

Project	<b>IEEE 802.16 Broadband Wireless Access Working Group</b> < <a href="http://ieee802.org/16">http://ieee802.org/16</a> >	
Title	CIS, community and power levels for non-interfering transmissions	
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Re:	Call for Contributions, IEEE 802.16h Task Group on License-Exempt Coexistence, IEEE 802.16h-05/014	
Abstract	Corrections / improvements to the Working Document	
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## CIS, community and power levels for non-interfering transmissions

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### **Coexistence Identification Server**

Discussion:

The problem is the naming of the server. The coexistence should be created, and not “ identified” . However, this Server is maintaining and providing the info relative to GPS coordinates of the Base Stations and their operators, together with the IP address to be used by the Coexistence Protocol.

Proposal: Replace “ Coexistence Identification Server” with “ Deployment Base Station Identification Server” .

### **Power levels for sub-frames dedicated to non-interfering traffic**

Discussion:

No radio signature has been defined for systems using a sub-frame dedicated to “ non-interfering traffic” . In typical situations the non-interfering links are representing the highest percentage of links, and sending the radio signature may become a serious overload for the system. However, the Base Station data-base and appropriate messages can resolve the interferer identification problem.

The radio signature for different transmitters is sent during Master sub-frames and can be measured by different receivers. The Base Station data base shall keep the following information regarding the usage of “ non-interfering sub-frame” or Master sub-frames belonging to other systems:

- BS power, relative to the radio signature, when using each of the sub-frames;
- List of SSs and their power, relative to the radio signature, when using each of the sub-frames.

The received power during other sub-frames can be calculated based on the radio signature measurement and suitable calculations, according to data-base information.

Proposal

Insert at Principles, after “ Controlling interference during the Master sub-frame” and before “ Power Control” ...

Controlling interference during not-interfering traffic sub-frames

The Base Station data base shall keep the following information regarding the usage of “ non-interfering sub-frame” or Master sub-frames belonging to other systems:

- BS power, relative to the radio signature power, when using each of the sub-frames;
- List of SSs and their power, relative to the radio signature power, when using each of the sub-frames.

The received power during other sub-frames can be obtained by using the radio signature measurement and suitable calculations, according to data-base information on used powers. Messages as Stop\_Operating\_Request and Reduce\_Power\_Request can be used for controlling the interference levels.

Add to BS data base parameters:

- BS power relative to radio-signature, in the used sub-frames, in the interval between two Master sub-frames;
- For every active SS: SSID and its attenuation relative to radio-signature power, in the used sub-frames, in the interval between two Master sub-frames;
- \_\_\_\_\_

## **Interferer identification (during Master sub-frame)**

### **Interferer identification**

The interferers will be identified by their radio signature, for example a short preamble for OFDM/OFDMA cases. The radio signature consist of:

- Peak power
- Relative spectral density
- Direction of arrival.

Every transmitter will send the radio signature during an interference-free slot. The *time position of this slot (frame\_number, sub-frame, time-shift)* will be used for identification.

The transmitted power of non-interfering radio transmitters using a Master sub-frame will be known from the BS data base, indicating their power attenuation relative to the radio signature, for every used sub-frame.

## **Community definition**

### Discussion

Community definition should be based on the idea of interference between a cell and the adjacent cells. Taking into account that in reality the cells are not circular, their coverage depending on propagation loss, shadowing and outdoor-to-indoor penetration loss, the figure named “ Figure 10 802.16 LE Neighbor BSs discovery and definition of neighbor and community” should be modified, to remove the elements which describe a perfect circle.

The figure should be also modified to show actual interference cases with synchronized Tx/Rx intervals: SS to BS and BS to SS, creating interference areas around the center of a cell, as opposite to the margin of a

cell. There is no BS-BS interference, due to the rule that all the BSs have synchronized MAC frames and Tx/Rx intervals.

Here down are the proposed modifications to the existing text. The figure was not editable, so it is need the help of the initial authors. In a next meeting, we should analyze what happens with overlapping communities. This case appears due to the fact that the existing community concept is BS- centric and in cellular deployment every BS will interact with different BSs.

Proposed modified text:

**Error! Reference source not found.** ~~Figure 8~~ explains how one new entry BS discovers its neighbor BSs. The new entry BS-5 uses its GPS coordinates (x5, y5) and its maximum coverage radius in LOS,  $R_m$ , at allowed maximum transmission power, ~~to query the LE DB.~~ A BS is neighbor BS of another BS if:

- in co-channel operation, means their the LOS maximum coverages area, resulting for the -at allowed maximum transmission power, overlaps one with each other.. As depicted in **Error! Reference source not found.** ~~Figure 8~~, the regional LE DB will return BS-1, BS-2 and BS-3 as the neighbor BSs of the new entry BS.

- in first or alternate adjacent channels operation, the BS should consider the attenuation of the transmitted power, corresponding to the actual operation channels of different Base Stations

Once a LE BS has learnt its neighbor topology from the regional LE DB, it evaluates the coexisting LE BSs and identifies which BSs might create interferences. The Adaptive Channel selection will select the actual operating frequency, such that the probability of interference will be minimized. While it decides its working frequency after scanning, the community to which the LE BS belongs is determined. Each LE BS tries to form its own community, by including. ~~The members of community come from the neighbor BSs of one BS, i.e. the members of community are the subset of neighbor BSs the.~~ Those neighbor BSs that might create interferences to ~~the BS or to the associated SSs under current working frequency are the members of its own community.~~ For example, BS-1 and BS-2 are the members of the community create by BS-5 if  $R_m = R_e$  and BS-1 and BS-2 might create adjacent channel or co-channel interferences to BS-5. ~~One BS creates and maintains one community of it at the same time.~~ The members of community will change when its the working frequency of any BS changes or new interfering neighbor BS comes in. ~~Every BS maintains the list of the member BSs forming the community. An SS will not communicate directly with a foreign BS and there is no need to register the SS location. All the Base Stations forming a community will have synchronized MAC frames.~~

## **Regional data base**

The existing text in the operation principles chapter should be revised, in order avoid misunderstanding. Below are the proposed changes, to clarify that the regional data base, having secure access from operators, is different from a data base that can be built by a country regulator.

Proposed modifications in the Working Document:

- There is country/region data base, which includes, for every Base Station:

- *Operator ID*
- *Base Station ID*
- *Base Station GPS coordinates*
- *IP identifier*

*The local Radio Administration may use, for light licensing procedure, its own database, generally not including the Base Station ID and IP identifier information.*

There is a Server that manage the write/reading of this Data Base, using the 802.16h standardized procedures, including secure access procedures; the Server and the country/region data base can be hosted by one of the operators or a trusted entity, like the local Radio Administration.