



STATE OF CONNECTICUT  
*CONNECTICUT SITING COUNCIL*

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**VIA ELECTRONIC MAIL**

April 20, 2023

Ersilia Davis  
Project Manager  
Network Building & Consulting  
1777 Sentry Parkway VEVA 17, Suite 210  
Blue Bell, PA 19422  
[edavis@nbcllc.com](mailto:edavis@nbcllc.com)

RE: **EM-VER-164-230203** – Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 750 Rainbow Road, Windsor, Connecticut.

Dear Ersilia Davis:

The Connecticut Siting Council (Council) is in receipt of your correspondence of April 20, 2023 submitted in response to the Council's April 18, 2023 notification of an incomplete request for exempt modification with regard to the above-referenced matter.

The submission renders the request for exempt modification complete and the Council will process the request in accordance with the Federal Communications Commission 60-day timeframe.

Thank you for your attention and cooperation.

Sincerely,

A handwritten signature in black ink, appearing to read "Melanie Bachman".

Melanie Bachman  
Executive Director

MAB/ANM/laf

**From:** Ersilia Davis <edavis@nbcllc.com>

**Sent:** Thursday, April 20, 2023 2:16 PM

**To:** Fontaine, Lisa <Lisa.Fontaine@ct.gov>

**Cc:** CSC-DL Siting Council <Siting.Council@ct.gov>

**Subject:** RE: Council 2nd Incomplete - EM-VER-164-230203 Verizon/Rainbow Rd., Windsor

Good afternoon Lisa

Please see attached RF Analysis that includes a cumulative far-field analysis for all entities located on the tower

**Ersilia Davis**

*Project Manager*

**NETWORK BUILDING + CONSULTING**

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FOX HILL TELECOM

## Radio Frequency Emissions Analysis Report



Crown Site ID: 842877 - Windsor North

Verizon Wireless Site Name: Windsor 2 CT

Verizon Wireless FUZE ID: 16092552

750 Rainbow Road  
Windsor, CT 06095

April 20, 2023

Fox Hill Telecom Project Number: 230370

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general population allowable limit:	40.49 %



April 20, 2023

Crown Castle  
1800 W. Park Drive  
Westborough, MA 01581

## Emissions Analysis for Site: **Crown Castle 842877 - Windsor North / Verizon Wireless Windsor 2 CT**

Fox Hill Telecom, Inc (“Fox Hill”) was directed to analyze the proposed upgrades for Verizon Wireless to the Crown Castle facility located at **750 Rainbow Road, Windsor, 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 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ). The number of  $\mu\text{W}/\text{cm}^2$  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 ( $\mu\text{W}/\text{cm}^2$ ). The general population exposure limits for the 700 MHz & 850 MHz bands are approximately  $467 \mu\text{W}/\text{cm}^2$  and  $567 \mu\text{W}/\text{cm}^2$  respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS), 3500 MHz CBRS and 3700 MHz Band bands is  $1000 \mu\text{W}/\text{cm}^2$ . Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.



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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 **750 Rainbow Road, Windsor, 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

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

S = Power Density (in  $\mu\text{w}/\text{cm}^2$ )

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.



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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
LTE	3400 MHz (CBRS)	2	5
5G	3700 MHz (C Band)	8	20

*Table 1: Channel Data Table*



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The following **Verizon Wireless** antennas listed in *Table 2* were used in the modeling for transmission in the 700 MHz, 850 MHz, 1900 MHz (PCS), 2100 MHz (AWS), 3500 MHz (CBRS) 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 the Inventory and Power Data table below.

Sector	Antenna Number	Antenna Make / Model	Antenna Centerline (ft)
A	1	Commscope NHH-65B-R2B	83
A	2	Commscope NHHSS-65B-R2BT4	83
A	3	Samsung MT6407-77A	83
A	4	Antel LPA-80063/6CF (Dormant)	83
B	1	Commscope NHH-65B-R2B	83
B	2	Commscope NHHSS-65B-R2BT4	83
B	3	Samsung MT6407-77A	83
B	4	Antel LPA-80063/6CF (Dormant)	83
C	1	Commscope NHH-65B-R2B	83
C	2	Commscope NHHSS-65B-R2BT4	83
C	3	Samsung MT6407-77A	83
C	4	Antel LPA-80063/6CF (Dormant)	83

*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	Commscope NHH-65B-R2B	700 MHz / 850 MHz / 1900 MHz (PCS)	12.75 / 12.85 / 15.75	8	320	9,062.34	2.86
Antenna A2	Commscope NHHSS-65B-R2BT4	700 MHz / 850 MHz / 2100 MHz (AWS) / 3500 MHz (CBRS)	12.65 / 13.05 / 15.85 / 15.55	9	326	9,456.13	2.99
Antenna A3	Samsung MT6407-77A	3700 MHz (C Band)	23.15	8	132	27,263.02	1.94
Antenna A4	Antel LPA-80063/6CF	NA	NA	0	0	0.00	0.00
Sector A Composite MPE%							<b>7.79</b>
Antenna B1	Commscope NHH-65B-R2B	700 MHz / 850 MHz / 1900 MHz (PCS)	12.75 / 12.85 / 15.75	8	320	9,062.34	2.86
Antenna B2	Commscope NHHSS-65B-R2BT4	700 MHz / 850 MHz / 2100 MHz (AWS) / 3500 MHz (CBRS)	12.65 / 13.05 / 15.85 / 15.55	9	326	9,456.13	2.99
Antenna B3	Samsung MT6407-77A	3700 MHz (C Band)	23.15	2	120	24,784.56	1.94
Antenna B4	Antel LPA-80063/6CF	NA	NA	0	0	0.00	0.00
Sector B Composite MPE%							<b>7.79</b>
Antenna C1	Commscope NHH-65B-R2B	700 MHz / 850 MHz / 1900 MHz (PCS)	12.75 / 12.85 / 15.75	8	320	9,062.34	2.86
Antenna C2	Commscope NHHSS-65B-R2BT4	700 MHz / 850 MHz / 2100 MHz (AWS) / 3500 MHz (CBRS)	12.65 / 13.05 / 15.85 / 15.55	9	326	9,456.13	2.99
Antenna C3	Samsung MT6407-77A	3700 MHz (C Band)	23.15	2	120	24,784.56	1.94
Antenna C4	Antel LPA-80063/6CF	NA	NA	0	0	0.00	0.00
Sector C Composite MPE%							<b>7.79</b>

Table 3: Verizon Wireless Inventory and Power Data



The following table (*Table 4*) 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.

<b>Site Composite MPE%</b>	
<b>Carrier</b>	<b>MPE%</b>
Verizon Wireless – Max Per Sector Value	<b>7.79 %</b>
T-Mobile	11.69 %
Dish	9.76 %
AT&T	7.76 %
Town Antennas	3.49 %
<b>Site Total MPE %:</b>	<b>40.49 %</b>

*Table 4: All Carrier MPE Contributions*

Verizon Wireless Sector A Total:	7.79 %
Verizon Wireless Sector B Total:	7.79 %
Verizon Wireless Sector C Total:	7.79 %
<b>Site Total:</b>	<b>40.49 %</b>

*Table 5: Site MPE Summary*



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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 ( $\mu\text{W}/\text{cm}^2$ )	Frequency (MHz)	Allowable MPE ( $\mu\text{W}/\text{cm}^2$ )	Calculated % MPE
Verizon Wireless 700 MHz LTE	4	744.89	83	9.72	700 MHz	467	2.08%
Verizon Wireless 850 MHz LTE / 5G	4	789.18	83	9.70	850 MHz	567	1.71%
Verizon Wireless 1900 MHz (PCS) LTE	4	1,503.35	83	9.70	1900 MHz (PCS)	1000	0.97%
Verizon Wireless 2100 MHz (AWS) LTE	4	1,538.37	83	9.71	2100 MHz (AWS)	1000	0.97%
Verizon Wireless 3400 MHz (CBRS) LTE	1	215.35	83	1.20	3400 MHz (CBRS)	1000	0.12%
T-Mobile 3700 MHz (C Band) 5G	8	3,407.88	83	19.40	3700 MHz (C Band)	1000	1.94%
						<b>Total:</b>	<b>7.79 %</b>

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:	7.79 %
Sector B:	7.79 %
Sector C:	7.79 %
Verizon Wireless Maximum Total (per sector):	7.79 %
Site Total:	40.49 %
Site Compliance Status:	<b>COMPLIANT</b>

The estimated composite emissions value for this site, assuming all carriers present, is **40.49 %** 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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