

Attachment 3

1. FCC Request 11532

To: Ken Ruppel, Glenayre Western Multiplex
From: Greg Czumak
gczumak@fcc.gov
FCC Application Processing Branch

Re: FCC ID HZB-S58-12
Applicant: Glenayre Western Multiplex
Correspondence Reference Number: 11532
731 Confirmation Number: EA95627
Date of Original E-Mail: 01/14/2000

1. We will need a list of all antennas to be used for this 5.8 GHz ss transmitter.

2. Your recent UNII filings had only 200 W EIRP output (due to 53 dBm limit for UNII). Even though the same type of antennas are proposed for the current filing, this device can have an output up to 2.7 kW EIRP when using a 41 dBi dish. This transmitter has an output nearly 10 times higher than the previous 2 UNII filings. Its output is also above the general categorical exclusion limits for routine RF exposure evaluation for licensed transmitters (see 1.1307 Table 1). Even though the rules do not specifically require a spread spectrum transmitter to perform routine RF exposure evaluation, because operations in the 5.8 GHz band do not have any EIRP restrictions for point-to-point operation, and there is a much higher potential for devices with high EIRP to exceed RF exposure requirements, we may need to apply 1.1307 (d), if there are no other effective solutions. The following are possible choices and/or issues which you may want to address or consider -

(a) Tests for emission requirements have been based on a 29 dBi antenna. With RF exposure requirements in effect, we have concerns for approving antennas with gains higher than those tested, especially when the EIRP is substantially high. In this case, we may need to limit the maximum antenna gain to 29 dBi, as tested, in order to make it reasonable/acceptable for RF exposure compliance purposes.

(b) Alternatively, you may choose to voluntarily limit the maximum EIRP (to similar levels used by your recent UNII filings) and we will indicate the maximum EIRP as a grant condition. This would allow you to consider antennas with higher than 29 dBi gain for this transmitter, with effective power reduction mechanisms. Again, a list of all antennas used by this transmitter must be submitted, including installation and power reduction procedures.

(c) If both of the above options are not desirable, and you want to maintain the full 23.3 dBm output for antennas with higher than 29 dBi gain (the maximum EIRP is about 2700 W for the proposed 41 dBi gain antenna), we will need to consider the alternative in 1.1307(d), which may lead to an Environmental Assessment. This high EIRP is substantial, and is also above the general categorical exclusion limits of 1640 W EIRP for licensed transmitters, which typically have minimum antenna height requirements. This means that you may need to address environmental impact issues for RF exposure at all sites using this transmitter, including any antenna co-location issues for all sites (that generally also reduces the allowable limits for individual antennas since the total output of all antennas at the site is expected to be higher, see 1.1307(b)(3)).

Please respond, informing us which of these options you select, or other alternatives you may propose, allowing us to complete the review of this application. Once an effective solution has been determined, we will determine the procedures for satisfying compliance and the type of antenna installation requirements, separation distances or any warnings etc.needed.

The items indicated above must be submitted before processing can continue on the above referenced application. Failure to provide the requested information within 60 days of the original e-mail date may result in application dismissal pursuant to Section 2.917 (c) and forfeiture of the filing fee pursuant to section 1.1108.

DO NOT reply to this e-mail by using the Reply button. In order for your response to be processed expeditiously, you must upload your response via the Internet at www.fcc.gov, Electronic Filing, OET Equipment Authorization Electronic Filing. If the response is submitted through Add Attachments, in order to expedite processing, a message which informs the processing staff that a new exhibit has been submitted must also be submitted via Submit Correspondence. Also, please note that partial responses increase processing time and should not be submitted.

Any questions about the content of this correspondence should be directed to the e-mail address listed below the name of the sender.

2. Response to FCC request 11532

RE: Response to FCC Requests
Correspondence Reference Numbers: 11532
FCC IDs: HZB-S58-12
Form 731 Confirmation Numbers: EA95627
Attn: Greg Czumak

1. Please find in the attached form a list of different types of antennas may be used with the HZB-S58-12 radios. For your reference, we have also included some typical antenna models made by different manufacturers.

Antenna Type	Manufacturer	Model Number	Mid-band Gain (dBi)
1 Foot Flat Panel	Gabriel	DFPD1-52	23.5
2 Foot Flat Panel	Gabriel	DFPD2-52	28
	RSI	A57A24-U	26.5
2 Foot Parabolic	Gabriel	SSP2-52B	28.5
	RSI	P-57C24	29
	Radio Waves	SP2-5.2	28.3
3 Foot Parabolic	Radio Waves	SP3-5.2	31.4
4 Foot Parabolic	Gabriel	SSP4-52A	34.2
	RSI	P-57B48	34.7
	Radio Waves	SP4-5.2	34.6
6 Foot Parabolic	Gabriel	SSP6-52A	37.5
	RSI	P-57A72	38.2
	Radio Waves	SP6-5.2	37.7
8 Foot Parabolic	Gabriel	DRFB8-55ASE	40.7
	RSI	P-57A96	40.8

2.
 - As I have indicated in my previous response, our radios are fixed-mount equipment that are designed for point-to-point outdoor communications. The antennas must be highly directional, and the transmission path must have line-of-sight clearance. The radio antennas must be installed either on top of a tower or a very high building so that the line-of-sight condition can be met. Therefore, the antenna sites are not accessible to the general public. Installation of the radios and antennas must be performed by professional installation engineers. The transmission paths of the radios are well above ground level radiating in a beam point to point rather than omnidirectional to the general public like a paging transmitter. Given all the conditions mentioned above, the radiation of our radios should be considered in the Occupational/Controlled exposure category, rather than of General Population/Uncontrolled Exposure category. However, we still comply with the limit set for General Population/uncontrolled exposure as specified in 1.1310. My last response shows the compliance with calculation for anywhere over 5 meters away from the antenna. We have included a warning message in our manual informing installers to keep at least five meters away from the antenna while the equipment is in operation.
 - Due to the fact that the HZB-S58-12 radio is used for fix-mount point-to-point communication that requires line-of-sight clearance in the path and that the radio is single-unit in-door equipment, the antenna sites are always far away from the radio equipment room. The typical length of RF cable that runs from the output of the radio to the antenna input is over 100 feet. In situations where an antenna site is extremely far from the equipment room, waveguide may be

used as a means to reduce the loss from RF transmission. A typical distance between antenna and radio when waveguide is used is over 200 feet. To give a worst example, let's assume 100 feet Andrew 5/8" foam coax cable or 200 feet Andrew waveguide is used. Given 0.5dB loss for the connectors on each end, the loss introduced by RF cabling is at least 3.5-5.5 dB (please refer to the table below for Loss/100' data). As for the majority of cases, the transmission line loss is usually in the range of over 10dB.

When this loss is taken into consideration, the maximum possible EIRP will be:
Maximum Output power + Maximum Antenna Gain – Minimum Implementation Loss = 23.4 + 41 – 3.5 = 60.9 dBm, which is equivalent to 1230W.

Many transmitters and facilities subject to EA listed in Table 1 of 1.1307 are of a broadcasting nature that radiate into the general public, while our radio radiates with a very narrow beam high above the general population. Even though, when taken the transmission line loss into consideration, we are still below the limit of 1640 EIRP set for the broadcasting stations.

In summary, our radio will not introduce RF radiation exceeding any FCC limits when using with antennas of up to 41dB, even when more stringent standards for other types of transmitters are applied. We are open to limiting antenna gain to 41dBi if FCC deems it necessary.

Feeder Loss Type	Manufacturer	Model Number	Loss/100'
1/2" foam coax	Andrew	LDF 4-50	6.6 dB
5/8" foam coax	Andrew	LDF 4.5-50	4.7 dB
Waveguide	Andrew	EW-52	1.2 dB

Yours truly

Caroline Yu
International Product Manager
Western Multiplex Corporation

3. Supporting Calculation:

Assume a maximum EIRP of 1640W (62.1dBm) for the HZB-S58-25 radio, a minimum implementation loss of 3.5dB for the transmission line and connectors, and the maximum antenna gain of 41dBi, the maximum output power will be:

$P_{out} = 62.1 + 3.5 - 41 = 24.6 \text{ dBm}$, which is equivalent to 288mW.