Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
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Re:	Call for Comments and Contribution, "IEEE 802.16's License-Exempt(LE) Task Group, 2005-12-15
Abstract	This document contains text originally in document IEEE C802.16h-06/003 and was refined during task group discussions that took place during Session 41 on 12 Jan, 2006.
Purpose	To harmonize contributions with existing text.
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Interference Neighborhood: Interference neighborhood is relative to a system (BS and its subscribers). A system (BS and its SSs) will perceive as interference neighbors, all other systems (BSs and their SSs) which create/receive interference to/from it.

Community: is composed of those systems (BSs and their SSs) which coordinate to resolve their interference.

Coexistence Community: is composed of those systems (BSs and their SSs) which have resolved their interference and coexist.

*[to be inserted in 15.2.1.1.3 after the end of the paragraph.]*A coexistence time slot (CTS) is a reserved physical frame used for the coexistence protocol signaling purposes. For example, ~~The~~ the beginning of the first CTS is at HH:MM:00 UTC, the second CTS is at HH:MM:06 UTC, etc. The beginning of every CTS slot is specified by a UTC message (time stamp). (Figure A8).

The CTS ~~shall~~ could be used by ad hoc wireless LE ~~networks~~ systems (BSs and their SSs) to mediate their co -channel coexistence. The CTS will be an opportunity for ~~a networks~~ systems (BSs and their SSs) to indicate to other systems (BSs and their SSs) ~~networks~~ the extent of the interference they can cause; newly arriving interfering base stations (IBS) will use the CTS to make themselves known to established communities of opera ting base stations (OBS). Newly entering SS will make their presence known when they are detected by base stations to which they are not associated (see Section TBD). Sporadic interference from BS or SS will also be detected by the same process.

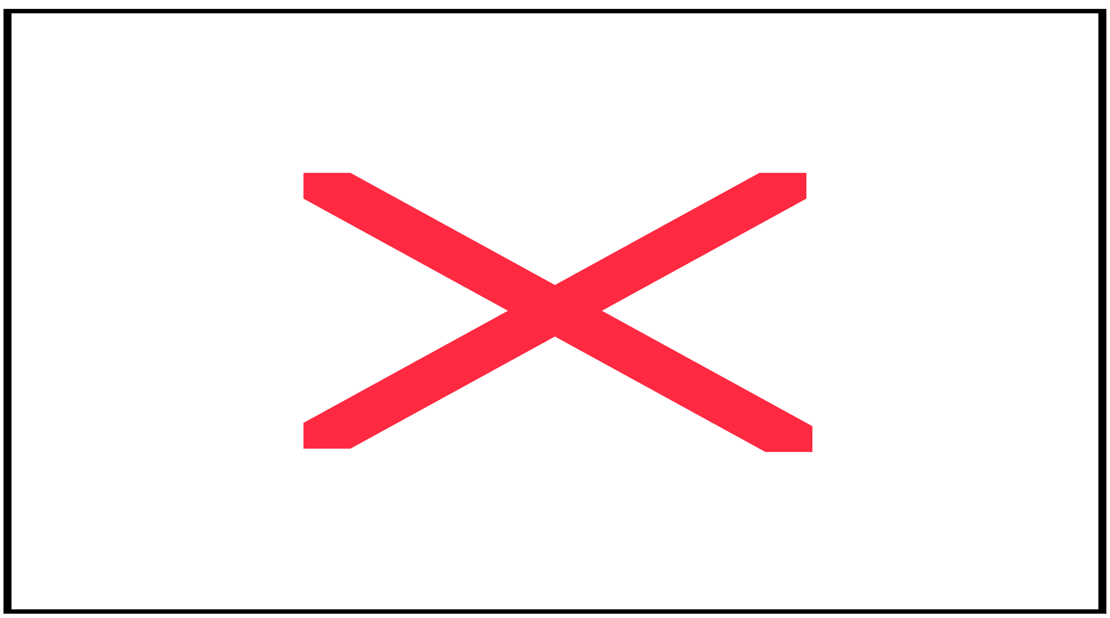
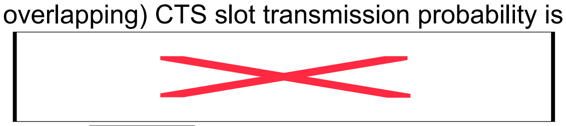
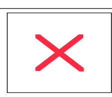


Figure A8. Alternative Timing of Coexistence Time Slot

[The text below is taken from C80216h-06_003, and call for comment, (to be inserted into 15.2.2.3.1)]
The CTS is the duration of a frame (20 msec) , and consists of an uplink and downlink intervals of equal size (10 msec). Downlink messages carry information (Radio Signatures/BSD messages TBD) unique to the identity of the base station controlling the network for which the particular CTS is associated. Uplink messages carry information (Radio Signatures/SSURF messages TBD) unique to the subscriber stations associated with the network and base station associated with

the same CTS. During a CTS all other networks, not associated with the particular CTS, remain silent and receive only.
A base station descriptor (BSD) messages (section 15.6.1.2.2) are broadcast within the downlink portion of the CTS every minute by a base station. This is always done in the same CTS frame, ie the frame claimed by the base station. In broadcasting in this manner the base station announces its (and its network's) existence. The BSD serves two purposes. First, it contains pertinent information related to the base station, allowing other base stations to identify it (via their SS). Secondly, it allows the differentiation of a CTS frame from a non-CTS frame. When it is received, SS associated with the BS will recognize the frame containing the BSD message as a CTS frame, and will transmit SSURF (uplink Radio Signature) messages (section 15.6.1.2.3) in response to it. Note that SSURF will use the uplink bandwidth granted only in the CTS frame, and is not transmitted in the data link.
Every BSD sent downlink has a BS_ID associated with it, it is always included in the DL_MAP message as specified in IEEE 802.16-2004. This is thus a de facto tag to the downlink frame, and can be used as an interference identification tag as well. The message contains the UL-MAP, which addresses specific SS to send their SSURF messages. The duration of the BSD message is typically 1 msec (TBD).
There is only one downlink BSD PDU in the CTS frame and it is transmitted at random starting point within the downlink time interval of the CTS. The rationale for the random placement of the BSD within the downlink subframe is ~~given in Appendix XXX. The CTS frame structure is~~ shown below:
There is the possibility that two or more potentially interfering base stations choose the same CTS slot. Such base stations and the respective networks they control may coexist peacefully without interference to each other because of hidden SS or no SS in the common coverage area. Essentially, such networks do not form a community because they do not interfere with each other. However, when the hidden SS or new SS enters into the common coverage area, co-channel interference will be detected at the new SS resulting in a situation that impacts the neighboring base stations having a common CTS.
CTS slot collision occurs in this situation. Two co-channel base stations, inadvertently and independently, have chosen the same CTS prior to interference being detected by the networks. To resolve this situation the start times of downlink sub frame PDU and uplink SSURF messages in the CTS slots are randomized. This reduces the possibility that two networks, sharing the same CTS, will overlap in their downlink and uplink transmissions. Realize that the downlink slot will be 10 msec wide and that the downlink sub frame PDU itself is only < 1 msec. For the worst CTS slot collision case, there are n base stations in the common coverage area, the successful (non-overlapping) CTS slot transmission probability is



Where .Assume the CTS downlink duration time length is t which is the uplink portion of a physical frame (physical frame duration is varying from 2, 2.5, 4, 5, 8, 10, 12.5, to 20ms), the CTS downlink PDU time duration is d t , which is typically < 1 msec.

[insert the following paragraph as indicate into 15.3.1.1.3]
15.3.1.1.3.1 Non-IEEE 802.16~~h~~ Systems (BSs and their SSs) capable of GPS/UTC Timing Recovery
Non-IEEE 802.16~~h~~ LE systems (BSs and their SSs) that are capable of GPS/UTC timing recovery can monitor the CTS intervals to determine the existence of co -channel IEEE 802.16~~h~~ users. Monitoring the intervals and undertaking CCI measurements over ~~several~~ CTS cycles will allow a non -IEEE 802.16~~h~~ system(BS and its SSs) to determine the occupancy on a channel and avoid settling on it.
Additionally, [CTS_ID54] (TBD) will be left unoccupied by IEEE 802.16~~h~~ systems (BSs and their SSs). Non -IEEE 802.16~~h~~ systems(BSs and their SSs) occupying LE spectrum can insert

downlink and uplink power bursts (TBD) into this interval. Such energy can be detected by IEEE 802.16h systems(BSs and their SSs) which will consequently avoid use of the given channel.

[insert the following paragraph as indicate into 15.3.1.1.3]

15.3.1.1.3.2 Non-IEEE 802.16h 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 required for IEEE 802.16h coexistence and channel detection. To deal with such interferers the IEEE 802.16h networks will have to opt for avoidance of such users. To facilitate this IEEE 802.16h 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 15.6.1.34. and 15.6.1.36 describe the instructions and formatting that will be used by the IEEE 802.16h networkssystems(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.