March 29, 2011

VIA EMAIL

Mayor Sid EsPinosa
Vice Mayor Yiaway Yeh
Council Members Patrick Burt, Karen Holman,
Larry Klein, Gail Price, Gregory Scharff,
Greg Schmid and Nancy Shepherd
City Council, City of Palo Alto
250 Hamilton Avenue
Palo Alto CA 94301

Re: City Council Agenda, April 4, 2011
Planning Director’s Approval of Amendment
to an Existing Conditional Use Permit (99-CUP-53)
and Staff Level Architectural and Historic Review
AT&T Mobility Wireless Facility at 488 University Avenue

Dear Mayor EsPinosa, Vice Mayor Yeh and Council Members:

We write1 to you on behalf of our client, AT&T Mobility (“AT&T”), to urge that you follow the recommendation of the Planning & Transportation Commission (the “PTC”) and Staff to uphold the Planning Director’s January 20, 2011, approval of the addition of two wireless fidelity (“Wi-Fi”) access nodes (the “Approved Wi-Fi Nodes”) to the existing AT&T wireless facility on the Hotel President located at 488 University Avenue (the “Existing Facility”). The hearing to review the Approved Wi-Fi Nodes was requested by Michelle Kraus and Jeffrey Jones (“Requestors”) due to their “grave concerns about long term health and safety.”2 On February 23, 2011, the PTC took public testimony on this CUP modification and after two and a half hours passed a motion to support Staff’s recommendation to uphold the Planning Director’s Approval. The PTC’s recommendation included two new conditions of approval, both of which are acceptable to AT&T and one of which has already been successfully satisfied by measurements

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showing that emissions on the surface of the Wi-Fi node are 20 times below Federal Communications Commission ("FCC") limits.

As detailed below, federal law prohibits the City of Palo Alto (the "City") from rejecting the Approved Wi-Fi Nodes based on the environmental effects of radio frequency emissions where, as here, the proposed facility complies with applicable FCC guidelines for such emissions. Further, as detailed below, rejection of the Approved Wi-Fi Nodes would run afoul of federal law due to lack of substantial evidence for denial and effective prohibition of AT&T’s ability to provide needed wireless capacity to an identified gap in service along University Avenue. We encourage you to follow the recommendation of the PTC and Staff and reaffirm the Planning Director’s well-reasoned approval of the Approved Wi-Fi Nodes.

The Approved Wi-Fi Nodes consist of two 12-inch by 7.75-inch by 6-inch nodes mounted behind the railing of the balcony approximately 63 feet above University Avenue. Associated equipment will be installed on the roof on wooden beams which already support equipment cabinets for the Existing Facility. Simple ethernet cabling will connect the equipment cabinets to the nodes. Photosimulations of the facility are attached as Exhibit A to this letter. As directed through historic review, the Wi-Fi nodes were relocated from the lower exterior of the existing balcony to behind either end of the balcony railing. The Approved Wi-Fi Nodes operate on public Wi-Fi frequencies in the 2.4 GHz and 5.8 GHz bands at very low wattage. Using this technology, the Approved Wi-Fi Nodes are uniquely able to provide necessary wireless capacity to the significant gap more fully described below. A graphic representation of the area to receive wireless coverage from the Approved Wi-Fi Nodes is attached as Exhibit B to this letter. Calculations of radio frequency emissions from the Approved Wi-Fi Nodes, detailed below, show that emissions anywhere on the balcony will be 200 times below permitted federal public exposure limits. Of course, emissions at any other location inside the building will be lower than that.

I. Federal Law

AT&T is licensed by the FCC to provide wireless telecommunications services throughout the United States, including in Palo Alto. Consequently, its placement of antenna facilities is subject to the federal Telecommunications Act. That statute attempts to reconcile any potential conflicts between the need for deployment of a new wireless communications facility ("WCF") and local land use authority “by placing certain limitations on localities’ control over the construction and modification of WCFs.” Sprint PCS Assets, LLC v. City of Palos Verdes Estates, 583 F.3d 716, 721 (9th Cir. 2009). Specifically, as relevant here, the Telecommunications Act preserves local control over land use decisions, subject to the following explicit statutory restrictions:
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-- The local government must act on a permit application within a reasonable period of time (47 U.S.C. §332(c)(7)(B)(ii));

-- The decision must be in writing and supported by substantial evidence contained in a written record (47 U.S.C. §332(c)(7)(B)(iii));

-- The local government may not regulate the placement, construction, or modification of WCFs on the basis of the environmental effects of radio frequency emissions to the extent such facilities comply with the FCC’s regulations concerning such emissions (47 U.S.C. §332(c)(7)(B)(iv));

-- The local government may not unreasonably discriminate among providers of functionally equivalent services (47 U.S.C. §332(c)(7)(B)(i)(I)) and

-- The local government’s decision must not “prohibit or have the effect of prohibiting the provision of personal wireless services” (47 U.S.C. §332(c)(7)(B)(i)(II)).

Local governments are specifically precluded from considering any alleged health or environmental effects of RF emissions in making decisions as to the siting of WCFs “to the extent such facilities comply with the FCC’s regulations concerning such emissions.” See 47 U.S.C. §332(c)(7)(B)(iv)).

The “substantial evidence” requirement means that a local government’s decision must be “authorized by applicable local regulations and supported by a reasonable amount of evidence (i.e., more than a ‘scintilla’ but not necessarily a preponderance).” Metro PCS, Inc. v. City and County of San Francisco, 400 F.3d 715, 725 (9th Cir. 2005); see also Sprint PCS, 583 F.3d at 726 (a local government decision must be valid under local law and supported by “such relevant evidence as a reasonable mind might accept as adequate to support a conclusion”). Generalized concerns or opinions about aesthetics are insufficient to constitute substantial evidence upon which a local government could deny a permit. City of Rancho Palos Verdes v. Abrams, 101 Cal.App.4th 367, 381 (2002). While a local government may regulate the placement of WCFs based on aesthetics, it must have specific reasons that are both consistent with the local regulations and supported by substantial evidence in the record to deny a permit.

Under the “effective prohibition” clause (the last in the list above), a local government runs afoul of the Telecommunications Act if it prevents a wireless provider from closing a “significant gap” in service coverage. This issue involves a two-pronged analysis: (1) whether the provider has demonstrated the existence of a “significant gap” in coverage; and (2) whether the proposed facility is the “least intrusive means,” in relation to the land use values embodied in local regulations, to address the gap. See e.g., Metro PCS, 400 F.3d at 734-35; Sprint PCS, 583 F.3d at 726.
If a provider demonstrates both the existence of a significant gap in coverage, and that the proposed facility meets the “least intrusive means” standard, the local government is required to approve the facility, even if there would otherwise be substantial evidence to deny the permit under local land use provisions. This is because the requirements for federal preemption under the Telecommunications Act have been satisfied, i.e., denial of the permit would “have the effect of prohibiting the provision of personal wireless services.” 47 U.S.C. §332(c)(7)(B)(1)(ii); T-Mobile USA, Inc. v. City of Anacortes, 572 F.3d 987, 999 (9th Cir. 2009). When a wireless provider presents evidence of a significant gap and the absence of a less intrusive alternative, the burden shifts to the local government to prove that a less intrusive alternative exists. In order to meet this burden (and overcome the presumption in favor of federal preemption), the local government must show that another alternative is available that fills the significant gap in coverage, that it is technologically feasible, and that it is “less intrusive” than the proposed facility. Id., 572 F.3d at 998-999.

With this legal framework in mind, we address below the specific issues before the City Council with respect to AT&T’s Approved Wi-Fi Nodes and the reasons for the hearing request.


Requestors’ sole objection to the Approved Wi-Fi Nodes is “grave concerns about long term health and safety.” As noted above, local governments are specifically precluded from considering any alleged health or environmental effects of RF emissions in making decisions as to the siting of WCFs “to the extent such facilities comply with the FCC’s regulations concerning such emissions.” See 47 U.S.C. §332(c)(7)(B)(iv)). Here, it is beyond dispute that the Approved Wi-Fi nodes will operate well below applicable FCC limits.

A radio frequency (“RF”) engineering analysis provided by Hammett & Edison, Inc., Consulting Engineers dated October 26, 2010 (the “H&E RF Report”) confirms that the Approved Wi-Fi Nodes will operate well within (and actually far below) all applicable FCC public exposure limits. A copy of this report is attached as Exhibit C to this letter. The H&E RF Report verifies that with the Approved Wi-Fi Nodes operating at maximum theoretical power levels, the RF exposure for a person anywhere on the balcony or at the nearest residence would be less than one half of one percent of the applicable public limit.3 In response to the Planning Department’s request, Hammett & Edison conducted a supplemental emissions review dated December 8, 2010, attached as Exhibit D to this letter (“The Supplemental H&E RF Report”), which calculates emissions in various locations adjacent to the Approved Wi-Fi Nodes. The Supplemental

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3 H&E RF Report, p. 2
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H&E RF Report confirms that emissions from the Approved Wi-Fi Nodes will be well within and actually far below the FCC permitted public exposure limits at any publicly accessible location on or in the Hotel President.4

The PTC’s February 23, 2011 motion to support Staff’s Recommendation included a new condition that an off-site live study be conducted to measure RF emissions from the Wi-Fi antenna equipment. AT&T commissioned a third study from Hammett & Edison, dated March 21, 2011, attached as Exhibit E to this letter (“The H&E RF Measurement Study”), which detailed the results of live measurements of a sample BelAir Model BX1A Wi-Fi access node. The measurements show that at the front cover of the node, RF emissions are 5.7% of the FCC permitted public exposure limits and that at a distance of 1 foot from the front cover the emissions are 0.75% of the FCC permitted public exposure limits.5 In light of these findings, the Approved Wi-Fi Nodes cannot be rejected based on Requestors’ “health and safety” concerns. This is true whether those concerns are raised explicitly (as in Requestors’ case) or indirectly through some proxy such as “property values.” A federal district court in California has held that in light of the federal preemption of RF regulation, “concern over the decrease in property values may not be considered as substantial evidence if the fear of property value depreciation is based on concern over the health effects caused by RF emissions.” AT&T Wireless Services of California LLC v. City of Carlsbad, 308 F.Supp.2d 1148, 1159 (S.D. Cal. 2003).

III. Substantial Evidence for Approval, Lack of Substantial Evidence for Denial

As noted above, the “substantial evidence” requirement means that a local government’s decision must be “authorized by applicable local regulations and supported by a reasonable amount of evidence.” See Metro PCS, Inc. v. City and County of San Francisco, 400 F3d 715, 725 (9th Cir. 2005). In other words, a local government must have specific reasons that are both consistent with the local regulations and supported by substantial evidence in the record to deny a permit.

In the instant case, Planning Department Staff has fully documented the substantial evidence for approval of the Approved Wi-Fi Nodes. As set forth in the Director’s decision, the Approved Wi-Fi Nodes comply with the standards for review (Palo Alto Municipal Code Section 18.76) and Architectural Review Board design guidelines. Also, the Approved Wi-Fi Nodes have been deemed by the Planning Staff to be categorically exempt, posing no significant adverse environmental impacts, under CEQA. Additionally, the Planning Director has acknowledged that the Approved Wi-Fi Nodes are consistent with Palo Alto Comprehensive Plan Policy B-13, which supports

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4 Supplemental H&E RF Report, p. 1
5 H&E RF Measurement Study, p.3.
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development of technologically advanced communications infrastructure and growth of emerging telecommunications industries.

In contrast, Requestors have provided only generalized health concerns and no evidence, let alone the substantial evidence required under federal law, to support denial of the Approved Wi-Fi Nodes. For the reasons discussed above, Requestors’ health and safety objections are preempted and do not constitute substantial evidence.

IV. Approval Required to Avoid Federal Prohibition of Service

As noted above, if a provider demonstrates both the existence of a significant gap in coverage, and that the proposed facility is the “least intrusive means” of filling that gap, the local government is required to approve the facility, even if there would otherwise be substantial evidence to deny the permit on aesthetic grounds or under other local land use provisions.

AT&T has identified a significant gap in the capacity of its wireless service along University Avenue between Waverly Street and Webster Street (the “Significant Gap”). Extraordinary growth of data and voice usage of the AT&T wireless network in this area threatens the reliability and accessibility of the network in the area served by the Existing Facility at the Hotel President as well as adjacent facilities. This significant gap in capacity is most acute when University Avenue is occupied by residents and visitors, at which time the coverage and reliability of the network can be compromised (dropped calls) or the network can become inaccessible (inability to connect, slow or no downloads). Indeed, actual switch data from the Existing Facility shows nearly 300 percent growth in use of data volume during 2010. AT&T RF engineers using this data project that the Existing Facility will reach its maximum data capacity sometime in 2012. A graphic representation of the actual and projected growth in data usage and projected maximum capacity exhaustion of the Existing Facility is shown in attached Exhibit F to this letter. Federal law has confirmed that such a gap in network capacity constitutes a significant gap for purposes of demonstrating a prohibition of service under federal law. AT&T RF engineers have determined that providing additional data capacity will ease pressure on the network at times most critical to wireless customers; that is, when the street is full and the need for communication may be critical, particularly in times of crisis.

AT&T has sought to identify the least intrusive means to fill the Significant Gap based on the values expressed in the Palo Alto Municipal Code and the Comprehensive Plan. In particular, AT&T sought to comply with Palo Alto Municipal Code Section 18.42(a) which states that both collocated and building-mounted facilities are “preferred

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and encouraged” and sought to avoid the installation of a large new wireless facility on an adjacent structure or installation of a new wireless structure such as a monopole, disfavored under the Palo Alto Municipal Code.

As more fully set forth in the attached Alternatives Analysis (Exhibit G-1), AT&T reviewed five potential alternatives before proceeding with the application that the Planning Director approved. In each case, these alternatives were either more intrusive under the Palo Alto Municipal Code or failed to provide the necessary capacity relief to the identified Significant Gap. Specifically, the AT&T Switch Station at 345 Hamilton Avenue, would not provide adequate coverage for the University Avenue corridor due to signal blockage from existing buildings, and installing an antenna structure tall enough to overcome this signal blockage would not be aesthetically viable at this location. Placement of the Wi-Fi nodes atop of the Hotel President failed to provide adequate coverage to University Avenue due to shadowing from the roof’s edge. Placement of the Wi-Fi nodes on the lower exterior of the Hotel President balcony was deemed aesthetically and historically unacceptable by the Planning Department. Similarly, the installation of a new WCF at the collocation site at 525 University Avenue, which currently includes facilities for Verizon Wireless, Sprint Nextel and Clearwire, would have required installation of a large new macrocell facility and proved too cumbersome for that location due to the 15-story height of the building. In an email dated February 22, 2011, planning staff requested that AT&T evaluate additional possible locations for the Approved WiFi Nodes. In general, these potential locations are either too far from the desired coverage zone, lack architectural features that would allow disguising the approved WiFi nodes or may require trenching of University Avenue to provide Fiber Optic Data service. A review of these supplemental alternatives, as requested by staff and submitted to the PTC on March 21, is enclosed as Exhibit G-2.

In contrast, the Approved Wi-Fi Nodes allow AT&T to fill the identified Significant Gap in capacity using fully stealthed, diminutive low-wattage Wi-Fi access nodes. By collocating the WiFi Nodes with an Existing Facility and thereby avoiding the installation of traditional cellular antennas and equipment or developing an entirely new cell site, the installation of the Approved Wi-Fi Nodes is the least intrusive means to fill the identified Significant Gap in AT&T wireless signal capacity and best complies with the values expressed in Palo Alto Municipal Code Section 18.42(a) where it states “Building mounted WCF and co-location facilities are preferred and encouraged, subject to all other provisions of this section”.

AT&T has made a *prima facie* case for prohibition of service and denial of the facilities would impermissibly result in the prohibition of wireless services within the significant gap area. AT&T has demonstrated both that there is a Significant Gap in coverage and that the Approved Wi-Fi Nodes are the least intrusive alternative for

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7 *See Metro PCS, 400 F.3d at 734-35; Sprint PCS, 583 F.3d at 726.*
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Schedule of Exhibits:  

Exhibit A: Photosimulations of Approved Wi-Fi Nodes  
Exhibit B: Wireless Coverage Area of Approved Wi-Fi Nodes  
Exhibit C: Hammett & Edison Radio Frequency Report, October 26, 2010  
Exhibit D: Hammett & Edison Supplemental Radio Frequency Report, December 8, 2010  
Exhibit F: Chart of Forecast Data Volume  
Exhibit G: Alternatives Analysis
Attachment: Attachment G: Correspondence including Request for CUP Hearing (1545: CUP for wireless facility at 488 University)
AT&T Mobility • Base Station No. CNU0770
488 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 personal wireless telecommunications carrier, to evaluate proposed modifications to its existing base station (Site No. CNU0770) located at 488 University Avenue in Palo Alto, California, for compliance with appropriate guidelines limiting human exposure to radio frequency ("RF") electromagnetic fields.

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 wireless services are as follows:

<table>
<thead>
<tr>
<th>Wireless Service</th>
<th>Frequency Band</th>
<th>Occupational Limit</th>
<th>Public Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microwave (Point-to-Point)</td>
<td>5–80,000 MHz</td>
<td>5.00 mW/cm²</td>
<td>1.00 mW/cm²</td>
</tr>
<tr>
<td>BRS (Broadband Radio)</td>
<td>2,600</td>
<td>5.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Wi-Fi</td>
<td>2,400</td>
<td>5.00</td>
<td>1.00</td>
</tr>
<tr>
<td>AWS (Advanced Wireless)</td>
<td>2,100</td>
<td>5.00</td>
<td>1.00</td>
</tr>
<tr>
<td>PCS (Personal Communication)</td>
<td>1,950</td>
<td>5.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Cellular</td>
<td>870</td>
<td>2.90</td>
<td>0.58</td>
</tr>
<tr>
<td>SMR (Specialized Mobile Radio)</td>
<td>855</td>
<td>2.85</td>
<td>0.57</td>
</tr>
<tr>
<td>700 MHz</td>
<td>700</td>
<td>2.35</td>
<td>0.47</td>
</tr>
<tr>
<td>[most restrictive frequency range]</td>
<td>30–300</td>
<td>1.00</td>
<td>0.20</td>
</tr>
</tbody>
</table>

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 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.
AT&T Mobility • Base Station No. CNU0770
488 University Avenue • Palo Alto, California

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 drawings by HMH Design Group, dated October 1, 2010, it is proposed to mount two Belair Model BX1A directional panel Wi-Fi antennas behind the railing at the two ends of the top-floor balcony on the face of the six-story Hotel President, located at 488 University Avenue in Palo Alto. The antennas would be mounted with up to 9° downtilt at an effective height of about 62½ feet above ground and would be oriented toward 50°T and 230°T. The maximum effective radiated power in any direction would be 3 watts.

Presently located above the roof of the building are PCS and cellular antennas for use by AT&T, and located about 170 feet away, above the roof of the building at 525 University Avenue, are similar antennas for use by Clearwire, Sprint Nextel, and Verizon Wireless. For the limited purpose of this study, those transmitting facilities are assumed to be as follows:

<table>
<thead>
<tr>
<th>Operator</th>
<th>Service</th>
<th>Maximum ERP</th>
<th>Antenna Model</th>
<th>Beamtilt</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT&amp;T</td>
<td>PCS</td>
<td>1,500 watts</td>
<td>Kathrein 742-264</td>
<td>2°</td>
<td>88 ft</td>
</tr>
<tr>
<td></td>
<td>Cellular</td>
<td>1,500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clearwire</td>
<td>BRS</td>
<td>970</td>
<td>Andrew LLPX310R</td>
<td>12</td>
<td>229</td>
</tr>
<tr>
<td>Sprint Nextel</td>
<td>SMR</td>
<td>1,500</td>
<td>Andrew DB844G65</td>
<td>12</td>
<td>229</td>
</tr>
<tr>
<td>Verizon</td>
<td>PCS</td>
<td>640</td>
<td>Antel BXD-63406380-CF</td>
<td>12</td>
<td>229</td>
</tr>
<tr>
<td></td>
<td>Cellular</td>
<td>1,200</td>
<td>Antel BXA-70063/4-CF</td>
<td>12</td>
<td>229</td>
</tr>
<tr>
<td></td>
<td>700 MHz</td>
<td>400</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Study Results

For a person anywhere at ground, the maximum ambient RF exposure level due to the proposed AT&T Wi-Fi operation by itself is calculated to be 0.00034 mW/cm², which is 0.034% of the applicable public exposure limit. The maximum calculated cumulative level at ground, for the simultaneous operation of all four carriers, is 0.47% of the public exposure limit. Calculated exposure levels on the balcony from the new antennas would be less than 0.5% 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.

No Recommended Mitigation Measures

Due to their mounting location, the new AT&T Wi-Fi antennas would not be accessible to the general public and so no mitigation measures are necessary to comply with the FCC public exposure guidelines. Due to their low power, the AT&T Wi-Fi antennas can be considered intrinsically compliant with FCC guidelines, and so no additional mitigation measures are required to comply with occupational exposure guidelines. Appropriate mitigation measures for the existing antennas in use by AT&T on the roof of the subject building, if any, have not been determined as part of this study.

Conclusion

Based on the information and analysis above, it is the undersigned’s professional opinion that the proposed modifications to the existing AT&T Mobility base station located at 488 University Avenue in Palo Alto, 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.

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, 2011. 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.

October 26, 2010

[Signature]

William F. Hammett, P.E.
707/996-5200
March 29, 2011

VIA EMAIL

Mayor Sid Esplinosa
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-- The local government may not regulate the placement, construction, or modification of WCFs on the basis of the environmental effects of radio frequency emissions to the extent such facilities comply with the FCC’s regulations concerning such emissions (47 U.S.C. §332(c)(7)(B)(iv));

-- The local government may not unreasonably discriminate among providers of functionally equivalent services (47 U.S.C. §332(c)(7)(B)(i)(I)); and

-- The local government’s decision must not “prohibit or have the effect of prohibiting the provision of personal wireless services” (47 U.S.C. §332(c)(7)(B)(i)(II)).

Local governments are specifically precluded from considering any alleged health or environmental effects of RF emissions in making decisions as to the siting of WCFs “to the extent such facilities comply with the FCC’s regulations concerning such emissions.” See 47 U.S.C. §332(c)(7)(B)(iv)).

The “substantial evidence” requirement means that a local government’s decision must be “authorized by applicable local regulations and supported by a reasonable amount of evidence (i.e., more than a ‘scintilla’ but not necessarily a preponderance).” Metro PCS, Inc. v. City and County of San Francisco, 400 F.3d 715, 725 (9th Cir. 2005); see also Sprint PCS, 583 F.3d at 726 (a local government decision must be valid under local law and supported by “such relevant evidence as a reasonable mind might accept as adequate to support a conclusion”). Generalized concerns or opinions about aesthetics are insufficient to constitute substantial evidence upon which a local government could deny a permit. City of Rancho Palos Verdes v. Abrams, 101 Cal.App.4th 367, 381 (2002). While a local government may regulate the placement of WCFs based on aesthetics, it must have specific reasons that are both consistent with the local regulations and supported by substantial evidence in the record to deny a permit.

Under the “effective prohibition” clause (the last in the list above), a local government runs afoul of the Telecommunications Act if it prevents a wireless provider from closing a “significant gap” in service coverage. This issue involves a two-pronged analysis: (1) whether the provider has demonstrated the existence of a “significant gap” in coverage; and (2) whether the proposed facility is the “least intrusive means,” in relation to the land use values embodied in local regulations, to address the gap. See e.g., Metro PCS, 400 F.3d at 734-35; Sprint PCS, 583 F.3d at 726.
If a provider demonstrates both the existence of a significant gap in coverage, and that the proposed facility meets the “least intrusive means” standard, the local government is required to approve the facility, even if there would otherwise be substantial evidence to deny the permit under local land use provisions. This is because the requirements for federal preemption under the Telecommunications Act have been satisfied, i.e., denial of the permit would “have the effect of prohibiting the provision of personal wireless services.” 47 U.S.C. §332(c)(7)(B)(1)(ii); T-Mobile USA, Inc. v. City of Anacortes, 572 F.3d 987, 999 (9th Cir. 2009). When a wireless provider presents evidence of a significant gap and the absence of a less intrusive alternative, the burden shifts to the local government to prove that a less intrusive alternative exists. In order to meet this burden (and overcome the presumption in favor of federal preemption), the local government must show that another alternative is available that fills the significant gap in coverage, that it is technologically feasible, and that it is “less intrusive” than the proposed facility. Id., 572 F.3d at 998-999.

With this legal framework in mind, we address below the specific issues before the City Council with respect to AT&T’s Approved Wi-Fi Nodes and the reasons for the hearing request.


Requestors’ sole objection to the Approved Wi-Fi Nodes is “grave concerns about long term health and safety.” As noted above, local governments are specifically precluded from considering any alleged health or environmental effects of RF emissions in making decisions as to the siting of WCFs “to the extent such facilities comply with the FCC’s regulations concerning such emissions.” See 47 U.S.C. §332(c)(7)(B)(iv)). Here, it is beyond dispute that the Approved Wi-Fi nodes will operate well below applicable FCC limits.

A radio frequency (“RF”) engineering analysis provided by Hammett & Edison, Inc., Consulting Engineers dated October 26, 2010 (the “H&E RF Report”) confirms that the Approved Wi-Fi Nodes will operate well within (and actually far below) all applicable FCC public exposure limits. A copy of this report is attached as Exhibit C to this letter. The H&E RF Report verifies that with the Approved Wi-Fi Nodes operating at maximum theoretical power levels, the RF exposure for a person anywhere on the balcony or at the nearest residence would be less than one half of one percent of the applicable public limit.3 In response to the Planning Department’s request, Hammett & Edison conducted a supplemental emissions review dated December 8, 2010, attached as Exhibit D to this letter (“The Supplemental H&E RF Report”), which calculates emissions in various locations adjacent to the Approved Wi-Fi Nodes. The Supplemental

3 H&E RF Report, p. 2
Palo Alto City Council  
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H&E RF Report confirms that emissions from the Approved Wi-Fi Nodes will be well within and actually far below the FCC permitted public exposure limits at any publicly accessible location on or in the Hotel President.4

The PTC’s February 23, 2011 motion to support Staff’s Recommendation included a new condition that an off-site live study be conducted to measure RF emissions from the Wi-Fi antenna equipment. AT&T commissioned a third study from Hammett & Edison, dated March 21, 2011, attached as Exhibit E to this letter (“The H&E RF Measurement Study”), which detailed the results of live measurements of a sample BelAir Model BXIA Wi-Fi access node. The measurements show that at the front cover of the node, RF emissions are 5.7% of the FCC permitted public exposure limits and that at a distance of 1 foot from the front cover the emissions are 0.75% of the FCC permitted public exposure limits.5 In light of these findings, the Approved Wi-Fi Nodes cannot be rejected based on Requestors’ “health and safety” concerns. This is true whether those concerns are raised explicitly (as in Requestors’ case) or indirectly through some proxy such as “property values.” A federal district court in California has held that in light of the federal preemption of RF regulation, “concern over the decrease in property values may not be considered as substantial evidence if the fear of property value depreciation is based on concern over the health effects caused by RF emissions.” AT&T Wireless Services of California LLC v. City of Carlsbad, 308 F.Supp.2d 1148, 1159 (S.D. Cal. 2003).

III. Substantial Evidence for Approval, Lack of Substantial Evidence for Denial

As noted above, the “substantial evidence” requirement means that a local government’s decision must be “authorized by applicable local regulations and supported by a reasonable amount of evidence.” See Metro PCS, Inc. v. City and County of San Francisco, 400 F3d 715, 725 (9th Cir. 2005). In other words, a local government must have specific reasons that are both consistent with the local regulations and supported by substantial evidence in the record to deny a permit.

In the instant case, Planning Department Staff has fully documented the substantial evidence for approval of the Approved Wi-Fi Nodes. As set forth in the Director’s decision, the Approved Wi-Fi Nodes comply with the standards for review (Palo Alto Municipal Code Section 18.76) and Architectural Review Board design guidelines. Also, the Approved Wi-Fi Nodes have been deemed by the Planning Staff to be categorically exempt, posing no significant adverse environmental impacts, under CEQA. Additionally, the Planning Director has acknowledged that the Approved Wi-Fi Nodes are consistent with Palo Alto Comprehensive Plan Policy B-13, which supports

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4 Supplemental H&E RF Report, p. 1
5 H&E RF Measurement Study, p.3.
development of technologically advanced communications infrastructure and growth of emerging telecommunications industries.

In contrast, Requestors have provided only generalized health concerns and no evidence, let alone the substantial evidence required under federal law, to support denial of the Approved Wi-Fi Nodes. For the reasons discussed above, Requestors’ health and safety objections are preempted and do not constitute substantial evidence.

IV. Approval Required to Avoid Federal Prohibition of Service

As noted above, if a provider demonstrates both the existence of a significant gap in coverage, and that the proposed facility is the “least intrusive means” of filling that gap, the local government is required to approve the facility, even if there would otherwise be substantial evidence to deny the permit on aesthetic grounds or under other local land use provisions.

AT&T has identified a significant gap in the capacity of its wireless service along University Avenue between Waverly Street and Webster Street (the “Significant Gap”). Extraordinary growth of data and voice usage of the AT&T wireless network in this area threatens the reliability and accessibility of the network in the area served by the Existing Facility at the Hotel President as well as adjacent facilities. This significant gap in capacity is most acute when University Avenue is occupied by residents and visitors, at which time the coverage and reliability of the network can be compromised (dropped calls) or the network can become inaccessible (inability to connect, slow or no downloads). Indeed, actual switch data from the Existing Facility shows nearly 300 percent growth in use of data volume during 2010. AT&T RF engineers using this data project that the Existing Facility will reach its maximum data capacity sometime in 2012. A graphic representation of the actual and projected growth in data usage and projected maximum capacity exhaustion of the Existing Facility is shown in attached Exhibit F to this letter. Federal law has confirmed that such a gap in network capacity constitutes a significant gap for purposes of demonstrating a prohibition of service under federal law. AT&T RF engineers have determined that providing additional data capacity will ease pressure on the network at times most critical to wireless customers; that is, when the street is full and the need for communication may be critical, particularly in times of crisis.

AT&T has sought to identify the least intrusive means to fill the Significant Gap based on the values expressed in the Palo Alto Municipal Code and the Comprehensive Plan. In particular, AT&T sought to comply with Palo Alto Municipal Code Section 18.42(a) which states that both collocated and building-mounted facilities are “preferred

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and encouraged” and sought to avoid the installation of a large new wireless facility on an adjacent structure or installation of a new wireless structure such as a monopole, disfavored under the Palo Alto Municipal Code.

As more fully set forth in the attached Alternatives Analysis (Exhibit G-1), AT&T reviewed five potential alternatives before proceeding with the application that the Planning Director approved. In each case, these alternatives were either more intrusive under the Palo Alto Municipal Code or failed to provide the necessary capacity relief to the identified Significant Gap. Specifically, the AT&T Switch Station at 345 Hamilton Avenue, would not provide adequate coverage for the University Avenue corridor due to signal blockage from existing buildings, and installing an antenna structure tall enough to overcome this signal blockage would not be aesthetically viable at this location. Placement of the Wi-Fi nodes atop of the Hotel President failed to provide adequate coverage to University Avenue due to shadowing from the roof’s edge. Placement of the Wi-Fi nodes on the lower exterior of the Hotel President balcony was deemed aesthetically and historically unacceptable by the Planning Department. Similarly, the installation of a new WCF at the collocation site at 525 University Avenue, which currently includes facilities for Verizon Wireless, Sprint Nextel and Clearwire, would have required installation of a large new macrocell facility and proved too cumbersome for that location due to the 15-story height of the building. In an email dated February 22, 2011, planning staff requested that AT&T evaluate additional possible locations for the Approved WiFi Nodes. In general, these potential locations are either too far from the desired coverage zone, lack architectural features that would allow disguising the approved WiFi nodes or may require trenching of University Avenue to provide Fiber Optic Data service. A review of these supplemental alternatives, as requested by staff and submitted to the PTC on March 21, is enclosed as Exhibit G-2.

In contrast, the Approved Wi-Fi Nodes allow AT&T to fill the identified Significant Gap in capacity using fully stealthed, diminutive low-wattage Wi-Fi access nodes. By collocating the WiFi Nodes with an Existing Facility and thereby avoiding the installation of traditional cellular antennas and equipment or developing an entirely new cell site, the installation of the Approved Wi-Fi Nodes is the least intrusive means to fill the identified Significant Gap in AT&T wireless signal capacity and best complies with the values expressed in Palo Alto Municipal Code Section 18.42(a) where it states "Building mounted WCF and co-location facilities are preferred and encouraged, subject to all other provisions of this section”.

AT&T has made a \textit{prima facie} case for prohibition of service and denial of the facilities would impermissibly result in the prohibition of wireless services within the significant gap area.\footnote{See Metro PCS, 400 F.3d at 734-35; Sprint PCS, 583 F.3d at 726.} AT&T has demonstrated both that there is a Significant Gap in coverage and that the Approved Wi-Fi Nodes are the least intrusive alternative for
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Schedule of Exhibits:

Exhibit A: Photosimulations of Approved Wi-Fi Nodes
Exhibit B: Wireless Coverage Area of Approved Wi-Fi Nodes
Exhibit C: Hammett & Edison Radio Frequency Report, October 26, 2010
Exhibit D: Hammett & Edison Supplemental Radio Frequency Report, December 8, 2010
Exhibit F: Chart of Forecast Data Volume
Exhibit G: Alternatives Analysis
Exhibit A

Attachment: Attachment G: Correspondence including Request for CUP Hearing (1545 : CUP for wireless facility at 488 University)
AT&T Mobility • Base Station No. CNU0770
488 University Avenue • Palo Alto, California

Statement of Hamnett & Edison, Inc., Consulting Engineers

The firm of Hamnett & Edison, Inc., Consulting Engineers, has been retained on behalf of AT&T Mobility, a personal wireless telecommunications carrier, to evaluate proposed modifications to its existing base station (Site No. CNU0770) located at 488 University Avenue in Palo Alto, California, for compliance with appropriate guidelines limiting human exposure to radio frequency ("RF") electromagnetic fields.

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 wireless services are as follows:

<table>
<thead>
<tr>
<th>Wireless Service</th>
<th>Frequency Band</th>
<th>Occupational Limit</th>
<th>Public Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microwave (Point-to-Point)</td>
<td>5–80,000 MHz</td>
<td>5.00 mW/cm²</td>
<td>1.00 mW/cm²</td>
</tr>
<tr>
<td>BRS (Broadband Radio)</td>
<td>2,600</td>
<td>5.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Wi-Fi</td>
<td>2,400</td>
<td>5.00</td>
<td>1.00</td>
</tr>
<tr>
<td>AWS (Advanced Wireless)</td>
<td>2,100</td>
<td>5.00</td>
<td>1.00</td>
</tr>
<tr>
<td>PCS (Personal Communication)</td>
<td>1,950</td>
<td>5.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Cellular</td>
<td>870</td>
<td>2.90</td>
<td>0.58</td>
</tr>
<tr>
<td>SMR (Specialized Mobile Radio)</td>
<td>855</td>
<td>2.85</td>
<td>0.57</td>
</tr>
<tr>
<td>700 MHz</td>
<td>700</td>
<td>2.35</td>
<td>0.47</td>
</tr>
<tr>
<td>[most restrictive frequency range]</td>
<td>30–300</td>
<td>1.00</td>
<td>0.20</td>
</tr>
</tbody>
</table>

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 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.

HAMMETT & EDISON, INC.
CONSULTING ENGINEERS
SAN FRANCISCO

AT0770596.2
Packet Pg. 178
AT&T Mobility • Base Station No. CNU0770
488 University Avenue • Palo Alto, California

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 drawings by HMH Design Group, dated October 1, 2010, it is proposed to mount two Belair Model BX1A directional panel Wi-Fi antennas behind the railing at the two ends of the top-floor balcony on the face of the six-story Hotel President, located at 488 University Avenue in Palo Alto. The antennas would be mounted with up to 9° downtilt at an effective height of about 62½ feet above ground and would be oriented toward 50°T and 230°T. The maximum effective radiated power in any direction would be 3 watts.

Presently located above the roof of the building are PCS and cellular antennas for use by AT&T, and located about 170 feet away, above the roof of the building at 525 University Avenue, are similar antennas for use by Clearwire, Sprint Nextel, and Verizon Wireless. For the limited purpose of this study, those transmitting facilities are assumed to be as follows:

<table>
<thead>
<tr>
<th>Operator</th>
<th>Service</th>
<th>Maximum ERP</th>
<th>Antenna Model</th>
<th>Beamtilt</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT&amp;T</td>
<td>PCS</td>
<td>1,500 watts</td>
<td>Kathrein 742-264</td>
<td>2°</td>
<td>88 ft</td>
</tr>
<tr>
<td></td>
<td>Cellular</td>
<td>1,500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clearwire</td>
<td>BRS</td>
<td>970</td>
<td>Andrew LLPX310R</td>
<td>12</td>
<td>229</td>
</tr>
<tr>
<td>Sprint Nextel</td>
<td>SMR</td>
<td>1,500</td>
<td>Andrew DB844G65</td>
<td>12</td>
<td>229</td>
</tr>
<tr>
<td>Verizon</td>
<td>PCS</td>
<td>640</td>
<td>Antel BXD-63406380-CF</td>
<td>12</td>
<td>229</td>
</tr>
<tr>
<td></td>
<td>Cellular</td>
<td>1,200</td>
<td>Antel BXA-70063/4-CF</td>
<td>12</td>
<td>229</td>
</tr>
<tr>
<td></td>
<td>700 MHz</td>
<td>400</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Study Results

For a person anywhere at ground, the maximum ambient RF exposure level due to the proposed AT&T Wi-Fi operation by itself is calculated to be 0.00034 mW/cm², which is 0.034% of the applicable public exposure limit. The maximum calculated cumulative level at ground, for the simultaneous operation of all four carriers, is 0.47% of the public exposure limit. Calculated exposure levels on the balcony from the new antennas would be less than 0.5% 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.

No Recommended Mitigation Measures

Due to their mounting location, the new AT&T Wi-Fi antennas would not be accessible to the general public and so no mitigation measures are necessary to comply with the FCC public exposure guidelines. Due to their low power, the AT&T Wi-Fi antennas can be considered intrinsically compliant with FCC guidelines, and so no additional mitigation measures are required to comply with occupational exposure guidelines. Appropriate mitigation measures for the existing antennas in use by AT&T on the roof of the subject building, if any, have not been determined as part of this study.

Conclusion

Based on the information and analysis above, it is the undersigned’s professional opinion that the proposed modifications to the existing AT&T Mobility base station located at 488 University Avenue in Palo Alto, 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.

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, 2011. 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.

October 26, 2010

William F. Hammett, P.E.
707/996-5200
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:

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>Electromagnetic Fields (f is frequency of emission in MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3 – 1.34</td>
<td>Electric Field Strength (V/m) 614 1.63  1.63  100  100</td>
</tr>
<tr>
<td>1.34 – 3.0</td>
<td>Magnetic Field Strength (A/m) 614 2.19  100  180/f</td>
</tr>
<tr>
<td>3.0 – 30</td>
<td>Electric Field Strength (V/m) 823.8/f 1.63  2.19/f  100  180/f</td>
</tr>
<tr>
<td>30 – 300</td>
<td>Magnetic Field Strength (A/m) 4.89/f 2.19/f  900/f²  180/f²</td>
</tr>
<tr>
<td>300 – 1,500</td>
<td>Equivalent Far-Field Power Density (mW/cm²) 61.4  0.163  0.0729  1.0  0.2</td>
</tr>
<tr>
<td>1,500 – 100,000</td>
<td>3.54f  1.59f  √(f/106)  √(f/238)  f/300  f/1500</td>
</tr>
</tbody>
</table>

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
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:

<table>
<thead>
<tr>
<th>Frequency Range (MHz)</th>
<th>Electromagnetic Fields (f is frequency of emission in MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Applicable Range</td>
</tr>
<tr>
<td>0.3 – 1.34</td>
<td>614 614</td>
</tr>
<tr>
<td>1.34 – 3.0</td>
<td>614 823.8/f</td>
</tr>
<tr>
<td>3.0 – 30</td>
<td>1842/f 823.8/f</td>
</tr>
<tr>
<td>30 – 300</td>
<td>61.4 27.5</td>
</tr>
<tr>
<td>300 – 1,500</td>
<td>3.54√f 1.59√f</td>
</tr>
<tr>
<td>1,500 – 100,000</td>
<td>137 61.4</td>
</tr>
</tbody>
</table>

![Graph showing occupational exposure](image)

![Graph showing public exposure](image)

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.
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 \( S = \frac{180}{\theta_B W} \times \frac{0.1 \times P_{net}}{\pi \times D \times h}, \) 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 \( \theta_B W \) = 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
\( \eta \) = aperture efficiency (unitless, typically 0.5-0.8).

The factor of 0.1 in the numerator 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:

\[ S = \frac{2.56 \times 1.64 \times 100 \times RFF^2 \times ERP}{4 \times \pi \times D^3}, \] 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.
BY E-MAIL CSFOWLER@WORLDNET.ATT.NET

December 8, 2010

Mr. Christopher Fowler
On Air, LLC
14960 Karl Avenue
Monte Sereno, California 95030

Dear Chris:

Thanks for passing along the question from the city planner regarding exposure levels at various distances from the AT&T WiFi antennas proposed to be mounted on the sixth-floor balcony on the front of the Hotel President, located at 488 University Avenue in Palo Alto. As reported in our earlier study, dated October 26, 2010, these antennas would operate at a maximum power output of just 3 watts. This applies in front of the antennas; due to their directional nature, the power levels above, below, to the sides, and behind the antenna are considerably lower.

We had reported that calculated exposure levels for someone on the balcony to be less than 0.5% of the applicable FCC public limit, that is, over 200 times below the limit. For the distances shown (see portion at right) on the AT&T drawing dated November 30, 2010, the calculated levels are:

<table>
<thead>
<tr>
<th>Calculation Location</th>
<th>Distance</th>
<th>vs. Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass door on balcony</td>
<td>2 feet</td>
<td>0.033%</td>
</tr>
<tr>
<td>Window in front of antenna</td>
<td>4</td>
<td>2.6%</td>
</tr>
<tr>
<td>Window in front and below</td>
<td>7</td>
<td>0.27%</td>
</tr>
<tr>
<td>Window behind and below</td>
<td>5</td>
<td>0.0053%</td>
</tr>
</tbody>
</table>

I trust that this addresses the specific question from the city. Actual levels for persons inside those windows and inside the hotel rooms would be even lower. Please let me know if any further information is requested.

Sincerely yours,

William F. Hammett
AT&T Mobility • Base Station No. CNU0770
488 University Avenue • Palo Alto, California

Statement of William F. Hammett, P.E.

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 WiFi antennas proposed to be installed at its existing base station (Site No. CNU0770) located at 488 University Avenue in Palo Alto, California, for compliance with appropriate guidelines limiting human exposure to radio frequency ("RF") electromagnetic fields. This statement provides supplemental information to the earlier report from Hammett & Edison, Inc., dated August 5, 2010, evaluating the proposed placement of the antennas at the site.

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. The applicable FCC limits for exposures of unlimited duration to radio frequency energy in the 2.4 and 5.8 GHz bands, reserved for unlicensed uses including WiFi service, are 1.0 mW/cm² for public exposure conditions and 5.0 mW/cm² for occupational exposure conditions. 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.

Background

Based upon information provided by AT&T, including drawings by HMH Design Group, dated July 3, 2010, that carrier proposes to mount two BelAir Model BX1A directional panel WiFi antennas at opposite ends of the narrow balcony on the front of top floor of the six-story apartment building (the "President Hotel") located at 488 University Avenue in Palo Alto. The antennas would be mounted at an effective height of about 60 feet above ground and would be oriented toward 50°T and 230°T, up and down University Avenue. The maximum effective radiated power in any direction would be 3 watts.

At the hearing on February 23, 2011, of the Palo Alto Planning Commission, I testified that, based on the calculations and analysis reported earlier, the FCC public limit would not be exceeded for a person reaching over the balcony and placing a hand in front of the antenna. As a condition of its recommendation for approval, the Planning Commission directed that measurements be taken:

Prior to the installation of the project, applicant shall complete and provide to the City an off-site live study for the proposed Wi-Fi antenna equipment to measure RF emissions in all directions immediately adjacent to the device and up to two feet away, to certify that the maximum power density does not exceed the FCC limits for exposure to the public.
Measurement Procedure

On March 17, 2011, I visited the offices of AT&T Mobility in San Francisco and was provided a sample antenna system for measurement. The first step in that process was to dismantle the unit for direct examination of the antennas. As shown in the picture at right, two antennas were mounted underneath the front cover. The upper antenna array (Model BEL110012-A01) is designed for operation at 2.4 GHz, with two patch antennas set at ±45° to provide diversity for improved reception for signals from customer devices. Each of the upper antennas is rated at a gain of 8 dBi. The lower antenna (Model BIBB025A-A01) is designed for operation at 5.8 GHz; only the bottom patch is connected in this model. That antenna is rated at a gain of 10.5 dBi. The three cables connected to the three coaxial fittings on the bottom of the unit, and the fittings connected inside the unit to the two transmitters mounted on the other side of the metal backplane. The black fitting provided the power for the transmitters, pulled from the one Cat5 computer cable that connects the BelAir unit to the Internet.

The next step was to power the unit. Using power control protocols through the manufacturer’s PC software, both transmitters were set operating at their maximum power: 27 dBm (0.5 watts) at 2.4 GHz and 23 dBm (0.2 watts) at 5.8 GHz. For the antenna gains noted above, these transmitter powers give maximum antenna output powers of 1.9 watts at 2.4 GHz and 1.4 watts at 5.8 GHz, for a total output power of 3.3 watts. AT&T had proposed to operate at a maximum output power of 3 watts, so the test conditions were conservative.

The final step in the testing procedure was to measure the actual power density levels. The measurement equipment used was a Wandel & Goltermann Type EMR-300 Radiation Meter with Type 25 Isotropic Electric Field Probe (Serial No. E-0001). The meter and probe were under current calibration by the manufacturer.

Measurement Results

Measurements were taken with the probe positioned at the front cover of the BelAir unit and at distances of 6 inches (see Figure 2 attached), 1 foot, 2 feet, and 4 feet in front of the unit, as well as
directly above and to the side.* The measured values were seen to vary from moment to moment, as the system maintained its connection with a WiFi modem in a laptop computer located in a nearby office. The measurements reported below are the maximum values observed over the periods of testing at the indicated distances:

<table>
<thead>
<tr>
<th>Direction / Distance</th>
<th>Measured Power Density</th>
<th>vs. FCC Public Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front / at cover</td>
<td>0.057 mW/cm²</td>
<td>5.7%</td>
</tr>
<tr>
<td>Front / 6 inches</td>
<td>0.029</td>
<td>2.9%</td>
</tr>
<tr>
<td>Front / 1 foot</td>
<td>0.0075</td>
<td>0.75%</td>
</tr>
<tr>
<td>Front / 2 feet</td>
<td>0.0040</td>
<td>0.40%</td>
</tr>
<tr>
<td>Front / 4 feet</td>
<td>0.0030</td>
<td>0.30%</td>
</tr>
<tr>
<td>Above / 6 inches</td>
<td>0.0015</td>
<td>0.15%</td>
</tr>
<tr>
<td>Right Side / 6 inches</td>
<td>0.0060</td>
<td>0.60%</td>
</tr>
</tbody>
</table>

**Conclusion**

Based on the measurements reported above, it is my professional opinion that operation of the BelAir Model BX1A WiFi antenna proposed to be installed at 488 University Avenue in Palo Alto, California, will comply with the prevailing standards for limiting public exposure to radio frequency energy. The maximum measured power density at any distance was well below FCC limits for exposure to the public. Therefore, the unit can be considered intrinsically compliant with the FCC guidelines.

**Authorship**

I am a qualified Professional Engineer, holding California Registration Nos. E-13026 and M-20676, which expire on June 30, 2011. This work has been carried out under my direction, and all statements are true and correct of my own knowledge except, where noted, when data has been supplied by others, which data I believe to be correct.

March 21, 2011

* No measurements were taken behind the unit. Levels there would have been lower than in any other direction, due to the large metal backplane on which the antennas were mounted, forming the center structure of the unit.
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:

<table>
<thead>
<tr>
<th>Frequency Applicable Range (MHz)</th>
<th>Electromagnetic Fields (f is frequency of emission in MHz)</th>
<th>Magnetic Field Strength (A/m)</th>
<th>Electric Field Strength (V/m)</th>
<th>Equivalent Far-Field Power Density (mW/cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3 – 1.34</td>
<td>614</td>
<td>1.63</td>
<td>614</td>
<td>100</td>
</tr>
<tr>
<td>1.34 – 3.0</td>
<td>614</td>
<td>1.63</td>
<td>823.8/f</td>
<td>1.63</td>
</tr>
<tr>
<td>3.0 – 30</td>
<td>1842/f</td>
<td>4.89/f</td>
<td>823.8/f</td>
<td>2.19/f</td>
</tr>
<tr>
<td>30 – 300</td>
<td>61.4</td>
<td>0.163</td>
<td>27.5</td>
<td>0.0729</td>
</tr>
<tr>
<td>300 – 1,500</td>
<td>3.54√f</td>
<td>√f/106</td>
<td>1.59√f</td>
<td>√f/238</td>
</tr>
<tr>
<td>1,500 – 100,000</td>
<td>137</td>
<td>0.364</td>
<td>61.4</td>
<td>0.163</td>
</tr>
</tbody>
</table>

![Graph of Power Density vs Frequency](image)

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
RF Power Density Measurement at 6 inches from BelAir BX1A WiFi Antennas

Measurements taken March 17, 2011. Meter reads in percent of occupational limit. Reading shown of 0.23% is 1.15% of FCC public limit. Maximum observed at this distance was 0.58%, which is 2.9% of the public limit. See text for more complete discussion.
Palo Alto – WiFi: Site location CNU0770

Data Volume

Attachment: Attachment G: Correspondence including Request for CUP Hearing (1545 : CUP for wireless facility at 488 University)
Alternatives Analysis

I. Summary

AT&T Mobility has identified a significant capacity gap in its wireless network at the northeast end of University Avenue. This busy section of roadway along with the neighborhood serving commercial uses (restaurants and retail) in this area create a high and rapidly growing demand for wireless voice and data service. AT&T Mobility explored several means to provide additional wireless capacity to this area. Rather than exclusively considering traditional wireless communication Facilities (“WCF”), AT&T Mobility also explored installing WiFi nodes similar to those used in residences and businesses to provide the local area with additional wireless capacity.

II. Preferred Locations

When considering facility locations AT&T Mobility seeks to identify the least intrusive means to provide coverage to the subject area based upon the values expressed in applicable local regulations. According to the Wireless Communication Facilities section of the City of Palo Alto Municipal Code, Section 18.42.110 (a) “building mounted WCF and co-location facilities are preferred and encouraged.”

Further, Section 18.42.110 (b) (1) states that wireless facilities consisting of “Building-mounted projects that do not exceed the existing building/roof-top screening height” require only architectural review and not a conditional use permit and are therefore preferred over locations which would require a CUP.

III. Methodology

AT&T Mobility reviewed both alternative siting location as well as alternative technologies to identify the least intrusive mean to fill the identified capacity gap. Through this analysis it immediately became apparent that a limited modification to the existing facility would be less intrusive than installing a new WCF, whether collocated or stand-alone. A review of the alternatives evaluated by AT&T Mobility follows.
IV. Proposed Modification of Existing Facility

AT&T Mobility currently operates a facility at on the Hotel President, located at 488 University Avenue in Palo Alto. In order to fill the capacity gap at the northeast end of University Avenue, AT&T Mobility engineers have designed an innovative addition to the existing wireless facility which will involve the addition of 2 WiFi nodes mounted on a balcony at approximately 63 feet above ground level. The WiFi nodes will be mounted behind and below the railing so as not to be seen from the street. None of the proposed equipment will be mounted above the existing height of the building and the low power nodes and thin ethernet cabling will be painted to match the existing building. The proposed nodes will be approximately 12 inches (H) by 7.25 inches (W) by 6 inches (D).

The approved location was suggested by the City\(^1\) and will have no impact on views from the public roadways and neighboring community while providing important wireless capacity to the area.

The unique design and placement of the proposed WiFi nodes collocated with an existing AT&T facility make this alternative far and away the least intrusive available to service the existing capacity gap.

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\(^1\) Email from Clare Campbell to Chris Fowler dated Friday, September 10, 2010.
V. List of Alternatives Considered

- 345 Hamilton Avenue

AT&T owns a landline telephone switch in a building at 345 Hamilton Avenue. While this was identified as the initial location for the approved facility, AT&T RF engineers determined that this site would not provide adequate coverage for the heavily traveled University Avenue corridor due to signal blockage from existing buildings. Installing an antenna structure tall enough to overcome this signal blockage would not be aesthetically viable at this location.
- Wireless Facility at 525 University Avenue

There is an existing cellular co-location facility at 525 University Avenue about 170 feet away from the approved facility. This facility houses equipment for Clearwire, Sprint Nextel, and Verizon Wireless. Due to its 15-story height and distance from University Avenue, this building would require the installation of a full WCF rather than the proposed WiFi nodes. The installation of an additional wireless facility at this location would be aesthetically inferior to the proposed facility.
- Existing Cellular Antennas at 488 University Avenue

AT&T also considered mounting WiFi nodes in the same location as the existing AT&T Mobility rooftop antennas at 488 University Avenue. However, AT&T’s RF Engineers determined that this location would not work because the roof of the building would block the low wattage WiFi signals, which would therefore not adequately cover the street nor fill the existing capacity gap.

- Outside of balcony at 488 University Avenue

AT&T Mobility also considered mounting the antennas on the outside of the balconies on 488 University Avenue overlooking the street below. While this location worked from an RF standpoint, the City rejected it as not consistent with the building’s historical status.²

VI. Conclusion

This Alternatives Analysis confirms that AT&T’s innovative proposal provides the best solution for filling the existing gap in capacity, while avoiding any significant visual and aesthetic impacts and meeting the requirements of the City’s Municipal Code.

² According to an Email from Clare Campbell to Chris Fowler dated Friday, September 10, 2010, the building is designated a Category 2 historic building by Chapter 16.49 of the Zoning Ordinance.
Supplemental Alternatives Analysis
(Response to Staff Inquiry 2/22/11)

This document should be read in conjunction with the Alternatives Analysis submitted 2/17/2011. In total twelve alternatives were considered for placement of the approved WiFi nodes.

I. Staff proposed locations

In an email dated February 22, 2011, planning staff requested that AT&T evaluate additional possible locations for the approved WiFi nodes. In general, these potential locations are either too far from the desired coverage location, lack architectural features that would allow disguising the approved WiFi nodes or may require trenching of University Avenue to provide Fiber Optic Data service. A brief review of these supplemental alternatives, as requested by staff, is set forth below.

499 University Ave.

This low-rise commercial building does not provide adequate height to provide effective service to more than a small portion of the coverage objective area. Additionally there are no architectural features that would allow the wireless access points to be installed without having them clearly visible from the street. Lastly, there is likely not a fiber optic connection that would be sufficient for connections into the AT&T data network. Installation of this capacity may require trenching of University Avenue.
428 University Ave. (aka 432 University Ave.)
This is a four-story square commercial building with a modern stone façade. To be located on this building, the approved WiFi nodes would have to either be mounted on approximately 5-foot tall rooftop tripods rising above the parapet, or be mounted to the exterior façade of the building both of which would be fully visible from the street below. Lastly, there is likely not a fiber optic connection that would be sufficient for connections into the AT&T data network. Installation of this capacity may require trenching of University Avenue.

Garden Court Hotel (520 Cowper Street)
Set back half a block from University Avenue, any signals from WiFi nodes on this four-story building would be blocked from the coverage objective area by the six-story President Hotel and the other buildings between the Garden Court Hotel and University Avenue.
Parking Garage – The City’s Webster/Cowper parking garage is setback from University Avenue and the signal from any WiFi nodes placed on this building would be obstructed from the coverage area by the buildings which surround the parking structure.

Borders Bookstore Façade – (456 University Ave.)
The iconic Borders façade and signage does not provide adequate height for the signal coverage necessary to fill the capacity gap identified by AT&T. In addition, locating the approved WiFi nodes at this location would pose significant challenges to avoid impacting the historic nature of this façade. Lastly, there is likely not a fiber optic connection that would be sufficient for connections into the AT&T data network. Installation of this capacity may require trenching of University Avenue.

II. Additional preliminary sites rejected by AT&T

The following additional locations were initially examined by AT&T as part of the site selection process. Due to their distance from the coverage gap area, it was determined early on that they would not meet the technical requirements to provide coverage along University Ave. and as such they were not included in the Alternatives Analysis.
Westin Palo Alto (675 El Camino Real) – this location did not provide coverage along University Ave.

AT&T Innovation Center (260 Homer Ave) – did not provide coverage to the desired outdoor area.
AT&T Applicant has prepared responses to Commissioner Keller’s questions:

1. Are residents of the apartments adjacent to the proposed antennas considered as members of the public for the exposure limitations?

   *Yes, we routinely evaluate against the tightest limit: public, meaning any member of the general public, 24/7*

2. Are the balconies where the proposed antennas are to be placed accessible to the residents of those apartments just as they are accessible to service personnel through those apartments?

   *Two 6th floor apartments have doors that open to the balcony, while the others have windows that face the balcony.*

3. The Hammett & Edison document dated August 5, 2010 provides a measurement regarding occupational guidelines (page 3, first full paragraph). At what radius would the power density level not exceed *public* exposure guidelines for the requisite frequency range? Please provide the calculations of this radius.

   *It would be a matter of inches, if it exceeds the public limit at all. And that’s in FRONT of the antenna, a position that would be close to impossible to attain, requiring one to be suspended in the air, off of the balcony. For someone on the balcony, BEHIND the antenna, the public limit would not be reached even touching the antenna.*

4. Is periodic access of wireless carrier personnel through private apartments detrimental to public health, safety, general welfare, or convenience?

   *Landlord access through an apartment at the Hotel President is a landlord/tenant issue and not a zoning issue subject to regulation by the Planning Commission. Landlord access to a tenant apartment does not affect Conditional Use findings related to the public health, safety, general welfare, or convenience.*

7. Have other locations in proximity to the coverage gap at an appropriate height been considered? In particular, the City’s Cowper-Webster garage, the Garden Court hotel, 499 University Avenue, Borders Bookstore façade, 432 University Avenue.

   *See attached documents for response*

8. Please provide a map of the coverage gap by signal strength.

   *A slide is attached for this information.*
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