To whom it may concern:

Per the guidance published by the FCC for devices operating in the 3650~3700MHz Band under Part 90Z, the following memo provides information to help determine the contention based protocol capability of the **RG300-3.7**. Note, this response makes reference to the FCC WT Docket No. 05-96 with MO&O Adopted May 22, 2007 and Released June 7, 2007.
The combination of the standard 802.16e subscriber device with a base station running this restricted operation protocol will together perform in compliance with Unrestricted Operation under Part 90Z (3650-3700MHz Band) of FCC Publication 552295.
Of course, transmit power and other RF parameters must additionally comply with the FCC regulations for the entire 3650-3700MHz band. This network legally is operating from 3650-3700MHz must employ base station(s) that are FCC certified for Unrestricted Operation.

The **Airspan Networks** is in the final stages of certification for Restricted Operation in the 3650-3700 Band for **FRC Base Stations (FCC ID: PIDMMAX3605).**
We look forward to being able to deploy **AWB RG300** gateway devices in the entire 3650-3700MHz band along with **Airspan base stations**.

In order to ensure that the device complies with the requirements of "Unrestricted" Contention Based Protocol (CBP) the following concerns have been addressed:

1.1. Unrestricted Restricted Protocol Description (by the Base station -FCC ID: PIDMMAX3605)
The base station employs a “listen before transmit” function whose purpose is to detect co-channel transmissions above a configurable detection threshold. The detection circuitry measures power level irrespective of the transmitting system’s air interface type (ie. technology agnostic). Detection is made at the start of each WiMAX frame (typically every 5 or 10ms). Upon detection of a transmission above the configured threshold, the base station creates a “contention allocation slot” that allows other systems access by creating gaps in it’s transmission (both the BS and associated CPE which is scheduled by the BS). Note that the number of frames over which transmission is stopped is operator configurable (Netspan “carrier Sense backoff Frames”) from a minimum value of 2 frames and the default value is typically 4-5frames (20-25ms), but can be much longer. Transmissions continue after the channel is clear (i.e. the other system’s transmissions stop), as the Base Station repeats the detection measurement at regular intervals and adjusts the contention slots accordingly.

1.2 Threshold detection to determine occupancy:

1.2.1 Describe how your system determines if another system is using the spectrum. At what detection level – relative to 0 dBi receive antenna gain (busy channel threshold) does the device determine if another system is operating on the spectrum?

The base stations transceiver design includes additional circuitry for performing an in-band interference measurement. This makes measurements of the co-channel power within allotted "listen" periods at the start of each frame. The power threshold above which a "contention allocation slot" will be triggered is configurable through SNMP commands to the Base Station. Airspan's element manager software allows the operator to set threshold levels between –65dBm and –96dBm (relative to a 0dBi antenna gain). This is set by the "Carrier Sense Threshold" parameter in the Netspan Management software.

1.2.2 How long does the system observe to determine if the channel is busy – at the initial time and in between communications?

The base station makes a measurement every frame (typically 5 or 10ms). The measurement period is 20us. The Base station creates "Contention slots". These slots are typically 20-25ms.

1.2.3 What is the bandwidth being monitored versus bandwidth occupied for all modes of operation?

The measurement is made over the bandwidth of operation as detection is made after the appropriate channel bandwidth filter.

1.2.4 How much variability is provided to the system operator to adjust busy channel detection threshold?

The variability that is provided to adjust busy channel detection is between -65dBm and -96dBm.

1.2.5 What is the operating system threshold (receive threshold) compared to the monitoring threshold (busy channel threshold)?

The base station receive threshold for a 10MHz channel is -96dBm. The detection circuitry has a similar dynamic range.

1.2.6 What additional checks does the system perform to determine if the spectrum is being used before initiating a transmission?

No additional checks are made.

1.2.7 Does the master and the client perform the threshold detection? If master only performs

the detection how does it determine if the client may interfere with the other system (hidden node detection mechanism)?

The system uses standard WiMAX compliant client devices. The system is a scheduled air-interface protocol where all client devices require MAP information from the base station in order to schedule signals. The base station is designed to provide wide area (macro) coverage from a "high-site" basestation location. This deployment mode allows the base station to detect the presence of other channel users with negligible risk of hidden node issues. Hidden node problems are generally associated with pico or micro coverage systems (eg. WiFi). uplink transmissions. In the case that the base station ceases transmissions (ie. initials a "contention slot"), the client devices will receive no MAP information, and therefore will not (cannot) transmit any

1.3 Action taken when occupancy is determined :

1.3.1 What action does your system take when it determines occupancy? Does it vacate the channel or does it have some back-off and retry strategy? What is the impact of traffic on the spectrum sensing or avoidance performance?

Upon detection of a transmission above the configured threshold, the base station will cease transmissions (from BS and associated CPE) and repeat the measurement at the start of the next frame. The number of frames over which transmission is ceased is configurable and planned.
Transmissions will not start until the channel is clear (i.e. other system's transmissions stop) or the "contention slot" period has expired.

1.3.2 If you use other means, please describe how the device determines the existence of other systems and what steps it takes to either share the channel or avoid its use.

Not Applicable.

1.3.3 Describe any mechanism that would limit a transmission from a remote station if only the master detects occupancy (hidden node avoidance mechanism).

The system is a scheduled air-interface protocol where all client devices require MAP information from the base station in order to schedule uplink transmissions. In the case that the base station ceases transmissions, the client devices will receive no MAP information, and therefore will not transmit any signals.

1.4 Opportunities for other transmitters to operate:

1.4.1 When describing occupancy profile, clarify any differences between start-up acquisition

mode of spectrum and operational modes.

At "start up" or after the system has been rebooted, the detection mechanism is activated prior to any transmission from base station or CPE.

1.4.2 In operational mode, how long does the system transmit before stopping giving others a reasonable time to transmit before continuing?

Transmissions are scheduled in blocks of 5 or 10ms frame duration. The "contention slots" for other systems are typically 4-5 frames (20-25ms). The frame duration includes both downlink and uplink transmissions. Detection is performed by the base station at the start of each frame.

1.4.3 Does the system (master and / or client) listen prior to every transmission? If no, explain.

Yes, the base station detects at the start of every frame.

1.4.4 Describe how the operational spectrum usage (on air time) is dependent on system load conditions (no load, typical and overload). For example, if a station does not have any information to transmit describe any regular or recurring transmission that may take place?

The base station transmits at the start of every "clear" frame (following detection period). CPE only transmit when scheduled by the base station. With no load, the majority of the frame is transmission-less. In overload condition, the frame is filled according to the base station scheduler protocols. In extreme overload conditions, a period of continuous transmission may occur. The creation of "contention slots" based on the detection of other activity, reduces the load that is programmed to be delivered over the system.

1.4.5 Describe if there are any limitations imposed by the contention protocol on what applications are used (i.e. limitations on Quality of Service).

There are no limitations imposed by the system. When sharing channel occupancy, system capacity will reduce. In this case the base station scheduler will prioritise traffic (based on packet classification rules) accordingly.

1.4.6 Describe how applications or configuration of services can affect spectrum usage. To describe your occupancy sharing capability you can assume that two systems on a co-channel are the same (your systems being described). How would they share the spectrum?

Each system will only transmit when it has detected that the channel is clear. If one system is transmitting, the second system will have it's opportunity to transmit when the data transfer is complete. With evenly loaded systems, the opportunities to transmit will statistically be equal for both.

This "listen before transmit" mechanism minimises interference between systems, hence reducing the need for re-transmissions and maximising overall spectrum efficiency. Note that he number of frames

over which transmission is ceased after detection of the second system transmissions is configurable and offers operators the means of tuning the systems to achieve optimum fair sharing.

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