

CityClerk

From: Norton, Susan
Sent: Monday, October 30, 2017 5:09 PM
To: CityClerk
Subject: FW: Final Administrative Comments on Small Cell Facilities Ordinance
Attachments: Townes.Ordinance Comments-signed.pdf; TownsendLetterRoche.pdf; Townsend5GDeploymentTimeline.pdf

Categories: Completed

Dear Sondra – Will you please forward this to the City Council for our discussion at the Agenda Session tomorrow? Thank you. Susan

Dear City Council -

As you know, the City of Fayetteville has an aggressive agenda for digital inclusion and broadband deployment while maintaining our community's aesthetic values, safety standards, and an even playing field for all telecommunications providers. We have continued to work over several months with providers, incorporating a majority of the modifications they have requested; however, we are reluctant to concede any points that would undercut the aesthetic standards we are trying to set.

For example, the 500 foot spacing requirement was modified to only impact new poles that do not fit within the existing streetscape but it has been misinterpreted to mean 500 feet between all facilities. Providers can leverage existing poles to install equipment as needed, regardless of the spacing requirements. If an existing pole can not be used to provide coverage, new structures can be installed within the 500 foot area as long as they are camouflaged or use stealth technology. During all of our discussions in person and over email, and in the very presentation they gave the Council two weeks ago showing photos of proposed structures, the providers indicate they understand the value of stealth and camouflage technologies for aesthetic purposes.

After the presentation on the Small Cell Facilities ordinance at the October 17 City Council meeting, I forwarded the final draft of the ordinance and the synthesized staff comments to telecommunications providers who have been following this item, asking that they submit any new substantive comments to me by COB Wednesday, October 25. We did not receive additional comments from those providers who attended the October 17 City Council meeting. We did, however, receive additional comments from one firm representing the Townes Telecommunications Company in Lewisville, Arkansas.

Townes is an existing local exchange carrier in southwest Arkansas who recently entered the potential 5G market in our region with the purchase of spectrum from the Federal Communications Commission auction.

This firm wishes to find a 5G project that is a fit for our region. Townes is discussing 5G based WIFI; the other carriers are discussing 4G cellular (to boost service within saturated networks) with intent to implement 5G at the same locations when standards are adopted.

The information presented by the consultant on behalf of Townes Telecommunications is attached. As you can see, they have no issues with the ordinance in the areas objected to by some cellular providers with respect to stealth/camouflage, height, distance between poles, and co-location.

The administration will not be making any further changes requested by the providers and recommends that you consider the red-lined draft that is before you. For now, we believe we have written flexibility into the ordinance in an effort to accommodate providers today and in the future. The administration desires feedback from the City Council and will make adjustments as the Council deems appropriate.

Thank you.

Team @FYVGOV (Susan, Blake, Keith, Don, Garner)

LAW OFFICES
BLOOSTON, MORDKOFKY, DICKENS, DUFFY & PRENDERGAST, LLP

BENJAMIN H. DICKENS, JR.
JOHN A. PRENDERGAST
GERARD J. DUFFY
RICHARD D. RUBINO
MARY J. SISAK
D. CARY MITCHELL
SALVATORE TAILLEFER, JR.

2120 L STREET, NW
WASHINGTON, DC 20037

(202) 659-0830
FACSIMILE: (202) 828-5568

AFFILIATED SOUTH AMERICAN OFFICES

ESTUDIO JAUREGUI & ASSOCIATES
BUENOS AIRES, ARGENTINA

HAROLD MORDKOFKY
OF COUNSEL

EUGENE MALISZEWSKYJ
ENGINEERING CONSULTANT

ARTHUR BLOOSTON
1914 – 1999

October 11, 2017

WRITER'S CONTACT INFORMATION

bhd@bloostonlaw.com

202-828-5510

VIA Federal Express and Electronic Mail

Devin Howland, CEcD
Director of Economic Vitality
City of Fayetteville City Council
113 W. Mountain Street
City of Fayetteville, AR 72701
Email: dhowland@fayetteville-ar.gov

RE: Small Cell Ordinance Comments

Dear Mr. Howland:

I represent Townes Telecommunications, Inc. ("Townes"), and I have been asked by our consultant Edward M. Roche provide you with Townes' comments on the proposed Small Cell Ordinance that was discussed in the City Council meeting October 3rd, 2017. Townes is a local Arkansas company headquartered at 120 East First Street, in Lewisville, Arkansas. Townes is the sole owner of the 5G spectrum license for the 28 GHz for the counties of Fayetteville, Springdale and Rogers. The reserved spectrum under the FCC's Universal Licensing System is titled "Local Multipoint Distribution Service License" and has the call sign WPOJ979.¹

In preparing comments on the proposed Small Cell Ordinance that was discussed at the City Council Meeting held on October 3, 2017, Townes has examined the following documents: (1) the video of the meeting, beginning at 2 minutes 30 seconds;² (2) The City of Fayetteville Staff Review Form 2017-0532 Registrar File ID 10/3/2017; (3) the City Council Memo, September 18, 2017 from Susan Norton to the Mayor and City Council; (4) Exhibit "A", which is a copy of the draft ordinance named "110.03 Small Cell Facilities and Networks;" and (5) a

¹ The details of this license are available on the FCC website at the following URL:
<http://wireless2.fcc.gov/UlsApp/UlsSearch/license.jsp?licKey=210718>

² As found at the following URL:
http://accessfayetteville.granicus.com/MediaPlayer.php?view_id=14&clip_id=5710

slide presentation titled “Small Cells are a Big Deal,” October 3, 2017, n.a., n.p. (referred to as “the Slides”). In addition, Townes has considered the comments in that same meeting provided by representatives from Mobility, Smith Communications, Verizon, and AT&T, particularly the statement by AT&T that one reason why “co-location” of antennas is not technically feasible is because AT&T “will be using interference spectrum”. Finally, Townes has considered a comment by one Council Member that the fees suggested in the proposed Small Cell Ordinance are “extremely magnanimous” (on the part of the City of Fayetteville). In response, Townes respectfully submits the following comments for your consideration:

Issue (1): Additional Equipment Installed on Poles Supporting Antennas

The City Council has not been provided complete information regarding the amount of equipment that is necessary to support a 5G antenna, and has the impression that much more equipment is needed than actually is. Specifically, Townes refers to a picture labeled “Samples of Small Cell Towers” found on Page 4 of the Slides, in which a significant amount of other pieces of equipment apart from the antenna are shown, including: (a) a fiber/telecom junction box; (b) radio packs; (c) grounding bar; (d) antenna coax; (e) electric meter; and (f) breaker panel/disconnect. Given all of this equipment, it reasonable for anyone to be concerned with a visual “technology blight” disturbing the pristine landscape for which Fayetteville is famous.

In our view, this picture is deceptive. See Figure 1 below. It is a photograph of a 5G 28 GHz wireless installation. As you can see, all of the extra equipment mentioned above in the Slides is not necessary. On the contrary, the size of the antenna in Figure 1 is about the same as a pineapple. (Note: In Figure 1, the small rectangular shape near the bottom of the pole is a traffic sign, not a piece of supporting technology). This is because the 5G system in Figure 1 is using a different type of architecture than what the City Council has been shown in the Slides. Specifically, the antenna in Figure 1 is using “self-configuring mesh network” architecture instead of an individual connection with a terrestrial fiber optic network that relies on terrestrial cables. In the mesh network, the backbone Internet signals are passed from one antenna to another. In other words, there is no terrestrial connection, and therefore no need for these excessive structures on the supporting pole. Please note also that in Figure 1 you are looking at not a test or demonstration network, but a live network in service today.



Figure 1: In-Service 5G 28 GHz antenna. Location 52°12'47.43N 0°06'39.05"E. (The rectangular shape near the bottom of the pole is a traffic sign, not part of any telecommunications infrastructure.)

Issue (2): The Co-Location Rule

The spectrum that Townes is proposing to use is licensed. There will not be any other carrier operating on these 5G frequencies without its permission. As a consequence, since any co-location by definition will not have antennas operating at our licensed frequencies, Townes has no objection to the co-location rule. Townes shares with the City of Fayetteville the view that co-location is an efficient and ecologically sound way to both better utilize existing resources, protect the environment, and minimize the visual “technology blight” in the City that would occur with unconstrained and reckless deployment of too many antennas.

Issue (3): 500 Foot Rule Regarding Separation of Antennas

The typical propagation of unobstructed 5G signals is 1-2 kilometers. If there are obstructions, then the propagation is small. With today’s technology, obstruction can be caused by (a) trees and leaves and (b) buildings. However, the new 5G antenna technology being developed, called MIMO (multiple-input and multiple-output) uses a “method for multiplying the capacity of a radio link using multiple transmit and receive antennas to exploit multi-path propagation.” Included in the R&D engineering design for 5G is the ability of antennas to bounce signals off of buildings, and thereby “go around” solid structures, thereby avoiding the need for strict line-of-sight. These technologies are being developed under the program of standardization managed by the International Telecommunications Union (ITU), an international organization based in Geneva, Switzerland. But these standards will not be available for at least 2 years, probably more.

The reason the vendor comments you have received thus far are cold towards the 500 foot rule is that they are not envisioning deployment of “real” 5G. Instead, they are planning on deployment of a less-sophisticated technology that is reliant on non-licensed spectrum. Such technology will not have the sophistication of “true 5G”, which will include the MIMO capabilities described above. The essence of the objection expressed by other vendors is that they wish each to be able to erect their own separate antennas to service the exact same geographic area, such as a public park or other place where many persons will be found. We believe it is in the interest of the City of Fayetteville to seek more clarification regarding the exact technologies being considered by each vendor in their “5G” deployments.

Issue (4): Thirty Feet Height Restriction

In our view, it is perfectly reasonable for the City of Fayetteville to be concerned with the placement of numerous tall antennas everywhere. If completely unrestricted, the City will start to look from the air like a spine-laden puffer-fish. However, in the type of architecture Townes is proposing, the access to the Internet will be provided not by the linking of each antenna into a terrestrial fiber cable, which is expensive and unsightly, but instead via a wireless link to an Internet “Point-of-Presence” (PoP), located on a building, or possibly on a cell tower. If the Internet PoP is located on a cell tower, then like other antennas on a cell tower, our 5G antenna

needs to be located at a height greater than 30 feet. Except for our PoP antenna, if located on a cell tower, Townes does not envision any need for our service antennas to be located higher than 30 feet. To resolve this issue, Townes recommends that the City implement a waiver process so that the rule can be set aside when circumstances warrant, such as a small cell antenna being used solely for PoP purposes to supply Internet to a 5G mesh antenna network is located on a cell tower that already is zoned for providing antenna infrastructure, and that is of a height of greater than 30 feet.

Issue (5): The Need for Providing Dark Fiber

During the October 5, 2017 City Council meeting, mention was made of “providing dark fiber” as a condition of installing 5G antennas. We have been unable to locate this specific provision in the copy of the Ordinance that Townes are in possession of. We would comment, however, that the type of architecture Townes is considering avoids the use of unsightly and expensive terrestrial cables for antenna access to the Internet. As a consequence, if there is a requirement to provide “dark fiber” for each antenna, then this rule would be unduly burdensome and expensive. In addition, it would completely bypass the advantages of the “all-wireless” architecture Townes are proposing. Therefore, Townes would suggest that the City of Fayetteville amend its ordinance so that providing “dark fiber” would be required only in situations where the antenna being installed is itself dependent upon directly connected terrestrial wired network infrastructure to get to its Internet PoP.

Issue (6): The Fees (Application Fee; Annual Fee)

Under the proposed Ordinance, there are two fees envisioned. The first is a \$200 dollar application fee. The second is an annual \$250 fee. It is our presumption that the \$200 dollar application fee is to compensate for the considerable effort that will by necessity be expended by the City of Fayetteville in consideration and review of applications. Townes finds the application fee to be reasonable, or even generous, on the part of the City of Fayetteville. The company is concerned, however, about the \$250 dollar annual fee. The 5G architecture proposed by Townes will require many more antennas than previous generations of wireless technology. Specifically, Townes has estimated that adequate 5G coverage for the Bentonville, Springdale, and Fayetteville region, it easily would require 5,000 to 10,000 antennas. This would be an annual fee of \$1-2.5 million dollars per year. Such an annual fee would be prohibitively expensive for Townes and, likely, any other similarly situated entity.

It is Townes’ understanding that the annual fee is based on the assumption that the builders of these antennas are major carriers who will be using their “5G” antennas to supplement services (such as 4G) that they already provide to tens of thousands of customers. But Townes does not have 4G mobile customers that are providing hundreds of millions of dollars per year in revenues; rather, Townes is a “pure” 5G carrier, not a “hybrid” 5G carrier able to cross-subsidize across lucrative wireless services. The annual fee, as proposed, would clearly

prevent small local carriers who do not have the deep pockets to cross-subsidize 5G services using revenue streams from other services from entering the market, and FCC rules prohibit municipalities from adopting ordinances that have the effect of erecting barriers to entry in wireless telecommunications.³

Townes also believes that the ordinance should recognize that there are circumstances in which this annual fee and application fee should be waived altogether. For example, Townes intends to propose the cities of Fayetteville, Bentonville, and Springdale provide Wi-Fi for their very popular and useful Trails system through Townes. The cities would pay for this service and then provide it to its citizens, similar to provisioning of electrical power. Except in this case, Wi-Fi service would be provided for free to citizens as part of the Trails system, and the citizens would pay for this in the same way they pay for Parks in general. Under these circumstances, then every effort must be made to reduce to the lowest possible level the cost of this system.

Townes looks forward to bringing 5G technology to this market and very much appreciates the opportunity to share its views with the City Council. Please do not hesitate to contact the undersigned with any questions you may have.

Sincerely,

A handwritten signature in black ink, appearing to read "B. Dickens, Jr.", with a stylized flourish at the end.

Benjamin H. Dickens, Jr.

General Counsel, Townes Telecommunications, Inc.

³ 47 U.S.C. 332(c).

3. **Small Cell Facilities and Networks**

(A) Definitions: As used in § 110.03, the following terms shall have the meanings set out below:

(1) *Antenna* means communications equipment that transmits or receives electromagnetic radio signals used in the provision of telecommunications services:

(a) *Distributed antenna system (DAS)* means a network that distributes radio frequency signals and consisting of:

1. Remote communications or Antenna nodes deployed throughout a desired coverage area, each including at least one Antenna for transmission and reception;
2. A high capacity signal transport medium that is connected to a central communications hub site; and
3. Radio transceivers located at the hub's site to process or control the communications signals transmitted and received through the Antennas to provide Wireless or mobile Service within a geographic area or structure.

(b) *Small Cell Facility* means a Telecommunications Facility that meets both of the following qualifications:

1. Each Antenna is located inside an enclosure of no more than six (6) cubic feet in volume, or in the case of an Antenna that has exposed elements, the Antenna and all of the Antenna's exposed elements could fit within an imaginary enclosure of no more than six (6) cubic feet; and
2. Primary equipment enclosures that are no larger than 17 cubic feet in volume, or facilities comprised of such higher limits as the FCC has excluded from review pursuant to 54 U.S.C. § 306108. Accessory Facilities may be located outside the primary equipment, and if so located, are not to be included in the calculation of equipment volume. Accessory Facilities includes, but is not limited to, any electric meter, concealment, telecommunications demarcation box, ground-based enclosures, back-up power systems, grounding equipment, power transfer switch, cut-off switch and vertical cable runs for the connection of power and other services.

(c) *Small Cell Network* means a collection of interrelated Small Cell Facilities designed to deliver wireless service.

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- (2) *Applicant* means any person or entity that is engaged in the business of providing wireless services or the wireless infrastructure required for wireless services.
- (3) *Competing local exchange carrier* means a telecommunications provider that has received a certificate of public convenience and necessity from the Arkansas Public Service Commission under the authority of Ark. Code Ann. § 23-17-409 and is authorized to install equipment and operate within the public rights of way or on public or private property in the City of Fayetteville. This shall include distributed antenna systems, small cell facilities and small cell networks.
- (4) *Person* means any individual, resident, citizens, business firm, corporation, partnership, governmental agency, or institution.
- (5) *Streets* means all streets, roads, highways, alleys, rights-of-way, public utility easements, public property, public ways and air space over such streets, roads, alleys, public rights-of-way, public utility easements, public property and public ways located within the geographic limits of the city.
- (6) *Telecommunications* means the transmission, between or among points specified by the user, of information of the user's choosing without change in the form or content of the information sent and received, whether wired or wireless.
- (7) *Telecommunications facilities or facilities* means all conduits, manholes, poles, antennas, transceivers, wires, cable (including fiber optic cable) and appurtenances owned or utilized by a telecommunications provider or third party infrastructure provider and located in, under or over the streets of the city or on public or private property and utilized in the provision of telecommunications services. This includes without limit, towers of all types, and base stations, including but not limited to buildings, church steeples, water towers, signs, or other structures that can be used as a support structure for antennas or the functional equivalent of such. It further includes all related accessory facilities associated with the site. It is a structure and facility intended for transmitting and/or receiving, wireless services, Specialized Mobile Radio (SMR), personal communications services (PCS), commercial satellite services, microwave services, radio, television, and any commercial Wireless Service not licensed by the FCC.
- (8) *Telecommunications Provider or provider* means any person, firm, corporation, partnership or other business entity, other than the city, that provides telecommunications services within or without the geographic boundaries of the city by utilizing telecommunications facilities to provide telecommunications services. This shall include competing local exchange carriers or businesses that install small cell facilities on behalf of telecommunications providers.
- (9) *Telecommunications services or services* means any service delivering telecommunications by a telecommunications provider that the provider is authorized to provide under federal, state and local law, except that these terms do not include cable service as defined by the Cable Communications

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Policy Act of 1984, as amended by the Cable Television Consumer Protection and Competition Act of 1992, 47 U.S.C. §521 et seq., and the Telecommunications Act of 1996.

- (B) Compliance with State and Federal Regulations. Applicant shall comply with all applicable state and federal regulations. Proof of compliance shall be provided upon request of the Zoning and Development Administrator.
- (C) Consolidated Application. An applicant may file one consolidated application for a small cell network of up to ten (10) individual small cell facilities of a substantially similar design every seven calendar days. The City may require a separate application for any small cell facilities that are not of a substantially similar design.
- (D) An applicant shall submit with the application all documentation or other evidence required by the Zoning and Development Administrator to sufficiently establish the structural soundness of proposed facilities.
- (E) Administrative Approval of Co-Located Facilities. The Zoning and Development Administrator, following an administrative review, may approve the following facility installations:
 - (1) Locating on Existing Structures. Installation of facilities on an existing structure other than a tower (such as a building, light pole, electric transmission tower, water tank, or other free-standing non-residential structure) provided that the facilities do not extend any higher than the existing structure. The Zoning and Development Administrator may grant a variance of up to five (5) feet in height when such additional height is necessary for improved functionality or safety.
 - (a) Facilities Placed on Top of Buildings. When facilities extend above the roof height of a building on which it is mounted, every effort shall be made to conceal the facility within or behind existing architectural features to limit its visibility from public ways. Facilities mounted on a roof shall be stepped back from the front façade in order to limit their impact on the building's silhouette.
 - (b) Facilities Placed on Sides of Buildings. Facilities which are side-mounted on buildings shall be camouflaged (such as in a light fixture), shrouded, painted or constructed of materials to match the color of the building material directly behind them, and shall not extend above the roof line or extend more than two (2) feet from the façade of the building.
 - (2) Locating on Existing Tower Not Previously Approved Through §163.13 of the U.D.C. Existing towers that do not have facilities may not add such capability without securing a conditional use permit. Antennas may be replaced by similar antennas at the same height and for the same basic usage as the antennas being replaced.
 - (3) Locating on Existing Towers Previously Approved Through §163.13. Additional facilities may be placed upon any tower already approved through §163.14 of the U.D.C. so long as such additional facilities would not violate any requirements of the conditional use permit or other provisions of §163.13.

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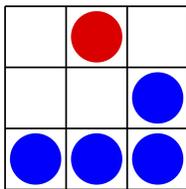
- (4) The applicant must submit a letter of intent indicating the intent and agreement to share space.
 - (5) If proposed facilities are not or cannot be adequately camouflaged, the City may require the installation of new stealth facilities.
 - (6) Any disturbance of City infrastructure (such as, but not limited to, streets, sidewalks, and utilities) shall be repaired and restored by the applicant at its expense and to a condition at least as good as that existing before the work causing such disturbance was commenced.
 - (7) Fees. An applicant shall pay an application fee in the amount of \$200.00 for a single facility and \$25.00 for each additional facility included in the application. Providers with approved permits shall pay an annual fee in the amount of \$250.00 for each facility co-located on an existing structure in the public rights-of-way.
- (F) Administrative Approval of New Facilities in Public Rights of Way. Providers proposing the construction or installation of new facilities in the public rights of way shall comply with following requirements:
- (1) Construction Maintenance. The provisions of § 110.02(E) shall govern the process of approval for the construction or installation of any new facilities within the public rights of way.
 - (2) Fees. An applicant shall pay an application fee in the amount of \$200.00 for a single facility and \$25.00 for each additional facility included in the application. Providers with approved permits shall pay an annual fee in the amount of \$250.00 for each new facility located in the public right of way.
 - (3) Height Limitations. New facilities placed by the provider in public rights of way are permitted to be a maximum height of no more than six (6) feet above the median height of other telecommunications facilities in the block for the proposed location, but in no event taller than thirty (30) feet above grade.
 - (4) Camouflaging or Stealth Technology Required. New facilities shall be designed to be camouflaged to the greatest extent possible including, but not limited to, use of compatible building materials and colors, incorporation within street lights, screening, landscaping, and placement within trees. All antenna arrays, cables, and other accessories used for providing the services shall not be obtrusive or noticeably visible. The Zoning and Development Administrator may approve the installation of a standard utility pole in areas where such installation will not degrade the streetscape but any facilities shall be camouflaged to the greatest extent possible. Camouflaging and stealth technology shall be required in all residential areas, improvement districts (including, but not limited to, the Dickson Street area and College Avenue improvement corridor), and any area in which utilities have been installed or relocated underground. Understanding that new technologies are anticipated to change the components of telecommunications facilities, the Administrator may determine if a telecommunications facility or component of a telecommunications facility is designed to be stealth.

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- (5) Fall Zone. The minimum distance from the base of any facility to any residential dwelling unit shall be the lower height or required setback, whichever is greater, unless all persons owning said residence or the land on which said residences are located consent in a sign writing to the construction of said facility. This setback is considered a "fall zone." In the event that an existing facility is proposed as a mount for the provider's equipment, a fall zone shall not be required.
- (6) Distance between new facilities. New facilities, excluding facilities camouflaged to fit within the streetscape (e.g., facilities incorporated within a street light), shall be spaced a minimum of five hundred feet (500') from any other new facility approved under this section.
- (7) Information Required to Process Requests for New Facilities.
 - (a) Provide a map of the geographic area that your project will serve;
 - (b) Provide a map that shows other existing or planned facilities that will be used by the telecommunications provider who is making the application;
 - (c) Provide a map that shows other potential standalone locations for your facility that have been explored;
 - (d) Provide a scaled site plan containing information showing the property boundaries, proposed facility, existing land use, surrounding land uses and zoning, access road(s) location and surface material, existing and proposed structures and topography. The plan shall indicate proposed landscaping, fencing, parking areas, location of any signage and specifications on proposed lighting of the facility;
 - (e) Describe why the proposed location is superior, from a community perspective, to other potential locations. Factors to consider in the community perspective should include: visual aspects, setbacks, and proximity of single-family residences;
 - (f) Describe your efforts to co-locate your facility on existing structures, one of the poles or towers that currently exists, or is under construction. The applicant should demonstrate a good faith effort to co-locate with other carriers. The city may deny a request to construct or install a new structure by an applicant that has not demonstrated a good faith effort to provide for co-location. Such good faith effort includes:
 - 1. A survey of all existing structures that may be feasible sites for co-locating wireless communications facilities;
 - 2. Contact with all other telecommunications providers;
 - 3. Sharing information necessary to determine if co-location is feasible under the design configuration most accommodating to co-location; and

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4. Letter from tower or pole owner stating why co-location is not feasible.
 - (g) Describe how you will accommodate equipment of other telecommunications providers that could co-locate on your facility. Describe how this accommodation will impact both your pole and your ground mounted facilities. Provide documentation of your provider's willingness to accommodate other providers who may be able to co-locate on your facility.
- (8) Application Time Frame. A final decision shall be issued for applications under subsection (D) within 60 calendar days. This timeframe may be tolled by mutual agreement or in cases in which the City determines that the application is incomplete. To toll the timeframe for incompleteness, the City shall provide written notice to the applicant within 30 days of receipt of the application, clearly and specifically delineating all missing documents and information. The timeframe shall begin running again when the applicant submits the supplemental documents or information in response to the City's notice. The City then has 10 days to notify the applicant that the supplemental submission did not provide the information identified in the original notice. Second or subsequent notices may not specify missing documents or information that were identified in the original notice of incompleteness.
- (G) New Structures on Private Property. Telecommunications providers proposing the construction or installation of new poles or towers on privately owned property in the City shall comply with the provisions of § 163.13 ***Wireless Communications Facilities*** and shall obtain a conditional use permit.
- (H) New Facilities on Public Property. The City of Fayetteville will actively market its own property and existing facilities as suitable co-location sites. As noted above, the review process is shortened and simplified when a request for location or co-location on city property is submitted by applicant. An annual lease amount should be charged according to the fair market value of the location. In cases in which the company no longer needs the facility, the city may require it to be removed. Applicants may be required to provide co-location space for city-owned facilities.
- (I) Pedestrian access and safety. All facilities shall be installed in such a manner not to impede, restrict, or adversely impact pedestrian or vehicular safety or convenience, or violate any provision of the Americans with Disabilities Act.
- (J) Emergency removal or relocation of facilities. The City retains the right to cut or move any facility located within its rights-of-way as the City, in its sole discretion, may determine to be necessary, appropriate, or useful in response to any public health or safety emergency. City shall notify the provider after cutting or removing any facility within its rights-of-way. If circumstances permit, the City shall notify the provider in advance of any cutting or removal and give the provider an opportunity to move its own facilities.



BARRACLOUGH

Edward M. Roche

Edward M. Roche
Director of Scientific Intelligence
Barracough NY LLC
135 East 54th Street 4-B
New York, NY 10022
Phone: +1 (212) 758-1296
E-mail: Roche@barracoughllc.com

October 24, 2017

Mrs. Susan Norton
Director
Department of Communications and Marketing
City of Fayetteville, Arkansas 72701

Dear Mrs. Norton

Your question regarding spectrum is actually complicated, but I will summarize as best I can the situation.

ADOPTION OF THE 5G STANDARDS

I have attached a time-line of milestones in the evolution of 5G. This work is being done through the International Telecommunications Union (ITU). The standardization process is one of collaboration between carriers and vendors (manufacturers) of telecommunications equipment.

The way it works is that the carriers conduct a number of experiments and when they find a solution that seems to work, they submit it as a standard. Naturally, more than one standard can emerge.

It is important to note that a “standard” is not necessarily the only way to do something. But instead, it is something that a carrier chooses based both on its performance (reliability) but also on how adoption of that particular solution will fit with the business plans of the carrier.

What you can see from the time-line is that we can expect at least some standards to be adopted by a vote at the ITU in late 2018. After that, and depending on what the carriers decide to do, the manufacturers (Nokia¹; Ericsson²) will begin ramping up their manufacturing of equipment, based on incoming orders from the carriers. After

¹Nokia sold its cell phone business to Microsoft, but purchased Alcatel, and what was Bell Laboratories. Nokia, regardless of its Finnish name, is actually the old Bell Labs.

²The world’s largest manufacturer of equipment is the Chinese company Huawei, but the U.S. Government has issued a report that *strongly* discourages any use of Huawei equipment because of fears of industrial and other espionage. As a consequence, it is doubtful you will find any responsible U.S. carrier or other vendor using Huawei equipment.

that, the roll-out of services will begin, and we can expect Fayetteville to get 5G in the 2020 period (although some carriers may claim what they are offering earlier than that is “5G”).

So that summarizes in a superficial way the 5G time-line.

LICENSED AND UNLICENSED SPECTRUM

I have also attached a slide on spectrum. It shows the Townes band, but also the other frequencies that may be used for 5G communications.

Lets move from Right to Left.

On the right hand side, you can see three bands 71-76, 81-86, and 92-96Ghz that are the “E-Band”. These are extremely high-capacity channels, but you should note that no one except possibly the military has any equipment for this yet. So it is really irrelevant for at least half of a decade and possibly longer.

Next (coming from Right to Left) you see the 57-64Ghz band that is unlicensed. Because of the high frequency, this spectrum will not go through trees, is absorbed by oxygen itself, and will be used mostly indoors, like in a factory environment. Again, this is not really relevant to your Small Cells Ordinance, because it is highly doubtful that anyone is going to be attempting to run 60Ghz channels outdoors.

Next (moving Right to Left) we have the LMDS band which is licensed, and which in your area is owned by Townes Telecommunications of Lewisville, Arkansas. (We are not a giant multinational carrier like AT&T and Verizon.)

Then on the left hand side, it gets more interesting. There is the 3.5Ghz band. That is almost certainly what Verizon and AT&T are planning on hanging on your Small Cells around Fayetteville, if allowed to.

But the licensing scheme for the 3.5 spectrum is a little different. This is the CBRS or Citizens Broadband Radio Service. In this spectrum, the users (carriers) will be divided into three classes. Class I are the *incumbents*. These have the right to use the spectrum without interference of others. Example: some fixed satellite companies. Class II are call Priority Access Licenses (PALs). There is a limit of only 4 PALs in limited geographic areas, and for three years. PALs are divided up into into 7 segments each of 10Mhz size. Class III is called General Authority Access and has the lowest priority. In this band, the carriers will “fight” with each other to use this spectrum. *This almost certainly is why the carriers object to the co-location rules of the Small Cell Ordinance.* If they are forced to co-locate, then it will increase problems of competition for spectrum (since it is not licensed).

WRAPPING UP

What the carriers (AT&T and Verizon) are planning is to install 3.5Ghz antennas using unlicensed spectrum. After this is in place, then persons using mobile phones (or other wireless devices) will be able to “jump” onto these faster circuits when they are

available.

For example, if a person is streaming video on their mobile device over the LTE network, then when they walk near to a carrier's 3.5Ghz antenna, the network will switch their session over to these faster circuits. Whether or not the carriers call this "5G" in some sense is a marketing issue.

The higher-speed bandwidth that Townes is working with has a few key differences. First, it is very much faster. Second, it will not require users to be tied to a carrier in order to get access to network services. One will not need a contract with Verizon or AT&T.

What we are going to propose soon to the City of Fayetteville is a way to use this higher-speed spectrum to provide WiFi to your Trails system, *without* all of the complex equipment that needs to be hung on the poles of the 3.5Ghz solution. Our solution will be many times less expensive, unless the carriers decide to compete by simply dumping their services into the market by cross-subsidizing them from other revenue-streams. Since we will be using licensed spectrum, then we do not care about co-location issues. And we also do not care too much about the rules on appearance of the poles, because our solution is so small and uncluttered.

I hope that has given you a reasonable picture of the spectrum issues, and I hope that it has answered your question. If you have any other questions, then please feel free to contact me.

Yours cordially,

Edward M. Roche

