  | Feedback region. When MAP NACK Channel Index = |
|  |  | 0b111111, it indicates NO MAP NACK channel is assigned |
|  |  | to this allocation. |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast Feedback |
|  |  | region. |
|  |  |  |
| } | — | — |
|  |  |  |
| **Dedicated UL Control Indica-** | 1 | — |
| **tor** |  |  |
|  |  |  |
| if (Dedicated UL Control Indica- | — | — |
| tor ==1) { |  |  |
|  |  |  |
| **Dedicated UL Control IE ()** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |

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**Table 8-267—Persistent UL HARQ IR CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indication** | 1 | 0b00: No Repetition coding |
|  |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| **SPID** | 4 | — |
|  |  |  |
| **ACID** | 4 | Initial value of HARQ channel identifier. |
|  |  |  |
| **AI\_SN** | 1 | Initial AI\_SN for each ACID. |
|  |  |  |
| **ACK Disable** | 1 | When ACK Disable == 1, the allocated sub-burst does not |
|  |  | require an ACK to be transmitted by the BS in the HARQ |
|  |  | ACK BITMAP (see 8.4.5.3.22). In this case, no bit position |
|  |  | is allocated for the sub-burst in the HARQ ACK BITMAP. |
|  |  | For TDD SS, for the burst, MS shall not perform HARQ |
|  |  | retransmission and ignore ACID, AI\_SN and SPID, which |
|  |  | shall be set to 0 by BS if they exist. For FDD SS, the BS |
|  |  | may set the ACID to a value other than 0 if that ACID is |
|  |  | listed in the Aggregated HARQ Channels TLV. The CRC |
|  |  | shall be appended at the end of each sub-burst regardless of |
|  |  | the ACK disable bit. |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to nibble; shall be set to 0. |
|  |  |  |
| } | — | — |
|  |  |  |

**Table 8-268—Persistent MIMO UL Chase HARQ Sub-burst IE format**

|  |  |  |  |
| --- | --- | --- | --- |
| **Syntax** | **Size** |  | **Notes** |
| **(bit)** |  |
|  |  |  |
|  |  |  |  |
| Persistent\_MIMO\_UL\_Chase\_HARQ\_s |  |  |  |
| ub-burst\_IE() { |  |  |  |
|  |  |  | |
| **MU Indicator** | 1 | Indicates whether this UL burst is intended for multiple MS | |
|  |  | 0 | = Single MS |
|  |  | 1 | = multiple MS |
|  |  |  |  |
| **Allocation Flag** | 1 | 1 | = allocate |
|  |  | 0 | = de-allocate |
|  |  |  |  |
| **Dedicated MIMO UL Control** | 1 | 0 | == MS shall use the stored Dedicated MIMO UL Control |
| **Indicator** |  | information from the last burst allocation where this | |
|  |  | information was included. | |
|  |  | 1 | = MS uses the Dedicated MIMO UL control information |
|  |  | is this IE | |
|  |  |  |  |
| if (MU Indicator == 0) { |  |  |  |
|  |  |  |  |

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**Table 8-268—Persistent MIMO UL Chase HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the group |
|  |  | assignment of the MS (see 8.4.4.2 and 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| if (Allocation flag == 0) { |  |  |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| if (Resource Shifting Indica- | — | — |
| tor== 1) { |  |  |
|  |  |  |
| **Duration** | *variable* | Duration in slots. OFDMA Frame duration dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in OFDMA |
|  |  | slots, with respect to the lowest numbered OFDM symbol |
|  |  | and the lowest numbered subchannel in the HARQ region. |
|  |  | OFDMA Frame duration dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Retransmission Flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in Relevant |
|  |  | Frame – Allocation Period. |
|  |  |  |
| **}** | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if (Allocation Flag == 1) { | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| if (Dedicated MIMO UL Con- | — | — |
| trol indicator == 1) { |  |  |
|  |  |  |
| **Dedicated MIMO UL** | *variable* | — |
| **Control IE ()** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **Persistent Flag** | 1 | 0 = non-persistent allocation |
|  |  | 1 = persistent allocation |
|  |  |  |
| **Duration Indicator** | 1 | If Duration Indicator is 1, it indicates that Duration is |
|  |  | explicitly assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same Duration as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Duration Indicator == 1) { | — | — |
|  |  |  |
| **Duration** | *variable* | See definition above in this IE |
|  |  |  |
| } | — | — |
|  |  |  |

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**Table 8-268—Persistent MIMO UL Chase HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Slot Offset** | *variable* | See definition above in this IE |
|  |  |  |
| **ACK Disable** | 1 | When ACK Disable == 1, the allocated sub-burst does not |
|  |  | require an ACK to be transmitted by the BS in the HARQ |
|  |  | ACK BITMAP (see 8.4.5.3.22). In this case, no bit position |
|  |  | is allocated for the sub-burst in the HARQ ACK BITMAP. |
|  |  | For TDD SS, for the burst, MS shall not perform HARQ |
|  |  | retransmission and ignore ACID, AI\_SN and SPID, which |
|  |  | shall be set to 0 by BS if they exist. For FDD SS, the BS |
|  |  | may set the ACID to a value other than 0 if that ACID is |
|  |  | listed in the Aggregated HARQ Channels TLV. The CRC |
|  |  | shall be appended at the end of each sub-burst regardless of |
|  |  | the ACK disable bit. |
|  |  |  |
| if (persistent flag ==1){ | — | — |
|  |  |  |
| **Allocation Period and** | 1 | If Allocation Period and N\_ACID Indicator is 1, it indicates |
| **N\_ACID Indicator** |  | that allocation information (allocation period, Number of |
|  |  | ACID (N\_ACID) is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same allocation |
|  |  | period as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Allocation Period and | — | — |
| N\_ACID Indicator == 1) { |  |  |
|  |  |  |
| **Allocation Period** | 5 | Period of the persistent allocation is this field value plus 1 |
|  |  | (unit is frame). |
|  |  |  |
| **Number of ACID** | 3 | Number of HARQ channels associated with this persistent |
| **(N\_ACID)** |  | assignment is this field value plus 1. |
|  |  |  |
| } | — | — |
|  |  |  |
| **MAP ACK Channel** | 6 | Index to a MAP ACK channel within the Fast Feedback |
| **Index** |  | region. |
|  |  |  |
| **MAP NACK Channel** | 6 | Index to a shared MAP NACK channel within the Fast |
| **Index** |  | Feedback region. When MAP NACK Channel Index = |
|  |  | 0b111111, it indicates NO MAP NACK channel is assigned |
|  |  | to this allocation. |
|  |  |  |
| } | — | — |
|  |  |  |
| for (*i* = 0; *i* < N\_Layers; *i*++) { | — | — |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indi-** | 2 | 0b00: No Repetition coding |
| **cation** |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| **ACID** | 4 | Initial value of HARQ channel identifier |
|  |  |  |
| **AI\_SN** | 1 | Initial AI\_SN for each ACID |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

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**Table 8-268—Persistent MIMO UL Chase HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| if (MU Indicator == 1) { | — | — |
|  |  |  |
| if (Dedicated MIMO UL Control | — | — |
| indicator == 1) { |  |  |
|  |  |  |
| **Dedicated MIMO UL Con-** | *variable* | — |
| **trol IE ()** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **Layer Relevance Bitmap** | 4 | 4 bit bitmap indicating if layer processing should be skipped |
|  |  | in the subsequent 'for loop'. The bit position indicates the |
|  |  | layer. The bit value: |
|  |  | 0 = skip the layer; |
|  |  | 1 = process the layer |
|  |  |  |
| for (*i* = 0; *i* < N\_Layers; *i*++) { | — | For each instance of the for-loop, when the corresponding |
|  |  | bit in the Layer Relevance Bitmap is set to 0, the subsequent |
|  |  | fields within this instance of for-loop are omitted. |
|  |  |  |
| if (Allocation flag == 0) { | — | De-allocate |
|  |  |  |
| **RCID IE ()** | *variable* | — |
|  |  |  |
| if (Resource Shifting Indi- | — | — |
| cator == 1) { |  |  |
|  |  |  |
| **Slot Offset** | *variable* | See definition above in this IE |
|  |  |  |
| **Duration** | *variable* | See definition above in this IE |
|  |  |  |
| **Retransmission Flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in Relevant |
|  |  | Frame – Allocation Period |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if (Allocation Flag == 1) { | — | — |
|  |  |  |
| **RCID IE ()** | *variable* | — |
|  |  |  |
| **Persistent flag** | 1 | — |
|  |  |  |
| **Slot Offset** | *variable* | See definition above in this IE |
|  |  |  |
| **Duration Indicator** | 1 | If Duration Indicator is 1, it indicates that Duration is |
|  |  | explicitly assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same Duration as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Duration Indicator == | — | — |
| 1) { |  |  |
|  |  |  |
| **Duration** | *variable* | See definition above in this IE |
|  |  |  |
| } | — | — |
|  |  |  |
| **ACK Disable** | 1 | See definition above in this IE |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |

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**Table 8-268—Persistent MIMO UL Chase HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Repetition Coding Indi-** | 2 | See definition above in this IE |
| **cation** |  |  |
|  |  |  |
| **ACID** | 4 | — |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| if (Persistent Flag == 1) { | — | — |
|  |  |  |
| **Allocation Period and** | 1 | If Allocation Period and N\_ACID Indicator is 1, it indicates |
| **N\_ACID Indicator** |  | that allocation information (allocation period, Number of |
|  |  | ACID (N\_ACID) is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same allocation |
|  |  | period as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Allocation Period | — | — |
| and N\_ACID Indicator |  |  |
| == 1) { |  |  |
|  |  |  |
| **Allocation Period** | 5 | See definition above in this IE |
|  |  |  |
| **Number of ACID** | 3 | See definition above in this IE |
| **(N\_ACID)** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **MAP ACK Channel** | 6 | See definition above in this IE |
| **Index** |  |  |
|  |  |  |
| **MAP NACK Channel** | 6 | See definition above in this IE |
| **Index** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to nibble; shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

**Table 8-269—Persistent MIMO UL IR HARQ Sub-burst IE format**

|  |  |  |  |
| --- | --- | --- | --- |
| **Syntax** | **Size** |  | **Notes** |
| **(bit)** |  |
|  |  |  |
|  |  |  | |
| Persistent\_MIMO\_UL\_IR\_HARQ\_sub- | — | — | |
| burst\_IE() { |  |  |  |
|  |  |  | |
| **MU Indicator** | 1 | Indicates whether this UL burst is intended for multiple MS | |
|  |  | 0 | = Single MS |
|  |  | 1 | = multiple MS |
|  |  |  |  |

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**Table 8-269—Persistent MIMO UL IR HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Allocation Flag** | 1 | 1 = allocate |
|  |  | 0 = de-allocate |
|  |  |  |
| **Dedicated MIMO UL Control** | 1 | 0 = MS shall use the stored Dedicated MIMO UL Control |
| **Indicator** |  | information from the last burst allocation where this |
|  |  | information was included. |
|  |  | 1 = MS uses the Dedicated MIMO UL control information |
|  |  | is this IE |
|  |  |  |
| If (MU Indicator == 0) { | — | — |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the group |
|  |  | assignment of the MS (see 8.4.4.2 and 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| If (Allocation flag == 0) { | — | — |
|  |  |  |
| **RCID IE()** | *variable* | — |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast Feedback |
|  |  | region. When MAP ACK Channel Index = 0b111111, it |
|  |  | indicates NO MAP ACK channel is assigned to this |
|  |  | de-allocation. |
|  |  |  |
| If (Resource Shifting Indica- | — | — |
| tor== 1) { |  |  |
|  |  |  |
| **NSCH** | 4 | — |
| **NEP** | 4 | — |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in OFDMA |
|  |  | slots, with respect to the start of the UL subframe if an |
|  |  | allocation start indication is not included in this IE and with |
|  |  | respect to OFDM symbol offset and subchannel offset if an |
|  |  | allocation start indication is included in this IE |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Retransmission Flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in Allocation |
|  |  | Period |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Allocation Flag == 1) { | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| If (Dedicated MIMO UL Con- | — | — |
| trol indicator == 1) { |  |  |
|  |  |  |
| **Dedicated MIMO UL** | *variable* | — |
| **Control IE ()** |  |  |
|  |  |  |

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**Table 8-269—Persistent MIMO UL IR HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **Persistent Flag** | 1 | 0 = non-persistent allocation |
|  |  | 1 = persistent allocation |
|  |  |  |
| **Duration Indicator** | 1 | If Duration Indicator is 1, it indicates that Duration is |
|  |  | explicitly assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same Duration as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Duration Indicator == 1) { | — | — |
|  |  |  |
| **NSCH** | 4 | — |
| **NEP** | 4 | — |
| } |  | — |
|  |  |  |
| **SPID** | 2 | — |
|  |  |  |
| **Slot Offset** | *variable* | See definition above in this IE. |
|  |  |  |
| **ACK Disable** | 1 | When ACK Disable == 1, the allocated sub-burst does not |
|  |  | require an ACK to be transmitted by the BS in the HARQ |
|  |  | ACK BITMAP (see 8.4.5.3.22). In this case, no bit position |
|  |  | is allocated for the sub-burst in the HARQ ACK BITMAP. |
|  |  | For TDD SS, for the burst, MS shall not perform HARQ |
|  |  | retransmission and ignore ACID, AI\_SN and SPID, which |
|  |  | shall be set to 0 by BS if they exist. For FDD SS, the BS |
|  |  | may set the ACID to a value other than 0 if that ACID is |
|  |  | listed in the Aggregated HARQ Channels TLV. The CRC |
|  |  | shall be appended at the end of each sub-burst regardless of |
|  |  | the ACK disable bit. |
|  |  |  |
| If (persistent flag ==1){ | — | — |
|  |  |  |
| **Allocation Period and** | 1 | If Allocation Period and N\_ACID Indicator is 1, it indicates |
| **N\_ACID Indicator** |  | that allocation information (allocation period, Number of |
|  |  | ACID (N\_ACID) is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same allocation |
|  |  | period as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Allocation Period and | — | — |
| N\_ACID Indicator == 1) { |  |  |
|  |  |  |
| **Allocation Period** | 5 | Period of the persistent allocation is this field value plus 1 |
|  |  | (unit is frame). |
|  |  |  |
| **Number of ACID** | 3 | Number of HARQ channels associated with this persistent |
| **(N\_ACID)** |  | assignment is this field value plus 1. |
|  |  |  |
| } | — | — |
|  |  |  |
| **MAP ACK Channel** | 6 | Index to a MAP ACK channel within the Fast Feedback |
| **Index** |  | region. |
|  |  |  |
| **MAP NACK Channel** | 6 | Index to a shared MAP NACK channel within the Fast |
| **Index** |  | Feedback region. When MAP NACK Channel Index = |
|  |  | 0b111111, it indicates NO MAP NACK channel is assigned |
|  |  | to this allocation. |
|  |  |  |

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**Table 8-269—Persistent MIMO UL IR HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| for (*i* = 0; *i* < N\_Layers; *i*++) { | — | — |
|  |  |  |
| **NSCH** | 4 | — |
| **NEP** | 4 | — |
| **SPID** | 2 | — |
|  |  |  |
| **ACID** | 4 | Initial value of HARQ channel identifier. |
|  |  |  |
| **AI\_SN** | 1 | Initial AI\_SN for each ACID. |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if (MU Indicator == 1) { | — | — |
|  |  |  |
| if (Dedicated MIMO UL Control | — | — |
| indicator == 1) { |  |  |
|  |  |  |
| **Dedicated MIMO UL Con-** | *variable* | — |
| **trol IE ()** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **Layer Relevance Bitmap** | 4 | 4 bit bitmap indicating if layer processing should be skipped |
|  |  | in the subsequent ‘for loop.’ The bit position indicates the |
|  |  | layer. The bit value: |
|  |  | 0 = skip the layer; |
|  |  | 1 = process the layer |
|  |  |  |
| for (*i* = 0; *i* < N\_Layers; *i*++) { | — | For each instance of the for-loop, when the corresponding |
|  |  | bit in the Layer Relevance Bitmap is set to 0, the subsequent |
|  |  | fields within this instance of for-loop are omitted. |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the group |
|  |  | assignment of the MS (see 8.4.4.2 and 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| If (Allocation flag == 0) { | — | De-allocate |
|  |  |  |
| **MAP ACK Channel** | 6 | Index to a MAP ACK channel within the Fast Feedback |
| **Index** |  | region. When MAP ACK Channel Index = 0b111111, it |
|  |  | indicates NO MAP ACK channel is assigned to this |
|  |  | de-allocation. |
|  |  |  |
| **RCID IE ()** | *variable* | — |
|  |  |  |
| If (Resource Shifting Indi- | — | — |
| cator == 1) { |  |  |
|  |  |  |
| **Slot Offset** | *variable* | See definition above in this IE |
|  |  |  |
| **NSCH** | 4 | — |
| **NEP** | 4 | — |

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**Table 8-269—Persistent MIMO UL IR HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Retransmission Flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in Allocation |
|  |  | Period |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Allocation Flag == 1) { | — | — |
|  |  |  |
| **RCID IE ()** | *variable* | — |
|  |  |  |
| **Persistent flag** | 1 | — |
|  |  |  |
| **Slot Offset** | *variable* | See definition above in this IE |
|  |  |  |
| **ACK Disable** | 1 | See definition above in this IE |
|  |  |  |
| **SPID** | 2 | — |
|  |  |  |
| **Duration Indicator** | 1 | If Duration Indicator is 1, it indicates that Duration is |
|  |  | explicitly assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same Duration as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Duration Indicator == | — | — |
| 1) { |  |  |
|  |  |  |
| **NSCH** | 4 | — |
| **NEP** | 4 | — |
| } | — | — |
|  |  |  |
| **ACID** | 4 | Initial value of HARQ channel identifier |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| if (Persistent Flag == 1) { | — | — |
|  |  |  |
| **Allocation Period and** | 1 | If Allocation Period and N\_ACID Indicator is 1, it indicates |
| **N\_ACID Indicator** |  | that allocation information (allocation period, Number of |
|  |  | ACID (N\_ACID) is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same allocation |
|  |  | period as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Allocation Period | — | — |
| and N\_ACID Indicator |  |  |
| == 1) { |  |  |
|  |  |  |
| **Allocation Period** | 5 | See definition above in this IE |
|  |  |  |
| **Number of ACID** | 3 | See definition above in this IE |
| **(N\_ACID)** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **MAP ACK Channel** | 6 | See definition above in this IE |
| **Index** |  |  |
|  |  |  |
| **MAP NACK Channel** | 6 | See definition above in this IE |
| **Index** |  |  |
|  |  |  |

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**Table 8-269—Persistent MIMO UL IR HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to nibble; shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

**Table 8-270—Persistent MIMO UL IR HARQ for CC Sub-burst IE format**

|  |  |  |  |
| --- | --- | --- | --- |
| **Syntax** | **Size** |  | **Notes** |
| **(bit)** |  |
|  |  |  |
|  |  |  |  |
| Persistent\_MIMO\_UL\_IR\_HARQ\_for\_ |  |  |  |
| CC\_sub-burst\_IE() { |  |  |  |
|  |  |  | |
| **MU Indicator** | 1 | Indicates whether this UL burst is intended for multiple MS | |
|  |  | 0 | = Single MS |
|  |  | 1 | = multiple MS |
|  |  |  |  |
| **Allocation Flag** | 1 | 1 | = allocate |
|  |  | 0 | = de-allocate |
|  |  |  |  |
| **Dedicated MIMO UL Control** | 1 | 0 | = MS shall use the stored Dedicated MIMO UL Control |
| **Indicator** |  | information from the last burst allocation where this | |
|  |  | information was included. | |
|  |  | 1 | = MS uses the Dedicated MIMO UL control information |
|  |  | is this IE | |
|  |  |  | |
| If (MU Indicator == 0) { | — | — | |
|  |  |  | |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. | |
|  |  | Used for FDD/H-FDD case only; to indicate the group | |
|  |  | assignment of the MS (see 8.4.4.2 and 8.4.4.2.1) | |
|  |  | 0b0: Group #1 | |
|  |  | 0b1: Group #2 | |
|  |  |  | |
| If (Allocation flag == 0) { | — | — | |
|  |  |  | |
| **RCID IE()** | *variable* | — | |
|  |  |  | |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast Feedback | |
|  |  | region. When MAP ACK Channel Index = 0b111111, it | |
|  |  | indicates NO MAP ACK channel is assigned to this | |
|  |  | de-allocation. | |
|  |  |  | |
| If (Resource Shifting Indica- | — | — | |
| tor== 1) { |  |  |  |
|  |  |  |  |

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**Table 8-270—Persistent MIMO UL IR HARQ for CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Duration** | *variable* | Duration in slots. OFDMA Frame duration dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in OFDMA |
|  |  | slots, with respect to the start of the UL subframe if an |
|  |  | allocation start indication is not included in this IE and with |
|  |  | respect to OFDM symbol offset and subchannel offset if an |
|  |  | allocation start indication is included in this IE |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Retransmission Flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in Allocation |
|  |  | Period |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Allocation Flag == 1) { | — | — |
|  |  |  |
| **RCID\_IE()** | *variable* | — |
|  |  |  |
| If (Dedicated MIMO UL Con- | — | — |
| trol indicator == 1) { |  |  |
|  |  |  |
| **Dedicated MIMO UL** | *variable* | — |
| **Control IE ()** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **Persistent Flag** | 1 | 0 = non-persistent allocation |
|  |  | 1 = persistent allocation |
|  |  |  |
| **Duration Indicator** | 1 | If Duration Indicator is 1, it indicates that Duration is |
|  |  | explicitly assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same Duration as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Duration Indicator == 1) { | — | — |
|  |  |  |
| **Duration** | *variable* | See definition above in this IE |
|  |  |  |
| } | — | — |
|  |  |  |
| **Slot Offset** | *variable* | See definition above in this IE |
|  |  |  |

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**Table 8-270—Persistent MIMO UL IR HARQ for CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **ACK Disable** | 1 | When ACK Disable == 1, the allocated sub-burst does not |
|  |  | require an ACK to be transmitted by the BS in the HARQ |
|  |  | ACK BITMAP (see 8.4.5.3.22). In this case, no bit position |
|  |  | is allocated for the sub-burst in the HARQ ACK BITMAP. |
|  |  | For TDD SS, for the burst, MS shall not perform HARQ |
|  |  | retransmission and ignore ACID, AI\_SN and SPID, which |
|  |  | shall be set to 0 by BS if they exist. For FDD SS, the BS |
|  |  | may set the ACID to a value other than 0 if that ACID is |
|  |  | listed in the Aggregated HARQ Channels TLV. The CRC |
|  |  | shall be appended at the end of each sub-burst regardless of |
|  |  | the ACK disable bit. |
|  |  |  |
| If (persistent flag ==1){ | — | — |
|  |  |  |
| **Allocation Period and** | 1 | If Allocation Period and N\_ACID Indicator is 1, it indicates |
| **N\_ACID Indicator** |  | that allocation information (allocation period, Number of |
|  |  | ACID (N\_ACID) is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same allocation |
|  |  | period as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Allocation Period and | — | — |
| N\_ACID Indicator == 1) { |  |  |
|  |  |  |
| **Allocation Period** | 5 | Period of the persistent allocation is this field value plus 1 |
|  |  | (unit is frame) |
|  |  |  |
| **Number of ACID** | 3 | Number of HARQ channels associated with this persistent |
| **(N\_ACID)** |  | assignment is this field value plus 1 |
|  |  |  |
| } | — | — |
|  |  |  |
| **MAP ACK Channel** | 6 | Index to a MAP ACK channel within the Fast Feedback |
| **Index** |  | region |
|  |  |  |
| **MAP NACK Channel** | 6 | Index to a shared MAP NACK channel within the Fast |
| **Index** |  | Feedback region. When MAP NACK Channel Index = |
|  |  | 0b111111, it indicates NO MAP NACK channel is assigned |
|  |  | to this allocation. |
|  |  |  |
| } | — | — |
|  |  |  |
| for (*i* = 0; *i* < N\_Layers; *i*++) { | — | — |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |
| **Repetition Coding** | 2 | 0b00: No Repetition coding |
| **Indication** |  | 0b01: Repetition coding of 2 used |
|  |  | 0b10: Repetition coding of 4 used |
|  |  | 0b11: Repetition coding of 6 used |
|  |  |  |
| **ACID** | 4 | Initial value of HARQ channel identifier |
|  |  |  |
| **AI\_SN** | 1 | Initial AI\_SN for each ACID |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| if (MU Indicator == 1) { | — | — |
|  |  |  |

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**Table 8-270—Persistent MIMO UL IR HARQ for CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| if (Dedicated MIMO UL Control | — | — |
| indicator == 1) { |  |  |
|  |  |  |
| **Dedicated MIMO UL Con-** | *variable* | — |
| **trol IE ()** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **Layer Relevance Bitmap** | 4 | 4 bit bitmap indicating if layer processing should be skipped |
|  |  | in the subsequent ‘for loop.’ The bit position indicates the |
|  |  | layer. The bit value: |
|  |  | 0 = skip the layer |
|  |  | 1 = process the layer |
|  |  |  |
| for (*i* = 0; *i* < N\_Layers; *i*++) { | — | For each instance of the for-loop, when the corresponding |
|  |  | bit in the Layer Relevance Bitmap is set to 0, the subsequent |
|  |  | fields within this instance of for-loop are omitted. |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the group |
|  |  | assignment of the MS (see 8.4.4.2 and 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| If (Allocation flag == 0) { | — | De-allocate |
|  |  |  |
| **MAP ACK Channel** | 6 | Index to a MAP ACK channel within the Fast Feedback |
| **Index** |  | region. When MAP ACK Channel Index = 0b111111, it |
|  |  | indicates NO MAP ACK channel is assigned to this |
|  |  | de-allocation. |
|  |  |  |
| **RCID IE ()** | *variable* | — |
|  |  |  |
| If (Resource Shifting Indi- | — | — |
| cator == 1) { |  |  |
|  |  |  |
| **Slot Offset** | *variable* | See definition above in this IE |
|  |  |  |
| **Duration** | *variable* | See definition above in this IE |
|  |  |  |
| **Retransmission Flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in Allocation |
|  |  | Period |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| If (Allocation Flag == 1) { | — | — |
|  |  |  |
| **RCID IE ()** | *variable* | — |
|  |  |  |
| **Persistent flag** | 1 | — |
|  |  |  |
| **Slot Offset** | *variable* | See definition above in this IE |
|  |  |  |
| **Duration Indicator** | 1 | If Duration Indicator is 1, it indicates that Duration is |
|  |  | explicitly assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same Duration as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |

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**Table 8-270—Persistent MIMO UL IR HARQ for CC Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| if (Duration Indicator == | — | — |
| 1) { |  |  |
|  |  |  |
| **Duration** | *variable* | See definition above in this IE |
|  |  |  |
| } | — | — |
|  |  |  |
| **ACK Disable** | 1 | See definition above in this IE |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indi-** | 2 | See definition above in this IE |
| **cation** |  |  |
|  |  |  |
| **ACID** | 4 | Initial value of HARQ channel identifier |
|  |  |  |
| **AI\_SN** | 1 | — |
|  |  |  |
| if (Persistent Flag == 1) { | — | — |
|  |  |  |
| **Allocation Period and** | 1 | If Allocation Period and N\_ACID Indicator is 1, it indicates |
| **N\_ACID Indicator** |  | that allocation information (allocation period, Number of |
|  |  | ACID (N\_ACID) is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same allocation |
|  |  | period as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Allocation Period | — | — |
| and N\_ACID Indicator |  |  |
| == 1) { |  |  |
|  |  |  |
| **Allocation Period** | 5 | See definition above in this IE |
|  |  |  |
| **Number of ACID** | 3 | See definition above in this IE |
| **(N\_ACID)** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **MAP ACK Channel** | 6 | See definition above in this IE |
| **Index** |  |  |
|  |  |  |
| **MAP NACK Channel** | 6 | See definition above in this IE |
| **Index** |  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to nibble; shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

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**Table 8-271—Persistent MIMO UL STC HARQ Sub-burst IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Persistent\_MIMO\_UL\_STC\_HARQ\_su |  |  |
| b-burst\_IE() { |  |  |
|  |  |  |
| **Allocation Flag** | 1 | — |
|  |  |  |
| **Group Indicator** | 1 | TDD mode: *Reserved;* set to 0. |
|  |  | Used for FDD/H-FDD case only; to indicate the group |
|  |  | assignment of the MS (see 8.4.4.2 and 8.4.4.2.1) |
|  |  | 0b0: Group #1 |
|  |  | 0b1: Group #2 |
|  |  |  |
| if (Allocation Flag == 0) { |  | // De-allocate |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast Feedback |
|  |  | region. When MAP ACK Channel Index = 0b111111, it |
|  |  | indicates NO MAP ACK channel is assigned to this |
|  |  | de-allocation. |
|  |  |  |
| **RCID\_IE ()** | *variable* |  |
|  |  |  |
| If (Resource Shifting Indicator |  | // resource shifting is allowed |
| ==1) { |  |  |
|  |  |  |
| **Duration** | *variable* | Duration in slots. OFDMA Frame duration dependant |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in OFDMA |
|  |  | slots, with respect to the start of the UL subframe if an |
|  |  | allocation start indication is not included in this IE and with |
|  |  | respect to OFDM symbol offset and subchannel offset if an |
|  |  | allocation start indication is included in this IE |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |
| **Retransmission flag** | 1 | 0: Deallocation command in Relevant Frame |
|  |  | 1: Retransmission of deallocation command in |
|  |  | Relevant Frame – Allocation Period |
|  |  |  |
| } |  |  |
|  |  |  |
| } |  |  |
|  |  |  |
| if (allocation flag ==1) { |  | // allocation |
|  |  |  |
| **RCID\_IE()** | *variable* |  |
|  |  |  |
| **Persistent Flag** | 1 |  |
|  |  |  |
| If (Persistent Flag == 1) { |  |  |
|  |  |  |

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**Table 8-271—Persistent MIMO UL STC HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **Allocation Period and** | 1 | If Allocation Period and N\_ACID Indicator is 1, it indicates |
| **N\_ACID Indicator** |  | that allocation information (allocation period, Number of |
|  |  | ACID (N\_ACID) is explicitly assigned for this sub-burst. |
|  |  | Otherwise, this sub-burst shall use the same allocation |
|  |  | period as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Allocation Period and |  |  |
| N\_ACID Indicator == 1) { |  |  |
|  |  |  |
| **Allocation period (ap)** | 5 | Period of the persistent allocation is this field value plus 1 |
|  |  | (unit is frame). |
|  |  |  |
| **MAP NACK Channel** | 6 | Index to a shared MAP NACK channel within the Fast |
| **Index** |  | Feedback region. When MAP NACK Channel Index = |
|  |  | 0b111111, it indicates NO MAP NACK channel is assigned |
|  |  | to this allocation. |
|  |  |  |
| } |  |  |
|  |  |  |
| **MAP ACK Channel Index** | 6 | Index to a MAP ACK channel within the Fast Feedback |
|  |  | region. |
|  |  |  |
| **Number of ACID (N\_ACID)** | 3 | Number of HARQ channels associated with this persistent |
|  |  | assignment is this field value plus 1. |
|  |  |  |
| } |  |  |
|  |  |  |
| **Tx count** | 2 | Tx count shall be set to ‘0’ when Persistent Flag is set to ‘1’. |
|  |  |  |
| **Duration Indicator** | 1 | If Duration Indicator is 1, it indicates that Duration is |
|  |  | explicitly assigned for this sub-burst. Otherwise, this sub- |
|  |  | burst shall use the same Duration as the previous sub-burst. |
|  |  | If *j* is 0 then this indicator shall be 1. |
|  |  |  |
| if (Duration Indicator == 1) { |  |  |
|  |  |  |
| **Duration** | *variable* |  |
|  |  |  |
| } |  |  |
|  |  |  |
| **Slot Offset** | *variable* | Indicates the start of this persistent allocation in OFDMA |
|  |  | slots, with respect to the start of the UL subframe if an |
|  |  | allocation start indication is not included in this IE and with |
|  |  | respect to OFDM symbol offset and subchannel offset if an |
|  |  | allocation start indication is included in this IE |
|  |  | 7 bits – 2.5 ms frame |
|  |  | 8 bits – 5 ms frame |
|  |  | 9 bits – 10 ms frame |
|  |  | 10 bits – 20 ms frame |
|  |  |  |

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**Table 8-271—Persistent MIMO UL STC HARQ Sub-burst IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| **ACK disable** | 1 | When ACK Disable == 1, the allocated sub-burst does not |
|  |  | require an ACK to be transmitted by the BS in the HARQ |
|  |  | ACK BITMAP (see 8.4.5.3.22). In this case, no bit position |
|  |  | is allocated for the sub-burst in the HARQ ACK BITMAP. |
|  |  | For TDD SS, for the burst, MS shall not perform HARQ |
|  |  | retransmission and ignore ACID, AI\_SN and SPID, which |
|  |  | shall be set to 0 by BS if they exist. For FDD SS, the BS |
|  |  | may set the ACID to a value other than 0 if that ACID is |
|  |  | listed in the Aggregated HARQ Channels TLV. The CRC |
|  |  | shall be appended at the end of each sub-burst regardless of |
|  |  | the ACK disable bit. |
|  |  |  |
| if (Tx count == 0) { |  |  |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |
| **Repetition Coding Indicator** | 2 | — |
|  |  |  |
| } |  |  |
|  |  |  |
| **ACID** | 4 | Initial value of HARQ channel identifier |
|  |  |  |
| } |  |  |
|  |  |  |
| **Padding** | *variable* | Padding to nibble; shall be set to zero |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.4.59 FDD Paired Allocation IE**

When one or more FDD UL allocations are made in the other UL Group (that is, the UL Group different from the group to which the current UL-MAP belongs) in the generic FDD/H-FDD frame, the extended UIUC = 11 shall be used with the subcode 0x13 to notify FDD MSs of their allocation. H-FDD MSs shall ignore the FDD Paired Allocation IE. (See Table 8-272.)

**Table 8-272—FDD Paired Allocation IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| FDD\_Paired\_Allocation\_IE() { | — | — |
|  |  |  |
| **Extended 2 UIUC** | 4 | FDD\_Paired\_Allocation\_IE() = 0xD |
|  |  |  |
| **Length** | 8 | Length in bytes |
|  |  |  |
| while (data remains) { | — | — |
|  |  |  |
| **UL-MAP\_IE()** | *variable* | See corresponding PHY specification. |
|  |  | (See 8.4.5.4) |
|  |  |  |
| } | — | — |
|  |  |  |
| if !(byte boundary) { | — | — |
|  |  |  |
| **Padding nibble** | *variable* | Padding to reach byte boundary. |
|  |  |  |

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**Table 8-272—FDD Paired Allocation IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.4.60 UL\_Burst \_Receive\_IE format**

**Table 8-273—UL\_Burst\_Receive\_IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bits)** |
|  |  |
|  |  |  |
| **UL\_Burst\_Receive\_IE() {** | 16 | — |
|  |  |  |
| **Extended UIUC** | 4 | UL Burst Receive IE = 0x0B |
|  |  |  |
| **Length** | 4 | Length=1 |
|  |  |  |
| **Nr** | 8 | Number of UL-MAP\_IE following |
|  |  | current IE for RS to receive data bursts |
|  |  | from subordinate station(s) |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.4.61 RS MIMO in UL IE format**

In the UL-MAP, a MIMO-enabled MR-BS shall transmit RS MIMO in the UL IE to RS to indicate the MIMO configuration and pilot patterns of the subsequent uplink allocations described in this IE. This IE may be used either for MIMO-enabled RS or for an RS that supports only collaborative SM up to two RSs.

**Table 8-274—RS MIMO UL IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bits)** |
|  |  |
|  |  |  |
| RS\_MIMO\_in\_UL\_IE() { | — | — |
|  |  |  |
| **Extended-2 UIUC** | 4 | 0x05 (Extended-3 UIUC) |
|  |  |  |
| **Length** | 8 | Length in bytes |
|  |  |  |
| **Extended-3 UIUC** | 4 | RS MIMO in UL IE = 0x00 |
|  |  |  |
| **Num\_Assign** | 4 | Number of burst assignment |
|  |  |  |
| For (j=0;j<Num\_Assign;j++) { | — | — |
|  |  |  |
| **Num\_CID** | 2 | — |
|  |  |  |
| For (i=0; i<Num\_CID; i++) { | — | — |
|  |  |  |
| **CID** | 16 | RS basic CID |
|  |  |  |

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**Table 8-274—RS MIMO UL IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bits)** |
|  |  |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |
| **Antenna\_Indicator** | 4 | Indicates the antennas used for |
|  |  | transmission |
|  |  | 0: antenna is not used |
|  |  | 1: antenna is used |
|  |  |  |
| If (single antenna is used) { | — | — |
|  |  |  |
| **Pilot Pattern Indicator** | 1 | Indicates pilot pattern |
|  |  | 0b0: pilot pattern A |
|  |  | 0b1: pilot pattern B |
|  |  |  |
| }elseif (dual antennas are used){ | — | — |
|  |  |  |
| **Matrix\_Indicator** | 2 | Indicates transmission matrix |
|  |  | 0b00= Matrix A (see 8.4.8.3.3), pilot |
|  |  | A/B 0b01= Matrix A (see 8.4.8.3.3), |
|  |  | pilot C/D 0b10= Matrix B (see |
|  |  | 8.4.8.3.3) 0b11= Matrix C (see |
|  |  | 8.4.8.3.3) |
|  |  |  |
| }elseif (three antennas are used){ | — | — |
|  |  |  |
| **Matrix\_Indicator** | 2 | Indicates transmission matrix |
|  |  | 0b00= Matrix A (see 8.4.8.3.4) 0b01= |
|  |  | Matrix B (see 8.4.8.3.4) 0b10= Matrix |
|  |  | C (see 8.4.8.3.4) 0b11= *Reserved* |
|  |  |  |
| If (Matrix\_Indicator==0b00 or 0b01) { | — | — |
|  |  |  |
| **Antenna\_Grouping\_Indicator** | 2 | Indicating the index of the antenna |
|  |  | grouping index if (Matrix\_indicator== |
|  |  | 0b00) |
|  |  | 0b000~0b010=0b101110~0b110000 in |
|  |  | Table 8-67 else |
|  |  | 0b000~0b010=0b110001~0b110011 in |
|  |  | Table 8-67 |
|  |  |  |
| } | — | — |
|  |  |  |
| }else{ | — | — |
|  |  |  |
| **Matrix\_Indicator** | 2 | Indicates transmission matrix |
|  |  | 0b00= Matrix A (see 8.4.8.3.5) 0b01= |
|  |  | Matrix B (see 8.4.8.3.5) 0b10= Matrix |
|  |  | C (see 8.4.8.3.5) 0b11= *Reserved* |
|  |  |  |
| If (Matrix\_Indicator== 0b00 or 0b01) { | — | — |
|  |  |  |
| **Antenna Grouping Index** | 3 | Indicating the index of the antenna |
|  |  | grouping index if (Matrix\_indicator== |
|  |  | 0b00) |
|  |  | 0b000~0b010=0b101110~0b110000 in |
|  |  | Table 8-67 else |
|  |  | 0b000~0b101=0b110001~0b110110 in |
|  |  | Table 8-67 |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |

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**Table 8-274—RS MIMO UL IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bits)** |
|  |  |
|  |  |  |
| } | — | — |
|  |  |  |
| **Duration** | 10 | In OFDMA slots (see 8.4.3.1) |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | — | Padding to reach byte boundary |
|  |  |  |
| } | — | — |
|  |  |  |

**Antenna\_Indicator**

A field that specifies which antenna(s) is/are used for uplink transmission. For example, if this field is set to 0b1100, a 3-antenna RS shall use the first and second antenna for uplink transmissions. The last bit, which shall be set to zero in this case, is skipped.

**Pilot Pattern Indicator**

A field that specifies which pilot pattern(s) is/are used. When the used antenna number is three, the first antenna shall use pilot pattern A, the second antenna shall use pilot pattern B and the third antenna shall use pilot pattern C. When the used antenna number is four, the first antenna shall use pilot pattern A, the second antenna shall use pilot pattern B, the third antenna shall use pilot pattern C, and the forth antenna shall use pilot pattern D.

**Matrix\_Indicator**

A field that specifies the used MIMO coding matrices, i.e., space-time-frequency coding matrices, for uplink. It may also jointly specify which pilot pattern(s) is/are used. All the uplink MIMO coding matrices in this IE are reused from the downlink, which are defined in 8.4.8.3.3, 8.4.8.3.4, and 8.4.8.3.5.

**8.4.5.4.62 MR\_UL-MAP\_MONITOR IE**

The MR\_UL-MAP MONITOR IE provides the list of CIDs of the MS whose transmissions need to be monitored in the UL part of the current frame. When an RS receives a MR\_UL-MAP Monitor IE, it stores the CID list and uses for HARQ data forwarding until the list is updated by another MR\_UL-MAP MONITOR IE.

**Table 8-275—MR UL-MAP MONITOR IE format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bits)** |
|  |  |
|  |  |  |
| MR\_UL-MAP\_MONITOR IE{ | — | — |
|  |  |  |
| **Extended-2 UIUC** | 4 | 0x05 (Extended-3 UIUC) |
|  |  |  |
| **Length** | 8 | Length in bytes |
|  |  |  |
| **Extended-3 UIUC** | 4 | MR UL-MAP Monitor IE = 0x01 |
|  |  |  |
| **Num\_RS** | 8 | Number of RSs |
|  |  |  |
| for(i=0; i<Num\_RS; i++){ | — | — |
|  |  |  |
| **RCID\_IE** | *variable* | Reduced MS basic CID |
|  |  |  |

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**Table 8-275—MR UL-MAP MONITOR IE format *(CONTINUED)***

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bits)** |
|  |  |
|  |  |  |
| **Number of CIDs** | 4 | Number of CIDs in the IE |
|  |  |  |
| For(i=0; i<Number of CIDs; i++){ | — | — |
|  |  |  |
| **RCID\_IE(i)** | *variable* | The CIDs of the connections that RS shall |
|  |  | monitor in the current frame |
|  |  |  |
| } | — | — |
|  |  |  |
| } | — | — |
|  |  |  |
| **Padding** | *variable* | Padding to reach byte boundary |
|  |  |  |
| } | — | — |
|  |  |  |

**8.4.5.5 Burst profile format**

Table 8-276 defines the format of the Downlink Burst Profile TLV, which is used in the DCD message (6.3.2.3.1). The DL burst profile is encoded with a type of 1, an 8-bit length, and a 4-bit DIUC. The DIUC field is associated with the DL burst profile and thresholds. The DIUC value is used in the DL-MAP message to specify the burst profile to be used for a specific DL burst.

**Table 8-276—OFDMA Downlink Burst Profile TLV format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Downlink\_Burst\_Profile { | — | — |
|  |  |  |
| **Type = 1** | 8 | — |
|  |  |  |
| **Length** | 8 | — |
|  |  |  |
| *Reserved* | 4 | Shall be set to zero |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **TLV encoded information** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |

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Table 8-277 defines the format of the Uplink Burst Profile TLV, which is used in the UCD message (6.3.2.3.1). The UL burst profile is encoded with a type of 1, an 8-bit length, and a 4-bit UIUC. The UIUC field is associated with the UL burst profile and thresholds. The UIUC value is used in the UL-MAP message to specify the burst profile to be used for a specific UL burst.

**Table 8-277—OFDMA Uplink Burst Profile TLV format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Uplink\_Burst\_Profile { | — | — |
|  |  |  |
| **Type = 1** | 8 | — |
|  |  |  |
| **Length** | 8 | — |
|  |  |  |
| *Reserved* | 4 | Shall be set to zero |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |
| **TLV encoded information** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |

Table 8-278 defines the format of the Downlink Burst Profile TLV with type = 153, which is used in the DCD message (6.3.2.3.1) for MS only. The DIUC field is associated with the DL burst profile and thresholds. The DIUC value is used in the DL-MAP message to specify the burst profile to be used for a specific DL burst.

**Table 8-278—OFDMA Downlink Burst Profile TLV format for multiple FEC types**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Downlink Burst Profile{ | — | — |
|  |  |  |
| **Type = 153** | 8 | — |
|  |  |  |
| **Length** | 8 | — |
|  |  |  |
| *Reserved* | 2 | Shall be set to zero |
|  |  |  |
| **Coding Type** | 2 | 0b00: BTC |
|  |  | 0b01: CTC |
|  |  | 0b10: ZT CC |
|  |  | 0b11: LDPC |
|  |  |  |
| **DIUC** | 4 | — |
|  |  |  |
| **TLV encoded information** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |

Table 8-279 defines the format of the Uplink Burst Profile TLV with type = 202, which is used in the UCD message (6.3.2.3.3) for MS only. The UIUC field is associated with the UL burst profile and thresholds. The UIUC value is used in the UL-MAP message to specify the burst profile to be used for a specific UL burst.

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**Table 8-279—OFDMA Uplink Burst Profile TLV format for multiple FEC types**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Uplink Burst Profile{ | — | — |
|  |  |  |
| **Type = 202** | 8 | — |
|  |  |  |
| **Length** | 8 | — |
|  |  |  |
| *Reserved* | 2 | Shall be set to zero |
|  |  |  |
| **Coding Type** | 2 | 0b00: BTC |
|  |  | 0b01: CTC |
|  |  | 0b10: ZT CC |
|  |  | 0b11: LDPC |
|  |  |  |
| **UIUC** | 4 | — |
|  |  |  |
| **TLV encoded information** | *variable* | — |
|  |  |  |
| } | — | — |
|  |  |  |

DIUC/UIUC for mandatory CC shall be referred to the Downlink/Uplink Burst Profile with type = 1. If there is no DL(UL) burst profile with type of 153(202), MSs shall refer to DL(UL) burst profile with type of 1. The burst transmitted without CID in the DL-MAP IE shall be encoded using DIUC specified in the DL burst profile with type of 1. This capability is determined by SBC-REQ/RSP (see 11.8.3.5.14).

MAP IEs that do not contain a CID or that contain broadcast/multicast CIDs shall always use type 1 DIUC (see Table 8-276).

**8.4.5.6 Compressed maps**

In addition to the standard DL-MAP and UL-MAP formats described in 6.3.2.3.2 and 6.3.2.3.4, the DL-MAP and UL-MAP may conform to the format presented in 8.4.5.6.1 and 8.4.5.6.2. The presence of the compressed DL-MAP format is indicated by the contents of the most significant three bits of the first data byte. The first three bits overlay the HT, EC, and most significant bit of Type field in a generic MAC header. When this combination of three bits is set to 110 (an invalid combination for a standard header in the downlink), the compressed DL-MAP format is present. A compressed UL-MAP shall only appear after a compressed DL-MAP. The presence of a compressed UL-MAP is indicated by a bit in the compressed DL-MAP data structure.

The compressed map shall occur directly after the DL Frame Prefix, or can be used as a private map in an AAS zone. When located after the DL Frame Prefix, the burst containing the Compressed DL-MAP (and appended UL-MAP) shall not contain any other messages and shall be mapped to slots in the same manner as the DL-MAP. When located in an AAS zone, the private map can be pointed to by a broadcast map, the AAS DLFP message, or another private map in a previous frame. Other restrictions of private maps include the following:

— The private map shall be the first message in a PHY burst.

— Private maps are only allowed to use unicast CID values.

— Allocations pointed to by a private map must occur within the same AAS zone as the private map.

— Both UL and DL allocations included in the private map are relative to the next frame + frame offset value negotiated with the SS (see 11.8.3.5.6).

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When a private map chain is started that has UL IE, an AAS UL IE shall be included in the first UL map so the AAS zone information is known by the SS. This information only needs to be included in the first private map of a private map chain, or after any parameters in the AAS zone is changed. The DL zone information is expected to be static for the duration of the private map chain; however, a AAS DL IE can be included to change the DL AAS zone parameters. The private map is an optional feature that can be negotiated between the SS and BS. In addition, there is a capability bit to indicate if an SS can support private map chains. This is to support applications that utilize private maps but do not require chains.

**8.4.5.6.1 Compressed DL-MAP**

The compressed DL-MAP format is presented in Table 8-280. The message presents the same information as the standard format with one exception. In place of the DL-MAP’s 48-bit Base Station ID parameter, the compressed format provides a subset of the full value. When the compressed format is used, the full 48-bit Base Station ID parameter shall be published in the DCD.

**Table 8-280—Compressed DL-MAP message format**

|  |  |  |
| --- | --- | --- |
| **Syntax** | **Size** | **Notes** |
| **(bit)** |
|  |  |
|  |  |  |
| Compressed\_DL-MAP() { | — | — |
|  |  |  |
| **Compressed map indicator** | 3 | Set to binary 110 to indicate a |
|  |  | compressed map format |
|  |  |  |
| **UL-MAP appended** | 1 | — |
|  |  |  |
| **FDD partition change flag** | 1 | For FDD only. Indicates the next |
|  |  | possible partition change. |
|  |  | 0: Possible partition change in next |
|  |  | frame |
|  |  | 1: Minimum number of frames |
|  |  | (excluding current frame) before next |
|  |  | possible change is given by TLV ‘FDD |
|  |  | Frame Partition Change Timer’ |
|  |  |  |
| **Map message length** | 11 | — |
|  |  |  |
| **PHY Synchronization Field** | 32 | — |
|  |  |  |
| **DCD Count** | 8 | — |
|  |  |  |
| **Operator ID** | 8 | — |
|  |  |  |
| **Sector ID** | 8 | — |
|  |  |  |
| **No. OFDMA symbols** | 8 | For TDD: Number of OFDMA |
|  |  | symbols in the DL subframe; |
|  |  | For FDD/H-FDD: Number of OFDMA |
|  |  | symbols in H-FDD DL-subframe1 or |
|  |  | DL-subframe 2 (whichever the case), |
|  |  | including all AAS/permutation zone |
|  |  | and including the preamble. |
|  |  | For H-FDD, see 8.4.4.2.2 |
|  |  |  |
| **DL IE count** | 8 | — |
|  |  |  |
| for (*i* = 1; *i <=* DL IE count; *i*++) { | — | — |
|  |  |  |

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