Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Consolidation description on Interferer identification**
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Re:	80216h-06_011：Working Group Review: P802.16h Working Document (2006-04-07)
Abstract	**Consolidation description on 15.3.1.1 Interferer identification**
Purpose	**Consolidating 15.3.1.1**
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Proposed text changes:

15.3.1.1 Interferer identification

The interferers will be identified by their radio signature or coexistence signaling. As an example for the OFDM/OFDMA Phy sy~~t~~stems a short preamble contains the radio signature, or for a coexistence community using CSI signaling mechanism, the location and symbols sequence will reveal the identity of the interferer. ~~for example a short preamble for OFDM/OFDMA cases.~~ The radio signature contains the following:~~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.

Alternatively, using CSI *(see 15.3.1.1.1)*, the time position of the OCSI will reveal the identity of the interferers in their operating phase on their operating channel, and the energy keying symbol sequence inside the ICSI frame will broadcast the initializing interferer's identity and contact information on each potential candidate channel. *[note: can we merge this mechanism into radio signature?]*

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.

15.3.1.1.1 Interference Identification & Resolution via CSI Detection

Downlink CSI is used by the BSs to broadcast signaling to the neighbor systems. These signals are~~is~~ used for Interference identification and resolution. In order not to collide with the other neighboring interferers, the coordinated community should prevent neighboring BSs from using~~to use~~ the same CSI.

There is ~~was~~ one ICSI for ~~each~~ IBS in an ICSI cycle, in the example figure below, each ICSI cycle have 4 CSIs and CSIN 0/4/8/12 indicate the CSI number of ICSI~~,~~. ~~and t~~The other ~~rest~~ CSI is leave to OBS as OCSI, as shown in figure h32. Every OBS need to obtain ~~get~~ an ~~its~~ OCSI allocation in one OCSI cycle, which is formed by multiple ICSI cycle so that IBS can get more opportunity then OBS. There are 4 ICSI cycles inside one OCSI cycle and 4 CSI in each ICSI cycle in the example, so that there is 4 ICSI interval for the IBS and 12 interval for up to 12 OBSs.

Notice that the CSI allocation MAP should indicate all the CSI allocation in the uncoordinated channel as unusable. The uncoordinated channel information can be gathered in the DFS procedure or by the failure of coordination procedure in the interfered channel.

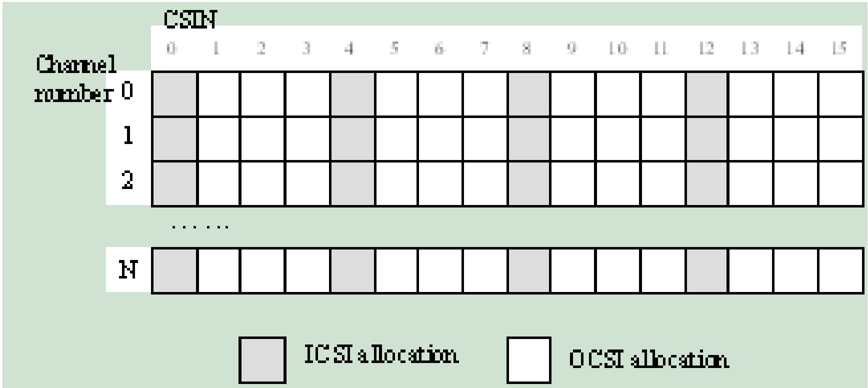

Figure h32—format of ICSI/OCSI allocation MAP

In the initialization phase of a BS, before the BS has an ~~having it's own~~ OCSI allocation, the BS should use ICSI to advertise its arrival in the air at every candidate channels sequentially one by one. The neighbor OBS will then send their current OCSI allocation and current sub_frame allocation to the IBS using CP message. After the IBS chooses the working channel for its radio link, the IBS ~~it sh~~shall choose ~~all pick~~ a vacant CSIN for OCSI in this channel and inform other neighbors about this choice. ~~tell all the neighbor the occupation.~~ Then, ~~After that,~~ this BS will start using this OCSI allocation as its exclusive CSI allocation.

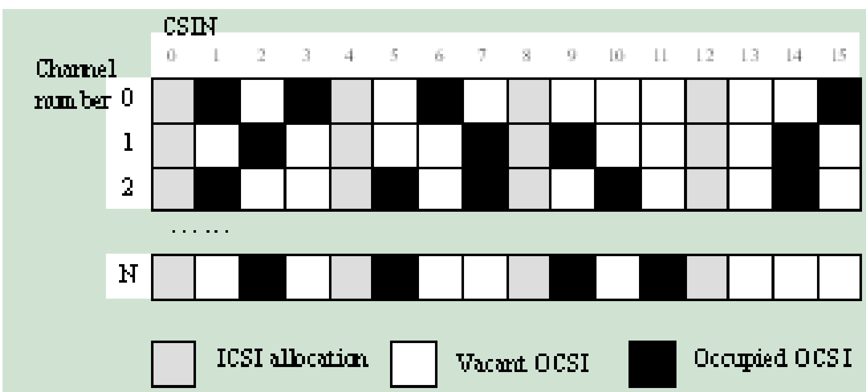

Figure h33—example of CSI allocation MAP in one BS's database

Figure h33 illustrates ~~Here is~~ an example of the CSI allocation MAP of one BS during his initialization phase by collecting the CP message information from his neighbors. Assume this BS chooses~~have choose~~ channel 0 as its working channel, it can then choose ~~pick~~ any one of the CSIN 2,5,7,9,10,11,13,14 as its OCSI allocation number. Every BS will have its own CSI allocation map indicating the current situation of CSI occupancy by the neighbors in the working channel and potential neighbors in the potential working channel. The CSI allocation MAP table of potential working channel will be used when BS move to another channel in cases. The CSI allocation MAP of the BS should be updated in time when any changes have been informed by its neighbors in the working channel and potential neighbors in the potential working channel.

In the OCSI mapping table, every neighbor in working channel or potential neighbor in potential channel is mapped to one OCSI allocation, every OCSI allocation will indicate its occupant or vacancy. By inquiring the mapping table of the OCSI allocations to the BSs, one BS can recognize the source of the interference or signaling in each OCSI allocation.

The initializing BS uses the OCSI allocation table to find out its neighbors in the working channel. By the contact information it acquired from the CP message, the IBS will ~~than~~ then use CP message to negotiate for interference resolution with its neighbors.

15.3.1.1.2 Interference from other ~~802.16~~ networks specified in this standard

[Editors note: Need to move the CCD content here? other Interferer identification mechanism should be introduced here, or go with the CSI part into the 15.3.1.1.1 section in separate level 6 section.]

15.3.1.1.3 Interference from Non-IEEE 802.16 systems.

Non-IEEE802.16 systems can make coexistence using collaborate mechanism or non-collaborate mechanism. When sharing information and coordinating with WirelessMAN-CX system using CP messaging or signaling, non-IEEE802.16 systems, such as IEEE802.11 systems, can share the same band of spectrum or doing radio resource distribution optimization using the collaborated mechanism(see 15.2.1.1) with WirelessMAN-CX systems. Otherwise, only non-collaborated mechanism can be use on coexistence between IEEE802.16 and non-IEEE802.16 systems.

15.3.1.1.3.1 Non-IEEE 802.16 Systems (BSs and their SSs) capable of GPS/UTC Timing Recovery

Other wireless systems not specified in this standard using the LE bands that ~~Non-IEEE 802.16 LE systems (BSs and their SSs)~~ that are capable of GPS/UTC timing recovery can monitor the CMI intervals to determine the existence of co-channel IEEE 802.16 users. Monitoring the intervals and undertaking CCI measurements over CMI cycles will allow these other systems ~~a non -IEEE 802.16 system(BS and its SSs)~~ to determine the occupancy on a channel and avoid settling on it. *[NOTE THAT BS AND SS MAY NOT BE DEFINED IN OTHER SYSTEMS.]*

Additionally, [CMI_ID54] [tbd.] will be left unoccupied by IEEE 802.16 systems (BSs and their SSs). Non -IEEE 802.16 systems(BSs and their SSs) occupying the same LE spectrum can insert downlink and uplink power bursts [tbd.] into this interval. Such energy should~~can~~ be detected by the IEEE 802.16systems(BSs and their SSs) which will consequently avoid use of the given channel.

15.3.1.1.3.2 Non-IEEE 802.16 Systems(BSs and their SSs) not capable of GPS/UTC Timing Recovery

The majority of co-channel interferers will be systems ~~(BSs and their SSs)~~ and devices that cannot perform rudimentary of signaling specified ~~required~~ for IEEE 802.16 coexistence and channel detection. To deal with such interferers the WierelessMAN_CX ~~IEEE 802.16 networks~~ systems in this standard will have to opt for avoidance of such users. To facilitate this avoidance, both the ~~IEEE 802.16 BS~~ BS and SS will have the ability to undertake [Power Spectral Density mappings] of selected bandwidth and disseminate such information as part of their [tbd.] inter-network messaging.

Sections **Error! Reference source not found.**. and **Error! Reference source not found.** describe the instructions and formatting that will be used by LE ~~the IEEE 802.16~~ systems ~~(BSs and their SSs)~~to undertake [PSD] measurements of contented spectrum. These measurements should be undertaken by a BS prior to occupancy of spectrum space and they can be undertaken throughout the operational period of a network to determine encroachments and to identify other spectrum that may have to be used in the event of uncontrolled interference arising in the occupied spectrum. The [PSD] measurements will be undertaken by the SS as well and this sensor information will be sent to the BS. [PSD] measurement information forms part of the data base that is exchanged between networks as part of their mutual spectrum management tasks. SSURF messages [tbd.] could be used to transport spectrum information.