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Title: Technical Questions for Devices Operating in the 3650-3700 MHz Band under Part 90Z

Short Title: Guidance for 3650-3700 Band:

Reason: Revision of current Publication for mobile equipment operating under limited waiver in DA 10-676

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Keyword/Subject: Part 90Z, Contention Based Protocol, 3650-3700 MHz Band

First Category: Radio Service Rules

Second Category: Part 90 Land Mobile

Third Category:

Question: What are the guidelines for approval of devices operating in the 3650 – 3700 MHz band under Part 90Z?

Answer: Guidelines are provided in the attachment below [552295 CBP Questions for 3650-3700 Band v01r02.](#)

Attachment List:

[552295 CBP Questions for 3650-3700 Band v01r02.](#)

Attachment 552295 CBP Questions for 3650-3700 Band v01r02.

Guidance regarding devices operating in the 3650-3700 MHz Band under Part 90Z

Document Overview

This document provides guidance for approval of devices operating in the 3650 – 3700 MHz under Part 90Z of the FCC rules. The guidance addresses: (1) several questions / information to help determine the contention based protocol capability of a device and (2) requirements for certain subscriber stations operating at power levels in excess of those permitted for mobile stations.¹

These questions are intended to be used as a guide by the applicant to describe how their system meets the requirements for the contention based protocol and / or for providing the necessary information to be granted under the mobile station waiver order. The list is not intended to be exhaustive and may be modified in the future. There may be follow-up questions based on the responses provide by the applicant for authorization.

Applicants seeking certification for systems as complying with restricted contention based protocol (3650 to 3675 MHz), that permit operation on a co-channel with like systems (similar systems), can seek equipment authorization from a Telecommunications Certification Body (TCB) using the Permit but Ask procedure, as described in Section 4 below.

Applicants seeking certification for systems as complying with the unrestricted contention based protocol for operation in the 3650 to 3700MHz band, that permit operation on a co-channel with similar or different systems (recognizing other systems), must apply to the FCC for equipment authorization.

1. Restricted Certification under Part 90Z (3650-3675 Band)

In order to ensure that a device complies with the requirements of restricted contention based protocol, the following information should be provided in the application.

1.1. Restricted Protocol Description

- 1.1.1. Although the restricted protocol does not have the extended requirement to recognize all other systems, it is still mandatory to incorporate a contention based protocol that provides satisfactory sharing of spectrum with similar systems.
- 1.1.2. Address the key requirements for operation using restricted contention based protocol opportunities for other transmitters to operate. Please note that this requires recognizing like systems (similar to yours) that permit operation on a co-channel.

¹ Mobile stations as defined in Section 90.1333 operate only if they can positively receive and decode an enabling signal transmitted by a base station. In a recent waiver order (see DA 10-676) the Commission approved Alvarion BreezeMAX Si-CPE mobile stations to operate above the limits of Section 90.1321 of 1 watt/25 MHz EIRP and 40 milliwatts in any one-megahertz slice of spectrum under prescribed circumstances. In the Order, the Commission also permitted similarly situated devices to be approved under similar conditions.

1.1.3. Provide any additional manuals and operational descriptions to allow the reviewer to understand the product and its operation.

1.2. Describe the method to permit occupancy.

1.3. Describe the action taken if two or more transmitters simultaneously access the same channel by the master and the client devices.

1.4. Describe opportunities for other similar systems to operate - address how, or if, a different system operator using the same technology can operate in the same band.

2. Unrestricted Certification under Part 90Z (3650-3700 Band)

In order to ensure that a device complies with the requirements of unrestricted contention based protocol, the following information should be provided in the application.

2.1. Unrestricted Protocol Description

Address the key requirements for operation using unrestricted contention based protocol. Please note that this requires recognizing other systems (both similar to yours and different from yours) that operate on a co-channel. Indicate the strategy for sharing the spectrum in terms of: (1) Does the system use spectrum sensing to determine if the other devices are transmitting and then find ways to share the bandwidth, or (2) Does the system have some other strategy?

2.2. Threshold detection to determine occupancy

- 2.2.1. Describe how your system determines if another system is using the spectrum. At what detection level – relative to 0 dBi receive antenna gain (busy channel threshold), does the device determine if another system is operating on the spectrum?
- 2.2.2. How long does the system observe to determine if the channel is busy – at the initial time and in between communications?
- 2.2.3. What is the bandwidth being monitored versus bandwidth occupied for all modes of operation?
- 2.2.4. How much variability is provided to the system operator to adjust busy channel detection threshold?
- 2.2.5. What is the operating system threshold (receive threshold) compared to the monitoring threshold (busy channel threshold)?
- 2.2.6. What additional checks does the system perform to determine if the spectrum is being used before initiating a transmission?
- 2.2.7. Does the master and the client perform the threshold detection? If master only performs the detection how does it determine if the client may interfere with the other system (hidden node detection mechanism)?

2.3. Action taken when occupancy is determined

- 2.3.1. What action does your system take when it determines occupancy? Does it vacate the channel or does it have some back-off and retry strategy? What is the impact of traffic on the spectrum sensing or avoidance performance?
- 2.3.2. If you use other means, please describe how the device determines the existence of other systems and what steps it takes to either share the channel or avoid its use.
- 2.3.3. Describe any mechanism that would limit a transmission from a remote station if only the master detects occupancy (hidden node avoidance mechanism).
- 2.4. Opportunities for other transmitters to operate
 - 2.4.1. When describing occupancy profile, clarify any differences between start-up acquisition mode of spectrum, and operational modes.
 - 2.4.2. In operational mode, how long does the system transmit before stopping giving others a reasonable time to transmit before continuing?
 - 2.4.3. Does the system (master and / or client) listen prior to every transmission? If no, explain.
 - 2.4.4. Describe how the operational spectrum usage (on air time) is dependent on system load conditions (no load, typical and overload). For example, if a station does not have any information to transmit, describe any regular or recurring transmission that may take place.
 - 2.4.5. Describe if there are any limitations imposed by the contention protocol on what applications are used (i.e. limitations on Quality of Service).
 - 2.4.6. Describe how applications or configuration of services can affect spectrum usage. To describe your occupancy sharing capability you can assume that two systems on a co-channel are the same (your systems being described). How would they share the spectrum?

3. Mobile Stations Certified under Limited Waiver DA 10-676

Mobile equipment (operating under Section 90.1333 that only transmits if it can positively receive and decode an enabling signal transmitted by a base station.) is permitted to be certified, marketed and operated under a limited waiver in DA 10-676 under the following conditions:

- 3.1. Similarly situated applications for certification of 3650 MHz equipment.
- 3.2. The conditions of certification, including marketing and operation conditions, apply to all equipment granted under the submitted FCC ID and not just to a limited set of models or installation configurations that may be applicable. Applications under this waiver shall:
 - 3.2.1. Applicant shall demonstrate equipment is similar to the equipment in the waiver, and shall provide a request for a waiver, which shall include a justification why this meets the intent in a fixed mode under this waiver. This request shall also include an operational overview that describes to the Commission the equipment's physical properties, intended installation arrangements, optional mounting arrangements, antennas, power outputs, modulation charter and channel bandwidths and references to the specific detailed installation instructions and end user guidelines that ensure that licensees locate the equipment in a manner that will maintain its fixed location, and appropriate human exposure separations.

- 3.2.2. The grant comments shall state “This equipment can only be installed and operated by a licensee and must be registered in the ULS database as a fixed station under the rules of Section 90.1331 and enabled by a valid base station registered in the ULS database to the same licensee”.
- 3.2.3. The installation manual shall state “This equipment is subject to the registrations rules of Section 90.1331 for restrictions on the operation of base and fixed stations. It can only be sold and marketed to licensees and cannot be sold to the general public. The license holder is responsible, prior to operation, to register the device in the ULS database and only operate the equipment at the registered fixed location and not at any other location”.
- 3.2.4. The application shall include in the installation and end-user manual a RF exposure Hazard Warning, sufficiently detailed installation instructions, antenna locations and guidelines to ensure that licensees locate the equipment and antenna to maintain an appropriate human exposure separations at all times: “The antenna used for this transmitter must be kept at a separation distance of at least * as applicable* cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter”.

4. All stations operating in fixed mode at higher power

Any station (includes one or more of the following attributes: non-mobile, mobile, base, fixed, subscriber, remote, CPE or stations that positively receive and decode an enabling signal) operating above the limits of 1 watt/25 MHz EIRP or a peak EIRP density above 40 milliwatts in any one-megahertz slice of spectrum as defined in Section 90.1321 (c), power and antenna limits, is subject to the registration rules of Section 90.1331 for restrictions on the operation of base and fixed stations

5. Procedures for Permit but Ask approvals

Applications for equipment based on restricted contention based protocol can be approved by a TCB following the Permit but Ask procedure. An initial inquiry providing the information described in Section 1 and in the applicable Section 3 above must be submitted to the FCC for review. Once approved, a TCB may file for final approval when the remainder of the application has been reviewed for compliance. The TCB is responsible for ensuring a complete review of the application for compliance with all the relevant requirements.

Special note must be made about the power limits specified in the rules for these devices. These devices are subject to transmitted power² and power density limits. Also, mobile devices may have to meet special restrictions based on the mode of operation. The grant must also list the note code RS³ to denote “restricted contention based protocol”.

² Grant comments “Output is EIRP”.

³RS Note Code: This device incorporates a restricted contention based protocol. It is not capable of avoiding co frequency interference with devices using all other types of contention-based protocols. Operation is restricted to the 3650-3675 MHz band.

Change Notice:

1/13/2010 552295 D01 CBT Guidance for 3650 3700 Band v01 has been changed to 552295 D01 CBT Guidance for 3650 3700 Band v01r01 to correct an error. Section 3 -Procedures for Permit-but-Ask approvals – the first sentence was correct from unrestricted to the restricted based protocol.

10/8/2010 552295 D01 CBT Guidance for 3650 3700 Band v01r01 has been changed to 552295 D01 CBT Guidance for 3650 3700 Band v02. Section 3 for Mobile equipment operating under limited waiver in DA 10-676 has been added and all stations as described in section 4.

