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AT&T Mobility • Proposed Base Station (Site No. LA0562A) 4205 East Anaheim Street • Long Beach, 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 personal wireless telecommunications carrier, to evaluate the base station (Site No. LA0562A) proposed to be located at 4205 East Anaheim Street in Long Beach, California, for compliance with appropriate guidelines limiting human exposure to radio frequency ("RF") electromagnetic fields.

Executive Summary

AT&T proposes to install directional panel antennas above the roof of the four-story apartment building located at 4205 East Anaheim Street in Long Beach. The proposed operation will comply with the FCC guidelines limiting public exposure to RF energy.

Prevailing Exposure Standards

The U.S. Congress requires that the Federal Communications Commission ("FCC") evaluate its actions for possible significant impact on the environment. A summary of the FCC's exposure limits is shown in Figure 1. These limits apply for continuous exposures and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health. The most restrictive FCC limit for exposures of unlimited duration to radio frequency energy for several personal wireless services are as follows:

Wireless Service	Frequency Band	Occupational Limit	Public Limit	
Microwave (Point-to-Point) 5,	000-80,000 MHz	5.00 mW/cm^2	1.00 mW/cm ²	
BRS (Broadband Radio)	2,600	5.00	1.00	
AWS (Advanced Wireless)	2,100	5.00	1.00	
PCS (Personal Communication)	1,950	5.00	1.00	
Cellular	870	2.90	0.58	
SMR (Specialized Mobile Radio)	855	2.85	0.57	
700 MHz	700	2.35	0.47	
[most restrictive frequency range]	30300	1.00	0.20	

General Facility Requirements

Base stations typically consist of two distinct parts: the electronic transceivers (also called "radios" or "channels") that are connected to the traditional wired telephone lines, and the passive antennas that send the wireless signals created by the radios out to be received by individual subscriber units. The transceivers are often located at ground level and are connected to the antennas by coaxial cables. A small antenna for reception of GPS signals is also required, mounted with a clear view of the sky. Because of the short wavelength of the frequencies assigned by the FCC for wireless services, the

HAMMETT & EDISON, INC. CONSULTING ENGINEERS SAN FRANCISCO

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RF Study

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AT&T Mobility • Proposed Base Station (Site No. LA0562A) 4205 East Anaheim Street • Long Beach, California

antennas require line-of-sight paths for their signals to propagate well and so are installed at some height above ground. The antennas are designed to concentrate their energy toward the horizon, with very little energy wasted toward the sky or the ground. Along with the low power of such facilities, this means that it is generally not possible for exposure conditions to approach the maximum permissible exposure limits without being physically very near the antennas.

Computer Modeling Method

The FCC provides direction for determining compliance in its Office of Engineering and Technology Bulletin No. 65, "Evaluating Compliance with FCC-Specified Guidelines for Human Exposure to Radio Frequency Radiation," dated August 1997. Figure 2 attached describes the calculation methodologies, reflecting the facts that a directional antenna's radiation pattern is not fully formed at locations very close by (the "near-field" effect) and that at greater distances the power level from an energy source decreases with the square of the distance from it (the "inverse square law"). The conservative nature of this method for evaluating exposure conditions has been verified by numerous field tests.

Site and Facility Description

Based upon information provided by AT&T, including zoning drawings by Connell Design Group, LLC, dated September 9, 2011, it is proposed to install twelve Powerwave Model P65-16-XLH-RR directional panel antennas within a view screen enclosure to be constructed above the raised section of the roof at the north end of the four-story apartment building located at 4205 East Anaheim Street in Long Beach. The antennas would be mounted with up to 4° downtilt at an effective height of about 48 feet above ground, 6½ feet above the raised roof section, and would be oriented in groups of four toward 90°T, 220°T, and 340°T, to provide service in all directions. The maximum effective radiated power in any direction would be 3,750 watts, representing simultaneous operation at 2,040 watts for PCS and 1,710 watts for cellular service; no operation on AWS or 700 MHz frequencies is proposed at this site. There are reported no other wireless telecommunications base stations at the site or nearby.

Study Results

For a person anywhere at ground, the maximum RF exposure level due to the proposed AT&T operation is calculated to be 0.012 mW/cm^2 , which is 1.3% of the applicable public exposure limit. The maximum calculated level at the second-floor elevation of any nearby building would be 2.3% of the public exposure limit. It should be noted that these results include several "worst-case" assumptions and therefore are expected to overstate actual power density levels from the proposed operation.



HAMMETT & EDISON, INC. CONSULTING ENGINEERS SAN FRANCISCO what about 3rd and 4th floors.

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AT&T Mobility • Proposed Base Station (Site No. LA0562A) 4205 East Anaheim Street • Long Beach, California

Recommended Mitigation Measures

Due to their mounting locations, the AT&T antennas would not be accessible to the general public, and so no mitigation measures are necessary to comply with the FCC public exposure guidelines. To prevent occupational exposures in excess of the FCC guidelines, no access within 7 feet directly in front of the antennas themselves, such as might occur during maintenance work on the raised roof section, should be allowed while the base station is in operation, unless other measures can be demonstrated to ensure that occupational protection requirements are met. Posting explanatory warning signs^{*} at the roof access door and on the enclosure in front of the antennas, such that the signs would be readily visible from any angle of approach to persons who might need to work within that distance, would be sufficient to meet FCC-adopted guidelines.

Conclusion

Based on the information and analysis above, it is the undersigned's professional opinion that operation of the base station proposed by AT&T Mobility at 4205 East Anaheim Street in Long Beach, California, will comply with the prevailing standards for limiting public exposure to radio frequency energy and, therefore, will not for this reason cause a significant impact on the environment. The highest calculated level in publicly accessible areas is much less than the prevailing standards allow for exposures of unlimited duration. This finding is consistent with measurements of actual exposure conditions taken at other operating base stations. Posting explanatory signs is recommended to establish compliance with occupational exposure limitations.

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, 2013. 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.

E-13026 M-20676 William F. Hammett, P.E. Exp. 6-30-2013 707/996-5200

October 12, 2011

* Warning signs should comply with OET-65 color, symbol, and content recommendations. Contact information should be provided (*e.g.*, a telephone number) to arrange for access to restricted areas. The selection of language(s) is not an engineering matter, and guidance from the landlord, local zoning or health authority, or appropriate professionals may be required.



HAMMETT & EDISON, INC. CONSULTING ENGINEERS

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FCC Radio Frequency Protection Guide

The U.S. Congress required (1996 Telecom Act) the Federal Communications Commission ("FCC") to adopt a nationwide human exposure standard to ensure that its licensees do not, cumulatively, have a significant impact on the environment. The FCC adopted the limits from Report No. 86, "Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," published in 1986 by the Congressionally chartered National Council on Radiation Protection and Measurements ("NCRP"). Separate limits apply for occupational and public exposure conditions, with the latter limits generally five times more restrictive. The more recent standard, developed by the Institute of Electrical and Electronics Engineers and approved as American National Standard ANSI/IEEE C95.1-2006, "Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz," includes similar limits. These limits apply for continuous exposures from all sources and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health.

As shown in the table and chart below, separate limits apply for occupational and public exposure conditions, with the latter limits (in *italics* and/or dashed) up to five times more restrictive:

Frequency	<u>equency</u> <u>Electromagnetic Fields (f is frequency of emission in MHz)</u>							
Applicable Range (MHz)	Electric Field Strength (V/m)		Magnetic Field Strength (A/m)		Equivalent Far-Field Power Density (mW/cm ²)			
0.3 - 1.34	614	614	1.63	1.63	100	100		
1.34 - 3.0	614	823.8/ f	1.63	2.19/5	100	180/ f ²		
3.0 - 30	1842/ f	823.8/ f	4.89/ f	2.19/ f	900/ 1 ²	180/ f ²		
30 - 300	61.4	27.5	0.163	0.0729	1.0	0.2		
300 - 1,500	3.54√f	1.59 Vf	√f/106	√ <i>f/</i> 238	f/300	<i>[/1500</i>		
1,500 - 100,000	137	61.4	0.364	0.163	5.0	1.0		
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Higher levels are allowed for short periods of time, such that total exposure levels averaged over six or thirty minutes, for occupational or public settings, respectively, do not exceed the limits, and higher levels also are allowed for exposures to small areas, such that the spatially averaged levels do not exceed the limits. However, neither of these allowances is incorporated in the conservative calculation formulas in the FCC Office of Engineering and Technology Bulletin No. 65 (August 1997) for projecting field levels. Hammett & Edison has built those formulas into a proprietary program that calculates, at each location on an arbitrary rectangular grid, the total expected power density from any number of individual radio sources. The program allows for the description of buildings and uneven terrain, if required to obtain more accurate projections.



HAMMETT & EDISON, INC. CONSULTING ENGINEERS SAN FRANCISCO

FCC Guidelines Figure 1

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RFR.CALC[™] Calculation Methodology

Assessment by Calculation of Compliance with FCC Exposure Guidelines

The U.S. Congress required (1996 Telecom Act) the Federal Communications Commission ("FCC") to adopt a nationwide human exposure standard to ensure that its licensees do not, cumulatively, have a significant impact on the environment. The maximum permissible exposure limits adopted by the FCC (see Figure 1) apply for continuous exposures from all sources and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health. Higher levels are allowed for short periods of time, such that total exposure levels averaged over six or thirty minutes, for occupational or public settings, respectively, do not exceed the limits.

Near Field.

Prediction methods have been developed for the near field zone of panel (directional) and whip (omnidirectional) antennas, typical at wireless telecommunications base stations, as well as dish (aperture) antennas, typically used for microwave links. The antenna patterns are not fully formed in the near field at these antennas, and the FCC Office of Engineering and Technology Bulletin No. 65 (August 1997) gives suitable formulas for calculating power density within such zones.

For a panel or whip antenna, power density $S = \frac{180}{\theta_{BW}} \times \frac{0.1 \times P_{nel}}{\pi \times D \times h}$, in mW/cm²,

and for an aperture antenna, maximum power density $S_{max} = \frac{0.1 \times 16 \times \eta \times P_{net}}{\pi \times h^2}$, in mW/cm²,

where θ_{BW} = half-power beamwidth of the antenna, in degrees, and

 P_{net} = net power input to the antenna, in watts,

- D = distance from antenna, in meters,
- h = aperture height of the antenna, in meters, and
- η = aperture efficiency (unitless, typically 0.5-0.8).

The factor of 0.1 in the numerators converts to the desired units of power density.

Far Field.

OET-65 gives this formula for calculating power density in the far field of an individual RF source:

power density S =
$$\frac{2.56 \times 1.64 \times 100 \times \text{RFF}^2 \times \text{ERP}}{4 \times \pi \times D^2}$$
, in mW/cm²,

where ERP = total ERP (all polarizations), in kilowatts,

- RFF = relative field factor at the direction to the actual point of calculation, and
 - D = distance from the center of radiation to the point of calculation, in meters.

The factor of 2.56 accounts for the increase in power density due to ground reflection, assuming a reflection coefficient of 1.6 (1.6 x 1.6 = 2.56). The factor of 1.64 is the gain of a half-wave dipole relative to an isotropic radiator. The factor of 100 in the numerator converts to the desired units of power density. This formula has been built into a proprietary program that calculates, at each location on an arbitrary rectangular grid, the total expected power density from any number of individual radiation sources. The program also allows for the description of uneven terrain in the vicinity, to obtain more accurate projections.



HAMMETT & EDISON, INC. CONSULTING ENGINEERS SAN FRANCISCO the search of his car. An appropriate Order shall issue.

NUMBER SYSTEM

VIRGINIA METRONET, INC., and Donna Grissom, Plaintiffs,

The BOARD OF SUPERVISORS OF JAMES CITY COUNTY, VIRGINIA, Defendant.

v.

No. CIV.A. 4:97CV83.

United States District Court, E.D. Virginia, Newport News Division.

Jan. 15, 1998.

Wireless telecommunications provider and real property owner brought action against county board of supervisors, alleging that board violated Telecommunications Act of 1996 when it denied provider's application for special use permit to construct telecommunications tower on property, and seeking writ of mandamus or declaratory judgment, and mandatory injunction. Parties crossmoved for summary judgment. The District Court, Jackson, J., held that: (1) board's denial of provider's application did not violate Act prohibition against local regulation having effect of prohibiting provision of personal wireless services; (2) neither minutes of meeting in which board denied provider's application nor letter which county planning staff member subsequently sent could not serve as "written decision" which Act mandated; and (3) even assuming that letter was Board's written decision, decision was not supported by substantial evidence as Act required.

Board's motion granted in part, and provider's motion granted in part.

1. Telecommunications 🖙 4

Telecommunications Act of 1996 is in tended to create national policy framework of accelerate deployment of telecommunications technology. Communications Act of 1938 § 1 et seq., as amended, 47 U.S.C.A. § 161 et seq.

2. Zoning and Planning \$384.1

County board of supervisors' denial of wireless telecommunications provider's apple cation for special use permit to construct telecommunications tower did not violate against local regulation having effect of prohibiting provision of personal wireless services, despite contention that tower was intended to serve previously unserved area absent showing that board's policies, had they been properly administered, would necessarily have resulted in denial of any application in area sought to be served. Comminnications Act of 1934, § 332(c)(7)(B)(i)(II).

3. Zoning and Planning \$14

Congress did not intend to completely preempt local zoning authority when it instituted Telecommunications Act of 1996 section governing preservation of local zoning authority over placement, construction, and modification of personal wireless service facilities. Communications Act of 1934, §§ 332, 332(c)(7), as amended, 47 U.S.C.A. §§ 332, 332(c)(7).

4. Zoning and Planning \$14

Telecommunications Act of 1996 provision barring local zoning regulation having effect of prohibiting provision of personal wireless services is intended to limit general bans of personal wireless services or policies which have effect of prohibiting personal wireless services. Communications Act of 1934, § 332(c)(7)(B)(i)(II), as amended, 47– U.S.C.A. § 332(c)(7)(B)(i)(II).

5. Zoning and Planning \$14

Scope of Telecommunications Act of 1996 provision barring local zoning regulation having effect of prohibiting provision of personal wireless services is not limited to general prohibitions, moratoriums, bans, or other similarly expressly hostile limitations on

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in of personal wireless ser $m_{\text{MULCATIONS}}$ Act $22(p)(\mathcal{O}(B)(i)(II)$, as amended $32(p)(\mathcal{O}(B)(i)(II)$.

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Zoning and Planning \approx 439 relecommunications Act of the requiring that local governm of denying request to place, comparing personal wireless service the writing and supported by subtions, in written record requires onles to produce written decision reasons for decision and evidence decision, and written record of a refore governing body. Commun of 1934, § 332(c)(7)(B)(iii), as an U.S.C.A. § 332(c)(7)(B)(iii).

⁹ Zoning and Planning ≈606, 7 In: Under Telecommunications A provision requiring that local go decision denying request to place or modify personal wireless servibe in writing and supported by evidence in written record, purpor tal review is to ensure that deciss ported by substantial evidence, th ons 🖙 4

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VIRGINIA METRONET v. BD. OF SUPERVISORS Cite as 984 F.Supp. 966 (E.D.Va. 1998)

siting of personal wireless service facilities Communications Act of 1934, § 332(c)(7)(B)(i)(II), as amended, 47 U.S.C.A. § 332(c)(7)(B)(i)(II).

6. Zoning and Planning 🖘14

For purposes of Telecommunications Ac of 1996 provision barring local zoning regula tion having effect of prohibiting provision of personal wireless services, policies that are facially neutral may have effect of prohibiting service if those policies, despite being objectively administered in accordance with state and local law and further requirements of Act, have necessary result that all possible sites in given area will be rejected. Communications Act of 1934, § 332(c)(7)(B)(i)(II), as amended, 47 U.S.C.A. § 332(c)(7)(B)(i)(II).

7. Zoning and Planning \$14

Facially neutral policies may have effect prohibiting personal wireless service if policies serve merely to mask arbitrary decision making, for purposes of Telecommunications Act of 1996 provision barring local zoning regulation having effect of prohibiting provision of personal wireless services, Communications Act of 1934, § 332(c)(7)(B)(i)(II), as amended, 47 U.S.C.A. § 332(c)(7)(B)(i)(II).

8. Zoning and Planning @439

Telecommunications Act of 1996 provision requiring that local governmental decision denying request to place, construct, or modify personal wireless service facilities be m writing and supported by substantial evidence in written record requires governing bodies to produce written decision, detailing reasons for decision and evidence that led to decision, and written record of all evidence before governing body. Communications Act 0(1934, § 332(c)(7)(B)(iii), as amended, 47 U.S.C.A. § 332(c)(7)(B)(iii).

2 Zoning and Planning \$\$606, 708

Under Telecommunications Act of 1996 provision requiring that local governmental decision denying request to place, construct, or modify personal wireless service facilities be in writing and supported by substantial Widence in written record, purpose of judital review is to ensure that decision is sup-Wited by substantial evidence, that is, that

decision is not arbitrary or capricious, is based upon applicable objective standards and policies of governing body, and that requirements of Act and state law are met. Communications Act of 1934. § 332(c)(7)(B)(iii), as amended, 47 U.S.C.A. § 332(c)(7)(B)(iii).

10. Zoning and Planning \$\$439

Minutes of meeting in which county board of supervisors denied wireless telecommunications provider's application for special use permit to construct telecommunications tower could not serve as "written decision" which Telecommunications Act of 1996 mandated in provision requiring that local governmental decision denying request to construct personal wireless service facilities be in writing, as minutes merely reflected that board members spoke to reasons for denial such as visibility of tower, desire of residents, and belief that more appropriate site existed. Communications Act of 1934. § 332(c)(7)(B)(iii), as amended, 47 U.S.C.A. § 332(c)(7)(B)(iii).

See publication Words and Phrases for other judicial constructions and definitions.

11. Zoning and Planning \$\$439

Letter which county planning staff member sent six days after wireless telecommunications provider brought action challenging county board of commissioners' denial of provider's application for special use permit to construct telecommunications tower was not written decision" which Telecommunications Act of 1996 required for local governmental denial of request to construct personal wireless services facilities; local government that made decision had not rendered it in writing, and letter consisted mainly of conclusory statements. Communications Act of 1934, § 332(c)(7)(B)(iii), as amended, 47 U.S.C.A. § 332(c)(7)(B)(iii).

12. Zoning and Planning \$\$439

To meet Telecommunications Act of 1996 requirement that local governmental decision denying request to place, construct, or modify personal wireless service facilities be in writing and supported by substantial evidence in written record, at minimum, local authorities must issue rulings in written

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form, setting out reasons for decision and evidence that led to decision. Communications Act of 1934, § 332(c)(7)(B)(iii), as amended, 47 U.S.C.A. § 332(c)(7)(B)(iii).

13. Zoning and Planning @384.1

Written decision of county board of supervisors in Virginia denying wireless telecommunications provider's special use permit application for telecommunications tower was not supported by substantial evidence as Telecommunications Act of 1996 required, even assuming that county planning staff member's letter was decision; alleged reasons for Board's action were largely aesthetic concerns so as to be inappropriate basis for zoning regulation in Virginia, were conclusory, or failed to address evidence of lack of alternative sites. Communications Act of 1934, § 332(c)(7)(B)(iii), as amended, 47 U.S.C.A. § 332(c)(7)(B)(iii).

14. Zoning and Planning \$36

Under Virginia law, aesthetic concerns, without more, are inappropriate basis for zoning regulation.

15. Zoning and Planning \$384.1

To be supported by substantial evidence as required by Telecommunications Act of 1996, profferred reasons for local governmental decision denying request to place, construct, or modify personal wireless service facilities must comport with objective criteria in existence, i.e., zoning regulations, permit application policies, etc.; governing bodies cannot simply arbitrarily invent new criteria to reject application. Communications Act of 1934, § 332(c)(7)(B)(iii), as amended, 47 U.S.C.A. § 332(c)(7)(B)(iii).

16. Zoning and Planning \$\$\$439.5

Each situation must be independently examined in determination of whether local authority rendered decision in reasonable amount of time on request to place, construct, or modify personal wireless services facilities as required by Telecommunications Act of 1996. Communications Act of 1934, § 332(c)(7)(B)(iii), as amended, 47 U.S.C.A. § 332(c)(7)(B)(iii).

17. Zoning and Planning 8772636

Remand for further consideration not appropriate upon district courts de nation that county board of superviso lated Telecommunications Act of 199 sion requiring written decision support substantial evidence in written record extensive delay that had already occurrent contrary to intentions of Act, in w telecommunications provider's action action board, arising from board's denial of print er's application for special use permit a struct wireless telecommunications seeking writ of mandamus or declarate judgment, and mandatory injunction munications Act of 1934, § 332(c)(7)(B) amended, 47 U.S.C.A. § 332(c)(7)(B)(iii)

M. E. Gibson, Jr., Tremblay, & Charlottesville, VA, for plaintiffs

Leo Paul Rogers, Jr., Deputy County, torney, James City County, Williamso VA, for defendant.

MEMORANDUM OPINION AND ORDER

JACKSON, District Judge.

This matter comes before the Court on the parties' cross motions for summary indement. On July 22, 1997 Plainting Virgin Metronet, Inc. ("Metronet") and Donna Gr som ("Grissom") filed a complaint allegue that the Defendant, the Board of Supervisors of James City County ("the Board") violated Section 704 of the Telecommunic tions Act of 1996 ("the Act") when it denied the Plaintiff Metronet's request for a speciuse permit to construct a telecommunications tower on Plaintiff Grissom's property. James City County. Plaintiffs request reup in the form of a writ of mandamus to the Board, or in the alternative, declaratory judgment finding the denial of the permit void, and a mandatory injunction ordering the Defendant to approve the special use a line permit. Plaintiffs and Defendant each filed for summary judgment on November 14 1997. The Court heard oral argument from the parties on December 18, 1997.

Upon consideration of the pleadings and the briefs submitted by the parties, the argument

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the parties, the Court finds the parties, the Court finds the parties, the Court finds the potion shall be GRANTE the Defendant's motion the Defendant's motion the Defendant's motion the DEFEND IN PART.

I. Jurisdiction

The Court has jurisdiction F(1) § 1331, which grants is the original jurisdiction ove the arising under the ... lar (2) States." 28 U.S.C. § (2) Alams arise under § 704 (2) Alams arise under § 7

II. Standard of R court may grant summ when "the pleadings, (to interrogatories, and is together with the affiday there is no genuine is priorial fact and that the r milled to a judgment as a Fad. R. Civ. P. 56(c).

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1. See, e.g. D.A. at 21.1, 21.17.

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