



To: Federal Communications Commission
445 12th Street SW
Washington, DC 20554

Subject: Experimental License / Public Exhibit I

Date: 1 September 2004

Gentlemen,

An experimental license is being sought for the development of a consumer data communications system. It will be necessary to perform field range and performance testing on equipment yet to be certified from time to time to verify performance in actual operating conditions. This document addresses some of the Commissions concerns regarding Experimental licenses

If additional information / clarification is required, please do not hesitate to contact me.

Regards,

A handwritten signature in black ink, appearing to read "David Waitt", with a stylized flourish at the end.

David Waitt
Consultant Representing MetroFi
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1. Complete program of research and experimentation proposal including description of equipment and theory of operation:

The main objective of the proposal is to demonstrate the feasibility of the MetroFi wireless network system. The network will rely on standards based IEEE 802.11 A/B (Wi-Fi) technology.

The proposed experiment will be utilizing pre-certified, standards based IEEE 802.11 A, 5GHz and 802.11 B, 2.4 GHz radios.

2. Specific Objectives sought to be accomplished:

The main objective of the proposal is to demonstrate the feasibility of the MetroFi wireless 2.4GHz / 5 GHz network for delivering a broadband data network to customers using standards based technology.

3. How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion, or utilization of the radio art, or is along the line not already investigated:

MetroFi proposes to deliver high quality; low cost, wireless connectivity using standards based 802.11 (Wi-Fi) technology. The state-of-the-art equipment for the proposed experiment is pre-certified. The company firmly believes that a 3rd access solution based on wireless access to compete with DSL and cable modem service will be of great benefit to consumers. We believe that MetroFi will deliver wireless access to customers with a high quality, low cost service that is currently not available of through conventional wireline (i.e., cable modem or DSL), or other wireless means.

Location Of Test Radios

The proposed system would be used at various locations through-out the Silicon Valley, California area. The units will all be in “Temporary Fixed “ location within an 80km radius of Mountain View California. This system would not be an aeronautical hazard, as it would be used on existing pole tops or on the top of existing buildings, with installations less than 6 meters above the roof top.

Proposed Certification Procedure

Multiple potential vendors of the radios that will make up the network infrastructure will be evaluated during this experiment. Each vendor will perform FCC certification pre-testing prior to delivering units to MetroFi for evaluation and experimentation. Once it is apparent that the units operate in the network as required and no additional significant modification to the units are required, MetroFi will notify the vendors to move forward with the official FCC Certification process. The proposed transmitters will be located within an 80 km radius of Mountain View, on existing pole tops and existing building tops below 6 meters, hence the antennas will not be an aeronautical hazard.

Technical Summary 2.4 GHz (IEEE802.11 B)

Modulation: DSSS
Occupied Bandwidth: 22 MHz
Necessary Bandwidth: 22 MHz
Emission Designator: 22MG7D
Frequency Tolerance: 25 ppm
Channelization: 22 MHz , Channels 1 -11
Center Frequency Ch 1 = 2.412 GHz
Ch 11 = 2.462 GHz

Pre-Certified 2.4 GHz (DSS) Equipment:

Vendor	(#1)	(#2)
Transmit power (max)	23 dBm	20 dBm
Maximum antenna gain	9 dBi, omni	5 dBi, omni
EIRP / ERP	1585 mW / 966 mW	316mW / 192.75 mW

Technical Summary 5.8 GHz (IEEE 802.11 A)

Modulation: OFDM
Occupied Bandwidth: 22 MHz
Necessary Bandwidth: 18 MHz
Emission Designator: 18MW7D
Frequency Tolerance: 25 ppm
Channelization: 20MHz, 4 Channels
Center Frequencies Ch 149 = 5.745 GHz
Ch 153 = 5.765 GHz
Ch 157 = 5.785 GHz
Ch 161 = 5.805 GHz

Pre-Certified 5.8 GHz (UNII) Equipment:

Vendor	(#1)	(#2)
Transmit power	27 dBm	18 dBm
Antenna info	12dBi 70° sector/20° vertical Right hand circular polarized	12 dBi 60° sector/18° vertical dual slant polarized
EIRP / ERP	7.9 W / 4.815 W	1 W / .609 W
Antenna info	16 dBi Panel 60° horizontal/20° vertical RHCP	
EIRP / ERP	19.9 W / 12.129 W	
Antenna info		
EIRP / ERP		

Outline Of MetroFi Compliance With FCC Regulations: Transmit Power, EIRP and Antenna Gain

2.4GHz Compliance

Sec. 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

<EDIT>

15.247(a)(2)(b) The **maximum peak output power of the intentional radiator shall not exceed the following:**

15.247(a)(2)(b)(1) For frequency hopping systems in the 2400-2483.5 MHz band employing at least 75 hopping channels, all frequency hopping systems in the 5725-5850 MHz band, **and all direct sequence systems: 1 watt.**

15.247(a)(2)(b)(3) Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, **if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced** below the stated values in paragraphs (b)(1) or (b)(2)

How MetroFi Complies:

	FCC Regulations	MetroFi Operation
Operating Frequency Band	2400 - 2483.5MHz	2412 - 2462 MHz
Transmit power (MAX, dBm EIRP) (1 W + 6 dBi)	36 dBm EIRP	32 dBm EIRP

5 GHz Compliance

Sec. 15.407 General technical requirements. (5GHz UNII)

15.407(a)(3) (5.725-5.825 GHz)

<EDIT>...For the band 5.725-5.825 GHz, **the peak transmit power over the frequency band of operation shall not exceed the lesser of 1 W ...**

<EDIT>...However, fixed point-to-point U-NII devices operating in this band **may employ transmitting antennas with directional gain up to 23 dBi without any corresponding reduction in the transmitter peak output power** or peak power spectral density.

<EDIT>...The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible **for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.**

How MetroFi Complies:

	FCC Regulations	MetroFi Operation
Operating Frequency Band	5.725 - 5.825 GHz	5.745 - 5.805 GHz
Transmit power (MAX)	1.0 Watt	.5 Watt
Antenna Gain (MAX, point to point)	23 dBi	16 dBi

The 5 GHz communications links are used exclusively as point to point links. The 5 GHz links serve as backhaul links for the rest of the network which operates as point-to-multipoint on 2.4 GHz only.

The 5GHz links comply with all aspects of 15.407(a) as mentioned above:

- There is no Point to multipoint on 5 GHz
- There are no omni directional transmissions
- There are not co-located transmitters transmitting the same information.

Additionally, the installer will be MetroFi, or an installer contracted by MetroFi. MetroFi will be responsible for ensuring point-to-point compliance.

Justification of the quantity of units requested for experimentation.

The main objective of the proposal is to demonstrate the feasibility of the MetroFi system for a residential broadband network using standards based IEEE 802.11 A/B (Wi-Fi) technology.

Multiple Vendor Evaluation:

In order to have the highest possible chance of success in its deployment, MetroFi has contracted with multiple vendors to provide radios that will make up the network infrastructure. Evaluating multiple vendors obviously requires radios from each vendor be deployed, thus increasing the number of required radios above what would be required if only a single vendor were being evaluated. Due to the obvious risk of relying on a single vendor, it is in the best interest of MetroFi's business plan not to evaluate a only a single vendor

Wide Coverage Area Required:

The proposed transmitters will be located at temporary fixed locations within an 80 km radius of Mountain View, CA. In order to adequately cover an area of this size, a large number of radios are required. It is necessary to cover an area of this size in order to evaluate the RF propagation characteristics over various terrains. Initial evaluation indicates the RF propagation characteristics vary greatly between an area with many trees and hills to an area with fewer trees and a flatter terrain. In order to provide wireless connectivity to customers over a large metropolitan area, the performance of the network must be evaluated over these different terrains.

Large Quantity of Traffic / Beta Users Required:

In order to verify the capacity of the network, it must be "loaded" with many "Beta" users, each of whom are moving a substantial amount of data each day - as will be the case during typical use once the network is deployed commercially. In order to verify the performance of the network under this load, the radio density of the experimental network must be similar to the planned commercial network.

Additionally, a large number of "beta" users is required in order to replicate the various usage habits of typical network users, (amount of data moved, time of day of maximum / minimum usage, etc) in order to product a statistically significant result. Covering a large number of beta users requires an appropriately scaled network of sufficient radio density. The Beta users will receive no payment for exercising the network, nor will they pay MetroFi for the service during the beta test.

No Previous Data / Statistics

Due to the novel approach being taken by MetroFi in its execution of the wireless network, there is no previous usage statistics or propagation studies that directly correlate with what MetroFi is attempting. MetroFi, therefore, cannot simply rely on the research that others may have performed in the past. Thus, it is necessary for MetroFi to perform its own network performance analysis.

Summary:

MetroFi is cognizant of the fact that a relatively large number of radios are being requested during this experiment. MetroFi feels it has not overestimated the number of radios required. Rather, MetroFi feels that the quantity requested represents the minimum number required for a successful experimental network deployment.

Removal of radios after evaluation:

The radios that will be installed and evaluated during the experiment will be “pre certified” by the manufacturers of the radio equipment being evaluated. The radios will have been tested at certified test labs and found to comply with FCC requirements. Full FCC Certification may not be pursued until a final vendor determination has been made.

At the conclusion of the experiment, the “pre-certified” evaluation radios will be removed and FCC certified radios will be installed.