Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	Proposed Changes to Section 3 (Definitions) & References to Cognitive Radio Signaling in IEEE P802.16.D1[1].
Date Submitted	**2007-01-08**
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Re:	Changes to Draft Standard
Abstract	Definition Changes to Sec 3/ Cognitive Radio clarifications
Purpose	Editorial changes
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Proposed Changes to Section 3 (Definitions) &

References to Cognitive Radio Signaling in IEEE P802.16.D1[1]

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Introduction

Section 3 of Ref.1 has a number of definitions which are incomplete, redundant, obsolete, and/or are grammatically incorrect. The proposed changes are intended to rectify these deficiencies. The rationale for the changes requested below are provided in the Commentary during Session #47.

Additionally, a concise definition of "Cognitive Radio" is given in Section 3. Consequently, changes are requested in [1] which clarify the use of the words: "cognitive, cognitive radio, cognitive signaling, etc". Specific changes are requested and detailed below.

General editorial instruction:

Blue underlined 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.

Make the following changes to Section 3 'Definitions':
This section provides a list of changes to IEEE P802.16.D1 [1].

~~3.91 Random Temporary Key (RTK):~~ ~~The temporary key generated and sent by the BS over the air, and is required to be contained in the request messages of the coexistence protocol sent to this BS. RTK is used to obstruct the coexistence requests from unauthenticated internet terminals.~~

3.92 Alternative Channel (ALTCH): The alternative working channel is a *physical* (frequency) channel ~~decided~~ determined by the base station~~, on which the base station has not detected any user and also not currently chosen to be the working channel of this base station.~~ as being a suitable alternative *physical* channel for use if its current *physical* channel becomes unavailable.

3.93 Alternative Subframe (ALTSF): ~~The~~ An alternative ~~working~~ subframe that can be used by the base station ~~in the~~ of a system because it is unoccupied.~~, able to be used as its master subframe in its capable channel, on which the base station haven't~~

~~detected any user and also not currently chosen to be the working channel of this base station.~~

3.94 Coexistence Signaling Interval (CSI): a predefined time slot <u>not associated with the CXCC , used</u> for ~~the~~ coexistence ~~protocol~~ signaling purpose<u>s between systems having different PHYs. This technique uses power keyed energy symbols and RSSI detection</u> ~~especially for the~~ <u>by a</u> BS to contact its coexistence neighbor BS through one or more coexistence neighbor SSs in the common coverage area.

3.99 Coexistence Messaging: the messaging mechanism defined in WirelessMAN-CX to exchange~~d~~ information <u>specifical</u>ly between wireless systems with the same PHY profiles.

3.100 Common sub-frame: <u>That</u> part of the MAC Frame when all the systems <u>of a coexistence community</u> may operate in parallel.~~, for the communication between BS and SSs which are not affected by harmful interference in the same system. (~~The operation during these sub-frame may require limitations of the transmit power.~~)~~

3.101 Master sub-frame: <u>That</u> part of the MAC frame~~,~~ <u>following the Common sub-frame</u>~~,~~ <u>which is allocated to a specific (Master) system of a coexistence community</u>. ~~with special coexistence properties for systems owning this sub-frame as Masters; during~~ <u>During</u> this sub-frame a Master system operates with reduced interference <u>from its neighboring systems</u> and may use its maximum transmission power. <u>Systems of a coexistence community equally share the role of Master system on a rotating basis.</u>

3.102 Slave sub-frame: <u>That</u> part of the MAC frame <u>coinciding with the Master sub-frame in which all systems (other than the Master) of the coexistence community have restricted operation. These are called Slave systems.</u> ~~with special restrictions for systems operating as Slaves;~~ Slave systems shall not create interference to systems which operate during their Master sub-frame.

3.106 Cognitive Radio ~~Signaling: t.b.c~~ (CR) : <u>A class of techniques and protocols that enhance Wireless MAN-CX operation by the identification and measurement of desired and interfering wireless signals and noise, using this sensed information (sometimes in an shared manner) to support coexistence amongst independent co-channel systems. WirelessMAN-CX implements coexistence signaling, messaging, measurement, and spectrum sharing techniques and protocols required by CR.</u>

3.89 Coexistence Community: A *coexistence community* <u>is relative to a system and</u> is composed of those systems which have resolved their interference and coexist <u>with it.</u>

<u>**3.126 Coexistence Messaging Interval (CMI) :** A unique repetitive interval claimed by a system and used to differentiate it from other systems in its coexistence community. The CMI appears in the CXCC and is used by the claiming system for Coexistence Messaging and noise/interference monitoring purposes.</u>

Make the following changes whenever the word "cognitive,etc" in [1], wherever they are referred to. Specifically:

Delete Line 25   of current Page 6 of Ref [1]

30   ~~CR_NOC   Cognitive Radio Network Operations Centre.~~

Delete Line 25   of current Page 6 of Ref [1]

25   ~~CNTI   Cognitive Network Time Interval~~

Insert revised line 60 of current page 6 of Ref [1]

59	NURBC	Neighborhood Update Request BroadCast
60	<u>NTI</u>	<u>Network Time Interval</u>
61	OBS	Operating Base Station

Change Table 345a of current page 31 of Ref [1]; specifically in column 3:

Table 345a—parameter of absolute time reference

Absolute time Reference	Chapter	Reference	Value
AT1	Radio signaling (*15.4.3.2*)	Start of the first MAC Frame (no. N) ~~including cognitive radio signaling~~ of CXCC	0003:000, 15:000, 27:000, 39:000, 51:000
AT2	Radio signaling (*15.4.3.2*)	Start of the 2nd MAC Frame ~~including cognitive radio signaling~~ of CXCC	AT1+0001:000
AT3	Radio signaling (*15.4.3.2*)	Start of the 3rd MAC Frame ~~including cognitive radio signaling~~ of CXCC	AT1+0002:000
AT4	Radio signaling (*15.4.3.2*)	Start of the 4th MAC Frame ~~including cognitive radio signaling~~ of CXCC	AT1+0004:000

Change Lines 54 and 54 Table 345b of current page 31 of Ref [1]; Specifically the entry in the 3rd column of the table:

54   Repetition period of the ~~cognitive signaling~~ CXCC
55

Change Lines 16 and 17 of current page 41 of Ref [1], specifically:

16   For inter-system communication, IP-level messages, MAC level messages and ~~Cognitive Radio~~
17   Coexistence Signaling are defined at infrastructure and radio level.

Change Line 31 current page 41 of Ref [1], specifically:

31   The ~~Cognitive Radio~~ Coexistence signaling uses elements of the existing PHY modes and allows simple communication
32   between different systems. The radio signaling may be used to communicate with ad-hoc systems, or to in
33   -directly transmit contact   information for the IP network during the Coexistence Signaling Interval.

Change Line 20 current page 45 of Ref [1], specifically:

19   o   A new BS uses the interference free slot to broadcast the message containing the contact
20   request and/or the ~~cognitive radio~~ coexistence signal ~~transmitting~~ carrying the IP address

Change Line 6 current page 61 of Ref [1], specifically:

4   In the case of different PHY Profiles the coexistence communication will be done at IP Level. Every Base

5   Station needs to know the IP address of the DRRM of the Base Stations in its area, by provisioning or/and by

6   using a regional data base approach or/and by using ~~cognitive radio~~ coexistence signaling.

Change Line 6 and 7   current page 71 of Ref [1], specifically:

6   broadcast its coexistence proxy's IP address and the BSID of its IBS, by sending a message and/or ~~cognitive~~
7   ~~radio~~ coexistence signaling. A coexistence neighbor operating BS (OBS) finds the initializing coexistence neighbor in

Change Line 37   current page 96 of Ref [1], specifically:

35   o   If a neighbor BS fails to acknowledge, it will be asked again, for additional M attempts,
36   after that other means (such as ~~cognitive radio~~ coexistence signaling) should be applied, or it will be

Change Line 32   current page 111 of Ref [1], specifically:

32   — During the MAC frame starting at the absolute time AT2, ~~cognitive~~ coexistence signals will indicate the beginning
33   and the end of Master sub-frames, by transmitting signals indicating by their transmission start

Change Line 41   current page 111 of Ref [1], specifically:

40   — The MAC frame starting at the absolute time AT3 is the beginning of a registration interval using
41   the ~~cognitive~~ coexistence signaling; the registration interval has the duration of Tcr_reg seconds; The ad-hoc

References

[1] IEEE P802.16h/D1: *Air Interface for Fixed Broadband Wireless Access Systems Improved Coexistence Mechanisms for License-Exempt Operation*, Draft Standard.