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March 14, 2007

Mr. David Waitt  
American Telecommunications Certification Body Inc.  
6731 Whittier Ave  
McLean, VA 22101

RE: Comments of March 12, 2007  
APPLICATION: UT650289BA8800DL Airorlite Communications

Dear Mr. Waitt:

Below are the comments that you have provided regarding the application for certification referenced above. Our responses to those comments are in ***bold italic***. Many responses refer you to additional exhibit(s) which has been uploaded to the application folder at the ATCB website.

Thank you for your attention. Please feel free to contact us for any additional information that you may require.

Regards,

*Brian J. Dettling*  
Documentation Specialist

Michael Violette  
President WLL Project: 9520-2

1) (Number 6 from original comments) Booster rules cites: – Include exhibit or correspondence showing applicant was informed that boosters must meet all criteria stated in Sections 90.219 and 22.383 for related booster/inbuilding operations. NOTE: THIS APPEARS TO BE A CLASS B DEVICE UNDER 90.219, AND IF SO, SHOULD ADEQUATELY JUSTIFY AS SUCH.

*(Original response) The applicant is informed. See letter (Airorlite Pt90.219 Letter).*

*Please add a reference to Part 90.219(d) to the letter. 90.219(d) is included below.*

(d) Class B broadband signal boosters are permitted to be used only in confined or indoor areas such as buildings, tunnels, underground areas, etc., or in remote areas, i.e., areas where there is little or no risk of interference to other users.

**R. Thank you for the clarification. The letter has been updated accordingly. Please see Airorlite Pt90.219 Letter revised.**

2) (Number 8 from original comments) There does not appear to be information to support that input drive level is at maximum input rating and maximum gain settings for all tests. Given this is basically an amplifier, this should be documented/justified....Additionally an explanation of what keeps the device from going into saturation should be provided...Generally amplifiers, booster, and repeaters must justify the levels used for test and document them as appropriate. See attached guidance as well...

*(Original response) The drive level was supplied by the customer. The optimal drive level was derived from empirical measurements provided by the customer on actual installations. A -50dBm level was found to represent the highest incoming stimulus signal.*

*Is -50 dBm the maximum input level to both the uplink and the downlink? If not, please provide the maximum input level for each unit (UL & DL)*

**R. Uplink: -60dBm; Downlink: -50dBm**

3) (Number 9 from original comments) Power on grant should be clearly understood as either composite of multi-channels or per carrier. If power is composite include in comments field: "Power output listed is composite for multi-channel operation." It appears single channel power was tested...But how is output affected for multi-carriers given this device is clearly going to operate using 8 channels? Also, since the downlink would be classified as mobile and not fixed (i.e. in-building operation) MPE must be addressed with the maximum power and highest gain antenna. It is not clear from the report if the power out of this device is a per-channel power or a composite power. Depending on which power designation it is the actual output power of the device may exceed that listed in the excluded rf category and may in fact have to have measured MPE performed. See 10).

Additionally, the output power was about 180 mW conducted per carrier, but the manual cites 25 dBm per carrier MINIMUM. Maybe this is due to difference of EIRP and conducted, but the way the manual cites this appears to be conducted. Therefore a difference between what was measured and expected may be present, which would also suggest drive levels were not properly set.

*(Original response) The device is intended to operate with eight (8) channels simultaneously. The uplink and downlink are rack-mounted equipment with fixed antennas. Mobile evaluation does not apply. The cutsheet originally supplied by the client mistakenly cited 25dB MINIMUM. A new sheet (52500-FCC\_03\_06\_07R2 Model (1)) reflects the actual which states 25dB MAXIMUM. The composite output power is limited to 31dBm through AGC in the amplifier. See 50289DL Block Diagram 3.07*

*Please provide additional documentation outlining the 31 dBm limitation. Where is this limit specified and / or set in the hardware. It is apparent from examining the initial block diagram provided that the maximum output is approximately 31 dBm, but for purposes of determining correct RF Exposure parameters, the limit needs to be well documented.*

*Additionally, with reference to the 25 dBm issue above, the user manual still references 25 dBm MINIMUM. Please correct*

**R. The User Manual has been corrected. Please see "50289DL User Manual Rev 2".**

**From the client: I reference you to the drawing # 52100-01-35. If you go to the Power Amplifier module 52500-02-05 the output of this amplifier is AGC'd to a +31 dBm output level maximum. The**

*AGC is adjusted as follows. With an input level of -30dBm the output is adjusted to a +31 dBm level by the AGC pot.*

*RF signal that is inputted to the power amplifier card is gained up and then sampled at the TAP. This sampled level is detected in the LTC 5505 IC. The output of this IC is a DC level that is proportional to the RF input. The Operational amplifiers that follow the detector has a threshold setting that is adjusted for the required output level (+31 dBm). When the DC level equals the setting the operational amplifier goes active and drives a second stage which interfaces to a PIN diode attenuator. The PIN attenuator has a range of 3 to 55 dB and adjusts the attenuation to reduce the RF input of the card. Since the gain in the feedback is infinite the adjustment is such that the loop gain is zero which provides RF tracking of less than 0.1 dB.*

4) (Number 10 from original comments) Given 9 above, it is uncertain if the RF exposure is adequate. For instance, is it possible that the output can be  $8^* 22.6 \text{ dBm} (182 \text{ mW}) + 5 \text{ dBi}$ . This would yield an EIRP of 4.6 Watts or ERP of 2.81 W. This would exceed the allowed 1.5 W under 1.1091 and would therefore require RF exposure evaluation (measurements). Clear understanding of RF exposure, power output, etc. must be shown. Also addition of the antenna gain (or net gain) for this device should be added to grant notes.

*(Original response) The 5 dBd antenna is the rooftop mounted antenna that will not have RF exposure issues as it is fixed installation. The inbuilding/ tunnel radiators are "leaky coax" with 60dB coupling. Assuming operation at the highest composite output power of 21dBm the radiating elements are emitting at a -29dBm level, which is well below accepted RF hazard levels.*

*Should the 21 dbm level referenced above in fact be 31 dBm?*

**R. The 31 dBm is correct.**

5) (Number 11 in original comments) Current RF exposure shows 25.7 dBm while report shows 22.6. Why the difference? Also note concern with 9) & 10) above which affects this issue.

*(Original response) See response to Question 13.*

**R.**

6) (Number 12 in original comments) I've not looked at the schematics in detail, but they should be separated appropriately so only the downlink path is included with this application.

*(Original Response) The Schematics files as supplied by the customer are locked from editing.*

*Please ask for applicant to provide. Schematics must cover only the device covered by the application.*

**R. Schematics have been provided per requirements. It is not possible to remove pages/drawings.**

6) (Number 13 in original comments) The manual states that a 15cm separation is required. Remember that the FCC MANDATES mobile devices must maintain a minimum 20cm separation otherwise they are classified as portable for rf exposure regardless of the type device. The manual must be changed to reflect this.

*(Original response) Unit is fixed, not mobile, for the uplink roof antenna. The inter-building/tunnel antenna is a leaky coax with 60 dB coupling.*

*Thus the mobile separation distance requirement is not applicable. We would appreciate guidance as to properly addressing separation distance for a fixed installation.*

*Please note that the FCC refers to “Portable”, “Mobile” and “Fixed” with respect to RF exposure guidelines. The terms, from the FCC point of view are NOT intended to refer to the ability to physically move the device or whether or not the device is intended to be moved to different physical locations during use.*

*If a device will be used within 20 cm of the general public it is considered portable, regardless of whether or not the user actually moved the device or carries it with them.*

*If a device is used at a distance of greater than 20cm and less than 2m it is considered “mobile” again, the device does not actually have to be physically mobile.*

*In general, if a device will be used at a distance greater than 2 m from the general public. It is considered fixed.*

*Having a distance of 15 cm in the user manual would classify this device as a portable device and SAR testing would be required. The MPE distance must be accurately determined. If the MPE distance is less than 20 cm, then the device should still be classified as mobile and the 20 cm distance placed in the manual and the unit installed in such a manner to maintain that separation distance.*

*The same is true of the MPE distance is greater than 20cm. The distance should be placed in the user manual and the device installed accordingly.*

*It appears from preliminary information that this device will require somewhere around 51 cm or more. Also since this operates with multiple antennas, for units operating with multiple indoor configurations, exposure from each antenna location must be addressed, including co-location issues in the manual. Additionally, we are only allowed to approve known operating configurations and exposure conditions only for these.*

*Information regarding the operating configurations/installations is necessary to document this.*

***Bottom line,***

***Please provide appropriate MPE calculations using correct RF transmit power and antenna gains (based on an aggregate power into each antenna) and place that distance ( or greater) in the user manual under RF exposure.***

***Note that if the distance calculates to less than 20cm, the manual must indicate a 20 cm distance (or SAR testing will be required) and a calculation showing the power density at 20 cm will be required.***

***Please be sure to clearly document RF transmit power and antenna gains for both units (UL & DL)***

***R. RF Exposure reports have been revised. Please see “50289DL RF Exposure Info Rev 1”. Also see “50289UL RF Exposure Info Rev 1” which has been uploaded to the Uplink application.***