



Malibu Networks, Inc.  
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Suite 250  
El Dorado Hills, CA 95762

10 July 2002

RE: Malibu Networks  
FCC ID: QQQ-AM241

Mr. Johnson,

On behalf of Malibu Networks I am pleased to provide you with the following answers to your inquiries. Should you have any further questions or require and clarification on any of these issues, please do not hesitate to contact me at [david@waitt.us](mailto:david@waitt.us).

Your questions are addressed below

Best Regards,  
David Waitt

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1) Please upload an exhibit for the operational description of the device.

MALIBU: Please refer to the "Detailed product information" section in the test report in addition to the "AirMAX CPE – BTS Overview" document uploaded with this reply.

Simply stated, the device is a "standard", previously certified, IEEE 802.11 PCMCIA card transceiver and a single board computer (both purchased components) housed in a weatherproof enclosure that is connected to a omni-directional or directional antenna to provide an IEEE 802.11 data link. The units operates with a maximum transmit power of approximately 100mw in the unlicensed Part 15, 2.4 GHz ISM band and utilizes Direct Sequence Spread Spectrum.

2) Two different models appear to be covered by this application, while only one unit was tested. Please provide detailed information regarding the differences between these models.

MALIBU: There is no significant difference between the hardware in each type of unit. Both units use the same single board computer, the same "Off the Shelf" Cisco Systems IEEE 802.11 radio module (AIR-LMC-350) that Cisco certified under FCC ID: LDK 102040 and the same enclosure. The only differences between the two units (CPE and BTS) are:

- The firmware contained in the compact flash card and the size of the compact flash card
- The amount of RAM on the single board computer
- The antenna that is connected to the unit. The BTS will typically NOT use the 19dBi panel antenna.

Since the CPE and the BTS have two different Malibu Networks model numbers, both were included in the application.

3) Please upload an exhibit for the external photographs of the device (please include photographs of the antennas as part of this).

MALIBU: External pictures have been uploaded with this reply

4) Please note that section 4(a) of the 731 form should list either DSS or DTS as appropriate for this type of product.

MALIBU: The equipment is DSS.

5) The test report mentions that there are 2 antenna (12 dBi Omni and 19 dBi panel antenna). The report also mentions that lower gain antennas may be used. Please provide a list of all planned antenna's including type, gain, and antenna connector style of each. Please note that the manual only mentions 4 specific antennas.

MALIBU: Malibu intends on using four different antennas in the implementation of the system. They are:

MaxRad 8 dBi omni - base model number: MFB24008 (down-tilt as required at particular installation)

NCG Company 12 dBi omni (with 3 degree down-tilt) - model number: GP-24-3

ARC Wireless 8.5 dBi panel - model number – panel 8.5

ARC Wireless 19 dBi panel - model number – panel 19

Given these intended antennas, the highest gain of each antenna type was tested with the unit. The antenna connector of each is an 'N' connector. They will be connected to the BSE or CPE unit via a coax cable. The data sheets on all of the antennae were uploaded with the original application submission.

6) Please provide a block diagram of the system as tested for radiated emissions. What was the cable lengths between the EUT and the antenna? Is this length always set, or is it variable?

MALIBU: The length of the cable used for the radiated emissions tests between the unit under test and the antenna was 4ft. This same length was used for all of the tests and the cable used during the tests is the type that will be shipped with the units. As this is the only cable that will be shipped with the units, the length will be constant throughout the installations. The radiated emissions test setup in the test report has been modified to show the antenna in the setup.

7) Currently TCB's are only authorize mobile classification spread spectrum transmitters in the 2.4 GHz band with both a peak conducted and peak radiated (EIRP) output power not exceeding 200 mW (see attached exclusion list). The EIRP of this transmitter with the + 12 dBi Omni & +19 dBi Panel antenna is greater than 200 mW. The FCC is currently working to change or eliminate many of the restrictions on TCB's and the latest information we have from the FCC is that they hope to publish this information shortly (see attached email regarding status of this). Options available for handling this application currently are:

We can go forth and review the application in completion (considering the antenna's as mobile), but will have to wait until the FCC releases the changed exclusion list before we issue the grant due to the RF exposure limitations currently imposed on TCB's. If certain configurations that exceed the 200 mW EIRP limitation can be considered as fixed instead of mobile (distance of 2 meters between antenna and user instead of 20 cm), then we may be able to go ahead with the application now with adjustments to the MPE calculations and users manual to cover both mobile and fixed installations. If this route is selected, it will affect the suggestive use of certain MPE exhibits and the users manual information given here. Also note that if lower gain antenna's are to be used, then distinguishing information must be provided in the users manual for all types of antennas used (see #5 above as well)

If time source based averaging can be applied this may be an additional option for still qualifying under mobile use. However this will depend on the worse case duty cycles inherent to this device and may be complicated to determine.

Resubmit the application to the FCC.

MALIBU: We will reclassify the device as a "Fixed" device. The modified RF exposure statement appears in the revised manual on page iii

8) Please provide information to show compliance with the antenna requirements of 15.203. Professional installation must be used if standard connectors are applied (i.e. use of a standard connector is not allowed if professional installation "may" be required or a possible option). Please note that professional installation will require a cover letter addressing the following 3 points:

Application (or intended use) of the device

Installation requirements

Method of marketing the device.

MALIBU: Recall that these devices will be sold to Internet service providers and corporate IT departments wishing to provide wireless Internet access to their customers. These units will not be installed or configured by the end user of the system. The systems will be installed, configured and maintained by professionals. In no instance will the end user of the system install the system or have access to the configuration area of the software. Access to the configuration of the system is controlled by a user name and password combination. A letter addressing this point has been uploaded with this reply as well as some pictures of typical installations (professional installation letter here.)

**Question 9 & 10 as follows are related depending on how the device is classified**

9) The label on the EUT displays both the FCC ID as well as the FCC Logo. The use of the FCC logo and the phrase "for home or office use" (for products authorized under Part 15) is reserved for products authorized using a Declaration of Conformity route to compliance. Has this device also been properly tested (as given by ANSI C63.4) as a class B computer peripheral and a test report issued by an accredited test facility? If the device has met with these requirements, also please provide the DoC Statements required by 2.1077 which should be contained on a single page included in the manual or with the product and adjust the labeling information in the users manual to the information given in 15.105(b).

MALIBU: The device has been tested to Class B specifications. A DOC has been prepared and is on file at Malibu Systems. The standard statement of 15.105 has been added to the manual. With regard to 2.1077, this appears to only be applicable to equipment that is imported in to the country, Thus, the DOC information that 2.1077 is stating must be in the manual is not applicable. The responsible party will simply be the company listed on the FCC grant.

10) The users manual states that the device has met with Class A emissions. However the detailed product information shows residential/SOHO at one point. If the device has met with Class A emissions only, then the label should have the FCC logo and the phrase "for home or office use" removed. Also, a justification as to Class A use only should accompany the application that explains why the device will not be used in a residential area.

MALIBU: The reference to being tested as Class A device is an error. The unit has been tested to and passed the Class B requirements. The reference to Class A has been removed from the manual

11) The test report states "Schematics, block diagrams, and algorithm descriptions subject to enclosed confidentiality statement". The confidentiality letter only lists schematics, block diagrams, and parts list. Please clarify which exhibits are to be held confidential and correct the confidentiality letter if necessary. Please note that the test report may not be held confidential and that any other information contained within the test report that might be considered confidential (i.e. detailed product description) should be removed from the test report and provided in a separate exhibit.

MALIBU: The exhibits to be held confidential are indeed:

Schematics

Parts lists

Block diagrams.

The reference to algorithms on the footer of the test report is an error since no algorithms were uploaded with this application. The footer has been removed from the report to eliminate any discrepancies.

12) The test methodology (page 8 of 39) given in the test report states that the power output was measured with a power meter, however the data given on pages 12-14 appear to be from a spectrum analyzers. Please comment. Note: All of the power output results match the information contained in the plots, except 1 which is off slightly.

MALIBU: The reference to using a power meter to make this measurement was an error. It has been corrected in the revised report. The incorrect information in the summary table has been corrected as well.

13) The power output tested should be performed with the RBW set to greater than the 6 dB bandwidth of the emissions. Since this is not possible on most spectrum analyzers, either a peak power meter should be used, or the power integration function as contained in most modern spectrum analyzers to measure the output power. This will likely affect the power measurements results (test data, RF exposure, 731 form, etc.).

MALIBU: This measurement has been repeated using the same recommended measurement method as is used for UNII devices. RBW=1MHz, VBW=100kHz, and the measurement was integrated over the 6dB bandwidth of the device (11.2 MHz). This measurement was made on the low, middle and high channel for power settings of +17 and +20 dBm. The plots are included in the revised report that was uploaded with this reply. The summary results table in the report has also been modified.

14) From antenna conducted test data provided it appears that spurious emissions may occur within the restricted bands 1660- 1710, 1718.8-1722.2 which could be higher than the harmonics measured. However the radiated test data does not show any measurements around these frequencies. Please comment.

MALIBU: Emissions within this band were re-measured in a radiated test setup against the restricted band emission limits. The data is included in this reply as an appendix. None of the emissions exceeded the restricted band limit.

15) Radiated emissions at 7232 MHz (run 1a) do fall in a restricted band. The limit applied is not correct and the reading appears over the limit. Also the note given on this table does not seem applicable to this measurement. Please explain.

MALIBU: The emissions in question at 7232.19 MHz does not actually fall within a restricted band. The restricted band is 7250.00 to 7750.00MHz. The emission is outside of the restricted band, the limit applied is therefore correct.

The note "Noise Floor Measurement" simply indicates that in fact there was no visible emission above the noise floor and that the level entered in the table is the level of the noise floor, not the level of any discrete emission.

16) The plot for the bandedge for the 19 dBi panel antenna at 2.390 GHz (page 37 of 39), appears to show the marker measurement made right at the bandedge. Please note that this measurement should be made to the highest emission in the restricted band region outside the bandedge. It appears that there may be 2 spurious emissions higher than the measurement made at the bandedge. Please comment.

MALIBU: This test was repeated to ensure compliance. The new results are included in the revised test report uploaded with this reply. The unit does comply with the restricted band emissions requirements. The previous data for the LOW edge measurement with the 19dBi panel has been removed from the report and the new data inserted. There were also some errors in the Summary table in the report that have been corrected.

17) Since power output levels will affect compliance of the unit with the FCC's rules, explain what precautions are built into the system to keep the end user from adjusting the power output levels. For example adjustment of this feature is only allowed by passwords used by the installers, etc. (reference 15.15(b)).

MALIBU: Only the installers of the system will have the ability to adjust the power levels. The power levels will be set at the time of installation and are not able to be changed by the end user of the system. Indeed, access to the configuration menus for the units are "User name" and "password" protected.

18) Please add information to the users manual that easily shows each antenna and its associated maximum power value settings to be used. This may be done through an installer's worksheet, or a simple matrix showing all antennas.

MALIBU: The information has been added to the manual and a modified manual has been uploaded with this response. A table outlining the correct power setting vs. antenna has been added to the manual. The table is contained on page 30 of the manual.



## EMC Test Data

Client:	David Waitt Consulting	Job Number:	J47530
Model:	Malibu Project	T-Log Number:	T47221
		Proj Eng:	Chris Byleckie
Contact:	David Waitt Consulting		
Spec:	802.11b	Class:	N/A

### Radiated Emissions

#### Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 7/10/2002

Config. Used: 1

Test Engineer: Chris Byleckie

Config Change:

Test Location: SVOATS #4

EUT Voltage: 120V/60Hz

#### General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. All remote support equipment was located approximately 30 meters from the EUT with all I/O connections running on top of the groundplane or routed in overhead in the GR-1089 test configuration.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected to allow for the external attenuators used.

#### Ambient Conditions:

Temperature: 33°C

Rel. Humidity: 36%

#### Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, Spurious Emissions Restricted Bands	FCC Part 15.209 / 15.247(c)	Pass	19 dBi Patch
2	RE, Spurious Emissions Restricted Bands	FCC Part 15.209 / 15.247(c)	Pass	12 dBi Omni

#### Modifications Made During Testing:

No modifications were made to the EUT during testing

#### Deviations From The Standard

No deviations were made from the requirements of the standard.

**Run #1: Radiated Spurious Emissions, 1660 - 1723MHz.****19dBi patch****Pout = 17dBm**

Frequency	Level	Pol	15.209 / 15.247	Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters

**Ch 1**

1663.752	61.6	V	74.0	-12.4	Pk	0	1.0
1663.670	48.8	V	54.0	-5.2	Avg	0	1.0
1663.810	61.3	H	74.0	-12.7	Pk	0	1.0
1663.449	48.8	H	54.0	-5.2	Avg	0	1.0

**Ch 6**

1700.064	62.1	V	74.0	-11.9	Pk	0	1.0
1699.656	49.0	V	54.0	-5.0	Avg	0	1.0
1701.117	61.8	H	74.0	-12.2	Pk	0	0.0
1700.553	49.0	H	54.0	-5.0	Avg	0	0.0

**Ch 11**

1738.194	62.3	V	74.0	-11.7	Pk	0	0.0
1736.522	49.3	V	54.0	-4.7	Avg	0	0.0
1737.362	62.3	V	74.0	-11.7	Pk	0	0.0
1737.743	49.3	V	54.0	-4.7	Avg	0	0.0

**Run #2: Radiated Spurious Emissions, 1660 - 1723MHz.****Pout = 20 dBm****12 dBi Omni**

Frequency	Level	Pol	15.209 / 15.247	Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters

**Ch 1**

1663.752	61.6	H	74.0	-12.4	Pk	0	0.0
1663.670	48.8	H	54.0	-5.2	Avg	0	0.0
1663.810	61.5	V	74.0	-12.5	Pk	0	0.0
1663.449	48.8	V	54.0	-5.2	Avg	0	0.0

**Ch 6**

1700.064	62.1	V	74.0	-11.9	Pk	0	1.0
1699.656	49.0	V	54.0	-5.0	Avg	0	1.0
1701.117	61.8	H	74.0	-12.2	Pk	0	0.0
1700.553	49.0	H	54.0	-5.0	Avg	0	0.0

**Ch 11**

1738.194	62.4	H	74.0	-11.6	Pk	0	0.0
1736.522	49.3	H	54.0	-4.7	Avg	0	0.0
1737.362	62.5	V	74.0	-11.5	Pk	0	0.0
1737.743	49.3	V	54.0	-4.7	Avg	0	0.0