

EM-CING-032-120612

**HPC Wireless Services**

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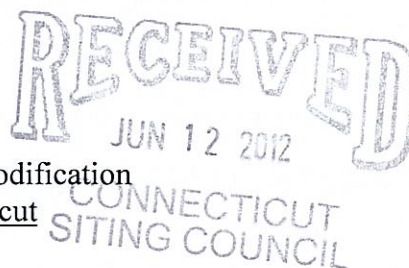


June 11, 2012

VIA OVERNIGHT COURIER

Connecticut Siting Council  
10 Franklin Square  
New Britain, Connecticut 06051  
Attn: Ms. Linda Roberts, Executive Director

ORIGINAL



Re: New Cingular Wireless PCS, LLC – exempt modification  
712 Bread and Milk Street, Coventry, Connecticut

Dear Ms. Roberts:

This letter and attachments are submitted on behalf of New Cingular Wireless PCS, LLC (“AT&T”). AT&T is making modifications to certain existing sites in its Connecticut system in order to implement LTE technology. Please accept this letter and attachments as notification, pursuant to R.C.S.A. Section 16-50j-73, of construction that constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2). In compliance with R.C.S.A. Section 16-50j-73, a copy of this letter and attachments is being sent to the Town Council Chairman of the Town of Coventry.

AT&T plans to modify the existing wireless communications facility owned by SBA and located at 712 Bread and Milk Street in the Town of Coventry (coordinates 41°-49’-05.04” N, 72°-23’-35.44” W). Attached are a compound plan and elevation depicting the planned changes, and documentation of the structural sufficiency of the structure to accommodate the revised antenna configuration. Also included is a power density report reflecting the modification to AT&T’s operations at the site.

The changes to the facility do not constitute a modification as defined in Connecticut General Statutes (“C.G.S.”) Section 16-50i(d) because the general physical characteristics of the facility will not be significantly changed. Rather, the planned changes to the facility fall squarely within those activities explicitly provided for in R.C.S.A. Section 16-50j-72(b)(2).

1. AT&T will add three (3) LTE panel antennas to the existing platform, with a mount height of approximately 162’ and a center line of approximately 164’, for a total of

nine (9) antennas. Six (6) RRHs (remote radio heads) and a surge arrestor will be mounted to the monopole behind the antennas. AT&T will also place a DC power and fiber run from the equipment to the antennas, up the tower along the existing coaxial cable run. The proposed modifications will not extend the height of the 175' structure.


2. The proposed changes will not extend the site boundaries. AT&T will install two (2) new cabinets on an extension to its concrete pad, and will mount a GPS antenna to the existing ice bridge. These changes will be within the existing compound and will have no effect on the site boundaries.

3. The proposed changes will not increase the noise level at the existing facility by six decibels or more. The incremental effect of the proposed changes will be negligible.

4. The changes to the facility will not increase the calculated "worst case" power density for the combined operations at the site to a level at or above the applicable standard for uncontrolled environments as calculated for a mixed frequency site. As indicated on the attached report prepared by C Squared Systems, LLC, AT&T's operations at the site will result in a power density of approximately 1.21%; the combined site operations will result in a total power density of approximately 3.56%.

Please feel free to contact me by phone at (860) 798-7454 or by e-mail at [jgaudet@hpcwireless.com](mailto:jgaudet@hpcwireless.com) with questions concerning this matter. Thank you for your consideration.

Respectfully yours,

  
Jennifer Young Gaudet  
(JYM)

Attachments

cc: Elizabeth A. Woolf, Chairman, Town Council  
John A. Elsesser, Town Manager  
Ronald R. & Jeannine G. Nadeau, Trustees (underlying property owners)









FDH Engineering, Inc., 6521 Meridien Drive Raleigh, NC 27616, Ph. 919.755.1012

Structural Analysis for  
SBA Network Services, Inc.

175' Monopole Tower

SBA Site Name: Coventry 2  
SBA Site ID: CT02573-S  
AT&T Site ID: CT5818  
AT&T Site Name: AWE-Coventry NW

FDH Project Number 12-04815E S1 (R1)

Analysis Results

Tower Components	90.3%	Sufficient
Foundation	39.1%	Sufficient

Prepared By:

Daniel Struempf, EI  
Project Engineer

Reviewed By:

Christopher M Murphy, PE  
President  
CT PE License No. 25842

FDH Engineering, Inc.  
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Raleigh, NC 27616  
(919) 755-1012  
info@fdh-inc.com



May 21, 2012

Prepared pursuant to TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and the 2005 Connecticut Building Code

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## EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Engineering, Inc. performed a structural analysis of the monopole located in Coventry, CT to determine whether the tower is structurally adequate to support both the existing and proposed loads pursuant to the Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, TIA/EIA-222-F and the 2005 Connecticut Building Code. Information pertaining to the existing/proposed antenna loading, current tower geometry, and member sizes was obtained from:

- Fred A. Nudd Corporation (Project No. 7491R Rev A) Design of 175'/190' Monopole Tower dated October 24, 2002.
- SBA Network Services, Inc.

The basic design wind speed per the TIA/EIA-222-F standards and 2005 Connecticut Building Code is 85 mph without ice and 38 mph with 1" radial ice. Ice is considered to increase in thickness with height.

## Conclusions

With the existing and proposed antennas from AT&T in place at 162 ft, the tower meets the requirements of the TIA/EIA-222-F standards and the 2005 Connecticut Building Code provided the Recommendation listed below is satisfied. Furthermore, provided the foundation was designed and constructed to support the original design reactions (see Fred A. Nudd Corporation Project No. 7491R Rev A), the foundation should have the necessary capacity to support both the proposed and existing loading. For a more detailed description of the analysis of the tower, see the Results section of this report.

Our structural analysis has been performed assuming all information provided to FDH Engineering, Inc. is accurate (i.e., the steel data, tower layout, existing antenna loading, and proposed antenna loading) and that the tower has been properly erected and maintained per the original design drawings.

## Recommendation

To ensure the requirements of the TIA/EIA-222-F standards and the 2005 Connecticut Building Code are met with the existing and proposed loading in place, we have the following recommendation:

1. The proposed coax should be installed inside the pole's shaft.



APPURTENANCE LISTING

The proposed and existing antennas with their corresponding cables/coax lines are shown in Table 1. If the actual layout determined in the field deviates from the layout, FDH Engineering, Inc. should be contacted to perform a revised analysis.

Table 1 - Appurtenance Loading

Existing Loading:

Antenna Elevation (ft)	Description	Coax and Lines	Carrier	Mount Elevation (ft)	Mount Type
172.5	(6) EMS RR90-17-2DP (6) Allen Telecom FE15501P77/75 MHAs	(12) 1-5/8"	T-Mobile	172.5	(1) Low Profile Mount
162	(6) Powerwave 7770.00 (6) Powerwave LGP21401 TMAs (6) Powerwave LGP21901 Diplexers	(6) 1-5/8"	AT&T	162	(1) Low Profile Mount

Proposed Loading:

Antenna Elevation (ft)	Description	Coax and Lines*	Carrier	Mount Elevation (ft)	Mount Type
162	(1) Andrew SBNH-1D6565C (2) KMW AM-X-CD-16-6500T (6) Powerwave 7770 (6) Powerwave LGP21401 TMAs (6) Powerwave 7020 RETs (6) Ericsson RRUS11 RRUs (1) Raycap DC-48-60-18-8F Surge Arrestor	(12) 1-5/8" (6) 1/2" (1) Fiber (2) DC Cables	AT&T	162	(1) Low Profile Mount

\*The fiber and DC cables will be installed in (1) 3" flex cable.



RESULTS

The following yield strength of steel for individual members was used for analysis:

Table 2 - Material Strength

Member Type	Yield Strength
Tower Shaft Sections	65 ksi
Base Plate	50 ksi
Anchor Bolts	105 & 127.7 ksi

Table 3 displays the summary of the ratio (as a percentage) of force in the member to their capacities. Values greater than 100% indicate locations where the maximum force in the member exceeds its capacity. Note: Capacities up to 105% are considered acceptable. Table 4 displays the maximum foundation reactions.

If the assumptions outlined in this report differ from actual field conditions, FDH Engineering, Inc. should be contacted to perform a revised analysis. Furthermore, as no information pertaining to the allowable twist and sway requirements for the existing or proposed appurtenances was provided, deflection and rotation were not taken into consideration when performing this analysis.

See the Appendix for detailed modeling information

Table 3 - Summary of Working Percentage of Structural Components

Section No.	Elevation ft	Component Type	Size	% Capacity	Pass Fail
L1	175 - 155	Pole	TP25.125x24x0.25	15.8	Pass
L2	155 - 130	Pole	TP34.6875x25.125x0.3125	22.2	Pass
L3	130 - 85	Pole	TP44.6875x32.15x0.375	31.8	Pass
L4	85 - 41	Pole	TP54.5x42.433x0.4375	34.6	Pass
L5	41 - 0	Pole	TP64.5x51.9356x0.4375	38.9	Pass
		Anchor Bolts	(24) 2.25"Ø w/ BC=58"	34.8	Pass
		Anchor Bolts	(16) 1.25"Ø w/ BC=50"	22.2	Pass
		Base Plate	68"Ø x 2.25" Thk.	90.3	Pass

Table 4 - Maximum Base Reactions

Base Reactions	Current Analysis (TIA/EIA-222-F)	Original Design (TIA/EIA-222-F)
Axial	44 k	---
Shear	22 k	43 k
Moment	2,316 k-ft	5,928 k-ft

## GENERAL COMMENTS

This engineering analysis is based upon the theoretical capacity of the structure. It is not a condition assessment of the tower and its foundation. It is the responsibility of SBA Network Services, Inc. to verify that the tower modeled and analyzed is the correct structure (with accurate antenna loading information) modeled. If there are substantial modifications to be made or the assumptions made in this analysis are not accurate, FDH Engineering, Inc. should be notified immediately to perform a revised analysis.

## LIMITATIONS

All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of this report. All opinions and conclusions are subject to revision based upon receipt of new or additional/updated information. All services are provided exercising a level of care and diligence equivalent to the standard and care of our profession. No other warranty or guarantee, expressed or implied, is offered. Our services are confidential in nature and we will not release this report to any other party without the client's consent. The use of this engineering work is limited to the express purpose for which it was commissioned and it may not be reused, copied, or distributed for any other purpose without the written consent of FDH Engineering, Inc.



C Squared Systems, LLC  
65 Dartmouth Drive, Unit A3  
Auburn, NH 03032  
(603) 644-2800  
support@csquaredsystems.com

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Calculated Radio Frequency Emissions



CT5818

(AWE-Coventry NW)

Bread and Milk Street, Coventry, CT 06238

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June 6, 2012



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## 1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed modifications to the existing AT&T antenna arrays mounted on the monopole tower located at Bread and Milk Street, Coventry, CT. The coordinates of the tower are 41-49-5.09- N, 72-23-35.43 W.

AT&T is proposing the following modifications:

- 1) Install three 700 MHz LTE antennas (one per sector).

## 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 ( $\text{mW}/\text{cm}^2$ ). 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.

### 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:

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

Where:

EIRP = Effective Isotropic Radiated Power

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

H = Horizontal Distance from antenna in meters

V = Vertical Distance from radiation center of antenna in meters

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 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 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 finished modifications.



#### 4. Calculation Results

Table 1 below outlines the power density information for the site. Because the proposed AT&T antennas are directional in nature, 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 <sup>2</sup> )	Limit	%MPE
AT&T UMTS	162	880	1	500	0.0069	0.5867	1.17%
AT&T GSM	162	1900	2	427	0.0117	1.0000	1.17%
AT&T GSM	162	880	4	296	0.0162	0.5867	2.77%
T-Mobile	172	1930	8	238	0.0231	1.0000	2.31%
AT&T UMTS	164	880	2	565	0.0015	0.5867	0.26%
AT&T UMTS	164	1900	2	875	0.0023	1.0000	0.23%
AT&T LTE	164	734	1	1375	0.0018	0.4893	0.38%
AT&T GSM	164	880	1	283	0.0004	0.5867	0.06%
AT&T GSM	164	1900	4	525	0.0028	1.0000	0.28%
<b>Total</b>							<b>3.53%</b>

**Table 1: Carrier Information<sup>1 2 3</sup>**

<sup>1</sup> The existing CSC filing for AT&T should be removed and replaced with the updated AT&T technologies and values provided in Table 1. The power density information for carriers other than AT&T was taken directly from the CSC database dated 3/29/2012. Please note that %MPE values listed are rounded to two decimal points. The total %MPE listed is a summation of each unrounded contribution. Therefore, summing each rounded value may not reflect the total value listed in the table.

<sup>2</sup> In the case where antenna models are not uniform across all 3 sectors for the same frequency band, the antenna model with the highest gain was used for the calculations to present a worse-case scenario.

<sup>3</sup> Antenna height listed for AT&T is in reference to the FDH Engineering, Inc. Structural Analysis for SBA Network Services, Inc. dated 5/22/2012.

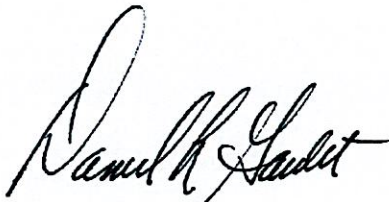
## 5. Conclusion

The above analysis verifies that emissions from the existing site will be below the maximum power density levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Even when using conservative methods, the cumulative power density from the proposed transmit antennas at the existing facility is well below the limits for the general public. The highest expected percent of Maximum Permissible Exposure at ground level is **3.53% of the FCC limit**.

As noted previously, obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. As a result, the predicted signal 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 ANSI/IEEE Std. C95.3, ANSI/IEEE Std. C95.1 and FCC OET Bulletin 65 Edition 97-01.



Daniel L. Goulet  
C Squared Systems, LLC

June 6, 2012

Date

### Attachment A: References

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

ANSI C95.1-1982, American National Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz. IEEE-SA Standards Board

IEEE Std C95.3-1991 (Reaff 1997), IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave. IEEE-SA Standards Board



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

**(A) Limits for Occupational/Controlled Exposure<sup>4</sup>**

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

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	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)**

<sup>4</sup> 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

<sup>5</sup> 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

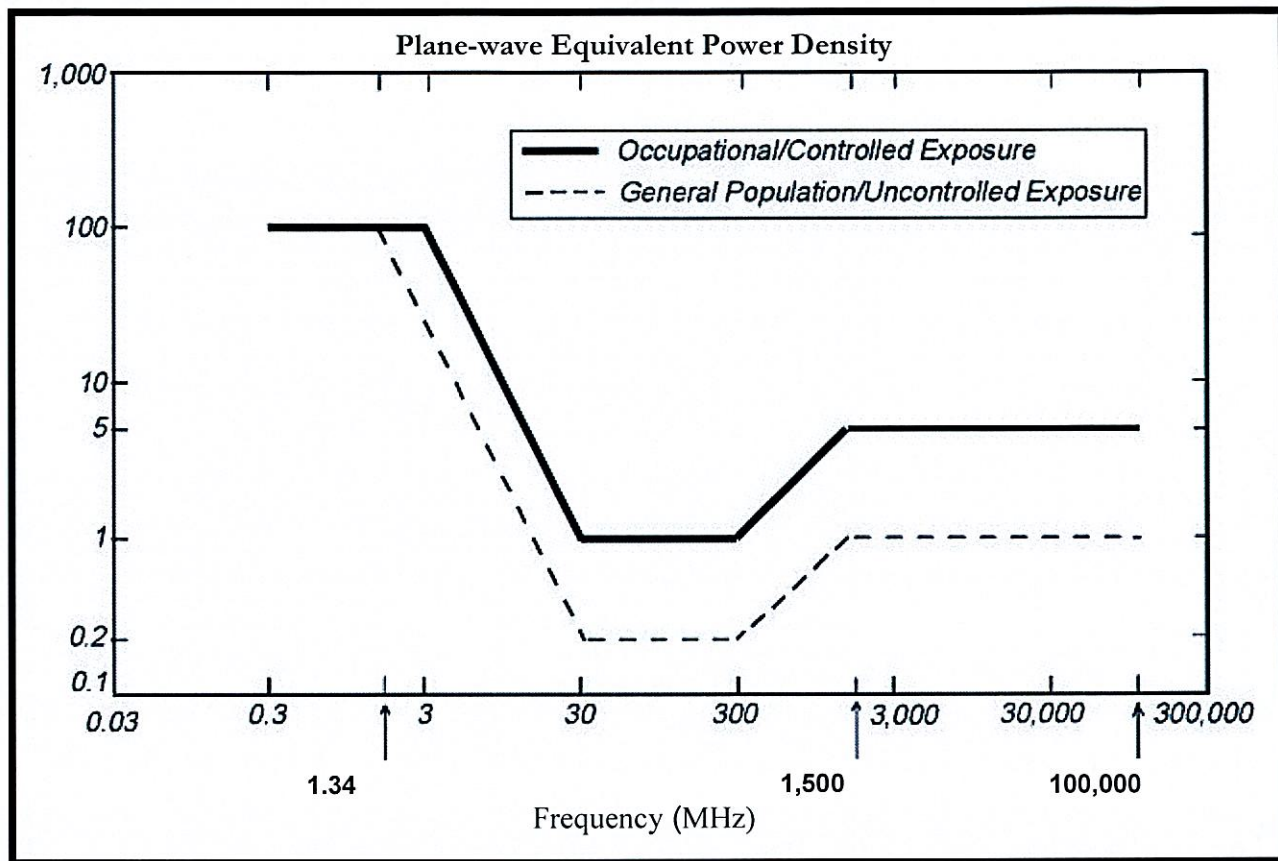
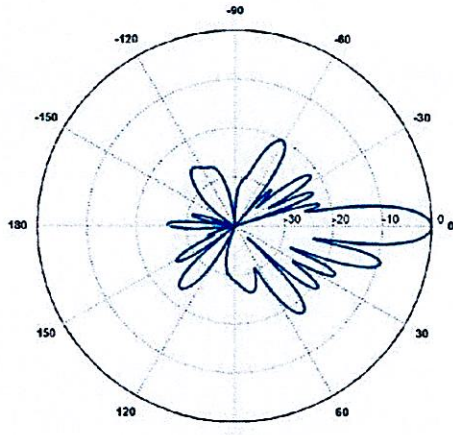
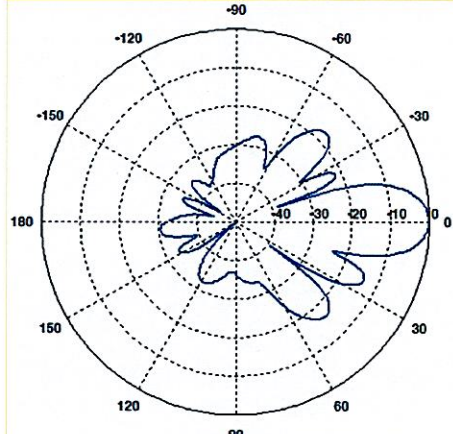


Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

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

<p><b>700 MHz</b></p> <p>Manufacturer: Commscope            Model #: SBNH-1D6565C            Frequency Band: 698-806 MHz            Gain: 13.6 dBd            Vertical Beamwidth: 8.6°            Horizontal Beamwidth: 71°            Polarization: ± 45°            Size L x W x D: 96.42" x 11.85" x 7.1"</p>	
<p><b>850 MHz</b></p> <p>Manufacturer: Powerwave            Model #: 7770            Frequency Band: 824-896 MHz            Gain: 11.5 dBd            Vertical Beamwidth: 15°            Horizontal Beamwidth: 85°            Polarization: Dual Linear ± 45°            Size L x W x D: 55.4" x 11.0" x 5.0"</p>	
<p><b>1900 MHz</b></p> <p>Manufacturer: Powerwave            Model #: 7770            Frequency Band: 1850-1990 MHz            Gain: 13.4 dBd            Vertical Beamwidth: 7°            Horizontal Beamwidth: 90°            Polarization: Dual Linear ± 45°            Size L x W x D: 55.4" x 11.0" x 5.0"</p>	