



Radio Frequency Emissions Analysis Report

T-MOBILE Proposed Facility

Site ID: CTHA227A

CTHA227A
780 Prospect Hill Road
Windsor, CT 06095

November 25, 2020

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general population allowable limit:	10.69 %



November 25, 2020

T-MOBILE

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Emissions Analysis for Site: **CTHA227A – CTHA227A**

Northeast Site Solutions (“NSS”) was directed to analyze the proposed T-MOBILE facility located at **780 Prospect Hill Road, Windsor, CT**, for the purpose of determining whether the emissions from the Proposed T-MOBILE Antenna Installation 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.

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 600 & 700 MHz bands are approximately $400 \mu\text{W}/\text{cm}^2$ and $467 \mu\text{W}/\text{cm}^2$ respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS), 2500 MHz (BRS) and 23 GHz 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.



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 T-MOBILE antenna facility located at **780 Prospect Hill Road, Windsor, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-MOBILE is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panels and 20 dB for highly focused parabolic microwave dishes, was focused at the base of the tower. For this report, the sample point is the top of a 6-foot person standing at the base of the tower.

Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. All power values expressed and analyzed are maximum power levels expected to be used on all radios.

All emissions values for additional carriers were taken from the Connecticut Siting Council (CSC) active MPE database. Values in this database are provided by the individual carriers themselves. For this proposed facility, there are no additional proposed carriers listed.

For each sector the following channel counts, frequency bands and power levels were utilized as shown in *Table 1*. The additional microwave dish shown and highlighted in green is proposed for Sector B only:

Technology	Frequency Band	Channel Count	Transmit Power per Channel (W)
LTE	1900 MHz (PCS)	4	40
LTE	1900 MHz (PCS)	2	60
LTE	2100 MHz (AWS)	2	60
LTE / 5G NR	600 MHz	2	30
LTE	700 MHz	2	60
LTE / 5G NR	2500 MHz (BRS)	8	30
Microwave	23 GHz	1	1

Table 1: Channel Data Table

The following antennas listed in *Table 2* were used in the modeling for transmission in the 600, 700 MHz, 1900 MHz (PCS), 2100 MHz (AWS), 2500 MHz (BRS) and 23 GHz frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panels and 20 dB for highly focused parabolic microwave dishes, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

Sector	Antenna Number	Antenna Make / Model	Antenna Centerline (ft)
A	1	Ericsson AIR32 DB B66A / B2A	130
A	2	RFS APXVAALL24_43-U-NA20	130
A	3	Ericsson AIR6449 B41	130
B	1	Ericsson AIR32 DB B66A / B2A	130
B	2	RFS APXVAALL24_43-U-NA20	130
B	3	Ericsson AIR6449 B41	130
B	4	Commscope VHLP1-23-CR4B130	130
C	1	Ericsson AIR32 DB B66A / B2A	130
C	2	RFS APXVAALL24_43-U-NA20	130
C	3	Ericsson AIR6449 B41	130

Table 2: Antenna Data

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

RESULTS

Per the calculations completed for the proposed T-MOBILE 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	Ericsson AIR32 DB B66A / B2A	1900 MHz (PCS) / 2100 MHz (AWS)	15.85 / 15.85 / 15.85	6	230	8,845.61	2.07
Antenna A2	RFS APXVAALL24_43-U-NA20	600 MHz / 700 MHz / 1900 MHz (PCS)	12.95 / 13.35 / 15.65	6	200	5,381.28	2.04
Antenna A3	Ericsson AIR6449 B41	2500 MHz (BRS)	21.45	8	200	27,927.37	6.53
Sector A Composite MPE%							10.64
Antenna B1	Ericsson AIR32 DB B66A / B2A	1900 MHz (PCS) / 2100 MHz (AWS)	15.85 / 15.85 / 15.85	6	230	8,845.61	2.07
Antenna B2	RFS APXVAALL24_43-U-NA20	600 MHz / 700 MHz / 1900 MHz (PCS)	12.95 / 13.35 / 15.65	6	200	5,381.28	2.04
Antenna B3	Ericsson AIR6449 B41	2500 MHz (BRS)	21.45	8	200	27,927.37	6.53
Antenna B4	Commscope VHLPI-23-CR4B130	23 GHz	33.45	1	1	1	0.05
Sector B Composite MPE%							10.69
Antenna C1	Ericsson AIR32 DB B66A / B2A	1900 MHz (PCS) / 2100 MHz (AWS)	15.85 / 15.85 / 15.85	6	230	8,845.61	2.07
Antenna C2	RFS APXVAALL24_43-U-NA20	600 MHz / 700 MHz / 1900 MHz (PCS)	12.95 / 13.35 / 15.65	6	200	5,381.28	2.04
Antenna C3	Ericsson AIR6449 B41	2500 MHz (BRS)	21.45	8	200	27,927.37	6.53
Sector C Composite MPE%							10.64

Table 3: T-MOBILE Emissions Levels

The Following table (*table 4*) shows all additional carriers on site and their MPE% as recorded in the CSC active MPE database for this facility along with the newly calculated maximum T-MOBILE MPE contributions per this report. FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. For this site, **Sector B** yielded the highest MPE value for this facility. *Table 5* below shows a summary for each T-MOBILE Sector as well as the composite MPE value for the site.

Site Composite MPE%	
Carrier	MPE%
T-MOBILE – Max Sector Value (Sector B)	10.69 %
Site Total MPE %:	10.69 %

Table 4: All Carrier MPE Contributions

T-MOBILE Sector A Total:	10.64 %
T-MOBILE Sector B Total:	10.69 %
T-MOBILE Sector C Total:	10.64 %
Site Total:	10.69 %

Table 5: Site MPE Summary

FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. *Table 6* below details a breakdown by frequency band and technology for the MPE power values for the maximum calculated T-MOBILE sector(s). For this site, **Sector B** yielded the highest MPE value for this facility.

T-MOBILE _ Frequency Band / Technology Max Power Values (Sector B)	# 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
T-Mobile 1900 MHz (PCS) LTE	2	1,538.37	130	7.19	1900 MHz (PCS)	1000	0.72%
T-Mobile 1900 MHz (PCS) GSM	2	576.89	130	2.70	1900 MHz (PCS)	1000	0.27%
T-Mobile 2100 MHz (AWS) LTE	2	2,307.55	130	10.79	2100 MHz (AWS)	1000	1.08%
T-Mobile 600 MHz LTE / 5G NR	2	788.97	130	3.69	600 MHz	400	0.92%
T-Mobile 700 MHz LTE	2	432.54	130	2.02	700 MHz	467	0.43%
T-Mobile 1900 MHz (PCS) LTE	2	1,469.13	130	6.87	1900 MHz (PCS)	1000	0.69%
T-Mobile 2500 MHz (BRS) LTE / 5G NR	8	3,490.92	130	65.30	2500 MHz (BRS)	1000	6.53%
T-Mobile 23 GHz Microwave	1	2,213.09	130	0.52	23 GHz	1000	0.05%
Total:							10.69%

Table 6: T-MOBILE Maximum Sector MPE Power Values (Sector B)

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 T-MOBILE facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:

T-MOBILE Sector	Power Density Value (%)
Sector A:	10.64 %
Sector B:	10.69 %
Sector C:	10.64 %
T-MOBILE Maximum Total (Sector B):	10.69 %
Site Total:	10.69 %
Site Compliance Status:	COMPLIANT

The anticipated composite MPE value for this site assuming all carriers present is **10.69 %** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions. For this proposed facility, there are no additional proposed carriers listed.

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 values calculated were well within the allowable 100% threshold standard per the federal government.