AT&T Mobility • Proposed Small Cell (No. CRAN_RSFR_SJWE0_024A)
135 University Avenue • Palo Alto, California

Statement of Hammett & Edison, Inc., Consulting Engineers

The firm of Hammett & Edison, Inc., Consulting Engineers, has been retained on behalf of AT&T Mobility, a wireless telecommunications carrier, to evaluate its small cell (No. CRAN_RSFR_SJWE0_024A) proposed to be sited in Palo Alto, California, for compliance with municipal limits on sound levels from the installation.

Executive Summary

AT&T proposes to install antennas and equipment on the light pole sited in the public right-of-way near 135 University Avenue in Palo Alto. Noise from the proposed operation will comply with the City's pertinent noise limits.

Prevailing Standard

The City of Palo Alto adopted in April 2019 an amendment to Section 18.42.110 of its Municipal Code, which sets limits in residential areas for Wireless Communication Facilities ("WCF") installed in public rights-of-way on wood utility poles and on streetlight poles. Noise at the nearest residential property line is limited to an increase of 5 dBA over existing ambient levels, if the ambient noise level would remain below 60 dBA L_{dn}, or to an increase of 3 dBA, otherwise. The composite "day-night" average L_{dn} incorporates a 10 dBA penalty during nighttime hours (10 pm to 7 am), to reflect typical residential conditions, where noise is more readily heard at night. By definition, sound from a continuous noise source will be 6.4 dBA higher when expressed in L_{dn}.

It is noted that the amended language also references Chapter 9.10 of the Code, which had set a more relaxed increase of 15 dBA increase for such WCF sitings, assessed at 25 feet from the pole. It is assumed for this study that the minimum reference ambient level is 40 dBA, as defined in Chapter 9.10.

A summary of noise assessment and calculation methodologies is shown in Figure 1.

General Facility Requirements

Wireless telecommunications facilities ("cell sites") typically consist of two distinct parts: the electronic base transceivers (also called "radios"), that are connected to traditional wired telephone lines, and the antennas, that send wireless signals created by the radios out to be received by individual subscriber units. The radios are typically located on or at the base of the pole and are connected to the antennas by cables. Some radios require fans to cool the electronics inside. Some radios are integrated with the antennas as a single unit.

Site & Facility Description

According to information provided by AT&T, including drawings by SureSite, dated June 11, 2020, that carrier proposes to install a cylindrical antenna and up to four Ericsson Model 2203 or 2205 radio units within a cylindrical shroud on top of the light pole sited in the public right-of-way on the southwest side of High Street adjacent to the two-story commercial building at 135 University Avenue, as well as two Samsung Model PICO antenna units, with integrated radios, lower on the pole.

Study Results

The maximum noise level from any one Model 2203 or 2205 radio is 42.0 dBA,[*] at a reference distance of 5 feet. The cylindrical antenna and PICO units are passively cooled, generating no noise.

At a distance of 5½ feet, the calculated noise level from the radios, taking into account attenuation from the cylindrical shroud, would result in an increase not exceeding 5 dB above the minimum allowed ambient level of 40 dBA; therefore, the increase above the ambient level would be less than 5 dB for any siting of the equipment beyond this distance. If the existing ambient levels were measured to be above 40 dBA, the calculated increase due to the AT&T operation would, by definition, decrease.

The nearest residential property is at 440 High Street, about 100 feet to the northwest from the proposed equipment at this small cell, which meets the distance requirement.

Conclusion

Based on the information and analysis above, it is the undersigned's professional opinion that operation of this AT&T Mobility small cell in Palo Alto will, under the conditions noted above, comply with the municipal standards limiting acoustic noise emission levels.

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[*] Adjusted value based on manufacturer data, to reflect record high temperature of 107°F in Palo Alto.

Authorship

The undersigned author of this statement is a qualified Professional Engineer, holding California Registration Nos. E-13026 and M-20676, which expire on June 30, 2021. This work has been carried out under his direction, and all statements are true and correct of his own knowledge except, where noted, when data has been supplied by others, which data he believes to be correct.

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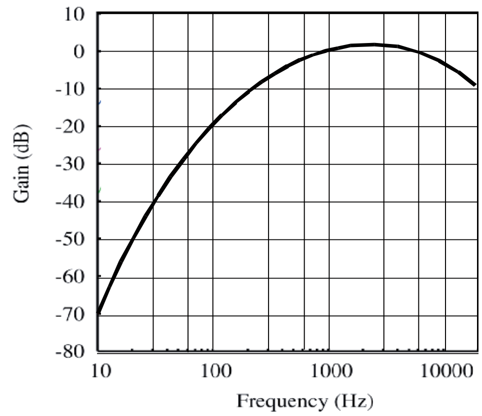
Noise Level Calculation Methodology

Most municipalities and other agencies specify noise limits in units of dBA, which is intended to mimic the reduced receptivity of the human ear to Sound Pressure ("L_P") at particularly low or high frequencies. This frequency-sensitive filter shape, shown in the graph to the right as defined in the International Electrotechnical Commission Standard No. 179, the American National Standards Institute Standard No. 5.1, and various other standards, is also incorporated into most calibrated field test equipment for measuring noise levels.



30 dBA	library
40 dBA	rural background
50 dBA	office space
60 dBA	conversation
70 dBA	car radio
80 dBA	traffic corner
90 dBA	lawnmower

The dBA units of measure are referenced to a pressure of 20 µPa (micropascals), which is the threshold of normal hearing. Although noise levels vary greatly by location and noise source, representative levels are shown in the box to the left.

Manufacturers of many types of equipment, such as air conditioners, generators, and telecommunications devices, often test their products in various configurations to determine the acoustical emissions at certain distances. This data, normally expressed in dBA at a known reference distance, can be used to determine the corresponding sound pressure level at any particular distance, such as at a nearby building or property line. The sound pressure drops as the square of the increase in distance, according to the formula:

$$L_P = L_K + 20 \log(D_K/D_P),$$

where L_P is the sound pressure level at distance D_p and L_K is the known sound pressure level at distance D_K.

Individual sound pressure levels at a particular point from several different noise sources cannot be combined directly in units of dBA. Rather, the units need to be converted to scalar sound intensity units in order to be added together, then converted back to decibel units, according to the formula:

$$L_T = 10 \log \left(10^{L_1/10} + 10^{L_2/10} + \ldots\right),$$

where L_T is the total sound pressure level and L_1, L_2, etc are individual sound pressure levels.

Certain equipment installations may include the placement of barriers and/or absorptive materials to reduce transmission of noise beyond the site. Noise Reduction Coefficients ("NRC") are published for many different materials, expressed as unitless power factors, with 0 being perfect reflection and 1 being perfect absorption. Unpainted concrete block, for instance, can have an NRC as high as 0.35. However, a barrier's effectiveness depends on its specific configuration, as well as the materials used and their surface treatment.