October 19, 2004
RE: Cirronet
FCC ID: HSW-2450
After a review of the submitted information, I have a few comments on the above referenced Application.

Administrative Issues:

1) Please confirm that confidentiality it not requested on the block diagram. If it is, please adjust the confidentiality letter.

The confidentiality request has been revised to include the block diagrams

2) It appears that a modular approval is desired for this device. When modular approval is requested, a cover letter addressing each of the modular issues in the FCC guidance document must be provided. Please provide a cover letter addressing each of the modular requirements.

A Modular Approval Letter has been provided.

3) In the RF exposure exhibit, please:
a) denote and group all mobile antennas together and all fixed antennas together. The exhibit should clearly denote which antennas are for which.

The RF Exposure Exhibit has been changed to correct this item.

b) Please denote which antennas were tested in this application.

That information is listed under the Power Output Section. The information has been bolded to better identify the antennas used for calculation.

4) The RF exposure exhibit lists frequencies from 2400.9 – 2476.2. However the 731 form lists 2401.69 – 2469.89, the test report lists 2400.9 – 2476.85, and the theory of operation cites 2401.6896 – 2469.888. What are the lowest and highest channels? All exhibits should be consistent. Please correct as necessary.

These have all been corrected to reflect the range of 2.401056 – 2.474496 GHz. Frequencies listed in test data may vary slightly based upon Spectrum Analyzer Settings. Original Data for conducted Power was taken at 2.47685 GHz, but was later scaled back based upon Band edge results. Final frequency is 2.474496 GHz. 2.47685 is still submitted as a representative output power, as it is consistent with low, low mid, high mid and High Channels.

5) The RF exposure exhibit mentions 2.0 cm for mobile applications. Note that distance should not be calculated for mobile applications as this is assumed to be 20 cm by definition. Please correct.

This has been corrected.

6) All point to point antennas should be listed in the users manual to the installer in connection with the first paragraph shown regarding point to point applications. This should likely include the 15 dBi Yagi, 18 dBi parabolic dish antennas, and the 14 dBi corner reflector (which may not apply see below) as well.

      See new manual attached.

7) Any EIRP that exceeds 36 dBi (maximum conducted power + dBi of antenna) may only be used for point to point applications. Please explain the use of the corner reflector. The EIRP with the corner reflector is 36.5 dBi, which is not allowed if it may be used for applications other than point to point without further power reduction for installation of this antennas (i.e. maximum power of 150 mW for point to multipoint installations). If power is reduced by the installer for these configurations, the device must be professionally installed, the users manual clearly explain what is to be done and how is it done, and any ability to increase/decrease the output power via software must meet with the requirements of 15.15(b) Please explain.

      The WIT2450 has three power levels.

      10dBm – Optional for Europe
      18dBm – Default setting for Multipoint operation
      23dBm – Point to Point (with low gain antennas or for use in other countries)

      A cover letter will be provided on the installation instructions manual indicating that power level commands cannot be supplied to the end user.

8) The users manual should clearly list all approved antennas and RF exposure conditions for all antennas (i.e. 20 cm, 52 cm, etc). This information should be simple and easy to understand (i.e. a table grouping by fixed/mobile and listing appropriate distances).

      See new manual attached.

9) The manual appears to be missing information of 15.21. Please update

      See new manual attached, page 3.

10) The fixed antenna statement appears to be missing the 18 and 24 dBi Andrews parabolic dish antennas (and possibly others). Please update

      See new manual attached.

11) The fixed and mobile statements should also include information to inform the installer or user "and must not be co-located or operating in conjunction with any other antenna or transmitter." Please update

      See new manual attached.

12) There are several other antennas which are given, which do not appear in the manual, but should likely be listed under the mobile antennas shown. Please update.

      See new manual attached.

13) Please explain why the users manual cites 2 meters, while the RF exposure is only around 52 cm for fixed antennas.

      Cirronet wishes to provide a conservative and consistent default of 2 meters in their manuals.

14) Test configuration photographs show some antennas placed directly on the table top. Antennas such as the yagi and corner reflector should not be placed directly on the table top. They should be insulated by foam or cardboard so that they are at least 1 to 2" above the table top. Please review and correct as necessary.

      Test results were spot checked using foam and found to provide no deviation in data.

15) The users manual should provide more guidance and instruction to the installers/OEM integrators to instruct the integrator how to properly label the device and specific information to include in the users manual. Example information for other filings may be found on the following page. Please add additional information which covers this information to the users manual.

      See section 7.8 in new manual provided.

16) The information regarding antenna connections states "reverse-sex TNC or N connector". Please clarify if this is in reference to a reverse N or standard N connector. Standard connectors are only allowed if professional installation if justified in the application.\

      Reverse N

17) FYI…For future power measurements of this type, please ensure that the signal is adequately below the top reference line.

      Noted.

18) Antenna conducted measurements for spurious should be measured using RBW = 100kHz, VBW > RBW per FCC guidelines. Please correct.

      Corrected and uploaded.

19) Please explain why conducted spurs only appears in antenna conducted plot 4g, and not on the other channels.

      Antenna conducted spurs are more accurately depicted using the spectrum analyzer settings noted above.

20) In table 4a and 4e, did 7203 MHz use the high pass filter or measured at 1 meter? Please review/correct as necessary.

      Measured at 1 meter. Report corrected to indicate 1 to 3 meter conversion.

21) 7428 MHz in Table 4d does not appear to be denoted properly.

      Table corrected.

22) Please comment on the RBW and VBW settings used to take average radiated measurements.

These were calculated from duty cycle corrections, which has been oulined in the report.

23) The peak plots appear to show that the signal was pulsed during test. Additionally, there appears
to be a large difference between peak and average measurements suggesting that inappropriate average settings were used. Note that If the TX was pulsed during testing, then average measurements of RBW=1 MHz, VBW = 10 Hz will likely not be applicable. Please provide a plot of
a single frequency with a 0 Hz span to show the duty cycle relationship that the TX had during testing. Please provide cursor measurements to show TXon time, TXoff time, and TXperiod. Note for average measurements to be valid, the VBW must be > 1/Ton time, but preferably > 4* (1/Ton)
time. Call to discuss if necessary. Note that the RF exposure information also suggests that maybe a 3 dB average factor may be applied (20 log 0.7).

The discrepancy between peak and average is accounted for above. Cirronet indicates that the signal was not pulsed during test.

24) Please confirm the Results of the fundamental in table 4e. The comma appears to suggest 480k
uV/m. Is this 4808k or 480k uV/m?

4808k uV/m.
The test report has been corrected for this typo.

25) The number of hopping channels can not adequately be determined from the plot provided. If necessary, please use different RBW and divide the band into 3 traces (i.e. 2.400-2428, 2428-2456, 2456-2484). Given the 20 dB bandwidth of 528 kHz, a RBW of 100 kHz may work better.

New data has been provided following the above guidelines.

26) Test report states 87 hopping channels, while the theory of operation cites 75. This is not consistent.

This has been corrected in the theory of operation, and all references, to 86 hopping channels.

27) The theory of operation states the output power is 18 dBm maximum, while the test report shows
much higher than this (22.5 dBm). All information is expected to be consistent. Please explain and
correct as necessary.

The theory of operation has been corrected to 23 dBm max power output. 18dBm is the default setting, as addressed earlier.

28) The theory of operation states the 20 dB bandwidth is about 880 kHz, while the test report shows538 kHz. All information is expected to be consistent. Please explain and correct as necessary.

Theory of operation has been corrected to state 864 kHz. Actual values tested show 870 kHz 20 dB Bandwidth. The report has been corrected to show High , Mid and Low channel with correct analyzer settings.

29) The test data does not show the carrier separation as given in 15.247(a)(1). Please measure and
provide.

This has been added.

30) It does not appear that the remainder of the report was provided. The last page is the paragraph of
2.16. Please correct.

Corrected.

31) Please provide test data to support that each frequency is used equally on the average.

Cirronet has indicated that they cannot provide data at full transmit time due to inability of the software to transmit for 17ms without being linked and downloading large data packets. They will attempt to provide a percentage of single channel time to illustrate. A copy of their response is as follows:

DTS Dwell Time
Pseudo-random hopping pattern in a DTS

The maximum system dwell time at any frequency is 30mS.The base transmits for a maximum of 17mS every 30mS. The base is set as wb1. The remote total response time for this maximum transmit time from the base is a maximum of 13mS every 30mS at the same frequency as the base. There is some guard time extra to this 30mS. Ignoring the guard time, every 30 seconds the system could have 1000 hops, 30/.03. Out of this 1000 hops each channel is exercised 11.6 times, 1000/86. Therefore, ignoring guard band time, the base could transmit for 0.017S x 11.6 =0.1972 seconds per frequency per 30 seconds. The total number of remotes in the system could transmit for 0.013x 11.6 = 0.151 seconds per frequency per 30 seconds.

I think this is how you should present it. This is how we have always approached this issue. It is very difficult to set the base to transmit for 17mS if it is not linked, downloading large data packets.

32) Please provide a sample hop table showing that the device complies with the pseudo-random hopping requirement.

Provided under separate download.

33) Please explain if the TX is always hopping regardless of data or not. How does the device handle
short intermittent bursts of data.

According to Cirronet, the tx is always hopping, due to the unit always exchanging network sync info. Under short intermittent bursts, the transmission stops and then resumes upon the next channel in the hop sequence.

34) Information regarding 2.1033(b)(10) has not been provided. Please provide.

This statement is forthcoming.

Sincerely,

Louis A. Feudi