FOX HILL TELECOM

Radio Frequency Emissions Analysis Report

Prepared for:

Crown Site ID: 876361_Seymour 2 / Oxford Town Garage

Verizon Wireless Site Name: Oxford W CT

Verizon Wireless FUZE ID: 16272032

Site Address:

20 Great Oak Road

Oxford, CT 06478

December 6, 2024

Fox Hill Telecom Project Number: 240104

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general population allowable limit:	20.50 %

Fox Hill Telecom, Inc Worcester MA 01609

FOX HILL TELECOM

December 6, 2024

Crown Castle
1800 W. Park Drive
Westborough, MA 01581

Emissions Analysis for:

Crown Castle Site: **876361 – Seymour 2 / Oxford Town Garage**

Verizon Wireless Site: **Oxford W CT**

Fox Hill Telecom, Inc ("Fox Hill") was directed to analyze the proposed upgrades for Verizon Wireless to the Crown Castle facility located at **20 Great Oak Road, Oxford, CT**, for the purpose of determining whether the emissions from the Proposed Verizon Wireless Antenna Installation, in addition to all existing radio systems located on this property, are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general population may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general population would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

General population exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 700 MHz band & the 850 MHz cellular band are approximately 497 $\mu W/cm^2$ and 586 $\mu W/cm^2$ respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS), and 3700 MHz C bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report the percentage of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were performed for the proposed upgrades to the Crown Castle facility for Verizon Wireless located at **20 Great Oak Road, Oxford, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65 for far field modeling calculations.

In OET-65, plane wave power densities in the far field of an antenna are calculated by considering antenna gain and reflective waves that would contribute to exposure.

Since the radiation pattern of an antenna has developed in the **far field** region the power gain in specific directions needs to be considered in exposure predictions to yield an Effective Radiated Power (ERP) in each specific direction from the antenna. Also, since the vertical radiation pattern of the antenna is considered, the exposure calculations would most likely be reduced significantly at ground level, resulting in a more realistic estimate of the actual exposure levels. To determine a worst-case scenario at each point along the calculation radials, each point was calculated using the antenna gain value at each angle of incident and compared against the result using an isotropic radiator at the antenna height with the greater of the two used to yield the more pessimistic far field value for each point along the calculation radial.

Additionally, to model a truly "worst case" prediction of exposure levels at or near a surface, such as at ground-level or on a rooftop, reflection off the surface of antenna radiation power can be assumed, resulting in a potential 1.6 times increase in power density in calculating far field power density values.

With these factors considered, the worst case **far field prediction model** utilized in this analysis is determined by the following equation:

Equation 9 per FCC OET65 for Far Field Modeling

$$S = \frac{33.4\ ERP}{R^2}$$

S = Power Density (in μw/cm^2)
ERP = Effective Radiated Power from antenna (watts)
R = Distance from the antenna (meters)

Predicted far field power density values for all carriers identified in this report were calculated 6 feet above the ground level and are displayed as a percentage of the applicable FCC standards. All emissions values for other carriers were calculated using the same Far Field model outlined above, using industry standard radio configurations and frequency band selection based upon available licenses in this geographic area for emissions contribution estimates.

For each Verizon Wireless sector, the following channel counts, frequency bands and power levels were utilized as shown in *Table 1*:

Technology	Frequency Band	Channel Count	Transmit Power per Channel (W)
LTE	700 MHz	4	40
LTE / 5G	850 MHz	4	40
LTE	1900 MHz (PCS)	4	40
LTE	2100 MHz (AWS)	4	40
5G	3700 MHz (C Band)	8	40

Table 1: Channel Data Table

The following **Verizon Wireless** antennas listed in *Table 2 – Antenna Data* were used in the modeling for transmission in the 700 MHz, 850 MHz, 1900 MHz (PCS), 2100 MHz (AWS) and 3700 MHz (C Band) frequency bands. This is based on feedback from Verizon Wireless regarding anticipated antenna selection. Maximum gain values for all antennas are listed in *Table 3 – Verizon Wireless Inventory and Power Data* below.

Sector	Antenna Number	Antenna Make / Model	Antenna Centerline (ft)
A	1	JMA MX06FHG665-HG	140
A	2	JMA MX06FHG665-HG	140
A	3	Samsung MT6413-77A	140
B	1	JMA MX06FHG665-HG	140
B	2	JMA MX06FHG665-HG	140
B	3	Samsung MT6413-77A	140
C	1	JMA MX06FHG665-HG	140
C	2	JMA MX06FHG665-HG	140
C	3	Samsung MT6413-77A	140

Table 2: Antenna Data

All calculations were done with respect to uncontrolled / general population threshold limits.

RESULTS

Per the calculations completed for the proposed Verizon Wireless configurations *Table 3* shows resulting emissions power levels and percentages of the FCC's allowable general population limit.

Antenna ID	Antenna Make / Model	Frequency Bands	Antenna Gain (dBd)	Channel Count	Total TX Power (W)	ERP (W)	MPE %
Antenna A1	JMA MX06FHG665-HG	700 MHz / 850 MHz	13.35 / 13.65	8	320	7,168.18	2.23
Antenna A2	JMA MX06FHG665-HG	1900 MHz (PCS) / 2100 MHz (AWS)	16.85 / 17.45	8	320	16,641.23	1.14
Antenna A3	Samsung MT6413-77A	3700 MHz (C Band)	23.15	2	320	66,092.16	2.55
						Sector A Composite MPE%	**5.92**
Antenna B1	JMA MX06FHG665-HG	700 MHz / 850 MHz	13.35 / 13.65	8	320	7,168.18	2.23
Antenna B2	JMA MX06FHG665-HG	1900 MHz (PCS) / 2100 MHz (AWS)	16.85 / 17.45	8	320	16,641.23	1.14
Antenna B3	Samsung MT6413-77A	3700 MHz (C Band)	23.15	2	320	66,092.16	2.55
						Sector B Composite MPE%	**5.92**
Antenna C1	JMA MX06FHG665-HG	700 MHz / 850 MHz	13.35 / 13.65	8	320	7,168.18	2.23
Antenna C2	JMA MX06FHG665-HG	1900 MHz (PCS) / 2100 MHz (AWS)	16.85 / 17.45	8	320	16,641.23	1.14
Antenna C3	Samsung MT6413-77A	3700 MHz (C Band)	23.15	2	320	66,092.16	2.55
						Sector C Composite MPE%	**5.92**

Table 3: Verizon Wireless Inventory and Power Data table

Table 4: All Carrier MPE Contributions shows all additional identified carriers on site and their emissions contribution estimates, along with the newly calculated maximum Verizon Wireless far field emissions contributions per this report. FCC OET 65 specifies that for carriers utilizing directional antennas the highest recorded sector value be used for composite site emissions values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. For this site, all three Verizon Wireless sectors have the same configuration yielding the same results for all three sectors. *Table 5* below shows a summary for each Verizon Wireless Sector as well as the composite estimated emissions value for the site.

Site Composite MPE%	
Carrier	**MPE%**
Verizon Wireless – Max Per Sector Value	**5.92 %**
T-Mobile	4.29 %
AT&T	7.38 %
Dish Wireless	2.91 %
Site Total MPE %:	**20.50 %**

Table 4: All Carrier MPE Contributions

Verizon Wireless Sector A Total:	5.92 %
Verizon Wireless Sector B Total:	5.92 %
Verizon Wireless Sector C Total:	5.92 %
Site Total:	20.50 %

Table 5: Site MPE Summary

Table 6 below details a breakdown by frequency band and technology for the MPE power values for the maximum calculated Verizon sector(s). For this site, all three Verizon Wireless sectors have the same configuration yielding the same results for all three sectors.

Verizon Wireless _ Frequency Band / Technology Max Power Values (Per Sector)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
Verizon Wireless 700 MHz LTE	4	865.09	140	6.06	700 MHz	497	1.22%
Verizon Wireless 850 MHz LTE / 5G	4	926.96	140	5.92	850 MHz	586	1.01%
Verizon Wireless 1900 MHz (PCS) LTE	4	1,936.69	140	5.70	1900 MHz (PCS)	1000	0.57%
Verizon Wireless 2100 MHz (AWS) LTE	4	2,223.62	140	5.70	2100 MHz (AWS)	1000	0.57%
Verizon Wireless 3700 MHz (C Band) 5G	2	33,046.08	140	25.50	3700 MHz (C Band)	1000	2.55%
						Total:	**5.92 %**

Table 6: Verizon Wireless Maximum Sector MPE Power Values

Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general population exposure to RF Emissions.

The anticipated maximum composite contributions from the Verizon Wireless facility as well as the site composite emissions estimates value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:

Verizon Wireless Sector	Power Density Value (%)
Sector A:	5.92 %
Sector B:	5.92 %
Sector C:	5.92 %
Verizon Wireless Maximum Total (per sector):	5.92 %
Site Total:	20.50 %
Site Compliance Status:	**COMPLIANT**

The estimated composite emissions value for this site, assuming all carriers present, is **20.50 %** of the allowable FCC established general population limit sampled at the ground level. This is based upon the far field calculations performed for all carriers identified in this report.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite estimated values calculated were well within the allowable 100% threshold standard per the federal government.

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