**PO Box 165**
**Fairview Village, PA 19409**
**Phone: 610.304.2024**
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November 25, 2024
Matt Penning
Milestone Towers
12110 Sunset Hills Rd, #600
Reston, VA 20190

**Subject:** **Electromagnetic Exposure Analysis**
**"Hamilton Safety Center"**
**39071 East Colonial Highway**
**Hamilton, VA 20158**
**Latitude: N 39° 08' 02.14" (NAD 83)**
**Longitude: W 77° 39' 08.10" (NAD 83)**

Mr. Penning:

I have received and executed your request that I perform an independent evaluation and certification of the cumulative anticipated radio-frequency exposure levels for the AT&T and Verizon Wireless telecommunication facilities proposed at the above referenced address. The intention of this study is to verify compliance with Federal Communications Commission (hereafter "FCC") guidelines for human exposure limits to radio-frequency electromagnetic fields as per FCC Code of Federal Regulation 47 CFR 1.1307 and 1.1310. As a registered Professional Engineer, I am bound by a code of ethics to hold paramount the safety, health, and welfare of the public. All statements and calculations offered herein are made in an objective and truthful manner pursuant to that code.

**Summary of Findings**

The maximum exposure to radio-frequency emissions from the proposed AT&T and Verizon Wireless equipment will be far below FCC exposure limits. **Using upper limit assumptions for the AT&T and Verizon Wireless equipment configuration, the cumulative radio-frequency exposure levels would be less than 5.9% of the applicable FCC standard at all ground level locations of public access.** The following charts specifically illustrate the anticipated exposure levels in areas surrounding the facility. All exposure levels have been calculated using the methods prescribed in FCC Office of Engineering and Technology (OET) Bulletin 65 "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio-frequency Electromagnetic Fields". These upper-limit conditions include maximum traffic loading, significant antenna down-tilt, maximum pattern gain, and constructive interference from ground reflection. Additionally, signal attenuation due to environmental clutter such as buildings, trees, and roadways has been ignored which will overestimate actual power densities.

**Applicability of the National Telecommunications Act of 1996**

This Act states that "no state or local government or instrumentality thereof may regulate the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio-frequency emissions to the extent that such facilities comply with the (Federal Communications) Commission's regulations concerning such emissions". As indicated above, this proposed facility will be in full compliance with the FCC's emissions standards and as such is beyond regulation in that regard.

**Technical Parameters of Consideration**

The above calculations were based on the equipment configuration information furnished by representatives of AT&T. Specifically, for this installation, the current AT&T design includes the installation of up to twelve (12) new panel-style antennas at an average antenna centerline height of 155' above grade. The antennas will be organized in three (3) arrays of up to four (4) antenna positions per array with sector azimuths evenly spaced in the horizontal plane with respect to true north. Transmitting through these antennas will be up to eight (8) LTE transmit paths in the 700 MHz band (per sector) at a cumulative maximum of 300 watts, up to eight (8) LTE and/or 5GNR transmit paths in the 1900 MHz band (per sector) at a cumulative maximum of 240 watts, up to four (4) LTE and/or 5GNR transmit paths in the 2100 MHz band (per sector) at a cumulative maximum of 240 watts, up to four (4) 5GNR transmit paths in the 850 MHz band (per sector) at a cumulative maximum of 240 watts, up to four (4) LTE transmit paths in the 2300 MHz band (per sector) at a cumulative maximum of 100 watts, up to sixty-four (64) 5GNR transmit paths in the 3700 MHz C-Band band (per sector) at a cumulative maximum of 320 watts radio power, and up to sixty-four (64) 5GNR transmit paths in the 3500 MHz DoD-Band band (per sector) at a cumulative maximum of 320 watts radio power. Transmitting through the Verizon Wireless antennas planned for installation at an antenna centerline of 145' are up to four (4) LTE channels in the 700 MHz band (per sector) at a cumulative maximum of 160 watts, up to four (4) 5GNR radios in the 850 MHz band (per sector) at a cumulative maximum of 160 watts, up to four (4) LTE radios in the 1900 MHz band (per sector) at a cumulative maximum of 160 watts, up to four (4) LTE channels in the 2100 MHz band (per sector) at a cumulative maximum of 160 watts, and up to sixty-four (64) 5GNR transmit paths in the 3700 MHz C-Band band (per sector) at a cumulative maximum of 320 watts radio power.

**Co-location of Other Wireless Providers and Anticipated Exposure Levels**
In an attempt to halt the proliferation of telecommunications structures and preserve as much of their natural landscape as possible many municipalities have adopted telecommunications ordinances that specifically require new structures to accommodate additional wireless providers from a structural standpoint. **From the standpoint of radio-frequency exposure**, the installation of the proposed AT&T and Verizon Wireless equipment would in no way preclude the use of this facility by other providers.

For purposes of a worse-case scenario examination, this analysis contemplates two (2) additional co-locaters on the monopole with antenna centerlines of 135' and 125'. These hypothetical providers are assumed to have antenna and radio configurations identical to those proposed by AT&T (one of the more heavily channelized providers) except for their incrementally lower heights. Because it is impossible to know which (if any) co-locators with eventually utilize this structure and what their radio frequency configuration could be, this analysis is only meant to provide a rough estimate as to what expected exposure levels could be if the structure were utilized to its full potential.

Using upper limit assumptions for the AT&T and Verizon Wireless equipment configuration, and two (2) more identically channelized wireless service providers with antenna centerlines at ten (10) foot increments below the proposed arrays, the cumulative radio-frequency exposure levels would be less than 16.9% of the applicable FCC standard at all ground level locations of public access. Measured exposure readings are always significantly lower than the worse-case exposure calculations. According to page 14 of the FCC Office of Engineering and Technology (OET) Bulletin 65 "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio-frequency Electromagnetic Fields"[1]:

*For antennas mounted higher than 10 meters, measurement data for cellular facilities have indicated that ground-level power densities are typically hundreds to thousands of times below the new MPE limits.*

[1] https://transition.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet65/oet65.pdf

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**Background Information**

In 1985, the FCC first adopted guidelines to be used for evaluating human exposure to RF emissions. The FCC revised and updated these guidelines on August 1, 1996, as a result of a rule-making proceeding initiated in 1993. The new guidelines incorporate limits for Maximum Permissible Exposure (MPE) in terms of electric and magnetic field strength and power density for transmitters operating at frequencies between 300 kHz and 100 GHz. The FCC's MPE limits are based on exposure limits recommended by the National Council on Radiation Protection and Measurements (NCRP) and, over a wide range of frequencies, the exposure limits were developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI) to replace the 1982 ANSI guidelines. Limits for localized absorption are based on recommendations of both ANSI/IEEE and NCRP.

The FCC's limits, and the NCRP and ANSI/IEEE limits on which they are based, are derived from exposure criteria quantified in terms of specific absorption rate (SAR). The basis for these limits is a whole-body averaged SAR threshold level of 4 watts per kilogram (4 W/kg), as averaged over the entire mass of the body, above which expert organizations have determined that potentially hazardous exposures may occur. The MPE limits are derived by incorporating safety factors that lead, in some cases, to limits that are more conservative than the limits originally adopted by the FCC in 1985. Where more conservative limits exist, they do not arise from a fundamental change in the RF safety criteria for whole-body averaged SAR, but from a precautionary desire to protect subgroups of the general population who, potentially, may be more at risk.

The FCC exposure limits are also based on data showing that the human body absorbs RF energy at some frequencies more efficiently than at others. The most restrictive limits occur in the frequency range of 30-300 MHz where whole-body absorption of RF energy by human beings is most efficient. At other frequencies, whole-body absorption is less efficient, and consequently, the MPE limits are less restrictive.

MPE limits are defined in terms of power density (units of milliwatts per centimeter squared: $mW/cm^2$), electric field strength (units of volts per meter: V/m) and magnetic field strength (units of amperes per meter: A/m). The far-field of a transmitting antenna is where the electric field vector (E), the magnetic field vector (H), and the direction of propagation can be considered to be all mutually orthogonal ("plane-wave" conditions).

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, as long as the exposed person has

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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.

General population / uncontrolled exposure limits apply to situations in which the general public 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 public 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. **In the case of this study, the general population exposure limits have been applied as they are the more conservative set of standards.**

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**Additional Remarks**

The radio-frequency emission levels from AT&T and other communications base stations are similar to that of other two-way communications systems like those used by police, fire and ambulance personnel. In contrast, commercial broadcast systems like television and radio often transmit at power levels ten times greater or more than the systems discussed above. The FCC exposure limits already include a significant margin of safety. Continuous exposure below 100% of FCC limit is considered by the scientific community to be just as safe as continuous exposure at 1% of FCC limit.

The biological effects on humans of non-ionizing radio-frequency exposure have been studied extensively now for decades. There have been thousands of reports produced by government agencies, universities, and private research groups that support the standards adopted by the FCC. **To date, there have been no credible studies conducted whose results showed evidence of any adverse health effects at the applicable FCC exposure limits.**

Sincerely,

Andrew M. Petersohn, P.E.
Registered Professional Engineer
Virginia License Number 042672


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dBm ENGINEERING, P.C.

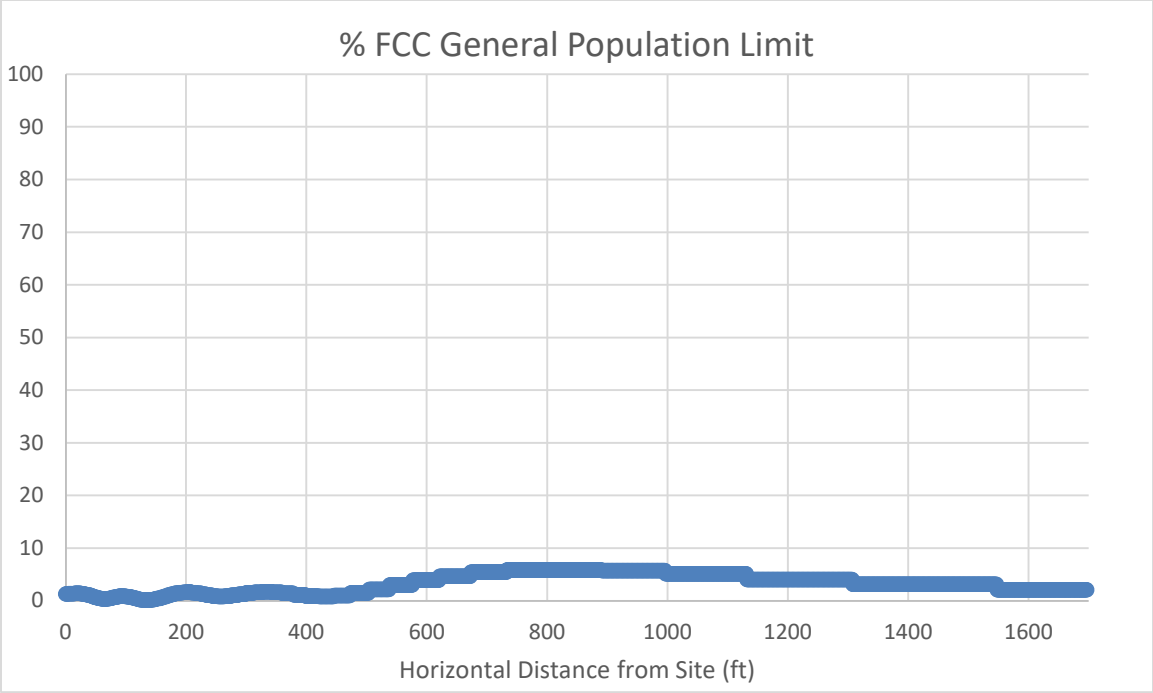


Figure-1 – calculated ground level cumulative exposure level surrounding the proposed telecommunications facility expressed in percentage of the applicable FCC standard

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| Horizontal Distance from Facility (Ft.) | Relative Height Above Ground (Ft.) | Maximum Power Density µW/cm$^2$ (micro-watts per square centimeter) | | | | | | | % of FCC Limit | | | | | | | Cumulative % of FCC limit across all bands |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 700 MHz | 850 MHz | 1900 MHz | 2100 MHz | 2300 MHz | 3500 MHz | 3700 MHz | 700 MHz | 850 MHz | 1900 MHz | 2100 MHz | 2300 MHz | 3500 MHz | 3700 MHz | |
| 0 | 6 | 0.09 | 0 | 0.02 | 0 | 0 | 4.29 | 8.56 | 0.02 | 0 | 0.002 | 0 | 0 | 0.429 | 0.856 | 1.307 |
| 300 | 6 | 0.19 | 0.57 | 0 | 0.07 | 0.02 | 4.36 | 8.69 | 0.04 | 0.1 | 0 | 0.007 | 0.002 | 0.436 | 0.869 | 1.454 |
| 600 | 6 | 2.76 | 2.61 | 0.08 | 0.2 | 0.05 | 9.39 | 18.74 | 0.59 | 0.46 | 0.008 | 0.02 | 0.005 | 0.939 | 1.874 | 3.896 |
| 1320 (1/4 mi.) | 6 | 0.23 | 0.28 | 0.64 | 0.69 | 0.17 | 9.48 | 18.92 | 0.05 | 0.05 | 0.064 | 0.069 | 0.017 | 0.948 | 1.892 | 3.09 |
| **FCC Exposure Limits for General Population (µW/cm$^2$)** | | **467** | **567** | **1000** | **1000** | **1000** | **1000** | **1000** | | | | | | | | |

Figure-2 – sample (multi-height) calculated exposure levels near the proposed telecommunications facility

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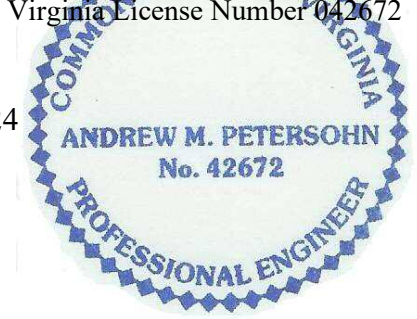
## DECLARATION OF ENGINEER

Andrew M. Petersohn, P.E., hereby states that he is a graduate telecommunications consulting engineer possessing Master and Bachelor Degrees in Electrical Engineering from Lehigh University (2005 and 1999, respectively). His corporation, dBm Engineering, P.C., has been retained by representatives of Milestone Towers to perform an electromagnetic emissions analysis for a proposed telecommunications facility.

Mr. Petersohn also asserts that the calculations and/or measurements described in this report were made personally and in a truthful and objective manner. Mr. Petersohn is a Registered Professional Engineer licensed in Pennsylvania, Delaware, Maryland, Virginia, New York, Florida and New Jersey. He has over two decades of engineering experience in the field of wireless communications. Mr. Petersohn is an active member of the National Society of Professional Engineers (NSPE) and the Pennsylvania Society of Professional Engineers (PSPE). Mr. Petersohn further states that all facts and statements contained in the foregoing document are true and accurate to the best of his knowledge. He believes, under penalty of perjury, the foregoing to be correct.

Andrew M. Petersohn, P.E.
Registered Professional Engineer
Virginia License Number 042672

Executed this the 25th day of November, 2024

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