

RF Report

Proposed Paxton PCS Facility

(Site MA4988 – 196 West Street, Paxton, MA)



October 11, 2013

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ATTACHMENTS

RF Exhibit 1: Current AT&T Coverage in Paxton, MA

RF Exhibit 2: Proposed AT&T Coverage in Paxton, MA with Proposed Facility in Western Paxton

1. Overview

New Cingular Wireless PCS, LLC (“AT&T”) is applying to the Paxton Board of Appeals for approval to construct, operate and maintain a ground-mounted monopole wireless telecommunications facility in Paxton for its Personal Communication Services. The proposed facility, to be located on 196 West Street, Paxton (Assessors’ Map 12, Lot 54) (the “Site”), is needed to address the significant coverage gaps that exist in AT&T’s network in western Paxton. This report addresses AT&T’s need for the proposed facility at the Site (the “Facility”) and confirms that there are no existing structures, buildings or towers in this part of the Town of Paxton (the “Town”) that meet AT&T’s coverage objectives for this area.

Included in this report are a brief summary of the Facility’s objectives, an analysis of alternate candidates considered, and radio frequency (“RF”) coverage plots showing the Facility’s predicted propagation based on the antenna mounting height necessary to achieve AT&T’s coverage goals.

2. AT&T’s Proposed Facility

As shown on the plans submitted with AT&T’s zoning applications, AT&T proposes to construct, operate and maintain a Wireless Communication Facility consisting principally of the following elements:

- 1) A 138’ high, multi-carrier monopole tower within a 50’ x 50’ fenced equipment compound with a gravel yard;
- 2) Twelve (12) multi-band (700/850/1900/2100 MHz) panel antennas (four per sector) on an antenna platform mounted at a centerline elevation of 134’± above ground level (“AGL”) on the proposed monopole:
 - a) Three (3) Andrew SBNH-1D6565C Antennas (one per sector),
 - b) Three (3) Ericsson KRC118160/1 Antennas (one per sector),
 - c) Three (3) Ericsson KRC118048/1 Antennas (one per sector), and
 - d) Three (3) Ericsson KRC118054/1 Antennas (one per sector)
- 3) Fifteen (15) Ericsson RRUS 11 – Dual PA remote radio units (“RRUs”) (five per sector), with four pipe-mounted above and one pipe-mounted below the platform;
- 4) Two (2) Raycap DC6-48-60-18-8F surge arrestors(per site) and Two (2) Raycap DC6-48-60-0-8F surge arrestors (per site) pipe-mounted below the antenna platform.
- 5) Two (2) fiberoptic trunks, eight (8) DC power trunks and 3 RET lines running from the antennas, down the monopole tower and across an ice bridge to AT&T’s radio and electronic equipment housed in a prefabricated 11’5” x 20’ equipment shelter located on a concrete pad (with a 4’ x 4’ concrete stoop) at the base of the monopole tower;
- 6) One (1) LTE GPS antenna, mounted to the roof of the equipment shelter, and one (1) UMTS GPS antenna, post-mounted on the ice bridge;

- 7) A 50 kW propane emergency generator on a 4' x 8' concrete pad, and a 1,000-gallon propane tank on a 4' x 16' concrete pad, for back-up power in the event of an emergency;
- 8) Underground electric and telephone utilities and a meter bank and disconnect within the fenced equipment area, together with a pad-mounted transformer outside of the fenced area, and a 10' wide utility easement along the Property's northern lot line;
- 9) A 6' high chain link fence with three strands of barbed wire; and
- 10) A 12' wide, 1,518'± long access road (within a 30' wide access and utility easement) from West Street to the fenced equipment compound (this access road will in part follow and will improve the existing dirt road that currently starts at the southern tree line and extends to the northern tree line on the Property).

3. AT&T'S Network

AT&T is the premier wireless company in the United States, with more than 107.9 million subscribers who use the nation's fastest 4G network. AT&T is dedicated to providing customers with wireless technology designed to enrich their lives. AT&T continually raises its performance to meet and exceed customer expectations.

AT&T is licensed by the Federal Communications Commission ("FCC") to provide wireless phone service in areas across the country, including the Town and surrounding communities.

Wireless coverage for voice and data services is provided by placement of a number of low power antenna sites within a given area. The sites are spaced so that the coverage from each location overlaps with its neighboring sites. When a connection is established on a certain site, the wireless device monitors the signal from the serving site, as well as the signal of all of the adjacent sites. When the wireless device receives a stronger signal from an adjacent site, it requests a transfer from the site it is currently using to the stronger site. If there is seamless coverage provided by the carrier, the connection will transfer without interruption. If there is a lack of appropriate signal strength at the transfer point, the quality of the connection degrades and may ultimately be lost.

4. Coverage and Capacity Objectives

Congress enacted the Telecommunications Act of 1996 ("TCA") "to promote competition and higher quality in American telecommunications services and to 'encourage the rapid deployment of new telecommunications technologies.'"¹ Under the TCA and its progeny, a federally licensed wireless communication carrier is to provide "seamless" coverage throughout its service territory.²

¹ *City of Rancho Palos Verdes, Cal. v. Abrams*, 544 U.S. 113, 115-116 (2005).

² See, for example, 47 U.S.C. § 615 (calling for "seamless, ubiquitous, reliable wireless telecommunications networks and enhanced wireless 9-1-1 service"); Pub. L. No. 106-81, § 2(a)(6), 113 Stat. 1286(a)(6) (calling for "construction and operation of seamless, ubiquitous, and reliable wireless telecommunications systems [to] promote public safety and provide immediate and critical communications links among members of the public; emergency medical service providers and emergency dispatch providers; public safety, fire service and law enforcement

As a result, the wireless industry has seen a remarkable evolution of wireless devices such as smart phones and tablets, and the advent of fourth generation technological developments in commercial wireless communication networks. CTIA, the international association for the wireless telecommunications industry, has summarized a variety of statistics on the wireless industry in the United States that graphically illustrate these growth trends:³

Statistic	December 1997	December 2007	December 2012
Wireless Subscriber Connections	55.3 Million	255.4 Million	326.4 Million
Wireless Penetration ⁴	19.8%	83.1%	102.2%
Wireless-Only Households (as a % of U.S. Households)	N/A	15.8%	35.8%
Annualized Minutes of Use	62.9 Billion	2.12 Trillion	2.30 Trillion
Monthly Text Messages	1.2 Million	48.1 Billion	171.3 Billion
E-911 Calls Per Day	55,000	260,000	>400,000
Cell Sites	51,600	213,299	301,779

As an FCC-licensed wireless communication carrier, AT&T must compete in the rapidly evolving wireless marketplace and deliver state-of-the-art services demanded by consumers. To do so, it must design, construct, optimize and operate its wireless communication network in Paxton in a manner that delivers competitive and reliable in-building coverage, addresses significant capacity problems in times of intense usage, and ensures that network infrastructure is properly designed, sited, constructed and maintained such that it can properly meet the needs created by increasing consumer demand for and use of sophisticated wireless devices. Where wireless customers have come to expect a landline Grade-of-Service from their wireless devices, AT&T must meet this demand in a proactive rather than reactive manner. For this reason, AT&T is continuously monitoring and optimizing network performance to resolve issues before they are experienced by the customer. It is in this context that AT&T proposes the Facility at issue here

officials; transportation officials, and hospital emergency and trauma care facilities”); Pub. L. No. 106-81, § 2(b), 113 Stat. 1286(b) (calling for “encourag[ing] and facilitat[ing] the prompt deployment throughout the United States of a seamless, ubiquitous, and reliable end-to-end infrastructure for communications, including wireless communications, to meet the Nation’s public safety and other communications needs”).

³ See U.S. Wireless Quick Facts (located at <http://www.ctia.org/advocacy/research/index.cfm/aid/10323>).

⁴ “Wireless penetration” is defined as “# of active units divided by the total U.S. and territorial population (Puerto Rico, Guam and the USVI.”

AT&T seeks to provide seamless, high-quality, low-cost wireless communication services by installing the Facility to enhance the quality and reliability of its service in western Paxton. AT&T provides digital cellular communications service using GSM (referred to as 2G) and UMTS (also referred to as 3G) technology in the 850 MHz and 1900 MHz frequency bands under license from the FCC. In addition, AT&T is in the process of expanding and enhancing its network throughout Massachusetts and specifically in Paxton to provide high-speed data services commonly referred to as “long term evolution” (“LTE”). LTE operates in the 700, 1900 and 2300 MHz frequencies under license from the FCC.

AT&T has determined that significant coverage gaps exist in its network in western Paxton, including along substantial portions of West Street (MA Route 31) and Pleasant Street (MA Route 122). These gaps also include areas along side roads proximate to West Street (MA Route 31) and Pleasant Street (MA Route 122) and residential and business areas proximate to West Street (MA Route 31) and Pleasant Street (MA Route 122). The purpose of the Facility is to address these coverage gaps, referred to hereinafter as the “Targeted Coverage Area.”

More specifically, the key objective of the Facility is to provide improved in-building, in-vehicle coverage and outdoor coverage on the 850 and 1900 MHz bands (UMTS) and the 700, 1900 and 2300 MHz bands (LTE) in western Paxton, in particular along West Street (MA Route 31) and Pleasant Street (MA Route 122) and the side roads and surrounding residential and commercial properties proximate to those roads.

5. Site Search and Selection Process/Candidate Evaluation

To find a site that provides acceptable service and fills the identified gaps in coverage, computer modeling is used to define a search ring. The search ring is designed such that a site located within the ring would have a high probability of completing coverage in the Targeted Coverage Area (assuming that sufficient height is used).

Once the search ring is determined, AT&T’s real estate consultants search within the defined area for existing buildings or tower structures of sufficient height that would fill coverage gaps within the network. As more fully explained below, AT&T neither has any of its own existing towers or facilities capable of providing the required coverage to the Targeted Coverage Area nor was it able to locate any other existing towers or structures capable of providing the required coverage.

6. Alternative Sites Analysis

AT&T has evaluated its “facility sites in the Town and in abutting Towns or cities in which it has a legal or equitable interest, whether by ownership, leasehold or otherwise,” and has determined that these facility sites do not already provide, or do not have the potential to provide by site adjustment, adequate coverage.” In addition, AT&T “has examined all facility sites located in the Town and in abutting Towns in which [it] has no legal or equitable interest” and has determined that none of “those existing facility sites can be used to provide adequate coverage.” Specifically, there are no suitable pre-existing structures, buildings or towers to which AT&T could attach its wireless antennas and equipment that would sufficiently address the Targeted Coverage Area.

AT&T currently has no existing or approved towers or other facilities located in or near Paxton that are suitable to address the Targeted Coverage Area. I have also evaluated other existing or approved wireless communication towers located in or near Paxton. All of these sites are listed in Table 1 below. As detailed in the table, none of the listed structures is located and/or designed to enable AT&T to sufficiently address the Targeted Coverage Area even if AT&T could co-locate on or in the structure at the highest existing available height.

Table 1: Alternate Sites Analysis

Structure Location	Town	Ground Elevation (feet)	Antenna Centerline (feet)	Comments
85 Irish Lane	Rutland	1076	140	AT&T currently operates and maintains a wireless facility at this site. However, due to the distance of this site from the Targeted Coverage Area, intervening topography and the characteristics of AT&T's radio frequency signal, this site does not address the Targeted Coverage Area.
92 McCormick Road (MAV3193)	Spencer	872	173	AT&T currently operates and maintains a wireless facility at this site. However, due to the distance of this site from the Targeted Coverage Area, intervening topography and the characteristics of AT&T's radio frequency signal, this site does not address the Targeted Coverage Area.
985 Asnebumskit Road (MAV3219)	Paxton	1322	221	AT&T currently operates and maintains a wireless facility at this site. However, due to the distance of this site from the Targeted Coverage Area, intervening topography and the characteristics of AT&T's radio frequency signal, this site does not address the Targeted Coverage Area.

7. Coverage Maps

Bylaw § 8.8.1.6 requires that an applicant submit “[p]redicted radio frequency coverage plots for the proposed facility and results of the pre-construction coverage drive test for comparison with the predicted plots.” In addition, Bylaw § 8.7.1 requires submission of “a map of the geographic area in which the proposed facility will provide adequate coverage.” The RF coverage maps attached as exhibits to this report are intended, among other things, to meet these requirements.

The following RF coverage maps are attached as exhibits to this report:

- RF Exhibit 1, entitled “Current AT&T Coverage in Paxton, MA,” shows AT&T’s existing wireless coverage in and around the Targeted Coverage Area without the Facility; and
- RF Exhibit 2, entitled “Proposed AT&T Coverage in Paxton, MA with Proposed Facility in Western Paxton,” shows the wireless coverage that would be provided in and around the Targeted Coverage Area by the Facility.

These coverage maps were generated using Forsk Atoll, an RF propagation computer modeling program. The software takes into account the geographical features of an area, antenna models, antenna heights and RF transmitting power. The maps show coverage for the 850 MHz frequency range, based on AT&T's site licensing for this market, and were produced using computer-generated models, based on actual drive tests. They are four-color, showing coverage based on the minimum required signal strengths for "in building", "in vehicle", "street level" and "unreliable" coverage. The areas shown on the maps in green represent signal strengths greater than or equal to -86dBm and the areas shown in blue represent signal strengths greater than or equal to -96dBm. The areas shown in yellow or red represent areas of marginal service or no coverage.

8. Least Disruptive Technology

Federal law preempts the Town's right to require AT&T to use certain technology, such as a distributed antenna system ("DAS"), microcells or other similar technologies, to provide wireless coverage.⁵ With this in mind, AT&T states that the Facility uses the least disruptive technology available by which it can provide adequate coverage in conjunction with all of AT&T's existing and currently proposed Wireless Communications Facilities in and around Paxton.

9. Summary

No other existing structures are available to provide the coverage and capacity that AT&T requires in this area of the Town of Paxton. The Facility has been designed to be constructed at the minimum height necessary to accommodate the anticipated user (AT&T) and future users. In sum, without the Facility at the Site at the antenna centerline height requested, significant gaps in service will continue to exist in western Paxton, and the Facility is the least intrusive means to fill these gaps. Therefore, AT&T asks that Paxton look favorably upon the Facility.

10. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate.



Ceferiano Bautista
RF Engineering
AT&T Mobility

10/11/13

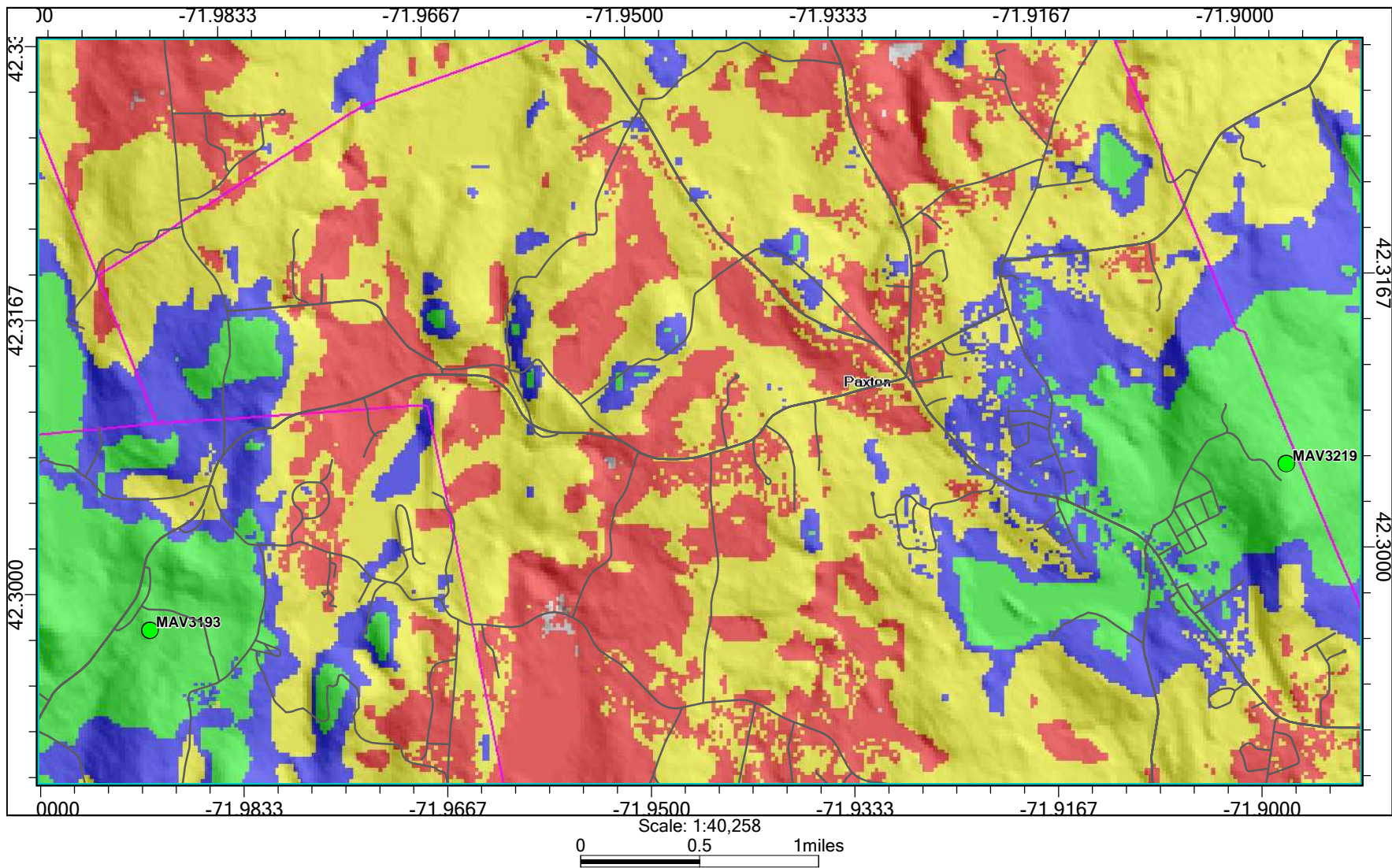
Date

⁵ See New York SMSA Ltd. P'ship v. Town of Clarkstown, 612 F.3d 97, 106 (2nd Cir. 2010) ("[f]ederal law has preempted the regulation of the technical and operational aspects of wireless telecommunications service").

Exhibit 1



CURRENT AT&T COVERAGE IN PAXTON, MA



Current Coverage

- >=-74 dBm
- 82 dBm
- 92 dBm
- 105 dBm

Green dots are current AT&T locations and Orange dots are future AT&T locations.
Coverage plots prepared by Renz C. Bautista, AT&T RF Engineer

Exhibit 2



PROPOSED AT&T COVERAGE IN PAXTON, MA

