Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	MAC Messages supporting the CSI
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Re:	80216h-06_059：IEEE 802.16 Working Group Working Group Letter Ballot #24 (2006-10-11)
Abstract	Discuss the MAC messages supporting the CSI, such as DCD, DL-MAP etc.
Purpose	To consolidate the working document.
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MAC Messages supporting the CSI

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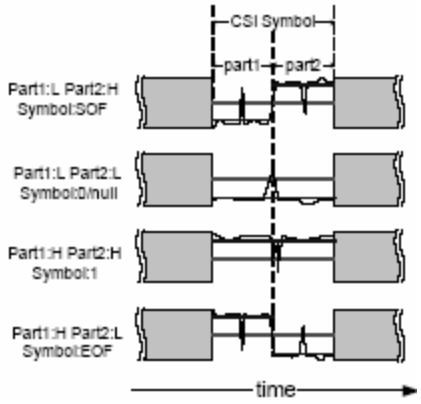
Overview

There is a lot of description in the CSI usage, but we have no MAC Message for implementing such structure. Some basic MAC Message should be defined:

1) For example, the ***CX interference criteria*** should be defined for the verdict for the decodable energy pulse symbol, which means the least difference in average power between high and low level to be decoded, which means the difference energy strength between [N] and [I+N] according to the specific interference source.
This parameter is the same as the criteria of harmful interference in the system.



2) Another general message is the DIUCs for the CSI-IE in the DL-MAP. SS should be aware of the timing and related parameter of CSI by such IE within the DL-MAP.

3) Specific MAC messages is needed in each related mechanism, these messages should be complemented to make the mechanism work.

PLS see detail in the proposal changes below.

Reference**:**

[1] *IEEE 802.16h-06/082: Using energy pulses for interference identification between 802.16 systems.| (2006-08-08)*

[2] *IEEE P802.16h/D1: Working Document for P802.16h (2006-08-01)*

[3] *80216h-06_059：IEEE 802.16 Working Group Working Group Letter Ballot #24 (2006-10-11)*

[4] *IEEE C802.16-05/012: IEEE 802.16-2004 and IEEE 802.16e RF Characteristics (2005-04-29)*

[5] *IEEE 802.16-2004: IEEE Standard for Local and metropolitan area networks Part 16: Air Interface for Fixed Broadband Wireless Access Systems (2004-10-01)*

[6] *IEEE 802.16e-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 (2006-02-28)*

[7] *ITU-R REC F.758 CONSIDERATIONS IN THE DEVELOPMENT OF CRITERIA FOR SHARING BETWEEN THE TERRESTRIAL FIXED SERVICE AND OTHER SERVICES (1992-1997-2000)*

[8] *Calculating the Sensitivity of an ASK Receiver (2003-11-05)*

[9] *IEEE C802.16h-06/054 Discussion on implementing the energy pulse (2006-07-10)*

Proposed Changes:

11.4.1 DCD channel encodings

Insert the following entries into Table 358:

Name	Type (1 byte)	Length	Value (variable length)	PHY scope
CX interference criteria	61	1	Minimum interference-plus-noise increasing ratio by the interference to be reported (in unit of half dB) (default value is 2, indicating 1 dB)	All

Insert a new section as 8.2.1.9.2.8:

8.2.1.9.2.8 SCa extended CSI_IE

In the DL-MAP a WirelessMAN-CX BS (see 15.) may transmit an extended IE with a DUIC value of 0x06 to indicate that subsequent allocations for CSI. (See 15.1.4.1.1, 15.3.1.1.1) The extended IE conforms to the structure in Table 200a.

Table 200a--SCa CSI IE format

Syntax	Size	Notes
CSI_IE() {		
Extended DIUC	4 bits	CSI = 0x06
Length	4 bits	Length = 0x03
CSI Cycle	4 bits	indicating the number of frames (Nth power of 2) for the CSI Cycle (default 0x04)
Offset Frames	4 bits	the frame number offset for each CSI allocated (4 CSI cycles forms a ICSI cycle, 4 ICSI cycle forms a OCSI cycle)
OCSN	4 bits	indicating the OCSI allocation of this system 0,4,8,12-reserved for ICSI 1,2,3,5,6,7,9,10,11,13,14 identified a OCSI channel each. 15 reserved for noise floor measurement
Symbol Length	8 bits	in units of PSs
TCG Length	8 bits	in units of PSs
CTG Length	8 bits	in units of PSs
}		

8.3.6.2.8 DL-MAP dummy IE format

Change Table 244 as indicated:

Table 244—OFDM DL-MAP dummy IE format

Syntax	Size	Notes
CSI_IE() {		
Extended DIUC	4 bits	~~0x06~~0x07...0x0F
Length	4 bits	0..15
Unspecified data	variable	The “Length” field specifies the size of this field in bytes.
}		

Insert a new section as 8.3.6.2.10:

8.3.6.2.10 OFDM CSI_IE format

In the DL-MAP a WirelessMAN-CX BS (see 15.) may transmit an extended IE with a DUIC value of 0x06 to indicate that subsequent allocations for CSI. (See 15.1.4.1.1, 15.3.1.1.1) The extended IE conforms to the structure in Table 244b.

Table 244b--OFDM CSI IE format

Syntax	Size	Notes
CSI_IE() {		
Extended DIUC	4 bits	CSI = 0x06
Length	4 bits	Length = 0x03
CSI Cycle	4 bits	indicating the number of frames (Nth power of 2) for the CSI Cycle (default 0x04)
Offset Frames	4 bits	the frame number offset for each CSI allocated (4 CSI cycles forms a ICSI cycle, 4 ICSI cycle forms a OCSI cycle)
OCSN	4 bits	indicating the OCSI allocation of this system 0,4,8,12-reserved for ICSI 1,2,3,5,6,7,9,10,11,13,14 identified a OCSI channel each. 15 reserved for noise floor measurement
Symbol Length	4 bits	in units of symbols
TCG Length	4 bits	in units of symbols
CTG Length	4 bits	in units of symbols
}		

Insert a new section as 8.4.5.3.30:

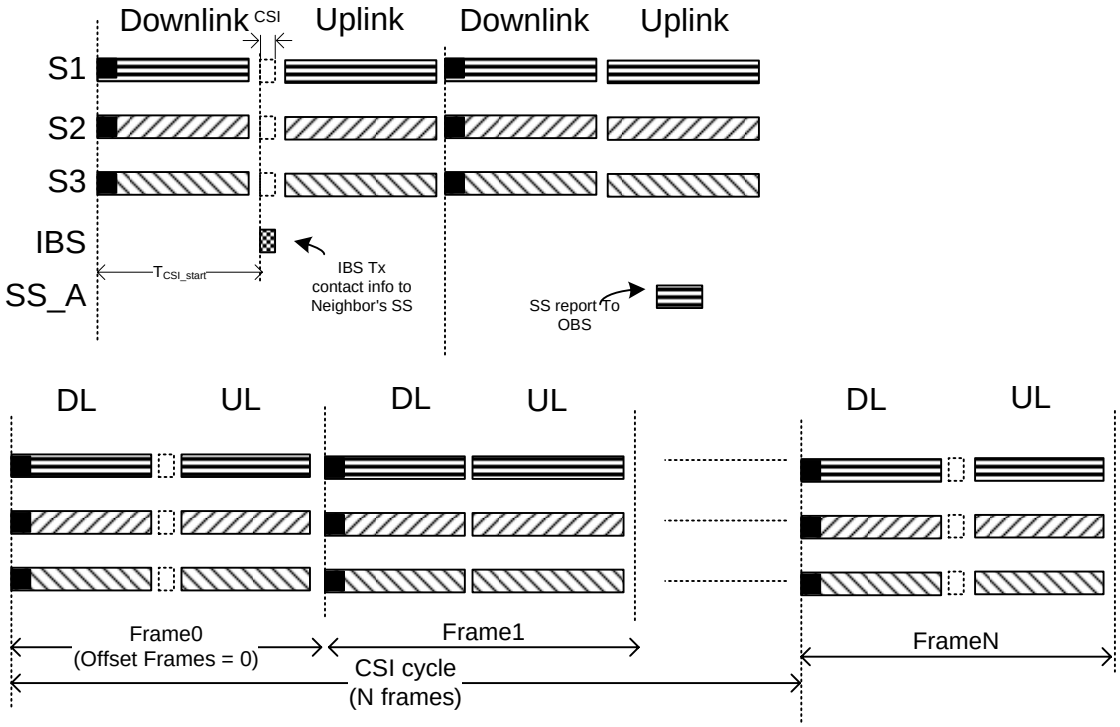
8.4.5.3.30 OFDMA CSI_IE Allocation

In the DL-MAP a WirelessMAN-CX BS (see 15.) may transmit an extended-2 IE with a DUIC value of 0x0F to indicate that subsequent allocations for CSI. (See 15.1.4.1.1, 15.3.1.1.1) The extended IE conforms to the structure in Table 286ac

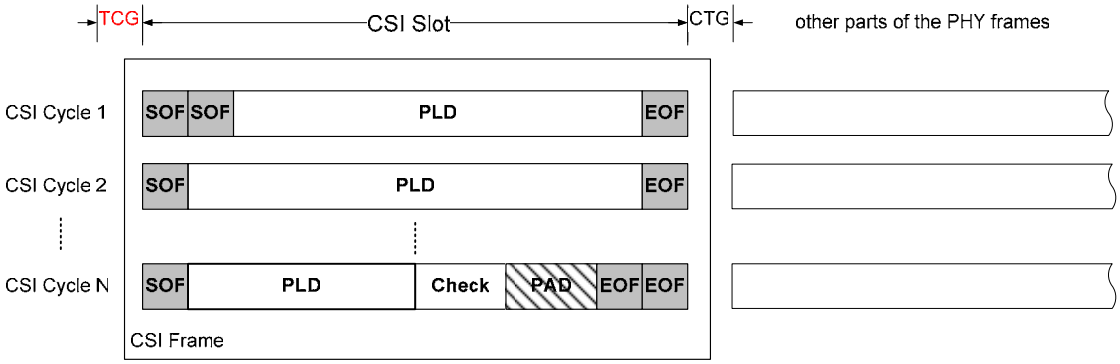
Table 286ac—OFDMA CSI IE format

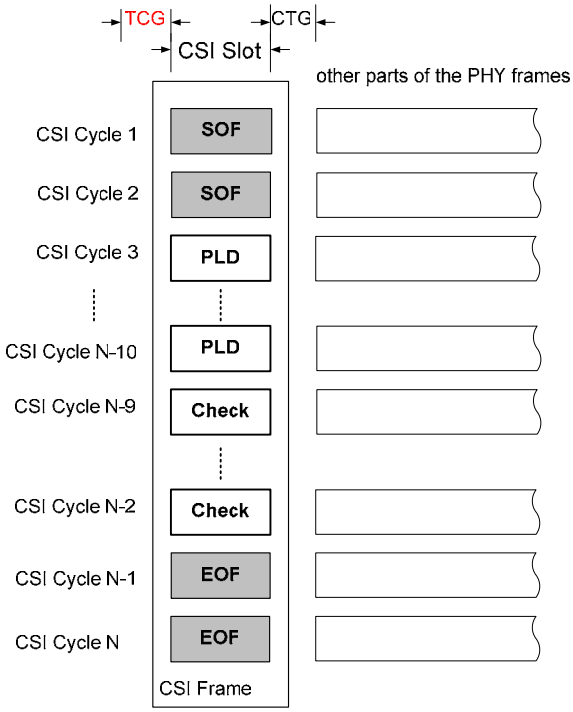
Syntax	Size	Notes
CSI_IE() {		
Extended-2 DIUC	4 bits	CSI = 0x0F
Length	4 bits	Length = 0x03
CSI Cycle	4 bits	indicating the number of frames (Nth power of 2) for the CSI Cycle (default 0x04)
Offset Frames	4 bits	the frame number offset for each CSI allocated (4 CSI cycles forms a ICSI cycle, 4 ICSI cycle forms a OCSI cycle)
OCSN	4 bits	indicating the OCSI allocation of this system 0,4,8,12-reserved for ICSI 1,2,3,5,6,7,9,10,11,13,14 identified a OCSI channel each. 15 reserved for noise floor measurement
Symbol Length	4 bits	in units of symbols
TCG Length	4 bits	in units of symbols
CTG Length	4 bits	in units of symbols
}		

Proposed changes on figure-h14 and h15



Proposed changes on figure-h29 and h30




TCG
CTG
CSI Slot
other parts of the PHY frames
CSI Cycle 1
SOF
CSI Cycle 2
SOF
CSI Cycle 3
PLD
CSI Cycle N-10
PLD
CSI Cycle N-9
Check
CSI Cycle N-2
Check
CSI Cycle N-1
EOF
CSI Cycle N
EOF
CSI Frame