IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>

Title	**Relay zone indicator**
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Re:	Call for technical Comments and Contributions regarding IEEE project P802.16j

Abstract	This contribution proposes a signaling method that provides the OFDMA symbol offset of the relay zone.

Purpose	Discussion and Adoption in IEEE 802.16j

Relay zone indicator

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1. Introduction

This contribution proposes a signaling method with existing STC_DL_ZONE_IE in the DL-MAP. With this method, RS is informed of the start of the relay zone through the initial network entry in the access zone, while MS recognizes the existence of another zone.

2. Problem Statement

On initialization, it is assumed that a RS performs initial network entry with access station, i.e., an MR-BS or RS in the same way that an MS does. In the beginning, RS detects a preamble in the MR-BS frame or an RS frame and establishes synchronization with the access station. RS continues to perform the remaining initial network entry procedures in the access zone.

After the RS completes its network entry, to continue communicating with the access station in the relay zone, the RS needs to be informed about the location of the start of the relay zone.

3. Suggested Remedy

A method of indicating the start of the relay zone is proposed. When the MR-BS or an RS transmits a DL-MAP in the access zone, the MR-BS or RS may transmit DIUC=15 with STC_DL_ZONE_IE() to indicate that the subsequent allocations shall be used with a specific permutation or mode. In this contribution, STC_DL_ZONE_IE is reused to indicate the start of the relay zone by utilizing one bit out of the existing reserved bits. This reserved bit serves the function of a relay zone indicator. If the RS receives STC_DL_ZONE_IE() with the relay zone indicator set to 1, then the RS recognizes that this STC_DL_ZONE_IE includes the OFDMA symbol offset of the relay zone. The MS on the other hand, receives the STC_DL_ZONE_IE() and recognizes in any case that another zone is present. After receiving STC_DL_ZONE_IE with relay zone indicator=1, RS moves to the relay zone and receives control information such as R-FCH, R-DL-MAP and frame configuration message. The frame configuration message is separately proposed in [1]. Note that the transceiver mode of the relay zone, which was indicated by STC_DL_ZONE_IE with relay zone indicator=1, is the Rx mode so that the RS can receive the R-DL-MAP and frame configuration information in the relay zone. Similarly, the MR-BS or RS transmits UL_ZONE_IE in the access zone, so that

the MS recognizes the existence of another zone in UL-subframe.

In summary, this contributions proposes the following:

- Clarify the operation that indicate Relay zone
    - Use STC_DL_ZONE_IE to indicate the downlink of Relay zone.
        - Insert a new field 'DL Relay zone indicator'
    - Use UL_ZONE_IE to indicate the uplink of Relay zone

4. Proposed Text Change

[Insert the following at the end of section 8.4.5.3.4:]

MR-BS or RS shall transmit the STC_DL_Zone_IE() with the DL Relay zone indicator set to '1' to indicate that the subsequent allocation is the downlink period of the Relay zone. Upon receipt of the STC_DL_Zone_IE() with DL Relay zone indicator=1, the RS shall recognize that the allocation in the STC_DL_Zone_IE() is the DL-Relay zone, while the MS shall recognize the existence of another zone for other MSs. After the RS moves to the relay zone indicated by STC_DL_ZONE_IE with relay zone indicator=1, the transceiver mode of the relay zone shall be Rx, so that the RS can receive the R-DL-MAP and frame configuration information.

[Change Table 279 at section 8.4.5.3.4 as following :]

Table 279-OFDMA downlink STC_DL_Zone IE format

Syntax	Size	Notes
STC_DL_ZONE_IE() {	-	-
Extended DIUC	4bits	STC/DL_ZONE_SWITCH = 0x01
Length	4bits	Length=0x04
OFDMA symbol offset	8bits	Denotes the start of zone (counting from the frame preamble and starting from 0)
Permutation	2bits	0b00 = PUSC permutation 0b01 = FUSC permutation 0b10 = Optional FUSC permutation 0b11 = Optional adjacent subcarrier permutation
Use All SC indicator	1bit	0 = do not use all subchannels 1 = use all subchannels
STC	2bits	0b00 = no STC 0b01 = STC using 2/3 antennas 0b10 = STC using 4 antennas 0b11 = FHDC using 2 antennas

Matrix indicator	2bits	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==ob11)
		{
		  0b00 = Matrix A
		  0b01 = Matrix B
		  0b10-11 = Reserved
		}

DL_PermBase	5bits	-
PRBS_ID	2bits	Value: 0..2. Refer to 8.4.9.4.1
AMC type	2bits	Indicates the AMC type in case permutation type=0b11, otherwise shall be set to 0. AMC type (NxM=N bits 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	1bit	0 = not present 1 = present at the first symbol in STC zone
Midamble boosting	1bit	0 = no boost 1 = Boosting (3dB)
2/3 antennas select	1bit	0 = STC using 2 antennas 1 = STC using 3 antennas selects 2/3 antennas when STC=0b01
Dedicated pilots	1bit	0 = Pilot symbols are broadcast 1 = Pilot symbols are dedicated. An MS should use only pilots specific to its burst for channel estimation
DL Relay zone indicator	1bit	1 : Indicates the existence of DL Relay zone
Reserved	34bits	shall be set to zero
}		

[Insert the followings after the field description of 'Dedicated pilots' at section 8.4.5.3.4 :]

DL Relay zone indicator

indicates the existence of the DL-Relay zone. If the DL Relay zone indicator is 1, RS recognizes that the STC_DL_Zone_IE includes the information of the DL-Relay zone, while the MS shall recognize the existence of another zone.

[Insert the followings at the end of section 8.4.5.4.7:]

To indicate the existence of UL-Relay zone, the MR-BS or RS shall transmit UL_Zone-IE() in the access zone. Upon receipt of the UL_Zone_IE(), MS recognizes the existence of another zone in the UL subframe.

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References

[1] IEEE 802.16j-07/236, "MAC message for configuring the multi-hop relay frame structure", Samsung Electronics, March 2007.

[2] IEEE 802.16-2005, "IEEE Standard for Local and metropolitan area networks-Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems: Amendment 2: Physical and Medium Access Control Layers for Combined Fixed and Mobile Operation in Licensed Bands and Corrigendum 1.