Project	**IEEE 802.16 Broadband Wireless Access Working Group**
Title	Power Control
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Re:	Call for contributions, posted 24 Sept 99. Specifically, addresses the "power control" equipment design parameters.
Abstract	Power control practices are reviewed. Recommendations for equipment conforming to the 802.16.2 coexistence practice are made, along with initial text for the document.
Purpose	This contribution proposes text for the section of the 802.16.2 coexistence practice power control.
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IEEE Patent Policy	

Power Control

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Suggested Text for Coexistence Practice

Power Control

BWA subscriber stations conforming to the equipment design parameters of this practice shall not transmit an EIRP spectral density of more than 15 dBW/MHz under unfaded conditions (conditions where the propagation loss is close to free-space). This requirement is met if the maximum EIRP spectral density produced by the equipment is always less than 15 dBW/MHz, or it may be met by employing adaptive transmit power control to reduce EIRP spectral density below this limit during unfaded conditions.

Background

Most of the justification for this text has already been presented in contribution 802.16cc-99/14.

It was shown that BWA systems generally do not benefit from employing downstream power control, as this creates C/I problems with intra-cell frequency re-use. Further, the reality is that most current and planned BWA systems do not employ downstream power control; hence the coexistence practice would not be applicable to coordinating BWA systems in the field today if downstream power control was assumed. Thus, the proposed text does not mention downstream power control.

It was also shown that BWA systems generally *do* benefit from employing upstream power control, as this equalizes near/far effects and improves frequency re-use within a system. Further, as most BWA systems *will* employ upstream power control, an assumption that interfering subscriber stations produce the maximum permitted EIRP spectral density even in clear-sky conditions is overly conservative. This assumption leads to unrealistically large separation distances. Thus, it is appropriate for the coexistence analysis to assume that subscriber stations, under clear sky conditions, produce less EIRP spectral density than the maximum. The proposed text sets the level. It is not necessary to mandate that the reduced level be achieved by the use of power control; if the transmitter always operates at low power, it leads to the same separation distance as a higher power system which uses power control.

The justification for a clear-sky level which is 15 dB below the maximum permitted EIRP spectral density (assumed here to be 30 dBW/MHz) was provided in the above-mentioned contribution. If the maximum EIRP spectral density is set to another value, then the level with power control should be set 15 dB below it.

At meeting#3 of the coexistence task group in Boulder, there was some discussion that the coexistence practice should also mandate that compliant BWA systems be designed such that received power levels at the hubs are never more than, say, 10 - 15 dB above threshold and further, that power control algorithms be primarily signal-strength driven, with a cap on C/I-driven adjustments of, say, 5 dB. While I believe that such assumptions about the hub receiver conditions are valid and may be applicable to the interference evaluation scenarios which the

practice uses to arrive at separation distances, I do not believe it is necessary or appropriate to mandate the receiver operating conditions as equipment requirements in the coexistence practice. As long as the practice puts a cap on interference levels transmitted during clear-sky conditions, interference analysis can be undertaken with confidence that no algorithmic conditions in a power control loop can result in higher levels of transmitted interference.