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Title	**Adaptive Channel Selection (Using GPS/UTC Synchronized CTS)**
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Re:	Call for Comments and Contribution, "IEEE 802.16's License-Exempt (LE) Task Group", 2006-02 Item 2.
Abstract	This document specifies an adaptive channel selection process Using GPS/UTC time Synchronization
Purpose	To provide an adaptive channel selection process Using GPS/UTC time Synchronization
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Adaptive Channel Selection (Using GPS/UTC Synchronized CTS)

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In the selection of a channel by an IBS operating in a Licence-Exempt (LE) environment, there are a number of challenges, such as:

(a). The necessity to identify, quantify, and rank channels used by a variety of users, some of which may have long periods of non-transmission or bursty performance. RLAN networks compliant to IEEE 802.11a/b/g are examples.
(b). The need to measure interference signal power that may be below demodulation levels. It will be necessary to differentiate interference signal power from thermal noise.
(c). The necessity to determine a noise floor power against which interference can be compared.

The proposal detailed below relies on the measurement and calculation of the mean and variance of received interference signals by techniques outlined in Section 8.4.11.2. These techniques can be used to quantify an interference-free noise floor [N], differentiate thermal noise from signal power, and measure interference power [I].

Within the context of the GPS/UTC synchronized system it is proposed that:

(1) The CTS_ID54 interval, which is free of IEEE802.16h traffic, be used to either determine the interference noise floor of the receiver or to identify a channel used by a non-IEEE 802.16 occupant. This is done by utilizing the statistical differences between LE signals and noise and additionally by defining expected noise floor values for the receiver.
(2) Having defined a noise floor, the techniques of Section 8.4.11.2 can be used to identify and measure interference signal power, and
(3) A representative sample of interference signals, free of bias introduced by data traffic transmission, are available in the form of SSURF traffic that is transmitted on the uplink in a periodic manner over the intervals CTS_ID00 to CTS_ID48.

Insert the follow as section 15.4.1.1

Adaptive Channel Selection (Using GPS/UTC Synchronized CTS)

Adaptive Channel Selection (ACS) is the process where a base station monitors a band to which it has access and selects, within that band, a channel having minimal use and occupancy by neighboring wireless systems.

Since a base station can only receive uplink traffic, this process relies on the monitoring uplink transmission intervals and the measurement of interference signal power [I] and noise power [N]. Each candidate channel will be ranked in terms of its (I/N) ratio. Those channels with the lowest ratio or ideally a ratio of 1 will be selected for use by the base station.

[I] and [N] will be determined using the RSSI measurement capability of the base station receiver as detailed in Section 8.4.11.2. After synchronization to the GPS and initialization of the base station operating parameters, the base station will select a channel and undertake noise floor measurements on CTS_ID54, which is unoccupied by IEEE 802.16h networks but may be used by non-IEEE 802.16h networks (15.3.1.1.3.1).

CTS_ID54, in situations when it is unoccupied, will be free from all IEEE 802.16h transmissions and will provide an interval allowing the measurement of the receiver thermal noise floor [N]. The thermal noise floor is the noise power spectral density of the received channel (No) multiplied by the channel bandwidth. Measurements will be undertaken long enough to determine whether [N] has Gaussian characteristics. Characteristics not deemed Gaussian and/or RSSI measurements that are 3 db (TBD) higher than a predetermined [N] value (which can be provided as a Receiver Noise Figure estimate within RSSI measurement algorithm in the base station receiver) will be indicators that channel may be occupied by non-IEEE 802.16h users. In this instance the value of the mean RSSI will be taken as the [I] created by the occupying non–IEEE 802.16h network and the given channel will be discarded from further consideration. Otherwise, the measurement will provide a value for [N].

[I] measurements will be undertaken by calculating the mean signal strength and variance due to uplink SSURF messages summed over intervals CTS_ID00 to CTS_ID48. The number of CTS cycles to be measured 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, with care being taken to ensure that valid signals are being measured, even at close-to noise floor levels. The mean RSSI and variance calculated for the summed CTS intervals of the channel will be construed as interference values [I] and [Var I] for the channel.

The channel with the lowest I/N and smallest [Var I] measurements will be selected. Figure Hxxx shows the ACS process.

Figure Hxxx. ACS Process.