*REDACTED – FOR PUBLIC INSPECTION*

**BEFORE THE**
**FEDERAL COMMUNICATIONS COMMISSION**
**WASHINGTON, D.C. 20554**

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| In the Matter of | ) | |
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| Applications of AT&T Inc. and United States Cellular Corporation for Consent to Assign Licenses | ) | WT Docket No 16-178 |
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# RESPONSE OF AT&T TO GENERAL INFORMATION REQUEST DATED JULY 27, 2016

**August 10, 2016**

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## Introduction

AT&T Mobility Spectrum LLC ("Mobility Spectrum") and New Cingular Wireless PCS, LLC ("New Cingular"), indirect wholly-owned subsidiaries of AT&T Inc. (collectively, "AT&T") hereby provides this response (the "Response") to the letter dated July 27, 2016 from Jon Wilkins, Chief of the Wireless Telecommunications Bureau of the Federal Communications Commission ("FCC" or "Commission"), and the General Information Request for AT&T attached thereto (collectively, the "Request"). In three Requests, (individually referred to herein as "Request No. [#]"), the FCC asks AT&T (sometimes referred to in the request as the "Company," as defined therein) to provide by August 10, 2016 documents, data, and other information to compete the Commission's review of the applications of USCOC of Central Illinois, LLC, Indiana RSA No. 4 Limited Partnership, United States Cellular Operating Company of Chicago, LLC, Oregon RSA #2, Inc., USCOC of Richland, Inc., and USCOC of Greater North Carolina, LLC (collectively, "U.S. Cellular"), New Cingular, and Mobility Spectrum for consent to the exchange of various AWS, Broadband PCS, and 700 MHz licenses.

Consistent with AT&T's discussions with Commission staff on similar requests, AT&T's responses are based on a review of available documents that are likely to contain responsive information and inquiry of those individuals and available sources that are likely to have relevant information. Where the Request seeks documents, responsive documents are produced.

The Request calls for AT&T to submit certain information and documents that are sensitive from a commercial, competitive, and financial perspective, and that AT&T would not reveal in the ordinary course of business to the public or its competitors. AT&T is submitting

information and documents on a Confidential and/or Highly Confidential basis pursuant to the Protective Order for this proceeding that was issued on July 27, 2016. The inadvertent inclusion of any material that is subject to an assertion of the attorney-client, attorney work-product, or other applicable privilege is not intended as a waiver of such privilege.

In the public version of the Response, AT&T has redacted Highly Confidential Information and marked the redactions with "**[BEGIN AT&T HIGHLY CONFIDENTIAL INFORMATION]** . . . **[END AT&T HIGHLY CONFIDENTIAL INFORMATION]**". The redacted Response is marked "**REDACTED – FOR PUBLIC INSPECTION**" and is being filed electronically in the Commission's Electronic Comment Filing System ("ECFS"). The Highly Confidential, unredacted Response is marked, "**HIGHLY CONFIDENTIAL INFORMATION – SUBJECT TO PROTECTIVE ORDER IN WT DOCKET NO. 16-178 BEFORE THE FEDERAL COMMUNICATIONS COMMISSION – ADDITIONAL COPYING RESTRICTED**" and is being delivered to the Secretary. Additional copies of the unredacted Response are being delivered as instructed in the Request.

Pursuant to discussions with the Commission staff, AT&T is submitting its Response with the qualification that AT&T has not verified that it has produced "all other documents referred to in the document or attachments."

## RESPONSES

**1. REQUEST:**

*On page 3 of the Public Interest Statement, the Applicants maintain that the additional spectrum "will be used to deploy and/or expand AT&T's 4G LTE network, and will increase network capacity to the benefit of all AT&T subscribers." In addition, on page 3, the Applicants contend that the acquisition of this spectrum "will give AT&T 24 contiguous megahertz of paired 700 MHz spectrum, enough to support a 10×10 MHz LTE deployment." Further, on page 3, the Applicants assert that there are benefits of a 10×10 MHz LTE configuration, such as greater efficiencies, increased network capacity, and better throughput. For each of CMA 196 (Champaign-Urbana-Rantoul, IL), CMA 217 (Anderson, IN), CMA 271 (Kokomo, IN), CMA 399 (Illinois 6 – Montgomery), and CMA 388 (Idaho 1 – Boundary) provide:*

*a. A detailed discussion of the Company's plans to provide high-quality, high-speed wireless broadband services prior to the Proposed Transaction, including a detailed description of the Company's current and planned deployment of LTE, which identifies the spectrum bands and the total amount of spectrum used for LTE deployment.*

AT&T has worked tirelessly to deploy 4G LTE wireless broadband services throughout its nationwide footprint. AT&T's LTE network covers 355 million people in North America, and data traffic on AT&T's network increased more than 150,000% from January 2007 through December 2015.[1] Today, AT&T's LTE deployment includes approximately **[BEGIN AT&T HIGHLY CONFIDENTIAL INFORMATION] [END AT&T HIGHLY CONFIDENTIAL INFORMATION]** people in the five Cellular Market Areas ("the Relevant CMAs") affected by this transaction. AT&T uses a variety of spectrum bands – Lower 700 MHz, 850 MHz cellular, Broadband PCS, and/or AWS-1 – to provide LTE services to its customers, with specific LTE deployments varying by market.[2] However, AT&T's LTE deployment strategy centers around the Lower 700 MHz band, and AT&T has made deployment

[1] AT&T, About Our Network, *at* http://about.att.com/news/wireless-network.html.

[2] As more customers upgrade to LTE service, and compatible handsets and equipment become available, AT&T expects to deploy LTE service using additional spectrum bands, including WCS and the Lower 700 MHz D and E Blocks.

of LTE in 700 MHz spectrum a key priority. Where AT&T holds Lower 700 MHz B or C Block spectrum, AT&T will launch LTE service initially using that spectrum. AT&T typically will launch LTE in a 5 x 5 MHz configuration where only a single 12 MHz block of Lower 700 MHz B or C Block spectrum is available, and will launch LTE in a 10 x 10 MHz configuration in areas where both the Lower 700 MHz B and C Blocks are available.

In the Champaign-Urbana-Rantoul, IL CMA (CMA196), AT&T currently operates an LTE network **[BEGIN AT&T HIGHLY CONFIDENTIAL INFORMATION]**

**[END AT&T HIGHLY CONFIDENTIAL INFORMATION]**

In the Anderson, IN CMA (CMA217), AT&T currently operates an LTE network **[BEGIN AT&T HIGHLY CONFIDENTIAL INFORMATION]**

**[END AT&T HIGHLY CONFIDENTIAL INFORMATION]**

In the Kokomo, IN CMA (CMA271), AT&T currently operates an LTE network **[BEGIN AT&T HIGHLY CONFIDENTIAL INFORMATION]**

**[END AT&T HIGHLY CONFIDENTIAL INFORMATION]**

In the Illinois 6 – Montgomery CMA (CMA399), AT&T currently operates an LTE network **[BEGIN AT&T HIGHLY CONFIDENTIAL INFORMATION]**

**[END AT&T HIGHLY CONFIDENTIAL INFORMATION]**

In the Idaho 1 – Boundary CMA (CMA388), AT&T currently operates an LTE network **[BEGIN AT&T HIGHLY CONFIDENTIAL INFORMATION]**

**[END AT&T HIGHLY CONFIDENTIAL INFORMATION]**

As explained in Response Nos. 1(b)-(d), AT&T is using and will continue to use the 700 MHz spectrum to be acquired in this transaction to improve the quality of service for subscribers in this market and to respond to subscribers' considerable demand for LTE services.

*b. A detailed description of how the Company would use the spectrum that it would acquire under the Proposed Transaction to provide a 10×10 megahertz LTE network, on a standalone basis and/or in conjunction with any other of the Company's spectrum holdings.*

With the exception of the Anderson, IN CMA, AT&T currently has licensed spectrum sufficient to deploy a 5 x 5 MHz LTE carrier in 700 MHz spectrum in each of the Relevant CMAs.[3] Through its spectrum manager leases of the U.S. Cellular Licenses that recently took effect, AT&T is able to provide a 10 x 10 MHz LTE deployment on 700 MHz in these markets prior to the consummation of this transaction. With the exception of the Anderson, IN CMA, AT&T has deployed this spectrum pursuant to its spectrum manager leases with U.S. Cellular.[4] Acquisition of these licenses from U.S. Cellular will enable AT&T to maintain this 10 x 10 MHz LTE deployment in the Lower 700 MHz spectrum in the Relevant CMAs on a permanent basis. As explained further below, the benefits of such a deployment are considerable, and represent a major improvement in speed and efficiency over a 5 x 5 MHz LTE carrier.

*c. A detailed description of how deployment of a 10×10 megahertz LTE network would improve efficiency, network capacity, and throughput, and the Company's timeline for such a deployment.*

There are numerous spectral efficiency benefits associated with the deployment of a 10 x 10 MHz LTE network, as opposed to a 5 x 5 MHz LTE network. First, the 10 x 10 MHz

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[3] As explained above, AT&T currently does not hold any paired 700 MHz spectrum licenses in the Anderson, IN CMA.

[4] AT&T plans to complete its deployment of an LTE network using the 700 MHz spectrum in the Anderson, IN CMA by the end of 2016.

deployment's wider bandwidth provides greater trunking efficiencies. Additionally, a 10 x 10 MHz contiguous block also benefits from signaling efficiency as many of the control overhead/messages (such as Physical Broadcast Control Channel, Shared Channel, *etc*) need to be transmitted only once instead of twice, as would be the case for two non-contiguous 5 x 5 MHz blocks. These efficiency improvements result in higher system capacity and spectral efficiency and a better user throughput experience than would be possible over two separate 5 x 5 MHz blocks.

The wider bandwidth of a contiguous 10 x 10 MHz block provides trunking efficiency gains due to the pooling of the resources across a single scheduler, thus enabling AT&T to carry more traffic (more calls and more megabytes of data traffic per busy hour) than AT&T would be able to carry over two separate 5 x 5 MHz blocks. In other words, the increased efficiency results from the fact that potential users can be scheduled over a larger number of resources (sub-channels) in the 10 x 10 MHz deployment than they can if they were split between two separate 5 x 5 blocks.[5] In addition, when the channel bandwidth is significantly greater than the coherence bandwidth[6] (the coherence bandwidth is generally somewhat less than 5 MHz in these

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[5] A useful analogy is to the ticket agent line at an airport. One line that is served by four ticket agents will provide more prompt and efficient service for customers than two separate lines, where each line is served by two ticket agents and customers cannot change lines. When one line is served by four ticket agents, whenever an agent is available, the next customer in line will be served. With two separate lines, if one line is empty and the other is full, the ticket agents serving the empty line are not utilized because customers cannot change lines. Combining the two lines results in better service to the customers as a whole, uses the ticket agents more efficiently, and provides the capacity to serve more customers in a given amount of time.

[6] "Coherence bandwidth is a statistical measure of the range of frequencies over which the channel can be considered 'flat' (*i.e.*, a channel which passes all spectral components with approximately equal gain and linear phase). In other words, coherence bandwidth is the range of frequencies over which two frequency components have a strong potential for amplitude

systems), it ensures that the entire signal does not undergo a deep fade, and by using proper frequency-selective resource allocation, this should result in increased efficiency.

The spectral efficiency benefits of a 10 x 10 MHz LTE deployment are a matter of Commission record. In approving another transaction in which AT&T acquired Lower 700 MHz B Block spectrum to complement its C Block holdings, the Commission agreed that "the proposed transaction has the potential to enable AT&T to achieve greater spectral efficiency and greater throughput in the license areas at issue, which would enable AT&T to expand its LTE deployment using contiguous spectrum. Indeed, AT&T's description of its plans for this market generally suggests that AT&T would take advantage of these potential benefits to provide better service to customers."[7]

AT&T's acquisition of the U.S. Cellular Licenses will also improve the capacity of AT&T's LTE network. The relative gain in capacity from a 5 x 5 MHz to a 10 x 10 MHz deployment is nonlinear, meaning that the capacity of a 10 x 10 MHz block is greater than the total capacity of two separate 5 x 5 MHz blocks. For example, AT&T estimates that the average downlink capacity of a 10 x 10 MHz block, optimized for average user performance, is more than double — 2.2 times — the capacity of a 5 x 5 MHz block. Thus, the 10 MHz block would have approximately 10 percent more capacity than two 5 MHz blocks.[8] The wider bandwidth also results in noticeably better performance for users than a deployment using two 5 x 5 MHz

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correlation." Theodore S. Rappaport, Wireless Communications: Principles and Practice (2007).

[7] *Applications of AT&T Inc., Cellco Partnership d/b/a Verizon Wireless, Grain Spectrum, LLC, and Grain Spectrum II, LLC*, Memorandum Opinion and Order, 28 FCC Rcd 12878, ¶ 59 (2013).

[8] *See* ATT-USCC000049-ATT-USCC000050 (setting forth assumptions underlying capacity gain estimates).

blocks. For example, under multi-user bursty traffic conditions and assuming a 50 percent load (where load is defined as the resource block utilization level), a 10 x 10 MHz deployment is expected to support a median user throughput of about **[BEGIN AT&T HIGHLY CONFIDENTIAL INFORMATION] [END AT&T HIGHLY CONFIDENTIAL INFORMATION]** compared to **[BEGIN AT&T HIGHLY CONFIDENTIAL INFORMATION] [END AT&T HIGHLY CONFIDENTIAL INFORMATION]** for a 5 x 5 MHz deployment, for a relative gain of about **[BEGIN AT&T HIGHLY CONFIDENTIAL INFORMATION] [END AT&T HIGHLY CONFIDENTIAL INFORMATION]**.[9] Finally, it is well known that the peak data rate for a 10 x 10 MHz block is twice that of a 5 x 5 MHz block.[10]

AT&T's current LTE population coverage in each of the Relevant CMAs is as follows: **[BEGIN AT&T HIGHLY CONFIDENTIAL INFORMATION]**

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9 *See* ATT-USCC000007 (setting forth assumptions underlying calculations).

10 *See, e.g.*, Eiko Seidel, Junaid Afzal, Günther Liebl, Nomor Research GmbH, *White Paper — Dual Cell HSDPA and its Future Evolution* at 2 (January 2009) (stating that doubling bandwidth will double data rates), *available at* http://www.nomor-research.com/uploads/1h/pA/1hpAccByjinAOWBDzTNt4w/WhitePaper_DC-HSDPA_2009-01.pdf.

**[END AT&T HIGHLY CONFIDENTIAL INFORMATION].**[11] As indicated above, AT&T is currently leasing the U.S. Cellular Licenses during the pendency of this transaction and has already deployed 10 x 10 MHz LTE carriers in in those areas where AT&T previously had deployed a 5 x 5 MHz carrier. In the Anderson, IN CMA, where AT&T previously had no paired 700 MHz spectrum deployed, AT&T plans to complete its LTE deployment by the end of 2016.

*d. A detailed explanation of why the Company needs more than one-third of the suitable and available spectrum below 1 GHz for the provision of mobile wireless services.*

By acquiring the U.S. Cellular Licenses, AT&T will be able to enhance and extend AT&T's LTE services. Many of these benefits cannot be replicated through the acquisition of any spectrum in these markets other than the U.S. Cellular Licenses. For the reasons explained below, this spectrum is of particular interest to AT&T – the fact that it happens to be below 1 GHz is secondary to the role this license plays in complementing and enhancing AT&T's existing spectrum holdings and network deployments.

Acquisition of the U.S. Cellular Licenses will allow AT&T to expand its Lower 700 MHz LTE deployment in the Relevant CMAs from 5 x 5 MHz to 10 x 10 MHz on a permanent basis. It is not a requirement that contiguous LTE spectrum be below 1 GHz – many of AT&T's

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[11] **[BEGIN AT&T HIGHLY CONFIDENTIAL INFORMATION]**

**[END AT&T HIGHLY CONFIDENTIAL INFORMATION]** The current coverage data may include "spillover" coverage from adjacent areas, potentially resulting in the Subject CMAs having population coverage although no LTE sites have been deployed within the CMA boundaries.

competitors are successfully deploying LTE in large, contiguous blocks in other bands.[12] AT&T, too, has deployed LTE in spectrum above 1 GHz, and this spectrum has played a valuable role in serving AT&T's subscribers. However, for AT&T the acquisition of these particular licenses is a logical complement to its existing holdings. The acquisition of additional 700 MHz spectrum for LTE also makes particular sense for AT&T because as a general matter and as explained above, AT&T's LTE deployment has centered around the Lower 700 MHz band.

*Provide all documents relied on in preparing the responses to 1(a)-1(d).*

Relevant documents are attached at Bates Ranges ATT-USCC000001 through ATT-USCC000120.

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[12] *See, e.g.,* Kevin Fitchard, "Verizon Quietly Unleashes its LTE Monster, Tripling 4G Capacity in Major Cities," Gigaom (Dec. 5, 2013), *available at* https://gigaom.com/2013/12/05/verizon-quietly-unleashes-its-lte-monster-tripling-4g-capacity-in-major-cities/ ("Verizon is tapping the Advanced Wireless Services airwaves it acquired from the cable operators back in 2012, and these are no paltry frequencies. In every major city east of the Mississippi and in several western markets, Palmer said, Verizon has fielded LTE systems utilizing a full 40 MHz of spectrum, twice as big as the 20 MHz network it's spent the last three years rolling out nationwide. In some cities it couldn't piece together a 40 MHz block, but it has been able to get close: In San Francisco and Los Angeles, for instance, the new networks are hosted on 30 MHz of AWS spectrum."); News Release, T-Mobile, "Customer Data Proves T-Mobile Network Now Fasted 4G LTE in the U.S." (Jan. 8, 2014), *available at* http://newsroom.t-mobile.com/news/customer-data-proves-t-mobile-network-now-fastest-4g-lte-in-the-us.htm ("The company also revealed the continued rapid expansion of its nationwide LTE network to reach 209 million people, with 43 of the top 50 markets now served by 10+10 MHz LTE. . . . With the launch of T-Mobile Wideband LTE in North Dallas last November, T-Mobile beat another company milestone, delivering 20+20 MHz LTE ahead of 2014, which is capable of peak download speeds of 150 Mbps. T-Mobile has measured download speeds of 147 Mbps and uplink speeds of up to 40 Mbps in North Dallas, meaning customers could download a 90-minute HD movie in under three minutes or a whole music album in 7 seconds."); Chuong Nguyen, "Sprint Chooses Radically Different Approach for LTE Network, And It May Pay Off," GottaBeMobile (Apr. 18, 2013), *available at* http://www.gottabemobile.com/2013/04/18/twitter-music-app-for-iphone-and-web-browsers-launches/ ("In essence, this will give Sprint roughly about a 20 X 20 channel for LTE when maximized, which is double the 10 X 10 channel that Verizon has for its LTE deployment and far more than the 5 X 5 channel that AT&T is limited to in select markets. . . .[Sprint Director of Solutions Engineering Kim Wade] says that essentially, this large chunk of bandwidth from Sprint and as part of its agreement with Clearwire will allow Sprint to deliver speeds up to 100 Mbps in the future.").

**2. REQUEST:**

*On page 5 of the Public Interest Statement, the Applicants assert that the proposed transaction "will enhance competition by enabling AT&T to be a more effective competitor, while preserving meaningful competition in the affected areas" and that "the transaction will not result in public interest harm in mobile telephony/mobile broadband markets because of the affected market's 'characteristics that would allow rival service providers to provide an effective competitive constraint.'" For each Relevant Area, provide a detailed discussion of how the Proposed Transaction promotes and preserves meaningful competition, would still allow rival service providers and potential new entrants to provide an effective competitive constraint, and how it would allow the Company to become a more effective competitor. Provide all documents relied on in preparing the response.*

**RESPONSE:**

The proposed transaction will preserve competition and allow rival service providers to provide an effective competitive constraint for several reasons. First, the transaction will not affect any subscribers in the affected markets. As such, this transaction will not lead to an increase in market concentration or decrease the number of entities providing service to customers in the Relevant CMAs. Meanwhile, Verizon Wireless, Sprint, T-Mobile, and DISH all have substantial spectrum holdings in these markets and will continue to provide a competitive constraint post-transaction. The proposed transaction will allow AT&T to become a more effective competitor because it will allow AT&T to deploy a higher quality 4G LTE network in the Relevant CMAs than it would be able to deploy in the absence of this transaction (see above). Wireless carriers compete vigorously on the speed and quality of their networks, and the higher speeds and technical efficiencies made possible by this acquisition of spectrum will allow AT&T to be a more effective competitor in the Relevant CMAs.

This transaction does not pose any threat of competitive harm because it is a *spectrum-only* transaction. In the *AT&T/Plateau Order* the Commission reiterated the factors it considers when assessing the potential for competitive harm. These factors include: (1) the total number of rival service providers, (2) the number of rival firms that can offer competitive service plans, (3)

the coverage by technology of the firms' respective networks, (4) the rival firms' market shares, (5) the combined entity's post-transaction market share and how that share changes as a result of the transaction, (6) the amount of spectrum suitable for the provision telephony/broadband services controlled by the combined entity, and (7) the spectrum holdings of each of the rival service providers.[13] AT&T's mere acquisition of the spectrum at issue, however, will have no impact on the number of rival service providers, the number and nature of available service plans, the coverage of providers' networks, or market shares.

Indeed, the facts of this proceeding amply support a finding, consistent with the *AT&T/Plateau Order*, that "the likelihood of competitive harm is low."[14] Post-transaction, the four nationwide providers will all have substantial spectrum holdings in these markets.[15] Moreover, in the markets that are the subject of this information request, numerous entities will continue to hold spectrum below 1 GHz.[16] In the *AT&T/Plateau Order*, the Commission relied on substantially similar facts in finding no significant threat to competition under its "enhanced factor" review, *even though* AT&T in that case was acquiring facilities and a number of customers.[17] It should be even clearer that the spectrum-only acquisitions here are "unlikely to

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[13] *AT&T/Plateau Order* at ¶ 29.

[14] *AT&T/Plateau Order* at ¶ 36.

[15] *Id.* at ¶ 35.

[16] Specifically, AT&T's post-transaction holdings below 1 GHz would be 55 MHz. Meanwhile, Verizon holds 47 MHz in the majority of areas, Sprint holds 14 MHz, and DISH holds 6 MHz. A variety of other entities – including T-Mobile and U.S. Cellular – hold 12 MHz of Lower 700 MHz A Block spectrum in portions of these markets. Further, Inland Cellular LLC holds 25 MHz of cellular spectrum in the Idaho 1 – Boundary CMA. AT&T/Plateau Order at ¶ 35. See also ULS File No. 0007216619, at Exhibit 4.

[17] *AT&T/Plateau Order* at ¶ 35

materially lessen the ability of rival service providers to respond to any anticompetitive behavior on the part of" AT&T in the Relevant CMAs.[18]

**3. REQUEST:**

*Provide polygons in an ESRI shapefile format representing geographic coverage for AT&T in each Relevant Area, including each mobile broadband network technology (e.g., CDMA, EV-DO, EV-DO Rev. A, GSM, EDGE, UMTS, HSPA, HSPA+, LTE) deployed in each frequency band (e.g., Lower 700 MHz, Cellular, AWS-1, PCS). Provide all assumptions, methodology (e.g., propagation, projection, field measurements), calculations (including link budgets), tools (e.g., predictive and field measurements) and data (e.g., terrain, morphology, buildings) used in the production of the polygons, and identify the propagation tool used, the propagation model used within that tool, including but not limited to, the coefficients used in the model and any additions, corrections or modifications made to the model.*

**RESPONSE:**

Exhibit 3 provides polygons in ESRI shapefile format representing geographic coverage for AT&T.

The polygons were generated by Forsk's Atoll propagation tool, which AT&T uses in the ordinary course of its business to create signal level files, which are collected and compiled to create coverage maps. Inputs to the propagation tool include cell site location, antenna height, antenna down tilt, antenna azimuth (direction in which the antenna points), antenna pattern (shape of antenna signal), signal power, topography/terrain, and clutter (physical land use and vegetation obstructions to the propagation of radio waves other than topography).

AT&T customizes the Atoll propagation tool primarily through the use of area-specific propagation models, which leverage up-to-date geographic terrain and clutter information provided by **[BEGIN AT&T HIGHLY CONFIDENTIAL INFORMATION]**

**[END AT&T HIGHLY CONFIDENTIAL INFORMATION]**, a geodata provider.

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[18] *Id.*

AT&T contracts with a third-party vendor, **[BEGIN AT&T HIGHLY CONFIDENTIAL INFORMATION] [END AT&T HIGHLY CONFIDENTIAL INFORMATION]**, to tune and deliver pre-calibrated propagation models to AT&T. The calibrated propagation models are based on **[BEGIN AT&T HIGHLY CONFIDENTIAL INFORMATION]**

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Bates Numbers ATT-USCC000001 through ATT-USCC000120 have been redacted as Highly Confidential information