EM-AT&T-021-120613A

HPC Wireless Services
46 Mill Plain Rd.
Floor 2
Danbury, CT, 06811
P.: 203.797.1112

HPC WIRELESS SERVICES

ORIGINAL

June 12, 2012

VIA OVERNIGHT COURIER

RECEIVED
JUN 13 2012
CONNECTICUT
SITING COUNCIL

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

Re: New Cingular Wireless PCS, LLC – exempt modification
12 Carpenter Road, Bolton, 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 First Selectman of the Town of Bolton.

AT&T plans to modify the existing wireless communications facility owned by SBA Towers and located at 12 Carpenter Road, in the Town of Bolton (coordinates 41°-46'-44.7" N, 72°-27'-55.1" 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 antennas to the existing platform, and will relocate three (3) of the existing six (6) antennas on the platform, all at a center line of

approximately 110'. Six (6) RRHs (remote radio heads) will be mounted behind the antennas on pipes, and a surge arrestor will be mounted behind the platform. AT&T will also place a DC power and fiber run from the equipment to the antennas along the existing coaxial cable run. The proposed modifications will not extend the height of the approximately 139' structure.

2. The proposed changes will not extend the site boundaries. AT&T will install related equipment within its existing shelter and will mount a GPS antenna to the shelter. 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 2.65%; the combined site operations will result in a total power density of approximately 37.73%.

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

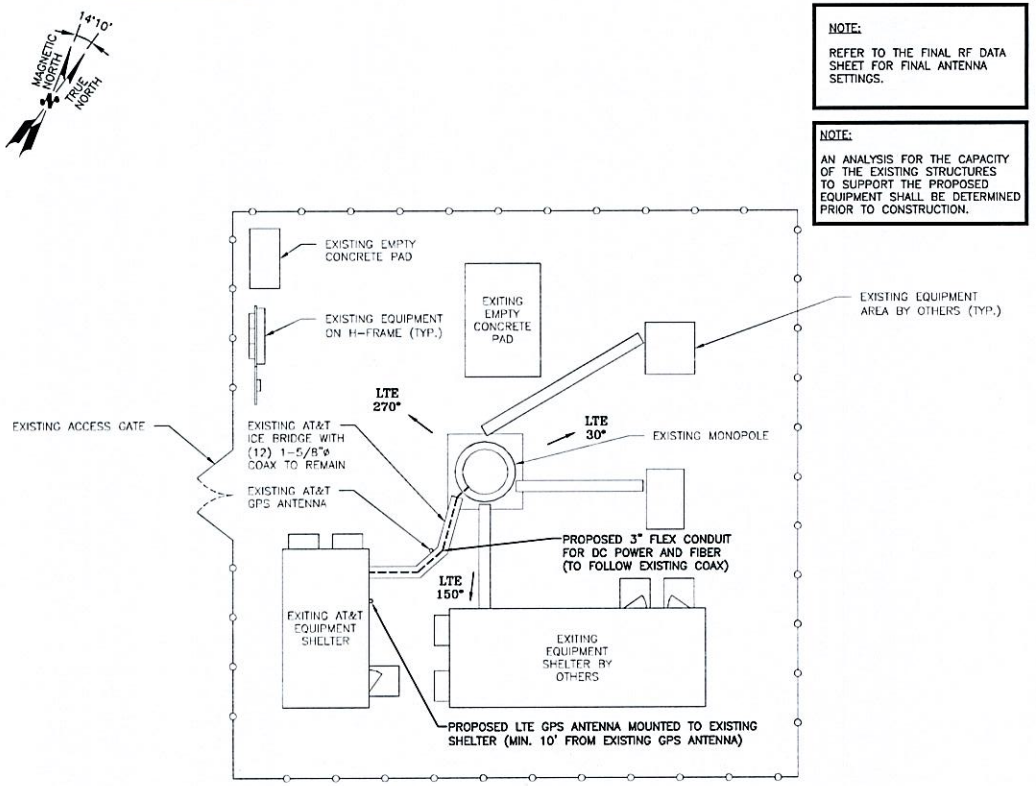
Respectfully yours,

Jennifer Young Gaudet

Jennifer Young Gaudet

Attachments

cc: Honorable Robert R. Morra, First Selectman, Town of Bolton
Terry L. Veo, Trustee (underlying property owner)




**NOTE:**

REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

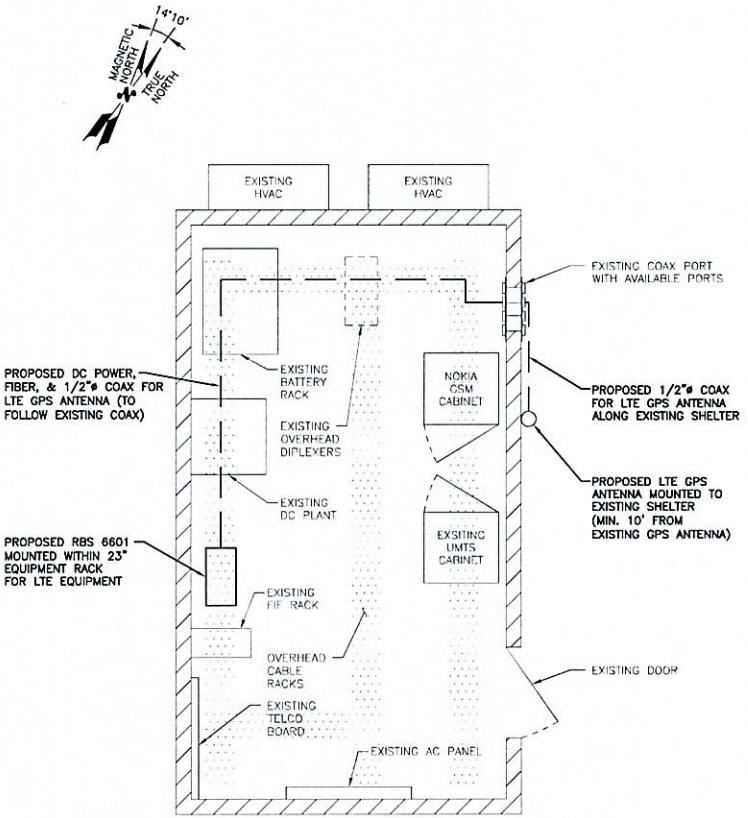
**NOTE:**

AN ANALYSIS FOR THE CAPACITY OF THE EXISTING STRUCTURES TO SUPPORT THE PROPOSED EQUIPMENT SHALL BE DETERMINED PRIOR TO CONSTRUCTION.

## COMPOUND PLAN

SCALE: 1/8"=1'-0"

0 4'-0" 8'-0" 16'-0" 24'-0"




## EQUIPMENT PLAN

SCALE: 1/2"=1'-0"

0 1'-0" 2'-0" 4'-0" 6'-0"

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 2-101
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5566

NEXLINK GLOBAL SERVICES
a UniTek GLOBAL SERVICES company
800 MARSHALL PHELPS ROAD UNIT#: 2A
WINDSOR, CT 06095

**SITE NUMBER: CT1227**
**SITE NAME: BOLTON CARPENTER ROAD**
12 CARPENTER ROAD
BOLTON, CT 06043
TOLLAND COUNTY

at&t
500 ENTERPRISE DRIVE
ROCKY HILL, CT 06067

| NO. | DATE | REVISIONS | BY | CHK | APP'D |
|---|---|---|---|---|---|
| 2 | 06/06/12 | CONSTRUCTION REVISED | DC | DPH | |
| 1 | 04/18/12 | ISSUED FOR CONSTRUCTION | SF | DC | DPH |
| 0 | 03/26/12 | ISSUED FOR REVIEW | SF | DC | DPH |

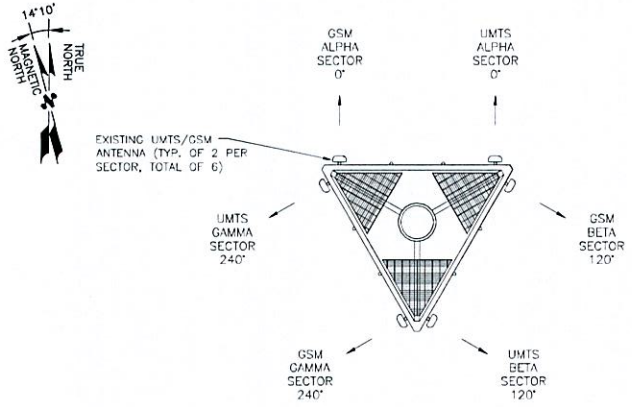
SCALE: AS SHOWN | DESIGNED BY: DC | DRAWN BY: SF

STATE OF CONNECTICUT — JAMES C. HAMM — No. 24175 — LICENSED PROFESSIONAL ENGINEER

AT&T

COMPOUND & EQUIPMENT PLAN (LTE)

| JOB NUMBER | DRAWING NUMBER | REV |
|---|---|---|
| 1227.01 | A-1 | 2 |




## EXISTING GSM/UMTS ANTENNA PLAN

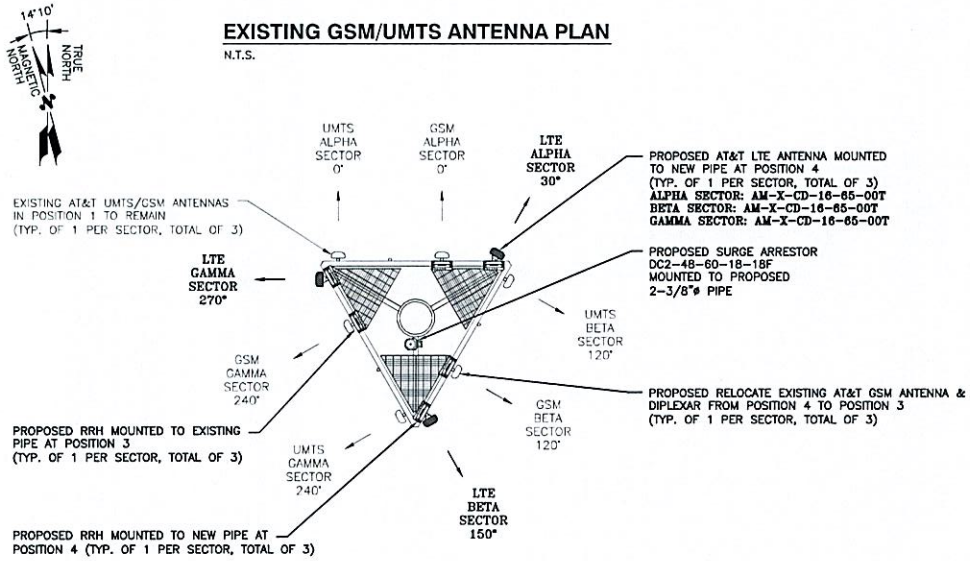
N.T.S.

**NOTE:**

REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

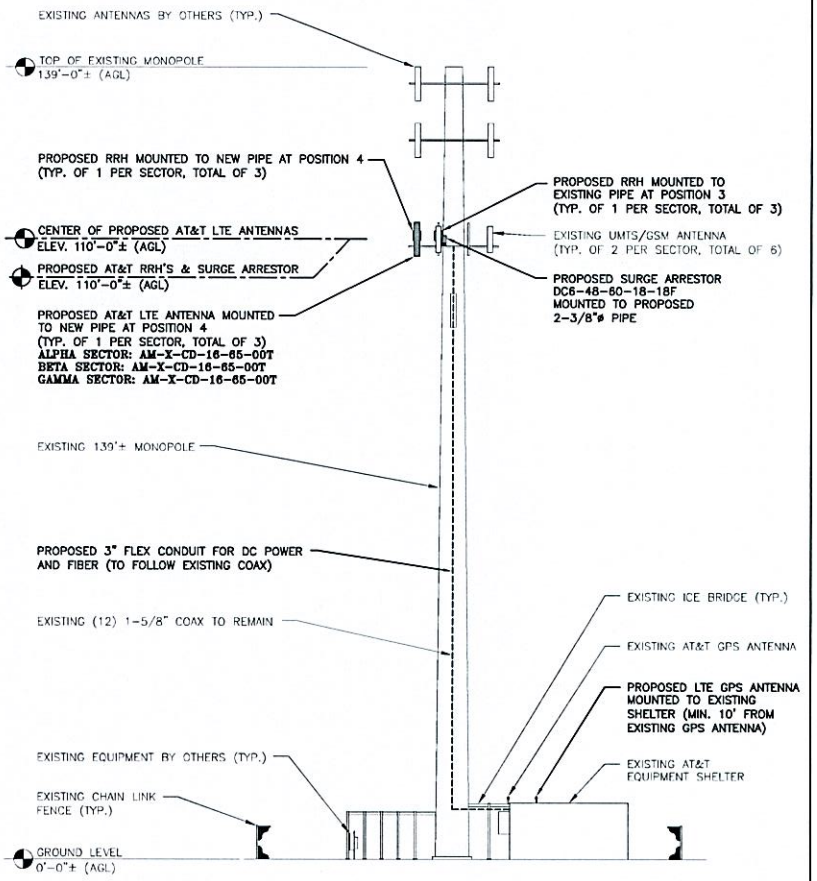
**NOTE:**

AN ANALYSIS FOR THE CAPACITY OF THE EXISTING STRUCTURES TO SUPPORT THE PROPOSED EQUIPMENT SHALL BE DETERMINED PRIOR TO CONSTRUCTION.




## PROPOSED LTE ANTENNA PLAN

N.T.S.




## WEST ELEVATION

SCALE: 3/32"=1'-0" 0' 5'-4" 10'-8" 21'-4" 32'-0"

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 2-101
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

NEXLINK GLOBAL SERVICES
a UniTek GLOBAL SERVICES company
800 MARSHALL PHELPS ROAD UNIT#: 2A
WINDSOR, CT 06095

**SITE NUMBER: CT1227**
**SITE NAME: BOLTON CARPENTER ROAD**
12 CARPENTER ROAD
BOLTON, CT 06043
TOLLAND COUNTY

at&t
500 ENTERPRISE DRIVE
ROCKY HILL, CT 06067

| NO. | DATE | REVISIONS | BY | CHK | APP'D |
|---|---|---|---|---|---|
| 2 | 06/06/12 | CONSTRUCTION REVISED | DC | DC | DPH |
| 1 | 04/18/12 | ISSUED FOR CONSTRUCTION | SF | DC | DPH |
| 0 | 03/26/12 | ISSUED FOR REVIEW | SF | DC | DPH |

SCALE: AS SHOWN | DESIGNED BY: DC | DRAWN BY: SF

STATE OF CONNECTICUT DANIEL P. HAMM No. 24175 LICENSED PROFESSIONAL ENGINEER

AT&T

ANTENNA & ELEVATION PLAN (LTE)

| JOB NUMBER | DRAWING NUMBER | REV |
|---|---|---|
| 1227.01 | A-2 | 2 |

FDH Engineering, Inc., 6521 Meridien Dr., NC 27616, Ph. 919.755.1012, Fax 919.755.1031

# Structural Analysis for SBA Network Services, Inc.

139' Monopole Tower

SBA Site Name: Bolton 2
SBA Site ID: CT11558-A
AT&T Site Name: Manchester Bolton
AT&T Site ID: CT1227

FDH Project Number 12-02254E S2 (R1)

Analysis Results

| | | |
|---|---|---|
| Tower Components | 58.0 % | Sufficient |
| Foundation | 73.4 % | Sufficient |

Prepared By:

Jonathan C. Holmes, EI
Project Engineer

Reviewed By:

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

FDH Engineering, Inc.
6521 Meridien Dr.
Raleigh, NC 27616
(919) 755-1012
info@fdh-inc.com


June 8, 2012

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

TABLE OF CONTENTS

## EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Engineering, Inc. performed a structural analysis of the monopole located in Bolton, 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 2005 Connecticut Building Code (CBC). Information pertaining to the existing/proposed antenna loading, current tower geometry, geotechnical data, and member sizes was obtained from:

- Fred A. Nudd Corporation (Project No. 207-13312) original design drawings dated September 5, 2007
- FDH, Inc. (Job No. 08-08057T) TIA Inspection Report dated September 16, 2008
- SBA Network Services, Inc.

The basic design wind speed per the TIA/EIA-222-F standards and 2005 CBC 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 110 ft, the tower meets the requirements of the TIA/EIA-222-F standards and 2005 CBC provided the Recommendations listed below are satisfied. Furthermore, provided the foundation was designed and constructed to support the original design reactions (see Nudd Project No. 207-13312), the foundation should have the necessary capacity to support the existing and proposed 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.

### Recommendations

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

1. The existing coax should be used with the proposed loading.
2. The proposed conduit 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 [1] | Carrier | Mount Elevation (ft) | Mount Type |
|---|---|---|---|---|---|
| 137 | (3) Antel BXA-70063/6CF W/Mount Pipe<br>(4) Antel LPA-80080/6CF W/Mount Pipe<br>(2) Antel BXA-171085/12BF_2 w/ Mount Pipe<br>(1) Antel BXA-171063/12CF_2 w/ Mount Pipe<br>(2) Antel LPA-80063/4CF w/ Mount Pipe<br>(6) RFS FD9R6004/2C-3L Diplexers | (12) 1-5/8" | Verizon | 137 | (1) 12.5' Low Profile Platform |
| 126.5 | (3) RFS APX16PV-16PVL-C W/Mount Pipe<br>(3) Comm DTMA1819-00-12 TMAs | (6) 1-5/8"<br>(1) 1/4" | T-Mobile | 126.5 | (1) 12.5' Low Profile Platform |
| 108.3 | (6) Powerwave AXCM-800/1900-90-13 w/ Mount Pipe<br>(6) Powerwave LGP13519 TMAs<br>(6) Powerwave LGP21401 TMAs | (12) 1-5/8" | AT&T | 108.3 | (1) 13.5' Low Profile Platform |
| 97 [2] | (3) RFS APXV18-206517S-C W/Mount Pipe | (6) 1-5/8" | Metro PCS | 97 | (3) Pipe Mounts |

1. Coax installed inside the pole's shaft unless otherwise noted.
2. Coax is installed outside the pole shaft in a single row.

### Proposed Loading:

| Antenna Elevation (ft) | Description | Coax and Lines | Carrier | Mount Elevation (ft) | Mount Type |
|---|---|---|---|---|---|
| 110 | (9) Powerwave 7770<br>(3) KMW AM-X-CD-16-65-00T<br>(12) Powerwave LGP2140X TMAs<br>(6) Ericsson RRUS11 RRUs<br>(1) Raycap DC6-48-60-18-8F | (12) 1-5/8"<br>(1) 3/8"<br>(2) DC Cables<br>(1) 3" Conduit | AT&T | 108.3 | (1) 13.5' Low Profile Platform |

## 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 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. 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 | 139 - 114 | Pole | TP29.875x24x0.25 | 20.4 | Pass |
| L2 | 114 - 89 | Pole | TP35.8125x29.875x0.25 | 40.9 | Pass |
| L3 | 89 - 69 | Pole | TP40x34.125x0.3125 | 49.3 | Pass |
| L4 | 69 - 44 | Pole | TP45.875x40x0.3125 | 56.7 | Pass |
| L5 | 44 - 25 | Pole | TP49.75x43.84x0.375 | 54.4 | Pass |
| L6 | 25 - 0 | Pole | TP55.625x49.75x0.375 | 58.0 | Pass |
| | 0 | Anchor Bolts | (20) 2"Ø on 62" BC | 48.8 | Pass |
| | 0 | Base Plate | PL 68"Ø x 2.5" thk. | 39.0 | Pass |

* Capacities include a 1/3 allowable stress increase for wind

Table 4 - Maximum Base Reactions

| Base Reactions | Current Analysis (TIA/EIA-222-F) | Original Design (ANSI/TIA-222-G) |
|---|---|---|
| Axial | 31 k | 67 k |
| Shear | 23 k | 39 k |
| Moment | 2,217 k-ft | 4,076 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

# Calculated Radio Frequency Emissions

at&t

## CT1227 – Manchester Bolton

## 12 Carpenter Rd., Bolton, CT 06040

June 8, 2012

# Table of Contents



# List of Tables



# List of Figures

## 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 12 Carpenter Rd in Bolton, CT. The coordinates of the tower are 41° 46' 44.96" N, 72° 27' 54.86" 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 ($mW/cm^2$). 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.

## 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:

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

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.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Cingular GSM* | *107* | *1900* | *2* | *296* | *0.0186* | *1.0000* | *1.86%* |
| *Cingular GSM* | *107* | *880* | *4* | *296* | *0.0372* | *0.5867* | *6.34%* |
| *Cingular UMTS* | *107* | *880* | *1* | *500* | *0.0157* | *0.5867* | *2.68%* |
| T-Mobile | 127 | 1945 | 12 | 162 | 0.0433 | 1.0000 | 4.33% |
| Sprint Nextel | 117 | 851 | 12 | 100 | 0.0315 | 0.5673 | 5.56% |
| Verizon | 137 | 869 | 9 | 301 | 0.0519 | 0.5793 | 8.96% |
| Verizon PCS | 137 | 1970 | 7 | 315 | 0.0422 | 1.0000 | 4.22% |
| Verizon AWS | 137 | 2145 | 1 | 788 | 0.0151 | 1.0000 | 1.51% |
| Verizon LTE | 137 | 698 | 1 | 790 | 0.0151 | 0.4653 | 3.25% |
| Pocket | 97 | 2130 | 3 | 631 | 0.0723 | 1.0000 | 7.23% |
| AT&T UMTS | 110 | 880 | 2 | 565 | 0.0034 | 0.5867 | 0.57% |
| AT&T UMTS | 110 | 1900 | 2 | 875 | 0.0052 | 1.0000 | 0.52% |
| AT&T LTE | 110 | 734 | 1 | 1313 | 0.0039 | 0.4893 | 0.80% |
| AT&T GSM | 110 | 880 | 1 | 283 | 0.0008 | 0.5867 | 0.14% |
| AT&T GSM | 110 | 1900 | 4 | 525 | 0.0062 | 1.0000 | 0.62% |
| | | | | | | **Total** | **37.73%** |

**Table 1: Carrier Information [1] [2] [3]**

[1] The existing CSC filing for Cingular 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 identically match the total value reflected in the table.

[2] 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.

[3] Antenna height listed for AT&T is in reference to the FHD Engineering Structural Analysis dated June 4, 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 **37.73% 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 8, 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[4]

| 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[5]

| 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)**

[4] 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

[5] 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

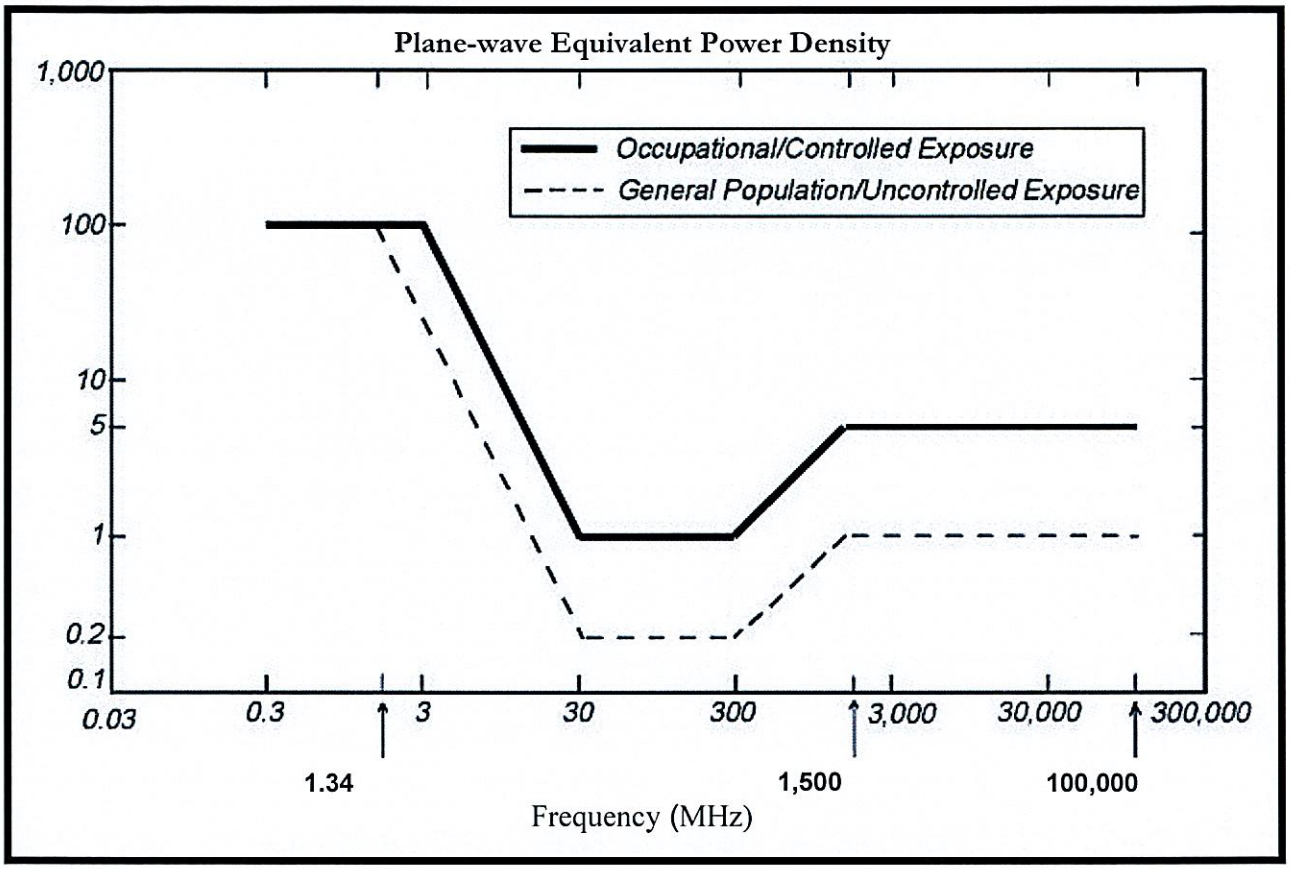
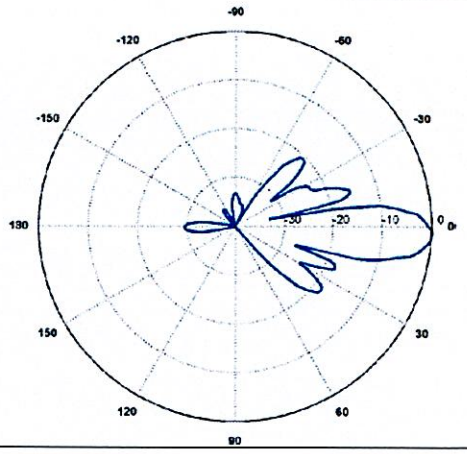



**Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)**

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

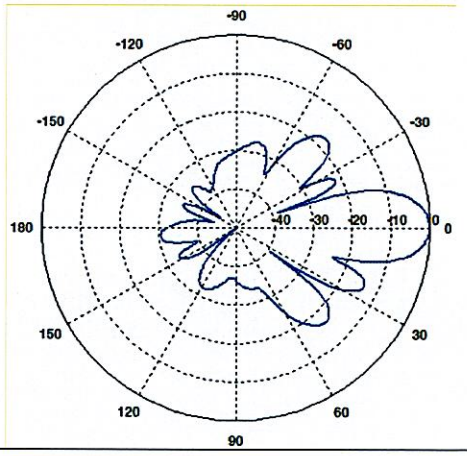
### 700 MHz

| | |
|---|---|
| Manufacturer: | KMW |
| Model #: | AM-X-CD-16-65-00T-RET |
| Frequency Band: | 698-894 MHz |
| Gain: | 13.4 dBd |
| Vertical Beamwidth: | 12.3° |
| Horizontal Beamwidth: | 65° |
| Polarization: | Dual Slant ± 45° |
| Size L x W x D: | 72" x 11.8" x 5.9" |




### 850 MHz

| | |
|---|---|
| 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" x 5" |




### 1900 MHz

| | |
|---|---|
| Manufacturer: | Powereave |
| 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" x 5" |