Response to FCC question regarding application for upper 25 MHz certification of Q66xx for 3.65GHz band

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Q: Can the manufacturer fix protocol selection in the US instead of letting users choose?

Answer: Depending upon the environmental conditions of a particular deployment, including the presence of competing systems deployed in the area, a customer in practical terms requires the flexibility to select the specific channel a base station will operate on. It is possible for the equipment to fix the protocol selection for unrestricted vs restricted operation based upon the channel frequency that has been entered.

The base station has a GPS receiver; however the GPS signal is used primarily for synchronization purposes and not location, and hence we do not utilize this information to govern or restrict operational mode.

Q: An attestation letter signed by a company official is requested for field software upgrade.

Answer: The letter has been submitted along with this response.

Q: How is the threshold selected (explain and justify the user selectable values) for all parameters in the detection protocol. In addition to providing the probabilities of detection/miss and false alarm of the selectable threshold, please explain why the selected back-off period, retry frames, retry frequency and total number of retires would not cause excessive interference after a neighboring system is detected.

Answer: We would like to point out that the Rules for the unrestricted portion of the band have been established to assure fair operation of all equipment operating within it, but the Rules do not provide specific values or guidelines for setting system parameters.

With the goal of being able to effectively operate in a wide variety of environments, and thereby bring quality broadband service to more people in remote locations, PureWave has chosen to provide parameter range settings that we feel provide the customer with the flexibility to optimize the network for its environment yet "play nicely" with other equipment likely to be encountered.

Indeed we arrived at these values following discussion with industry colleagues as well as inspection of published documents on the FCC site corresponding to previously certified products. As an example, Airspan has received certification for unrestricted mode operation in the upper 25MHz portion of the band using similar parameter ranges.

To ensure fair and efficient operation of all devices, and for all users to benefit equally from this spectrum allocation, it is imperative that operators have the ability to work together to assure compatibility of their respective equipment.

The minimum setting for back-off period, retry frames and retry frequency is two TDD frames, corresponding to 10 msec. This period is long enough for any system operating in this frequency to enjoy normal operation in a non-interfering manner. One interesting potential interferer is 802.11y-2008 operating in the 3.7 GHz band (3650-3700) with an OFDM frame length of 3.1 usecs. The minimum parameter settings of 2 frames for back-off period (minimum of 10 ms), retry frames, etc gives plenty of time to transmit and receive in a WiFi system without interruption (approximately 3000 WiFi frames in 10 ms). Again, as no values are specified by the FCC rules, these are values we believe are a good compromise between performance and interference.

In general it should be stressed that regardless of any of the above settings, no CPE will ever transmit unless instructed to by the base station. WiMAX is a scheduled protocol for which all transmissions are called out by the base station.

Q: The reason why detection threshold should be dependent of the antenna gain is because with a fixed threshold, the detector will "see" farther with an antenna having a greater gain. This may not be an issue if all antennas are of the same gain. But if the manufacturer agrees with this, instructions should be provided in the manual to the installer in case antennas of different gains are used for this licensed equipment.

Answer: Antenna gain does of course affect the absolute sensitivity of the system, and hence its sensitivity to an interferer. However, due to the reciprocity of TDD antennas, although a higher-gain antenna will be more sensitive to noise our transmissions will also reach farther. Conversely, if we are less sensitive on Rx then on our transmissions will not reach as far either. The goal of the unrestricted contention-based mode is to ensure fairness between devices in the field, and this a fundamental aspect of how the system will operate – with any antenna.

Although on any particular base station antennas of the same gain are always utilized, it is possible for different antennas to be chosen for different base station deployments. We don't feel this is a concern, as the threshold range is already variable and the highest gain antennas employed never vary from the typical by more than a dB or so. However, if it is seen to be a concern then it is possible to specify the threshold range as a sensitivity number with the antenna gain subtracted out (i.e., the Rx signal level before amplification by the antenna). This would make it independent of antenna gain.