

## **Contention Based Protocol – revised Restricted Band only**

Answers to FCC Technical questions in KDB 552295 for devices operating in the 3650-3700MHz Band under Part 90Z

### **Restricted Certification under Part 90Z (3650-3675 Band)**

The FCC state in Memorandum Opinion and Order FCC 07-99:

34. Under the Commission's rules, contention-based protocols can be broadly categorized as either "unrestricted" or "restricted....restricted contention protocols can prevent interference only with other devices incorporating the same protocol.

WiMAX, with its scheduling protocol, currently stands as the main example of a restricted contention technology. In its present format, WiMAX technology effectively prevents interference among multiple transmitters on a single WiMAX system. Different WiMAX systems can be coordinated to avoid interfering with each other, thus providing each WiMAX device a "reasonable opportunity to operate."

### **WiMAX Protocol Brief**

WiMAX MAC protocol is a centralised protocol in which the base station controls access to the air interface. In the downlink, all decisions related to the allocation of bandwidth to various MSs are made by the BS, which does not require the involvement of the MS. As packets arrive for each terminal, the BS schedules them for the PHY resources, based on their QoS requirements. Once dedicated PHY resources have been allocated for the transmission of the MAC PDU, the BS indicates this allocation to the MS using the specific MAC messages.

In general, WiMAX MS is a slave to the BS. In the uplink, the MS requests resources by using a contention based protocol. WiMAX uses a truncated binary exponential back-off algorithm for the contention-resolution during polling of user terminals. When it needs to send a bandwidth request the MS first enters a contention resolution phase, if selecting a uniformly distributed random number between 0 and BACKOFF WINDOW. This random value indicates the number of transmission opportunities, allocated resources for multicast/broadcast poll, the MS will wait before sending its bandwidth request. BACKOFF WINDOW is the maximum number of transmission opportunities an MS can wait before sending the pending bandwidth request. If it does not receive a bandwidth allocation based on the UL MAP message within a time window specified by a timer, the MS assumes that its bandwidth request message was lost owing to collision with another MS, in which case MS increases its BACKOFF WINDOW and repeats process. If bandwidth is still not allocated after a maximum number of retries, the MAC PDU is discarded.