

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

IN RE:	:	
	:	
A PETITION OF CROWN CASTLE FOR A	:	PETITION NO. 1552
DECLARATORY RULING ON THE NEED TO	:	
OBTAIN A SITING COUNCIL CERTIFICATE	:	
FOR THE MODIFICATION OF AN EXISTING	:	
TELECOMMUNICATIONS FACILITY AT 845	:	
ETHAN ALLEN HIGHWAY, RIDGEFIELD,	:	
CONNECTICUT	:	FEBRUARY 15, 2023

**RESPONSES OF CROWN CASTLE TO
CONNECTICUT SITING COUNCIL INTERROGATORIES**

On January 25, 2023, the Connecticut Siting Council (“Council”) issued Interrogatories to Crown Castle (“Crown”), relating to Petition No. 1552. Below are Crown’s responses.

Notice

Question No. 1

Referencing page 8 and Attachment 8 of the Petition, has the Town of Ridgefield, the host property owner and/or abutters provided comments to Crown Castle (Crown) and Cellco Partnership d/b/a Cellco Wireless (Cellco) (collectively, the Petitioner) since the Petition filing? If so, please summarize the comments.

Response

As of the date of this filing, the Petitioner has not received any comments from the Property Owner or abutting property owners. The Petitioner did receive comments from Ridgefield’s Director of Planning and Zoning dated December 16, 2022. A copy of the Town’s comment letter is included in Attachment 1.

Project Development

Question No. 2

What is the estimated cost of the proposed project?

Response

Crown estimates its cost for the project costs to be approximately \$398,000.

Question No. 3

Is the project, or any portion of the project, proposed to be undertaken by state departments, institutions or agencies, or to be funded in whole or in part by the state through any contract or grant?

Response

No.

Question No. 4

Provide typical construction workdays and hours, and the anticipated duration of construction.

Response

Construction would occur between 7 a.m. and 7 p.m. Monday through Saturday.

Question No. 5

Page 2 of the Petition references Sprint antennas. Have those antennas been decommissioned or repurposed since the merger with T-Mobile?

Response

No. Both Sprint and T-Mobile tower lease agreements remain active at 845 Ethan Allen Highway.

Question No. 6

Would AT&T, T-Mobile and Sprint, as applicable, cutover their existing antennas and equipment from the existing facility to the proposed replacement facility?

Response

If the proposed replacement tower is approved by the Council, the existing carriers would be given the opportunity to expand their antenna configuration from the existing internal/flush-mounts inside the flagpole tower to exterior flush-mounted antennas or a full array on an antenna platform. It is unclear at this point how the existing carriers will modify their antenna configurations. When that occurs, additional site modification filings would need to be made with the Council.

Question No. 7

Would a temporary tower facility be required to maintain services provided by AT&T, T-Mobile and Sprint, as applicable, during the cutover of carrier equipment to the replacement facility?

Response

Crown does not anticipate the need for a temporary facility to maintain continuity of service. The existing tower will remain operational during construction of the replacement tower.

Question No. 8

When would AT&T, T-Mobile and Sprint, as applicable, relocate their antennas to the replacement facility? How long will it take to switch the equipment? Would customers experience service outages?

Response

Crown does not anticipate any interruption in AT&T, Sprint or T-Mobile service. Crown expects the existing carriers will install antennas and related equipment onto the replacement tower prior to terminating service from the existing antennas.

Question No. 9

When would the existing tower be removed?

Response

Crown expects that the existing flagpole tower would be removed within 90 days of the full activation of all carrier antennas and equipment to the new tower.

Existing Facility Site

Question No. 10

Provide the number of residences within 1,000 feet of the existing site.

Response

There are six (6) residences within 1,000 feet of the existing tower site.

Question No. 11

When did Crown acquire the existing facility from Omnipoint Communications?

Response

Crown acquired its interest in the existing tower site from Omnipoint on November 30, 2012.

Question No. 12

Provide photographs of the existing facility and the proposed compound expansion area. Use stakes to show the limits of the expansion area.

Response

See Remote Field Review photographs included in Attachment 2.

Question No. 13

If the replacement facility were to be of the same flagpole design as the existing facility, what height would be required for Cellco to meet its service objectives and approximately how much would it cost?

Response

For Cellco to utilize all of its operating frequencies, the tower height would need to be increased to at least 130 feet, 20 feet taller than proposed in Petition No. 1552. Without evaluating each carriers' specific needs in the area, it is difficult to settle on a specific height of the flagpole tower described in this question. It is safe to say, however, that a new flagpole tower would need to be between 20 feet and 50 feet taller than the existing structure if each carrier was required to install flush-mounted antennas. In order for each carrier utilize all of their respective operating frequencies, the carriers would each need to occupy two or three antenna separate antenna centerline locations on a flagpole tower. Utilizing antenna heights lower on the existing flagpole tower pushes antennas to heights of approximately 76 feet and below the height or area trees. To accommodate multiple carriers, each with the need to occupy multiple antenna heights, the tower would simply have to be taller than proposed in the Petition.

Question No. 14

When the existing facility is decommissioned and removed, would the existing tower foundation remain? Explain.

Response

Yes. To avoid disruption of existing equipment within the existing facility compound

Crown would remove the existing tower once the new structure is operational but would leave the existing tower foundation in place.

Proposed Replacement Facility

Question No. 15

Provide the distance and direction from the proposed replacement facility expansion area to the nearest residential property line.

Response

The nearest residential property line, located at 195 Haviland Road, is approximately 371 feet to the southwest of the replacement tower, and separated by dense woodlands on the undeveloped intervening parcel owned by the Town of Ridgefield. *See Attachment 3.*

Question No. 16

Referencing Petition page 3, would Cellco's collocation on the proposed replacement facility provide 5G service on the 3600 MHz band only or also on other frequencies?

Response

Cellco intends to provide 5G services using its 850 MHz and 3600 MHz frequency ranges on the proposed replacement tower.

Question No. 17

Approximately when was the search ring established for the Cellco installation?

Response

Cellco established its search ring in this area and began speaking with Crown about replacing the existing tower in December of 2021.

Question No. 18

Were other potential sites considered for the proposed Cellco installation? If so, please

identify the other potential sites and why they were rejected.

Response

No. Early in the site search process, Cellco identified the existing facility as a structure that would satisfy its wireless service objectives and began working with Crown to modify the existing tower. Cellco did not therefore investigate alternative tower locations and focused its efforts on modifications to this existing Crown structure.

Question No. 19

Referencing Petition page 2, could the proposed replacement facility accommodate the current concealment configuration of the antennas behind a RF transparent screening shroud? What type of antenna mounts would AT&T, T-Mobile and Sprint, if applicable, utilize on the proposed replacement facility, if known at this time?

Response

No, the proposed replacement tower would not provide for any concealment opportunities similar to the existing flagpole tower. As discuss above in response to Q.6, the existing carriers will have the opportunity to maintain their antennas in a flush-mounted configuration on the replacement tower or utilize a more traditional antenna mounting platform.

Question No. 20

What is the maximum number of tenants the replacement tower can support?

Response

The replacement tower would be designed to accommodate a minimum of four (4) wireless carriers with additional capacity build in for future growth for each carrier, or a fifth carrier if one come into the Connecticut market.

Question No. 21

Have any other carriers, emergency service providers or the Town expressed an interest in locating at the replacement facility?

Response

No.

Public Safety

Question No. 22

Provide a rigorous cumulative far-field radio frequency analysis for the facility that accounts for Celco's and all other entities equipment on the tower, accounting for a 6-foot tall person at ground level and the actual antenna patterns for the facility with a cumulative %MPE at or below 100%. Identify the distance from the tower with the highest cumulative %MPE.

Response

See Attachment 4.

Question No. 23

Could the construction or operation of the proposed facility impact or interfere with any existing utilities or infrastructure within the development area? If so, identify any measures that would be employed to protect existing utilities or infrastructure from impact or interference.

Response

No. Prior to the start of construction, all existing utilities and other site infrastructure will be located on final construction plans and drawings so that adequate and proper measure can be incorporated into construction sequencing to avoid impacts and interference.

Question No. 24

Does AT&T offer FirstNet services from the existing facility? Could the replacement

facility accommodate any additional equipment that might be required to provide FirstNet services?

Response

AT&T does not currently have First Net services deployed on the existing tower site. A more robust tower, like the proposed Crown replacement, is preferable for any future network growth, including AT&T's FirstNet capabilities.

Question No. 25

Would Celco's, proposed co-location(s) at the replacement tower support text-to-911 service? Is additional equipment required for this purpose?

Response

Yes, Celco's proposed installation will support text-to-911 service and can do so without the installation of any additional equipment.

Question No. 26

Would Celco's antennas comply with federal E911 requirements?

Response

Yes.

Question No. 27

Would Celco's installation(s) comply with the intent of the Warning, Alert and Response Network Act of 2006?

Response

Yes.

Question No. 28

Would the replacement facility, including Celco's proposed equipment, comply with

Department of Energy and Environmental Protection (DEEP) noise control standards at the property boundaries?

Response

A noise study has not been performed for the existing or the proposed modified facility at the Property. That said, Crown is confident that all of the carriers' radio equipment at the modified facility will comply the State Noise Standards. As the Council is aware, noise generated by emergency backup generators, is exempt from State noise regulations.

To ensure compliance, Crown would accept, as a condition of the Council's approval of Petition No. 1552, a requirement that a Noise Study be completed and submitted to the Council prior to the commencement of construction activity of the facility modifications.

Question No. 29

What measures are proposed for the site to ensure security and deter vandalism?
(Including alarms, gates, locks, anti-climb fence design, etc.)

Response

The expanded facility compound will be surrounded by a six-foot tall chain link security fence and gate. The compound gate will remain locked at all times and restrict access to the carriers using the tower and Crown. Wireless service equipment will maintain silent intrusion alarms that are monitored remotely. Climbing pegs will be removed from the bottom portion of the tower to deter unauthorized climbing of the tower.

Question No. 30

Referencing Attachment 3 of the Petition, Sheet R-1, could the tower be designed with a yield point to ensure that the tower setback radius remains within the boundaries of the subject property? If yes, at what height would the yield point be located, and what would the

incremental cost the yield point be?

Response

Yes, the tower could be designed with a yield point if required by the Council. If incorporated into the design, a yield point at approximately 80 feet above ground level, would be required to ensure that the tower setback remained on the Property. The closest property line from the proposed replacement tower is approximately 84 feet to the north. The design and fabrication of a tower with a yield point would add between 10% and 15% to the tower cost.

Question No. 31

Referencing the DEEP National Flood Insurance Program letter dated December 5, 2022, paragraph two, would the proposed replacement tower and proposed equipment platform be designed to resist collapse, lateral movement and buoyancy affect associated with the 2 feet/sec velocity flow for this location?

Response

Yes. The proposed Cellco equipment platform will be designed to resist collapse, lateral movement and buoyancy affects associated with the 2 feet/sec velocity flows for this location.

Question No. 32

Identify the safety standards and/or codes by which equipment, machinery or technology that would be used or operated at the proposed facility.

Response

- 2021 International Building Code (IBC), as amended by the 2022 Connecticut State Building Code.
- 2020 National Electric Code (NFPA 70), as amended by the 2022 Connecticut State Building Code.

- 2021 International Mechanical Code, as amended by the 2022 Connecticut State Building Code.
- 2022 Connecticut State Fire Prevention Code.
- 2022 Connecticut State Fire Safety Code.
- ANSI/TIA-222-H "Structural Standard for Antenna Supporting Structures and Antennas and Small Wind Turbine Support Structures".
- Occupational Safety and Health Administration (OSHA).

Backup Power

Question No. 33

Referencing Attachment 3 of the Petition, Sheet C-2, please respond to the following regarding Cellco's proposed propane-fueled emergency backup generator:

- At what duration would the backup generator run weekly for maintenance purposes (e.g. 20 to 30 minutes per week)?
- Would the backup generator have containment measures to protect against fluid leakage?
- Based on the 360 gallons of propane tank capacity, how long could the proposed generator operate at full load before refueling would be required?

Response

- Cellco's backup generator is exercised once every other week for maintenance purposes, 20 to 30 minutes per session.
- The fueling source for the proposed emergency generator is propane as opposed to diesel due to the proximity of the existing wetlands. In addition, the generator

controller which is accessed remotely has alarms for all engine issues including detecting fluid leakages.

- c. The proposed generator could operate at full load for approximately 30 hours based on the 360-gallon propane tank capacity before refueling would be required.

Question No. 34

Would a battery backup be used to provide uninterrupted power for Cellco. How long could the battery backup alone supply power to the facility?

Response

Yes. The on-site battery cabinet can provide 4 to 8 hours of back-up power depending upon load.

Environmental

Question No. 35

Quantify the total amounts of cut and fill that would be required to develop the proposed facility and the compensatory flood storage area. Would any net cut material need to be removed from the site, or would all net cut material be reused on the host property?

Response

The volume of excavation required to construct the compound expansion and the required storage is 59.7 cubic yards. A total of 23.4 cubic yards of fill is required to construct the compound expansion area. Any excess cut material will need to be removed from the site.

Question No. 36

How would Petitioner maintain the proposed compensatory flood storage area?

Response

The flood compensatory storage area will be planted with native wetland vegetation to

function as a natural floodplain wetland system in support of the adjacent Norwalk River. Once the native vegetation is established and the soil surface is stabilized with vegetation, this area would not require regular maintenance.

Question No. 37

Referencing Attachment 5 of the Petition, Viewshed Map, describe the change in visibility, if any, of the proposed facility versus the existing facility from Martin Park. Provide the distance and direction from the proposed replacement facility to Martin Park.

Response

Martin Park is comprised of multiple parcels. The nearest parcel boundary, along Ethan Allen Highway is approximately 260 feet to the northeast of the proposed replacement facility. This is a mostly wooded parcel that is also developed with the parking lots associated with Martin Park. The proposed replacement facility is approximately 750 feet west of the nearest point to the parking lots.

No substantive changes in visibility would occur within Martin Park. Any change in visibility of the proposed facility versus the existing facility will be minimal and isolated to the vehicular parking area, due to the combination of the proposed 10-foot height increase and slight location shift of the monopole. Regardless, any views would remain seasonal (when the leaves are off the deciduous trees), as is the case today.

Question No. 38

What, if any, stealth tower design options would be feasible to employ at this site? Please provide costs related to each stealth tower design.

Response

Optional designs intended to camouflage the tower (e.g., unipoles with interior mounted

antennas similar to the existing facility, monopines, or other styles) are technically feasible to construct at this site. However, these designs are intended to either disguise the facility or at least soften its visual effect, requiring it to have context with the surrounding environment. The existing facility's unipole design was sufficient when initially constructed; however, in order for a similar unipole to be deployed that would account for the current and future needs of the wireless carriers, it would require a substantial increase in pole diameter and tower height to accommodate the quantity and dimensions of internal antenna arrays necessary to achieve each carrier's services to the area. *See* also Crown's response to Q. 13 above.

A monopine would increase the bulk of the tower due to the increased diameter of the pole, the addition of branches (which could extend out 10 to 16 feet or more in all directions; resulting in a total profile width of 25 to 37 feet), and potentially an increase to the top height of the facility if the branching is added to create a natural, conical shape. From a context perspective, the surrounding area is comprised primarily of deciduous trees and the introduction of a faux conifer would not naturally "blend in" with the existing environment. Similarly, other alternate designs (e.g., silo, fire tower) would also create large profiles and likely draw more visual attention given its anomalous appearance relative to its surroundings.

Question No. 39

Would visibility of the proposed replacement tower be reduced if it was painted? If so, what colors are available that may reduce visibility? Would Crown be willing to paint the replacement tower and wireless carrier panel antennas/mounting equipment?

Response

The visibility of the proposed replacement tower would not be reduced by painting the tower as it relates to an overall reduction in visibility. If the lower portion of the tower (perhaps,

below the tree line) were to be painted a solid brown or gray color, it could help to soften seasonal views of the facility from nearby areas with intervening vegetation or trees as a backdrop. However, from locations with unobstructed views, the contrast may draw more attention. Views of the extended tower (should it be approved) would be virtually unchanged from existing conditions and isolated to areas within the immediate vicinity, primarily along the Route 7 corridor, which is commercially developed. Although Crown would be willing to paint the replacement tower and wireless carrier panel antennas/mounting equipment, it is our opinion that no benefit would result in terms of minimizing visibility.

Question No. 40

Identify the nearest “Important Bird Area” as designated by the National Audubon Society?

Response

The closest Important Bird Area (“IBA”) to the host property is The Nature Conservancy’s Devil’s Den Preserve in Weston and Redding located approximately 4.6 miles to the southeast. This preserve is The Nature Conservancy's largest contiguous preserve in Connecticut and is part of the largest tract of protected land in densely developed Fairfield County. Devil's Den Preserve supports large populations of all of Connecticut’s forest interior nesting bird species. Due to its distance from the host property and the proposed minor 10’ extension to an existing monopole which has been in existence for over 20 years, this IBA would not experience an adverse impact resulting from the proposed Replacement Facility. Please refer to the attached Avian Resources Evaluation, dated February 5, 2023, for additional details documenting the proposed Replacement Facility will not adversely affect migratory birds.

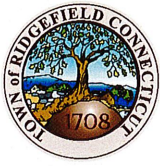
Question No. 41

Would the proposed replacement tower comply with the USFWS Recommended Best Practices for Communication Tower Design, Siting, Construction, Operation, Maintenance and Decommissioning? (available at <https://www.fws.gov/sites/default/files/documents/usfws-communication-tower-guidance.pdf>)

Response

Yes. The replacement tower would comply with the USFWS tower design, siting, construction, operation and maintenance recommended best practices for minimizing the potential impacts to bird species. Please refer to the attached Avian Resources Evaluation, dated February 5, 2023, for additional details documenting the proposed Replacement Facility will not adversely affect migratory birds.

ATTACHMENT 1



TOWN OF RIDGEFIELD
Planning and Zoning Department

December 16, 2022

Mr. Kenneth C. Baldwin
Robinson & Cole, LLP
280 Trumbull Street
Hartford, CT 06103-3597

Re: 845 Ethan Allen Highway
Petition #1552

Dear Mr. Baldwin;

This is in response to your December 1, 2022 letter describing the modifications that are being proposed for the existing telecommunication facility at 845 Ethan Allen Highway.

Original approval for the cell tower was granted December 5, 2000 by the Planning & Zoning Commission, File #20104-SP. Modifications were approved in 2002, 2004, 2011, 2014 and 2019 by zoning permit during the building permit process. Currently, CT Siting Council still has jurisdiction over any modifications to cell towers and their facilities.

The floodplain impacts have been addressed in the petition for a declaratory ruling on December 1, 2022 on page 6, "Floodplain Impact Analysis" and in the All-Points Technology Corp. report of November 21, 2022. The base flood elevation is 492 and this has been used for evaluating the floodplain impacts. This was also used in calculating the compensatory storage which will be located in the fill area adjacent to the wetland boundary along the western property boundary line. Due to the Siting Council's jurisdiction, a floodplain site plan approval will not be needed. The applicant will have National Flood Insurance Program regulations evaluated for compliance.

The existing tower is 100' in height. The proposed tower will be 110' with 9 antennas on a triangular antenna platform. This will be much more visible than the existing "flagpole" tower. We do have the list of abutters in the petition and, as per our conversation today, there has been no concern about the proposed modifications to the existing cell tower and facilities.

Inland-Wetlands does have some concerns due to the proximity of existing wetlands and poorly drained soils on site that will be addressed during an Inland Wetlands review.

Sincerely,

Alice W. Dew,
Director of Planning and Zoning

ATTACHMENT 2



REMOTE FIELD REVIEW



RESPONSE TO INTERROGATORY #12
REDDING/ RT7
845 ETHAN ALLEN HIGHWAY
RIDGEFIELD, CT

PREPARED FOR:
CROWN CASTLE

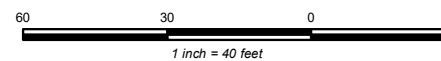


PREPARED BY:
ALL-POINTS TECHNOLOGY CORPORATION, P.C.
567 Vauxhall Street Extension – Suite 311
Waterford, CT 06385



PHOTO LOG

- | | | | |
|-----------------------|----------------------|--|-------------------------------|
| ● Photo Locations | ■ Proposed Monopole | — Proposed Verizon Wireless Lease Area | — Delineated Wetland Boundary |
| ● Photo Point Markers | ■ Proposed Equipment | — Proposed Fence | ■ Approximate Wetland Area |
| ■ Subject Property | ★ Proposed Trees | --- Proposed Conduit | — Proposed Retaining Wall |



Proposed Wireless
Telecommunications Facility
Redding/RTE 7
845 Ethan Allen Highway
Redding, Connecticut



PHOTO

1

DESCRIPTION

LOOKING SOUTHWEST



PHOTO

2

DESCRIPTION

LOOKING SOUTHWEST



PHOTO

3

DESCRIPTION

LOOKING EAST

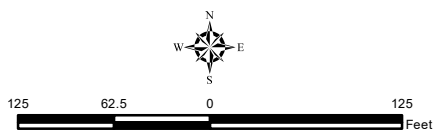
ATTACHMENT 3



Legend

- | | |
|--------------------------------------|-------------------------------------|
| Nearest Residential Property | Proposed Monopole |
| Subject Property | Proposed Verizon Wireless Equipment |
| Proposed Verizon Wireless Lease Area | Existing Equipment (By Others) |
| Proposed Fence | Approximate Parcel Boundary |
| Proposed Conduit | |
| Proposed Retaining Wall | |
| Proposed Tree | |

Map Notes:
 Base Map Source: 2019 Aerial Photograph (CTECO)
 Map Scale: 1 inch = 125 feet
 Map Date: February 2023



Petition No. 1552 Response to Connecticut Siting Council Interrogatory Question #15

Proposed Wireless
 Telecommunications Facility
 Redding/RTE 7
 845 Ethan Allen Highway
 Ridgefield, Connecticut



ATTACHMENT 4



C Squared Systems, LLC
65 Dartmouth Drive
Auburn, NH 03032
(603) 644-2800
support@csquaredsystems.com

Calculated Radio Frequency Emissions Report



Ridgefield 2
845 Ethan Allen Highway, Ridgefield, CT 06877

February 13, 2023

Table of Contents

1. Introduction.....	1
2. FCC Guidelines for Evaluating RF Radiation Exposure Limits	1
3. RF Exposure Prediction Methods	2
4. Antenna Inventory	3
5. Calculation Results.....	4
6. Conclusion.....	6
7. Statement of Certification.....	6
Attachment A: References.....	7
Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)	8
Attachment C: Verizon Antenna Model Data Sheets and Electrical Patterns.....	10

List of Figures

Figure 1: Graph of General Population % MPE vs. Distance.....	4
Figure 2: Graph of FCC Limits for Maximum Permissible Exposure (MPE).....	9

List of Tables

Table 1: Proposed Antenna Inventory	3
Table 2: Maximum Percent of General Population Exposure Values	5
Table 3: FCC Limits for Maximum Permissible Exposure	8

1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed installation of Verizon's antenna arrays to be mounted at 106' AGL on a proposed replacement monopole tower located at 845 Ethan Allen Highway in Ridgefield, CT. The coordinates of the monopole tower are 41° 18' 46.8612" N, 73° 28' 20.4816" W.

Verizon is proposing the following:

- 1) Install twelve (12) multi-band antennas (four (4) per sector) to support its commercial LTE network and the FirstNet National Public Safety Broadband Network ("NPSBN").

This report considers the planned antenna configuration for Verizon, AT&T, Sprint and T-Mobile¹ to derive the resulting % MPE of its proposed installation.

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include Maximum Permissible Exposure (MPE) limits for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based upon those recommended by the National Council on Radiation Protection and Measurements (NCRP), developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

The FCC general population/uncontrolled limits set the maximum exposure to which most people may be subjected. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Public exposure to radio frequencies is regulated and enforced in units of milliwatts per square centimeter (mW/cm²). The general population exposure limits for the various frequency ranges are defined in the attached "FCC Limits for Maximum Permissible Exposure (MPE)" in Attachment C of this report.

Higher exposure limits are permitted under the occupational/controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure, and they must be able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals. Attachment C contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population/uncontrolled exposure and for occupational/controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

¹ As referenced to Verizon's Radio Frequency Design Sheet updated 6/24/2022

3. RF Exposure Prediction Methods

The emission field calculation results displayed in the following figures were generated using the following formula as outlined in FCC bulletin OET 65:

$$\text{Power Density} = \left(\frac{\text{EIRP}}{\pi \times R^2} \right) \times \text{Off Beam Loss}$$

Where:

EIRP = Effective Isotropic Radiated Power

$$R = \text{Radial Distance} = \sqrt{(H^2 + V^2)}$$

H = Horizontal Distance from antenna in meters

V = Vertical Distance from radiation center of antenna in meters

Off Beam Loss is determined by the selected antenna patterns

Ground reflection factor of 1.6

These calculations assume that the antennas are operating at 100 percent capacity, that all antenna channels are transmitting simultaneously, and that the radio transmitters are operating at full power. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. The calculations assume even terrain in the area of study and do not take into account actual terrain elevations which could attenuate the signal. As a result, the predicted signal levels reported below are much higher than the actual signal levels will be from the final installations.

4. Antenna Inventory

Table 1 below outlines Verizon's proposed antenna configuration for the site. The associated data sheets and antenna patterns for these specific antenna models are included in Attachments C.

Operator	Sector / Call Sign	TX Freq (MHz)	Power at Antenna (Watts)	Ant Gain (dBi)	Power EIRP (Watts)	Antenna Model	Beam Width	Mech. Tilt	Length (ft)	Antenna Centerline Height (ft)
Verizon	Alpha / 135°	700	160	15.3	5421.5	MX06FRO860-03	60	0	7.99	106
		850	160	14.5	4509		53.5			
		1900	160	17.9	9865		55			
		2100	240	18.2	15856		55.5			
		3500	20	10.65	232	XXDWMM-12.5-65-8T	61.7	0	-	106
		3700	200	23.35	43254	MT6407-77A	-	0	2.92	106
	Beta / 250°	700	160	15.3	5421.5	MX06FRO860-03	60	0	7.99	106
		850	160	14.5	4509		53.5			
		1900	160	17.9	9865		55			
		2100	240	18.2	15856		55.5			
		3500	20	10.65	232	XXDWMM-12.5-65-8T	61.7	0	-	106
		3700	200	23.35	43254	MT6407-77A	-	0	2.92	106
	Gamma / 335°	700	160	15.3	5421.5	MX06FRO860-03	60	0	7.99	106
		850	160	14.5	4509		53.5			
		1900	160	17.9	9865		55			
		2100	240	18.2	15856		55.5			
		3500	20	10.65	232	XXDWMM-12.5-65-8T	61.7	0	-	106
		3700	200	23.35	43254	MT6407-77A	-	0	2.92	106

Table 1: Proposed Antenna Inventory^{2 3}

² As referenced to Verizon's Radio Frequency Design Sheet updated 6/24/2022

³ Transmit power assumes 0 dB of cable loss.

5. Calculation Results

The calculated power density results are shown in Figure 1 below. For completeness, the calculations for this analysis range from 0 feet horizontal distance (directly below the antennas) to a value of 3,000 feet horizontal distance from the site. In addition to the other worst-case scenario considerations that were previously mentioned, the power density calculations to each horizontal distance point away from the antennas was completed using a local maximum off beam antenna gain (within ± 5 degrees of the true mathematical angle) to incorporate a realistic worst-case scenario.

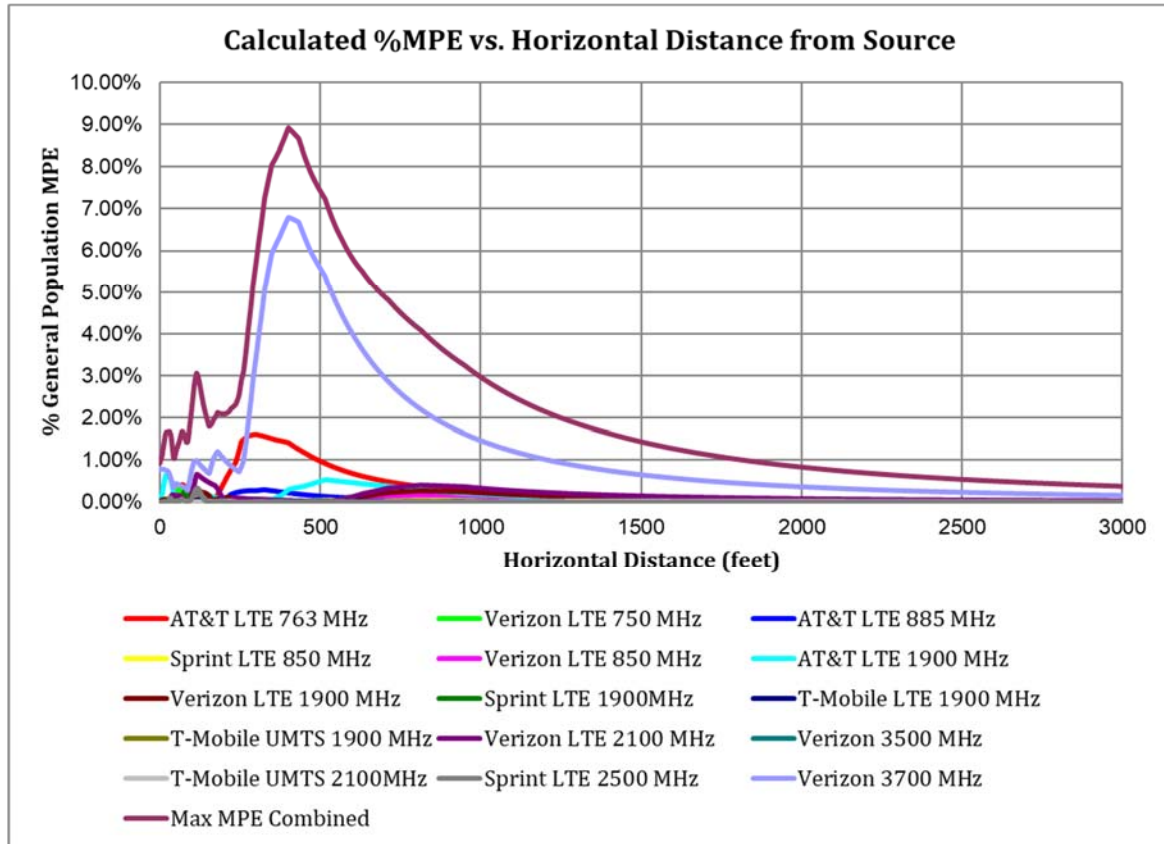


Figure 1: Graph of General Population % MPE vs. Distance

The highest percent of MPE (8.92% of the General Population limit) is calculated to occur at a horizontal distance of 401 feet from antennas. Please note that the percent of MPE calculations close to the site take into account off beam loss, which is determined from the vertical pattern of the antennas used. Therefore, RF power density levels may increase as the distance from the site increases. At distances of approximately 1500 feet and beyond, one would now be in the main beam of the antenna pattern and off beam loss is no longer considered. Beyond this point, RF levels become calculated solely on distance from the site and the percent of MPE decreases significantly as distance from the site increases.

Table 2 below lists percent of MPE values as well as the associated parameters that were included in the calculations. The highest percent of MPE value was calculated to occur at a horizontal distance of 401 feet from the site (reference Figure 1).

As stated in Section 3, all calculations assume that the antennas are operating at 100 percent capacity, that all antenna channels are transmitting simultaneously, and that the radio transmitters are operating at full power. Obstructions (trees, buildings etc.) that would normally attenuate the signal are not taken into account. In addition, a six foot height offset was considered in this analysis to account for average human height. As a result, the predicted signal levels are significantly higher than the actual signal levels will be from the final configuration. The results presented in Figure 1 and Table 2 assume level ground elevation from the base of the tower out to the horizontal distances calculated.

Carrier	Number of Transmitters	Power out of Base Station Per Transmitter (Watts)	Antenna Height (Feet)	Distance to the Base of Antennas (Feet)	Power Density (mW/cm ²)	Limit (mW/cm ²)	% MPE
AT&T LTE 1900 MHz	1	160.0	69.5	401	0.003079	1.000	0.31%
AT&T LTE 763 MHz	1	160.0	69.5	401	0.007213	0.509	1.42%
AT&T LTE 885 MHz	1	40.0	69.5	401	0.001337	0.590	0.23%
Sprint LTE 1900MHz	1	160.0	79.5	401	0.000046	1.000	0.00%
Sprint LTE 2500 MHz	1	120.0	79.5	401	0.000115	1.000	0.01%
Sprint LTE 850 MHz	1	100.0	79.5	401	0.000054	0.567	0.01%
T-Mobile LTE 1900 MHz	1	160.0	96.0	401	0.000158	1.000	0.02%
T-Mobile UMTS 1900 MHz	1	40.0	96.0	401	0.000039	1.000	0.00%
T-Mobile UMTS 2100MHz	1	160.0	96.0	401	0.000014	1.000	0.00%
Verizon 3500 MHz	1	20.0	106.0	401	0.000192	1.000	0.02%
Verizon 3700 MHz	1	200.0	106.0	401	0.067940	1.000	6.79%
Verizon LTE 1900 MHz	1	160.0	106.0	401	0.000374	1.000	0.04%
Verizon LTE 2100 MHz	1	240.0	106.0	401	0.000416	1.000	0.04%
Verizon LTE 750 MHz	1	160.0	106.0	401	0.000028	0.497	0.01%
Verizon LTE 850 MHz	1	160.0	106.0	401	0.000121	0.567	0.02%
						Total	8.92%

Table 2: Maximum Percent of General Population Exposure Values⁴⁵

⁴ Antenna information for AT&T, Sprint and T-Mobile was taken from SiteSafe, Radio Frequency (RF) Site Compliance Report, dated 9/15/2022

⁵ Antenna height for AT&T, Sprint, T-Mobile and Verizon are in reference to Connecticut Siting Council – PETITION NO. 1552

6. Conclusion

The above analysis verifies that RF exposure levels from the site with Verizon's proposed antenna configuration will be well below the maximum permissible levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Using the conservative calculation methods and parameters detailed above, the maximum cumulative percent of MPE in consideration of all transmitters is calculated to be **8.92% of the FCC limit (General Population/Uncontrolled)**. This maximum cumulative percent of MPE value is calculated to occur 401 feet away from the site.

7. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in ANSI/IEEE Std. C95.3, ANSI/IEEE Std. C95.1 and FCC OET Bulletin 65 Edition 97-01.



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Martin J. Lavin
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February 13, 2023
Date

Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

IEEE C95.1-2005, IEEE Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz IEEE-SA Standards Board

IEEE C95.3-2002 (R2008), IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz-300 GHz IEEE-SA Standards Board

Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure⁶

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f ²)*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

(B) Limits for General Population/Uncontrolled Exposure⁷

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz * Plane-wave equivalent power density

Table 3: FCC Limits for Maximum Permissible Exposure

⁶ Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

⁷ General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

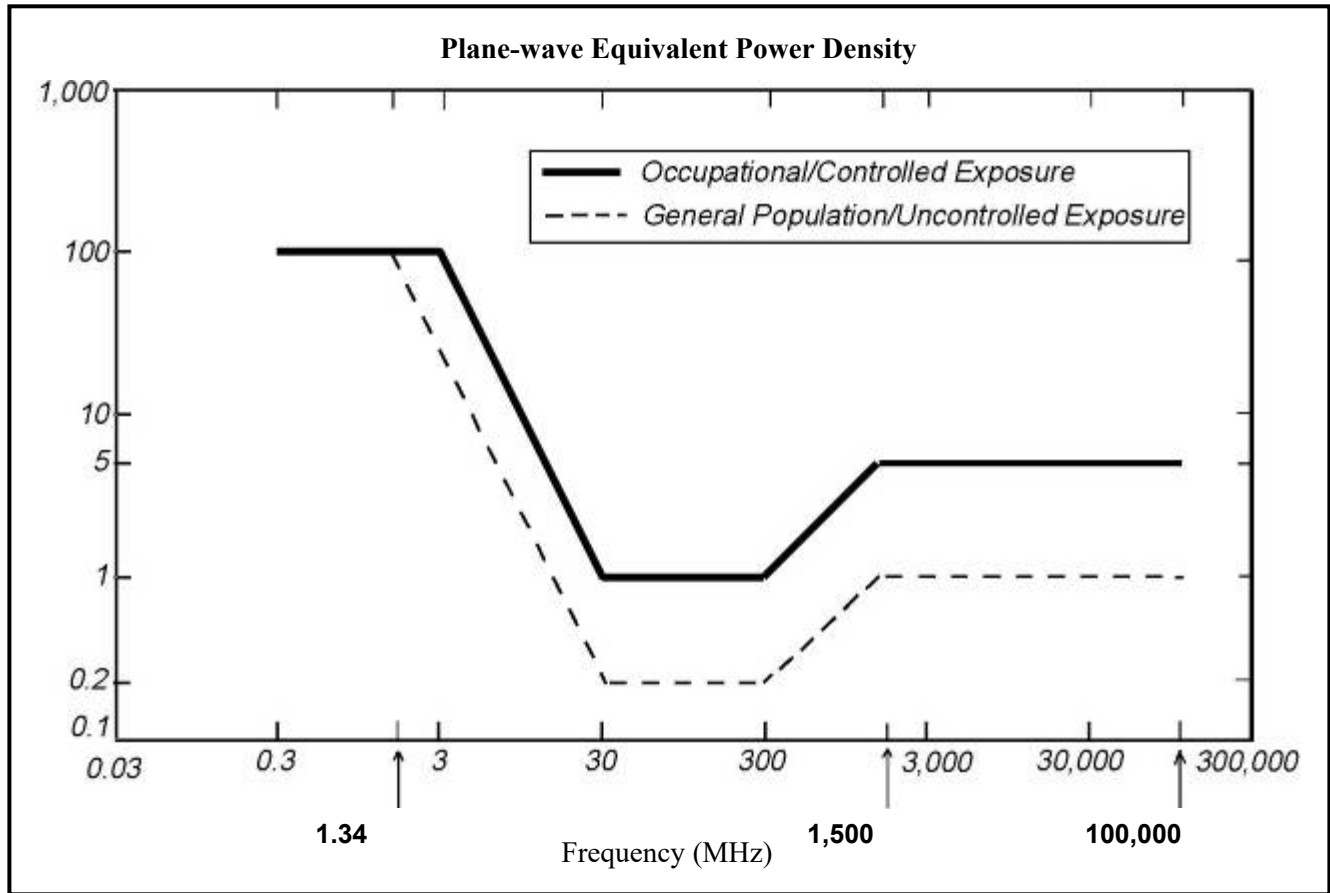
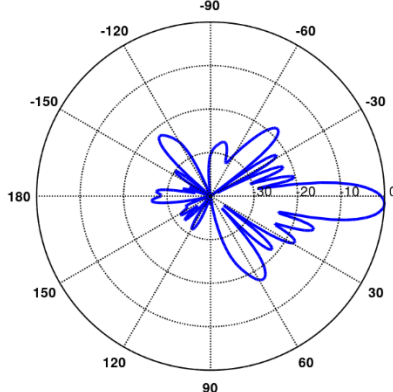
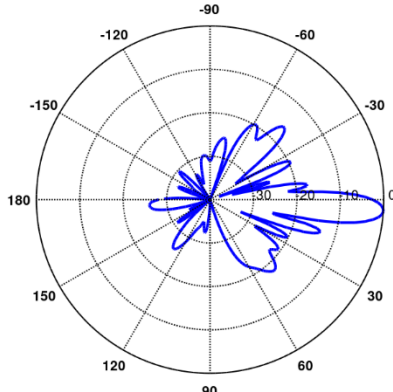
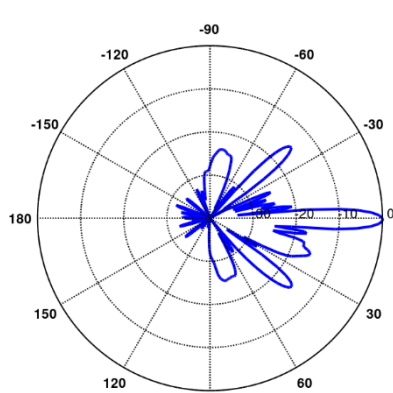


Figure 2: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Verizon Antenna Model Data Sheets and Electrical Patterns

<p>750 MHz</p> <p>Manufacturer: JMA Model #: MX06FRO860-03 Frequency Band: 698-798 MHz Gain: 15.3 dBi Vertical Beamwidth: 9.0° Horizontal Beamwidth: 60° Polarization: ±45° Dimensions (L x W x D): 95.9" x 15.4" x 10.7"</p>	 <p>A polar plot showing the radiation pattern of the 750 MHz antenna. The plot is circular with concentric dashed lines representing gain levels. The radial axis is labeled from 0 to 180 degrees in 30-degree increments. The pattern shows a main lobe centered at 0 degrees, with a peak gain of approximately 15.3 dBi. There are side lobes extending to about ±45 degrees, and the pattern is symmetrical about the 0-degree axis.</p>
<p>885 MHz</p> <p>Manufacturer: JMA Model #: MX06FRO860-03 Frequency Band: 698-798 MHz Gain: 14.5 dBi Vertical Beamwidth: 8.3° Horizontal Beamwidth: 53.5° Polarization: ±45° Dimensions (L x W x D): 95.9" x 15.4" x 10.7"</p>	 <p>A polar plot showing the radiation pattern of the 885 MHz antenna. The plot is circular with concentric dashed lines representing gain levels. The radial axis is labeled from 0 to 180 degrees in 30-degree increments. The pattern shows a main lobe centered at 0 degrees, with a peak gain of approximately 14.5 dBi. There are side lobes extending to about ±45 degrees, and the pattern is symmetrical about the 0-degree axis.</p>
<p>1900 MHz</p> <p>Manufacturer: JMA Model #: MX06FRO860-03 Frequency Band: 1850-1990 MHz Gain: 17.9 dBi Vertical Beamwidth: 5.5° Horizontal Beamwidth: 55° Polarization: ±45° Dimensions (L x W x D): 95.9" x 15.4" x 10.7"</p>	 <p>A polar plot showing the radiation pattern of the 1900 MHz antenna. The plot is circular with concentric dashed lines representing gain levels. The radial axis is labeled from 0 to 180 degrees in 30-degree increments. The pattern shows a main lobe centered at 0 degrees, with a peak gain of approximately 17.9 dBi. There are side lobes extending to about ±45 degrees, and the pattern is symmetrical about the 0-degree axis.</p>

2100 MHz

Manufacturer: JMA
Model #: MX06FRO860-03
Frequency Band: 1920-2180 MHz
Gain: 18.2 dBi
Vertical Beamwidth: 5.5°
Horizontal Beamwidth: 55.5°
Polarization: $\pm 45^\circ$
Dimensions (L x W x D): 95.9" x 15.4" x 10.7"

