

RADIO FREQUENCY EMISSIONS ANALYSIS REPORT  
EVALUATION OF HUMAN EXPOSURE POTENTIAL  
TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: Sailfest

311 Thames Street  
Groton, Connecticut 06479

**May 1, 2023**

**EBI Project Number: 6223001577**

Site Compliance Summary	
Compliance Status:	<b>COMPLIANT</b>
Site total MPE% of FCC general population allowable limit:	<b>8.16%</b>

May 1, 2023

T-Mobile

Attn: Jason Overbey, RF Manager  
35 Griffin Road South  
Bloomfield, Connecticut 06002

### Emissions Analysis for Site: Sailfest

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **311 Thames Street in Groton, Connecticut** 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.

Public 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 MHz and 700 MHz frequency 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) and 11 GHz frequency 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 done for the proposed T-Mobile Wireless antenna facility located at 311 Thames Street in Groton, Connecticut 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 manufacturer's supplied specifications, minus 10 dB for directional panel antennas 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. For power density calculations, the broadcast footprint of the AIR6449 or similar SON antenna has been considered. Due to the beamforming nature of these antennas, the actual beam locations vary depending on demand and are narrow in nature. Using the broadcast footprint accounts for the potential location of beams at any given time.

For all calculations, all equipment was calculated using the following assumptions:

- 1) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a total transmit power of 120 Watts per Channel.
- 2) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a total transmit power of 120 Watts per Channel.
- 3) 1 LTE Traffic channel (LTE IC and 2C BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 45 Watts.
- 4) 1 LTE Broadcast channel (LTE IC and 2C BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 15 Watts.
- 5) 1 NR Traffic channel (BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 90 Watts.

- 6) 1 NR Broadcast channel (BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 30 Watts.
- 7) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. 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. This is rarely the case, and if so, is never continuous.
- 8) For the following calculations, the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.
- 9) The antennas used in this modeling are the COMMSCOPE SON\_5NPX1006F Beam I 06DT 1900 for the 1900 MHz / 2100 MHz channel(s), the ERICSSON SON\_AIR6449 2500 LTE TB for the 2500 MHz / 2500 MHz / 2500 MHz / 2500 MHz channel(s) in Sector A. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas 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.
- 10) The antenna mounting height centerline of the proposed antennas is 50 feet above ground level (AGL).
- 11) Emissions from additional carriers were not included because there are no other carriers on this site.
- 12) All calculations were done with respect to uncontrolled / general population threshold limits.

## T-Mobile Site Inventory and Power Data

Sector:	A
Antenna #:	1
Make / Model:	COMMSCOPE SON_5NPX1006F Beam 1 06DT 1900
Frequency Bands:	1900 MHz / 1900 MHz / 1900 MHz / 1900 MHz / 1900 MHz / 1900 MHz / 2100 MHz / 2100 MHz / 2100 MHz / 2100 MHz
Gain:	18.45 dBd / 19.94 dBd / 20.4 dBd / 19.93 dBd / 18.51 dBd / 18.73 dBd / 20.33 dBd / 20.43 dBd / 20.19 dBd / 19.02 dBd
Height (AGL):	50 feet
Channel Count:	20
Total TX Power (W):	480.00 Watts
ERP (W):	26,212.40
Antenna A1 MPE %:	<b>48.68%</b>
Antenna #:	2
Make / Model:	ERICSSON SON_AIR6449 2500 LTE TB
Frequency Bands:	2500 MHz / 2500 MHz / 2500 MHz / 2500 MHz
Gain:	22.35 dBd / 22.35 dBd / 17.3 dBd / 17.3 dBd
Height (AGL):	50 feet
Channel Count:	4
Total TX Power (W):	180.00 Watts
ERP (W):	25,608.41
Antenna A2 MPE %:	<b>47.55%</b>

Site Composite MPE %	
Carrier	MPE %
T-Mobile (Max at Sector A):	8.16%
no additional carriers	N/A
<b>Site Total MPE % :</b>	<b>8.16%</b>

T-Mobile Sector A Total:	8.16%
<b>Site Total MPE % :</b>	<b>8.16%</b>

## T-Mobile Maximum MPE Power Values (Sector A)

T-Mobile Frequency Band / Technology (Sector A)	# 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 LTE	2	991.7706269	50	36.83430042	1900 MHz LTE	1000.0	3.68%
T-Mobile 1900 MHz LTE	2	1397.691235	50	51.91016698	1900 MHz LTE	1000.0	5.19%
T-Mobile 1900 MHz LTE	2	1553.857691	50	57.7101796	1900 MHz LTE	1000.0	5.77%
T-Mobile 1900 MHz LTE	2	1394.476634	50	51.79077691	1900 MHz LTE	1000.0	5.18%
T-Mobile 1900 MHz LTE	2	1005.567531	50	37.34671658	1900 MHz LTE	1000.0	3.73%
T-Mobile 2100 MHz LTE	2	1057.818704	50	39.28732196	2100 MHz LTE	1000.0	3.93%
T-Mobile 2100 MHz LTE	2	1529.013225	50	56.78745764	2100 MHz LTE	1000.0	5.68%
T-Mobile 2100 MHz LTE	2	1564.628518	50	58.11020745	2100 MHz LTE	1000.0	5.81%
T-Mobile 2100 MHz LTE	2	1480.509647	50	54.98603775	2100 MHz LTE	1000.0	5.50%
T-Mobile 2100 MHz LTE	2	1130.866247	50	42.00030323	2100 MHz LTE	1000.0	4.20%
T-Mobile 2500 MHz LTE	1	7730.587742	50	143.556778	2500 MHz LTE	1000.0	14.36%
T-Mobile 2500 MHz NR	1	15461.17548	50	287.1135559	2500 MHz NR	1000.0	28.71%
T-Mobile 2500 MHz LTE	1	805.5476946	50	14.95899605	2500 MHz LTE	1000.0	1.50%
T-Mobile 2500 MHz NR	1	1611.095389	50	29.9179921	2500 MHz NR	1000.0	2.99%
						<b>Total:</b>	<b>8.16%</b>

• NOTE: Totals may vary by approximately 0.01% due to summation of remainders in calculations.

## 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:	8.16%
T-Mobile Maximum MPE % (Sector A):	8.16%
Site Total:	8.16%
Site Compliance Status:	<b>COMPLIANT</b>

The anticipated composite MPE value for this site assuming all carriers present is **8.16%** 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.

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.