

From: Timco Engineering [tei@timcoengr.com]
Sent: Wednesday, May 23, 2007 2:39 PM
To: Rita Cai
Subject: FW: SPAM- FW: TIMCO-TCB/Request for additional info - ZHONE TECHNOLOGIES, INC. - FCC ID: TBA

-----Original Message-----

From: Juan Castaneda [mailto:JUanc@zhone.com]
Sent: Wednesday, May 23, 2007 1:54 PM
To: tei@timcoengr.com
Cc: Charles Coston; Keith Nauman; Peter Walsh
Subject: Re: SPAM- FW: TIMCO-TCB/Request for additional info - ZHONE TECHNOLOGIES, INC. - FCC ID: TBA

JOB: 910AUT7
FCC ID: TBA - Zhone Technologies, INC.
APPLICANT: Chuck Coston

Zhone Responses to Timco TCB Review of SkyZhone WiFi Base Station FCC Part 15 Certification

----- BEGIN -----

1. User's manual page 13/52 refers to MIMO. For MIMO operation, please explain in the Operational description whether the signals have fixed phase relationship (i.e., same signal), or if beam-forming is used. Please verify that the current system does not use any beam-forming features. If beam-forming is used, the antenna gain in dBi must include an additional array gain of $10 \log(N)$, where N is the number of antennas. If the phase relationship between the signals is independently varying, an additional array gain is not necessary. For beam forming capability, please see requirements of 15.247(c)(2). Please provide any appropriate description of diversity and coding mechanisms (e.g. spatial multiplexing or time-space code multiplexing) which may have impacted on the selection of test sequence and procedures. Please answer the following questions: Can the device transmit on just one chain? Can different frequencies transmit on different chains? Is this a (2x3) MIMO (2 Tx and 3 Rx)?

Response: The SkyZhone 1424 Wi-Fi Access Point uses a 2x2 MIMO chipset. In transmit mode, the same two antennas are always used, and the transmit signals have a fixed phase relationship with one another. Beam-forming is not used. In 802.11g operating modes, the device transmits using one or two chains, with the same frequency on both chains. In 802.11b operating mode, a single transmit chain is used with only one antenna active.

2. The device contains two transmitting antennas for each transmitter. Indicate whether each transmitter can operate with either one of the antennas alone as well as with both antennas simultaneously. If both modes are possible (e.g., transmission at 2.4 GHz with single or dual signals) both modes have to be tested. Please clarify whether these modes were investigated for all tests: line conducted, conducted spurious, radiated emissions in restricted band, etc.

Response: In 802.11b mode only the center antenna is used. In 802.11g mode two transmitting antennas are active. Preliminary radiated emissions measurements were made in both modes with the final reported values presented for 802.11g mode because of its associated higher aggregate power. All other direct (conducted) measurements were made in both modes.

3. Jabil test report – Output power and Power Spectral Density: Please clarify whether the test results are for single or dual transmissions mode. Were tests performed using a combiner for dual transmission mode (i.e. cables losses accounted for?) Was the aggregated power across transmitters calculated based on the summation in linear power units across each transmitter?

Response: Output power and PSD measurements in the IEEE 801.11b mode were made in the single transmission mode, i.e. with a single antenna. Output power and PSD measurements in the IEEE 801.11g mode were made in the dual transmission mode, i.e. with two antennas. The measurements were made directly at the antenna terminals with cable loss and the loss of a 10 dB pad taken into account. Signal power results were summed in linear terms to derive the total aggregate power all active transmitting antennas.

4. Jabil test report - page 31/48: The output power was measured at 239mW, whereas the power requested on Form 731 and listed in TEI's test report is 162mW. This file "Ayecom_WL5018B.pdf" lists a maximum output power of ~71mW. Please explain or revise power values listed throughout the documentation for consistency. Also, please clarify the method used for measuring the output power. Particularly, you can reference the method according to FCC document KDB 558074.

Response: The system power output is greater than the output power of the radio module because the system includes an internal amplifier. The test method used to measure the

output power was set out in KDB Publication No. 558074, Power Output Option 2, Method # 3. Because different test methods can yield different results, it is suggested that the higher output power recorded by Jabil's lab be listed on the Form 731. This level is well below the FCC limit of 1 watt.

5. Jabil test report: Section 5.2. Spurious radiated emissions in restricted band: Per 15.35(b), please show that spurious emissions at the band-edge above 2483.5MHz comply with the peak limit as well. Compliance with the average limit is not sufficient unless the measured peak level is below the avg. limit. Please revise.

Response: Preliminary measurements showed levels well below the peak limit (20 dB above the Average Limit) in the restricted band edge above the 2483.5 MHz. The test report will be revised to add this note and re-issued as FCCIR-ZHONE-04-18-07d (uploaded to your web site).

6. Part 15.203: This devices uses type N connectors. Professional installation is required. Please include a warning statement about this in a conspicuous location of the manual.

Response: The nature of the product requires professional installation with coordination with the telephone company. The installation guide identifies the audience as, "This guide is intended for use by installation technicians..." The user manual statements have been amended to add this statement but clearly the unit is not a consumer type product and must be professionally installed. SkyZhone_Install_052307 has been uploaded to your web site.

----- END -----

Rita Choi wrote:

Dear Juan,

TCB completed the technical review and has following questions for Zhone.

Please contact me if you have questions.

Kind Regards

Rita

From: Bruno Clavier [<mailto:bruno@timcoengr.com>]

Sent: Tuesday, May 15, 2007 3:19 PM

To: Rita Choi

Subject: TIMCO-TCB/Request for additional info - ZHONE TECHNOLOGIES, INC. - FCC
ID: TBA

Importance: High

TIMCO ENGINEERING INC.

TCB &

FCB

849 NW State Road 45

FCC

Approvals

Newberry, Florida 32669

Industry Canada

Approvals

<http://www.timcoengr.com>

Notified Body for

Europe

888.472.2424 F 352.472.2030 email: tei@timcoengr.com

5/15/2007

MR. CHUCK COSTON

ZHONE TECHNOLOGIES, INC.

727-530-8326

CCOSTON@ZHONE.COM

SUBJECT: ZHONE TECHNOLOGIES, INC. - FCC ID: TBA

REFERENCE: JOB 910AUT7

Dear MR. COSTON:

This application is on hold until these questions are resolved. Please answer all question(s) together and only respond to tei@timcoengr.com. Any other method will cause **unnecessary delay**.

DO NOT HIT REPLY! Your response should be sent **ONLY** to tei@timcoengr.com. Any additional exhibits that are sent should be **UPLOADED** at our web site – please do not attach files to your email. Responses should also contain the job number, applicant name and FCC ID of the device. If an acceptable response is not received within 2 weeks the job will be closed & there will be additional charges to reopen.

Answer all questions. Be sure to number or identify your answer with the corresponding question. If you are referring to another document, be sure to give the page number and paragraph reference where your response can be found.

Based upon our review of this application we have the following questions:

1. User' manual page 13/52 refers to MIMO. For MIMO operation, please explain in the Operational description whether the signals have fixed phase relationship (i.e., same signal), or if beam-forming is used. Please verify that the current system does not use any beam-forming features. If beam-forming is used, the antenna gain in dBi must include an additional array gain of $10 \log(N)$, where N is the number of antennas. If the phase relationship between the signals is independently varying, an additional array gain is not necessary. For beam forming capability, please see requirements of 15.247(c)(2). Please provide any appropriate description of diversity and coding mechanisms (e.g. spatial multiplexing or time-space code multiplexing) which may have impacted on the selection of test sequence and procedures. Please answer the following questions: Can the device transmit on just one chain? Can different frequencies transmit on different chains? Is this a (2x3) MIMO (2 Tx and 3 Rx)?
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Sincerely,
Bruno Clavier

No virus found in this incoming message.

Checked by AVG Free Edition.

Version: 7.5.467 / Virus Database: 269.7.1/805 - Release Date: 5/15/2007 10:47 AM

No virus found in this outgoing message.

Checked by AVG Free Edition.

Version: 7.5.467 / Virus Database: 269.7.1/805 - Release Date: 5/15/2007 10:47 AM

No virus found in this incoming message.

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Version: 7.5.467 / Virus Database: 269.7.6/815 - Release Date: 5/22/2007 3:49 PM