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| Re: | The document supports a comment at Sponsor Ballot on 802.16e/D8 document | |
| Abstract | The documents suggests the method for an BS to allocate initial ranging interval to MSs using UCD message. | |
| Purpose | The document is for consideration during Sponsor Ballot comments resolution | |
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Ranging region allocation using UCD message

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Introduction

The reduction of broadcast message size is important for the usage of bandwidth more efficiently. In general, UL-MAP IEs with UIUC 12 for initial ranging and BW-REQ/periodic ranging should be frequently included in ULMAP message regardless of rarely changed that information. If a BS omits UL-MAP IE with UIUC 12 in ULMAP and MS is informed of allocated ranging region, it can reduce the broadcast message overhead. MS shall obtain UCD message associated with the BS before performing initial ranging during network entry or HO. If a BS provides MSs with the information of allocated ranging region through UCD message, BS can omit UL-MAP IE with UIUC 12, and MS can perform initial ranging and BW-REQ/periodic ranging without receiving UL-MAP IE with UIUC 12.

So, we propose the TLV parameter of UCD for allocating UL ranging region.

At the last session, the r2 version was presented but rejected.

There were 3 reasons for rejection.

The first reason was that there was not enough time for all members to review the contribution carefully because much time was spent in harmonizing.

The second rejection reason was that this feature should be optional for MS.

And the third reason was that we should use only MAPs for allocations.

We have modified the contribution to solve above problems.

To solve the second problem, we added the red and underlined text to make this feature optional for MS.

We cannot accept the third reason because D8 already describes DCD parameter for MAP information, which is "DL region definition".

To reflect Ran and Lei's reply comments, we modified the contribution and indicated R4 modification with green text as following :

1) Change all occurrences of 'Initial Ranging' to 'Initial Ranging/Handover ranging'.

2) page 2, 'Ranging region' field in table 353a. Change bit description:

bit 7:0 -> bit 0-7, bit 13:8 -> bit 8-13, etc.

3) page 4, correct typo: negation -> negotiation.

4) page 3, add the text to indicate that Ranging_Region_Allocation_Indication in FCH is relevant to the MAC frame which UL-MAP refers to.

5) page 4, modify the text not to break backward compatibility for 802.16-2004 SS and to remove ambiguity.

Proposed text change

[Add the text in 11.3.1 UCD channel encodings in table 353a at page 504, as follows :]

| Name | Type (1 byte) | Length | Value |
|-----------------------|---------------|---|---|
| Tx power report | 196 | 3 | <p>Bit#0~3: Tx_Power_Report_Threshold, It is unsigned integer and shall be read in dB scale. When "0b111" it means infinite.</p> <p>Bit#4~7: It is unsigned integer whose value is d. Its value 'd' shall be interpreted as Tx_Power_Report_Interval = 2^d. When "0b111" it means infinite.</p> <p>Bit#8~11: <u>p_avg</u> in multiples of 1/16 (range [1/16,16/16])</p> <p>Bit#12~15: Tx_Power_Report_Threshold, It is unsigned integer and shall be read in dB scale. When "0b111" it means infinite. It shall be used when CQICH is allocated to the SS.</p> <p>Bit#16~19: It is unsigned integer whose value is d. Its value 'd' shall be interpreted as Tx_Power_Report_Interval = 2^d. When "0b111" it means infinite. It shall be used when CQICH is allocated to the SS.</p> <p>Bit#20~24: <u>p_avg</u> in multiples of 1/16 (range [1/16,16/16]), It shall be used when CQICH is allocated to the SS.</p> |
| <u>Ranging Region</u> | <u>197</u> | <u>4 (one region) / 8 (two regions)</u> | <p><u>Bit #0-7 : OFDMA Symbol offset</u></p> <p><u>Bit #8-13 : Subchannel offset</u></p> <p><u>Bit #14-20 : No. OFDMA Symbols</u></p> <p><u>Bit #21-26 : No. Subchannels</u></p> <p><u>Bit #27-28 : Ranging Method</u></p> <p><u>(0b00: Initial Ranging/Handover Ranging over two symbols, 0b01: Initial Ranging/Handover Ranging over four symbols, 0b10: BW Request/Periodic Ranging over one symbol, 0b11: BW Request/Periodic Ranging over three symbols)</u></p> <p><u>Bit #29-31 : reserved</u></p> <p><u>(If length is 8 bytes, first 4 bytes indicates first ranging region and the following 4 bytes indicates another ranging region.)</u></p> |

[Modify the Table268 in 8.4.4.3 DL Frame Prefix at page 259:]

Table 268—OFDMA downlink Frame Prefix format for all FFT sizes except 128

| Syntax | Size (bits) | Notes |
|--|-----------------------|---|
| DL_Frame_Prefix_Format() { | — | — |
| Used subchannel bitmap | 6 | 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 |
| Ranging_Change_Indication | 1 | — |
| Repetition_Coding_Indication | 2 | 0b00 – No repetition coding on DL-MAP 0b01 – Repetition coding of 2 used on DL-MAP 0b10 – Repetition coding of 4 used on DL-MAP 0b11 – Repetition coding of 6 used on DL-MAP |
| Coding_Indication | 3 | 0b000: CC encoding used on DL-MAP 0b001: BTC encoding used on DL-MAP 0b010: CTC encoding used on DL-MAP 0b011: ZT CC used on DL-MAP 0b100: LDPC encoding used on DL-MAP 0b101 to 0b111 – <i>Reserved</i> |
| DL-MAP_Length | 8 | — |
| <u>Ranging_Region_Allocation_Indication</u> | <u>2</u> | <u>Bit #0: When set to 1, Initial Ranging/Handover Ranging Region is allocated as defined by UCD message</u> <u>Bit #1: When set to 1, BW Request/Periodic Ranging Region is allocated as defined by UCD message</u> |
| <i>reserved</i> | 4 <u>2</u> | Shall be set to zero. |
| } | — | — |

[Insert the following text before the last sentence in 8.4.4.3:]

Ranging_Region_Allocation_Indication

Indicates whether ranging region defined by UCD message is allocated or not. When the indication bit is set to “1”, ranging region is allocated in the relevant UL subframe, which the UL-MAP refers to, as defined by the ranging region in UCD message. When the indication bit is set to “0”, UL ranging region defined in UCD message is not allocated. In this case, BS may allocate ranging region by using UL-MAP-IE with UIUC=12 in UL-MAP.

Bit #0: Indicates whether Initial Ranging/Handover Ranging Region defined in UCD message is allocated or not.

Bit #1: Indicates whether BW Request/Periodic Ranging Region defined in UCD message is allocated or not.

[Add the following text in 6.3.10.3 OFDMA-based ranging, page 151, line 59 :]

6.3.10.3 OFDMA-based ranging

[Insert at the end of 6.3.10.3]

The BS may inform MSs of attributes of ranging regions with Ranging Region TLV in UCD (see 11.3.1). The UCD message shall only include contention based ranging region for initial ranging/handover ranging and/or BW-Request/Periodic ranging region. A BS shall include UL-MAP IE with UIUC 12 when it assigns dedicated ranging region.

This capability is negotiated during basic capabilities negotiation phase (see 11.8.3.7.8)

If a BS has any registered SS (compliant only with 802.16-2004) or MS not supporting this capability, the BS shall allocate initial ranging/handover ranging and BW-Request/Periodic ranging regions only by UL-MAP IE with UIUC 12.

When ranging region TLV for initial ranging/handover ranging and/or BW Request/Periodic ranging region has been included in UCD message, the BS may allocate the ranging region using Ranging Region Allocation Indications in FCH, without including contention-based ranging region allocations in the UL-MAP message. The BS shall set the Ranging Region Allocation Indication bit to "1" if the BS is allocating a contention-based ranging region defined by UCD message (see 8.4.4.3). When the ranging region allocated by UCD message is changed, UCD Count in UL-MAP shall be incremented.

A BS may include UL-MAP IE with UIUC 12 in the UL-MAP message for contention-based ranging region allocation, regardless of UCD definitions.

When Ranging Region Allocation Indication bit is set to "0", the BS may provide ranging region allocations via UL-MAP IE with UIUC 12.

When Ranging Region Allocation Indication bit is set to "1", the BS may provide ranging allocations by both UCD and UL-MAP IE with UIUC 12. In this case, SSs (compliant only with 802.16-2004) shall use ranging region allocated via UL-MAP IE and MSs shall use ranging region allocated via UCD. Furthermore, ranging regions allocated by UL-MAP IE and UCD shall be identical.

When a BS assigns UL transmission opportunity to any SS (compliant only with 802.16-2004) in an UL subframe, the ranging region allocated by UCD shall not be activated in the same UL subframe.

[Add the capability negotiation for Ranging Region Allocation by UCD in SBC-REQ/RSP, page 531, line 42 and 56 :]

11.8.3.7.8 OFDMA MAP Capability

The 'OFDMA MAP Capability' field indicates the different MAP options supported by a WirelessMANOFDMA PHY. This field is not used for other PHY specifications. A bit value of 0 indicates "not supported" while 1 indicates "supported."

Support for Extended HARQ IE in Normal MAP mandates a support for Sub MAP for first zone.

Bit #5 defines the capability of MS recognizing ranging region allocated by UCD message.(see 11.3.1, and 6.3.10.3)

| Type | Length | Value | Scope |
|------|--------|---|------------------|
| 167 | 1 | bit #0: HARQ MAP Capability bit #1: Extended HARQ IE in Normal MAP capability bit #2: Sub MAP capability for first zone bit #3: Sub map capability for other zones bit #4: DL region definition support <u>bit #5:Ranging Region Allocation by UCD support</u> bit # 5 6-7: reserved | SBC-REQ, SBC-RSP |