Radio Frequency Emissions Analysis Report

T-Mobile Wireless Enclosed Monopole Facility

Prepared by: FOX HILL TELECOM

Site ID: 4BN0510A
Site Name: BN510/Oregon Club

Address: 117 Oregon Road
Ashland, MA 01721

County: Middlesex
Latitude: 42.284798
Longitude: -71.490710
Site Structure Type: enclosed monopole
IXUS Version: 4.13 (2025)

Report Date: 9/12/2025

Prepared For: Crown Castle
1800 West Park Drive
Westborough, MA 01581

Report Author: Scott Heffernan
Report Reviewer: Ryan McManus
Fox Hill Project Number: 250303

Compliance Status:

This site is compliant with FCC regulations for radio frequency emissions.

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1.0 Introduction

Fox Hill Telecom, Inc. has been contracted by T-Mobile to produce a theoretical assessment of the potential radio frequency emissions at the proposed T-Mobile enclosed monopole site. FCC OET Bulletin 65 – Edition 97-01 recommends that theoretical calculations should be done for all radio systems to yield a worst-case assessment of potential emissions. This analysis will assume all transmitters are operating at their maximum transmit power to produce the maximum emissions values across the entire study area. This will provide T-MOBILE with a guideline of how to proceed with mitigating the site to ensure the site will be compliant with FCC regulations at any instance.

Licensed wireless system operators are typically required to perform periodic assessments of potential impacts to humans due to radio frequency emissions from active radio frequency transmitters. The Federal Communications Commission ("FCC") considers two levels of standards based on access controls to the site and the level of knowledge of the effects of radio frequency to humans.

A controlled/occupational environmental limit assumes that anyone accessing the defined area is fully trained in RF safety and is aware of the effects of the exposure to radio frequency emissions to humans,

An uncontrolled/general population environmental limit establishes the area where access does not need to be restricted to RF trained individuals and other members of the general population may be able to access the site for any reason, occupation or otherwise.

2.0 Site Information

The proposed T-Mobile facility will be installed on an existing monopole structure located at **117 Oregon Road, Ashland, MA.** Table 1below contains the site-specific data for this structure, including structure type, height as well as existing and proposed carriers on this structure.

Site Type:	Enclosed Monopole
Site Height (ft):	75 feet above ground level
Site Latitude (dec):	42.284798 N
Site Longitude (dec):	-71.490710 W
County:	Middlesex
Ground Level:	311 feet AMSL
Carriers on Site:	T-Mobile (Existing & Proposed) Verizon Wireless (Existing)

Table 1: Site Information

3.0 Results Snapshot and Mitigation Measures

Based on the theoretical modeling analysis performed, there are no generally accessible areas that exceed the FCC's General Public and/or Occupational limits at this site.

Table 2.0 below provides a snapshot of the highest T-Mobile and composite emissions at each pertinent location at and around the site.

T-Mobile MPE Contribution		
	% FCC General Public	% FCC Occupational
Ground Level	1.25 %	0.25 %
Adjacent Building 1	1.49 %	0.298 %
Adjacent Building 2	1.09 %	0.218 %
Composite MPE Contribution		
Ground Level	3.40 %	0.68 %
Adjacent Building 1	5.05 %	1.01 %
Adjacent Building 2	3.26 %	0.652 %

Table 2.0 MPE Contribution

Based on the data provided by T-Mobile, there are antennas from other wireless providers on site. These other carrier antennas were also included in the modeling analysis using assumed values based on existing industry standards.

Section 6.0 will show the areas of exposure, if any, for each T-Mobile Sector.

A site scaled map can be found in section 4.0 which details the locations where mitigation should be installed to bring the site into compliance with FCC regulations.

Below is a summary of **recommended mitigation** at this T-Mobile facility.

Access Point:

- Since the T-Mobile antennas are higher than 10 meters above the ground level and there are no areas that exceed the FCC's general population or occupational limits, no signage or mitigation is required.

Sector A:

- No additional mitigation required.

Sector B:

- No Additional Mitigation required.

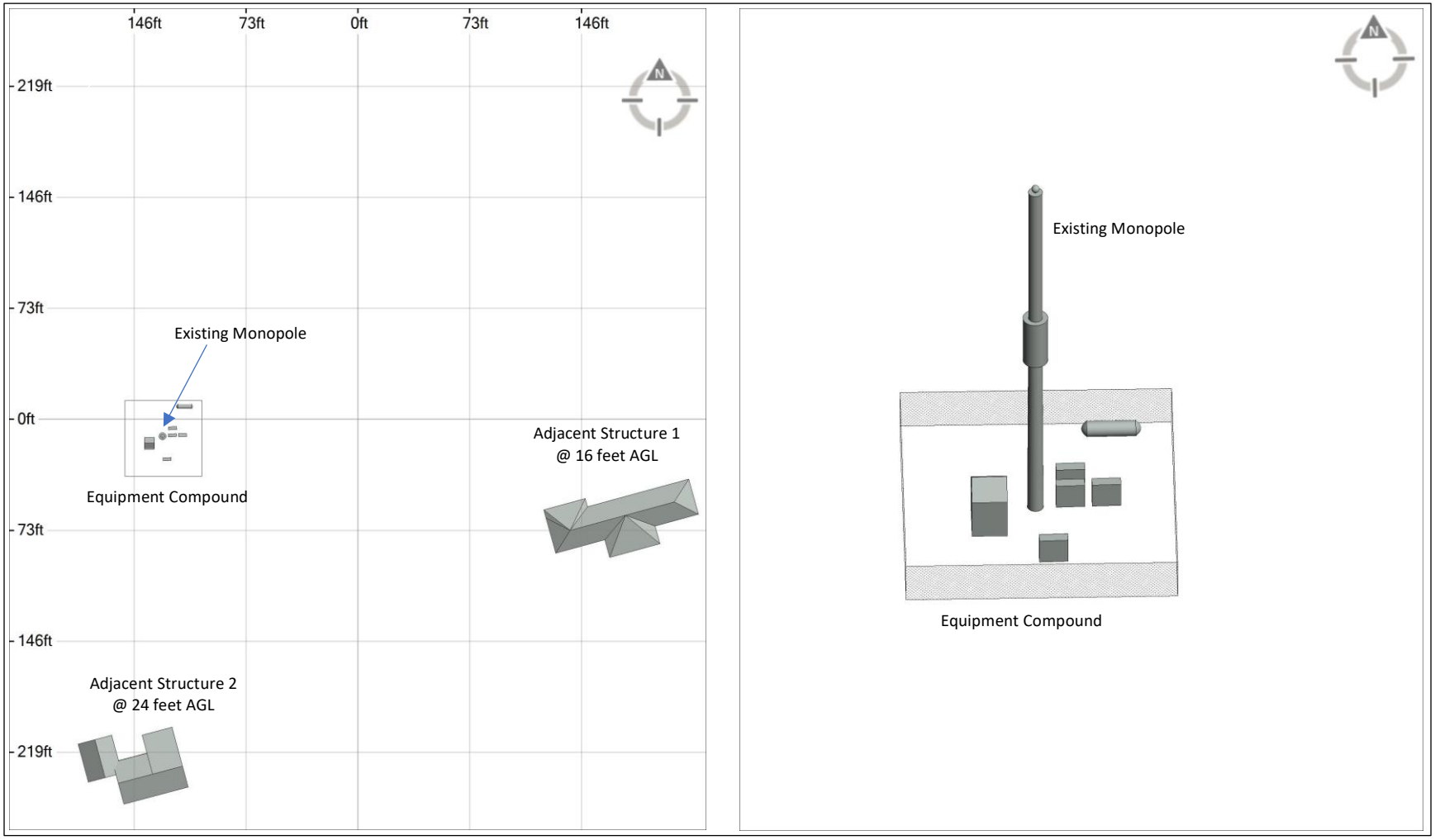
Sector C:

- No Additional Mitigation required.

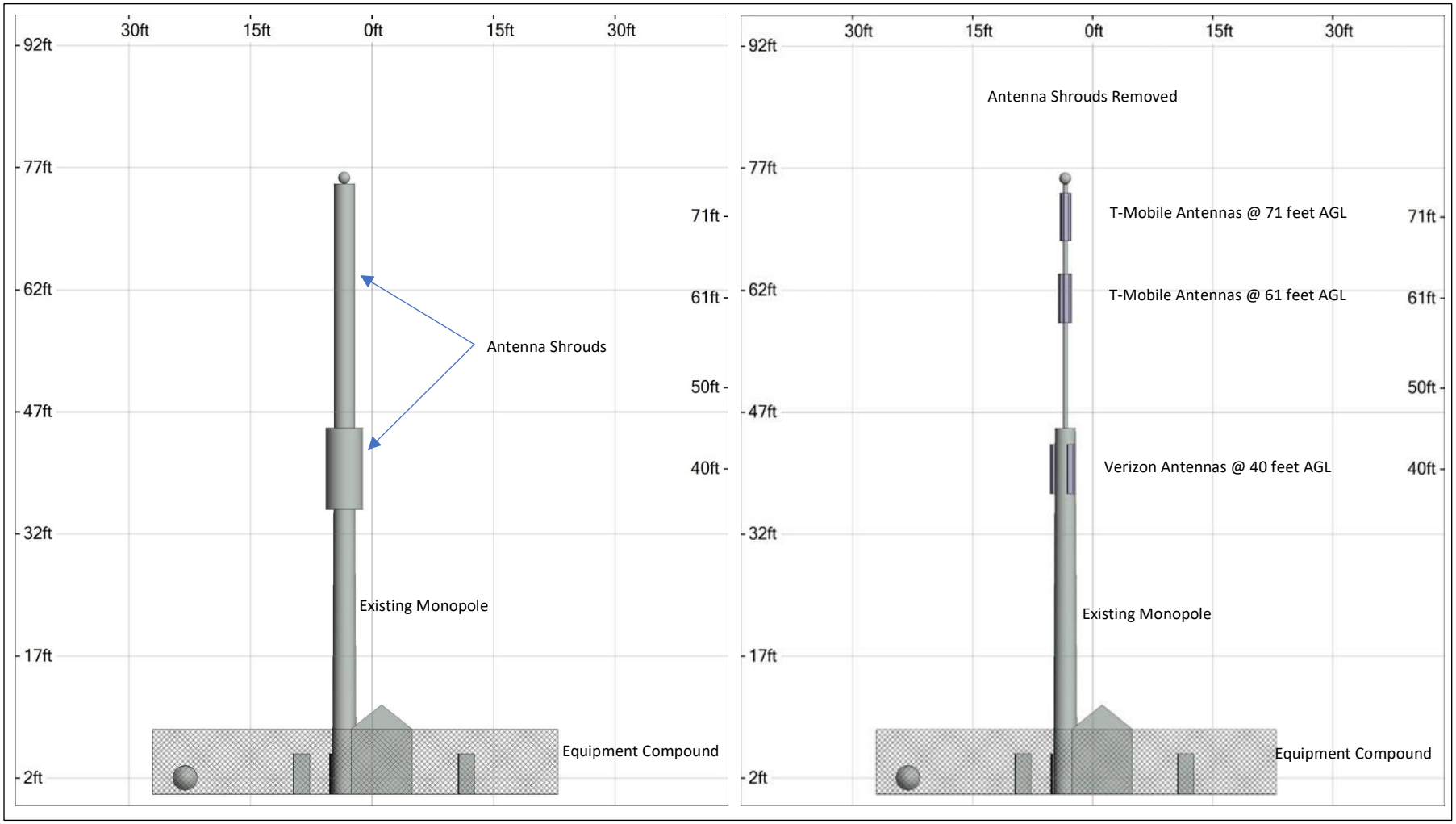
4.0 Site Maps

Site Overview Map

T-Mobile Antenna Layout



Antenna Layout



5.0 Antenna Inventory Tables

Antenna & Radio Configuration Data

Antenna ID	Operator	Antenna Make and Model	Type	Freq (MHz)	Input Power (Watts)	# of TX	ERP (Watts)	Azimuth (°)	Gain (dBd)	BW (°)	Length (ft)	Antenna Height CL (ft)
A1	T-Mobile	Commscope VV-65B-R1	Panel	LTE 1900 MHz	35	4	6778.41	0	16.85	65	5.86	71
A1	T-Mobile	Commscope VV-65B-R1	Panel	5G NR 1900 MHz	40	4	7746.76	0	16.85	65	5.86	71
A1	T-Mobile	Commscope VV-65B-R1	Panel	LTE 2100 MHz	60	4	11620.14	0	16.85	65	5.86	71
A1	T-Mobile	Commscope VV-65B-R1	Panel	5G NR 2500 MHz	40	8	16601.60	0	17.15	58	5.86	71
A2	T-Mobile	Commscope FVV-65B-R3	Panel	LTE / 5G NR 600 MHz	60	4	3937.42	0	12.15	71	6.00	61
A2	T-Mobile	Commscope FVV-65B-R3	Panel	LTE 700 MHz	20	4	1439.10	0	12.55	70	6.00	61
B1	T-Mobile	Commscope VV-65B-R1	Panel	LTE 1900 MHz	35	4	3163.26	120	16.85	65	5.86	71
B1	T-Mobile	Commscope VV-65B-R1	Panel	5G NR 1900 MHz	40	4	4131.60	120	16.85	65	5.86	71
B1	T-Mobile	Commscope VV-65B-R1	Panel	LTE 2100 MHz	60	4	11620.14	120	16.85	65	5.86	71
B1	T-Mobile	Commscope VV-65B-R1	Panel	5G NR 2500 MHz	40	8	16601.60	120	17.15	58	5.86	71
B2	T-Mobile	Commscope FVV-65B-R3	Panel	LTE / 5G NR 600 MHz	60	4	3937.42	120	12.15	71	6.00	61
B2	T-Mobile	Commscope FVV-65B-R3	Panel	LTE 700 MHz	20	4	1439.10	120	12.55	70	6.00	61
C1	T-Mobile	Commscope VV-65B-R1	Panel	LTE 1900 MHz	35	4	3163.26	240	16.85	65	5.86	71
C1	T-Mobile	Commscope VV-65B-R1	Panel	5G NR 1900 MHz	40	4	4131.60	240	16.85	65	5.86	71
C1	T-Mobile	Commscope VV-65B-R1	Panel	LTE 2100 MHz	60	4	11620.14	240	16.85	65	5.86	71
C1	T-Mobile	Commscope VV-65B-R1	Panel	5G NR 2500 MHz	40	8	16601.60	240	17.15	58	5.86	71
C2	T-Mobile	Commscope FVV-65B-R3	Panel	LTE / 5G NR 600 MHz	60	4	3937.42	240	12.15	71	6.00	61
C2	T-Mobile	Commscope FVV-65B-R3	Panel	LTE 700 MHz	20	4	1439.10	240	12.55	70	6.00	61
VZW_A1	Verizon	Commscope SBNHH-1D65B	Panel	LTE 700 MHz	40	4	3013.84	0	12.75	68	6.07	40

Antenna ID	Operator	Antenna Make and Model	Type	Freq (MHz)	Input Power (Watts)	# of TX	ERP (Watts)	Azimuth (°)	Gain (dBd)	BW (°)	Length (ft)	Antenna Height CL (ft)
VZW_A1	Verizon	Commscope SBNHH-1D65B	Panel	LTE / 5G 850 MHz	40	4	2878.19	0	12.55	66	6.07	40
VZW_A1	Verizon	Commscope SBNHH-1D65B	Panel	LTE 1900 MHz	40	4	5742.75	0	15.55	69	6.07	40
VZW_A1	Verizon	Commscope SBNHH-1D65B	Panel	LTE 2100 MHz	40	4	7065.13	0	16.45	63	6.07	40
VZW_B1	Verizon	Commscope SBNHH-1D65B	Panel	LTE 700 MHz	40	4	3013.84	120	12.75	68	6.07	40
VZW_B1	Verizon	Commscope SBNHH-1D65B	Panel	LTE / 5G 850 MHz	40	4	2878.19	120	12.55	66	6.07	40
VZW_B1	Verizon	Commscope SBNHH-1D65B	Panel	LTE 1900 MHz	40	4	5742.75	120	15.55	69	6.07	40
VZW_B1	Verizon	Commscope SBNHH-1D65B	Panel	LTE 2100 MHz	40	4	7065.13	120	16.45	63	6.07	40
VZW_C1	Verizon	Commscope SBNHH-1D65B	Panel	LTE 700 MHz	40	4	3013.84	240	12.75	68	6.07	40
VZW_C1	Verizon	Commscope SBNHH-1D65B	Panel	LTE / 5G 850 MHz	40	4	2878.19	240	12.55	66	6.07	40
VZW_C2	Verizon	Commscope SBNHH-1D65B	Panel	LTE 1900 MHz	40	4	5742.75	240	15.55	69	6.07	40
VZW_C1	Verizon	Commscope SBNHH-1D65B	Panel	LTE 2100 MHz	40	4	7065.13	240	16.45	63	6.07	40

6.0 Results and Compliance Recommendations

Based on the theoretical modeling analysis performed, there are no generally accessible areas at this site and identified in this study that exceed the FCC's General Public and/or Occupational limits. All areas of concern extend into free space directly in front of the antennas.

T-Mobile Results:

At the **ground (0.00' AGL**), the maximum power density value (% MPE) calculated for T-MOBILE's antennas is **1.25 %** of the FCC's allowable limit for General Population exposure to radio frequency emissions (**0.25 %** of the FCC's allowable Occupational limit).

At the **Adjacent Building 1 (16' AGL**), the maximum power density value (% MPE) calculated for T-Mobile's antennas is **1.49 %** of the FCC's allowable limit for General Population exposure to radio frequency emissions (**0.30 %** of the FCC's allowable Occupational limit).

At the **Adjacent Building 2 (24' AGL**), the maximum power density value (% MPE) calculated for T-Mobile's antennas is **1.09 %** of the FCC's allowable limit for General Population exposure to radio frequency emissions (**0.22 %** of the FCC's allowable Occupational limit).

Sector A:

The maximum power density value (% MPE) at any generally accessible area was calculated for **T-Mobile's Sector A antennas** on the **ground level (0')** is **1.25%** of the FCC's allowable limit for General Population exposure to radio frequency emissions (**0.25 %** of the FCC's allowable Occupational limit).

There are no generally accessible areas at any forementioned level that exceed the FCC's General Population or Occupational limit for exposure to radio frequency emissions in front of the Sector A antennas. All areas of concern extend into free space.

Sector B:

The maximum power density value (% MPE) at any generally accessible area was calculated for **T-Mobile's Sector B antennas** on the **ground level (0')** is **1.25 %** of the FCC's allowable limit for General Population exposure to radio frequency emissions (**0.25 %** of the FCC's allowable Occupational limit).

There are no generally accessible areas at any forementioned level that exceed the FCC's General Population or Occupational limit for exposure to radio frequency emissions in front of the Sector B antennas. All areas of concern extend into free space.

Sector C:

The maximum power density value (% MPE) at any generally accessible area was calculated for **T-Mobile's Sector C antennas** on the **ground level (0')** is **1.25 %** of the FCC's allowable limit for General Population exposure to radio frequency emissions (**0.25 %** of the FCC's allowable Occupational limit).

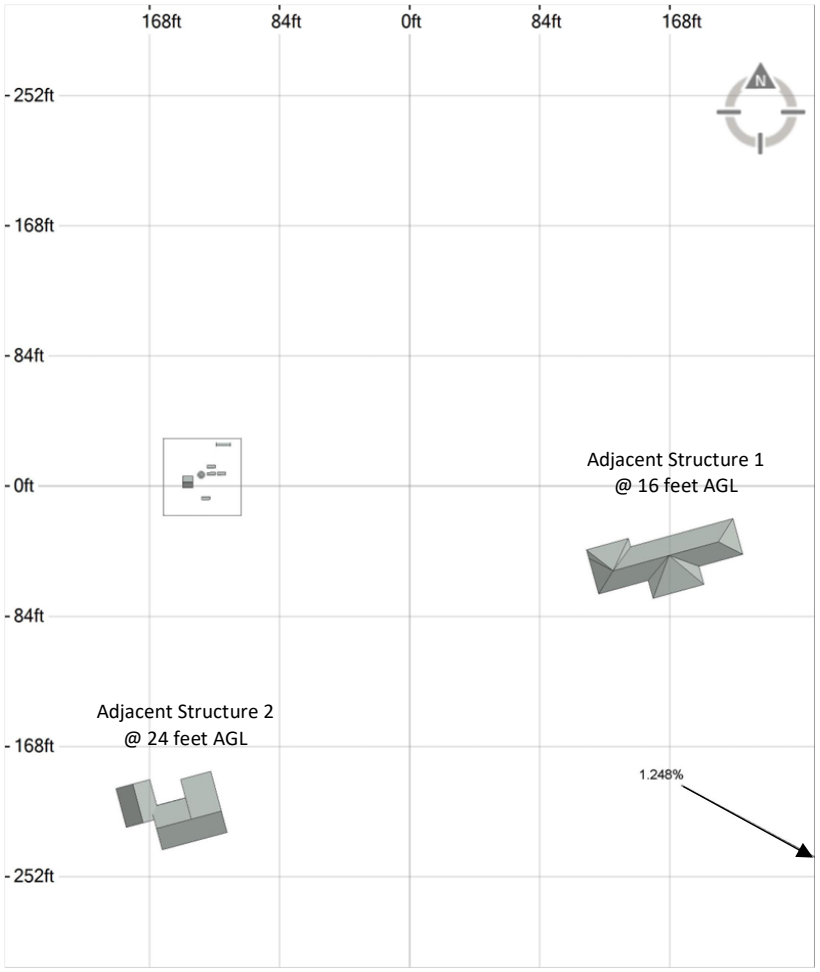
There are no generally accessible areas at any forementioned level that exceed the FCC's General Population or Occupational limit for exposure to radio frequency emissions in front of the Sector C antennas. All areas of concern extend into free space.

The FCC mandates that if a site is found to be out of compliance with regard to emissions that any system operator contributing 5% or more to areas exceeding the FCC's allowable limits, as outlined in this report, will be responsible for bringing the site into compliance.

there are antennas from other wireless providers on site. These other carrier antennas were also included in the modeling analysis using assumed values based on existing industry standards.

The largest composite maximum power density value (% MPE) calculated for all carriers at any accessible area surrounding the site is **3.40 %** of the FCC's allowable limit for General Population exposure to radio frequency emissions (**0.68 %** of the FCC's allowable Occupational limit), located on the ground level.

MPE Contribution T-Mobile Antennas @ Ground Level (0’ AGL)



% of FCC OET 65 Public

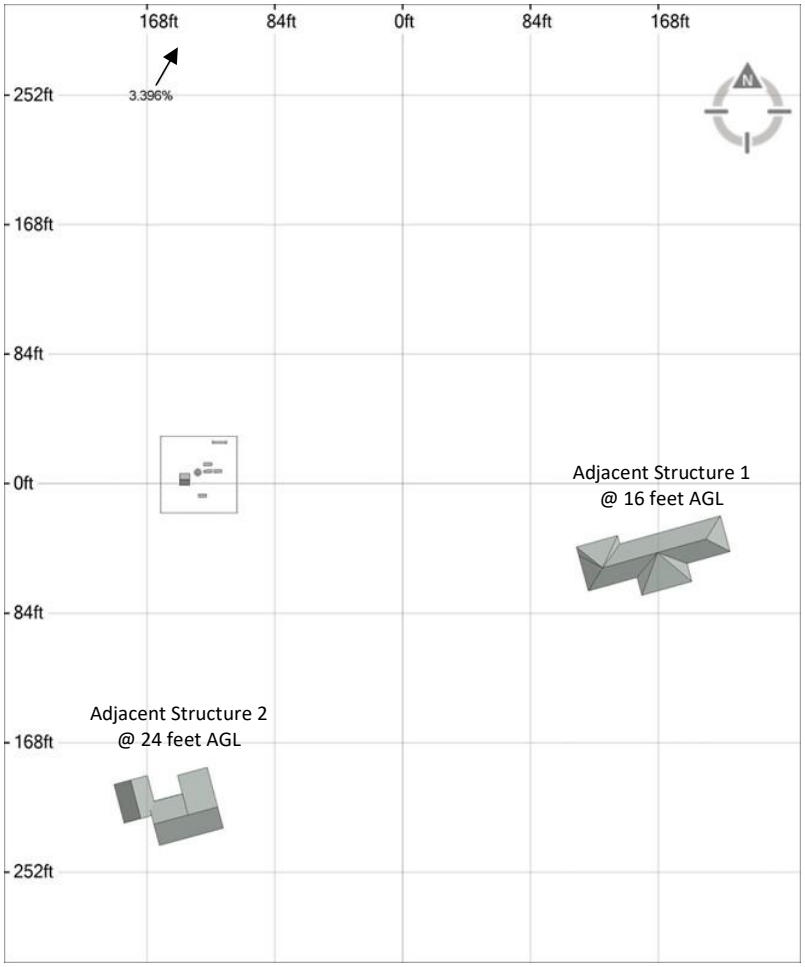
- 0% - 5%
- 5% - 100%
- 100% - 500%
- 500% - 5000%
- 5000% +

Maximum % MPE

General Population Limit
1.25 %

Occupational Limit
0.25 %

MPE Contribution All Antennas @ Ground Level (0’ AGL)



% of FCC OET 65 Public

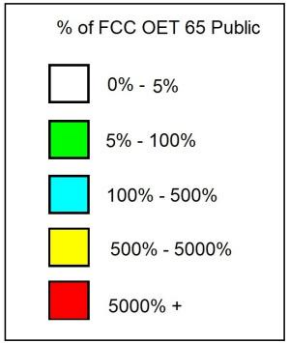
- 0% - 5%
- 5% - 100%
- 100% - 500%
- 500% - 5000%
- 5000% +

Maximum % MPE

General Population Limit
3.40 %

Occupational Limit
0.68 %

MPE Contribution T-Mobile Antennas @ Adjacent structures

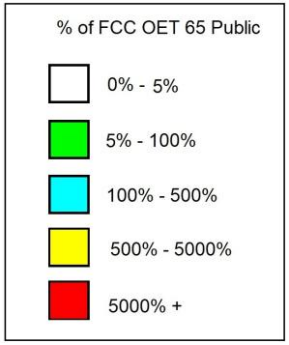


Maximum % MPE

General Population Limit
1.49 %

Occupational Limit
0.298 %

MPE Contribution all Antennas @ Adjacent structures

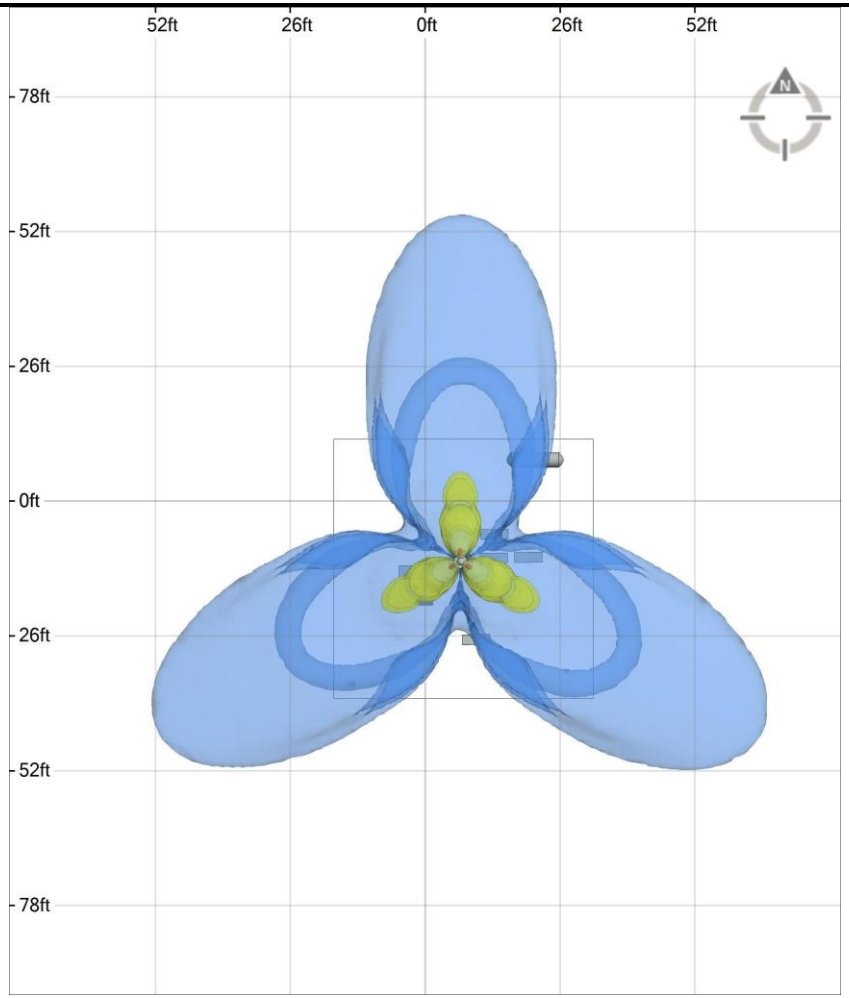


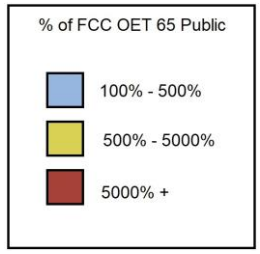
Maximum % MPE

General Population Limit
5.05 %

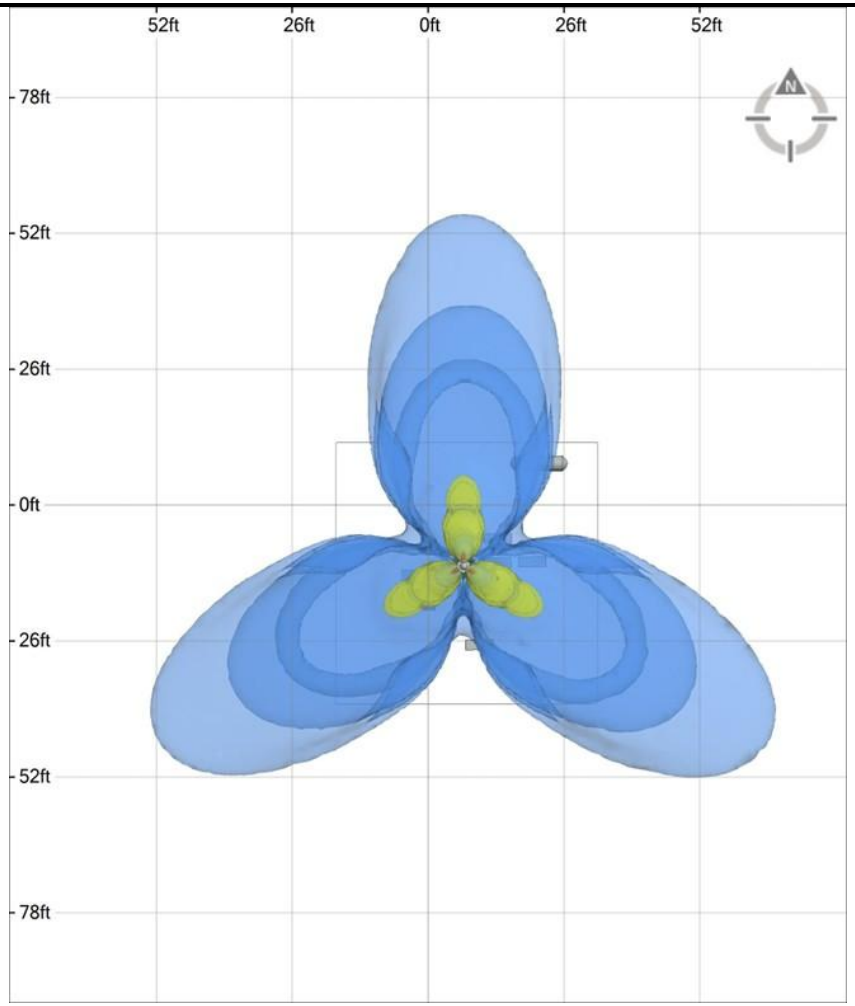
Occupational Limit
1.01 %

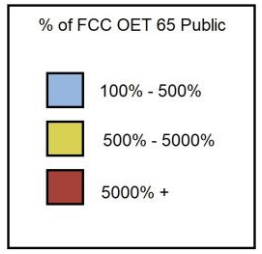
Top-Down View T-Mobile Antennas



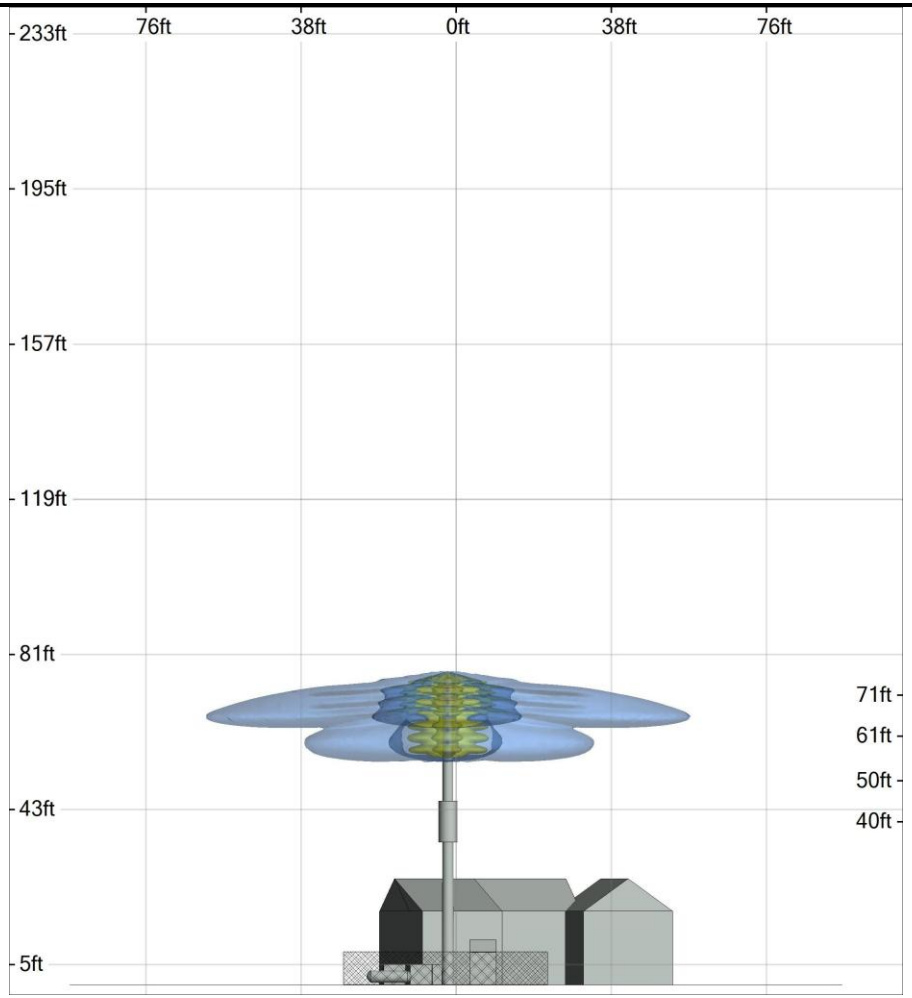


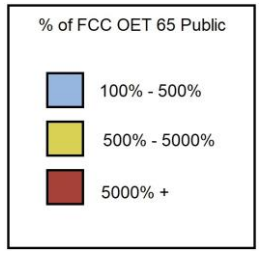
Top-Down View All Antennas



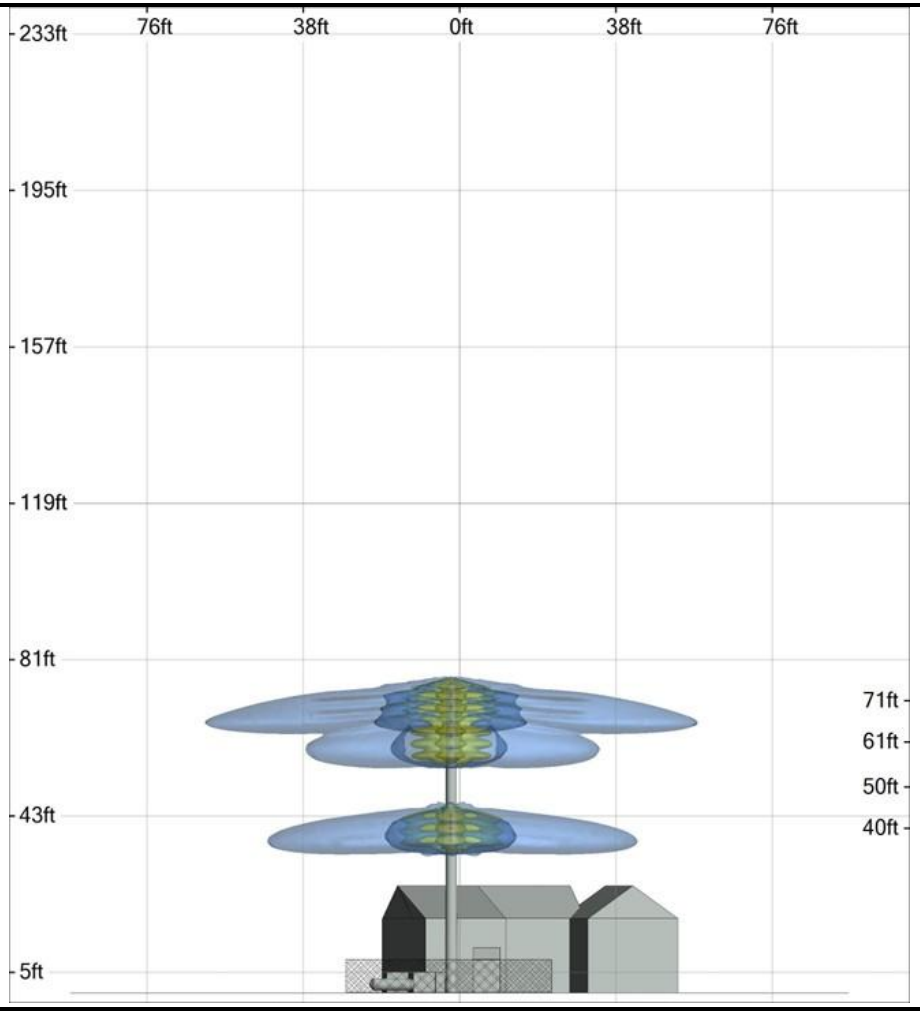


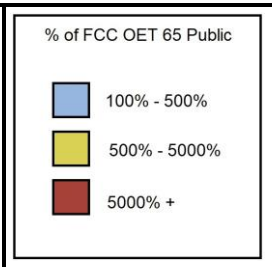
Elevation View T-Mobile Antennas (View from North)





Elevation View All Antennas (View from North)





7.0 T-Mobile Signage Policy

Sign	Description
	**RF Guidelines Sign** Gives guidelines on how to proceed in areas that may exceed either the FCC's General Population or Occupational emissions limits.
	**Blue Notice Sign** Used to inform individuals that they are entering an area that may exceed the FCC's General Population limits. Must be placed anywhere the public can get within 30 feet vertically or horizontally of an antenna.
	**Yellow Caution Sign** Used to inform individuals that they are entering an area that may exceed either the FCC's General Population or Occupational Emissions limits. It must be placed so it is visible from all approachable sides. It must also be just outside of the area predicted to exceed the MPE limits so it can be read without standing within the affected area.
	**Red Warning Sign** Used to inform individuals that they are entering an area that may exceed 10x the FCC's Occupational emissions limit. It must be placed so it is visible from all approachable sides. It must also be just outside of the area predicted to exceed the MPE limits so it can be read without standing within the affected area.

8.0 FCC Guidelines

All power density values used in this report were 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 µW/cm2 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 (µW/cm2). The general population exposure limit for the 600 MHz, 700 MHz and 850 MHz Bands is approximately 400 $\mu W/cm^2$, 467 $\mu W/cm^2$ and 567 $\mu W/cm^2$ respectively, and the general population exposure limit for the 1900 MHz PCS band, 2100 MHz AWS band and 2500 MHz BRS band is 1000 $\mu W/cm^2$ (1mw/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.

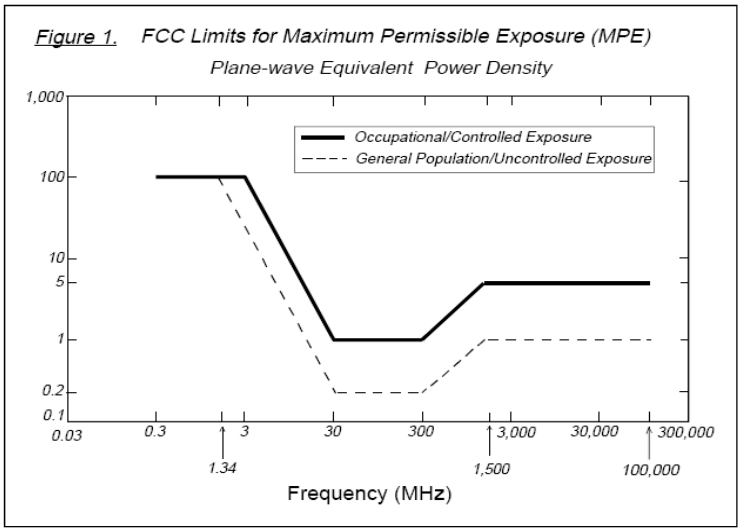
Occupational/Controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure, have been properly trained in RF safety and can exercise control over their 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, have been trained in RF safety and can exercise control over his or her exposure by leaving the area or by some other appropriate means. The Occupational/Controlled exposure limits all utilized frequency bands is five (5) times the FCC's General Population / Uncontrolled exposure limit.

Table 1: Limits for Maximum Permissible Exposure (MPE)				
(A) Limits for Occupational/Controlled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (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-I,500	--	--	f/300	6
1,500-100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (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-I,500	--	--	f/1,500	30
1,500-100,000	--	--	1.0	30

f = Frequency in (MHz)

* Plane-wave equivalent power density

Figure 1. *FCC Limits for Maximum Permissible Exposure (MPE)*



9.0 Calculation Methodology

The IXUS electromagnetic field (EMF) calculation software was used to assess all the RF field levels presented in this study. IXUS (https://ixusapp.com/) is a software product of Alphawave Mobile Network Products (Pty) Ltd, who specialize in electromagnetic software and systems. The IXUS software uses a fast and accurate EMF calculation tool that allows for the determination of RF field strength in the vicinity of radio communication base stations and transmitters. At its core, the IXUS EMF calculation module implements field evaluation techniques detailed in the ITU-T K.61, CENELEC 50383, and IEC62232 specifications. The calculation of EMF results at any point in 3-D space is achieved by either a synthetic ray tracing technique, a conservative cylindrical envelope method, or through full-wave EM simulation results obtained from a computational electromagnetic software tool.

The selection of the solution method is determined by the specific antenna being considered. In addition, a conservative and verified modelling technique for 5G beamforming antennas in IXUS is used. The simulation accuracy of the IXUS calculation module has been verified extensively with full-wave EM simulations.

Predicted power densities are displayed as a percentage of the applicable FCC standards.

10.0 Certifications

I, Scott Heffernan, preparer of this report certify that I am fully trained and aware of the Rules and Regulations of both the Federal Communications Commissions (FCC) and the Occupational Safety and Health Administration (OSHA) with regard to Human Exposure to Radio Frequency Radiation. I have been trained in the procedures and requirements outlined in T-MOBILE's RF Exposure: Responsibilities, Procedures & Guidelines document.

9/12/2025

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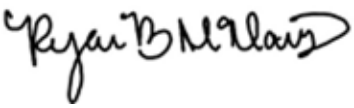
I, Ryan McManus, reviewer and approver of this report certify that I am fully trained and aware of the Rules and Regulations of both the Federal Communications Commissions (FCC) and the Occupational Safety and Health Administration (OSHA) with regard to Human Exposure to Radio Frequency Radiation. I have been trained in the procedures and requirements outlined in T-MOBILE's RF Exposure: Responsibilities, Procedures & Guidelines document.



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