

*In 1997, 38,650  
cell sites existed;*

*In 2012, 285,561  
cell sites and  
growing*

# 2013

## Part 1 - A Primer on Wireless in Ormond Beach *"Yesterday, Today and Tomorrows' Technology"*

*Wireless  
penetration in the  
US reaches 101%  
in 2012*

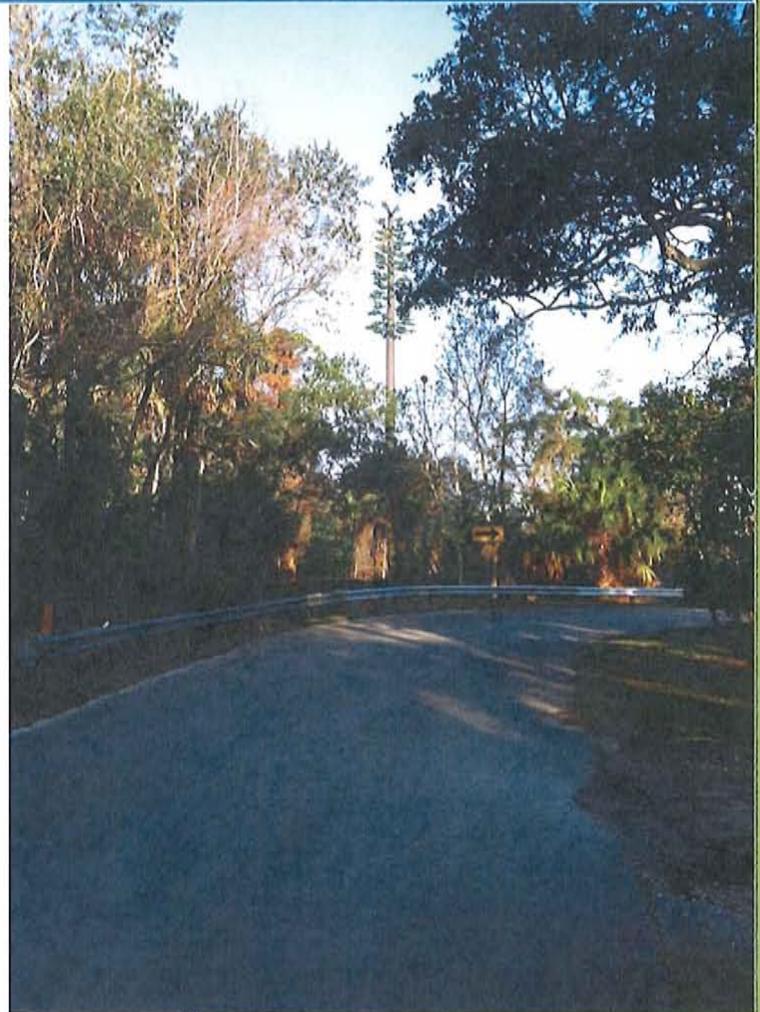
*In 2012, 35.8% of  
US households  
were wireless  
only*

*In 1997, 56.7  
billion minutes of  
use;*

*In 2012, 2.3 trillion  
minutes of use*

*In 2002, no text  
messaging existed*

*In 2012, 2.27 trillion  
messages were  
transmitted*



City of Ormond Beach  
Planning Department  
1/15/2013

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**DRAFT**

## 1.0 Introduction

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Over the past few years, Ormond Beach has received several requests to construct macrocell towers (150± feet high) to support a growing market for wireless telecommunication applications. Towers assist in the wireless transmission of voice and data which includes cellular, personal communications services (PCS), paging, wireless internet services and mobile radio. These services operate from wireless networks that are dependent on antennas and related equipment to transmit from a sender to one or more receivers. Such services are viewed as a public utility that benefits the community and its economic growth and vitality and yet locations for wireless are becoming increasingly difficult to locate in the City.

Wireless technology has substantially changed since 1997 when the City's current Telecommunication Ordinance was adopted. An increasing number of cell phones with text and voice capability have been pushing capacity limits. Now, with the proliferation of smart phones and other mobile devices requiring wireless broadband, the network is reaching a point where the subscriber can no longer rely on service being available when it is needed. Today and into the future, the City faces capacity issues which are different than coverage issues. Part 1 is a working paper on the past, current state and future of wireless technology facing Ormond Beach. Part 2, if needed, will depend on Planning Board direction regarding the regulation of wireless cell technology.

Consequently, the purposes of this primer are to acquaint the City's Planning Board with:

1. The Telecommunication Act of 1996, particularly Section 704 (Section 2);
2. How the technology has evolved (Section 3);
3. Common definitions and terms used in the industry and in this paper (Section 3);
4. The current number of towers and antennas that exist in and around the City today (Section 4);
5. Wireless facility location process (Section 5);
6. How wireless works today and future wireless technologies (Section 6);
7. Coverage and capacity in Ormond Beach (Section 7);
8. Key thoughts for consideration and deliberation (Section 8); and
9. Future direction (Section 9)

The challenge facing Ormond Beach is to provide adequate numbers of cell sites to improve network capacity while at the same time addressing the issues and concerns of property owners. Wireless communication services providers are not treated as public utilities or franchises under the Telecommunications Act, but rather as competitors in an open market. This free market approach is intended to result in the best communication service for the least cost; however it will also result in an increase in the number of wireless cell sites. The question fronting Ormond Beach is what shall these wireless cell sites look like in the future?

Co-location of equipment on existing structures is the most preferable option to construction of new towers in the City's Land Development Code but it is difficult from the City's perspective to ensure co-location is occurring since the city is obliged to rely on service providers or tower builders to confirm no space is available or the existing tower is inadequate to their needs. However, co-location for carriers is good for the bottom line. A single tower used by just one tenant costs roughly \$316,000 to build and maintain over a 10-year period. As renters, wireless service providers pay about \$195,000 over that 10-year period, cutting their costs by more than a third, hence the growth of towers and tower builders.<sup>1</sup>

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<sup>1</sup> Investors.Com, Industry Snapshot – Towering Demand for Wireless. By Brian Deagon. November 26, 2012

## ***2.0 Section 704 of the Telecommunication Act of 1996<sup>2</sup>***

The Telecommunications Act of 1996 mandated localities provide maximum wireless communication coverage but provided latitude in formulating plans and policies which address issues associated with wireless technology development. Section 704 of the Act preserves local zoning authority over the placement, construction and modification of personal wireless service facilities with some limitations or protections from regulation by local governments.

**2.1 Protected and Non-Protected Services** - Personal Wireless Services that are protected by the Telecommunication Act include:

- Commercial Mobile Radio Services
- Unlicensed Wireless Services
- Common Carrier Wireless Services
- Cellular
- PCS
- Enhanced Specialized Mobile Radio
- Specialized Mobile Radio
- Paging

Services not protected by this Act include:

- Broadcast Systems (radio and television)
- Public Service and Emergency Systems (Volusia County Dispatch services for City Police)
- Wireless Cable Systems
- Private Dispatch Systems (taxi, HAM radio operators)
- Tower Builders

This same section also sets forth the following limitations on Ormond Beach:

1. The City can't discriminate among carriers of "functionally equivalent" services. For example, if cellular carriers already have facilities in the area, additional or new carriers of similar services - such as PCS - can't be prohibited, but should be allowed under the same rules that govern existing services. Similarly, if three PCS carriers are operating in an area, a fourth can't be excluded by the local authority simply because they feel that three carriers are sufficient. It should be noted that Cellular, PCS, ESMR and Paging are treated in essentially the same way by the Act, and should receive the same treatment by Ormond Beach.
2. The City can't reject all wireless communications services (i.e. facilities) completely, nor have the effect of prohibiting wireless services, for example by enacting excessively restrictive zoning ordinances.
3. The City must act on any request for authorization to place, construct, or modify wireless service facilities within a reasonable period of time after the request is filed.

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<sup>2</sup> Telecommunications Act of 1996, Section 704 (a) (7) (B)

4. The City shall put any decision to deny wireless service facilities into writing, supported by substantial evidence contained in the written record,
5. The City can't reject a request for wireless facilities based on health concerns if the facilities meet the FCC's regulations concerning radio frequency (RF) emissions. In other words, local rules can't be more stringent than Federal rules. Ormond Beach can require that carriers demonstrate compliance.

The law also provides for review in the courts or by the FCC of any decision by a local zoning authority that is inconsistent with Section 704. Limitations 2 and 3 above are why the Courts have rejected open ended moratoria on antenna towers but generally allowed limited moratoria as long as the time limit is considered "reasonable." While not in the 11<sup>th</sup> District Court of Appeals (DCA), Limitation 5 was interpreted by the 4<sup>th</sup> DCA, on appeal, in *AT&T Wireless PCS vs. City Council of the City of Virginia Beach* to mean that health concerns could not be a reason for rejecting wireless facilities, but that the mention of such concerns by residents as part of the record was not fatal to the City's decision.<sup>3</sup>

It is also within the purview of Ormond Beach to regulate the manner in which cell sites are located and constructed in order to protect the public. Safety features are physical hazards that can be mitigated. The following are safety issues related to wireless facilities.

**2.2 Radio Frequency Emissions** - At high levels, certain kinds of radio frequency radiation (RFR) are known to be associated with environmental health risk factors. However, the level of power at which wireless technologies operate is relatively low and is not the type normally associated with health risks. The Telecommunications Act prohibits denial of the placement of telecommunication facilities solely on the basis of radio frequency emissions, as long as specific standards are met. The Act states: "*No State or local government or instrumentality thereof may regulate the placement, construction and modification of personal wireless service facilities on the basis of environmental effects of radio frequency emission to the extent that such facilities comply with the Commission's regulations concerning such emissions.*"<sup>4</sup> Because the FCC does not review each cell site, it is incumbent upon City to assure that RFR standards are met. At a minimum, this should involve certification by the carrier and concurrence of the responsible person in the City for communications that the proposed cell site meets the FCC guidelines.

**2.3 Structural Hazards** - Structural hazards associated with wireless facilities include potential collapse of antenna mounts and equipment or falling of debris from the structure. Tower structures are constructed to Florida Building Code Standards and must withstand hurricane force winds up to 130 mph in the Ormond Beach area. Structures are also designed to collapse into themselves if there is a failure. In response to potential hazards, Ormond Beach has designated "fall zones" around the base of the tower. These are generally expressed as distance-to-height ratios. The original basis for these setbacks in 1997 was to prevent damage from ice or other falling debris from the antenna platform. The monopole is manufactured to collapse in several sections, rather than to drop lengthwise, like a tree.

It is important to note here that companies which build towers and then lease space to carriers are not protected by Section 704 of the Act. Consequently, the City has the obligation and flexibility to craft a policy that addresses limitations on location, numbers, heights, and visibility while understanding that the very same resident and business who do not want a tower beside them also demands better service for personal and business use.

<sup>3</sup> *AT&T Wireless v City Council of Virginia Beach, Virginia*, US 4<sup>th</sup> DCA, FindLaw

<sup>4</sup> Telecommunication Act of 1996, Section 704, (a) (7) (II) (iv)

### 3.0 Evolving Technology and Related Terms

**3.1 Technology Evolution** – The evolution of telecommunication technology began as first generation analog (800 Megahertz (MHz)). Then it was second generation digital (1900 MHz), third generation digital (2400 MHz), fourth generation digital (700 MHz) and fifth digital generation of wireless deployment. Unlike 1G and 2G which launched cellular and PCS wireless service providing initial wireless coverage; 3G through 5G deployments will be focused on compressing more data in existing and future bandwidths. Why? Smart phones consume 24 times more data than conventional phones; tablets can use up to 120 times more bandwidth. Fourth generation network technology (the platform for smart-phones) emphasizes improving network capacity and maximizing the use of bandwidth for faster and more efficient transfers of data. Fifth generation wireless will enable faster data transfers such as streaming mobile video, VoLTE and credit card transactions and other similar functions. Unlike previous generations of wireless deployment, LTE, 4G and 5G will require even more sites but these sites will require different network architecture than macrocell towers.<sup>5</sup> The drivers for this transition from macrocell towers only to a HetNet are the ongoing growth in data traffic demands, lack of available spectrum and operating/capital costs savings through small cell deployment.

Most cellular network architectures in the country and in Ormond Beach are based on macrocells with a centralized base station which was and still is designed to give wide area coverage to a relative small number of subscribers. A macrocell can support a couple hundred simultaneous calls, so scaling on the radio side can be achieved by adding more macrocells or filling in the gaps with microcells and even picocells to support a higher density of subscribers. Increasing site densities can solve some of the problems but site acquisition is a major problem and has always been a huge expense and challenge for carriers. Ormond Beach like many communities attempt to control cell site locations and their visual impact. Adding more base stations and macrocell towers will not be enough to support the increased demand for high speed data. LTE based networks are being designed to deliver higher speeds (1000 mega bits per second (Mbps) on the downlink and 50 Mbps on the uplink) and achieving these speeds in practice is not possible using the current macrocell tower cellular architectures.<sup>6</sup> Table 1 below depicts demand for wireless communication technology is increasing at exponential rates since 1997.<sup>7</sup> In fact, wireless penetration in the United States (# of cell phones/population) is at 101% in 2012!

Topic	1997	2002	2007	2012
Subscribers (000's)	48.7M	134.6M	243.4M	321.7M
Cell Sites (000's)	38,650	131,350	210,360	285,561
Minutes of Use (000's)	56.71B	552.00B	1.96T	2.32T
Text Messages (000's)	N/A	N/A	240.8B	2.27T
Wireless only Households	N/A	N/A	10.5%	35.8%
Wireless Penetration	18.3%	47.4	81.3%	101%

The first generation (1G) cellular systems in the US were called *Advanced Mobile Phone Service (AMPS)* and they divided geographic regions into sections referred to as cells for the purpose of maximizing the capacity of a limited number of transmission frequencies. Each connection or conversation requires a dedicated

<sup>5</sup> Analysis of Wireless Telecommunications, Trends and Policies, Albemarle County, Virginia, pages 3-5 & 11. August 2012 Draft

<sup>6</sup> Femtocells - Enabling 4G, Mobilitie LLC White Paper, Bud Noel, Vice President

<sup>7</sup> CTIA Semi-Annual Mid-Year 2012 Survey

frequency, and the total number of available frequencies is approximately 1,000. Cellular systems allocate a set number of frequencies for each cell to support more than 1,000 simultaneous conversations. Equipment limitations can reduce this number significantly. Two cells can utilize the same frequency for different conversations as long as the cells are not adjacent to each other. There are also analog systems which operate in the United States. They are the *Extended Advanced Mobile Phone System (EAMPS)* which has currently replaced AMPS as the US standard, and *Narrowband AMPS* which has three times as many voice channels as EAMPS with no loss of signal quality. All three are analog systems and are considered backward compatible - designed for older phones to work on the newer systems.<sup>8</sup>

### 3.2 Terms<sup>9</sup> - The following list of definitions is used in this paper:

- **AWS (Advanced Wireless Services)** - is a wireless telecommunication spectrum band used for mobile phones.
- **AGL (Above Ground Level)** – height above ground as measured from the ground to the top of the structure.
- **Antenna** – an exterior apparatus designed for telephonic, radio, or television communications through sending and/or receiving electromagnetic waves.
- **Bandwidth** – range of signal frequencies that a medium responds without excessive attenuation (loss of signal strength).
- **Base stations** – a wireless service provider's electronic equipment used to transmit and receive radio signals, usually mounted within a facility including, but not limited to: cabinets, backup generators, shelters, pedestals or other similar enclosures generally used to contain electronic equipment for said purpose.
- **Broadband** – high speed Internet access technology, delivering access hundreds of times faster than dial-up.
- **Capacity** - means providing sufficient bandwidth to satisfy subscribers' communication needs.
- **CDMA** - Code Division Multiple Access refers to 3G digital cellular technologies that use spread-spectrum techniques. Unlike competing systems such as GSM that use time-division multiplexing (TDM), CDMA does not assign a specific frequency to each user. Instead, every channel uses the full available spectrum. Individual conversations are encoded with pseudo-random digital sequence. CDMA is a military technology first used during World War II by the Allies to foil attempts at jamming transmissions. The Allies decided to transmit over several frequencies, instead of one, making it difficult for the Germans to intercept the complete signal. Qualcomm Inc. created communications chips form, CDMA technology that allowed the company sole access to the classified information. Once the information became public, Qualcomm claimed patents for the technology and became the first to commercialize CDMA. (Verizon, Sprint Nextel, MetroPCS and US Cellular use CDMA).
- **Cellular Communication** – communication via low power transmitters to service geographical areas or cells. Cellular systems in the United States operate in the 824-849 MHz frequency bands.
- **Co-location** – sharing space on a structure to support multiple carriers.
- **Coverage** - means providing connectivity at all desired locations within a specified area from a cellular network. Coverage should not be confused with capacity.
- **DAS (distributed antenna system)** – a network with spatially separated nodes connected to a common source via a transport medium that provides wireless service within a geographic area.
- **DBm** – a power ratio in decibels of measurement in relation to one milliwatt.
- **Femtocell** – a wireless access point that improves cellular reception inside a home or office building

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<sup>8</sup> Fauquier County 2010-2030 Comprehensive Plan, the Plan for Commercial Wireless Facilities

<sup>9</sup> [Whatis.techtarget.com/definitions/](http://whatis.techtarget.com/definitions/)

- **GSM (Global System Mobile Communications)** - one of the leading digital cellular systems. GSM uses narrowband TDMA, which allows eight simultaneous calls on the same radio frequency. GSM, first introduced in 1991, is available in over 100 countries and has become the *de facto* standard in Europe and Asia. Uniform standard for 2G digital systems. (AT&T and T-Mobile use the GSM standard)
- **HetNet** – Heterogeneous Network integrating macro, micro and femtocell technologies at a network level.
- **Internet** - a electronic medium by which information may be uploaded or downloaded whereby it may be reviewed, manipulated and/or used for personal and commercial applications. This technology is typically sent via a wire Local Exchange Carrier (LEC) network. However, the technology is for adaptable-to-wireless networks.
- **Macrocell** – the largest, and most powerful type of mobile phone cell.
- **Mini/Micro Cell** – small structure, not greater than 80' AGL, used to fill 'holes' in coverage or improve capacity. Range is typically a ½ square mile.
- **MHz** – measurement of radio frequency radiation. One MHz = One million cycles per second.
- **MC** - Microwave is a medium of communication licensed by the Federal Communication Commission (FCC) as services used to transmit and receive compressed voice and data. These systems typically are direct point-to-point transmissions in which large amounts of information may be sent over a longer distance versus a short broadcast. Typically, this technology is digital.
- **MW Link (Microwave Link)** – digital service licensed by the FCC to transmit and receive compressed voice data. Microwave systems are used to transmit large amounts of data, from point to point, over greater distances than traditional broadcast systems.
- **Paging** - Wireless medium of communication via the transmission of data designed for messaging services. This technology has evolved from single (receive-only) radio tones to two-way transmission and receiving of alphanumeric messaging.
- **Propagation** – physical principle of energy emitted through broadcasting a frequency as it relates to transmission, power, ASML, antenna gain and transport loss.
- **PCS** - Personal Communications Service is a term used to describe the set of digital cellular technologies currently deployed in the United States. PCS technologies include Code Division Multiple Access (CDMA), Global System Mobile Communication (GSM), and North American Time Division Multiple Access (TDMA), also known as IS-136. Two of the most distinguishing features of PCS systems are that they operate digitally at the 1850 - 1900 MHz frequency range.
- **Picocell** – a small mobile base station that improves in-building cellular coverage. Range is 650 sq.ft.
- **TDMA (Time Division Multiple Access)** - a technology designed to provide digital wireless service using time division multiplexing (TDM). TDMA works by dividing a radio frequency into time slots and then allocating slots to multiple calls. This allows a single frequency to support multiple, simultaneous data channels. TDMA is used by the GSM digital cellular system.
- **Self-Supporting Structure** – a free-standing monopole or lattice tower that requires no additional support.
- **SMRS (Short for Specialized Mobile Radio Service)** - a two-way radio used to transmit and receive signals. This technology allows a basic two-way radio to designate a specific Narrowband channel to broadcast and receive, thus creating a 'secure' channel for communication.
- **Topographic Study** – how terrain, other land forms and natural features impact the transmission and receipt of radio waves.
- **Tower Types** – Lattice (steel and either square or triangular shape); Monopole (single tubular mast); Guyed Tower (tubular or lattice with guyed wires); monopine (monopole that uses steel pine branches to disguise the pole and antennas).
- **VoLTE** – Voice-over-LTE is a systems approach that enables integration with the suite of applications that are or will be available on LTE.
- **Wireless Internet** – provision of internet services through specialized devices over a wireless network

## 4.0 Existing Wireless Structures, Mounted Antennae and Carriers in City

Table 2 depicts thirteen constructed tower types in the Ormond Beach immediate area.<sup>10</sup> Sites are identified by a Registration Number, Structure Owner or Carrier, Latitude/Longitude Coordinates, AGL, and Tower Type. Co-location opportunities exist on several of these sites

Registration #	Owner	Height above AGL in meters & feet	Location	Structure Type	Carrier
1011716	Orlando SMSA Limited Partnership	79.9 (283 feet)	Latitude: 29-15-18.1N Longitude: 081-09-01.0W (2341 W. Granada)	Lattice Tower	AT&T Verizon
1020470	American Towers, LLC	97.2 meters (318 feet)	Latitude: 29-15-32.1N Longitude: 081-07-04.5W 1687 W. Granada	Lattice Tower	Verizon
1029742	Orlando SMSA Limited Partnership	81.4 meters (267 feet)	Latitude: 29-17-07.0N Longitude: 081-04-01.4W 123 N. Orchard Street	Lattice Tower	AT&T Verizon
1048033	ARK Communications Network	48.8 meters (160 feet)	Latitude: 29-15-16.0N Longitude: 081-13-47.0W Old Kings Road	Monopine Tower	T-Mobile
1061168	SBA Towers IV, LLC	91.5 meters (299 feet)	Latitude: 29-15-33.7N Longitude: 081-07-51.6W Tymer Creek Road	Guyed wire Tower	Verizon
1062834 1062835 1062836 1062837	Wings Communication (WELE)	61.9 meters (203 feet)	Latitude: 29-16-10.0N Longitude: 081-04-53.0W West of Nova (MHP)	Guyed Wire 4 Towers --	Verizon
1224686	City of Ormond Beach	21.3 meters (69.8 feet)	Latitude: 29-18-03.3N Longitude: 081-06-39.5W Airport	Whip Tower	Verizon
1266912	State of Florida	91.4 meters (300 feet)	Latitude: 29-20-12.1N Longitude: 081-07-48.4W (SR40 & I95 Ramp)	Monopole Tower	Public
1285123	Capital Telecom	48.8 meters (160 feet)	Latitude: 29-16-00.6N Longitude: 081-03-21.1W (610 S. Yonge Street)	Monopine Tower	AT&T
1258112	Global Tower LLC	37.8 meters (124 feet)	Latitude: 29.31792 Longitude: 81.1066 (1203 US 1 N.)	Monopole Tower	Verizon

Table 3 depicts the major carriers and the different frequencies provided in Ormond Beach. AT&T and Verizon own the 850 MHz and recently obtained the 700 MHz spectrum. Sprint PCS, MetroPCS and T-Mobile purchased the Advanced Wireless System (AWS) which uses the 1700 or 1900 MHz spectrum. Higher frequencies are a disadvantage for coverage but are an advantage for capacity

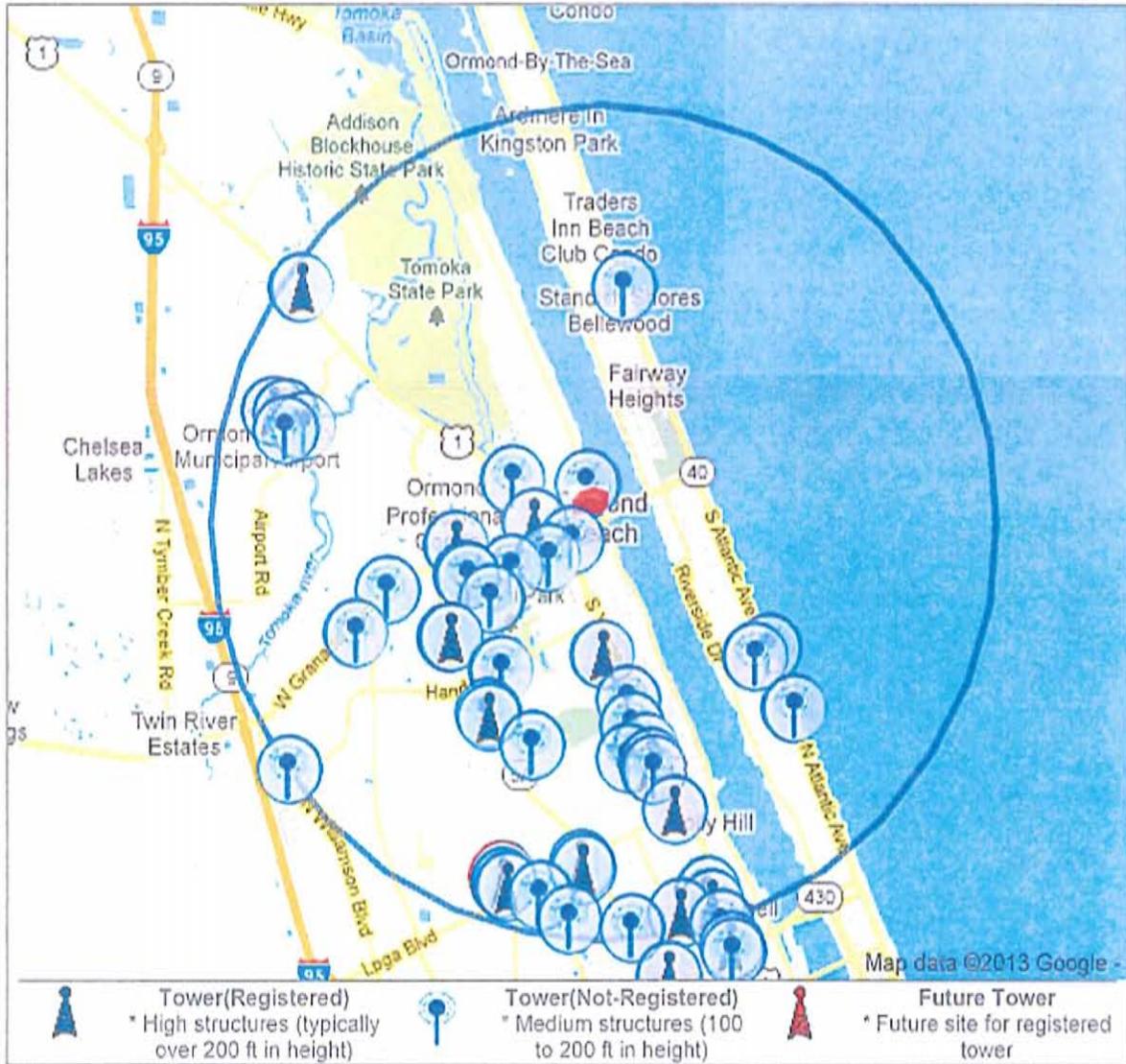
	2G	3G	4G	3G Technology	4G Technology
AT&T	850 and 1900 MHz Sunsets in 1/2017	850 and 1900 MHz	1700 AWS	GSM	LTE
Verizon	850 and 1900 MHz	850 and 1900 MHz	1700 AWS	CDMA	LTE
T-Mobile	1900 MHz	1700 AWS	No LTE	GSM	LTE (2013)
Sprint/Nextel	1900 MHz	1900 MHz	1900 AWS	CDMA	WiMax (2010) LTE (2013)
MetroPCS	850 and 1900 MHz	1700 AWS	1700 AWS	CDMA	LTE

<sup>10</sup> Antenna Structure Registration (ASR) Report for Ormond Beach, 2013 Federal Communication Commission

An internet query was performed to locate tower structures and antennae that are within 4 miles of City Hall. Map 1 depicts 53 towers - 21 are Registered (>200 feet in height) and 32 Non-Registered (100 to 200 feet in height). Not all the towers or antennas are tall or devoted to voice and data transmission. Many are classified as towers but they are whips and provide mobile radio communications. The towers are primarily located along major road corridors of SR 40, Nova, US 1, LPGA (11<sup>th</sup> Street) and ISB.<sup>11</sup>

### Map 1- Tower Location

- Tower Structures - (22 S Beach St, Ormond Beach, FL 32174)



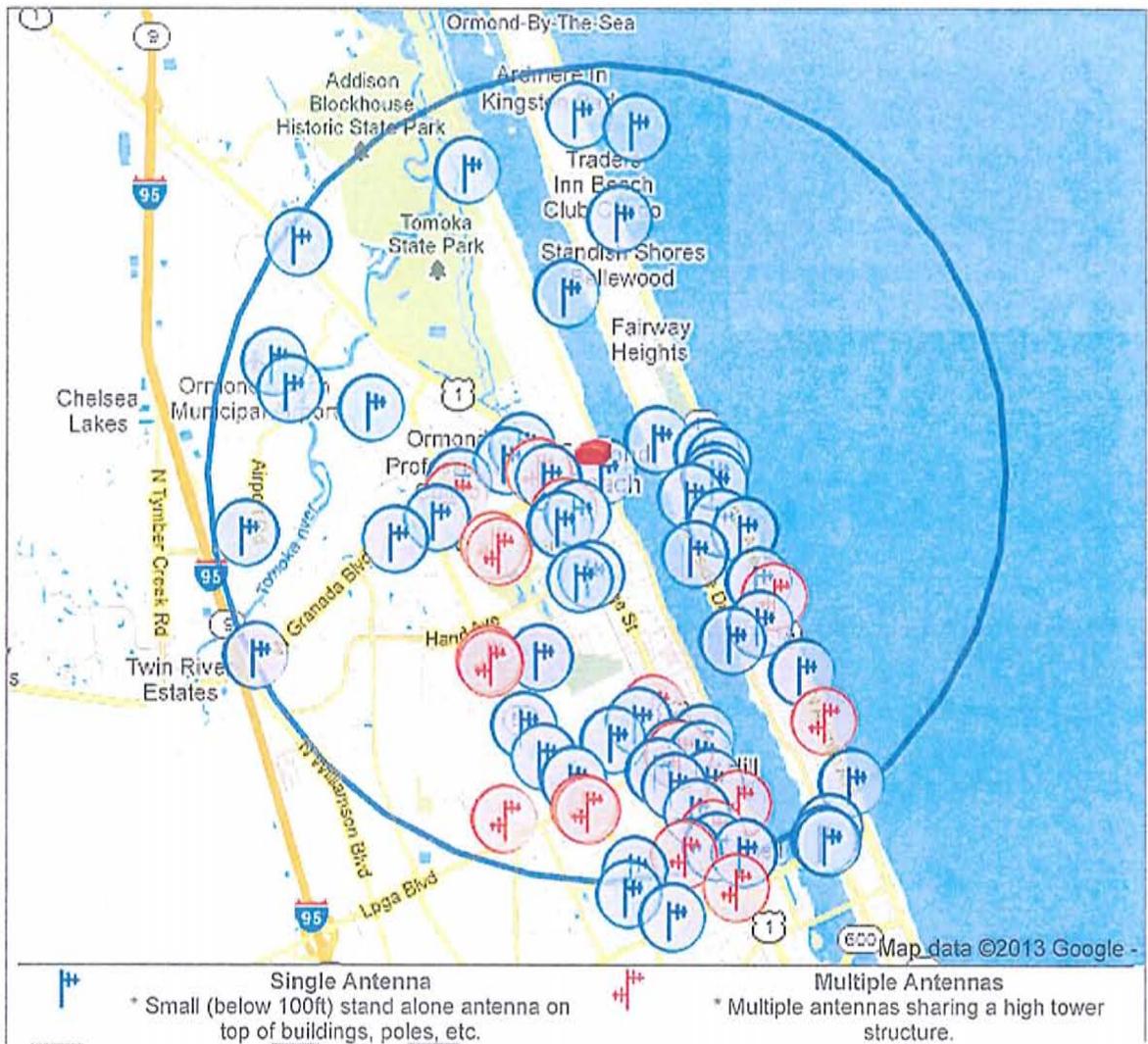
Map 2 depicts 150 antennae - 18 have multiple antennae's sharing a high tower location and 57 single antennae locations which are located on buildings, poles and other tall structures such as Air Traffic Control towers. Ormond Beach has a number of single antennae locations along A1A, US1 and SR40.<sup>12</sup>

<sup>11</sup> Antenna Search Report for Ormond Beach, February 18, 2013.

<sup>12</sup> Ibid

## Map 2 – Antenna Locations

- Antenna Sites - (22 S Beach St, Ormond Beach, FL 32174)



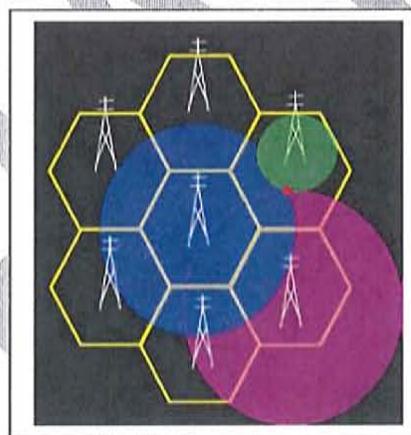
In summary, the location of towers and antennas in and around Ormond Beach depend on carriers and their different frequencies which can carry different distances. Verizon and AT&T use the 800MHz frequency range and can broadcast their signals more than twice the distance of T-Mobile and Sprint/Nextel which uses 1900 MHz frequencies. So why don't all the carriers use 800 MHz? Spectrum licenses are limited and when they are gone, other frequencies have to be used. The 800 MHz has better penetration capabilities than 1900 MHz, so cell signals in buildings may be stronger with 800 MHz compared to 1900 MHz. Another factor is the technology. CDMA technology (Verizon, Sprint Nextel, MetroPCS and US Cellular) has the ability to broadcast farther distances than GSM (T-Mobile and AT&T). Of course, all of this is in pursuit of the best reception signal strength which is measured in dBm's. Signal strength can range from -50 to -100+ dBm. On the lower range, the signal is perfect. One is probably standing at the cell site. On the higher dBm end, there is basically no usable service. Ranges between -60 to -70 is considered extremely good; -80 to -85 typical; -90 to -95 signal is getting weak; -95 to -98 calls are dropping; and from -98 to -100, service is considered bad and it's hard to stay connected. AT&T converts the reception signal strength to a number between 0-5 bars - 5 bars means excellent reception and 0 bars means almost no reception.

## 5.0 *The Process of locating Wireless Facilities*

Radio Frequency (RF) engineers develop grid systems by placing circles on a map which are then overlaid with hexagonal cells. Each hexagon equals a proposed base station coverage area. The hexagon center is supposed to be the best location for a base station. The propagation pattern emanating from the base station is circular in form and the size of the circle is typically affected by the height of the antennae, land cover (horizontal obstructions) and the number of customers (capacity).

The illustration in Figure 1 depicts this grid pattern with a tower symbol in the exact center of the hexagon. The circular colors depict large, medium and small coverage areas depending on the elevation of the towers, capacity of the base station (network architecture), and the character of the land uses around the tower. In Ormond Beach, topography (hills) or tall buildings are not factors that would affect coverage or capacity. What is important to note here is that the grid pattern is different for each carrier and is maintained by each individual service provider's engineering department. Geographic coverage and number of subscribers that can be supported are also limited based upon the number of base station sites that exist in a grid network. Each carrier is different but a single carrier can only process or turn over a certain number of calls per minute, and at any particular time only a certain number of calls can occur simultaneously which was referred to as network capacity by Telecom recently at a neighborhood meeting for a proposed tower.

Figure 1 – Typical Grid Pattern



The City's permanent population, along with its temporary population which increases in the winter months, combined with tourism places excessive demand on the existing system's network capacity. When the network capacity reaches its limit, a customer will frequently experience interruptions in service. As the wireless network reaches design network capacity, it causes the service area to shrink, further complicating coverage objectives. Network capacity can only be increased by shifting channels from an adjacent site, or the provider must add additional base stations with additional infrastructure.<sup>13</sup>

Rusty Monroe, co-founder of the Center for Municipal Solutions, states, "There are 3 primary technologies employed by wireless service. They are SMRS, Cellular and PCS. Each of these services operates using different frequency ranges. SMRS and Cellular operate in the 700 to 950 MHz range while PCS operates in

<sup>13</sup> Analysis of Wireless Telecommunications Trends and Policies, Albemarle County, Virginia, page 10. August 2012 Draft

the 1800-1900 MHz range. The nature of frequency propagation is such that the higher up on the frequency band a service operates, the less distance the signal will travel. The net effect is that SMRS and Cellular service should be useable at twice the distance of PCS, because it is only ½ the frequency.”<sup>14</sup> As the wireless carriers migrate to 3G and 4G, towers may not be needed due to new technologies used to provide service.

Table 4 illustrates two different propagation prediction models that numerically calculated cell towers radiuses, cell phone handoff allowance radiuses, and the search area of both the 850 MHz and 1900 MHz frequencies. The lower the operating frequencies (850 MHz or <) the shorter the potential handoff zone radiuses. Keep in mind; these coverage radiuses do not take into consideration the network architecture or the number of subscribers accessing a limited number of frequencies.

Table 4- Cell Phone Radiuses by Height by Frequency <sup>15</sup>						
Okumura-Hata Formula for 850 MHz						
Antenna Mounted Height	50	80	100	115	115	180
Cell Site Radius (miles)	2.53	3.20	3.60	3.88	4.50	5.00
Cell Phone Handoff Radius (miles)	0.51	0.64	0.72	0.78	0.90	1.00
COST 231 for 1900 MHz						
Antenna Height	50	80	100	115	150	180
Cell Site Radius (miles)	1.33	1.64	1.82	1.95	2.23	2.45
Cell Phone Handoff	1.07	1.31	1.46	1.56	1.79	1.96
Search Area (miles)	0.27	0.33	0.36	0.39	0.45	0.49

Typical locations used for siting cell sites include:

**5.1 Public Property** - Governmental sites within the City that may be appropriate for locating commercial wireless communications facilities include selected fire stations, the airport, water tanks, school property, FDOT owned land and other public facilities. These facilities are often large enough to allow sufficient separation from surrounding residential uses or are located adjacent to industrial land use. Even on these sites, steps must be taken to minimize impacts on surrounding properties.

**5.2 Buildings** - Antennas can be mounted on the roofs of buildings. While most buildings in the City are less than 35’ tall, there are some taller structures that could be used for co-location opportunities provided that the antenna(e) are not visible from the road or are camouflaged with radio frequency transparent materials. The City has a number of single antennae on taller buildings located on South Atlantic as can be seen on Map 2.

**5.3 Houses of Worship** - Several large churches in the City present a wireless provider with the potential for locating towers because of the land area size within residentially zoned areas and the fact that much of the increased demand is in residential areas and homeowners do not like having cell towers adjacent to them. The church community may welcome this type of proposal, because it would provide additional revenue.

**5.4 Private Land** - Although the use of existing facilities is preferred to the construction of new ground-mounted facilities, opportunities exist for the development of freestanding camouflaged towers on private land.

<sup>14</sup>“ Understanding Wireless Telecommunications and the Key Issues Related to the Siting of Wireless Facilities,” by L.S. (Rusty) Monroe, Center of Municipal Solutions.

<sup>15</sup> “A Litigator’s Guide to Historical Cell Phone Location Evidence - Centroids & Working Range,” John Minor CSA, CCE, CSE

## ***6.0 Future Cell Sites for Ormond Beach?***

Wireless telecommunications service coverage is not static. Most wireless communications service providers (PCS, cellular, ESMR) have already established their initial networks of cell sites. Wireless is here to stay and the future predicts service enhancements that must meet a growing demand from residential areas.

Initially, in the 1990's facilities were established primarily along highways and other major transportation corridors like SR 40 and US1 - the focus of "mobile" communications. This phase is called a "coverage" phase which required personal wireless service carriers to spread their signal everywhere using macrocell towers in an attempt to reach new subscribers.

As usage patterns evolved, networks expanded to provide wireless service where people work and live. Wireless is now in the "capacity" phase adding facilities to fill gaps in their coverage and increase capacity in high demand areas. Capacity is the amount of radio traffic, or number of calls, a wireless system can handle simultaneously. A single site is limited to the number of channels that can handle calls. The wireless network reaches design capacity as more customers in an area subscribe to the service, use their devices more often, or as mobile devices become more technologically advanced and more data is transmitted - as in video or wireless internet services. A service carrier may seek to increase network capacity by:

- Option 1: Sectoring which reconfigures existing antennas or adds more directional antennas, if possible;
- Option 2: Creating microcell zones where only one base station is needed;
- Option 3: Adding additional frequencies, or
- Option 4: Splitting cells into smaller microcells while reusing the frequency pattern of the larger cell system.

Option one is used first and the changes are not apparent to the City. Option 2 requires many new antenna sites. The third option is seldom used because it requires obtaining additional frequencies (licenses), which are very expensive or may not be available. Because the number and range of available frequencies are the main limiting factors for wireless network capacity, capacity needs are most often addressed through option four, adding new sites and "reusing" the allocated frequencies in smaller geographic areas. In reviewing the major carriers' service provision claims, Ormond Beach has good coverage but more capacity is needed.

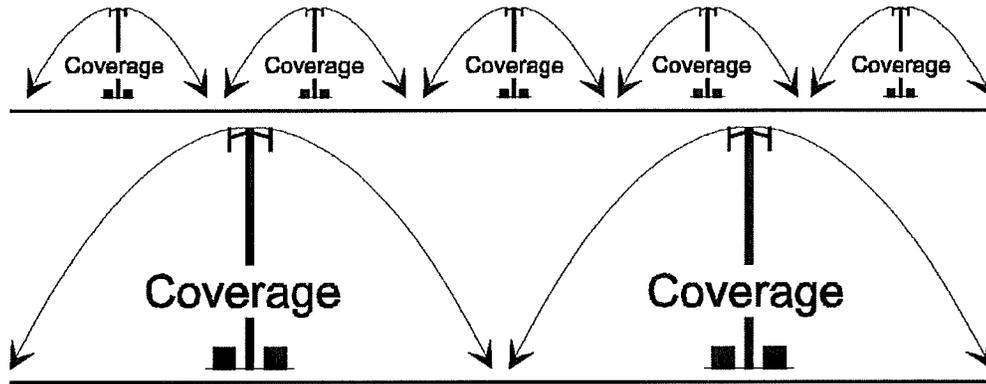
Entry into residential areas will be the carrier's final phase with emphasis placed on eliminating land lines in customer homes. It is this final phase that will bring personal wireless service sites into residential areas of the City where they have traditionally not been located.<sup>16</sup> While there has been Wireless studies' regarding impact on residential property value, the studies seem to support the premise that wireless facilities if located appropriately will have neutral or positive effects on property values. The studies that are available on the internet have been prepared by the wireless industry in support of locating wireless facilities in residential areas.

Figure 2 below depicts the current Land Development Code of Ormond Beach which favors greater height but fewer towers rather than more towers at lower heights. This philosophy dovetails well with current personal communication service carrier's desire to achieve the most coverage from the fewest sites since this is less expensive for carriers in the beginning phase of service provision. However, as the City approaches the "capacity" phase of personal communication service deployment, there are alternatives to macrocell towers beyond what exists today. It is worth nothing than many cities are looking at not permitting towers at all.

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<sup>16</sup> Wireless Communication Master Plan, Wichita-Sedgwick County Metropolitan Planning Department, pages 13-14.  
August 2000

Figure 2 – Typical Tower Coverage by Height

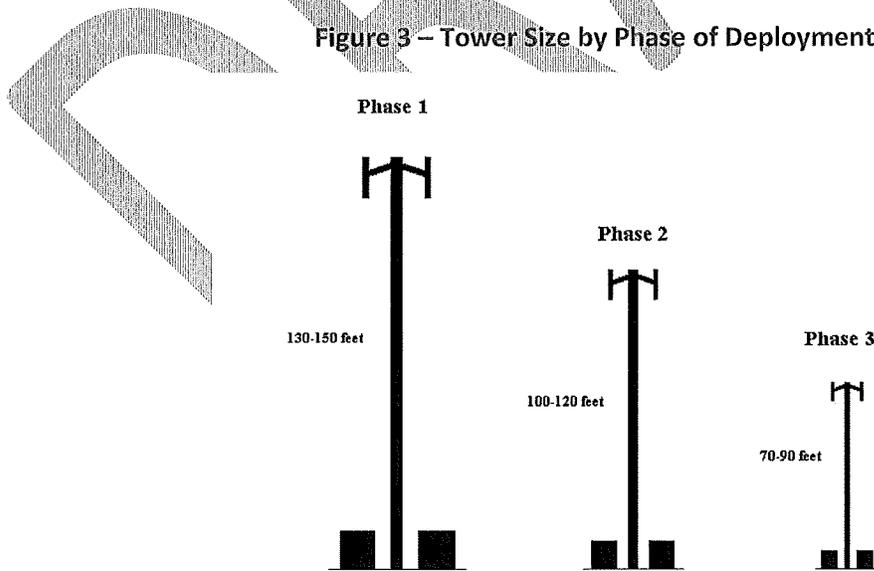


Cell site coverage and enhanced capacity follows essentially three phases of deployment:

1. Phase 1 – there are 12 tower types today in the City and they provide coverage for cellular.
2. Phase 2 – as demand increases, each carrier will need to add several sites in order to add capacity; and
3. Phase 3 – it is likely that there will have to be many more sites for each carrier upon entry into the residential areas. For each succeeding phase however, tower heights should be reduced as depicted below.

In California, technology exists where upper antennas are clipped on telephone poles and voice and data transmission boxes are placed at seven to eight feet high on telephone poles. If heights are reduced as call cells are split and higher frequencies are used, the introduction of smaller microcell tower sites at 70 feet or less can be effectively camouflaged and should integrate well into residential areas where tree coverage exists. A better strategy for the City may be to get the towers lower and accept more of them. In the late 1980's, California did exactly this and over 50% of all wireless towers are less than 50 feet AGL.<sup>17</sup>

Figure 3 – Tower Size by Phase of Deployment

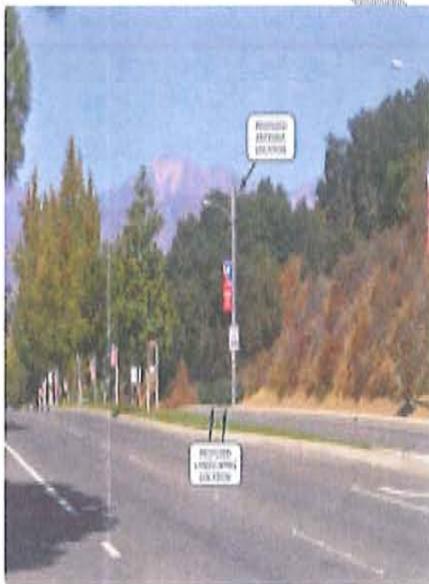


<sup>17</sup> Plan Wireless, "The Trouble with "Towers" > "Towers" Aren't Necessary.

Wireless conferences and numerous articles in the news and on the internet indicates service providers are developing new business models and new technologies with infrastructure requirements that were not thought of when the City's LDC was initially approved or even amended in 2007 after the introduction of the iPhone. Many of these new technologies do not involve towers and are less objectionable because entry into residential neighborhoods is a must if the technology is to continue to grow. An example of this new technology is the location of boxes and antennas at much lower heights – generally less than 20 feet. In wireless vernacular, it is called a Distributed Antenna System Network or DAS Network for short.

A DAS Network spatially separates antenna nodes connected to a common source via a transport medium that provides wireless service within a geographic area or structure. DAS antenna elevations are generally at or below the clutter level and node installations are compact. DAS consists of fiber-optic cable network connecting a series of comparatively small radio antennas attached to streetlight poles which in turn is connected to the service provider's main base station which is a tower. Much of this is located in the public rights-of-way. In fact, during the research which led to the preparation of this paper, the City of Tamarac, Florida received an application to provide DAS which led to the City Manager signing an administrative order dated December 19, 2012 declaring zoning in progress and prohibiting the issuance of permits for personal wireless service facilities in all residential areas and in the public-rights of way. Tamarac in 2013 banned deployment of these antennae systems from the residential neighborhoods because of aesthetics. However the DAS has been deployed in North Lauderdale and Lauderdale.

In 2011, Alcatel-Lucent released lightRadio, a boxy 2-inch cellular antenna and base station system that represent a growing trend towards shrinking traditional cellular towers while boosting network capacities with additional cellular antenna systems. Microcell, picocell, femtocell and more recently DAS have been used in an effort to appease communities opposed to traditional macrocell towers. These smaller antenna systems face less opposition through the permitting approval process and are quicker to set up in order to service the explosive growth in cell phones and mobile data usage. Of course, DAS is just one technology and it may not be economically viable given the low density of the City's urban neighborhoods however the City has the zoning power under the Telecommunication Act concerning time, place and manner. Micro-cell sites at heights lower than 80 feet AGL is available and would be less objectionable in residential areas. Microcell antennas tend to cover roughly a mile in diameter. It takes roughly three to six microcells to get the same coverage of a traditional macrocell tower, which has about a 6 to 10 mile range. This system has not been commercially deployed as of the preparation of this primer.





Microcells have increased in popularity over the past five years and can sometimes be found stationed on top of lamp posts, a highway sign, or a flagpole about 20 feet high. The pictures depicted to the left and below best illustrate DAS and microcell technology. These alternatives to tall macrocell towers, in terms of visibility and function, fit better in the built urban environment while improving capacity for PCS subscribers. Unlike tall tower networks, which have a lower capacity over a larger area, DAS and microcell networks depicted in the pictures on this page and the previous page deliver a high capacity at a short distance. When it comes to cell density, for every one tall tower or macrocell, there could be anywhere from five to 25 microcells (# depends on microcell height) covering the same area, increasing capacity per usage. These microcells are also located outside providing better street level coverage in an urban environment, as well as better building penetration. Macrocell towers costs several hundred thousand dollars and at least a year to build and operate. Microcell sites and DAS are low enough in visibility that the same permitting and approval

process that is required for macro towers would not be required since there would be less community opposition because existing structures are used for the antennas. Consequently, time to market, which is important to carriers, is faster.<sup>18</sup>

Nomura Group's analyst Stuart Jeffrey predicts that small cells will make up 90% of total cell tower deployments by 2015. AT&T recently won approval from Palo Alto, California city officials for a significant DAS test project throughout the city however there are resident concerns regarding the intrusive nature and overall aesthetics of the distributed antennae system. Juan Santiago, head of Powerwave Technologies product management stated that small cell deployment is a huge opportunity coming. He is quoted as saying, "No one wants a giant cell tower in their backyard."<sup>19</sup> Unlike femtocells, microcells and pico cells can be engineered to provide greater capacity outdoors, work well in managing bandwidth, and can supplement macro cell coverage. These small cells can be deployed in arrays, be extremely directional, and deliver capacity in areas that are either unreachable by macrocell towers or politically constrained by community or city opposition.



HetNet is another developing technology to address coverage and capacity needs for next-generation networks. Heterogeneous networks combine both existing macrocell sites with microcell sites utilizing the same core equipment such as a base station. The point to be stressed is that there are current (DAS and microcell) and developing technologies (HetNet) that are either a replacement or a supplement to macrocell tower sites. These alternative technologies did not exist in 2007 when the iPhone debuted. The City's Telecommunication Ordinance was developed in 1997 solely to address the 1996 Telecommunication Act's mandate to maximize coverage. The best technology for coverage at that time was macrocell towers. It is now 2013 and LTE and 5G exist to address the growing usage of electronic devices and the issue is capacity. The post-macrocell era is not coming, it is already here.

<sup>18</sup> My DailyFinance, "The Incredible, Shrinking Cellphone Tower: Alcatel-Lucent Offers an Alternative," by Dawn Kawamoto, March 2011

<sup>19</sup> The Spectrum Crunch, "Itsy-bitsy teeny cell towers are coming." David Goldman@CNMONEYTech April 1012.

## 7.0 Coverage and/or Capacity in Ormond Beach

Why is it important for Ormond Beach to have a citywide radio frequency coverage analysis completed? It is important because wireless carriers use coverage data to<sup>20</sup>:

1. Schedule capital programming to expand the network for maximum Return on Investment;
2. Provide resolution to customer reported complaints on coverage quality;
3. Marketing to subscribers as to what mobile and fixed service is available;

To date, Ormond Beach must take at face value the submitted propagation analyses used to support cell site heights and location – both issues which are zoning related and reserved to the city to regulate. Without the ability of the City to have access to an independent spatial analysis and map display of coverage and capacity data, the City is at the mercy of the carriers and tower builders. Consequently, the assessment needs to compare the measurements of existing wireless coverage with an in-depth qualification process for properties within poor capacity areas. The consultant must be a specialist in wireless systems and proficient in propagation coverage and capacity design, to perform extensive test activity to measure existing commercial wireless coverage and capacity within the City. This drive test should include RSSI (Received Signal Strength Indicator) coverage measurements for AT&T, Sprint-Nextel, T-Mobile and Verizon.

A report that should include the following:

- Inventory List of Existing Facilities and carriers located on each site;
- A narrative explaining each carriers coverage throughout the city;
- An outline indicating current coverage gaps or capacity issues;
- A Conclusion/Summary of all carriers coverage needs; and
- Maps of existing sites, reliable coverage and each carrier's individual plots.

In the absence of a propagation study, staff has attempted to provide coverage maps using the concept of crowdsourcing. Crowdsourcing is the practice of obtaining needed services, ideas, or content by soliciting contributions from a large group of people, especially from an online community, rather than through traditional employees or suppliers.<sup>21</sup> Open Signal, Roots Metric and Sensorly are cell coverage crowdsourcing websites that take advantage of subscribers individual Smartphone's capability to collect and analyze data using apps designed to report accurate and unbiased mobile performance data which in turn is used to construct coverage maps. Maps were developed for AT&T (2G, 3G, & 4G), Verizon (2G,3G & 4G), T-Mobile (2 G & 3G), Sprint ((2 G & 3G) and Metro PCS (2G & 3G).

Caution is emphasized regarding crowdsourcing. Crowdsourcing of information for development of coverage maps is accurate but it does not represent the universe of users with Android or iOS devices.

In addition to the crowdsourcing coverage maps, Volusia County Sheriff's Department during May and June of 2012 drove state, county and local roads using four notebooks and aircards testing data rates. Signal

<sup>20</sup> "Processing RF Propagation Coverage Data for Optimized Display and Analysis in a Web-based Application," Jeremy Peters. MapInfo Corporation.

<sup>21</sup> Wikipedia, the Free Encyclopedia.

coverage proved to be unreliable indicator of usability. Exhibit G maps depict AT&T, Sprint, Verizon and T-Mobile data rates. Dark green is the best rates; yellow-red is poor and black is no coverage.

Individual carrier coverage maps that are online were considered for use however there were so many exceptions, exclusions, and reservations concerning service and quality of service that the coverage maps were considered unreliable for the purposes of this paper. Coverage should not be confused with capacity. Coverage is not capacity and vice versa. Bandwidth frequencies cannot be reused at existing cell sites. So the only alternative available is to construct additional cell sites. However, each cell site must process now not only voice but increased amounts of data as depicted in Table 1 of this report. More cell sites will be needed to increase capacity but the future cellular networks will need thousands more smaller cell sites (called microcells and picocells) which are much lower to the ground to manage the increased amount of data transmission. The City is not knowledgeable of the capacity of the base stations so the maps will change. Only through a propagation analysis can the maps be truly accurate to reflect coverage and capacity.

DRAFT

## 8.0 Key Thoughts

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- Section 704 of the Telecommunications Act preserves local zoning authority over time, place and manner (i.e., location, height and numbers of personal wireless service facilities) with some limitations or protections from regulation by the City of Ormond Beach.
- The City's Telecommunication Tower Ordinance predates the iPhone and was written to address the latest technology at the time which was maximum coverage through the use of macrocell towers.
- Tower builders are in the business of building towers and making money on leasing space and it is less expensive for the individual carriers to co-locate rather than develop individual cell sites.
- Tower builders are not included in the definition of Personal Wireless Services and therefore are not protected by Section 704 of the Act; consequently the city has greater discretion regarding time, place and manner restrictions governing cell site placement, heights, and numbers.
- Fourth generation network technology (the platform for smart-phones) emphasizes improving network capacity and maximizing the use of bandwidth for faster and more efficient transfers of data.
- Fifth generation wireless will bring faster data transfers and additional wireless services such as using the phone for credit card transactions and other similar functions. Unlike previous generations of wireless deployment, 5G will require even more sites but these sites do not need to be on macrocell towers.
- Small cell technologies will be more important to carriers than macrocell towers in future LTE network deployments.
- Within a four mile radius of City Hall, there are 53 towers and 150 antennas for wireless transmission of voice and data that includes cellular and personal communications services (PCS) as well as paging, wireless internet services and mobile radio.
- Coverage should not be confused with capacity.
- Ormond Beach is in the capacity phase of wireless deployment due to demand.
- Cell splitting into smaller microcells which reuses the frequency pattern of the larger cell system is the choice of most providers.
- The benefits of dividing networks into smaller "cells" go far beyond esthetics. Smaller cells mean vastly higher capacity for calls and data traffic. Instead of having all phones within a mile or two connect to the same cell tower, the traffic could be divided between several smaller cells, so there's less competition for the cell tower's attention.
- The next expansion stage for wireless facing Ormond Beach in the near future is residential service.
- When heights are reduced as cell sites are split and higher frequencies are used, smaller but more cell sites can be effectively camouflaged and should integrate well into residential areas where tree coverage exists.
- Each cell not only processes voice but increased amounts of data as depicted in Table 1 of this report. More cell sites will be needed to increase capacity but the future cellular networks will need thousands more smaller cell sites (called microcells and picocells) which are much lower to the ground to manage the increased amount of data transmission. Distributed Antenna System (DAS) Network is one technology that exists and was not contemplated in 1997 and it is employed on existing street light or telephone poles in Florida.

## 9.0 *Where do we go from here?*

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Prior to the Telecommunication Act of 1996, traditional land lines delivered over ancient copper infrastructure was *the* technology. Subsequent to Congress passing the Telecommunications Act of 1996, the transition from land lines to internet based services began. In 2012 37% of all households were wireless only and this trend continues unabated. Within the next decade land lines will go the way of ice manufacturing. As demonstrated in this paper, the technology is rapidly changing due to the introduction of 4G and 5G. PCS service requires higher frequencies and more cell sites due to 3G, 4G and 5G service. The large increase in usage requires service providers to seek new wireless technologies to boost signal strength and reuse frequency – all in an effort to increase transmission capacity and reduce time to market.

It would be worth the Planning Board's time and energy upon reading, discussing and understanding this technology, to request staff to invite representatives for a presentation on the future of wireless from the individual carriers as well as representatives from the Personal Communication Industry Association (PCIA) which is the Wireless Infrastructure Association. This primer should be sufficient to prepare each Board member to actively engage the wireless industry representatives regarding why certain wireless technology is deployed in Ormond Beach. Upon the completion of those presentations and depending on policy direction from the Planning Board, Part 2 to this paper may be prepared. Part 2 would consider the issues identified in this paper, the individual carrier's future directions regarding cell technology as expressed at the workshops, and the Planning Board's policy directions to staff - all of which would result in alternatives from which amendments to the city's wireless technology ordinance would be proposed.

The City of Ormond Beach adopted amendments to the Land Development Code by Ordinance 97-6 in April, 1997 to ensure the siting of telecommunication towers and antennas would comply with federal law. The City's regulations addressed the state of technology at the time. Three more amendments were adopted in 2007 and 2012 concerning camouflaging of towers, setbacks, and professional assistance in reviewing propagation studies. On the latter amendment, staff struggles to find an RF engineer close by to perform municipal reviews. The main focus of the City's current ordinance then and now remains on towers because the prevailing business model involves tower builders applying and siting towers where one or more service providers would lease space to provide voice and data service to subscribers over a large area of the City. While in theory co-location is a priority, there is no independent way for the City to ensure co-location occurs. The city will need a consultant whose clients are principally municipal (RF Engineer and Legal) to assist staff in preparing a defensible wireless plan for incorporation into the Comprehensive Plan as well as an ordinance that uses time, place and manner restrictions that reflect a technology best suited for the city's urban environment.

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# Exhibit A

FCC Fact Sheet on Section 704 of the Telecommunication Act of 1996

## **SUMMARY OF SECTION 704 OF THE TELECOMMUNICATIONS ACT OF 1996**

The following is a summary of key provisions. The text of Section 704 is reproduced in its entirety as an attachment to this summary.

### 1. Local Zoning Authority Preserved

Section 704(a) of the 1996 Act amends Section 332(c) of the Communications Act ("Mobile Services") by adding a new paragraph (7). It preserves the authority of state and local governments over decisions regarding the placement, construction, and modification of personal wireless service facilities, except as provided in the new paragraph (7).

### 2. Exceptions

#### a. States and Localities May Not Take Discriminatory or Prohibiting Actions

Section 704(a) of the 1996 Act states that the regulation of the placement, construction, and modification of personal wireless service facilities by any State or local government or instrumentality thereof shall not unreasonably discriminate among providers of functionally equivalent services and shall not prohibit or have the effect of prohibiting the provision of personal wireless services. 47 U.S.C. §332(c)(7)(B)(i).

Review: Any person that is adversely affected by a state or local government's action or failure to act that is inconsistent with Section 332(c)(7) may seek expedited review in the courts. 47 U.S.C. §332(c)(7)(B)(v).

#### b. Procedures for Ruling on Requests to Place, Construct or Modify Personal Wireless Service Facilities

Section 704(a) also requires a State or local government to act upon a request for authorization to place, construct, or modify personal wireless service facilities within a reasonable time. Any decision to deny a request must be made in writing and be supported by substantial evidence contained in a written record. 47 U.S.C. §332(c)(7)(B)(ii), (iii).

#### c. Regulations Based On Environmental Effects of RF Emissions Preempted

Section 704(a) of the 1996 Act expressly preempts state and local government regulation of the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the FCC's regulations concerning such emissions. 47 U.S.C. §332(c)(7)(B)(iv).

Review: Parties may seek relief from the FCC if they are adversely affected by a state or local government's final action or failure to act that is inconsistent with this provision. 47 U.S.C. § 332(c)(7)(B)(v).

### 3. Federal Guidelines Concerning RF Emissions

Section 704(b) requires the FCC to prescribe and make effective new rules regarding the environmental effects of radio frequency emissions, which are under consideration in ET Docket 93-62, within 180 days of enactment of the 1996 Act.

*NOTE: The pendency of this proceeding before the FCC does not affect the rules which currently are in effect governing the environmental effects of radio frequency emissions. Section 704(b) gives preemptive effect to these existing rules. See related attachments to the Fact Sheet.*

4. Use of Federal or State Government Property

a. Federal Property

Section 704(c) of the 1996 Act requires the President (or his designee) to prescribe procedures by which the federal government may make available on a fair, reasonable and nondiscriminatory basis, property, rights-of-way and easements under their control, for the placement of new spectrum-based telecommunications services.

b. State Property

With respect to facilities siting on state property, Section 704(c) of the 1996 Act requires the FCC to provide technical support to States to encourage them to make property, rights-of-way and easements under their jurisdiction available for the placement of new spectrum-based telecommunications services.

*NOTE: Information concerning technical support for tower siting which the FCC is making available to state and local governments is attached to the Fact Sheet.*

5. Definitions

"Personal wireless services" include commercial mobile services, unlicensed wireless services, and common carrier wireless exchange access services. 47 U.S.C. §332(c)(7)(C)(i).

"Commercial mobile services" are defined in Section 332 of the Communications Act and the FCC's rules, and include cellular telephone services regulated under Part 22 of the FCC's rules, SMR services regulated under Part 90 of the FCC's rules, and PCS regulated under Part 24 of the FCC's rules. 47 C.F.R. §20.9.

"Unlicensed wireless services" are defined as the offering of telecommunications services using duly authorized devices which do not require individual licenses; direct-to-home satellite services are excluded from this definition. 47 U.S.C. §332(c)(7)(C)(iii).

**COMPLETE TEXT OF SEC. 704 OF THE TELECOMMUNICATIONS ACT OF 1996**

SEC. 704. FACILITIES SITING; RADIO FREQUENCY EMISSION STANDARDS.

(a) NATIONAL WIRELESS TELECOMMUNICATIONS SITING POLICY- Section 332(c) (47 U.S.C. 332(c)) is amended by adding at the end the following new paragraph:

`(7) PRESERVATION OF LOCAL ZONING AUTHORITY-

`(A) GENERAL AUTHORITY- Except as provided in this paragraph, nothing in this Act shall limit or affect the authority of a State or local government or instrumentality thereof over decisions regarding the placement, construction, and modification of personal wireless service facilities.

`(B) LIMITATIONS-

`(i) The regulation of the placement, construction, and modification of personal wireless service facilities by any State or local government or instrumentality thereof--

`(I) shall not unreasonably discriminate among providers of functionally equivalent services; and

`(II) shall not prohibit or have the effect of prohibiting the provision of personal wireless services.

`(ii) A State or local government or instrumentality thereof shall act on any request for authorization to place, construct, or modify personal wireless service facilities within a reasonable period of time after the request is duly filed with such government or instrumentality, taking into account the nature and scope of such request.

`(iii) Any decision by a State or local government or place,

construct, or modify personal wireless service facilities shall be in writing and supported by substantial evidence contained in a written record.

`(iv) No State or local government or instrumentality thereof may regulate the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the Commission's regulations concerning such emissions.

`(v) Any person adversely affected by any final action or failure to act by a State or local government or any instrumentality thereof that is inconsistent with this subparagraph may, within 30 days after such action or failure to act, commence an action in any

court of competent jurisdiction. The court shall hear and decide such action on an expedited basis. Any person adversely affected by an act or failure to act by a State or local government or any instrumentality thereof that is inconsistent with clause (iv) may petition the Commission for relief.

(C) DEFINITIONS- For purposes of this paragraph--

(i) the term 'personal wireless services' means commercial mobile services, unlicensed wireless services, and common carrier wireless exchange access services;

(ii) the term 'personal wireless service facilities' means facilities for the provision of personal wireless services; and

(iii) the term 'unlicensed wireless service' means the offering of telecommunications services using duly authorized devices which do not require individual licenses, but does not mean the provision of direct-to-home satellite services (as defined in section 303(v)).'

(b) RADIO FREQUENCY EMISSIONS- Within 180 days after the enactment of this Act, the Commission shall complete action in ET Docket 93-62 to prescribe and make effective rules regarding the environmental effects of radio frequency emissions.

(c) AVAILABILITY OF PROPERTY- Within 180 days of the enactment of this Act, the President or his designee shall prescribe procedures by which Federal departments and agencies may make available on a fair, nondiscriminatory basis, property, rights-of-way, and easements under their control for the placement of new telecommunications services that are dependent, in whole or in part, upon the utilization of Federal spectrum rights for the transmission or reception of such services. These procedures may establish a presumption that requests for the use of property, rights-of-way, and easements by duly authorized providers should be granted absent unavoidable direct conflict with the department or agency's mission, or the current or planned use of the property, rights-of-way, and easements in question. Reasonable fees may be charged to providers of such telecommunications services for use of property, rights-of-way, and easements. The Commission shall provide technical support to States to encourage them to make property, rights-of-way, and easements under their jurisdiction available for such purposes.

# Exhibit B

ASR Tower Registration

ASR Registration Search

**Registration Search Results****Specified Search**

Structure State = **FLORIDA**  
 City like **ormond beach**  
 Structure Zipcode like **32174**  
 Structure County = **VOLUSIA**

**Displayed Results**

**PA** = Pending Application(s)

Registration Number	Status	File Number	Owner Name	Latitude/Longitude	Structure City/State	Overall Height Above Ground (AGL)
1	Terminated	A0273995	American Tower LP	29-21-12.0N 081-08-14.0W	ORMOND BEACH, FL	48.2
2	Constructed	A0791346	ORLANDO SMSA LIMITED PARTNERSHIP	29-15-18.1N 081-09-01.0W	Ormond Beach, FL	79.9
3	Cancelled	A0018927	APT TAMPA ORLANDO INC	29-18-10.0N 081-07-57.0W	ORMOND BEACH, FL	30.4
4	Constructed	A0601472	American Towers, LLC.	29-15-32.1N 081-07-04.5W	ORMOND BEACH, FL	97.2
5	Terminated	A0024928	OPM USA INC	29-15-33.0N 081-06-51.0W	ORMOND BEACH, FL	97.5
6	Constructed	A0791371	ORLANDO SMSA LIMITED PARTNERSHIP	29-17-07.0N 081-04-01.4W	ORMOND BEACH, FL	81.4
7	Dismantled	A0451314	Bright House Networks, LLC	29-16-30.0N 081-04-27.0W	ORMOND BEACH, FL	110.3
8	Granted	A0056516	ARK COMMUNICATIONS NETWORK	29-15-16.0N 081-13-47.0W	ORMOND BEACH, FL	152.4
9	Terminated	A0198100	American Tower Limited Partnership	29-21-11.0N 081-08-12.0W	ORMOND BEACH, FL	48.8
10	Constructed	A0817270	SBA Towers IV, LLC	29-15-33.7N 081-07-51.6W	Ormond Beach, FL	98.1

ASR Registration Search

## Registration Search Results

### Specified Search

Structure State = **FLORIDA**  
 City like **ormond beach**  
 Structure Zipcode like **32174**  
 Structure County = **VOLUSIA**

### Displayed Results

**PA** = Pending Application(s)

Registration Number	Status	File Number	Owner Name	Latitude/Longitude	Structure City/State	Overall Height Above Ground (AGL)
11	Constructed	A0073410	WINGS COMMUNICATIONS INC DBA = WELE RADIO	29-16-10.0N 081-04-53.0W	ORMOND BEACH, FL	61.9
12	Constructed	A0073411	WINGS COMMUNICATIONS INC DBA = WELE RADIO	29-16-10.0N 081-04-53.0W	ORMOND BEACH, FL	61.9
13	Constructed	A0073412	WINGS COMMUNICATIONS INC DBA = WELE RADIO	29-16-10.0N 081-04-53.0W	ORMOND BEACH, FL	61.9
14	Constructed	A0073413	WINGS COMMUNICATIONS INC DBA = WELE RADIO	29-16-10.0N 081-04-53.0W	ORMOND BEACH, FL	61.9
15	Granted	A0115745	MEMORIAL HOSPITAL - ORMOND BEACH	29-16-55.9N 081-04-49.2W	ORMOND BEACH, FL	57.0
16	Constructed	A0258559	City of Ormond Beach, Florida	29-18-03.3N 081-06-39.5W	ORMOND BEACH, FL	9.4
17	Granted	A0296359	City of Ormond Beach	29-18-17.0N 081-07-01.0W	Ormond Beach, FL	21.3
18	Granted	A0618781	Florida, State of	29-20-12.1N 081-07-48.4W	Ormond Beach, FL	48.7
19	Granted	A0780365	Capital Telecom	29-16-00.6N 081-03-21.1W	Ormond Beach, FL	48.8

[CLOSE WINDOW](#)

# Exhibit C

FCC Registered Cell Phone and Antenna Towers in Ormond Beach

## FCC Registered Cell Phone and Antenna Towers in Ormond Beach, Florida

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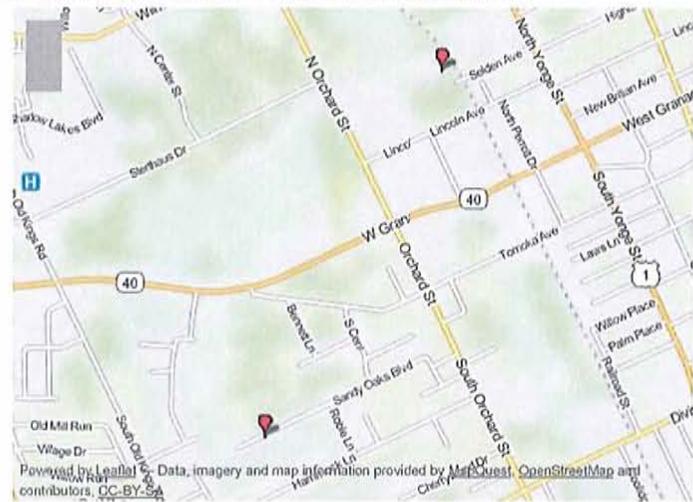
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[Cell Phone Reverse Lookup](#)

1. Enter Phone Number 2. Find Owner  
 3. Full Address & Info Details Now  
[Hexum.com](http://Hexum.com)

[Cell Phone, Antenna](#)

### FCC Registered Cell Phone Towers in Ormond Beach, FL



Note: Not all towers must be registered in the FCC database, so the above map may not list all the towers in the area.

### Full list of 2 FCC Registered Cell Phone Towers in Ormond Beach, FL:

123 N. Orchard Street (Lat: 29.285250 Lon: -81.067000), Structure height: 80.8 m, Call Sign: KNKA703  
 Assigned Frequencies: 880.020 MHz, 880.020 MHz, 880.020 MHz, 891.510 MHz, 891.510 MHz, 891.510 MHz, 835.020 MHz, 835.020 MHz, 835.020 MHz, 846.510 MHz, 846.510 MHz, 846.510 MHz  
 Grant Date: 11/06/2007, Expiration Date: 10/01/2017  
 Registrant: At&t Mobility LLC, 1120 20th Street, Nw, Suite 1000, Washington, DC 20036, Phone: (202) 457-2055, Fax: (202) 457-3074, Email: [mg7268@att.com](mailto:mg7268@att.com)

Ormond Beach 125 Bennet Lane (Lat: 29.274139 Lon: -81.073111), Structure height: 106.7 m, Call Sign: KNKA528  
 Assigned Frequencies: 869.040 MHz, 869.040 MHz, 890.010 MHz, 890.010 MHz, 824.040 MHz, 824.040 MHz, 845.010 MHz, 845.010 MHz  
 Grant Date: 11/06/2007, Expiration Date: 10/01/2017, Certifier: David C Jattlow  
 Registrant: At&t Mobility LLC, 1120 20th Street, Nw, Suite 1000, Washington, DC 20036, Phone: (202) 457-2055, Fax: (202) 457-3074, Email: [mg7268@att.com](mailto:mg7268@att.com)

[Cell Phone, Antenna](#)

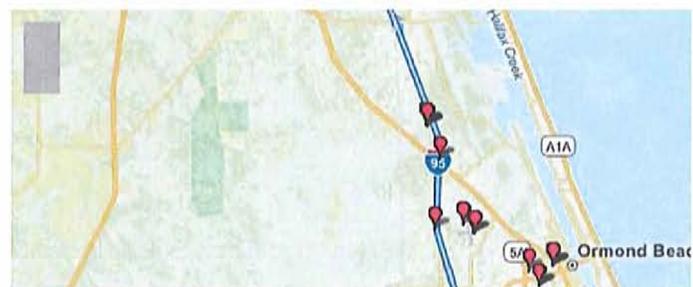
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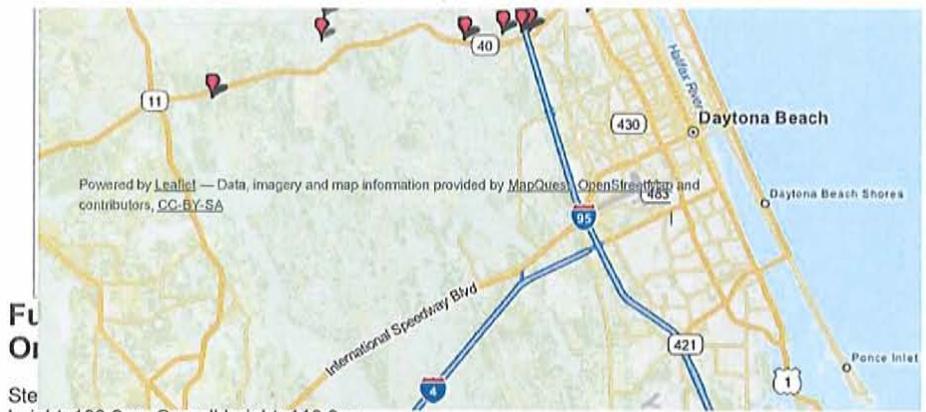
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### FCC Registered Antenna Towers in Ormond Beach, FL





height: 108.2 m, Overall height: 110.3 m  
 Registrant: Bright House Networks, LLC, 2600 McCormick Drive, Clearwater, FL 33759,  
 Phone: (727) 791-7730, Email: [chris.feathers@mybrighthouse.com](mailto:chris.feathers@mybrighthouse.com)

KELLYE E ABERNATHY, 4901 W. Granada (Lat: 29.227222 Lon: -81.290000), Type:  
 Tower, Structure height: 88.4 m, Overall height: 88.4 m  
 Registrant: Cingular Wireless LLC, 5601 Legacy Drive, Ms: A-3, Plano, TX 75024,  
 Phone: (469) 229-7422, Email: [kellye.e.abernathy@cingular.com](mailto:kellye.e.abernathy@cingular.com)

KELLYE E ABERNATHY, Sr 40 2 Mi W Of I-95 (Lat: 29.255028 Lon: -81.150278), Type:  
 Tower, Structure height: 76.2 m, Overall height: 78.6 m  
 Registrant: Cingular Wireless LLC, 5601 Legacy Drive, Ms: A-3, Plano, TX 75024,  
 Phone: (469) 229-7422, Email: [kellye.e.abernathy@cingular.com](mailto:kellye.e.abernathy@cingular.com)

KELLYE E ABERNATHY, 123 N. Orchid Street (Lat: 29.285278 Lon: -81.066944), Type:  
 Tower, Structure height: 76.2 m, Overall height: 80.8 m  
 Registrant: Cingular Wireless LLC, 5601 Legacy Drive, Ms: A-3, Plano, TX 75024,  
 Phone: (469) 229-7422, Email: [kellye.e.abernathy@cingular.com](mailto:kellye.e.abernathy@cingular.com)

SIGNATURE ON FILE, Ormond Beach Municipal Airport (Lat: 29.300944 Lon: -  
 81.111444), Type: Tower, Structure height: 9.4 m, Overall height: 9.4 m  
 Registrant: Hoyle, Tanner & Associates, Inc., 3452 Lake Lynda Dr., Suite 151, Orlando,  
 FL 32817, Phone: (407) 380-1919, Email: [htaff@magicnet.net](mailto:htaff@magicnet.net)

WILLIAM A TRESSLER, 875 Sterthaus Ave (Lat: 29.282194 Lon: -81.080333), Type:  
 Bant, Structure height: 45.7 m, Overall height: 57 m, Licensee ID: L00212312  
 Registrant: Memorial Hospital - Ormond Beach, 875 Sterthaus Ave, Ormond Beach, FL  
 32174, Phone: (904) 676-6017

Lawrence C Miller, 1687 W Tranada Blvd (Lat: 29.259167 Lon: -81.114167), Type:  
 Tower, Structure height: 97.5 m, Overall height: 97.5 m, Licensee ID: L00008376  
 Registrant: American Towers, Inc., 1898 Leland Drive, Marietta, GA 30067, Phone: (678)  
 265-6770

Vincent R Clawson, 123 N. Orchid Street (Lat: 29.285278 Lon: -81.066944), Type:  
 Tower, Structure height: 76.2 m, Overall height: 80.8 m, Licensee ID: L00000959  
 Registrant: Bellsouth Mobility Inc, 5201 Congress Ave., Boca Raton, FL 33487, Phone:  
 (561) 995-3500

Lawrence C Miller, 1687 W Tranada Blvd (Lat: 29.259167 Lon: -81.114167), Type:  
 Tower, Structure height: 97.5 m, Overall height: 97.5 m, Licensee ID: L00008376  
 Registrant: American Towers, Inc., 1898 Leland Drive, Marietta, GA 30067, Phone: (678)  
 265-6770

KELLYE ABERNATHY, Sr 40 2 Mi W Of I-95 (Lat: 29.255000 Lon: -81.150278), Type:  
 Tower, Structure height: 76.2 m, Overall height: 80.8 m, Licensee ID: L00001084  
 Registrant: Orlando Smsa Limited Partnership, 5601 Legacy Drive, Ms:a-3, Plano, TX  
 75024, Phone: (469) 229-7471, Email: [lq5201@att.com](mailto:lq5201@att.com)

KELLYE ABERNATHY, 123 N. Orchid Street (Lat: 29.285278 Lon: -81.066944), Type:  
 Tower, Structure height: 76.2 m, Overall height: 80.8 m, Licensee ID: L00001084  
 Registrant: Orlando Smsa Limited Partnership, 5601 Legacy Drive, Ms:a-3, Plano, TX  
 75024, Phone: (469) 229-7471, Email: [lq5201@att.com](mailto:lq5201@att.com)

Douglas I Brandon, 4901 W. Granada (Lat: 29.227222 Lon: -81.290000), Type: Tower, Structure height: 88.4 m, Overall height: 88.4 m  
Registrant: At&t Wireless Services, Inc., 1150 Connecticut Avenue, Nw, 4th Fl, Washington, DC 20036, Phone: (202) 223-9222, Email: [esther.hilliard@atws.com](mailto:esther.hilliard@atws.com)

DWANE L RIGG, 6 Miles N.W Of City (Lat: 29.353056 Lon: -81.136667), Type: Tower, Structure height: 42.7 m, Overall height: 48.8 m, Licensee ID: L00131936  
Registrant: American Tower Limited Partnership, 3200 Cobb Galleria Pkwy Suite 205, Atlanta, GA 30339, Phone: (770) 953-9400

Steven O Vondran, 1687 W Tranada Blvd (Lat: 29.259167 Lon: -81.114167), Type: Tower, Structure height: 97.5 m, Overall height: 97.5 m  
Registrant: American Tower, LP, 3200 Cobb Galleria Pkwy Suite 205, Atlanta, GA 30339, Phone: (770) 936-9400

DWANE L RIGG, 405 Lincoln (Lat: 29.353333 Lon: -81.137222), Type: Tower, Structure height: 48.2 m, Overall height: 48.2 m, Licensee ID: L00131936  
Registrant: American Tower LP, 829 Pickens Industrial Drive, Ste 3, Marietta, GA 30062, Phone: (770) 919-9003

DWANE L RIGG, 405 Lincoln (Lat: 29.353333 Lon: -81.137222), Type: Tower, Structure height: 48.2 m, Overall height: 48.2 m  
Registrant: GA

TOM LIPPS, Ormond Beach Municipal Airport (Lat: 29.300917 Lon: -81.110972), Type: Tower, Structure height: 7.6 m, Overall height: 9.4 m  
Registrant: Hoyle, Tanner & Associates, Inc, 3452 Lake Lynda Dr Suite 151, Orlando, FL 32817, Phone: (407) 380-1919, Email: [rholiday@hta-fl.com](mailto:rholiday@hta-fl.com)

A C NEWBERRY, 1687 W Tranada Blvd (Lat: 29.259167 Lon: -81.114167), Type: Tower, Structure height: 97.5 m, Overall height: 97.5 m, Licensee ID: L00008376  
Registrant: American Towers, Inc., 1898 Leland Drive, Marietta, GA 30067, Phone: (678) 265-6770

APRIL C NEWBERRY, 1687 W Tranada Blvd (Lat: 29.259167 Lon: -81.114167), Type: Tower, Structure height: 97.5 m, Overall height: 97.5 m, Licensee ID: L00131936  
Registrant: American Tower Limited Partnership, 3200 Cobb Galleria Pkwy Suite 205, Atlanta, GA 30339, Phone: (770) 953-9400

APRIL C NEWBERRY, 405 Lincoln (Lat: 29.353333 Lon: -81.137222), Type: Tower, Structure height: 48.2 m, Overall height: 48.2 m, Licensee ID: L00131936  
Registrant: American Tower LP, 829 Pickens Industrial Drive, Ste 3, Marietta, GA 30062, Phone: (770) 919-9003

APRIL C NEWBERRY, 6 Miles N.W Of City (Lat: 29.353056 Lon: -81.136667), Type: Tower, Structure height: 42.7 m, Overall height: 48.8 m, Licensee ID: L00131936  
Registrant: American Tower Limited Partnership, 3200 Cobb Galleria Pkwy Suite 205, Atlanta, GA 30339, Phone: (770) 953-9400

APRIL C NEWBERRY, 405 Lincoln (Lat: 29.353333 Lon: -81.137222), Type: Tower, Structure height: 48.2 m, Overall height: 48.2 m, Licensee ID: L00131936  
Registrant: American Tower LP, 829 Pickens Industrial Drive, Ste 3, Marietta, GA 30062, Phone: (770) 919-9003

APRIL C NEWBERRY, 405 Lincoln (Lat: 29.353333 Lon: -81.137222), Type: Tower, Structure height: 48.2 m, Overall height: 48.2 m, Licensee ID: L00131936  
Registrant: American Tower LP, 829 Pickens Industrial Drive, Ste 3, Marietta, GA 30062, Phone: (770) 919-9003

APRIL C NEWBERRY, 6 Miles N.W Of City (Lat: 29.353056 Lon: -81.136667), Type: Tower, Structure height: 42.7 m, Overall height: 48.8 m  
Registrant: American Tower Limited Partnership, 3200 Cobb Galleria Pkwy Suite 205, Atlanta, GA 30339, Phone: (770) 953-9400

Tosha N Taylor, 1687 W Tranada Blvd (Ormond Beach / 002703) (Lat: 29.259167 Lon: -81.117861), Type: Tower, Structure height: 92.1 m, Overall height: 95.7 m  
Registrant: American Tower Limited Partnership, 3200 Cobb Galleria Pkwy Suite 205,

Atlanta, GA 30339, Phone: (770) 953-9400

Bridget B Breen, 1687 W Tranada Blvd (Ormond Beach / 002703) (Lat: 29.259167 Lon: -81.117861), Type: Tower, Structure height: 92.1 m, Overall height: 95.7 m  
Registrant: American Tower Limited Partnership, 3200 Cobb Galleria Pkwy Suite 205, Atlanta, GA 30339, Phone: (770) 953-9400

KELLYE ABERNATHY, 123 N. Orchid Street (Lat: 29.285278 Lon: -81.066944), Type: Tower, Structure height: 76.2 m, Overall height: 80.8 m, Licensee ID: L00001084  
Registrant: Orlando Smsa Limited Partnership, 5601 Legacy Drive, Ms:a-3, Plano, TX 75024, Phone: (469) 229-7471, Email: [lq5201@att.com](mailto:lq5201@att.com)

KELLYE ABERNATHY, 123 N. Orchid Street (Lat: 29.285278 Lon: -81.066944), Type: Tower, Structure height: 76.2 m, Overall height: 80.8 m, Licensee ID: L00001084  
Registrant: Orlando Smsa Limited Partnership, 5601 Legacy Drive, Ms:a-3, Plano, TX 75024, Phone: (469) 229-7471, Email: [lq5201@att.com](mailto:lq5201@att.com)

KELLYE ABERNATHY, Sr 40 2 Mi W Of I-95 (Lat: 29.255000 Lon: -81.150278), Type: Tower, Structure height: 76.2 m, Overall height: 80.8 m, Licensee ID: L00001084  
Registrant: Orlando Smsa Limited Partnership, 5601 Legacy Drive, Ms:a-3, Plano, TX 75024, Phone: (469) 229-7471, Email: [lq5201@att.com](mailto:lq5201@att.com)

Bridget B Breen, 1687 West Granada Blvd (Ormond Beach / 002703) (Lat: 29.258917 Lon: -81.117917), Type: Tower, Structure height: 92.1 m, Overall height: 97.2 m  
Registrant: American Tower Limited Partnership, 3200 Cobb Galleria Pkwy Suite 205, Atlanta, GA 30339, Phone: (770) 953-9400

Bridget B Breen, 1687 West Granada Blvd (Ormond Beach / 002703) (Lat: 29.258917 Lon: -81.117917), Type: Tower, Structure height: 92.1 m, Overall height: 97.2 m  
Registrant: American Tower Limited Partnership, 3200 Cobb Galleria Pkwy Suite 205, Atlanta, GA 30339, Phone: (770) 953-9400

Tom Lipps, Ormond Beach Municipal Airport (Lat: 29.300917 Lon: -81.110972), Type: Tower, Structure height: 7.6 m, Overall height: 9.4 m  
Registrant: Hoyle, Tanner & Associates, Inc, 3452 Lake Lynda Dr Suite 151, Orlando, FL 32817, Phone: (407) 380-1919, Email: [rholiday@hta-fl.com](mailto:rholiday@hta-fl.com)

Harold Heaster, Off Tymber Creek Rd (Lat: 29.258056 Lon: -81.129167), Type: Tower, Structure height: 90.5 m, Overall height: 91.5 m  
Registrant: Keller And Heckman LLP, 1001 G Street, Nw, Suite 500 West, Washington, DC 20001, Phone: (202) 434-4124, Email: [morrone@khlaw.com](mailto:morrone@khlaw.com)

Bridget B Breen, 405 Lincoln (Lat: 29.353333 Lon: -81.137222), Type: Tower, Structure height: 48.2 m, Overall height: 48.2 m, Licensee ID: L00131936  
Registrant: American Tower LP, 829 Pickens Industrial Drive, Ste 3, Marietta, GA 30062, Phone: (770) 919-9003

Bridget B Breen, 1687 West Granada Blvd (Ormond Beach / 002703) (Lat: 29.258917 Lon: -81.117917), Type: Tower, Structure height: 92.1 m, Overall height: 97.2 m  
Registrant: American Tower LP, 829 Pickens Industrial Drive, Ste 3, Marietta, GA 30062, Phone: (770) 919-9003

Bridget B Breen, 405 Lincoln (Lat: 29.353333 Lon: -81.137222), Type: Tower, Structure height: 48.2 m, Overall height: 48.2 m  
Registrant: American Tower LP, 829 Pickens Industrial Drive, Ste 3, Marietta, GA 30062, Phone: (770) 919-9003

Bridget B Breen, 1687 West Granada Blvd (Ormond Beach / 002703) (Lat: 29.258917 Lon: -81.117917), Type: Tower, Structure height: 92.1 m, Overall height: 97.2 m  
Registrant: American Tower LP, 829 Pickens Industrial Drive, Ste 3, Marietta, GA 30062, Phone: (770) 919-9003

Harole Heaster, Off Tymber Creek Rd (Lat: 29.258056 Lon: -81.129167), Type: Tower, Structure height: 90.5 m, Overall height: 91.5 m  
Registrant: Keller And Heckman LLP, 1001 G Street, Nw, Suite 500 West, Washington, DC 20001, Phone: (202) 434-4124, Email: [morrone@khlaw.com](mailto:morrone@khlaw.com)

Harold Heaster, Off Tymber Creek Rd (Lat: 29.258056 Lon: -81.129167), Type: Tower,

Structure height: 90.5 m, Overall height: 91.5 m  
Registrant: Keller And Heckman LLP, 1001 G Street, Nw, Suite 500 West, Washington, DC 20001, Phone: (202) 434-4124, Email: [morrone@khlaw.com](mailto:morrone@khlaw.com)

Tom Lipps, Ormond Beach Municipal Airport (Lat: 29.304722 Lon: -81.116944), Type: Bant, Structure height: 18.2 m, Overall height: 21.3 m  
Registrant: City Of Ormond Beach, 22 S. Beach Street, Ormond Beach, FL 32175-0277, Phone: (386) 676-3224, Email: [tlipps@ormondbeach.org](mailto:tlipps@ormondbeach.org)

Bridget B Carter, 1687 West Granada Blvd (Ormond Beach / 002703) (Lat: 29.258917 Lon: -81.117917), Type: Tower, Structure height: 92.1 m, Overall height: 97.2 m, Licensee ID: L00008376  
Registrant: American Towers, Inc., 1898 Leland Drive, Marietta, GA 30067, Phone: (678) 265-6770

Kellye E Abernathy, Sr 40 2 Mi W Of I-95 (Lat: 29.255000 Lon: -81.150278), Type: Tower, Structure height: 76.2 m, Overall height: 80.8 m  
Registrant: Cingular Wireless LLC, 17330 Preston Road, Suite 100a, Dallas, TX 75252, Phone: (972) 733-2022

Bridget B Carter, 1687 West Granada Blvd (Ormond Beach / 002703) (Lat: 29.258917 Lon: -81.117917), Type: Tower, Structure height: 92.1 m, Overall height: 97.2 m  
Registrant: American Towers (Delaware), Inc., 829 Pickens Industrial Dr., Suite 3, Marietta, GA 30062, Phone: (770) 970-2050

Lewis Heaster, Off Tymber Creek Rd (Lat: 29.258056 Lon: -81.129167), Type: Tower, Structure height: 90.5 m, Overall height: 91.5 m  
Registrant: Keller And Heckman LLP, 1001 G Street, Nw, Suite 500 West, Washington, DC 20001, Phone: (202) 434-4124, Email: [morrone@khlaw.com](mailto:morrone@khlaw.com)

Steve Miron, 121 Bennett Ln (Lat: 29.275000 Lon: -81.074167), Type: Tower, Structure height: 108.2 m, Overall height: 110.3 m, Licensee ID: L00555808  
Registrant: Bright House Networks, LLC, 5000 Campuswood Drive, E. Syracuse, NY 13057, Phone: (315) 438-4100, Email: [sam@advancenewhouse.com](mailto:sam@advancenewhouse.com)

KELLYE ABERNATHY, Sr 40 2 Mi W Of I-95 (Lat: 29.255028 Lon: -81.150278), Type: Tower, Structure height: 76.2 m, Overall height: 78.6 m  
Registrant: Cingular Wireless LLC, 17330 Preston Road, Suite 100a, Dallas, TX 75252, Phone: (972) 733-2349

KELLYE ABERNATHY, Sr 40 2 Mi W Of I-95 (Lat: 29.255028 Lon: -81.150278), Type: Tower, Structure height: 76.2 m, Overall height: 78.6 m  
Registrant: Cingular Wireless LLC, 17330 Preston Road, Suite 100a, Dallas, TX 75252, Phone: (972) 733-2349

B B Carter, 1687 West Granada Blvd (Ormond Beach / 002703) (Lat: 29.258917 Lon: -81.117917), Type: Tower, Structure height: 92.1 m, Overall height: 97.2 m, Licensee ID: L00008376  
Registrant: American Towers, Inc., 1898 Leland Drive, Marietta, GA 30067, Phone: (678) 265-6770

KELLYE ABERNATHY, Sr 40 2 Mi W Of I-95 (Lat: 29.255028 Lon: -81.150278), Type: Tower, Structure height: 76.2 m, Overall height: 78.6 m  
Registrant: Cingular Wireless LLC, 17330 Preston Road, Suite 100a, Dallas, TX 75252, Phone: (972) 733-2092

KELLYE ABERNATHY, 123 N. Orchid Street (Lat: 29.285278 Lon: -81.066944), Type: Tower, Structure height: 76.2 m, Overall height: 80.8 m  
Registrant: Cingular Wireless LLC, 17330 Preston Road, Suite 100a, Dallas, TX 75252, Phone: (972) 733-2092

KELLYE ABERNATHY, Sr 40 2 Mi W Of I-95 (Lat: 29.255028 Lon: -81.150278), Type: Tower, Structure height: 76.2 m, Overall height: 78.6 m  
Registrant: Cingular Wireless LLC, 17330 Preston Road, Suite 100a, Dallas, TX 75252, Phone: (972) 733-2092, Email: [kellye.e.abernathy@cingular.com](mailto:kellye.e.abernathy@cingular.com)

KELLYE ABERNATHY, 123 N. Orchid Street (Lat: 29.285278 Lon: -81.066944), Type: Tower, Structure height: 76.2 m, Overall height: 80.8 m  
Registrant: Cingular Wireless LLC, 17330 Preston Road, Suite 100a, Dallas, TX 75252,

Phone: (972) 733-2092, Email: [kellye.e.abernathy@cingular.com](mailto:kellye.e.abernathy@cingular.com)

David C Jallow, 4901 W. Granada (Lat: 29.227222 Lon: -81.290000), Type: Tower, Structure height: 88.4 m, Overall height: 88.4 m  
Registrant: At&t Wireless Services, Inc., 1150 Connecticut Avenue, Nw, 4th Fl, Washington, DC 20036, Phone: (202) 223-9222, Email: [esther.hilliard@attws.com](mailto:esther.hilliard@attws.com)

B B CARTER, 1687 West Granada Blvd (Ormond Beach / 002703) (Lat: 29.258917 Lon: -81.117917), Type: Tower, Structure height: 92.1 m, Overall height: 97.2 m  
Registrant: American Towers, Inc., 3200 Cobb Galleria Pkwy., Suite 205, Atlanta, GA 30339, Phone: (770) 308-1986, Email: [bridget.carter@americantower.com](mailto:bridget.carter@americantower.com)

DAVID C JATLOW, 4901 W. Granada (Lat: 29.227222 Lon: -81.290000), Type: Tower, Structure height: 88.4 m, Overall height: 88.4 m  
Registrant: Cingular Wireless LLC, 17330 Preston Road, Suite 100a, Dallas, TX 75252, Phone: (972) 733-2092

B B CARTER, 1687 West Granada Blvd (Ormond Beach / 002703) (Lat: 29.258917 Lon: -81.117917), Type: Tower, Structure height: 92.1 m, Overall height: 97.2 m  
Registrant: American Towers, Inc., 900 Circle 75 Parkway, Suite 300, Atlanta, GA 30339, Phone: (770) 308-1986, Email: [bridget.carter@americantower.com](mailto:bridget.carter@americantower.com)

B B CARTER, 1687 West Granada Blvd (Ormond Beach / 002703) (Lat: 29.258917 Lon: -81.117917), Type: Tower, Structure height: 92.1 m, Overall height: 97.2 m  
Registrant: American Towers, Inc., 900 Circle 75 Parkway, Suite 300, Atlanta, GA 30339, Phone: (770) 308-1986, Email: [bridget.carter@americantower.com](mailto:bridget.carter@americantower.com)

KELLYE ABERNATHY, 123 N. Orchid Street (Lat: 29.285278 Lon: -81.067056), Type: Tower, Structure height: 77.7 m, Overall height: 81.4 m  
Registrant: Cingular Wireless LLC, 5601 Legacy Drive, Ms: A-3, Plano, TX 75024, Phone: (469) 229-7422, Email: [kellye.e.abernathy@cingular.com](mailto:kellye.e.abernathy@cingular.com)

KELLYE ABERNATHY, 123 N. Orchid Street (Lat: 29.285278 Lon: -81.067056), Type: Tower, Structure height: 77.7 m, Overall height: 81.4 m  
Registrant: Cingular Wireless LLC, 5601 Legacy Drive, Ms: A-3, Plano, TX 75024, Phone: (469) 229-7422, Email: [kellye.e.abernathy@cingular.com](mailto:kellye.e.abernathy@cingular.com)

KELLYE E ABERNATHY, 4901 W. Granada (Lat: 29.227222 Lon: -81.290000), Type: Tower, Structure height: 88.4 m, Overall height: 88.4 m, Licensee ID: L00000732  
Registrant: New Cingular Wireless Services, Inc., 5601 Legacy Drive, Ms: A-3, Plano, TX 75024, Phone: (469) 229-7422, Email: [kellye.e.abernathy@cingular.com](mailto:kellye.e.abernathy@cingular.com)

Muayyad Mustafa, 2341 W. Granada Blvd (Lat: 29.255028 Lon: -81.150278), Type: Tower, Structure height: 78.6 m, Overall height: 80 m  
Registrant: At&t Mobility LLC, 5601 Legacy Drive, Ms: A-3, Plano, TX 75024, Phone: (469) 229-7422, Email: [ka8805@att.com](mailto:ka8805@att.com)

Muayyad Mustafa, 2341 W. Granada Blvd (Lat: 29.255028 Lon: -81.150278), Type: Tower, Structure height: 78.6 m, Overall height: 80 m  
Registrant: At&t Mobility LLC, 5601 Legacy Drive, Ms: A-3, Plano, TX 75024, Phone: (469) 229-7422, Email: [ka8805@att.com](mailto:ka8805@att.com)

MUAYYAD MUSTAFA, 123 N. Orchid Street (Lat: 29.285278 Lon: -81.067056), Type: Tower, Structure height: 77.7 m, Overall height: 81.4 m  
Registrant: At&t Mobility LLC, 5601 Legacy Drive, Ms: A-3, Plano, TX 75024, Phone: (469) 229-7422, Email: [kellye.e.abernathy@cingular.com](mailto:kellye.e.abernathy@cingular.com)

MUAYYAD MUSTAFA, 123 N. Orchid Street (Lat: 29.285278 Lon: -81.067056), Type: Tower, Structure height: 77.7 m, Overall height: 81.4 m  
Registrant: At&t Mobility LLC, 5601 Legacy Drive, Ms: A-3, Plano, TX 75024, Phone: (469) 229-7422, Email: [kellye.e.abernathy@cingular.com](mailto:kellye.e.abernathy@cingular.com)

Muayyad Mustafa, 2341 W. Granada Blvd (Lat: 29.255028 Lon: -81.150278), Type: Tower, Structure height: 78.6 m, Overall height: 80 m  
Registrant: At&t Mobility LLC, 5601 Legacy Drive, Ms-A3, Plano, TX 75024, Phone: (469) 229-7422, Email: [ka8805@att.com](mailto:ka8805@att.com)

Muayyad Mustafa, 123 N. Orchid Street (Lat: 29.285278 Lon: -81.067056), Type: Tower,

Structure height: 77.7 m, Overall height: 81.4 m  
Registrant: At&t Mobility LLC, 5601 Legacy Drive, Ms-A3, Plano, TX 75024, Phone: (469) 229-7422, Email: [ka8805@att.com](mailto:ka8805@att.com)

Muayyad Mustafa, 4901 W. Granada (Lat: 29.227222 Lon: -81.290000), Type: Tower,  
Structure height: 88.4 m, Overall height: 88.4 m  
Registrant: At&t Mobility LLC, 5601 Legacy Drive, Ms-A3, Plano, TX 75024, Phone: (469) 229-7422, Email: [ka8805@att.com](mailto:ka8805@att.com)

Michael P Goggin, 123 N. Orchid Street (Lat: 29.285278 Lon: -81.067056), Type: Tower,  
Structure height: 77.7 m, Overall height: 81.4 m  
Registrant: At&t Mobility LLC, 5601 Legacy Drive, Ms-A3, Plano, TX 75024, Phone: (469) 229-7422, Email: [ka8805@att.com](mailto:ka8805@att.com)

B Carter, 1687 West Granada Blvd (Ormond Beach / 002703) (Lat: 29.258917 Lon: -81.117917), Type: Tower, Structure height: 92.1 m, Overall height: 97.2 m  
Registrant: American Towers, Inc., 1898 Leland Drive, Marietta, GA 30067, Phone: (678) 265-6770

Lewis M Heaster, Off Tymber Creek Rd (Lat: 29.258056 Lon: -81.129167), Type: Tower,  
Structure height: 90.5 m, Overall height: 91.5 m  
Registrant: Lewis Towers, Inc., 700 W. Granada Blvd. Suite 203, Ormond Beach, FL 32174, Phone: (386) 673-6262, Email: [lheaster@bellsouth.net](mailto:lheaster@bellsouth.net)

Elizabeth Birriel, Se Quadrant Of I-10 And Us1 Interchange (Lat: 29.336694 Lon: -81.130111), Type: Tower, Structure height: 48.7 m, Overall height: 48.7 m, Licensee ID: L00001437  
Registrant: State Of Florida, 605 Suwannee St. Ms 90, Tallahassee, FL 32399-0450, Phone: (850) 410-5600

Rick Suarez, 4901 W. Granada (Lat: 29.227333 Lon: -81.290139), Type: Tower,  
Structure height: 85.6 m, Overall height: 87.8 m  
Registrant: At&t Mobility LLC, 5601 Legacy Drive, Ms-A3, Plano, TX 75024, Phone: (469) 229-7422, Email: [ka8805@att.com](mailto:ka8805@att.com)

Rick Suarez, 4901 W. Granada (Lat: 29.227333 Lon: -81.290139), Type: Tower,  
Structure height: 85.6 m, Overall height: 87.8 m, Licensee ID: L00000732  
Registrant: New Cingular Wireless Pcs, LLC, 5601 Legacy Drive, Ms-A3, Plano, TX 75024, Phone: (469) 229-7422, Email: [ka8805@att.com](mailto:ka8805@att.com)

RICK SUAREZ, 2341 W. Granada Blvd (Lat: 29.255028 Lon: -81.150278), Type: Tower,  
Structure height: 78.6 m, Overall height: 80 m  
Registrant: At&t Mobility LLC, 5601 Legacy Drive, Ms:a-3, Plano, TX 75024, Phone: (469) 229-7471, Email: [lq5201@att.com](mailto:lq5201@att.com)

RICK SUAREZ, 123 N. Orchid Street (Lat: 29.285278 Lon: -81.067056), Type: Tower,  
Structure height: 77.7 m, Overall height: 81.4 m  
Registrant: At&t Mobility LLC, 5601 Legacy Drive, Ms:a-3, Plano, TX 75024, Phone: (469) 229-7471, Email: [lq5201@att.com](mailto:lq5201@att.com)

RICK SUAREZ, 2341 W. Granada Blvd (Lat: 29.255028 Lon: -81.150278), Type: Tower,  
Structure height: 78.6 m, Overall height: 80 m  
Registrant: At&t Mobility LLC, 5601 Legacy Drive, Ms:a-3, Plano, TX 75024, Phone: (469) 229-7471, Email: [lq5201@att.com](mailto:lq5201@att.com)

RICK SUAREZ, 123 N. Orchid Street (Lat: 29.285278 Lon: -81.067056), Type: Tower,  
Structure height: 77.7 m, Overall height: 81.4 m, Licensee ID: L00001084  
Registrant: Orlando Smsa Limited Partnership, 5601 Legacy Drive, Ms:a-3, Plano, TX 75024, Phone: (469) 229-7471, Email: [lq5201@att.com](mailto:lq5201@att.com)

RICK SUAREZ, 4901 W. Granada (Lat: 29.227333 Lon: -81.290139), Type: Tower,  
Structure height: 85.6 m, Overall height: 87.8 m  
Registrant: At&t Mobility LLC, 5601 Legacy Drive, Ms:a-3, Plano, TX 75024, Phone: (469) 229-7471, Email: [lq5201@att.com](mailto:lq5201@att.com)

Rick Suarez, 2341 W. Granada Blvd (Lat: 29.255028 Lon: -81.150278), Type: Tower,  
Structure height: 78.6 m, Overall height: 79.9 m  
Registrant: At&t Mobility LLC, 5601 Legacy Drive, Ms:a-3, Plano, TX 75024, Phone: (469) 229-7471, Email: [lq5201@att.com](mailto:lq5201@att.com)

Rick Suarez, 2341 W. Granada Blvd (Lat: 29.255028 Lon: -81.150278), Type: Tower, Structure height: 78.6 m, Overall height: 79.9 m  
Registrant: At&t Mobility LLC, 5601 Legacy Drive, Ms:a-3, Plano, TX 75024, Phone: (469) 229-7471, Email: [lg5201@att.com](mailto:lg5201@att.com)

Sr 40 2 Mi W Of I-95 (Lat: 29.255000 Lon: -81.150278), Type: Tower, Structure height: 76.2 m, Overall height: 80.8 m  
Registrant: Bellsouth Mobility Inc, 100 Technology Park Ste 100, Lake Mary, FL 32746, Phone: (407) 325-0022

Sr 40 2 Mi W Of I-95 (Lat: 29.255000 Lon: -81.150278), Type: Tower, Structure height: 76.2 m, Overall height: 80.8 m  
Registrant: Bellsouth Mobility Inc, 500 Technology Park, Lake Mary, FL 32746, Phone: (407) 325-0022

6.4 Mi Wsw (Lat: 29.266111 Lon: -81.228333), Type: Tower, Structure height: 92 m, Overall height: 92 m  
Registrant: Communication Educational Association, 1485 Us 1 S, Saint Augustine, FL 32086, Phone: (904) 829-9200

I-95 & Tymber Lake Rd (Lat: 29.302778 Lon: -81.132500), Type: Tower, Structure height: 28.9 m, Overall height: 30.4 m  
Registrant: Apt Tampa Orlando Inc, 8410 W Bryn Mawr Ste 1100, Chicago, IL 60631, Phone: (773) 399-8846, Email: [kirl@aerial1.com](mailto:kirl@aerial1.com)

1687 W Tranada Blvd (Lat: 29.259167 Lon: -81.114167), Type: Tower, Structure height: 97.5 m, Overall height: 97.5 m  
Registrant: Opm Usa Inc, 325 Interstate Boulevard, Sarasota, FL 34240, Phone: (941) 379-4455

Ormond Beach (Lat: 29.259167 Lon: -81.114167), Type: Tower, Structure height: 97.5 m, Overall height: 97.5 m  
Registrant: Opm Usa Inc, 325 Interstate Boulevard, Sarasota, FL 34240, Phone: (941) 379-4455

123 N. Orchid Street (Lat: 29.285278 Lon: -81.066944), Type: Tower, Structure height: 76.2 m, Overall height: 80.8 m  
Registrant: Bellsouth Mobility Inc, 1101 Greenwood Blvd., Lake Mary, FL 32746, Phone: (407) 325-0022

121 Bennett Ln (Lat: 29.275000 Lon: -81.074167), Type: Tower, Structure height: 108.2 m, Overall height: 110.3 m  
Registrant: Time Warner Entertainment Advance Newhouse Partnership, 2251 Lucien Way Ste 320, Mailland, FL 32751, Phone: (407) 660-5524

Tomoka Road (Lat: 29.254444 Lon: -81.229722), Type: Tower, Structure height: 151.5 m, Overall height: 152.4 m  
Registrant: Ark Communications Network, 106 Tate Court, Orlando, FL 32828, Phone: (407) 273-5515

6 Miles N.W Of City (Lat: 29.353056 Lon: -81.136667), Type: Tower, Structure height: 42.7 m, Overall height: 48.8 m  
Registrant: Opm-Usa(2726), 325 Interstate Blvd, Sarasota, FL 34240, Phone: (941) 379-4455, Email: [dwane@opm-usa.com](mailto:dwane@opm-usa.com)

Off Tymber Creek Rd (Lat: 29.258056 Lon: -81.129167), Type: Tower, Structure height: 90.5 m, Overall height: 91.5 m  
Registrant: Lewis Towers Inc, 15 Moss Point Dr, Ormond Beach, FL 32174, Phone: (904) 673-4066, Email: [heasterh@aol.com](mailto:heasterh@aol.com)

Twr 1 - 0.5 Km W Of Nova Rd In Mobile Home Park (Lat: 29.269167 Lon: -81.081667), Type: 4ta1, Structure height: 61.9 m, Overall height: 61.9 m  
Registrant: Wings Communications Inc DbA , 432 S Nova Rd, Ormond Beach, FL 32174, Phone: (904) 677-4122

Twr 2 - 0.5 Km W Of Nova Rd In Mobile Home Park (Lat: 29.269167 Lon: -81.081667), Type: 4ta2, Structure height: 61.9 m, Overall height: 61.9 m

Registrant: Wings Communications Inc Dba , 432 S Nova Rd, Ormond Beach, FL 32174,  
Phone: (904) 677-4122

Twr 3 - 0.5 Km W Of Nova Rd In Mobile Home Park (Lat: 29.269167 Lon: -81.081667),  
Type: 4ta3, Structure height: 61.9 m, Overall height: 61.9 m  
Registrant: Wings Communications Inc Dba , 432 S Nova Rd, Ormond Beach, FL 32174,  
Phone: (904) 677-4122

Twr 4 - 0.5 Km W Of Nova Rd In Mobile Home Park (Lat: 29.269167 Lon: -81.081667),  
Type: 4ta4, Structure height: 61.9 m, Overall height: 61.9 m  
Registrant: Wings Communications Inc Dba , 432 S Nova Rd, Ormond Beach, FL 32174,  
Phone: (904) 677-4122

405 Lincoln (Lat: 29.353333 Lon: -81.137222), Type: Tower, Structure height: 48.2 m,  
Overall height: 48.2 m  
Registrant: Opm Usa Inc, 325 Interstate Blvd, Sarasota, FL 34240, Phone: (941) 379-  
4455, Email: [fla\\_site@aol.com](mailto:fla_site@aol.com)

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# Exhibit D

Tower Structure Locations

**CenturyLink® Prism™ TV**  
**"IT'S EXACTLY WHAT WE SIGNED UP FOR."** - Susan P.

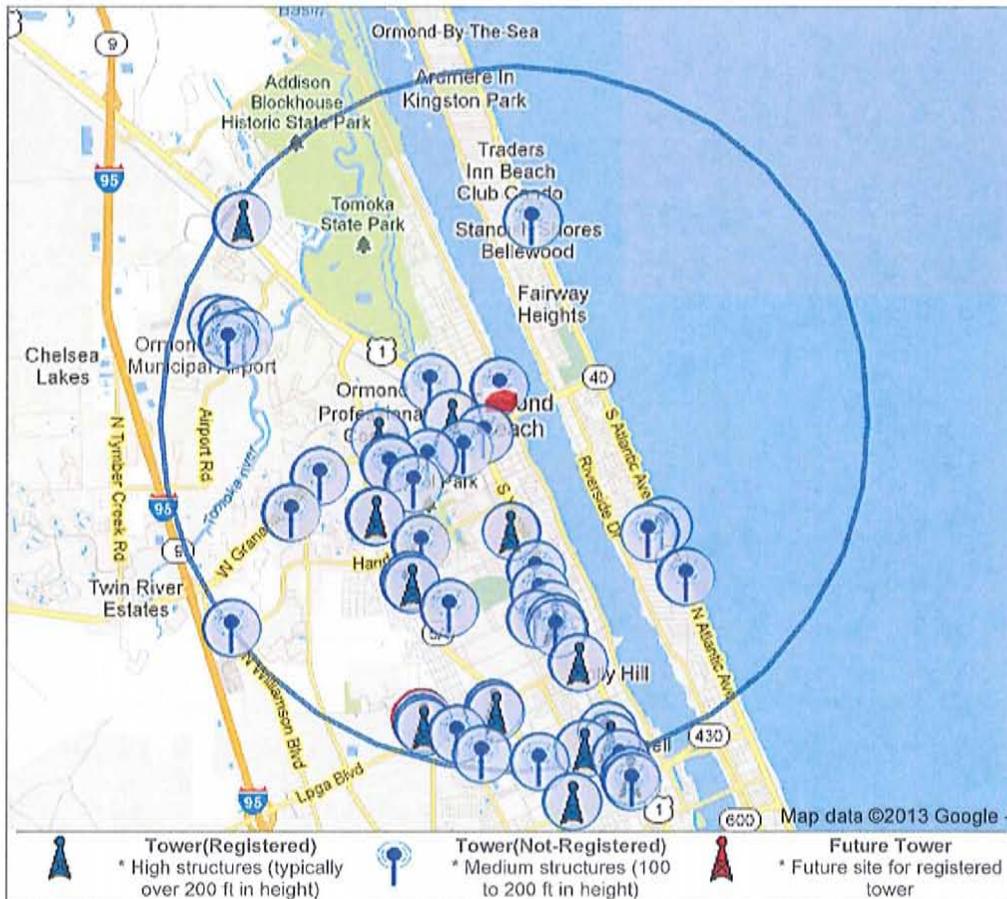
Details

See what real customers are saying about Prism™ TV »





• Tower Structures - (22 S Beach St, Ormond Beach, FL 32174)



**Tower Search Results**

- Alert!** 53 Towers (21 Registered,32 Not Registered) found within 4.00 miles of 22 S Beach St, Ormond Beach, FL 32174.
- Info!** The NEAREST Tower is .38 miles away and is owned by Volusia County School Board.
- Alert!** One New Tower Application found within 4.00 miles of 22 S Beach St, Ormond Beach, FL 32174.

Tower Type	ID Num	Site Owner	Height	Dist
Registered	(1)	<a href="#">Orlando Smsa Limited Partnership</a>	267 feet	.73 miles
	(2)	<a href="#">Capital Telecom</a>	160 feet	1.15 miles
	(3)	<a href="#">Memorial Hospital - Ormond Beach</a>	187 feet	1.57 miles
	(4)	<a href="#">Wings Communications Inc Db a = Wele Radio</a>	203 feet	1.90 miles
	(5)	<a href="#">Wings Communications Inc Db a = Wele Radio</a>	203 feet	1.90 miles
	(6)	<a href="#">Wings Communications Inc Db a = Wele Radio</a>	203 feet	1.90 miles
	(7)	<a href="#">Wings Communications Inc Db a = Wele Radio</a>	203 feet	1.90 miles
	(8)	<a href="#">Verizon Wireless Personal Communications Lp</a>	200 feet	2.07 miles
	(9)	<a href="#">Public Radio, Inc.</a>	373 feet	2.14 miles

	(10)	<a href="#">Spectrasite Communications, Llc. Through American Towers, Llc.</a>	216 feet	2.60 miles
	(11)	<a href="#">Orlando Smsa Limited Partnership</a>	263 feet	2.97 miles
	(12)	<a href="#">Sba Towers, Inc</a>	272 feet	3.00 miles
	(13)	<a href="#">Global Tower, Llc</a>	350 feet	3.22 miles
	(14)	<a href="#">Black Crow Media, Llc</a>	196 feet	3.29 miles
	(15)	<a href="#">Black Crow Media, Llc</a>	196 feet	3.31 miles
	(16)	<a href="#">American Towers, Llc.</a>	315 feet	3.47 miles
	(17)	<a href="#">Pinnacle Towers Llc</a>	320 feet	3.48 miles
	(18)	<a href="#">City Of Ormond Beach, Florida</a>	31 feet	3.61 miles
	(19)	<a href="#">Verizon Wireless Personal Communications Lp</a>	124 feet	3.80 miles
	(20)	<a href="#">New Cingular Wireless Services, Inc.</a>	310 feet	3.88 miles
	(21)	<a href="#">Spectrasite Communications, Llc. Through American Towers, Llc.</a>	192 feet	3.96 miles
	Not Registered	(1)	<a href="#">Volusia County School Board</a>	350 feet .38 miles
		(2)	<a href="#">Blank</a>	211 feet .38 miles
		(3)	<a href="#">Mcfayden Bc Ltd. Partnership</a>	349 feet .67 miles
		(4)	<a href="#">Bellsouth Mobility Inc</a>	254 feet 1.04 miles
		(5)	<a href="#">Gloria Bell Byrd</a>	349 feet 1.07 miles
		(6)	<a href="#">Time Warner Entertainment Advance</a>	362 feet 1.35 miles
		(7)	<a href="#">T-mobile</a>	155 feet 1.51 miles
		(8)	<a href="#">T-mobile</a>	150 feet 1.53 miles
		(9)	<a href="#">Ormond Communicaitons, Inc.</a>	352 feet 1.56 miles
		(10)	<a href="#">Thomas H. Moffit Jr</a>	193 feet 1.68 miles
		(11)	<a href="#">Wireless Vision, Llc</a>	170 feet 1.77 miles
		(12)	<a href="#">Volusia County School Board</a>	90 feet 1.96 miles
		(13)	<a href="#">Midchael A &amp; Cynthia L Kulisky</a>	372 feet 1.99 miles
		(14)	<a href="#">Ocean Ritz Of Daytona Condominium</a>	220 feet 2.04 miles
		(15)	<a href="#">Joy C. Byron</a>	344 feet 2.05 miles
		(16)	<a href="#">Primeco Personal Communications Lp</a>	128 feet 2.06 miles
		(17)	<a href="#">Agape Of Central Florida, Inc.</a>	347 feet 2.06 miles
		(18)	<a href="#">Blank</a>	163 feet 2.06 miles
		(19)	<a href="#">American Tower Lp</a>	372 feet 2.19 miles
		(20)	<a href="#">Capital Telecom, Llc</a>	160 feet 2.34 miles
		(21)	<a href="#">T-mobile Usa Inc.</a>	232 feet 2.56 miles
		(22)	<a href="#">Capital Telecom Acquisition, Llc</a>	160 feet 2.79 miles
		(23)	<a href="#">Towercom Iii, Llc</a>	148 feet 3.29 miles
		(24)	<a href="#">Volusia County School Board</a>	60 feet 3.29 miles
		(25)	<a href="#">Johnson Communications Corp.</a>	300 feet 3.37 miles
		(26)	<a href="#">Ormond Beach Municipal Airport</a>	51 feet 3.44 miles
		(27)	<a href="#">Holly Hill Radio Partners</a>	325 feet 3.45 miles
		(28)	<a href="#">Ormond Beach Municipal Airport</a>	25 feet 3.48 miles
		(29)	<a href="#">Blank</a>	300 feet 3.51 miles
		(30)	<a href="#">Media Star Communication</a>	182 feet 3.67 miles
		(31)	<a href="#">Crown Castle</a>	160 feet 3.93 miles
		(32)	<a href="#">Emergency Mangement And Communications</a>	190 feet 3.95 miles
	Future	(1)	<a href="#">Black Crow Broadcasting, Inc.</a>	350 feet 3.24 miles

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### GPS Fleet Tracking

[www.Sage-Quest.com](http://www.Sage-Quest.com)

Increase Fleet Productivity Get a Free Demonstration



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# Exhibit E

Antenna Site Locations

# Exhibit E

Antenna Site Locations

## GPS Fleet Tracking

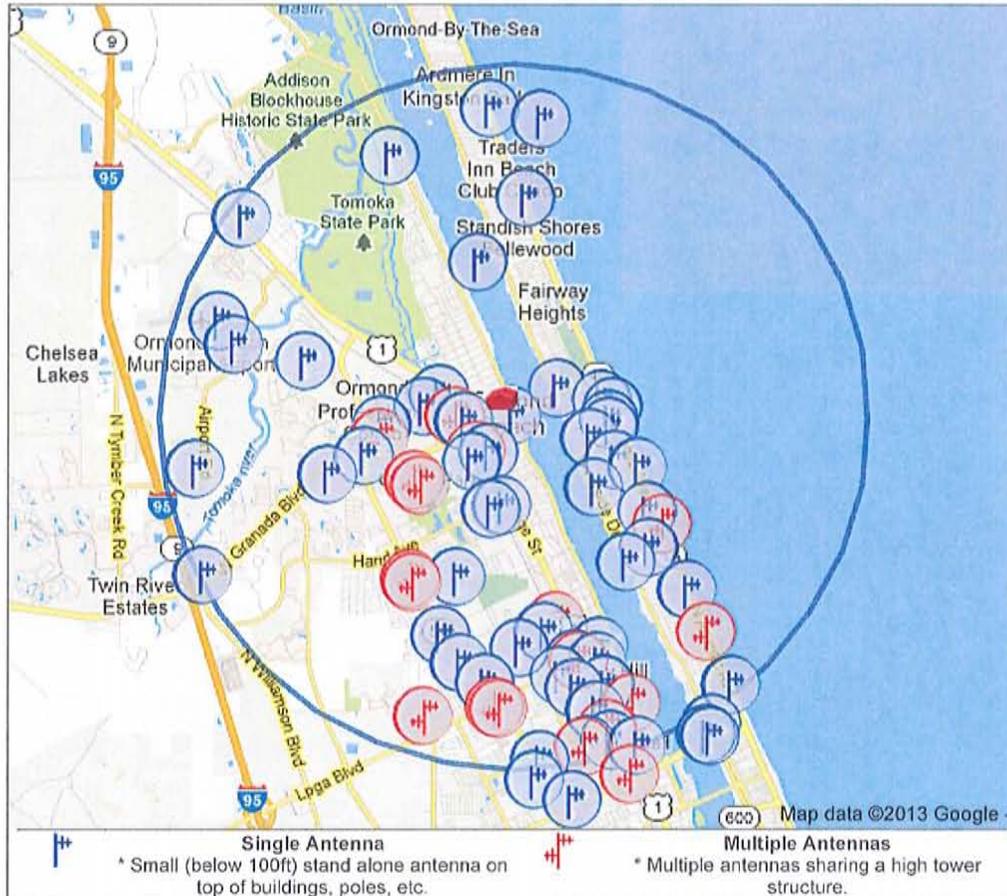
[www.Sage-Quest.com](http://www.Sage-Quest.com)

Increase Fleet Productivity Get a Free Demonstration



AdChoices

• **Antenna Sites - (22 S Beach St, Ormond Beach, FL 32174)**



### Antenna Search Results!

**Alert!** 150 Antennas found within 4.00 miles of 22 S Beach St, Ormond Beach, FL 32174.

Site Type	Site Num	Antenna Owner	Height	Dist	
	(1)	<a href="#">County Of Volusia</a>	300 feet	.71 miles	
		<a href="#">Nextel License Holdings 1, Inc.</a>	265 feet	.73 miles	
		<a href="#">Volusia, County Of</a>	267 feet	.73 miles	
		<a href="#">Clearwire Spectrum Holdings Iii Llc</a>	267 feet	.73 miles	
		(2)	<a href="#">Halifax Tile &amp; Floor Covering Inc</a>	NA	1.31 miles
			<a href="#">Paging Network Of America, Inc.</a>	351 feet	1.31 miles
			<a href="#">Paging Network Of America, Inc.</a>	351 feet	1.31 miles
		(3)	<a href="#">Arch Wireless License Co., Llc</a>	362 feet	1.34 miles
			<a href="#">Paging Network Of America, Inc.</a>	361 feet	1.34 miles
			<a href="#">Mci Worldcom Network Services Inc</a>	353 feet	1.33 miles
		(4)	<a href="#">Arch Wireless License Co., Llc</a>	362 feet	1.34 miles
			<a href="#">Metrocall Usa, Inc.</a>	NA	2.05 miles
		(5)	<a href="#">Paging Network Of America, Inc., Debtor-in-possession</a>	243 feet	2.05 miles
			<a href="#">Holly Hill Rhf Housing Inc Db a Bishops Glen</a>	NA	2.13 miles
				<a href="#">Master Craft Plumbing Contr Inc</a>	NA
		<a href="#">Clearwire Spectrum Holdings Iii Llc</a>	373 feet	2.14 miles	
		<a href="#">Metrocall Usa Inc</a>	371 feet	2.13 miles	
		<a href="#">Arch Wireless License Co., Llc</a>	NA	2.13 miles	
		<a href="#">Arch Wireless License Co., Llc</a>	371 feet	2.13 miles	

(6)	<a href="#">Nextel License Holdings 1, Inc.</a>	213 feet	2.60 miles
	<a href="#">Nextel License Holdings 1, Inc.</a>	213 feet	2.60 miles
(7)	<a href="#">H. Scott Wetmore</a>	NA	2.99 miles
	<a href="#">H. Scott Wetmore</a>	NA	2.99 miles
	<a href="#">Mc Queen, Lawrence</a>	98 feet	2.99 miles
	<a href="#">Arch Wireless License Co., Llc</a>	NA	2.99 miles
	<a href="#">Metrocall Usa Inc</a>	NA	2.99 miles
	<a href="#">Arch Communications Enterprises Llc</a>	300 feet	2.99 miles
	<a href="#">Ams Spectrum Holdings, Llc</a>	197 feet	2.99 miles
	<a href="#">J.e.r. Beepers, Inc.</a>	270 feet	2.99 miles
	<a href="#">Skytel Spectrum Llc</a>	NA	2.99 miles
	<a href="#">Porta-phone Paging Licensee Corporation</a>	NA	2.99 miles
	<a href="#">Daytona Beach, City Of</a>	NA	2.99 miles
	<a href="#">Trs Wireless, Inc.</a>	270 feet	2.99 miles
	<a href="#">All Florida Paging, Inc.</a>	NA	2.99 miles
	<a href="#">Simor, Inc.</a>	NA	2.99 miles
	<a href="#">Simor, Inc.</a>	NA	2.99 miles
	<a href="#">Associated Communications Group, Inc.</a>	NA	2.99 miles
	<a href="#">Simor, Inc.</a>	NA	2.99 miles
	<a href="#">Skytel Spectrum Llc</a>	NA	2.99 miles
	<a href="#">Simor, Incorporated</a>	NA	2.99 miles
	<a href="#">Trs Wireless, Inc.</a>	344 feet	2.99 miles
(8)	<a href="#">Southern Stone Communications, Llc</a>	350 feet	3.22 miles
	<a href="#">Bizcom Usa, Inc.</a>	NA	3.24 miles
(9)	<a href="#">Ams Spectrum Holdings, Llc</a>	299 feet	3.37 miles
	<a href="#">Nextel License Holdings 3, Inc.</a>	NA	3.37 miles
	<a href="#">Pagemart Ii Inc</a>	299 feet	3.37 miles
	<a href="#">Nextel License Holdings 1, Inc.</a>	NA	3.37 miles
	<a href="#">Pagemart Ii Inc</a>	299 feet	3.37 miles
	<a href="#">Ferran Services &amp; Contracting Inc</a>	NA	3.37 miles
	<a href="#">State Of Florida, Fish &amp; Wildlife Conservation Commission</a>	305 feet	3.37 miles
	<a href="#">Trs Wireless, Inc.</a>	302 feet	3.37 miles
	<a href="#">Johnson, Bruce E</a>	NA	3.37 miles
	<a href="#">New Age Wireless Corp.</a>	302 feet	3.37 miles
	<a href="#">Rhea, Bruce A</a>	299 feet	3.37 miles
	<a href="#">Rogers, Kenneth E</a>	NA	3.37 miles
	<a href="#">Florida Mobile Telecom,inc.</a>	NA	3.37 miles
	<a href="#">Ams Spectrum Holdings, Llc</a>	299 feet	3.37 miles
	<a href="#">Valentin, Harry</a>	NA	3.37 miles
	<a href="#">Nextel License Holdings 3, Inc.</a>	NA	3.37 miles
	<a href="#">Nextel License Holdings 1, Inc.</a>	299 feet	3.37 miles
	<a href="#">Nextel License Holdings 3, Inc.</a>	NA	3.37 miles
	<a href="#">Nextel License Holdings 3, Inc.</a>	NA	3.37 miles
(10)	<a href="#">Daves Communications Inc</a>	315 feet	3.47 miles
	<a href="#">Arch Wireless License Co., Llc</a>	NA	3.47 miles
	<a href="#">Metrocall Usa, Inc.</a>	313 feet	3.47 miles
	<a href="#">Nextel License Holdings 3 Inc DbA Nextel Communications</a>	NA	3.47 miles
	<a href="#">Usa Mobility Wireless, Inc.</a>	348 feet	3.47 miles
	<a href="#">Arch Wireless License Co., Llc</a>	NA	3.47 miles
(11)	<a href="#">Ormond Beach Memorial Hospital</a>	180 feet	1.61 miles
	<a href="#">Ormond Beach Memorial Hospital</a>	NA	1.61 miles
(12)	<a href="#">Landau Enterprises Inc DbA Fryers Towing Service</a>	43 feet	3.22 miles
	<a href="#">Landau Enterprises Inc</a>	43 feet	3.22 miles
(13)	<a href="#">Volusia, County Of</a>	310 feet	3.88 miles
	<a href="#">Volusia, County Of</a>	314 feet	3.90 miles
	<a href="#">Flaschberger, Susan L</a>	295 feet	3.89 miles
	<a href="#">Volusia, County Of</a>	314 feet	3.90 miles
	<a href="#">Orlando Smsa Limited Partnership</a>	311 feet	3.88 miles
	<a href="#">New Cingular Wireless Pcs, Llc</a>	311 feet	3.88 miles
	<a href="#">Volusia, County Of</a>	315 feet	3.90 miles
	<a href="#">Volusia, County Of</a>	299 feet	3.90 miles
	<a href="#">County Of Volusia</a>	280 feet	3.90 miles
(14)	<a href="#">New Cingular Wireless Pcs, Llc</a>	205 feet	2.04 miles
	<a href="#">Orlando Smsa Limited Partnership</a>	205 feet	2.04 miles
(15)	<a href="#">Ormond Beach, City Of</a>	190 feet	.57 miles
	<a href="#">Ormond Beach, City Of</a>	180 feet	.57 miles
	<a href="#">Ormond Beach, City Of</a>	180 feet	.57 miles
(16)	<a href="#">Tower Cloud, Inc.</a>	200 feet	2.07 miles
	<a href="#">Clearwire Spectrum Holdings Iii Llc</a>	200 feet	2.07 miles
(17)	<a href="#">Orlando Smsa Limited Partnership</a>	263 feet	2.97 miles
	<a href="#">Clearwire Spectrum Holdings Iii Llc</a>	274 feet	2.97 miles
(18)	<a href="#">Advanced Satellite Inc</a>	207 feet	3.13 miles
	<a href="#">Advanced Satellite Inc</a>	207 feet	3.13 miles
† Single (19)	<a href="#">Lewis Towers, Inc.</a>	NA	2.74 miles
(20)	<a href="#">Usa Mobility Wireless, Inc.</a>	320 feet	3.48 miles
(21)	<a href="#">Nextel License Holdings 1, Inc.</a>	210 feet	3.96 miles
(22)	<a href="#">Taco Bell</a>	NA	.06 miles

(23)	<a href="#">C &amp; C Enterprises Inc</a>	59 feet	.48 miles
(24)	<a href="#">Ormond Heritage Condo Assn</a>	NA	.58 miles
(25)	<a href="#">Pruett &amp; Associates</a>	59 feet	.61 miles
(26)	<a href="#">Cemex Construction Materials Florida, Llc</a>	NA	.67 miles
(27)	<a href="#">First United Methodist Church</a>	NA	.91 miles
(28)	<a href="#">Florida East Coast Railway Co.</a>	72 feet	.91 miles
(29)	<a href="#">Florida East Coast Railway Co.</a>	10 feet	.92 miles
(30)	<a href="#">Florida Power &amp; Light Company</a>	56 feet	.97 miles
(31)	<a href="#">Ocean Inn Inc Dbq Quality Inn &amp; Suites</a>	NA	1.04 miles
(32)	<a href="#">Columbia Medical Center</a>	39 feet	1.11 miles
(33)	<a href="#">Volusia, County Of</a>	NA	1.11 miles
(34)	<a href="#">Maverick Condominium Association</a>	NA	1.15 miles
(35)	<a href="#">Ormond Beach, City Of</a>	95 feet	1.16 miles
(36)	<a href="#">Casa Del Mar</a>	NA	1.25 miles
(37)	<a href="#">Coral Beach Motel</a>	NA	1.52 miles
(38)	<a href="#">Willow Pond</a>	NA	1.55 miles
(39)	<a href="#">Rio Bravo Restaurant Dbq Innovative Restaurant Concepts Inc</a>	NA	1.64 miles
(40)	<a href="#">Riviera Country Club</a>	NA	1.77 miles
(41)	<a href="#">Tarmac America Inc</a>	105 feet	1.83 miles
(42)	<a href="#">Georgian Inn Beach Club Condominium Assn Inc Dbq Georgian Inn Beach Club</a>	NA	1.96 miles
(43)	<a href="#">School Board Of Volusia County Fl</a>	39 feet	2.07 miles
(44)	<a href="#">Cemex Inc</a>	NA	2.21 miles
(45)	<a href="#">Tomoka Elementary School</a>	NA	2.26 miles
(46)	<a href="#">Kuhn S Auto Service Inc Dbq Franks + Move S Used Auto Parts</a>	NA	2.36 miles
(47)	<a href="#">Pelican Bay Country Club Of Daytona Beach Inc</a>	10 feet	2.38 miles
(48)	<a href="#">Eddy Corporation Dbq Mcdonalds</a>	NA	2.51 miles
(49)	<a href="#">R &amp; R Industries Inc</a>	NA	2.54 miles
(50)	<a href="#">Florida East Coast Railway Co.</a>	20 feet	2.58 miles
(51)	<a href="#">Bills Commercial Air Conditioning Inc</a>	NA	2.59 miles
(52)	<a href="#">Beachside Electronics Inc Dbq Coastal Communications</a>	190 feet	2.66 miles
(53)	<a href="#">Holly Hill, City Of</a>	33 feet	2.67 miles
(54)	<a href="#">Holly Hill, City Of</a>	72 feet	2.69 miles
(55)	<a href="#">Holly Hill, City Of</a>	NA	2.86 miles
(56)	<a href="#">D &amp; W Paving Inc</a>	NA	2.94 miles
(57)	<a href="#">Volusia, County Of</a>	NA	3.05 miles
(58)	<a href="#">Florida Dep-recreation And Parks</a>	103 feet	3.06 miles
(59)	<a href="#">Widmaier Oil Co</a>	NA	3.14 miles
(60)	<a href="#">Volusia, County Of</a>	30 feet	3.17 miles
(61)	<a href="#">Riverbend Investment Group, Inc.</a>	NA	3.38 miles
(62)	<a href="#">Cunningham Oil Co</a>	299 feet	3.45 miles
(63)	<a href="#">News Journal Corp</a>	200 feet	3.51 miles
(64)	<a href="#">Ormond Beach, City Of</a>	13 feet	3.59 miles
(65)	<a href="#">Volusia, County Of</a>	NA	3.63 miles
(66)	<a href="#">Communications Service Company</a>	138 feet	3.71 miles
(67)	<a href="#">Kasim Inc Dbq Super 8 Motel Daytona</a>	NA	3.73 miles
(68)	<a href="#">Pine Trail Elementary School</a>	33 feet	3.78 miles
(69)	<a href="#">Labor, James M</a>	95 feet	3.88 miles
(70)	<a href="#">Triester Diplomatic Towers Associates</a>	NA	3.95 miles
(71)	<a href="#">Parsons Transportation Group Inc</a>	98 feet	3.98 miles
(72)	<a href="#">Florida, State Of</a>	322 feet	4.00 miles
(73)	<a href="#">Ormond Beach, City Of</a>	26 feet	1.06 miles
(74)	<a href="#">Renda Broadcasting Corp. Of Nevada</a>	40 feet	1.81 miles
(75)	<a href="#">Clearwire Spectrum Holdings Iii Llc</a>	126 feet	2.24 miles
(76)	<a href="#">Tower Cloud, Inc.</a>	124 feet	3.80 miles

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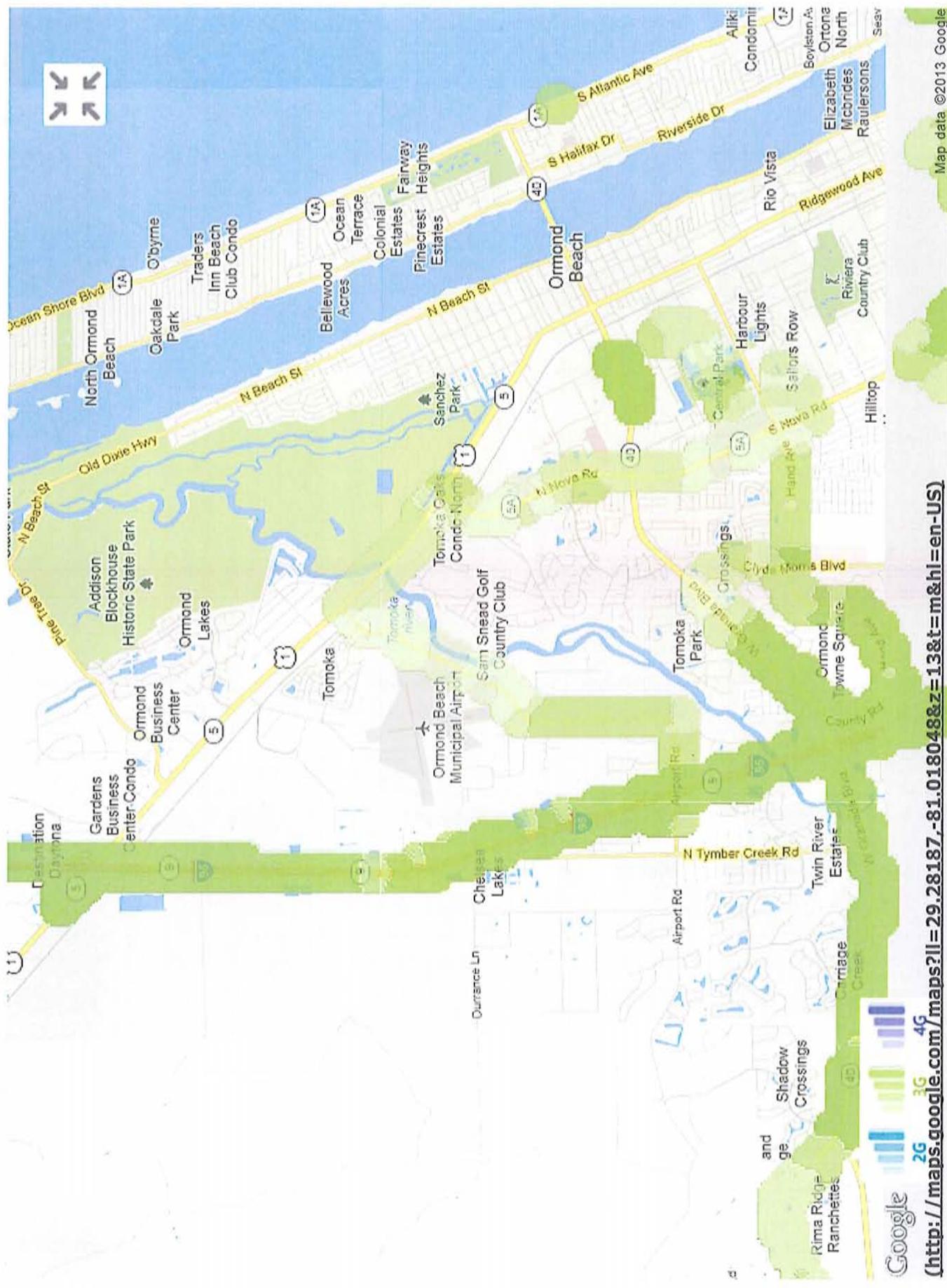


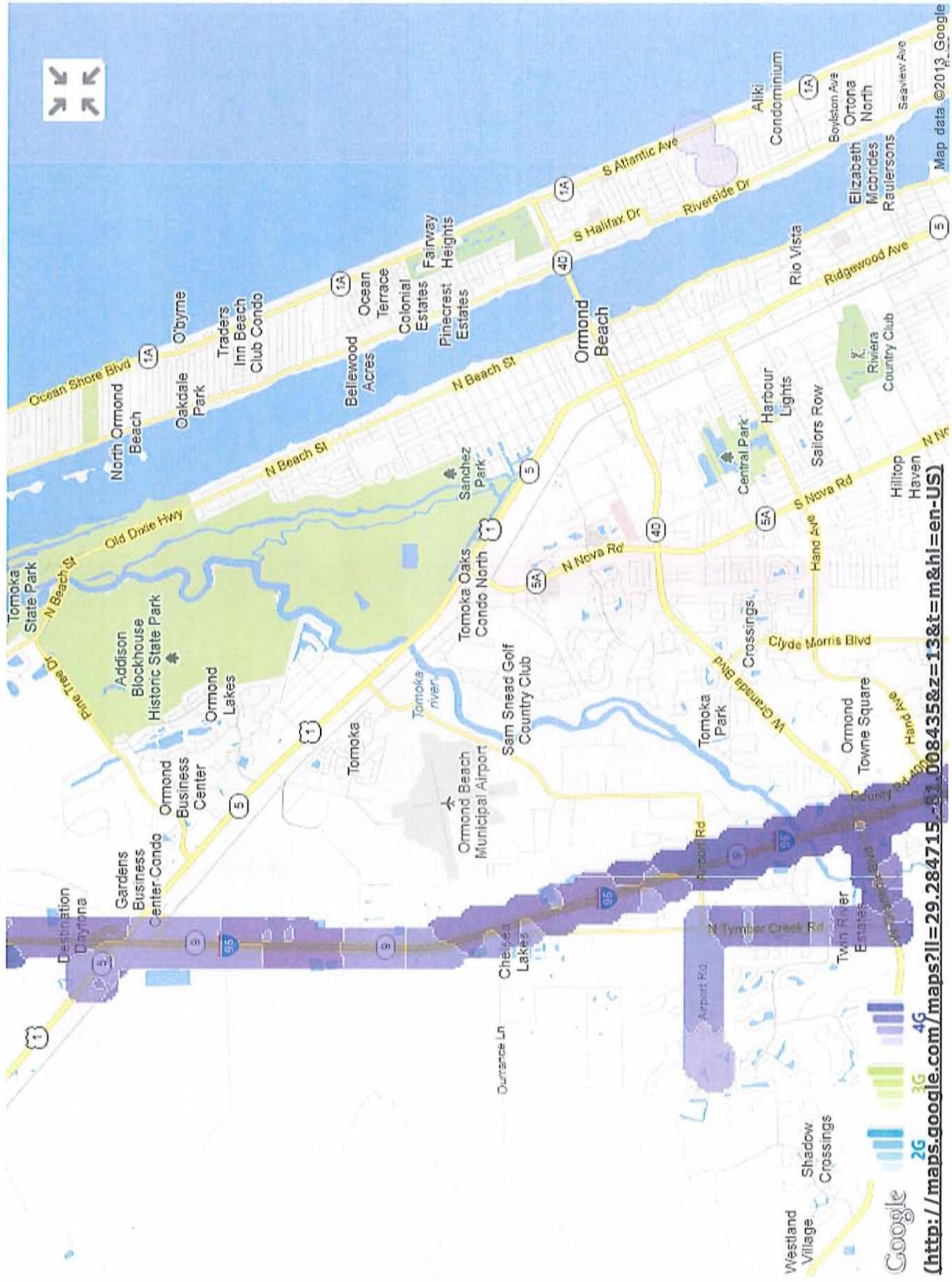
AdChoices

# Exhibit F

Sensorly Coverage Maps for Carriers



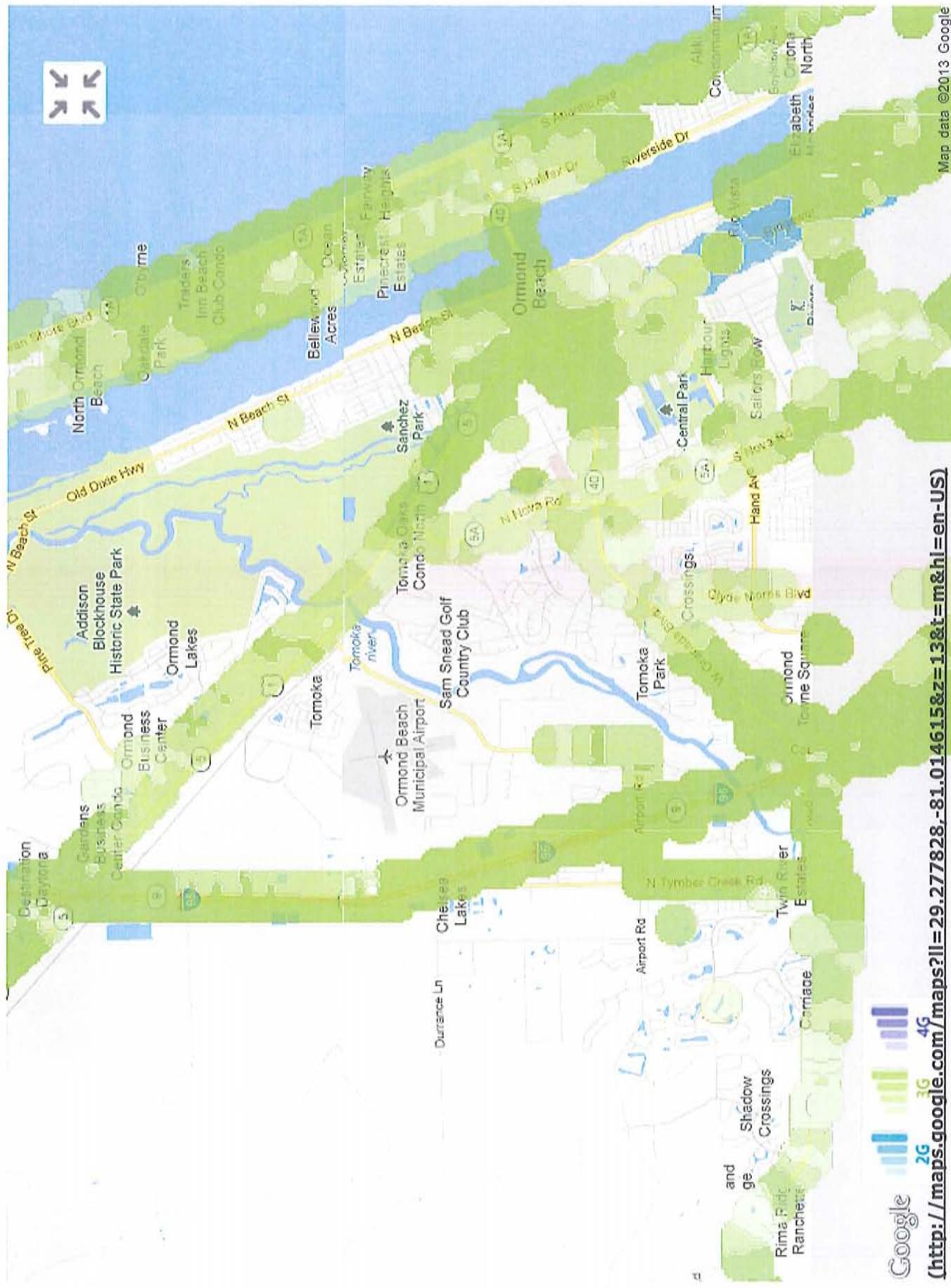


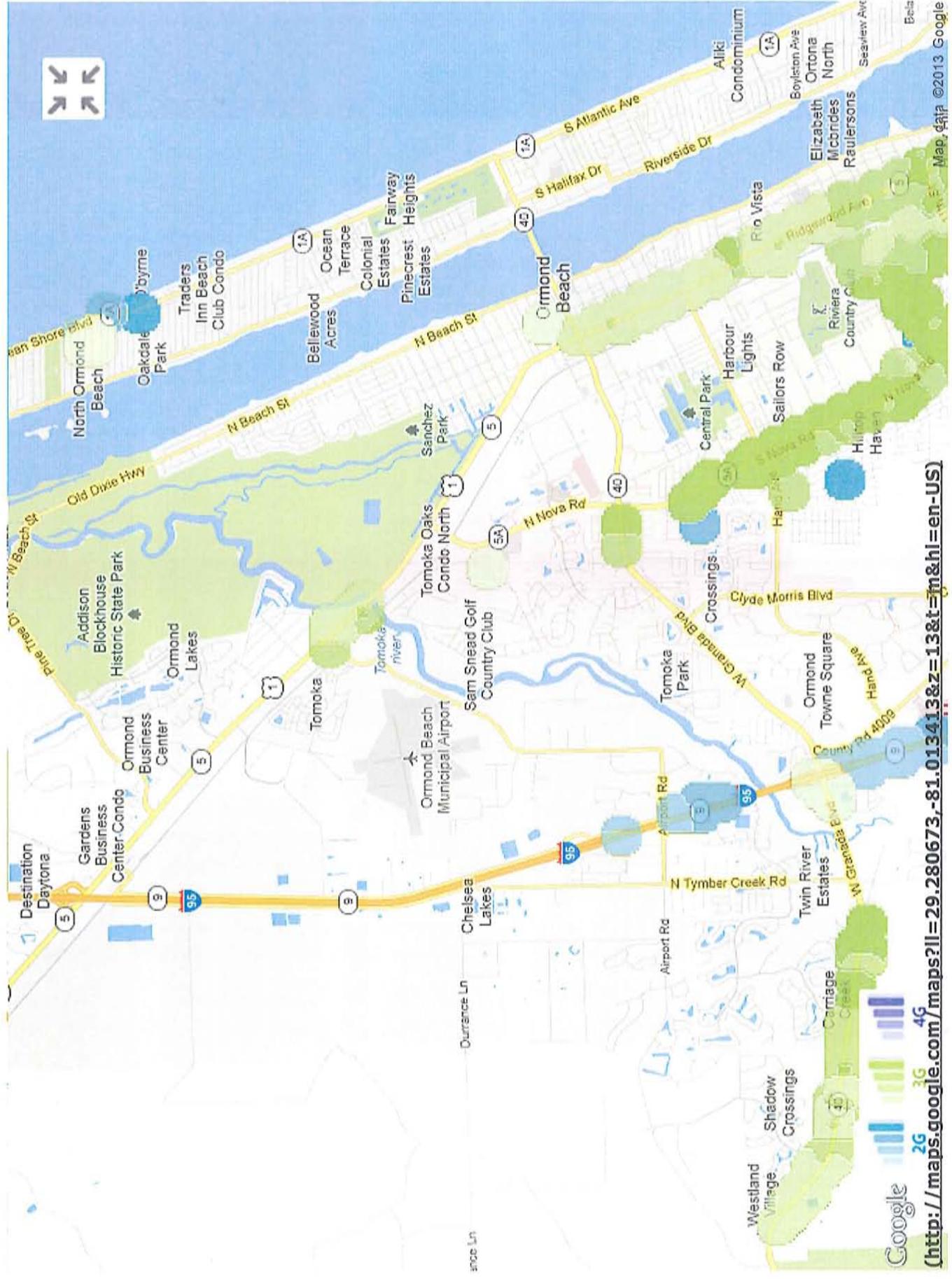






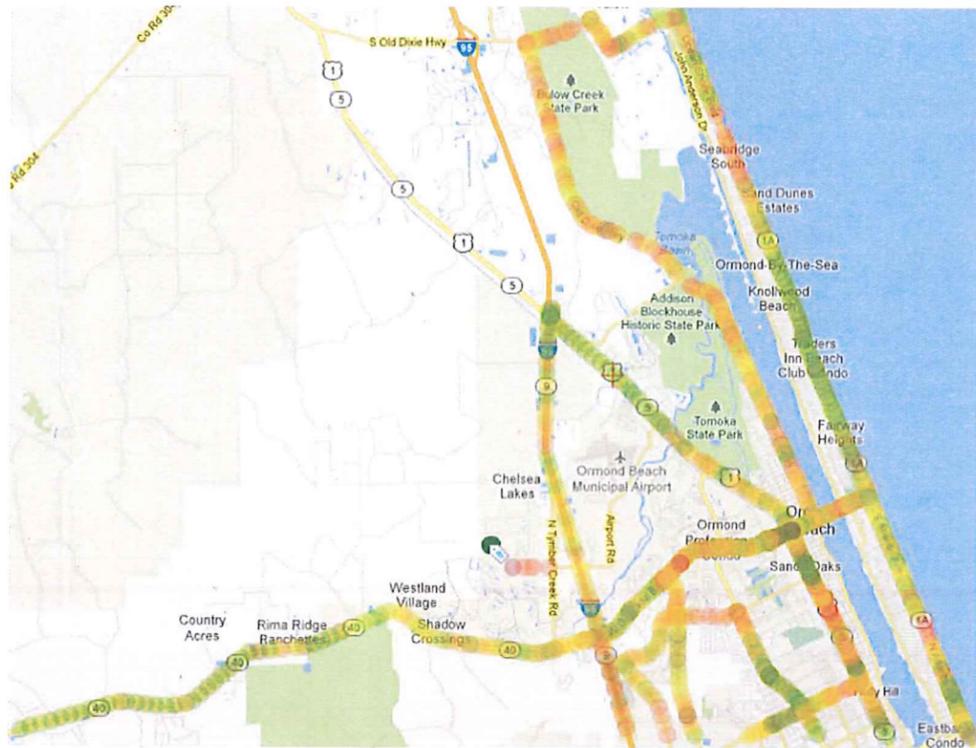
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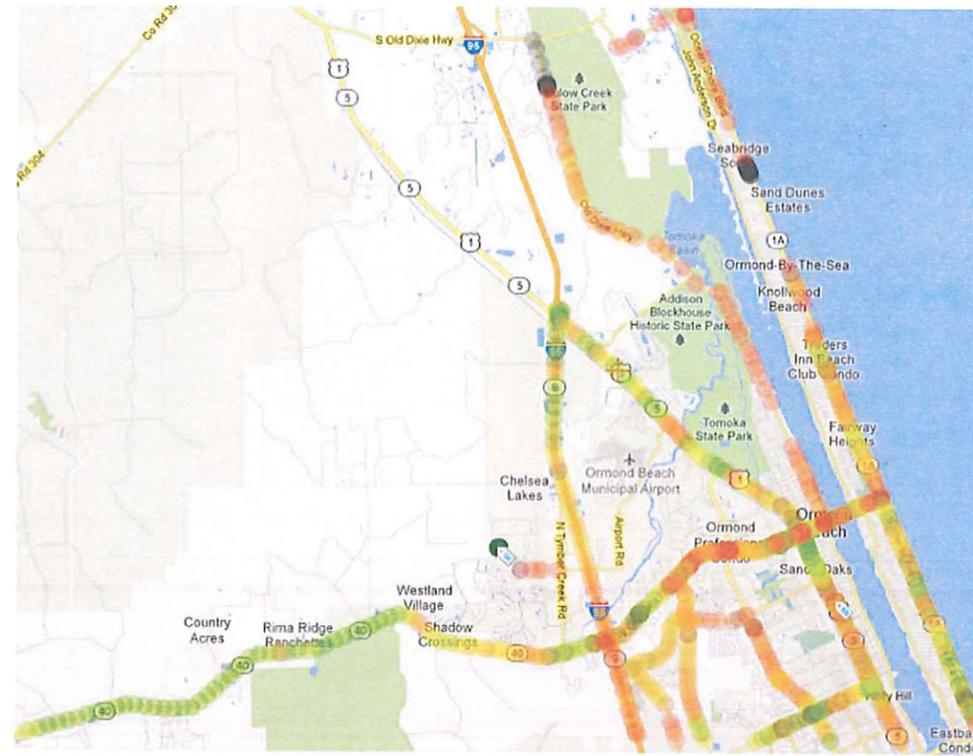
# Exhibit G

Air Card Data Rate Maps



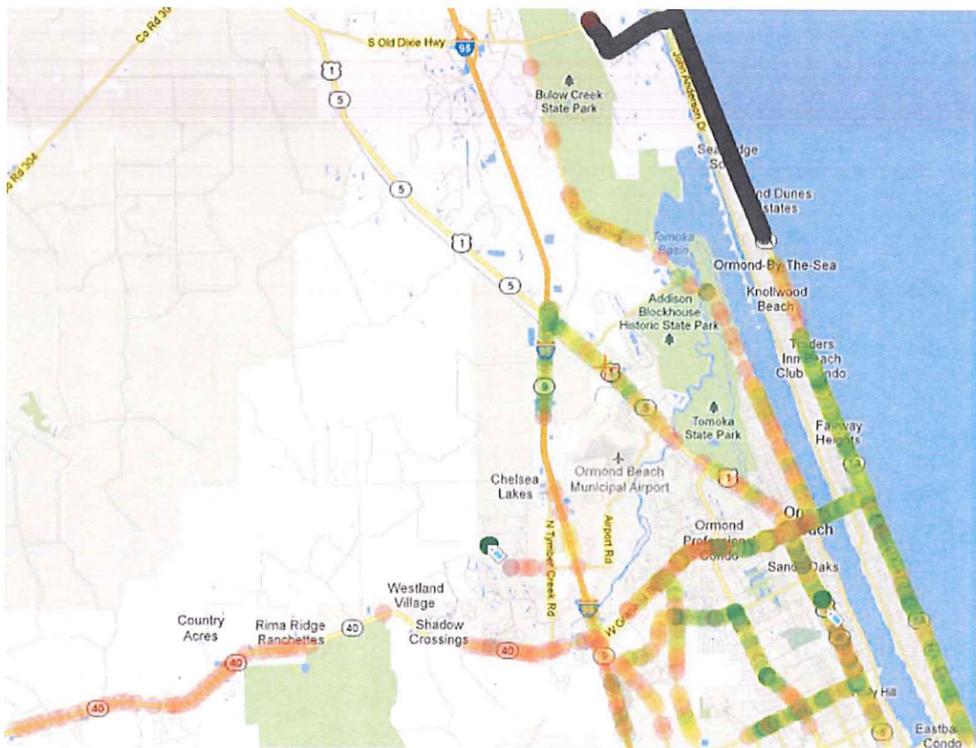
# AT&T

Avg. UL 199.38 Kbps  
 Avg. DL 833.99 Kbps  
 Peak UL 1017.19 Kbps  
 Peak DL 8.12 Mbps



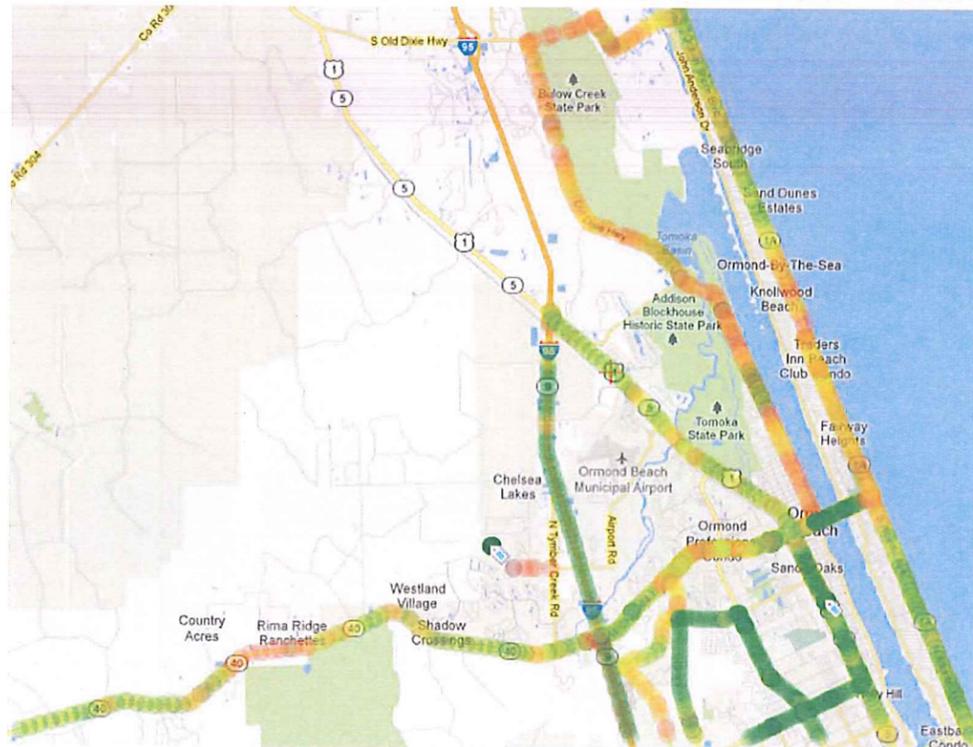
# Sprint

Avg. UL 192.21 Kbps  
 Avg. DL 917.58 Kbps  
 Peak UL 1017.19 Kbps  
 Peak DL 8.12 Mbps



# T-Mobile

Avg. UL 281.65 Kbps  
 Avg. DL 807.95 Kbps  
 Peak UL 1.11 Mbps  
 Peak DL 8.12 Mbps



# Verizon

Avg. UL 318.2 Kbps  
 Avg. DL 2.99 Mbps  
 Peak UL 1017.19 Kbps  
 Peak DL 63.58 Mbps

NE