Project	**IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>**	
Title	**Proposed changes to clause 15.3**	
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Re:	Task Group Review	
Abstract	Summary of the Ad-Hoc activity	
Purpose	Approval	
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Proposed changes to clause 15.3

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Proposed general approach

There is lot of redundant text, which appears at the beginning of each clause. A better document will result if every mechanism will have its own clause and all the related ones will be just mentioned, instead to be described again. Here down is the proposed rationalization, providing instructions to 802.16h Editor.

- 15.3 Interference assessment and basic connectivity creation
  - 15.3.1 CXCC Description
  - 15.3.2 Candidate Channel and Candidate Master Frame selection
    - (Monitor CXCC to determine the interference in Master frames on the available channels and using all the available procedures;
    - Use information available in the data-base to improve the channel selection and Master frame selection in case of low interference levels or hidden stations
    - Channel selection procedure based on the accumulated information)
    - use as basis the John's text from 15.3.3.2 (it is now in a place related to messaging, however this is the best available text on channel selection)
  - 15.3.3 Coexistence Messaging Mechanism
    - Inter-system communication
    - Interferer Identification
    - BSD Description
    - SSURF Description
  - 15.3.4 Coexistence Signaling Mechanism
    - Energy keying in time-domain
    - Inter-system communication during CSI
  - 15.3.5 Mechanisms based on energy keying in frequency domain
    - 15.3.5.1 Signal definition
    - 15.3.5.2 Synchronization using CXCC
    - 15.3.5.3 Inter-system communication
    - 15.3.5.4 Special procedures for backhaul-less systems

Proposed reorganization and text changes

Existing clause	Title	Text	
15.3	Interference assessment and basic connectivity creation	Needs re-organization Delete most of the introductory text because it is redundant or not relevant to the subject or just wrong	Delete p86/r60 to p87/r63

15.3.1	Change title to "Coexistence Control Channel"	15.3.1.2.3.2 (NUR-BS using freq keying) goes to 15.3.5.3	P89/r49 to p90/r6 to 15.3.5.3
		15.3.1.2.3.3 (signaling to backhaul-less) goes to 15.3.5.4	P90/r6 to p91/r9 to 15.3.5.4
		15.3.1.3 (signaling using fre-keyed) goes to 15.3.5.1 and 15.3.5.2	P91/r52- to p92r44 goes to 15.3.5.1 (Signal Definition) P92/r44 to p93r34 goes to 15.3.5.2 (Synchronization using CXCC)
15.3.2	Change title to "Coexistence Signaling Mechanism"	Goes to new clause 15.3.4 Needs up-date	P93/r37 to p102/r 8
15.3.3	Coexistence messaging mechanism	15.3.3.2 (candidate channel determination) goes to new 15.3.2; delete "using GPS…" in the title 15.3.3.3 becomes 15.3.3.2; add at the beginning of the clause a sentence saying that the channel selection is described in 15.3.3	p103/r3 to p104/r44 which goes to new clause 15.3.2
		Create 15.3.2 Candidate Channel and Candidate Master Frame selection; use the text below	
		Create 15.3.4 Coexistence Signaling Mechanism - Energy keying in time-domain - Inter-system communication during CSI	
		Create 15.3.5 Mechanisms based on energy keying in frequency domain - 15.3.5.1 Signal definition - 15.3.5.2 Synchronization using CXCC - 15.3.5.3 Inter-system communication - 15.3.5.4 Special procedures for backhaul-less systems	

Proposed text changes to 15.3.2 based on John's text from 15.3.3.2

(change all the references to 15.3.3.2 to the new clause 15.3.2)

15.3.2 Candidate Channel and Candidate Master Frame selection (CCS and CMFS)

~~**15.3.3.2 Candidate Channel Determination (Using GPS/UTC Synchronized CMI and Common Profile)**~~

Candidate Channel Determination (CCD) is the process used by WirelessMAN-CX systems in a given frequency range, after the exclusion of channels occupied by SSUs, for finding a frequency channel and Master sub-frame in order to start the operation. ~~(conforming to a synchronized CMI and common profile)~~. With this scope ~~where~~ the base station monitors a band to which it has access and selects, within that band, a channel and a Master sub-frame having minimal use and occupancy by neighboring wireless systems. This process is used, for example, by an IBS prior to forming a Coexistence Community. Since a base station can only ~~receive~~ listen to the uplink traffic, this process relies on the monitoring uplink transmission intervals and the measurement of the radio activity, which will be the potential interference signal power [I] and thermal noise power [N].

CXCC sub-channel 4 offers the possibility to measure the potential interference during the Master sub-frames~~.~~ Supplementary interference indication may be obtained from the measurements undertaken on CXCC sub-channel 2. Also the BSIS could be used to calculate the expected interference in the BS area.

Each candidate channel and Master sub-frame ~~will~~ should be ranked in terms of its [I/N] ratio. Those channels and Master sub-frames with the lowest ratio or ideally a ratio of 1 will be selected for use by the base station and be candidates for entry by an IBS, since such channels and Master sub-frames will have the lowest amount of discernable activity on them, hence likely have lower interference.

Channels should be further ranked according to the number of available Master sub-frames. A higher number of available Master sub-frames indicate a less interfered channel.

[I] and [N] ~~will~~ should be determined using the RSSI measurement capability of the base station receiver as detailed in Section 8.4.11.2. After synchronization to a universal timing standard and initialization of the base station's operating parameters, the base station will select a channel and undertake noise floor measurements during the ~~(No+Io) intervals~~ CXCC suitable allocations (see 15.3.1.2) which ~~are unoccupied CXCC slots (section *15.1.5.3*) used by WirelessMAN-CX networks, but~~ may be also used by non-WirelessMAN-CX systems~~.~~

~~The (No +Io) slots, will be free of WirelessMAN-CX transmissions and will provide an interval allowing the measurement of the receiver noise floor [N].~~

The noise floor [N] is the noise power spectral density of the received channel (No) multiplied by the channel bandwidth. Measurement ~~will~~ should be undertaken long enough to determine whether [N] has Gaussian characteristics. Measurements not deemed as Gaussian and/or RSSI measurements that result in a combined [N] and interference noise [I] floor higher than 1dB above [N] alone ((N+I)/N>1 dB) will be an indication that channel may be occupied by non-WirelessMAN-CX users. In this instance the value of the mean interfering RSSI will be taken as the [N+I] created by the occupying non-WirelessMAN-CX user and the given channel will be discarded from further consideration as it is considered occupied.(the discarded channel's noise plus interference floor will be stored in the BS interference table). Otherwise, the measurement will provide a value for [N].

The determination of [N] may be difficult if the channels have high occupancy even though specific measurement intervals ~~(No+Io) are~~ provided on the CXCC during sub-channel 1. The manufacturer of the WirelessMAN-CX receiver may be required to resort to special measurement techniques or determine a-priori the noise figure of the receiver. The Gaussian characteristic test is recommended as a proof of thermal noise unaltered by man-made interference and requires multiple sampling of the channel to be statistically valid.

[I] measurements on channels occupied by WirelessMAN-CX systems will be undertaken by calculating the mean signal strength and variance due to uplink SSURF messages summed over the uplink CMI intervals CX_CMI_Un {n=1-3}. The number of Tcxcc cycles over which the measurements are to be conducted will be ~~a variable (TBD)~~ set for the base station by the operator. Measurement of the RSSI will be done in accordance with Section 8.4.11.2. The mean RSSI and variance calculated for the summed SSURF occurrences over the repeated CMI intervals of the channel will be construed as interference values [I] and [Var I] for the channel. In essence, what this measurement represents is the total interference power that the Base Station measures on a given channel due to the total of all Subscriber Stations operating on that channel. In the case of the OFDM PHY, ~~B~~because of the granularity of the measurements within the CXCC sub-channel 2 (each interfering SS ~~will~~ may be separately detected) it will be possible for the BS to obtain a more sophisticated understanding of the interference environment beyond what is simply given by [I] and [Var I]. The incorporation of advanced interference detection approaches will not be considered in the context of the current discussion.

The channels are then ranked, with the channel having the lowest I/N and smallest [Var I] measurements over a maximum number of Master sub-frames to be likely selected for IBS entry into a Coexistence Community. This process is undertaken for each channel that is specified for the band of operation for the WirelessMAN-CX system and in essence identifies “white space” spectrum. Additionally, the passive PSD monitoring process described in section ***Error! Reference source not found. Error! Reference source not found.*** can be considered as a parallel process to the CCD, and can be used as another method of ascertaining spectrum occupancy. *Candidate Channel* Determination Process (needs changes) shows the CCD process.

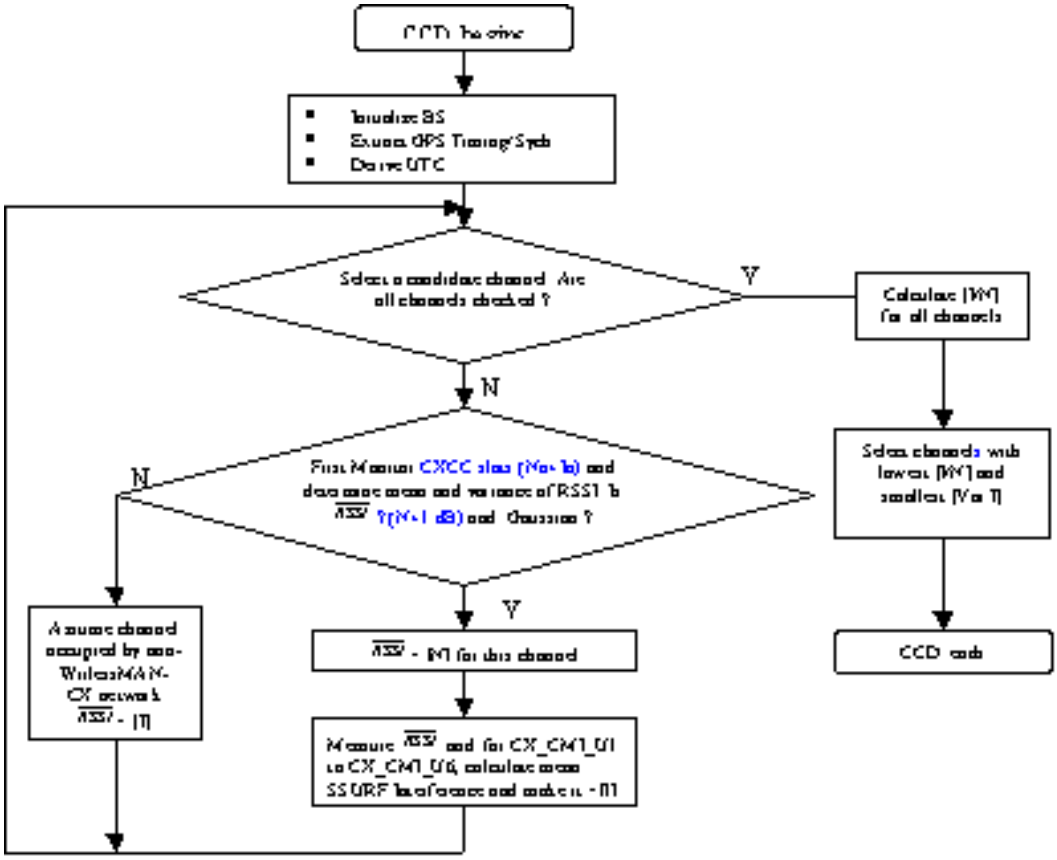

Figure h48—Candidate Channel Determination Process