# Radio Frequency Emissions Analysis Report

AT&T Existing Facility

Site ID: CT2102
FA#: 10128691

Greenwich Perryville Rd Twr
5 Perryville Road
Greenwich, CT 06830

**April 6, 2018**

**Centerline Communications Project Number: 950006-112**

| Site Compliance Summary | |
|---|---|
| Compliance Status: | **COMPLIANT** |
| Site total MPE% of FCC general population allowable limit: | **34.67 %** |

April 6, 2018

AT&T Mobility – New England
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Emissions Analysis for Site: **CT2102 – Greenwich Perryville Rd Twr**

Centerline Communications, LLC ("Centerline") was directed to analyze the proposed AT&T facility located at **5 Perryville Road, Greenwich, CT**, for the purpose of determining whether the emissions from the Proposed AT&T 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 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ 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 ($\mu W/cm^2$). The general population exposure limits for the 700 and 850 MHz Bands are approximately 467 $\mu W/cm^2$ and 567 $\mu W/cm^2$ respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 2300 MHz (WCS) bands is 1000 $\mu W/cm^2$. 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 AT&T Wireless antenna facility located at **5 Perryville Road, Greenwich, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since AT&T 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, 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 each sector the following channel counts, frequency bands and power levels were utilized as shown in *Table 1*:

| Technology | Frequency Band | Channel Count | Transmit Power per Channel (W) |
|---|---|---|---|
| UMTS | 850 MHz | 2 | 30 |
| LTE | 700 MHz | 4 | 40 |
| LTE | 700 MHz (Band 14) | 4 | 40 |
| LTE | 850 MHz | 2 | 40 |
| LTE | 1900 MHz (PCS) | 4 | 40 |
| LTE | 2100 MHz (AWS) | 4 | 30 |
| LTE | 2300 MHz (WCS) | 4 | 30 |

*Table 1: Channel Data Table*

The following antennas listed in *Table 2* were used in the modeling for transmission in the 700 MHz, 850 MHz, 1900 MHz (PCS), 2100 MHz (AWS) and 2300 MHz (WCS) 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, 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 | Powerwave 7770 | 134 |
| A | 2 | Quintel QS66512-2 | 134 |
| A | 3 | Kathrein 800-10965 | 134 |
| A | 4 | CCI HPA-65R-BUU-H6 | 134 |
| B | 1 | Powerwave 7770 | 134 |
| B | 2 | Quintel QS66512-2 | 134 |
| B | 3 | Kathrein 800-10965 | 134 |
| B | 4 | CCI HPA-65R-BUU-H6 | 134 |
| C | 1 | Powerwave 7770 | 134 |
| C | 2 | Quintel QS66512-2 | 134 |
| C | 3 | Kathrein 800-10965 | 134 |
| C | 4 | CCI HPA-65R-BUU-H6 | 134 |

*Table 2: Antenna Data*

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

## RESULTS

Per the calculations completed for the proposed AT&T 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 | Powerwave 7770 | 850 MHz | 11.4 | 2 | 60 | 828.23 | 0.32 |
| Antenna A2 | Quintel QS66512-2 | 700 MHz / 850 MHz / 1900 MHz (PCS) / 2300 MHz (WCS) | 10.85 / 11.35 / 13.85 / 14.85 | 12 | 440 | 9,613.10 | 2.54 |
| Antenna A3 | Kathrein 800-10965 | 700 MHz / 2100 MHz (AWS) | 12.65 / 15.95 | 8 | 280 | 7,667.84 | 2.42 |
| Antenna A4 | CCI HPA-65R-BUU-H6 | 700 MHz | 11.95 | 2 | 80 | 1,253.40 | 0.59 |
| | | | | | | Sector A Composite MPE% | **5.87** |
| Antenna B1 | Powerwave 7770 | 850 MHz | 11.4 | 2 | 60 | 828.23 | 0.32 |
| Antenna B2 | Quintel QS66512-2 | 700 MHz / 850 MHz / 1900 MHz (PCS) / 2300 MHz (WCS) | 10.85 / 11.35 / 13.85 / 14.85 | 12 | 440 | 9,613.10 | 2.54 |
| Antenna B3 | Kathrein 800-10965 | 700 MHz / 2100 MHz (AWS) | 12.65 / 15.95 | 8 | 280 | 7,667.84 | 2.42 |
| Antenna B4 | CCI HPA-65R-BUU-H6 | 700 MHz | 11.95 | 2 | 80 | 1,253.40 | 0.59 |
| | | | | | | Sector B Composite MPE% | **5.87** |
| Antenna C1 | Powerwave 7770 | 850 MHz | 11.4 | 2 | 60 | 828.23 | 0.32 |
| Antenna C2 | Quintel QS66512-2 | 700 MHz / 850 MHz / 1900 MHz (PCS) / 2300 MHz (WCS) | 10.85 / 11.35 / 13.85 / 14.85 | 12 | 440 | 9,613.10 | 2.54 |
| Antenna C3 | Kathrein 800-10965 | 700 MHz / 2100 MHz (AWS) | 12.65 / 15.95 | 8 | 280 | 7,667.84 | 2.42 |
| Antenna C4 | CCI HPA-65R-BUU-H6 | 700 MHz | 11.95 | 2 | 80 | 1,253.40 | 0.59 |
| | | | | | | Sector C Composite MPE% | **5.87** |

*Table 3: AT&T 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 AT&T 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, all three sectors have the same configuration yielding the same results on all three sectors. *Table 5* below shows a summary for each AT&T Sector as well as the composite MPE value for the site.

| **Site Composite MPE%** | |
|---|---|
| **Carrier** | **MPE%** |
| AT&T – Max Sector Value | **5.87 %** |
| Eversource | 20.44 % |
| Verizon | 2.78 % |
| MW to Bruce | 0.74 % |
| MW to PD | 0.02 % |
| MW to Putnam | 0.74 % |
| Trunked Systems | 0.22 % |
| Mutual Aid | 0.12 % |
| CMED | 0.08 % |
| Fire Paging | 0.13 % |
| SP Hotline | 0.17 % |
| Sprint | 0.34 % |
| Clearwire | 0.08 % |
| T-Mobile | 2.28 % |
| Nextel | 0.66 % |
| **Site Total MPE %:** | **34.67 %** |

*Table 4: All Carrier MPE Contributions*

| | |
|---|---|
| AT&T Sector A Total: | 5.87 % |
| AT&T Sector B Total: | 5.87 % |
| AT&T Sector C Total: | 5.87 % |
| | |
| Site Total: | 34.67 % |

*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 AT&T sector(s). For this site, all three sectors have the same configuration yielding the same results on all three sectors.

| **AT&T _ Frequency Band / Technology Max Power Values (Per Sector)** | **# Channels** | **Watts ERP (Per Channel)** | **Height (feet)** | **Total Power Density ($\mu W/cm^2$)** | **Frequency (MHz)** | **Allowable MPE ($\mu W/cm^2$)** | **Calculated % MPE** |
|---|---|---|---|---|---|---|---|
| AT&T 850 MHz UMTS (Antenna 1) | 2 | 414.12 | 134 | 1.82 | 850 MHz | 567 | 0.32% |
| AT&T 700 MHz LTE (Antenna 2) | 2 | 486.47 | 134 | 2.13 | 700 MHz | 467 | 0.46% |
| AT&T 850 MHz LTE (Antenna 2) | 2 | 545.83 | 134 | 2.40 | 850 MHz | 567 | 0.42% |
| AT&T 1900 MHz (PCS) LTE (Antenna 2) | 4 | 970.64 | 134 | 8.52 | 1900 MHz (PCS) | 1000 | 0.85% |
| AT&T 2300 MHz (WCS) LTE (Antenna 2) | 4 | 916.48 | 134 | 8.04 | 2300 MHz (WCS) | 1000 | 0.80% |
| AT&T 700 MHz LTE (Antenna 3) | 4 | 736.31 | 134 | 6.46 | 700 MHz | 467 | 1.38% |
| AT&T 2100 MHz (AWS) LTE (Antenna 3) | 4 | 1,180.65 | 134 | 10.36 | 2100 MHz (AWS) | 1000 | 1.04% |
| AT&T 700 MHz LTE (Antenna 4) | 2 | 626.70 | 134 | 2.75 | 700 MHz | 467 | 0.59% |
| | | | | | | **Total:** | **5.87%** |

*Table 6: AT&T Maximum Sector MPE Power Values*

## 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 AT&T 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:

| AT&T Sector | Power Density Value (%) |
|---|---|
| Sector A: | 5.87 % |
| Sector B: | 5.87 % |
| Sector C: | 5.87 % |
| AT&T Maximum Total (per sector): | 5.87 % |
| | |
| Site Total: | 34.67 % |
| | |
| Site Compliance Status: | **COMPLIANT** |

The anticipated composite MPE value for this site assuming all carriers present is **34.67 %** 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.

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