



Mr. S Derek Phelps  
Executive Director  
Connecticut Siting Council  
Ten Franklin Square  
New Britain, CT 06051

28 July 2010

**In Re: Docket No. 388, Application of New Cingular Wireless PCS, LLC (AT&T) for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance and operation two telecommunications tower facility located at 1990 Litchfield Turnpike.**

Dear Mr. Phelps,

I write today to present the Connecticut Siting Council with my opinion that the above-captioned proposed facility is not the least visually detrimental to the Connecticut environment surrounding the proposed facility site. I am working on behalf of the Woodbridge, Connecticut Conservation Commission.

My work is known to the Connecticut Siting Council. Since 1995, I have from time to time testified before the Council on matters relating to the placement, construction, and modification of personal wireless service facilities in Connecticut. I have appended as Exhibit 1 my *curriculum vitae*. Of recent note, I have earned by examination the only independent certification available for experts in wireless communications engineering and technology – the Wireless Communications Professional® certification issued by the Communications Society of the International Institute of Electrical and Electronics Engineers. The certification demonstrates my expertise in the seven subject areas of wireless communications engineering.

As an expert on radio frequency coverage analysis and on the placement, construction and modification of personal wireless service facilities, and upon review of the record of Docket 388 posted on the Council's website, I find the following four fundamental facts:

- The application indicates a proposed 170 foot tower at a 290 foot elevation above mean sea level (Application Exhibit 3, Site Plan page C02)
- The review of the potential alternatives that were considered at the adjacent transmission line right-of-way (ROW) relied on an incorrect presumption that a 170 foot tower would be necessary if the ROW were utilized for the proposed facility.
- There are alternative means for utilizing the ROW that do not require a structure 170 feet in height and would readily comply with CL&P concerns and constraints.
- A lesser height at the ROW would provide sufficient coverage for the applicant, make the facility nearly invisible to the public, and could be accomplished in a manner that meets the needs of the applicant and the utility.

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The wireless services of Broadcast Signal Lab, LLP are now offered through

Isotrope, LLC  
505 Main Street  
Medfield, MA 02052  
508 359 8833



I base the foregoing conclusions on the following information in the record and other information lacking in the record:

**1. 170 foot height not necessary at utility ROW**

*A. Difference in Ground Elevations*

The proposed site has a 290 ft AMSL elevation, while the transmission line towers directly northwest of the proposed facility are at approximately 330 ft AMSL (based on ortho-imagery and on a USGS Digital Elevation Model; this is corroborated by the fact that Site Plan C02 shows the ground elevation as high as 331 feet AMSL at 100 feet from the proposed facility). This represents a 40-foot difference in ground elevation between the proposed site and the nearby transmission line ROW. By simple arithmetic, a tower at an alternative location on the ROW in proximity to the proposed site would only need to be 130 feet above ground to achieve the same height AMSL as the 170 foot tower at the proposed site. This substantially changes the site requirements for placing the wireless facility on the ROW.

*B. Lesser Heights Not Evaluated at either location*

The Record lacks any justification for the 170-foot height or the 150 foot height at the proposed site or at the utility ROW.

i. Applicant had considered 150 feet but no lower-

The applicant initially considered a lesser height of 150 feet above ground at the proposed site prior to filing the application. (Three letters addressed to separate departments at the Town of Woodbridge dated November 26, 2008) and of 160 feet (A letter to the Mashantucket Pequot Tribe also dated November 26, 2008, which we assume was a typographical error and was intended to be 150 feet.)

ii. Proceeding considered 150 feet but no lower-

In the proceeding, the applicant supplied coverage maps of the proposed plus existing coverage at three heights (170, 160 & 150 feet) in response to Pre-Hearing Interrogatory Set 1, Question 12. No projected coverage from lesser heights was requested or presented.

Applicant's assertions about the purported 150-170 foot height requirement are unsubstantiated. In the June 14, 2010 AT&T response to the May 17, 2010 interrogatories, Question 1, AT&T asserted, "As part of its radiofrequency analysis that included several of the 115 kV poles shown in the attached [Northeast Utilities as-built] map, AT&T again concluded that at heights up to that which would be considered co-location (i.e. 20' attachment to the existing structure), the CL&P [transmission towers] could not fully meet [AT&Ts] coverage objectives." (*emphasis added*) This remark appears to be a reference to page 6 of the original application narrative, "AT&T investigated the use or replacement of one of these CL&P towers. AT&T was advised to seek other siting opportunities due to the priority of the transmission line and the need to avoid outages." The narrative continues, "As such, and only after determining that no existing structures could reasonably be used to provide the needed coverage in this area, AT&T commenced a search for tower sites." Only then did their "...search include the study of tax maps, planning



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and zoning files, and topographic maps *as well as review by AT&T radiofrequency engineers* and investigative visits by AT&T consultants.”

The AT&T Site Search Summary included with the application echoes this reliance on CL&Ps reluctance rather than on any lack of sufficient coverage from 20 feet above the transmission tower height, “Consultation with Connecticut Light & Power revealed that nearby high tension power lines were not viable siting options.”

In short, the original application relies on CL&Ps reluctance to get involved as the reason to exclude the transmission line towers. Radio frequency coverage from attachments to the existing transmission towers was not specified as a contributing factor, nor was any coverage from up to 20 feet above tower heights submitted to illustrate the purported need for 170 feet at the ROW.

iii. No Significant Difference between projected 150 and 170 foot coverage indicates lesser heights should be evaluated.

The applicant’s comparative analysis of coverage showed there is no significant difference between the coverage the applicant would obtain at 170 feet and at 150 feet. See, for instance, the reduction in *calculated* coverage provided by the applicant in response to Pre-Hearing Interrogatory Set 1, Question 14. In response to question 14, the applicant calculated the area with greater than -82 dBm that the proposed site would serve. The area served by three heights were computed and compared – 170, 160, and 150 feet. The calculated difference between the 170 foot and the 150 foot heights changed from 3 square miles to 2.8 square miles. This is less than a 7% change in the calculated area. This type of evidence is a very coarse indicator, so a less than 7% difference is essentially meaningless. This is because the locations of the less than 7% reduction which are not necessarily in inhabited areas or streets. It is also because some of the -82 dBm coverage area of the proposed facility overlaps the -82 dBm coverage of existing facilities. There is no evidence this overlap was removed from the calculations, which would further bias the comparison between 170 and 150 foot coverage.

iv. Reason for going up from 150 to 170 feet in the first place not justified-

Applicant adjusted its intended height from 150 to 170 feet before filing the application. Applicant explained the change to the Connecticut Commission on Culture and Tourism in a June 17, 2009 letter, explaining the height had been changed, “The undertaking has since been modified and the structure is now a 170-foot monopole.”

The Pre-Hearing Interrogatories Set 1, Question 4 sought an explanation of the applicant’s search ring. Applicant explained that there were two search rings, SR2124 and SR2125, “but at 170’ it was apparent that this site would provide service to both SR2124 and SR2125, obviating the need for two sites.”

Assuming the most likely explanation, which would be that the applicant obtained a more precise ground elevation for the proposed facility that was 20 feet lower than originally planned, a simple answer would be that the applicant attempted to recover lost ground elevation during the design process by increasing the elevation



of the proposed tower. However, this answer still underscores the lack of any evidence in the first place that the original 150 foot height at some estimated elevation and the proposed 170 foot height at the proposed elevation had any need basis, compared to lesser heights.

**2. Insufficient Reasons for Ruling Out Utility Right of Way Location**

**A. *Height Required at ROW Erroneously Assumed to be 170 feet***

The January 29, 2010 letter from Cuddy & Feder to Northeast Utilities Service Company seeks additional information on, among other things, “The CL&P terms and conditions upon which a *replacement transmission tower* might be constructed by AT&T in this specific right-of-way near its overpass on Dillon Road...” (*emphasis added*) Applicant further specifies to Northeast Utilities, “Of note, AT&T would require an approximately 170 foot structure at a ground level of 300’ AMSL.” As discussed above, assuming an alternative ROW location has the same ground elevation as the proposed site, there is no evidence of the coverage obtainable from heights less than 150 feet. Thus, there is no proof that “an approximately 170 foot structure at ground level of 300’...” is a necessary design constraint on the ROW.

**B. *Ground elevation***

As discussed above, the ground elevation of the utility ROW at the transmission towers nearest the proposed site is approximately 330 feet. Closer to the Dillon Road transmission line overpass the ground elevation rises to approximately 370 feet at the location of a set of transmission line towers. This is an additional 40 feet above the 330 foot elevation. Simple arithmetic suggests that if a 170 foot tower were truly necessary at the proposed site at 290 feet elevation, then a tower only 90 feet tall would be necessary to support the applicant’s antennas at the same elevation AMSL that would be obtained from 170 feet from the proposed site.

**C. *Applicant inquiries were conclusory and telegraphed applicant’s disinterest in using the ROW***

The January 29, 2010 Cuddy & Feder letter to Northeast Utilities asked, “Thus, we would simply ask that CL&P provide AT&T with information to the extent possible so that *we may further explain to the Siting Council why use of CL&P’s infrastructure in this part of the state is not feasible for AT&T* in the development of its own critical infrastructure needed for the reliable provision of wireless services to the public.” (*emphasis added*)

**D. *Northeast Utilities Responses were Tailored to Applicant’s Narrow Inquiry, and therefore Were Incomplete***

- i. The February 19, 2010 letter from Northeast Utilities to Cuddy & Feder answered Question 2, regarding a “replacement transmission tower,” explained, “...it is not CL&P’s practice to replace an existing steel transmission structure for the sole purpose of attaching a third-party cellular antenna.” Whether this is or is not a defensible answer, the supposed need to install a tower replacement is based on the incorrect 170-foot height assumption and the incorrect assumption that a replacement rather than an attachment to an existing transmission tower would be necessary.
- ii. The same February 19, 2010 letter provided a response to the stand-alone tower question. CL&P states the general case without considering the specific case of the proposed AT&T facility in Woodbridge. CL&P also relies on the specified height of approximately 170 feet to form its answer. “New *independent* telecommunications structures within CL&P rights-of-way (“ROWS”) *would generally be unacceptable.*”



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AT&T is proposing a 170' tower engineered only to hold antennae belonging to AT&T [and future wireless tenants]... that would also require a 75' by 75' fenced area for associated cell service facilities." (*emphasis added*)

The assumptions contained in the applicant's queries force the Northeast Utilities response to overlook the more customary ways wireless facilities are routinely accommodated on utility rights-of-way that are occupied by steel transmission line towers. A 170-foot tower with a 75-foot-square compound can understandably be a non-starter on a utility ROW in some circumstances.

- iii. Northeast Utilities expresses some general concerns that the locus of the proposed facility could address.

Specifically in #2 of the February 19, 2010 response, in a list labeled "Structure Replacement Considerations", Northeast utilities says, "lattice towers and steel poles are typically double-circuit structures; this requires an extended outage on two parallel circuits." We have identified at least one pair of poles where the double circuit per pole configuration has been split to a single circuit per pole at a suitable location and elevation.

Also, we suggest that since transmission tower replacement is not necessary, the duration of outage for an attachment would be significantly less than for a replacement. With suitable engineering, and if necessary, reinforcement, existing steel transmission towers are often retrofitted with wireless antennas. Outage time and construction cost would be significantly reduced with a retrofit attachment instead of a replacement. For illustration I have appended a photograph of a wireless three-sector antenna canister mounted on the top of a transmission line tower in Barnstable, Massachusetts. This photograph is marked Exhibit 2 and is incorporated herein by reference.

- iv. The Northeast Utilities response illuminates the utility's perceived problem with "independent telecommunications structures", "Most ROWs are fully or nearly fully occupied with transmission lines and distribution facilities...Where unused [ROW] widths do exist, these widths are reserved for future power lines..."; Access...by CL&P vehicles must be maintained"; "Minimum horizontal and vertical distance criteria must be maintained..."

Northeast Utilities seemingly indicates that a privately-owned tower occupying precious ROW space reserved for future lines is an obstacle to success (see 2.D.ii. above). Further, Northeast Utilities is of the assumption that the tower proposed by AT&T would be utilized only by AT&T and future personal wireless service providers. Creative ownership and design solutions are often negotiated to achieve competing objectives. Since there are locations where coverage from antenna heights that are similar to the height of the 115 kV towers, and if a separate tower were constructed, it could be positioned and designed to be a full-fledged transmission tower for future utility use while also being designed to support wireless antennas.



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In the event a new line is to be put in, and the present tower design of a standalone wireless/transmission tower is not suited to the new transmission line design, the parties could anticipate such problems by negotiating terms in the license or lease that anticipate a potential replacement of the wireless structure with a jointly used structure in the future.

Access to the ROW and the individual transmission towers can be maintained by eliminating the monolithic 75-foot-square multi-carrier compound and designing simple 15 by 20 foot compounds, or smaller as needed, to support the one to three wireless carriers that might share a single transmission tower structure.

- v. The Northeast Utilities February 19, 2010 response to Question 4 from AT&T indicates there are methods to address utility concerns about towers placed in relative proximity to transmission lines. Northeast Utilities described two solutions to concerns about wireless tower failures, 1) Limiting the height of the new tower to prevent a (very unlikely) toppling to strike any live lines, and 2) designing a new tower to have a buckling joint that will fail safely under extreme loading by buckling the tower in place rather than toppling. As will be shown in the next section, with wireless antenna heights of 90 to 110 feet on the ROW achieving substantial coverage, it becomes highly probable that a wireless tower could be placed compatibly on the ROW. Because the 170 foot height was the criterion, there has been no analysis of more reasonable wireless facility concepts for the ROW.

### **3. New Coverage Analysis Contradicts Claims of Poor Coverage from Utility Towers**

#### *A. Proposed Site Characteristics obtained from the Record and Modeled*

I discerned the antenna height (170 feet above ground), antenna characteristics and orientation, and emitted power levels from the record. The information was put into the Isotrope, LLC propagation modeling software application. I selected a propagation model that produced results that are substantially similar to the applicant's coverage plots in the Pre-Filed Testimony of Anthony Wells, January 10, 2010. While this is not our first choice of propagation model, it is one of the well known algorithms for estimating radio coverage. Our goal was to produce a close approximation of the applicant's impression of its projected coverage as possible. We will save discussions of its accuracy or reliability for another time.

#### *B. Model of Proposed 170 foot Coverage from Site is Consistent with Applicant's*

Appended as Exhibit 3, and incorporated herein by reference, is our coverage plot of only the proposed tower at 170 feet at the proposed site for comparison to the applicant's coverage plot of coverage from the same height. We did not find anywhere in the record a table of AT&Ts existing wireless facility parameters that would be sufficient for performing peer review of the applicant's existing coverage plotting. Consequently, we have not modeled the existing coverage around the proposed facility. The existing facilities' coverage information is not necessary for comparing coverage from the example potential alternative with that of the proposed facility.

#### *C. Model of alternative location on ROW at 110 feet is extremely effective*

Exhibit 4, appended hereto and incorporated herein by reference, shows the potential coverage from a 110 foot height at the location of one of the 115 kV transmission



towers. It could be a new structure on the ROW, or an attachment to the top of an existing structure.

**4. Co-location versus Minimum Visibility**

There is always a tension between the desire to maximize the height of a structure to maximize co-location and minimize the number of independent facilities required for competitors to serve the same area, versus maintaining a low structure that may be substantially less visible and limited in co-location potential. In the present case, there is no need for monolithic structures to support four to six wireless carriers. There are numerous existing utility towers that have the potential to be of service – not by replacement with new structures, but by attachment, which is a substantially less invasive and less costly way to convert a transmission tower to wireless use. Co-location on the ROW would consist of having one or two carriers occupy a location on the ROW, and having additional carriers spread themselves out horizontally at other locations along the ridge. With the substantially lower heights of these installations, compared to a 170 foot tower, and with the fact that there is an existing development in the form of the transmission lines, this low-and-wide strategy for placing new wireless facilities along the ROW would be substantially less visually objectionable than the lone tall tower. Sight lines, if they were to be found, would have these antennas very close to the viewer’s tree line, if not behind it.

**5. Conclusion**

Based on the foregoing analysis, it is my opinion that the 170 foot tower and wireless facility proposed by AT&T Wireless off Litchfield Turnpike in Woodbridge, Connecticut does not have the least impact on the environment because it will be practicable to substantially achieve the coverage the applicant seeks using less visible means at the transmission line right-of-way. The record was not fully developed to establish this fact.

Yours truly,

David Maxson, WCP  
Isotrope, LLC  
505 Main Street  
Medfield, MA 02052  
508 359 8833  
www.isotrope.im



## Exhibit 1

### Curriculum Vitae of David Maxson



# **David P. Maxson, WCP®**

## **Curriculum Vitae**

Broadcast Signal Lab, LLP, Cambridge, Massachusetts, 1982-present. Founder, managing partner

- |  |   |
|--|---|
| a) Evaluation of radio frequency facilities for compliance with technical and regulatory standards | b) Municipal guidance in wireless planning and regulation         |
| c) Safety planning and evaluation of communications facilities, safety protocol development        | d) Spectrum monitoring services at NIST-traceable calibration lab |
| e) Communications facility design and construction   | f) Radio frequency interference remediation                       |
|  | g) Digital communications protocol development                    |

Isotope, LLC, Medfield, Massachusetts, 2010-present Founder, CEO

- Spun off the Broadcast Signal Lab activities b), c), e) & g) (above) into new company
- Pursuing new initiatives in wireless technology

Charles River Broadcasting Company, Waltham, Massachusetts, 1978-1998.

Vice President, Director of Engineering and Technical Operations

### ***Affiliations and Accomplishments***

- Certified by the Institute of Electrical and Electronics Engineers (“IEEE”) Communications Society Wireless Communications Engineering Technology program as a Wireless Communications Professional, demonstrating “a thorough understanding of different key technologies in the wireless arena.” (ieee-wcet.org)
- Project Reviewer - NTIA Broadband Technology Opportunities Program and USDA Rural Utilities Service Broadband Initiatives Program – American Recovery and Reinvestment Act, 2009.
- Delegate to the National Radio Systems Committee, Digital Audio Broadcasting Subcommittee, 1998-present.
- Member of the PCIA’s DAS Forum (the wireless infrastructure association’s distributed antenna system group)
- Qualified expert on wireless communications matters before federal and state courts.
- Testimony, US House of Representatives Commerce Committee Telecommunications Subcommittee in the matter of Low Power FM Broadcasting, February 2000.
- Wireless facility evaluation and planning consultant to the Cape Cod Commission as well as to over a hundred municipalities in New England and beyond.
- Appointed member of Massachusetts Department of Public Health ad hoc committee on revisions to electromagnetic energy safety regulations 105 CMR §122, 1997.
- Senior Member, IEEE; Certified Broadcast Radio Engineer, Society of Broadcast Engineers; FCC General Class Radiotelephone License with Radar Endorsement; Bachelor of Science, Boston University, 1977; Massachusetts Licensed Construction Supervisor #CS073481.
- Member of the Technical Advisory Board for Radio Ink Magazine’s *Tech Ink* publication, Skip Pizzi, Technical Editor.

### ***Publications***

- Author, *The IBOC Handbook— Understanding HD Radio Technology*, 2007, Focal Press.
- Author, Chapter 2.5, *Managing Workplace and Environmental Hazards*, NAB Engineering Handbook, 10<sup>th</sup> Edition, 2007.
- Article, *Evaluating Emissions of Your New IBOC Transmitter*, Radio World Engineering Extra, June 2005.
- Article, *Posting Hazard Communications Signs at Your Radio Transmission Plant*, Radio Guide, April 2005.
- Published Paper: *Interference Potential of Hybrid Digital Transmission: An IBOC Occupied Bandwidth Case Study*, Proceedings of the National Association of Broadcasters Broadcast Engineering Conference (“NAB-BEC”), 2004.
- Published Paper: *Integrating ANSI-Compliant RF Signs Into Corporate RF Safety Programs*, NAB-BEC 2004.
- Published Paper, co-author: *Applying the Principles of Data Communications to the Development of an Open and Universal IBOC Data Protocol*, NAB-BEC 2003.



## Exhibit 2

# Wireless Attachment to Transmission Tower

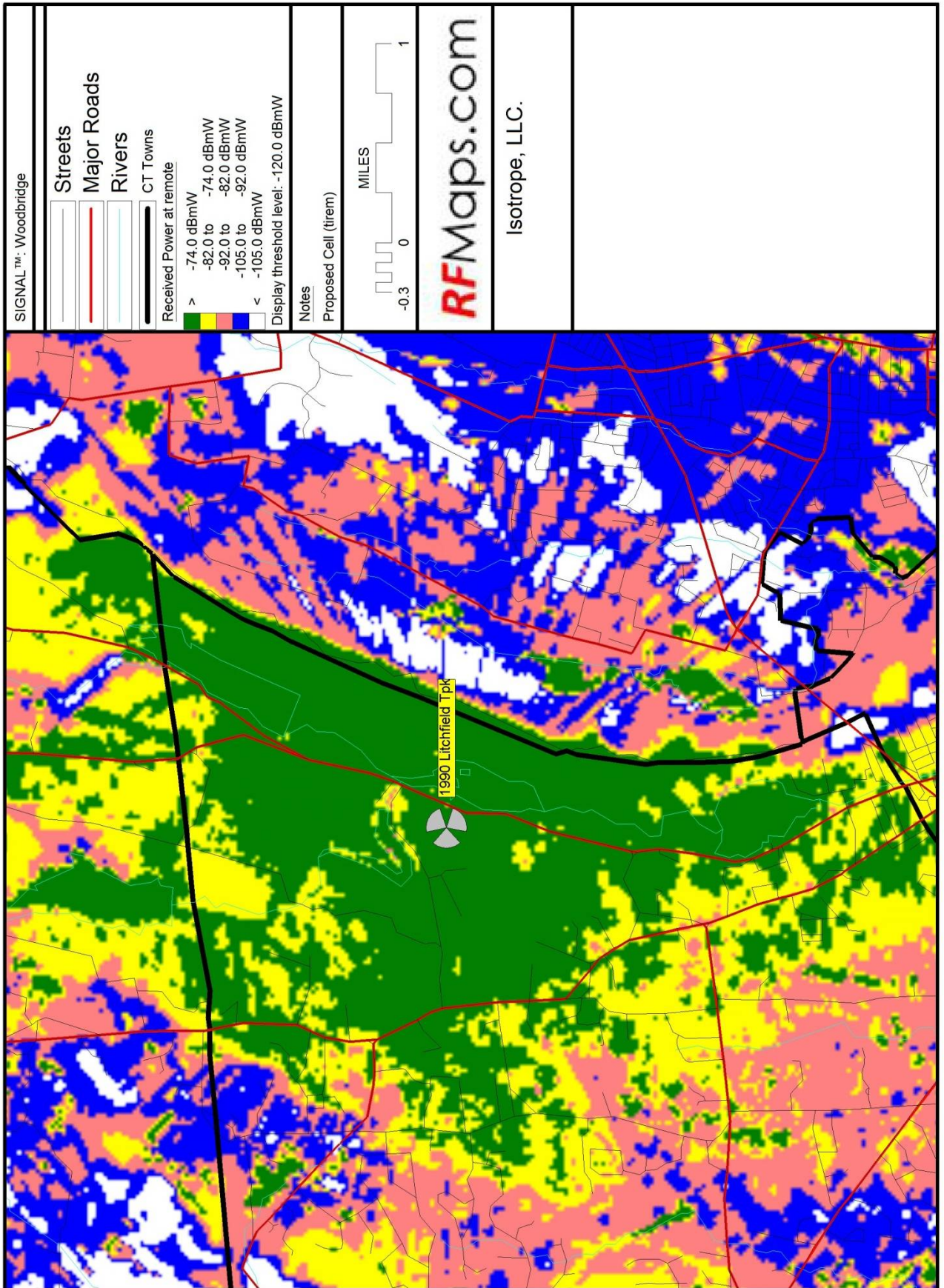


Three-Sector Wireless Antenna Canister, Barnstable Massachusetts



## Exhibit 3

# Coverage from Proposed Site at 170 feet





## Exhibit 4

# Coverage from Transmission ROW at 110 ft

