EXHIBIT J

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Calculated Radio Frequency Exposure

CT2327

1063 Boston Post Road, Milford, CT 06460

August 24, 2020

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1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed installation of the city of Milford's Public Safety and AT&T antenna arrays on a new monopole tower located at 1063 Boston Post Road in Milford, CT. The coordinates of the tower are 41° 13' 54.32" N, 73° 02' 34.55" W.

AT&T is proposing the following:

1) Install six (9) multi-band antennas (three 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 AT&T[1] to derive the resulting % Maximum Permissible Exposure 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/cm^2). The general population exposure limits for the various frequency ranges are defined in the attached "FCC Limits for Maximum Permissible Exposure (MPE)" in Attachment B 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 B 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 AT&T's Radio Frequency Design Sheet updated 9/30/2019.

3. RF Exposure Calculation Methods

The power density calculation results were generated using the following formula as outlined in FCC bulletin OET 65, and Connecticut Siting Council recommendations:

$$\text{Power Density} = \left(\frac{1.6^2 \times 1.64 \times \text{ERP}}{4\pi \times R^2}\right) \text{X Off Beam Loss}$$

Where:

ERP = Effective Radiated Power

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

H = Horizontal Distance from antenna

V = Vertical Distance from radiation center of antenna

Ground reflection factor of 1.6

Off Beam Loss is determined by the selected antenna pattern

These calculations assume that the antennas are operating at 100 percent capacity and power, and that all antenna channels are transmitting simultaneously. 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 consider 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. Calculation Results

Table 1 below outlines the cumulative power density information for the AT&T and Verizon equipment at the site. The proposed antennas are directional in nature; therefore, the majority of the RF power is focused out towards the horizon. As a result, there will be less RF power directed below the antennas relative to the horizon, and consequently lower power density levels around the base of the tower. Please refer to Attachment C for the vertical pattern of the proposed AT&T antennas. The calculated results for AT&T in Table 1 include a nominal 10 dB off-beam pattern loss to account for the lower relative gain below the antennas.

Carrier	Antenna Height (Feet)	Operating Frequency (MHz)	Number of Trans.	ERP Per Transmitter (Watts)	Power Density (mw/cm^2)	Limit	% MPE
AT&T	100	770	1	3540	0.0144	0.5133	2.81%
AT&T	100	770	1	3155	0.0128	0.5133	2.50%
AT&T	100	770	1	1730	0.0070	0.5133	1.37%
AT&T	100	850	1	3155	0.0128	0.5667	2.27%
AT&T	100	1900	1	5876	0.0239	1.0000	2.39%
AT&T	100	2100	1	6443	0.0262	1.0000	2.62%
AT&T	100	2300	1	6153	0.0251	1.0000	2.51%
Verizon	112	770	1	1393	0.0045	0.5133	0.87%
Verizon CDMA	112	850	1	433	0.0014	0.5667	0.24%
Verizon LTE	112	850	1	1734	0.0056	0.5667	0.98%
Verizon	112	1900	1	3342	0.0107	1.0000	1.07%
Verizon	112	2100	1	3665	0.0117	1.0000	1.17%
						Total	**20.81%**

Table 1: Carrier Information

5. Conclusion

The above analysis concludes that RF exposure at ground level from the proposed site will be below the maximum power density levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Using conservative calculation methods, the highest expected percent of Maximum Permissible Exposure at ground level is **20.81% of the FCC General Population/Uncontrolled limit**.

As noted previously, the calculated % MPE levels are more conservative (higher) than the actual signal levels will be from the finished modifications.

6. 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 FCC OET Bulletin 65 Edition 97-01, ANSI/IEEE Std. C95.1 and ANSI/IEEE Std. C95.3.

August 24, 2020

Reviewed/Approved By: Martin Lavin
Sr. RF Engineer
C Squared Systems, LLC

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 Exposure[2]

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 Exposure[3]

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 2: FCC Limits for Maximum Permissible Exposure (MPE)

[2] 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

[3] 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

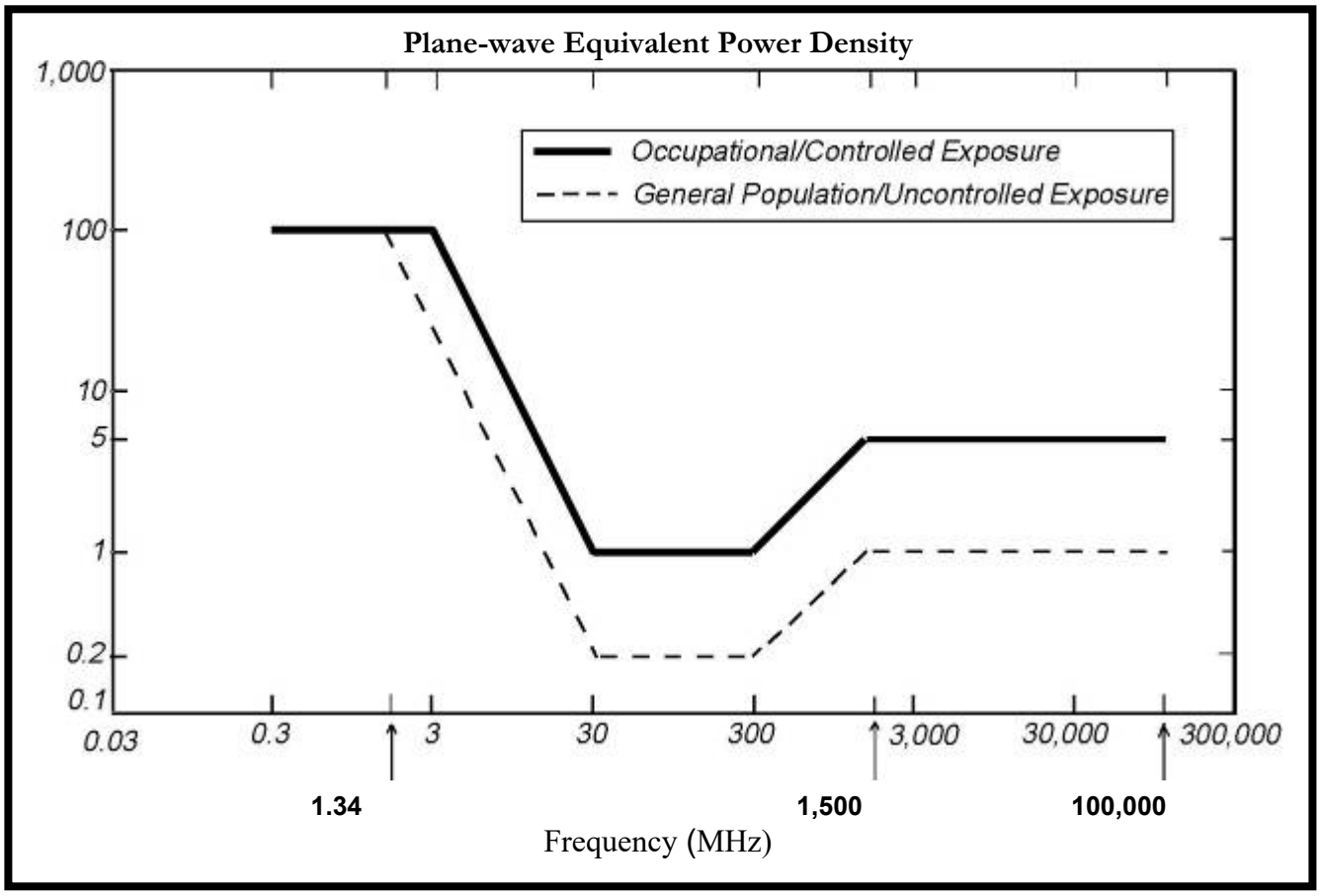
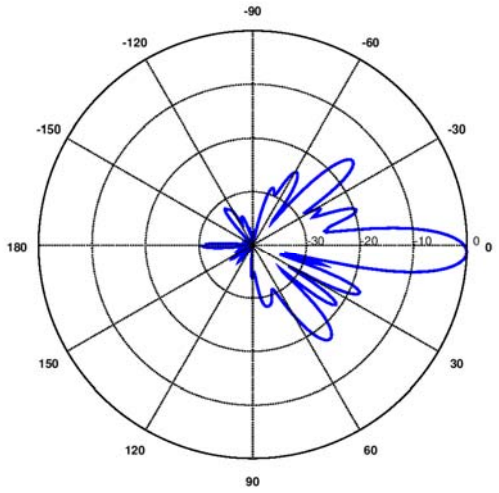
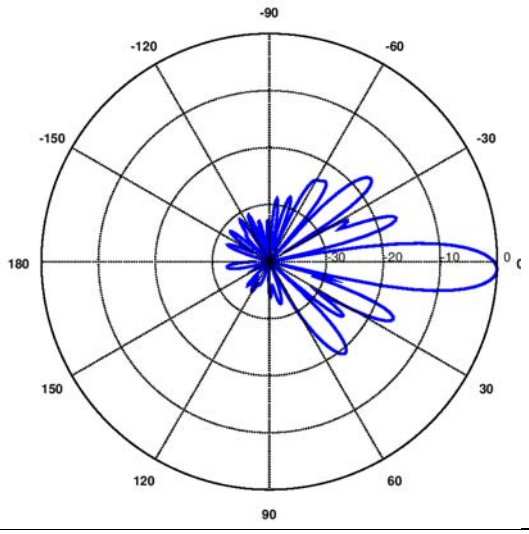
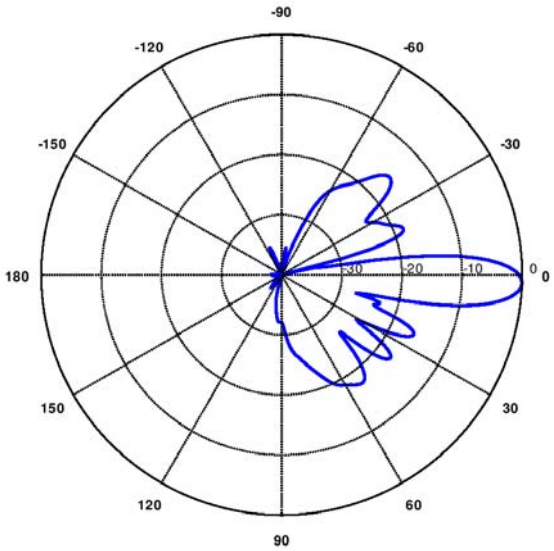


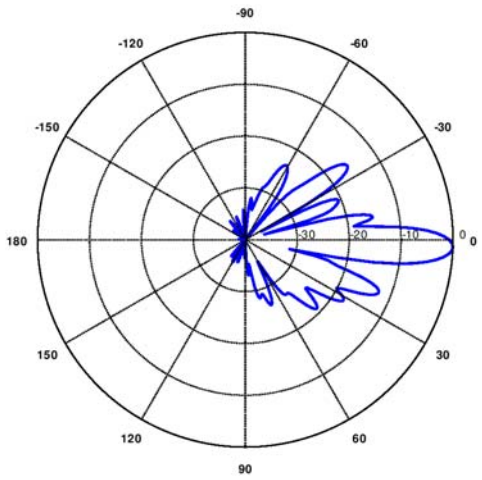
Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: AT&T Antenna Data Sheets and Electrical Patterns

750 MHz Manufacturer: CCI Products Model #: TPA-65R-BU8D Frequency Band: 698-806 MHz Gain: 13.45 dBd Vertical Beamwidth: 9.5° Horizontal Beamwidth: 74° Polarization: Dual Linear 45° Size L x W x D: 96.0” x 21” x 7.8”	
750 MHz Manufacturer: CCI Products Model #: DMP-65R-BU8D Frequency Band: 698 - 798MHz Gain: 12.95 dBd Vertical Beamwidth: 9.5° Horizontal Beamwidth: 75° Polarization: Dual Linear 45° Size L x W x D: 96.0” x 20.7” x 7.7”	
750 MHz Manufacturer: CCI Products Model #: HPA-65R-BU8A Frequency Band: 698 - 806 MHz Gain: 13.35 dBd Vertical Beamwidth: 9.7° Horizontal Beamwidth: 67° Polarization: Dual Linear 45° Size L x W x D: 96.0” × 11.7” × 7.7”	

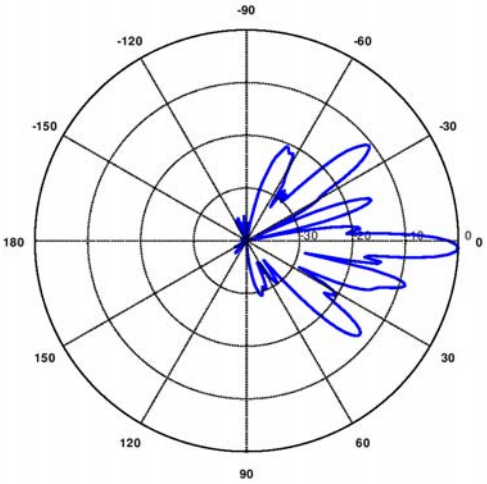
850 MHz

Manufacturer:	CCI Products
Model #:	DMP-65R-BU8D
Frequency Band:	824-896 MHz
Gain:	13.85 dBd
Vertical Beamwidth:	8.0°
Horizontal Beamwidth:	64°
Polarization:	Dual Linear 45°
Size L x W x D:	96.0” x 20.7” x 7.7”



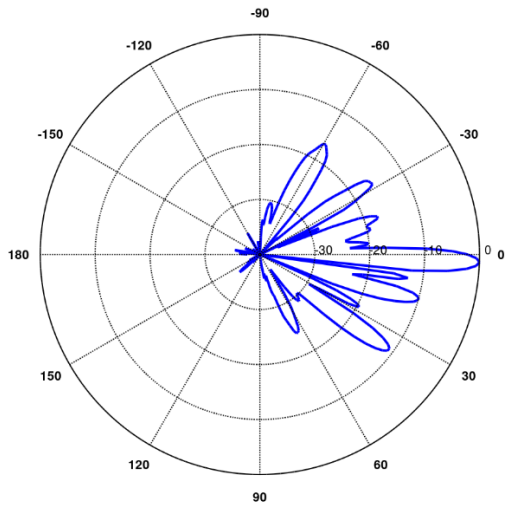
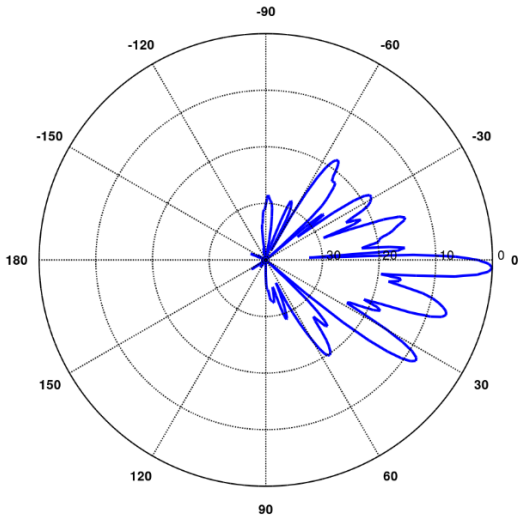
1900 MHz

Manufacturer:	CCI Products
Model #:	DMP-65R-BU8D
Frequency Band:	1850-1990 MHz
Gain:	15.65 dBd
Vertical Beamwidth:	5.1°
Horizontal Beamwidth:	68°
Polarization:	Dual Linear 45°
Size L x W x D:	96.0” x 20.7” x 7.7”



2100 MHz

Manufacturer:	CCI Products
Model #:	TPA-65R-BU8D
Frequency Band:	1920 - 2180 MHz
Gain:	16.15 dBd
Vertical Beamwidth:	4.7°
Horizontal Beamwidth:	67°
Polarization:	Dual Linear 45°
Size L x W x D:	96.0” × 20.7” × 7.7”



2310 MHz	
Manufacturer:	CCI Products
Model #:	HPA-65R-BU8A
Frequency Band:	2300 - 2400 MHz
Gain:	15.85 dBd
Vertical Beamwidth:	4.0°
Horizontal Beamwidth:	60°
Polarization:	Dual Linear 45°
Size L x W x D:	96.0” × 11.7” × 7.7”