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Title	Consideration on BS-BS Communication over the Air for Dynamic Resource Sharing	
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Re:	Call for Contributions, IEEE 802.16h Task Group on License-Exempt Coexistence, IEEE 802.16h-06/004	
Abstract	The credit tokens based co-existence and negotiation protocol can be enabled by with IP-based wired communications (using the shared distributed system architecture) and over the air signaling. This contribution proposes basis for over the air signaling between BSs for OFDMA PHY.	
Purpose	This contribution proposes basis for OFDMA frame structure in support of BS-BS communication over the air for dynamic resource sharing.	
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Consideration on BS-BS Communication over the Air for Dynamic Resources Sharing

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Overview

Dynamic cooperative resource sharing mechanisms between BSs have been proposed [1] and included within the section 15.7.2.2.6 of the IEEE 802.16h working document [2]. The sharing is enabled by a credit tokens based negotiation protocol. This mechanism requires communication messages between BSs during the different phases of the negotiation between the master and slave BSs. This BS-BS communication can be enabled with IP based wired and over the air communication signaling. These messages can already be exchanged with IP-based wired communications via the server and local databases proposed in [2]. Both of the methods should be considered for LE operations. Purpose of this contribution is to propose basis for the OFDMA frame structure to support these BS-BS communications over the air. The text of this new contribution is intended for updating the section 15.7.2.2.6.4 of the IEEE 802.16h draft document [2].

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 proposal for section 15.7.2.2.6.4

Replace the existing text of the section 15.7.2.2.6.4 by the following one.

The ~~above~~ credit tokens mechanisms (section 15.7.2.2.6.3) require inter BSs communication between different NWs. This inter BS communications is necessary to exchange the parameters related to the ~~Advertising phase, the Admissible co-channel interference control phase and the~~ credit tokens based scheduling cycle. ~~Auctioning/bidding phase.~~

The primitive parameters include: T_{Start} , T_{end} , $T_{End\ Renting}$, $T_{Start\ Renting}$, T_{Msf} , RPA, id_k , $BS_CT_k^{(n)}$, X_k , $T_{Start\ k}$, $T_{End\ k}$.

The derived parameters include: TS_m , $\{id_{k,m}^{(n)}\}_{selected}$, $P_m^{min, (n)}$, $P_m^{max, (n)}$.

~~It is assumed that t~~ These parameters are stored into the regional LE DB and into the local database of each LE BS of the shared distributed system architecture (section 15.2.2).

The information exchange about these parameters between these databases and the RADIUS/BSIS servers can be either supported ~~by secured over the air signalling, or~~ by IP based wired communication or by secured over the air signalling between the ~~network~~BSs.

For the implementation of the credit tokens based co-existence protocol, these two methods for BS – BS communication are proposed.

IP based wired BS – BS communication method:

With this method; the IP based wired communications between BSs can be supported by the inter network messages defined in the shared distributed system architecture (section 15.2.2).

Over the air based BS – BS communication method:

The credit tokens based scheduling cycle requires signaling in both the downlink and uplink. Here:

- BS-BS downlink (DL BS-BS) stands for the communication from the master BS towards one or several slave BS(s).
- BS - BS uplink (UL BS-BS) stands for the communication from the slave BS towards one master BS.

With respect to this terminology, the UL BS-BS signaling is dedicated to the following sequences of the credit tokens based scheduling cycle:

- Awareness/Advertising (sequence 1),
- Inform bidding phase (sequence 3),
- n^{th} ($n \geq 1$) bidding results (sequence 5 & 7),
- Final bidding results/pricing (sequence 8),
- BW granting (sequence 10).

With respect to this terminology, the DL BS-BS signaling is dedicated to the following sequences of the credit tokens based scheduling cycle:

- Express BS_k interest (sequence 2),
- Express initial BS_k bidding (sequence 4),
- Express new n^{th} ($n > 1$) BS_k bidding (sequence 6),
- Transaction (sequence 9).

To support both DL BS-BS and UL BS-BS signaling, it is proposed to introduce a DL BS-BS sub-channel and a UL BS-BS sub-channel. These sub-channels are depicted in figure 1 for TDD OFDMA PHY. Both DL BS-BS and UL BS-SB sub channels are active only when the master BS decides to open temporally for renting some channels.

The UL BS-BS transmission acts as a SS's transmission. The master BS allocates (in UL-MAP) the uplink resources between those dedicated to the SSs (UL Bursts) and those for the UL BS-BS channel in uplink. The UL-MAP provides the necessary IEs about the UL BS-BS sub-channel availability and usage for the slave BSs during the different sequences of the cycle.

The DL BS-BS sub-channel usage is provided in DL-MAP.

DL BS- BS sub-channel usage and IE

- o Awareness/Advertising (sequence 1),
tbc
- o Inform bidding phase (sequence 3),
tbc
- o n^{th} ($n \geq 1$) bidding results (sequence 5 & 7),
tbc
- o Final bidding results/pricing (sequence 8),
tbc
- o BW granting (sequence 10).

UL BS- BS sub-channel usage and IE

- o Express BS_k interest (sequence 2),
tbc
- o Express initial BS_k bidding (sequence 4),
tbc
- o Express new n^{th} ($n > 1$) BS_k bidding (sequence 6),
tbc
- o Transaction (sequence 9).

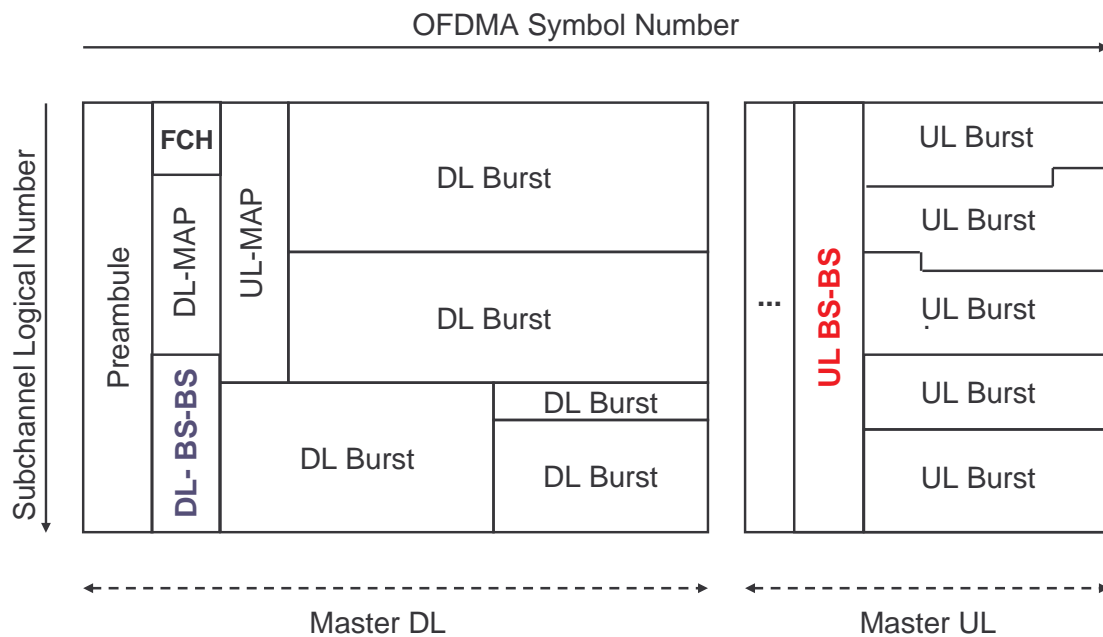


Figure 1: DL and UL BS-BS sub-channels

References

[2] IEEE C802.16h-05/036r1 - Proposal for enhanced credit tokens based co-existence resolution and negotiation protocol, 2005-07-11

[1] IEEE 802.16h-06/004: Part 16: Air Interface for Fixed Broadband Wireless Access Systems Amendment for Improved Coexistence Mechanisms for License-Exempt Operation, Working document; 2006-01-24