Project	IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>
Title	Text fixing on master/slave cell terminology (action item from Session #46) + additional editorial changes
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Re:	Working Group Letter Ballot #24 for IEEE P80216h/D1
Abstract	This contribution proposes editorial changes related to the comments #83 and #87 [2] + some additional editorial changes in subclauses 6.3.2.3.64, 6.3.2.3.65, 6.3.2.3.66 and 15.4.2.5.6 of the draft [1].
Purpose	Text fixing on master/Slave BS terminology + additional editorial changes
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Text fixing on master/slave cell terminology (action item from Session #46) + additional editorial changes

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Overview

During Session #46, comments (#83 and #87 of [2]) has suggested to change the 'master cell' and 'slave cell' terminologies by the 'master system' and 'slave system' respectively in subclauses 6.3.2.3.64 and 6.3.2.3.66 of the draft [1]. Comments #83 and #87 are detailed in the Annex. This contribution proposes these editorial changes to harmonize the document terminology. Also, this contribution provides some additional editorial changes in section 6.3.2.3.65 and 15.4.2.5.6.

Text remedies in the sections are as follows:
- in subclause 6.3.2.3.64: text change related to comment #83 + additional editorial changes.
- in subclause 6.3.2.3.65: text change related to same scope as comment #83 + additional editorial changes.
- in subclause 6.3.2.3.66: text change related to comment #87 + additional editorial changes.
- in subclause 15.4.2.5.6: text change related to same scope as comment #83 + additional editorial changes.

Specific editorial changes

This section provides a list of changes to the draft document.

Blue text represents specific editorial additions.

~~Red strikethrough~~ text is to be deleted.

Black text is text already in the draft.

Bold italic text is editorial instructions to the editor.

Text remedy proposal for section 6.3.2.3.64

Replace the text of section 6.3.2.3.64 by the amended text below (related to comment # 83 of [2]).

The Master Advertisement Discovery Descriptor (MADD) message specifies the advertisement discovery information sent out by the master BS towards the slave SSs located in the overlapped area of this master system~~cell~~ and~~with~~ the surrounding slave systems~~cells~~. This information is sent out periodically by the master BS in MATI in downlink ~~(section *15.4.2.5.6*) on a given channel (frequency domain)~~within the coexistence control channel CXCC. ~~This information is sent every T_{MATI} (time interval between two consecutive MATIs). These consecutive MATIs (TBD) are part of an advertisement discovery sequence of time duration TAD. This sequence occurs cyclically. The time interval between two sequences is of time duration Ts.~~ MADD provides the necessary information to these slave SSs ~~of the surrounding slave cells~~ to enable then these slave SSs ~~to~~ to inform their home~~slave~~ BS~~s~~ about ~~possibilities of~~ radio resources sharing opportunities ~~with~~ offered by this master BS~~cell~~.

A MADD message shall include the following parameters:

BSID_M: ID of the master BS.

BS_IP_Proxy_address_M: The Coexistence Proxy IP address of the master BS.

T_START_M: The Starting time of the period opened for renting by the master system~~cell~~ on that channel. This starting time is identified by a UTC time stamp following the format HH:MM:SS after the transmission of the message.

T_End_M: The Ending time of the period opened for renting by this master system~~cell~~ on that channel. This ending time is identified by a UTC time stamp following the format HH:MM:SS after the transmission of the message.

MRCTN: Minimum number of credit tokens per time unit required by the master BS from each slave BS so that the master BS's radio resources can be rented.

LC: List of alternative channels (in frequency domain) opened for renting by the master system~~cell~~ in addition to the channel under consideration.

Table 108ac—MADD message format

Syntax	Size	Notes
MADD_Message_Format( ) {		
Management Message Type =69	8 bits	
BSID_M	48 bits	
IP_Proxy_address_M	variable	TLV specific
T_START_M	16 bits	Absolute time based on UTC time stamp following the format HH:MM:SS
T_End_M	16 bits	Absolute time based on UTC time stamp following the format HH:MM:SS
MRCTN	TBD	Minimum number of credit tokens required by the master BS
LC	TBD	List of other channels (frequency domain) of master system~~cell~~ opened for renting
}		

Text proposal for section 6.3.2.3.65

Replace the text of section 6.3.2.3.65 by the amended text below (related to same scope as comment # 83 of [2]).

The Slave Advertisement Discovery Descriptor (SADD) message specifies the advertisement discovery information sent out by the slave BS towards the master SSs located in the overlapped area of this slave ~~cell~~ system and~~with~~ the surrounding master systems~~cells~~. This information is sent out periodically by the slave BS in SATI in downlink ~~(section *15.4.2.5.6*)~~ within the coexistence control channel CXCC.~~on a given channel (frequency domain). This information is sent every T_{SATI} (time interval between two consecutive SATIs). These consecutive SATIs (TBD) are part of an advertisement discovery sequence of time duration TS. This sequence occurs cyclically. The time interval between two consequences is of time duration Ts.~~ SADD provides the necessary information to these master SSs ~~of the surrounding master cells~~ to enable then these master SSs

~~inform the~~ to inform their home ~~master~~ BSs about ~~possibilities of~~a radio resources sharing request with this master system~~cell~~.

A SADD message shall include the following parameters:

BSID_S: ID of the slave BS.

BS_IP_Proxy_address_S: The Coexistence Proxy IP address of the slave BS.

T_START_S: Starting time from which the slave BS would be interested to rent a period opened for renting. This starting time is identified by a UTC time stamp following the format HH:MM:SS after the transmission of the message.

T_End_S: Ending time of the period the slave BS would be interested to rent. This ending time is identified by a UTC time stamp following the format HH:MM:SS after the transmission of the message.

.

Table 108ad—SADD message format

Syntax	Size	Notes
SADD_Message_Format( ) {		
Management Message Type =70	8 bits	
BSID_S	48 bits	
IP_Proxy_address_S	variable	TLV specific
T_START_S	16 bits	Absolute time based on UTC time stamp following the format HH:MM:SS
T_End_S	16 bits	Absolute time based on UTC time stamp following the format HH:MM:SS
}		

Text proposal for section 6.3.2.3.66

Replace the text of section 6.3.2.3.66 by the amended text below (related to comment # 87 of [2]).

The Advertisement Discovery Policy Descriptor (ADPD) message is sent out by the slave BS in SATI in downlink within the coexistence control channel CXCC.~~(section *15.4.2.5.6*) on a given channel (in frequency domain).~~ ADPD specifies when some slave SSs (located in the overlapped area of~~between~~ this slave system~~cell~~ and surrounding master systems~~cells~~, and receiving~~getting~~ MADD message from master BS) associated to this slave BS have to relay~~port~~ toward this slave BS the MADD messages received ~~conveyed in~~ within MATI ~~towards this slave BS~~.

ADPD message shall include the following parameters:

T_START_S: Starting time from which the slave BS would be interested to rent in a period opened for renting. For values received below ~~Before~~ this specified ~~that~~ time in MATI, the SSs associated to that slave BS are not allowed to report MADD content to this BS. This starting time is identified by a UTC time stamp following the format HH:MM:SS after the transmission of the message.

T_End_S: Ending time of the period the slave BS would be interested to rent in. This ending time is identified by a UTC time stamp following the format HH:MM:SS after the transmission of the message. After this time, the SSs associated to that slave BS are not allowed to report MADD content to this BS.

RCTN_MAX: Maximum admissible number of credit tokens per radio resource unit the slave BS will provide to get the radio resources offered for renting~~ed~~ by the master BSs. Above this~~ese~~ number of tokens, the SSs associated to that slave BS are not allowed to report MADD content to this BS.

Table 108ae—ADPD message format

Syntax	Size	Notes
ADPD_Message_Format( ) {		
Management Message Type =71	8 bits	
T_START_S	16 bits	Absolute time based on UTC time stamp following the format HH:MM:SS
T_End_S	16 bits	Absolute time based on UTC time stamp following the format HH:MM:SS
RCTN_MAX	16 bits	
}		

Text proposal for section 15.4.2.5.6

Replace the text of section 15.4.2.5.6 by the amended text below (related to same scope as comment # 83 of [2]).

In case no backhaul exits, or in case backhaul is not operational, or in case BSIS is not valid or in to facilitate inter BSs communications~~-~~, ~~O~~over the air signaling for the first phase (advertisement) of the negotiation cycle would be also of great support to facilitate ~~urgent (critical time)~~ radio resources sharing opportunities discovery between IEEE WirelessMAN-CX systems themselves, but also between IEEE WirelessMAN-CX systems and non IEEE WirelessMAN-CX systems. This section describes discovery messages and procedures so that:

- Master BSs can advertise periodically to the neighboring slave BSs about their offers of radio resources for renting. This enables the slave BSs to be aware of master BSs' offers.

- Slave BSs can inform periodically the surrounding cells about their search of radio resources sharing opportunities for renting. This enables slave BSs to inform the master BSs that they are looking for temporally some additional radio resources.

Specific master BS and slave BS downlink time intervals ~~(TBD)~~ are used to support the over the air advertisement discovery messages in support of the credit token~~s~~ based negotiation. These time intervals~~, not yet defined, are temporary called~~ are respectively named MATI (Master Advertisement Time Interval) and SATI (Slave Advertisement Time Interval).

Usage of MATI and SATI within CXCC~~the advertisement discovery MAC frame structure~~

The usage of MATI is:~~and SATI is described in this paragraph.~~

- The MATIs are dedicated to master BS transmissions in downlink.

- Each MATI is used by a master BS in downlink for broadcasting. At a given time, each MATI can only be used by a single BS ~~among~~ within the co-existence neighborhood.~~ However, a same MATI can be used by different BSs at different times.~~

- Each master BS can use any MATI provided it is not already used by any other ~~MATI~~ BS of the co-existence neighborhood.

- MADD (Master Advertisement Discovery Descriptor) message is sent in MATI (Section*6.3.2.3.64*).

~~- The MATIs are ranked in each *Advertisement discovery sequence* in such a way that the first MATI is assigned to the master BS whose renting period will occur first (i.e. min of the T_Start_M), the second MATI is assigned to the master BS whose renting period will occur in second, and so on. Re-ranking is updated dynamically each time a new master BS is arriving. This mechanism avoids the SSs of the slave cells (see paragraph "*Advertisement discovery from master cell by slave cell*" below) to scan all MATIs when the slave cells have to find very shortly some available resources to rent. In this manner, they have directly knowledge of the next available resources they can propose credit tokens for.~~

- Each master system~~cell~~ releases the MATI it is using when its negotiation starting time has elapsed. This enables new arriving master systems~~cells~~ to use this MATI ~~(eventually after the re-ranking)~~ to advertise incoming ~~channels~~ radio resource reuse opportunities.

The usage of SATI is:

- The SATIs are dedicated to slave BS transmissions in downlink.

- Each SATI is used by a slave BS in downlink for broadcasting. Each SATI can only be used by a single BS among the co-existence neighborhood. ~~However, a same SATI can be used by different slave BSs at different times.~~

- Each slave BS can use any SATI provided it is not already used by any other slave BS of the co-existence neighborhood.

- SADD (Slave Advertisement Discovery Descriptor) message is sent in SATI (Section 6.3.2.3.65).

- A "master" SS is a SS belonging to a master system~~cell~~. A "slave" SS is a SS belonging to a slave system~~cell~~.

~~-~~The MATI and SATI time positions are known by the "master" and "slave" SSs within CXCC.

-—There are no direct RF communications between the master and slave BSs. The master-slave BS communications are performed via master and slave SSs which act as RF bridges to convey the information as follows:

-o A “slave” SS performs the RF bridge between its slavehome BS and the foreign master BS (provided the coverage of the master cell system overlaps with the slave systemcell area, and this slave SS is located in the overlapping area).
-o A “master” SS performs the RF bridge between its masterhome BS and the foreign slave BS (provided the coverage of the slave systemcell overlaps with the master systemcell area, and this master SS is located in the overlapping area).

-Slave SSs in the overlapped (master/slave) systemscell area listen to the MATIs. Master SSs in the overlapped (master/slave) systemscell area listen to the SATIs.

15.4.2.5.6.1 Mechanisms enabling the discovery and the exploitation of the master systemscells originated advertisement discovery messages by the slave cellssystems

This paragraph describes the mechanisms enabling the discovery and the exploitation of the master systemscells originated advertisement discovery messages by the slave systemscells. The terminology used in the following is:

These mechanisms are described by the different steps as illustrated in the following:

1- Policy instructions to the slave SSs by the slave BS

Figure h52—Policy instructions to the slave SSs by the slave BSs

- During this step, the slave BS initially instructs (by broadcasting) its SSs (in red) about the behaviors they have to adopt when some of these SSs get the messages from the different MATIs.
- The behavior is instructed by the ADPD (Advertisement Discovery Policy Descriptor) message (section 6.3.2.3.66) specifies when some slave SSs (located in the overlapped area ofbetween this slave systemcell and surrounding master systems,cells and receivinggetting MADD message from master BS) associated to this slave BS have to relayport toward this slave BS the MADD message received information conveyed within MATI. towards this slave BS.
- The slave SSs that can hear the MATIs and meeting the requirements sent in ADPD are the only SSs that are allowed to make the RF bridge between the master and slave systemscells. This means, the policy rules the transmissions from any slave SS towards the slave BS when these SSs are mandated to get feedback

about the MATIs proposals. This mechanism avoids having incessant transmissions from the slave SSs towards the slave BS when the MATIs are not aligned with the slave BSs strategy. This saves bandwidth. Any policy can be established. Moreover, the policy can be adapted dynamically in time by the slave BS.

2- Detection and identification of the MATIs content by the slave SSs

Figure h53—Detection and identification of the MATIs content by the slave SSs

- During this step, the slave SSs in the overlapping area between the master systemcell and their slave systemcell listen to the different MATIs sequentially. For each master systemcell, these slave SSs can get the information sent out in the MADD message (Section 6.3.2.3.64).
- Provided the received MADD and ADAP (section 6.3.2.3.66) messages information ~~received, and the ADAP message received about the policy (section 6.3.2.3.66) established by the slave BS~~, the slave SS is able to decide whether it has to transmit this information to its home~~the slave~~ BS or not.

3- Relaying of the MATIs content to the slave system~~cell~~ by the slave SSs

Figure h54—Relaying of the MATIs content to the slave system~~cell~~ by the slave SSs

- In case the policy requirements are met, the information collected by the slave SS is conveyed to the slave BS. The information the slave SS sends to its BS is the content of the MADD message.
- In order to ensure this information is appropriately received by the slave BS, the information could be~~is~~ sent out by several slave SSs (e.g. 2 slave SSs circulate this information to the slave BS in *Relaying of* the MATIs content to the slave system by the slave SSs). This ensures both reliability and security check.

Note: In case the policies requirements sent in ADAP are not met, the slave SSs do not transmit the information. However, it would be possible for the slave SS to convey the information about the list LC (message included in MADD) to its slave BS since it will provide it some further information about other radio resources renting opportunities on other channel (frequency domain). This decision to send the LC information can be ruled by the policy.

4- Master BS - Slave BS communication through the backhaul

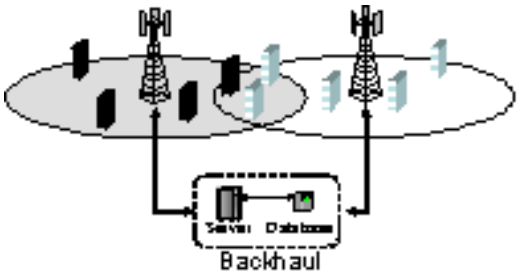

Figure h55—Master-Slave BS communication through the backhaul

After step 3, the slave BS knows the IP_Proxy_address_M (Section 6.3.2.3.64) associated to the master systemcell. Accordingly, the communications between master and slave systemscells (BSs) is performed through the backhaul to make the negotiation (*Master-Slave BS* communication through the backhaul) with the co-existence protocol (CXP). The remaining phases of the credit tokens based negotiation cycle is performed via this backhaul with IP based communications using server(s) and database(s).

15.4.2.5.6.2 Mechanisms enabling the discovery and the exploitation of the slave systemscells originated requests discovery messages by the master systemscells

This paragraph describes the mechanisms enabling the discovery and the exploitation of the slave systemscells originated request discovery messages by the master systemscells. The terminology used in the following is the same as in the previous paragraph.
These mechanisms are described by the different steps illustrated as follows:

1- Detection and identification of the SATIs content by the master SSs

Figure h56—Detection and identification of the SATIs content by the master SSs

During this step (*Detection and* identification of the SATIs content by the master SSs), the master SSs in the overlapping area between of the master systemcell and their slave systemcell listen to the different SATIs sequentially. For each slave systemcell, these master SSs can get the information contained in the SADD message.

2- Relaying of the SATIs content to the master systemcell by the master SSs

Figure h57—Relaying of the SATIs content to the master systemcell by the master SSs

- The SADD message information is reported by the master SS to its master system~~cell~~ (*Relaying of* the SATIs content to the master system by the master SSs).
- In order to ensure this information is appropriately received by the master BS, the information is sent out by several masters (e.g. 2 master SSs convey this information to the master BS in *Relaying of* the SATIs content to the master system by the master SSs). This ensures both reliability and security check.

3- **Master BS - Slave BS communication through the backhaul**

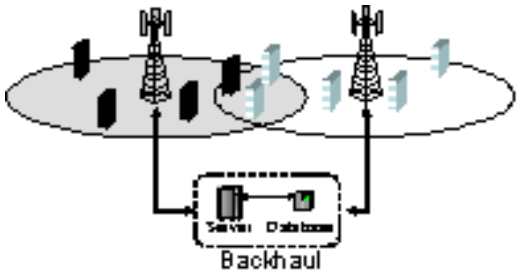

Figure h58—Master BS - Slave BS communication through the backhaul

After step 2, the master BS knows the IP_Proxy_address_S (Section 6.3.2.3.65) of the slave system~~cell~~. Accordingly, the communications between master and slave systems~~cells~~ (BSs) is performed through the backhaul to make the negotiation (*Master BS* - Slave BS communication through the backhaul) with the co-existence protocol (CXP). The remaining phases of the credit tokens based negotiation cycle is performed via this backhaul with IP based communications using a server and database.

References

[1] IEEE 802.16h/D1: Part 16: Air Interface for Fixed Broadband Wireless Access Systems Amendment for Improved Coexistence Mechanisms for License-Exempt Operation; 2006-10-10
[2] IEEE 80216h-06_068r2: *Letter Ballot #24 Commentary file with resolutions from Session #46.*

Annex

This annex contains the comment from [2] to be resolved via this the action item covered by the contribution.

Comment 83:
Mariana Goldhamer
Comment:
The MADD message uses "master cells" and "slave cells".
Suggested Remedy:
These should be defined in the context of Master / Slave sub-frames and Systems

Comment 87:
Mariana Goldhamer
Comment:
ADPD uses Master / Slave BS.
Suggested Remedy:
These should be defined in the context of Master / Slave sub-frames and Systems.