# Non-Ionizing Radiation Report

Compiled For: Smartlink on behalf of AT&T

Site Name: Bristol

Site FA: 10035029

Site ID: CTL01055

1 Willis Street, Bristol, CT 06010

Latitude: 41.649075 Longitude: -72.9480269

Structure Type: Monopole

Report Date: October 3, 2019

Status: AT&T will be compliant with FCC rules on RF Exposure with the installation of recommended signage in section 4 of this report.

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# 1. Executive Summary:

Smartlink on behalf of AT&T has contracted Infinigy Solutions, LLC to determine whether the site Bristol located at 1 Willis Street in Bristol, CT Will Be Compliant with all Federal Communications Commission (FCC) rules and regulations for radio frequency (RF) exposure as indicated in **47CFR§1.1310**.

The report incorporates a theoretical RF field analysis in accordance with the FCC Rules and Regulations for all individuals classified as "Occupational or Controlled" and "General Public or Uncontrolled" (see Appendix A and B).

This document and the conclusions herein are based on information provided by Smartlink on behalf of AT&T.

As a result of the analysis, **AT&T Will Be Compliant with FCC rules with the installation of recommended signage in section 4.**

**Engineering assumptions were made regarding the collocation operators. The assumptions coincide with the typical deployment practices of each operator.**

| All Carriers, All Bands Cumulative Exposure % | | |
|---|---|---|
| Uncontrolled / General Population | Exposure values at the site ($mW/cm^2$) | 0.0277 |
| | % Exposure | 3.92% |
| Controlled / Occupational | Exposure values at the site ($mW/cm^2$) | 0.0277 |
| | % Exposure | 0.82% |

## 2. Site Summary:

| Site Information | |
|---|---|
| Site Name: Bristol | |
| Site Address: 1 Willis Street, Bristol, CT 06010 | |
| Site Type: Monopole | |
| Compliance Status | Will Be Compliant |
| Mitigation Required | No |
| Signage Required | Yes |
| Barriers Required | No |
| Access Locked | No |
| Area Controlled or Uncontrolled | Uncontrolled |

## 3. Site Compliance

This report also incorporates overview of the site information:

- Antenna Inventory Table
- Calculation Tables showing exposure for each carrier transmit frequency
- Total exposure for all carriers existing and proposed at ground level considering the centerline of all antennas and horizontal distance from the tower.
- Maximum Effective Radiated Power Assumed as Worst Case for Calculations used in this study
- Calculations based on flat ground around base of the structure

# 4. Site Compliance Recommendations

Infinigy recommends the following upon the installation of antennas at the site:

**Base of tower**

Caution 2 Sign at the base of the tower.

Note: The recommendation is moot if there is an existing Caution 2 sign at the base of the tower.

# 5. Antenna Inventory Table

| Ant ID | Sector | Operator | Antenna manufacturer | Antenna Model | Operating Frequency | Rad Ctr (Ft) | Total ERP Power (Watts) |
|---|---|---|---|---|---|---|---|
| 1 | Alpha | AT&T | Powerwave | 7770 | 850 | 124 | 301 |
| 2a | Alpha | AT&T | CCI | TPA-65R-LCUUUU-H8 | 700 | 124 | 1476 |
| 2b | Alpha | AT&T | CCI | TPA-65R-LCUUUU-H8 | 1900 | 124 | 4842 |
| 2c | Alpha | AT&T | CCI | TPA-65R-LCUUUU-H8 | 2300 | 124 | 1286 |
| 3a | Alpha | AT&T | Kathrein-Scala | 800-10966 | 700 | 124 | #REF! |
| 3b | Alpha | AT&T | Kathrein-Scala | 800-10966 | 1900 | 124 | 2951 |
| 4a | Alpha | AT&T | CCI | DMP65R-BU8D | 700 | 124 | 3664 |
| 4b | Alpha | AT&T | CCI | DMP65R-BU8D | 2100 | 124 | 1475 |
| 4c | Alpha | AT&T | CCI | DMP65R-BU8D | 850 | 124 | 3837 |
| 4d | Alpha | AT&T | Powerwave | DMP65R-BU8D | 850 | 124 | 1000 |
| 5 | Beta | AT&T | Powerwave | 7770 | 850 | 124 | 1000 |
| 6a | Beta | AT&T | Quintel | TPA-65R-LCUUUU-H8 | 700 | 124 | 1476 |
| 6b | Beta | AT&T | Quintel | TPA-65R-LCUUUU-H8 | 1900 | 124 | 4842 |
| 6c | Beta | AT&T | Quintel | TPA-65R-LCUUUU-H8 | 2300 | 124 | 1286 |
| 7a | Beta | AT&T | Kathrein-Scala | 800-10966 | 700 | 124 | 2951 |
| 7b | Beta | AT&T | Kathrein-Scala | 800-10966 | 1900 | 124 | 3664 |
| 8a | Beta | AT&T | CCI | DMP65R-BU8D | 700 | 124 | 1475 |
| 8b | Beta | AT&T | CCI | DMP65R-BU8D | 2100 | 124 | 3837 |
| 8c | Beta | AT&T | CCI | DMP65R-BU8D | 850 | 124 | 1000 |
| 8d | Beta | AT&T | Powerwave | DMP65R-BU8D | 850 | 124 | 1000 |
| 9 | Gamma | AT&T | Powerwave | 7770 | 850 | 124 | 301 |
| 10a | Gamma | AT&T | CCI | TPA-65R-LCUUUU-H8 | 700 | 124 | 1476 |
| 10b | Gamma | AT&T | CCI | TPA-65R-LCUUUU-H8 | 1900 | 124 | 4842 |
| 10c | Gamma | AT&T | CCI | TPA-65R-LCUUUU-H8 | 2300 | 124 | 1286 |
| 11a | Gamma | AT&T | Kathrein-Scala | 800-10966 | 700 | 124 | 2951 |

| Ant ID | Sector | Operator | Antenna manufacturer | Antenna Model | Operating Frequency | Rad Ctr (Ft) | Total ERP Power (Watts) |
|---|---|---|---|---|---|---|---|
| 11b | Gamma | AT&T | Kathrein-Scala | 800-10966 | 1900 | 124 | 3664 |
| 12a | Gamma | AT&T | CCI | DMP65R-BU8D | 700 | 124 | 1475 |
| 12b | Gamma | AT&T | CCI | DMP65R-BU8D | 2100 | 124 | 3837 |
| 12c | Gamma | AT&T | CCI | DMP65R-BU8D | 862 | 124 | 1000 |
| 12d | Gamma | AT&T | Powerwave | DMP65R-BU8D | 862 | 124 | 1000 |
| 13 | Alpha | Sprint | Commscope | DB844H90E-XY | 862 | 110 | 1023 |
| 14 | Alpha | Sprint | Commscope | DB844H90E-XY | 862 | 110 | 1023 |
| 15 | Alpha | Sprint | Commscope | DB844H90E-XY | 862 | 110 | 1023 |
| 16 | Alpha | Sprint | Commscope | DB844H90E-XY | 862 | 110 | 1023 |
| 17 | Gamma | Sprint | Commscope | DB844H90E-XY | 862 | 110 | 1023 |
| 18 | Gamma | Sprint | Commscope | DB844H90E-XY | 862 | 110 | 1023 |
| 19 | Gamma | Sprint | Commscope | DB844H90E-XY | 862 | 110 | 1023 |
| 20 | Gamma | Sprint | Commscope | DB844H90E-XY | 862 | 110 | 1023 |
| 21 | Alpha | Metro PCS (T-Mobile) | Kathrein-Scala | 742213 | 862 | 101 | 2803 |
| 22 | Beta | Metro PCS (T-Mobile) | Kathrein-Scala | 742213 | 862 | 101 | 2803 |
| 23 | Gamma | Metro PCS (T-Mobile) | RFS | APXV18-206517 | 862 | 101 | 2677 |
| 24 | N/A | Clearwire (Sprint) | Generic | 11 GHz Dish | 862 | 93 | 1 |
| 25 | N/A | Clearwire (Sprint) | Generic | 11 GHz Dish | 862 | 93 | 1 |
| 26 | N/A | Clearwire (Sprint) | Generic | 11 GHz Dish | 862 | 93 | 1 |
| 27 | N/A | Clearwire (Sprint) | Generic | 18 GHz Dish | 862 | 93 | 1 |

# 6. RF Guidelines

To ensure safety of company workers, the following points need to be taken into consideration and implemented at wireless sites in accordance with the Carriers policies:

a) Worksite: Any employee at the site should avoid working directly in front of the antenna or in areas predicted to exceed general population exposure limits by 100%. Workers should insist that the transmitters be switched off during the work period.

b) RF Safety Training and Awareness: All employees working in areas exceeding the general population limits should have a basic awareness of RF safety measures. Videos, classroom lectures and online courses are all appropriate training methods on these topics.

c) Site Access: Restricting access to transmitting antenna locations is one of the most important elements of RF safety. This can be done with:
   - Locked doors/gates/ladder access
   - Alarmed doors
   - Restrictive barriers

d) Three-foot Buffer: There is an inverse relationship between the strength of the field and the distance from the antenna. The RF field diminishes with distance from the antenna. Workers should maintain a three-foot distance from the antennas.

e) Antennas: Workers should always assume that the antenna is transmitting and should never stop right in front of the antenna. If someone must pass by an antenna, he/she should move quickly, thus reducing RF exposure.

# Attachment 1: AT&T Exposure Analysis

| AT&T 700 MHz LTE | | |
|---|---|---|
| Uncontrolled / General Population | FCC's exposure limits (mW/cm$^2$) | **0.5** |
| | Exposure values at the site (mW/cm$^2$) | **0.0068** |
| | % Exposure | **1.36%** |
| Controlled / Occupational | FCC's Exposure limits(mW/cm$^2$) | **2.3** |
| | Exposure values at the site (mW/cm$^2$) | **0.0068** |
| | % Exposure | **0.30%** |

| AT&T 850 MHz UMTS | | |
|---|---|---|
| Uncontrolled / General Population | FCC's exposure limits (mW/cm$^2$) | **0.6** |
| | Exposure values at the site (mW/cm$^2$) | **0.0005** |
| | % Exposure | **0.09%** |
| Controlled / Occupational | FCC's Exposure limits(mW/cm$^2$) | **2.8** |
| | Exposure values at the site (mW/cm$^2$) | **0.0005** |
| | % Exposure | **0.02%** |

| AT&T 850 MHz LTE | | |
|---|---|---|
| Uncontrolled / General Population | FCC's exposure limits (mW/cm$^2$) | **0.6** |
| | Exposure values at the site (mW/cm$^2$) | **0.0020** |
| | % Exposure | **0.33%** |
| Controlled / Occupational | FCC's Exposure limits(mW/cm$^2$) | **2.8** |
| | Exposure values at the site (mW/cm$^2$) | **0.0020** |
| | % Exposure | **0.07%** |

| AT&T 850 MHz 5G | | |
|---|---|---|
| Uncontrolled / General Population | FCC's exposure limits (mW/cm²) | **0.6** |
| | Exposure values at the site (mW/cm²) | **0.0010** |
| | % Exposure | **0.17%** |
| Controlled / Occupational | FCC's Exposure limits(mW/cm²) | **2.8** |
| | Exposure values at the site (mW/cm²) | **0.0010** |
| | % Exposure | **0.04%** |

| AT&T 1900 MHz LTE | | |
|---|---|---|
| Uncontrolled / General Population | FCC's exposure limits (mW/cm²) | **1.0** |
| | Exposure values at the site (mW/cm²) | **0.0085** |
| | % Exposure | **0.85%** |
| Controlled / Occupational | FCC's Exposure limits(mW/cm²) | **5.0** |
| | Exposure values at the site (mW/cm²) | **0.0085** |
| | % Exposure | **0.17%** |

| AT&T 2300 MHz LTE | | |
|---|---|---|
| Uncontrolled / General Population | FCC's exposure limits (mW/cm²) | **1.0** |
| | Exposure values at the site (mW/cm²) | **0.0013** |
| | % Exposure | **0.13%** |
| Controlled / Occupational | FCC's Exposure limits(mW/cm²) | **5.0** |
| | Exposure values at the site (mW/cm²) | **0.0013** |
| | % Exposure | **0.03%** |

# Attachment 2: Sprint Exposure Analysis

| Sprint 862 MHz LTE | | |
|---|---|---|
| Uncontrolled / General Population | FCC's exposure limits (mW/cm$^2$) | **0.6** |
| | Exposure values at the site (mW/cm$^2$) | **0.0035** |
| | % Exposure | **0.58%** |
| Controlled / Occupational | FCC's Exposure limits(mW/cm$^2$) | **2.8** |
| | Exposure values at the site (mW/cm$^2$) | **0.0035** |
| | % Exposure | **0.12%** |

| Sprint (Clearwire) 11 GHz Microwave | | |
|---|---|---|
| Uncontrolled / General Population | FCC's exposure limits (mW/cm$^2$) | **1.0** |
| | Exposure values at the site (mW/cm$^2$) | **0.0000** |
| | % Exposure | **0.00%** |
| Controlled / Occupational | FCC's Exposure limits(mW/cm$^2$) | **5.0** |
| | Exposure values at the site (mW/cm$^2$) | **0.0000** |
| | % Exposure | **0.00%** |

| Sprint (Clearwire) 18 GHz Microwave | | |
|---|---|---|
| Uncontrolled / General Population | FCC's exposure limits (mW/cm$^2$) | **1.0** |
| | Exposure values at the site (mW/cm$^2$) | **0.0000** |
| | % Exposure | **0.00%** |
| Controlled / Occupational | FCC's Exposure limits(mW/cm$^2$) | **5.0** |
| | Exposure values at the site (mW/cm$^2$) | **0.0000** |
| | % Exposure | **0.00%** |

# Attachment 3: T-Mobile Exposure Analysis

| T-Mobile 1900 MHz LTE | | |
|---|---|---|
| Uncontrolled / General Population | FCC's exposure limits (mW/cm$^2$) | **1.0** |
| | Exposure values at the site (mW/cm$^2$) | **0.0040** |
| | % Exposure | **0.40%** |
| Controlled / Occupational | FCC's Exposure limits(mW/cm$^2$) | **5.0** |
| | Exposure values at the site (mW/cm$^2$) | **0.0040** |
| | % Exposure | **0.0808%** |

# Attachment 4: Combined Exposure Analysis for each Carrier

| AT&T All Bands | | |
|---|---|---|
| Uncontrolled / General Population | Exposure values at the site (mW/cm²) | 0.0202 |
| | % Exposure | 2.94% |
| Controlled / Occupational | Exposure values at the site (mW/cm²) | 0.0202 |
| | % Exposure | 0.62% |

| Sprint All Bands | | |
|---|---|---|
| Uncontrolled / General Population | Exposure values at the site (mW/cm²) | 0.0035 |
| | % Exposure | 0.58% |
| Controlled / Occupational | Exposure values at the site (mW/cm²) | 0.0035 |
| | % Exposure | 0.12% |

| T-Mobile (Metro PCS) All Bands | | |
|---|---|---|
| Uncontrolled / General Population | Exposure values at the site (mW/cm²) | **1.0**<br>**0.0040** |
| | % Exposure | **0.40%** |
| Controlled / Occupational | Exposure values at the site (mW/cm²) | **5.0**<br>**0.0040** |
| | % Exposure | **0.08%** |

# 7. Appendix A: FCC Guidelines

## FCC Policies

The Federal Communications Commission (FCC) in 1996 implemented regulations and policies for analysis of RF propagation to evaluate RF emissions. All the analysis and results of this report are compared with FCC's (Federal Communications Commission) rules to determine whether a site is compliant for Occupational/Controlled or General Public/Uncontrolled exposure. All the analysis of RF propagation is done in terms of a percentage. The limits primarily indicate the power density and are generally expressed in terms of milliwatts per centimeter square, $mW/cm^2$.

FCC guidelines incorporate two separate tiers of exposure limits that are dependent on the scenario/ situation in which that exposure takes place or the status of the individuals who are subjected to that exposure. The decision as to which tier is applied to a scenario is based on the following definitions:

### Occupational / Controlled

These limits apply in situations when someone is exposed to RF energy through his/her occupation, is fully aware of the harmful effects of the RF exposure and has an ability to exercise control over this exposure. Occupational / controlled exposure limits also apply when 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. limits for Occupational/Controlled exposure can be found on Table 1(A).

### General Population / Uncontrolled

These limits apply to situations in which the general public may be exposed or in which persons who are exposed because of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure to RF. Therefore, members of the general public would always be considered under this category, for example, in the case of a telecommunications tower that exposes people in a nearby residential area. Exposure limits for General Population/Uncontrolled can be found on Table 1(B).

**Table 1. LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

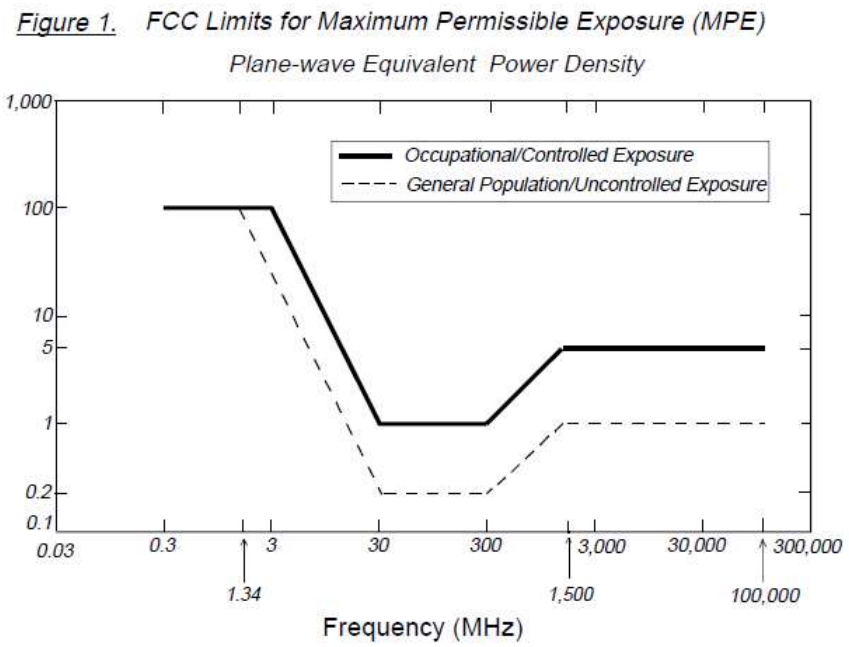
**(A) Limits for Occupational/Controlled Exposure**

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (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**

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (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




OSHA Statement:

The objective of the OSHA Act is to ensure the safety and health of the working men and women by enforcing certain standards. The act also assists and encourages the states in their efforts to ensure safe and healthy working conditions through means of research, information, education and training in the field of occupational safety and health and for other purposes.

According to OSHA Act section 5, important duties to be considered are:

(a) Each employer

1) Shall furnish to each of his employees' employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious harm to his employees
2) Shall comply with occupational safety and health standards promulgated under this act.

(b) Each employee shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to this Act which are applicable to his own actions and conduct.

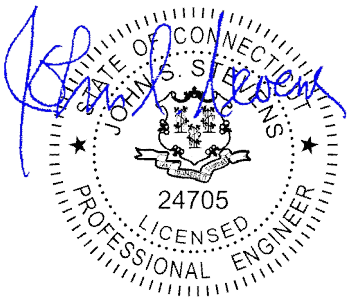
# 8. Appendix B: Preparer Certification

I, Tim Harris, preparer of this report, certify that I am fully trained and aware of the rules and regulations of both the Federal Communications Commission and the Occupational Safety and Heath Administration regarding Human Exposure to Radio Frequency Radiation. In addition, I have been trained in 1) RF safety and 2) RF modeling using RoofView modeling software.

I certify that the information contained in this report is true and correct to the best of my knowledge.

*Timothy A. Harris* *10/3/2019*

Signature Date




10/04/2019