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Re:	IEEE P802.16e/D9.
Abstract	This presentation clarifies Band AMC operation.
Purpose	Review and adoption of the proposed text change into IEEE P802.16e/D9.
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Clarification on Band AMC operations

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1. Problem Statements

The newly inserted sub-clause, '6.3.18 Band AMC operations using 6-bit CQICH encoding' explains basic band AMC operations for different FFT sizes and, at the same time, introduces 6-bit CQICH encoding, which was designed to enhance the band AMC operation. However, current text may mislead readers such that 6-bit CQICH encoding must be used in Band AMC operations when the FFT size is smaller than 2048. Band AMC operations should be supported with or without 6 bit CQICH encoding whatever the FFT size is.

The purpose of this contribution is to modify texts of the corresponding section so that optional features can be described clearly as optional features.

2. Remedy

[Option 1 – Treat whole section 6.3.18 as optional]

[Add one sentence at the end of the last paragraph in page268 in section 6.3.17.4 as follows:]

The SS sends the REP-RSP message in an unsolicited fashion to BS to trigger Band AMC operation. The triggering conditions are given by TLV encodings in UCD messages. The REP-RSP (see 11.12 for the TLV encodings) includes the CINR measurements of five best bands. Only when an SS reports its BS the CINR measurements of Band AMC channels, its logical definition is made differently, as follows. If the number of bands is 48 (2048 FFT in 20 MHz), the two contiguous bands are paired and renumbered the same as a 24 band system. Then, if the LSB of an SS MAC address is 1, it only uses the odd-numbered bands. If not, it only uses the even-numbered bands. Hence, for example, the LSB of an SS MAC address is 1, (4m+2, 4m+3) bands are paired and the paired band is the m-th band of the SS. Similarly, for an even-numbered SS, (4m, 4m+1) bands are paired and the paired band is the m-th band of the SS. If the number of bands is 24, the two contiguous bands are just paired and renumbered the same as a 12 band system. If the original number of band is equal to or less than 12, the logical definition is not necessary.

[Change 6.3.18 as follows:]

6.3.18 optional Band AMC operations using 6-bit CQICH encoding

[Remove the first paragraph of subclause 6.3.18:]

~~For band AMC subchannel operations, the number of bands should be less than or equal to 12. As described in 6.3.17.4, if the number of bands is 48 (2048 FFT in 20 MHz), the two contiguous bands are paired and renumbered the same as a 24 band system. Then, if the LSB of an MS MAC address is 1, it only uses the odd-numbered bands. If not, it only uses the even-numbered bands. Hence, for example, the LSB of an MS MAC~~

1 ~~address is 1, (4m+2, 4m+3) bands are paired and the paired band is the m-th band of the MS. Similarly, for an~~
2 ~~even-numbered MS, (4m, 4m+1) bands are paired and the paired band is the m-th band of the MS. If the~~
3 ~~number of bands is 24, the two contiguous bands are just paired and renumbered the same as a 12 band system.~~
4 ~~If the original number of band is equal to or less than 12, the logical definition is not necessary.~~
5
6
7 **[Option 2 – Treat only 6-bit CQICH encoding as optional and treat call flows and conditions of**
8 **transition triggering as mandatory for all Band AMC enabled MS]**
9
10 *[Change 6.3.18 as follows:]*
11
12 *[Insert new subclause 6.3.18:]*
13

14 **6.3.18 Band AMC operations <u>for variable FFT sizes</u> ~~using 6 bit CQICH encoding~~**
15

16 For band AMC subchannel operations, the number of bands should be less than or equal to 12. As described in
17 6.3.17.4, if the number of bands is 48 (2048 FFT in 20 MHz), the two contiguous bands are paired and
18 renumbered the same as a 24 band system. Then, if the LSB of an MS MAC address is 1, it only uses the odd-
19 numbered bands. If not, it only uses the even-numbered bands. Hence, for example, the LSB of an MS MAC
20 address is 1, (4m+2, 4m+3) bands are paired and the paired band is the m-th band of the MS. Similarly, for an
21 even-numbered MS, (4m, 4m+1) bands are paired and the paired band is the m-th band of the MS. If the
22 number of bands is 24, the two contiguous bands are just paired and renumbered the same as a 12 band system.
23 If the original number of band is equal to or less than 12, the logical definition is not necessary.
24

25 *[Insert new subclause 6.3.18.1:]*
26

27 **6.3.18.1 Call flows for mode transitions between normal subchannel and band AMC**
28 <u>Basic call flows for mode transitions between normal subchannel and band AMC are as below. Mode</u>
29 <u>transitions can be initiated by either BS or MS. For 6-bit CQICH enabled MS, t</u>~~T~~hree ~~allocated~~ CQICH
30 codewords are allocated for indicating the transitions. Let the first codeword be C1 (the 62<u>nd</u>~~th~~ codeword in
31 Table 296b: 0b111101), the second one C2 (the 63<u>rd</u>~~th~~ codeword: 0b111110), and the third one C3 (the 64th
32 codeword: 0b111111).
33 — i. Normal -> Band AMC
34 ~~The MS transmits C1, and the BS that receives the codeword transmits REP-REQ. The MS replies~~
35 ~~with REP-RSP having the CINR measurements of the 5 best bands at the same frame or after~~
36 ~~transmitting C2. From the next frame after transmitting REP-RSP, the MS reports the Band AMC~~
37 ~~differential CQI of the selected bands.~~
38 <u>When the BS wants to trigger the transition to Band AMC mode, it sends the REP-REQ message.</u>
39 <u>When the MS receives the message, it replies with REP-RSP having the CINR measurements of the 5</u>
40 <u>best bands. The MS may transmit C2 at the same frame or before it replies with REP-RSP.</u>
41 <u>When the MS wants to trigger the transition to Band AMC mode, it sends the unsolicited REP-RSP</u>
42 <u>message having the CINR measurements of the 5 best bands to the BS. The MS may transmit C1</u>
43 <u>instead of REP-RSP. Then, the BS that receives the codeword transmits REP-REQ and the MS</u>
44 <u>replies with REP-RSP having the CINR measurements of the 5 best bands. The MS may transmit C2</u>
45 <u>at the same frame or before it replies with REP-RSP.</u>
46 <u>From the next frame after transmitting REP-RSP, the MS reports the Band AMC differential CQI of</u>
47 <u>the selected bands.</u>
48 — ii. Band AMC -> Normal

~~The MS transmits C3. The MS reports the regular CQI of the whole bandwidth. Until the BS allocates normal subchannels, the MS repeats this process. In other words, the MS transmits the C3 and the regular CQI alternately until the normal subchannel is allocated to it.~~

When the BS wants to trigger the transition to normal mode, it simply allocates normal subchannels to the MS.

When the MS wants to trigger the transition to normal mode, it reports the regular CQI of the whole bandwidth. It may transmit C3 at the same frame or before it reports the regular CQI. Until the BS allocates normal subchannels, the MS repeats this process.

— iii. Band change

The MS and its BS follows the same procedure of the transition from normal subchannel to Band AMC.

— iv. Refreshing the CINR of the 5 best bands without band changes

The MS transmits an unsolicited REP-RSP. The MS may transmit C2 at the same frame or before it transmits the unsolicited REP-RSP ~~after transmitting C2~~.

[Insert new subclause 6.3.18.2:]

6.3.18.2 Conditions of transition triggering

— i. Normal subchannel -> AMC transition

If the maximum of the standard deviations of the individual band's CINR measurements is lower than 'Band AMC Allocation Threshold' and the average CINR of the whole bandwidth is larger than 'Band AMC Entry Average CINR' for at least 'Band AMC Allocation Timer' frames, MS using normal subchannels sends an unsolicited REP_RSP to request mode transition and may transmit~~s~~ a special codeword on its CQICH to inform its BS of its request of mode transition. REP_RSP message contains band bitmap indicating the best five bands and their CINR measurements.

— ii. AMC -> Normal subchannel transition

If the maximum of the standard deviations of the individual band's CINR measurements for at least 'Band AMC Release Timer' frames is higher than 'Band AMC Release Threshold', MS in Band AMC mode may trigger mode transition from Band AMC to normal subchannel.

— iii. Band Change

If the CINR of any one band excluding the best five bands previously selected for band AMC allocations is greater than the average CINR of the AMC reporting bands for at least Band AMC Allocation Timer, the AMC allocation bands should be changed by following the procedure given above.

3. References

[1] IEEE Std 802.16-2004, "IEEE Standard for Local and metropolitan area networks Part 16: Air Interface for Fixed Broadband Wireless Access Systems," Oct. 2004.

[2] IEEE P802.16e/D9, "Draft Amendment to IEEE Standard for Local and Metropolitan Area Networks Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems —Amendment for Physical and Medium Access Control Layers for Combined Fixed and Mobile Operation in Licensed Bands," June 2005.