



PUBLIC NOTICE

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WIRELESS TELECOMMUNICATIONS BUREAU AND OFFICE OF ENGINEERING AND TECHNOLOGY ANNOUNCE METHODOLOGY FOR DETERMINING THE PROTECTED CONTOURS FOR GRANDFATHERED 3650-3700 MHZ BAND LICENSEES

GN Docket No. 12-354

I. INTRODUCTION

1. With this Public Notice, the Wireless Telecommunications Bureau (WTB) and Office of Engineering and Technology (OET) adopt a final methodology for determining Grandfathered Wireless Protection Zones for existing licensees in the 3650-3700 MHz band.¹ We will utilize a two-prong approach to determine Grandfathered Wireless Protection Zones that is generally consistent with the approach that we sought comment on in the *3650-3700 MHz Protection Contours PN*.² This approach will establish a baseline contour that will be used to protect the area - by sectors - in which unregistered consumer premises equipment (CPEs) are located, and allow licensees to protect the specific area - by sectors - where registered CPEs are located. The sectors are defined by the azimuth and beam width of the registered base stations. Specifically, under this approach, the Grandfathered Wireless Protection Zone around each eligible registered base station is defined by: (1) for sectors encompassing unregistered CPE, a 5.3 km radius sector from each registered base station based on the azimuth and beam width registered for that base station; and (2) for sectors encompassing registered CPE, a sector centered on each base station with the registered azimuth and beam width covering all registered subscriber stations within that sector.³ We continue to believe that the approach we sought comment on in the *3650-3700 MHz Band Protection Contours Comment PN* will effectively protect Grandfathered Wireless Broadband Licensees during the transition period.⁴

2. However, based on the comments that we received we refine several aspects of the methodology. As described in detail below, we: (1) eliminate the requirement for licensees to identify the specific frequencies that are in operation on each sector and, instead, base the protected range of frequencies on what licensees have already registered in ULS; (2) require Citizens Broadband Service Device (CBSD) operators to meet the interference protection level at all locations within the Grandfathered Wireless Protection Zone, not just at the edge; (3) modify the distance of the protection contour for unregistered CPEs; and (4) modify the interference protection level to match the interference

¹ See 47 C.F.R. § 96.3 (Grandfathered Wireless Protection Zone).

² See Wireless Telecommunications Bureau Seeks Comment on an Appropriate Method for Determining the Protected Contours for Grandfathered 3650-3700 MHz Band, GN Docket No. 12-354, *Public Notice*, 30 FCC Rcd 11557 (2015) (*3650-3700 MHz Band Protection Contours Comment PN*).

³ See Appendix C for a graphical representation of the methodology.

⁴ See *3650-3700 MHz Band Protection Contours Comment PN*.

protection level used for protection of Priority Access Licensees (*i.e.*, the aggregate power of co-channel CBSDs must be no greater than -80 dBm/10 MHz within the Grandfathered Wireless Protection Zone).

II. BACKGROUND

3. On April 17, 2015, the Commission adopted a *Report and Order and Second Further Notice of Proposed Rulemaking (3.5 GHz Order)* that established a new Citizens Broadband Radio Service in the 3550-3700 MHz band (3.5 GHz Band).⁵ In the *3.5 GHz Order*, the Commission adopted rules to protect existing licensees' registered base stations in the 3650-3700 MHz band from harmful interference from Citizens Broadband Radio Service users for a fixed transition period. During the transition period, existing licensees will receive protection for operations that are within their Grandfathered Wireless Protection Zone, provided that: (1) the stations were registered in the Commission's Universal Licensing System (ULS) on or before April 17, 2015; and (2) as of April 17, 2016 the stations were constructed, in service, and fully compliant with the relevant operating rules. The *3.5 GHz Order* stated that the Commission would issue a public notice seeking comment on the appropriate methodology for determining the Grandfathered Wireless Protection Zones, and provided that these zones would be defined "using methodology determined by the Wireless Telecommunications Bureau and Office of Engineering and Technology."⁶

4. On October 23, 2015, WTB released a public notice seeking comment on the appropriate methodology and relevant technical parameters for determining the Grandfathered Wireless Protection Zones.⁷ Comments were due on December 28, 2015 and reply comments were due on January 12, 2016.⁸

5. In the *3650-3700 MHz Band Protection Contours Comment PN*, we sought comment on a two-prong approach that would define the Grandfathered Wireless Protection Zone around "grandfathered" base stations. Under this two-prong approach, the Grandfathered Wireless Protection Zone around each base station would be defined by: (1) sectors with a 4.4 km radius from each registered base station, and the azimuth and beamwidth registered for that base station with associated unregistered CPEs to encompass the operational area of unregistered subscriber stations; and (2) sectors (centered on each base station with the registered azimuth and beamwidth) which would encompass all registered subscriber stations within that sector.⁹ A number of commenters, including CenterPoint Energy Houston Electric, LLC, Exelon Corporation, the WiMAX Forum, Sacred Wind Communications, Inc., the Utilities Telecom Council, the American Petroleum Institute (API), LS Telecom and Xcel Energy Services, generally support the approach on which we sought comment, though some commenters differed as to specific elements of the protection criteria.¹⁰

6. Others, including Google, Inc., the Wireless Innovation Forum (WinnForum), the Wireless Internet Service Providers Association (WISPA), and Neptuno Networks suggest a site-based approach

⁵ See Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band, GN Docket No. 12-354, *Report and Order and Second Further Notice of Proposed Rulemaking*, 30 FCC Rcd 3959 (2015) (*3.5 GHz Order*).

⁶ See *id.*, 30 FCC Rcd 3959 at 4077, ¶ 404; 47 C.F.R. § 96.3 (Grandfathered Wireless Protection Zone).

⁷ See *3650-3700 MHz Band Protection Contours Comment PN*.

⁸ Comments were originally due on December 10, 2015 and reply comments were originally due on December 28, 2015. See *3650-3700 MHz Band Protection Contours Comment PN*. On December 9, 2015, WTB released a public notice extending the comment deadlines in response to a request from WinnForum. See Wireless Innovation Forum Request for Extension of Time For Comment and Reply Comment Deadlines, GN Docket No. 12-354 (filed Dec. 7, 2015) at 1; Wireless Telecommunications Bureau Extends Period to File Comments and Reply Comments in Response to Public Notice on an Appropriate Method for Determining the Protected Contours for Grandfathered 3650-3700 MHz Band Licensees, GN Docket No. 12-354, *Public Notice*, 30 FCC Rcd 14049 (2015).

⁹ See *3650-3700 MHz Band Protection Contours Comment PN* at 2.

¹⁰ See generally, CenterPoint Energy Houston Electric Comments; Exelon Comments; WiMAX Forum Comments; Sacred Wind Communications Comments; UTC Comments; API Comments; LS Telecom Comments; Xcel Energy Services Comments.

that deviates from the approach that we sought comment on in the *3650-3700 MHz Band Protection Contours Comment PN*. Specifically, these commenters argue that existing 3650-3700 MHz wireless broadband service deployments should be registered with the spectrum access systems (SASs) through a central third-party database maintained by a multi-stakeholder group, with regular confirmation that such deployments remain in operation. These commenters also contend that incumbent licensees should be allowed to update the registration data during the grandfathered period to protect new customers, as well as to indicate devices that no longer require protection. Under the approach suggested by these commenters: (1) protection would be based on the characteristics of individual devices rather than a static contour; and (2) protection would require registration of each individual device with an SAS.¹¹

7. Several commenters also request changes to specific elements of the contour calculations, including: (1) the use of specific frequencies and emission characteristics for determining protection contours; (2) whether Citizens Broadband Radio Service users should be required to meet a signal strength limit at the contour boundary; (3) the appropriate signal strength for determining the protection contours; and (4) the appropriate protection contour for unregistered customer premise devices. These comments are discussed in detail below.

III. DISCUSSION

8. *Two-Prong Approach*. The *3.5 GHz Order* stated that the Grandfathered Wireless Protection Zone should “reasonably protect *registered* networks that are *constructed, in service, and in compliance* with the prior existing rules for the 3650-3700 MHz band.”¹² The two-prong approach described in the *3650-3700 MHz Band Protection Contours Comment PN*, and adopted as modified herein, is consistent with the Commission’s instructions. Specifically, we derive protections based on registered base stations that were constructed and providing service within one year of adoption of the rules. Under the applicable Part 90 and Part 96 rules, only base stations or CBSDs are required to register with the Commission and/or the SAS.¹³ Establishing protections based upon contours that define the coverage area of registered and operational base stations will also effectively protect customer premises equipment, whether registered or unregistered.

9. The approaches suggested by Google, WinnForum, WISPA, and Neptuno Networks would represent a significant departure from the framework established in the *3.5 GHz Order*. Notably, the approach suggested by these parties would require CPE to be registered with SASs and would tailor Grandfathered Wireless Protection Zones to these deployments - possible including new deployments put in operation after the grandfathering period (effectively extending the Grandfathered Wireless Protection Zone) - in contravention of the Commission’s rules.¹⁴ The Commission’s rules explicitly state: “Grandfathered Wireless Protection Zones will not be defined for subscriber units operated by Grandfathered Wireless Broadband Licensees, regardless of whether they have been registered in ULS.”¹⁵ We believe that the alternative approach advanced by the commenters is inconsistent with the Commission’s rules and would exceed the scope of the delegated authority granted to WTB and OET. Therefore, we reject this approach and focus our analysis on fine tuning the two-prong methodology that

¹¹ See WinnForum Comments at 3; Google Comments at 2, 4, 7; Neptuno Networks Comments at 2-3

¹² See *3.5 GHz Order*, 30 FCC Rcd 3959 at 4077, ¶ 404; See also 47 C.F.R. § 96.21(a)(2) (“Incumbent User protections for a Grandfathered Wireless Broadband Licensee shall only apply to Grandfathered Wireless Protection Zones around base or fixed stations that are registered in ULS on or before April 17, 2015 and constructed, in service, and fully compliant with the rules in part 90, subpart Z of this chapter as of April 17, 2016. Grandfathered Wireless Protection Zones will be reduced in geographic area and/or applicable frequency range if portions of the protected network fail to meet the above criteria after April 17, 2016.”)

¹³ See 47 C.F.R. §§ 90.1307(a), 96.39(c).

¹⁴ See 47 C.F.R. § 96.21.

¹⁵ See 47 C.F.R. § 96.21(a)(2).

will be used to define the Grandfathered Wireless Protection Zones in accordance with our delegated authority.

10. *Protection at the Contour Edge.* Google raises concerns about the requirement for CBSD operators to meet a field strength limit at the edge of the Grandfathered Wireless Protection Zones rather than within the entire area covered by the zones. In particular, Google contends that, while our approach establishes protection criteria to be measured at the edge of the protection contour, it does not clearly propose to protect the area inside that boundary (*e.g.*, that the same protection criteria would need to be met as measured at points within the contour).¹⁶ Google, and others, raised similar concern about the Commission's rules requiring CBSDs to meet an aggregate power limit of -80 dBm/10MHz along the Service Area border, as opposed to meeting the aggregate level anywhere within the Service Area, in response to the *3.5 GHz Order*.¹⁷ The Commission addressed these concerns in the *Order on Reconsideration and Second Report and Order* and adopted area-based protection criteria for Priority Access Licensees (PALs).¹⁸ Consistent with the Commission's approach in the *Second Order*, we clarify that CBSDs must meet the aggregate power limit at any point within the Grandfathered Wireless Protection Zone and not simply along the edge of the contour.¹⁹

11. *Aggregate Signal Strength.* Google, the WinnForum, and WISPA suggest an aggregate power level limit of -95 dBm/MHz (-85 dBm/10 MHz) for the interference protection level within the Grandfathered Wireless Protection Zone. API proposes a somewhat more protective signal strength limit at the edge of the contour of 37 dBuV/m compared to the 44dBuV/m field strength limit on which we sought comment.²⁰ Google replied that API's suggested protection level would negatively affect integration of Part 90 users.²¹

12. The alternative limits suggested by commenters are more restrictive than the interference protection level the Commission adopted to protect PAL Protection Areas from interference caused by General Authorized Access (GAA) users.²² Given that we have decided to apply the same area-based interference protection methodology to protect Grandfathered Wireless Broadband Licensees that we adopted in the *Second Order* for PAL Protection Areas, we believe that it is also appropriate to define the interference protection level consistently. Further, we believe that it is equitable that Grandfathered Wireless Broadband Licensees should be afforded the same degree of interference protection from GAA operation²³ that the Commission granted to Priority Access Licensees. Therefore, consistent with the Commission's conclusions in the *Second Order*, we will require that the aggregate power of co-channel CBSDs must no greater than -80 dBm/10 MHz at any point inside the Grandfathered Wireless Protection Zone.

13. *Protection of Base Station Sectors that Serve Unregistered Devices.* CenterPoint Energy

¹⁶ See Google Reply Comments at 3.

¹⁷ See *e.g.*, Google *Second FNPRM* Comments at 2-11; Motorola Solutions Petition for Reconsideration at 3-5; WinnForum Petition for Reconsideration at 11-16.

¹⁸ See Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band, GN Docket No. 12-354, *Order on Reconsideration and Second Report and Order*, 31 FCC Rcd 5011, 5050 (2016) (*3.5 GHz Second Order*) at ¶¶ 138-140.

¹⁹ API recommends that an additional protection zone be applied to account for "look past" interference because of unprotected regions next to a base station in non-protected sectors. See API Comments at 4. There is a possibility that interference could be caused by another party setting up operations close by in a non-protected sector, but we believe that using the area-based methodology adopted in this Public Notice will mitigate this concern.

²⁰ See API Comments at 2.

²¹ See Google Reply Comments at 6.

²² See 47 C.F.R. §§ 96.3 (PAL Protection Areas), 96.25(c); *3.5 GHz Second Order*, 31 FCC Rcd at 5050, ¶¶ 138-140.

²³ We note that only GAA CBSD operations are permitted in the 3650 – 3700 MHz band.

Houston Electric, LLC, Exelon Corporation, the WiMAX Forum, Sacred Wind Communications, Inc., UTC, API, LS Telecom and Xcel Energy Services, while in agreement with our general approach, have unanimously suggested that we expand the radius for base station sectors that serve unregistered devices, with three commenters suggesting we expand the radius by up to 24 km.²⁴ UTC claims that our use of average values for receiver sensitivity to determine the zones results in the protection zones being too restrictive.²⁵ The WiMAX Forum echoes this argument and suggests that we extend the radius for base station sectors that serve unregistered devices to 11.2 km.²⁶ Sacred Wind Communications, Inc. has requested that we extend the radius for base station sectors that serve unregistered devices to 18 km or alternatively that we establish “Tribal Protection Zones.”²⁷ API recommends that we set the radius for base station sectors that serve unregistered devices at 6.4 km if we adopt its suggested signal strength limit of 37 dBuV/m or 10 km if we continue to use 44 dBuV/m.²⁸

14. After review of the record, we find that the radius for base station sectors serving unregistered CPE should be enlarged to reflect the actual capabilities of existing equipment but should not be extended to the degree suggested by commenters. We note that the purpose of the Grandfathered Wireless Protection Zones is to provide a reasonable level of protection for existing and operational systems in the band.²⁹ We also note that, when a given site also has registered CPE associated with it, the Grandfathered Wireless Protection Zone will frequently be larger than the default protection zone applied to unregistered CPE. Since unregistered CPE operate at lower maximum power levels than registered CPE, the default protection zones for unregistered CPE will be utilized mostly for those sites with no associated registered CPE.³⁰ In other words, because of the ability to operate registered CPE at higher power, and therefore at longer distances, the protection zone for any registered CPE will effectively encompass the protection zone for any unregistered CPE. As such, the default protection zones for unregistered CPE must be narrowly tailored to the interference protection needs, and technical capabilities, of existing unregistered CPE equipment and deployments.

15. We do not believe that commenters have provided sufficient technical analysis to support their requests for significantly expanded protections for base station sectors that serve unregistered CPE deployments. Specifically, commenters have not demonstrated that CPE equipment that operates within the power limits specified by the Commission’s rules would provide reasonable levels of service at the edges of the requested protection zones. While we recognize that using average technical values of the most widely deployed equipment may underestimate the capability of some higher powered devices, or more sensitive receivers, our use of free space loss in our calculation - and our use of the sensitivity associated with the lowest order modulation scheme - both provide a generous estimate of the possible path distance. As we discussed in the *3650-3700 MHz Band Protection Contours PN*, we recognize that the use of free space path loss is conservative, as propagation over the earth generally causes the signal to fall off as a function of distance more rapidly than predicted by the free space model, and that clutter near either antenna or in the path between them can further reduce the signal strength. We also note that using the stated receiver sensitivity level for the lowest order modulation scheme is also conservative as systems would typically be designed to provide a signal level above the minimum receiver sensitivity level. However, in this case because the protection zones will exist for only a limited time, and the unregistered CPE locations are not known, we find it acceptable to use this conservative approach.

16. Considering the multitude of factors that could affect the actual service contour, we continue

²⁴ See Exelon Comments at 4; Xcel Energy Services Comments at 3; and UTC Comments at 2.

²⁵ See UTC Reply Comments at 6.

²⁶ See WiMAX Forum Comments at 5.

²⁷ See Sacred Wind Communications Comments at 5.

²⁸ See API Comments at 4.

²⁹ See *3.5 GHz Order*, 30 FCC Rcd at 4075-77, ¶¶ 400-404.

³⁰ See 47 C.F.R. § 90.1321.

to believe that these assumptions and methodology strike an appropriate balance between best and worst case scenarios and between simplicity and complexity in order to define a protection zone that is generally appropriate in the vast majority of situations. Previously, we based our maximum distance calculations on average specification values of the top five most widely deployed base station radios along with the average values for all certified unregistered low power devices. After consideration of the arguments raised by commenters, we hereby modify this approach and limit our analysis to the most widely deployed base station equipment that is designed to operate with unregistered CPE equipment from the same manufacturer. Using a weighted average of receiver sensitivities based on the top five most widely deployed base stations along with the average value for Equivalent Isotropically Radiated Power (EIRP) of their corresponding low power CPE, we get a maximum distance of 5.3 km.³¹ The results of this analysis indicate that a somewhat larger protection zone than we previously sought comment on for unregistered CPE is warranted. Therefore, we adjust the radius for base station sectors that serve unregistered devices from 4.4 km outward to 5.3 km.

17. *Other Issues.* Xcel Energy Services and UTC have requested that we extend coverage to 360 degrees around each registered base station, and several commenters have recommended that new and future deployments be protected as well.³² The Commission clearly articulated that the intent behind protecting Grandfathered Wireless Broadband Licensees was to protect existing investment in the band; it was not the Commission's intent to protect future planned deployments. Instead, the Commission intended to transition the band into the new Citizens Broadband Radio Service. These suggestions, therefore, are inconsistent with the Commission's rules governing Grandfathered Wireless Protection Zones and we therefore decline to adopt them.

18. Google has also recommended that Part 90 licensees be required to register the parameters of actual operations and confirm annually that registered devices remain in service.³³ In a reply to Google, WISPA argues that annual registration would be unnecessary and burdensome.³⁴ WISPA points out that licensees should be able to add or delete facilities when necessary because section 90.1307 is explicit regarding registration of locations and deletion of unused stations.³⁵ We agree with WISPA that our existing rules cover the addition and deletion of facilities and that annual registration is unnecessary. However, we clarify that added locations outside of Grandfathered Wireless Protection Zones will not be protected and will not extend the pre-existing Grandfathered Wireless Protection Zones.

IV. FINAL METHODOLOGY FOR DETERMINING THE GRANDFATHERED WIRELESS PROTECTION ZONE

19. Consistent with the discussion above, and with the Final Regulatory Impact Analysis in the *3.5 GHz Order*,³⁶ we will protect Grandfathered Wireless Broadband Licensees using the two-prong approach that we sought comment on in the *3650-3700 MHz Band Protection Contours Comment PN*, with minor modifications. Under this approach, the Grandfathered Wireless Protection Zone around each eligible registered base station will be defined by: (1) for sectors encompassing unregistered CPE, a 5.3 km radius sector from each registered base station based on the azimuth and beam width registered for that base station; and (2) for sectors encompassing registered CPE, a sector centered on each base station with the registered azimuth and beam width covering all registered subscriber stations within that sector.³⁷

³¹ See Appendix A.

³² See UTC Comments at 2; Xcel Energy Services Comments at 4; Exelon Corporation Comments at 4; WinnForum Comments at 3; WISPA Comments at 2; Sacred Wind Comments at 5.

³³ See Google Comments at 7.

³⁴ See WISPA Reply Comments at 2.

³⁵ See *id.*

³⁶ See *3.5 GHz Order*, 30 FCC Rcd at 4075-77, ¶¶ 7, 17, 19, 20.

³⁷ See Appendix C.

V. IMPLEMENTATION PROCEDURES

20. *Implementation:* To implement this process to determine the Grandfathered Wireless Protection Zone we will require licensees to certify which of their base stations were constructed, in service, and in full compliance with the rules by April 17, 2016. At the same time that licensees certify to the above they must identify whether or not that base station has unregistered CPE and the distance to the furthest registered CPE for each sector. Licensees will only be required to provide this information for base stations and will not be required to provide supplemental information in regard to registered CPE equipment beyond the distance to the furthest registered CPE.

21. We are currently in the process of modernizing ULS so that it will have the functionality to collect all the necessary data. When the mechanism is in place, WTB will communicate to the licensees the process by which they must submit this additional information. Then the existing registration data in ULS, along with the supplementary information provided by licensees, will determine the Grandfathered Wireless Protection Zone. The Grandfathered Wireless Protection Zones will then be communicated to the SASs.

Implementing the Grandfathered Wireless Protection Zones will be a one-time event. The zone for each station will remain unchanged unless a base station is taken out of service. If a base station is taken out of service the licensee will be required to delete the registration, the FCC will communicate to the SAS that the base station is no longer in service and that station's Grandfathered Wireless Protection Zone will no longer be protected. In a future public notice, following receipt of any necessary OMB approval under the Paperwork Reduction Act, we will provide additional details about the process for certification and additional data collection and establish a timeframe in which to respond. The registration system will contain a link that will allow the public to view the Grandfathered Wireless Protection Zones. Such information will require licensees to inventory their operational base stations that were: (1) registered on or before April 17, 2015; (2) constructed, operational, and providing a *bona fide* service before April 17, 2016; and (3) are otherwise in compliance with the Commission's rules.

For further information, contact Paul Powell, Mobility Division, Wireless Telecommunications Bureau at (202) 418-1613, or by e-mail at Paul.Powell@fcc.gov or Stephen Buenzow, Broadband Division, Wireless Telecommunications Bureau at (717) 338-2647, or by e-mail at Stephen.Buenzow@fcc.gov.

Appendix A

Calculation of maximum range of unregistered CPE.

The calculation of the maximum range of an unregistered CPE is based on the link budget between an unregistered CPE and the base station using the receiver (RX) sensitivity threshold of the lowest order modulation scheme, and assuming free space loss.

The following assumptions are used:

We used the weighted average value of receiver sensitivity based on the lowest order modulation scheme and channel bandwidths used by the vast majority of licensees of the top five most widely deployed base stations = -94.95 dBm ~ 95 dBm³⁸

For transmit power we used the average EIRP of available unregistered CPE equipment = 23 dBm³⁹

Base station antenna gain (RX) = 17.2 dBi⁴⁰

Maximum Allowable Path Loss = System Gain + Antenna Gain (Rx only) – Fade Margin – Line Losses (tx only)

Where System Gain = EIRP – Rx Sensitivity = 23 dBm – (- 95 dBm) = 118 dBm

Maximum Allowable Path Loss = 118 + 17.2 – 15 – 2 = 118.2 dBm⁴¹

From this we can derive distance as 5.3 km based on free space loss, where $d = 10^{\frac{((MAPL-92.45)/20) - \log(f)}{4}}$ where d is in km and f is in GHz.

³⁸ This is the average value for minimum receiver threshold based on equipment specifications of the top five most widely deployed base station devices from manufacturers who also produce low power unregistered devices. The average is weighted based on deployment. See Appendix B.

³⁹ Average EIRP value for five unregistered devices corresponding to the base stations above from type certifications. See Appendix B.

⁴⁰ Average gain based on 28,000 ULS registration records for base stations.

⁴¹ 15 dB Fade Margin from Ubiquiti outdoor link design guideline at <https://help.ubnt.com/hc/en-us/articles/204952224-airMAX-Plan-an-outdoor-wireless-link>.

Appendix B

Table 1

Most Widely Deployed Base Station Equipment

<u>FCC ID#</u>	<u>Number Registered</u>	<u>Percentage</u>	<u>EIRP in Watts</u>	<u>Rx Sensitivity in dBm</u>
<u>O2J-365T</u>	1751	51	4.07/5 MHz	-96
<u>OJB-APC4-365</u>	772	23	4.57/6.34 MHz	-96
<u>QC8-AN100UA</u>	620	18	1.35/6.25 MHz	-91
<u>QC8-AN100UXA</u>	212	6	5.4/6.32 MHz	-91
<u>QISRRU3232-3650</u>	74	2	13.34/20 MHz	-103.5

Table 2

Unregistered Equipment EIRP in Watts

<u>FCC ID #</u>	<u>EIRP in Watts</u>
PIDASMAX36	0.197 @ 5 MHz
PIDGWU-200	0.1778 @ 5 MHz
QC8-SUIIRM	0.2 @ 6.33 MHz
OJB-SSIDU-365	0.28 @ 6.37 MHz
QISE5776S-420	0.161 @ 18 MHz

Appendix C

