DIGITAL FORENSICS GUIDE

CELL PHONE LOCATION AND TRACKING FORENSIC

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Methods of Locating Cell Phones

Call Detail Records

The approximate location of a cell phone in reference to a cell tower is the most common method of phone location you will see in cases. This is because this is the easiest type of evidence to obtain.

Precision Location Data i.e. PCMD, RTT or NELOS

In some cases, Network Equipment Location Service (NELOS), Per Call Measurement Data (PCMD) and Real Time Tool (RTT) data may be present in addition to call detail records.

None of these methods contains particularly accurate GPS locations and are highly suspect for any kind of use for determining the location of a cell phone other than a general location that is really no more precise and in many cases less precise than the use of call detail records.

NELOS data is a form of precision location that is performed by AT&T in their network. However, the data does not provide any more specific information than a GPS coordinate with nothing to substantiate its accuracy other than the a "better than xx meters" estimate. It is interesting in this type of data that the data points can vary in accurate by thousands of meters in minutes. NELOS was not created as a method for location people, it is for AT&T's commercial purposes, and is not the same as the emergency location of a cell phone.

Drive Testing

Drive testing is a process that uses radio frequency measuring equipment to analyze the strength of cellular radio signals. This validates the analysis of call detail records.

E-911 Records

This is the process of determining the location of the cell phone in real time. This method delivers an actual geo- location of the phone and is the most accurate means of location a phone based on the wireless phone company.

Phone Based Location

Using the phone itself for location is one of the most accurate methods for locating a cell phone. This would include GPS locations stored in the phone device.

Find my iPhone

This service forces the phone to provide its GPS location via an iCloud or other location account.

Call Detail Records - "The Evidence"

What are they?

Call detail records are the most common form of evidence used in cases involving cell phone location and tracking forensics.

Legal proof of a service provided

Call detail records are proof that the service the customer is paying for; voice, data and text, is being provided. The fact that call detail records are created as the result of the customer's phone using the wireless phone company's network is proof that the service is being provided.

A technical road map of a call

Each call detail record contains technical details such as the date and time of the phone call or text message. Each record may also contain the starting and ending cell tower used for a phone call and in some cases text messages and data sessions.

A financial transaction record

As part of the billing system, the call detail record is summarized into phone bills that are provided to the customer.

How to get call detail records

Account holder can request with notarized letter

This works but does not always result in getting a full set of records, depending on the phone company

Via subpoena from the phone carrier

Language for use in discovery motions and court orders for Call Detail Records and Cell Tower Locations. The items in red should be edited to fit your particular case details.

Via discovery from opposing counsel

Subpoena responses and warrant returns from wireless phone companies will contain specific files that are delivered via email, on disk or via a secure web portal. It is very important that you received all of the files returned to the requester. Also, copies of the original subpoena and or warrant with the affidavit are very helpful for your expert.

There are spreadsheets and documents that provide such information as subscriber information; the call detail records themselves, cell tower location keys, explanation forms and disclaimers. These disclaimers are important, as they provide pertinent information regarding location accuracy or time-zone information. Each carrier stores their records in various formats and below you will find the specific data you should receive organized by four of the major carriers. Other carriers like US Cellular follow a similar pattern.

How are call detail records used?

Associate a phone transaction with a cell tower

Call detail records can contain the cell tower used for a phone call and in some cases, text messages. This associates a phone call with a cell tower location. Based on this limited information, an analyst will determine the approximate location of a cell phone. Note that this is not the location of the phone, but the location of the cell tower.

Show connections between phone numbers

Call detail records can be used determine if one phone has contacted another particular phone number. These connections are used to determine if a person "knows" another person, or in some cases is used as evidence in spoofing cases.

Show frequency of connections

The analysis of the frequency of connections between two or more phone numbers is used to show that one person may be directing the actions of others, or that two or more persons are in collusion.

Show "user" activity

Voice call activity

Voice call activity is the only type of activity that will always result in a record containing cell tower information if the phone call is not a forwarded call.

Call forwarding information

When a phone does not answer a call, i.e. the user simply failed to "pick up" for some reason, the phone has a dead battery and is off the network, or the phone is out of range of a cell tower, the phone calls may be forwarded to a voicemail service, if the phone account has voicemail service.

The fact that calls are forwarded is not an indication of the phone being turned off to hide its location, as there are a number of reasons for a user to fail to "pick up" the phone.

Text message transactions

While all carriers have a short or no retention period for text message content, the fact that a text message was sent or received can be obtained in the call detail records or as a separate report from the phone company. Bear in mind that text messages may be in a single time zone, i.e. always in Central Standard Time or in Pacific Daylight Time depending on the carrier.

Data transactions

Other than showing that a phone is on and connected to the cellular network, data transactions are not reliable enough to be used for location purposes.

How are they used?

Analysis of call detail records is used quite often in criminal cases to attempt locate a person of interest, either as they go about their criminal enterprises, or in relation to a particular incident or crime.

This type of analysis is also used in civil litigation involving vehicle accidents, property damage claims and other types of cases where the location of a particular cell phone at a particular time is of interest.

Cell phone location analysis is also used to locate missing persons who may have their phone with them when they go missing. This type of cell phone location is normally triggered through an exigent circumstances request to the cellular carrier to begin actively "pinging" the cell phone using the E911 location system to attempt to locate the phone.

Most common type of evidence in "Cell Phone Location Maps"

You have the location of the cell tower, NOT the phone. A tenuous relationship to the phone's location…this is NOT triangulation.

The term triangulation is often misused when applied to the analysis of historical call detail records. Call detail records only contain information about a single cell tower used when a call was made. To triangulate the location of any phone or object, for best accuracy you have to have three points or more of reference.

Important Cases regarding obtain phone records or historic cell site location information (CSLI)

Carpenter v. United States

- Issue: Whether the warrantless seizure and search of historical cellphone records revealing the movement f a cellphone user over the course of 127 days is permitted by the fourth Amendment
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Carpenter v. United States

Docket No.	Op. Below	Argument	Opinion	Vote	Author	Term
16-402	6th Cir.	Nov 29, 2017	TBD	TBD	TBD	OT 2017

Issue: Whether the warrantless seizure and search of historical cellphone records revealing the location and movements of a cellphone user over the course of 127 days is permitted by the Fourth Amendment.

United States v. John Boynton Sidbury

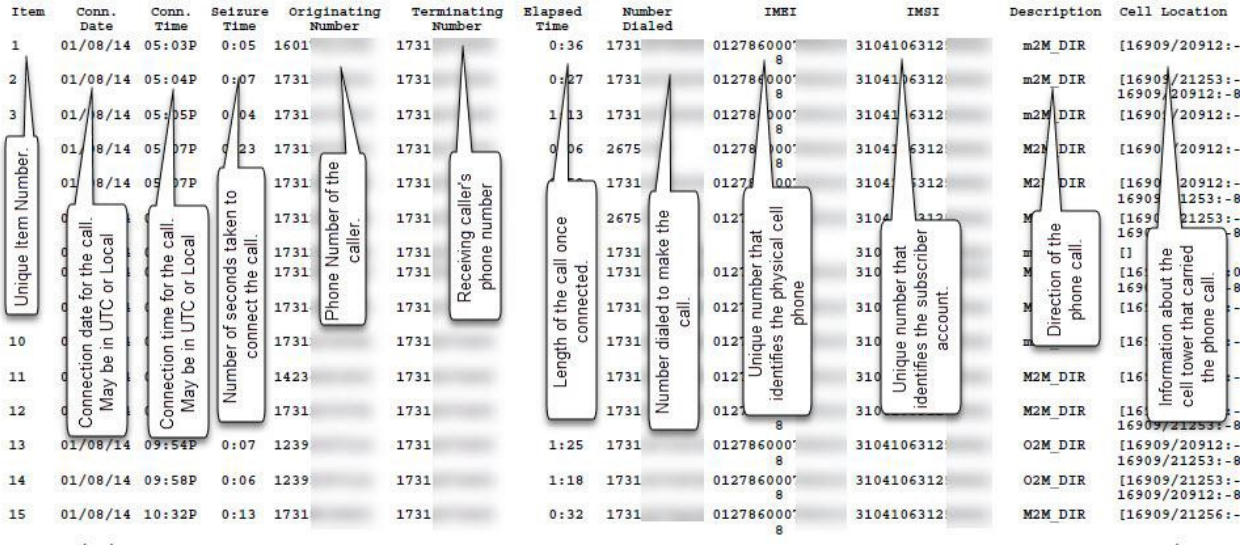
- Raymond Tarlton and Elliot Abrams represented two co-defendants charged in federal court after an investigation by Raleigh PD into marijuana dealing. The case was built on cell tracking and vehicle tracking. They challenged both and United States District Judge Flanagan ultimately ordered the suppression of the fruits of the tracking, adopting the Magistrate Judge's finding that the standard NC LEO cell tracking order is unconstitutionally overbroad.
- In the 3-day evidentiary hearing, it became apparent that this is the standard form used throughout the state in many drug and other investigations to track cell phones. So they thought to pass this along so folks can consider whether to challenge real-time cell phone tracking and have a framework for doing so.

Call Detail Records (Retention)

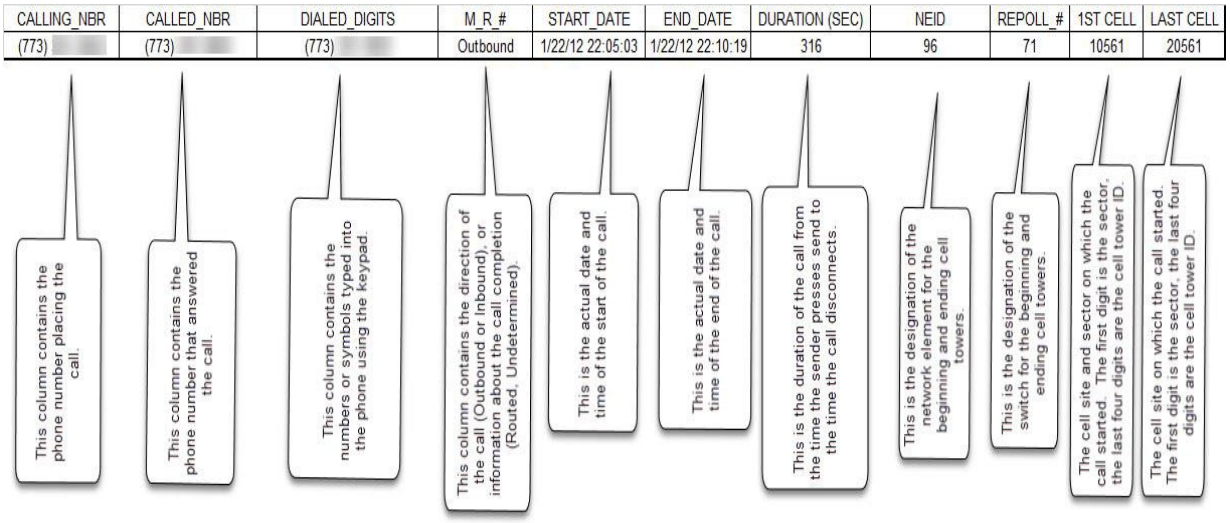
Carrier	Subscriber	Call History Only	Call History with Towers	SMS Content	"Precision Location"
Verizon	7-10 Years	7 Years	Rolling 12 months	3 to 10 days	8 Days
AT&T/Cricket	7 Years	7 Years	7 Years	N/A	8 Days
Sprint	10 Years	18 Months	18 Months	N/A	180 Days
T-Mobile/ Metro PCS	3 to 5 years	23 Months	23 Months	N/A	23 Months
US Cellular	7 Years	Rolling 12 Months	Rolling 12 months	3 to 5 Days	N/A

Call Detail Records Structure

Call Detail Records (AT&T)



Call Detail Records (Sprint)



What About Prepaid aka "Burner" Phones?

What are they?

Pre-Paid Phones

No verification of identity needed and no valid "Subscriber" information. These are phones that can be purchased as a "phone in a box" from big box retail stores. The purchaser contacts the phone carrier and pre-pays for an allotment of time and or data. Normally one or more months of service. The phone can be "re-loaded" with additional time.

How to you get the records?

All wireless or "cell" phones must have a carrier network for operations. These carrier networks are going to be based on one of the major infrastructure systems maintained by Sprint, Verizon, T-Mobile, AT&T, US Cellular or a regional phone company. When you subpoena the phone records, they will usually be provided by the actual phone carrier that maintains the network.

Getting the records

You can find the carrier for the phone number several ways, one of which is to use www.fonefinder.net. When you enter the phone number, fonefinder.net can determine the original carrier or phone company for the number.

However, bear in mind that with modern number porting, i.e. you decide to leave Sprint and subscribe with Verizon, you can take your phone number with you. This is called "porting" your number. Since fonefinder.net does not have any porting information, the web site can only tell you the original wireless company for the phone number.

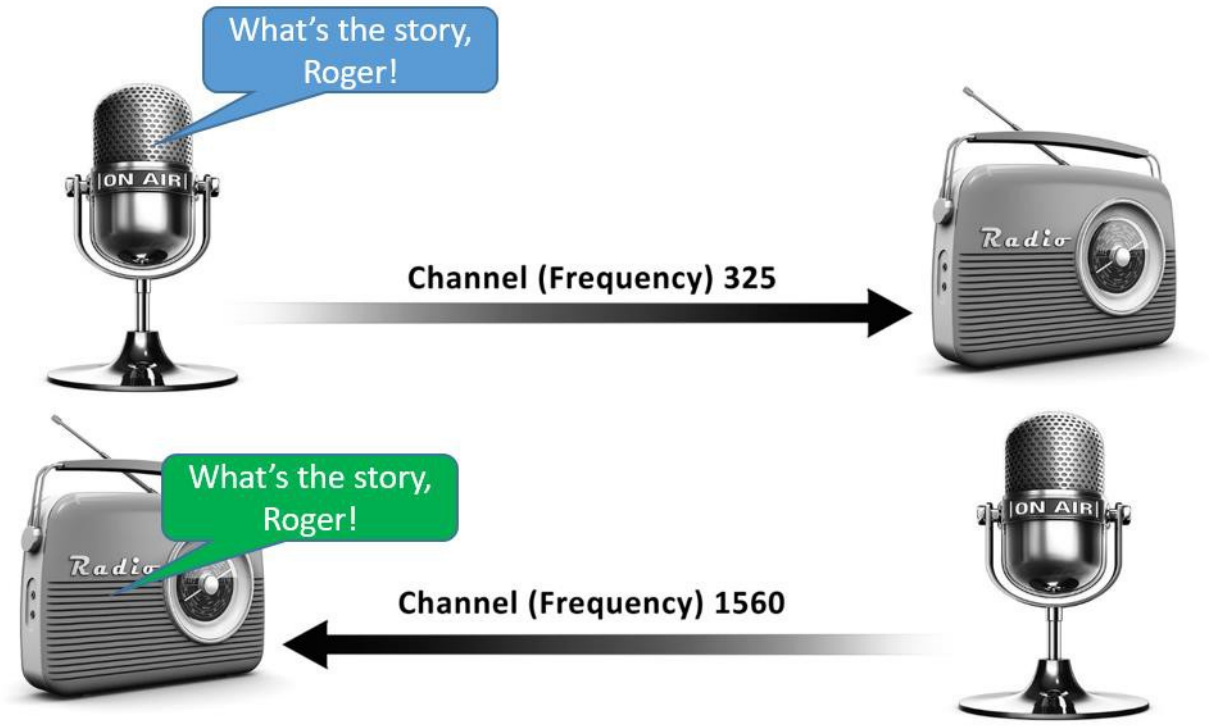
Remember that all pre-paid phones have a phone company and the actual service provider is going to be one of the majors such as T-Mobile / Metro PCS, Verizon, etc.

Bear in mind that pre-paid phone records may have a shorter retention period than a post-paid phone. In fact, pre-paid phone records are limited to 90 to 180 days in many cases

How does a cell phone work?

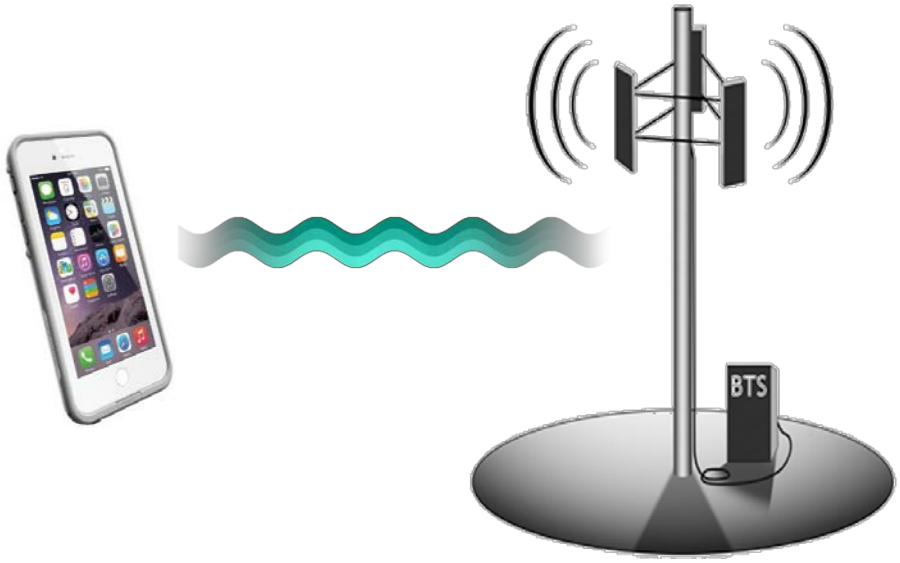
Communications

As mentioned, a cell phone is a walkie-talkie that uses two radio frequencies: One to send and one to receive.



Registration with the network:

On Power up the phone tunes to a known frequency and begins to listen



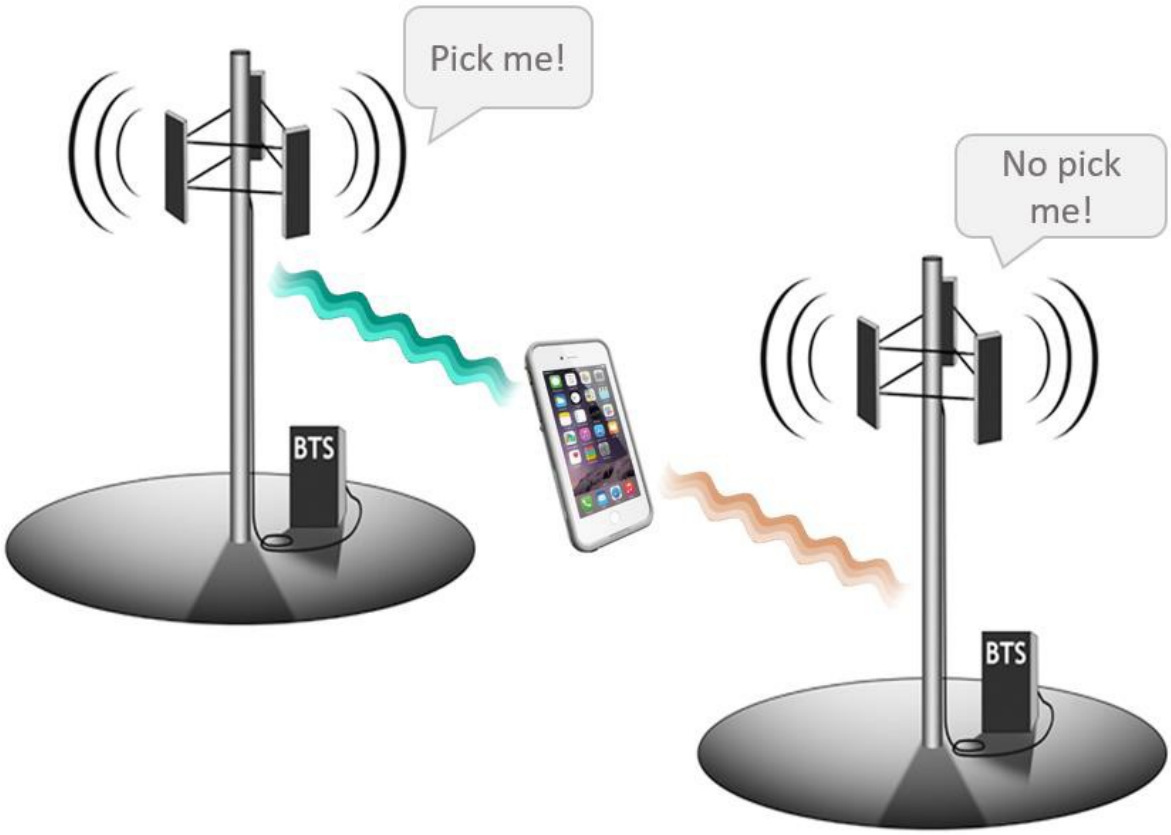
In order for the cell phone to be able to use a wireless phone company's network, it must have an active subscription. The registration process is how the phone and the network talk to each other and is when the network authenticates the phone. Once the network acknowledges the subscriber account, the network will allow the phone to use the services that are part of the subscription. For example, a phone that does not have a data plan will not be allowed to use the data portion of the network to access steaming music services and so on.

The Hook Up: Choosing a Tower

How does the phone choose a tower?

A cell phone is in constant communication with the network to ensure that the phone will be able to connect to a cell tower to make or receive a phone call. When you look at your phone screen and watch the antenna bars change over time, this is a result of the phone and the network communication about service quality, signal strength and availability. Some phones will even show when the service type changes from LTE to 3G or even 2G.

This scanning of network allows the phone to choose the tower that it will use for the next incoming or outgoing transaction; voice, text or data.



There are a number of factors that come into play in the process of a phone choosing a tower and these will be discussed in the following sections.

However, the call detail records will not reflect any of these factors. While it is important to understand that the cell tower used for a phone call may not be the absolute closest cell tower to the phone, the only thing you know is what was recorded in the call detail record about the cell tower that was used at the time of the call.

Equidistant

When equidistant, no way to know what the deciding factor was in choosing a cell tower.

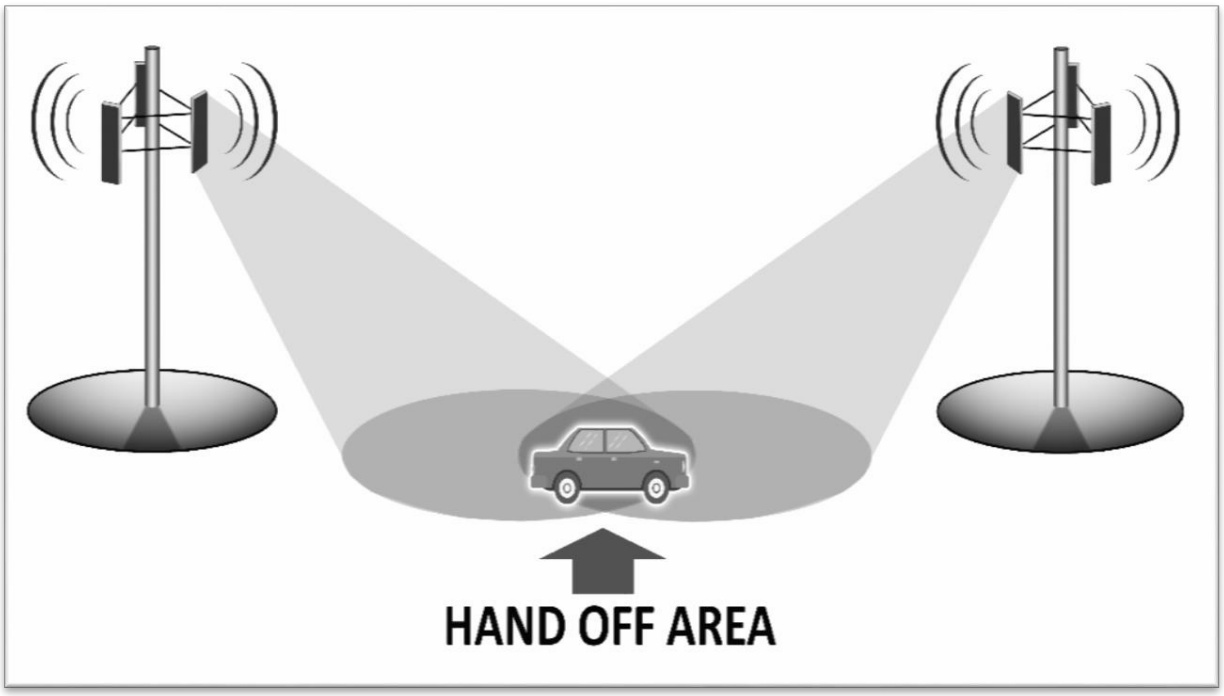
Occlusions

In the illustration below, we have Godzilla blocking the line of sight between the cell phone and the nearest cell tower. Because organic materials like Godzilla, leaves, your head, all both absorb and block radio waves, it would be possible that the phone would select the tower on the left, rather than the closer tower on the right.

Overload

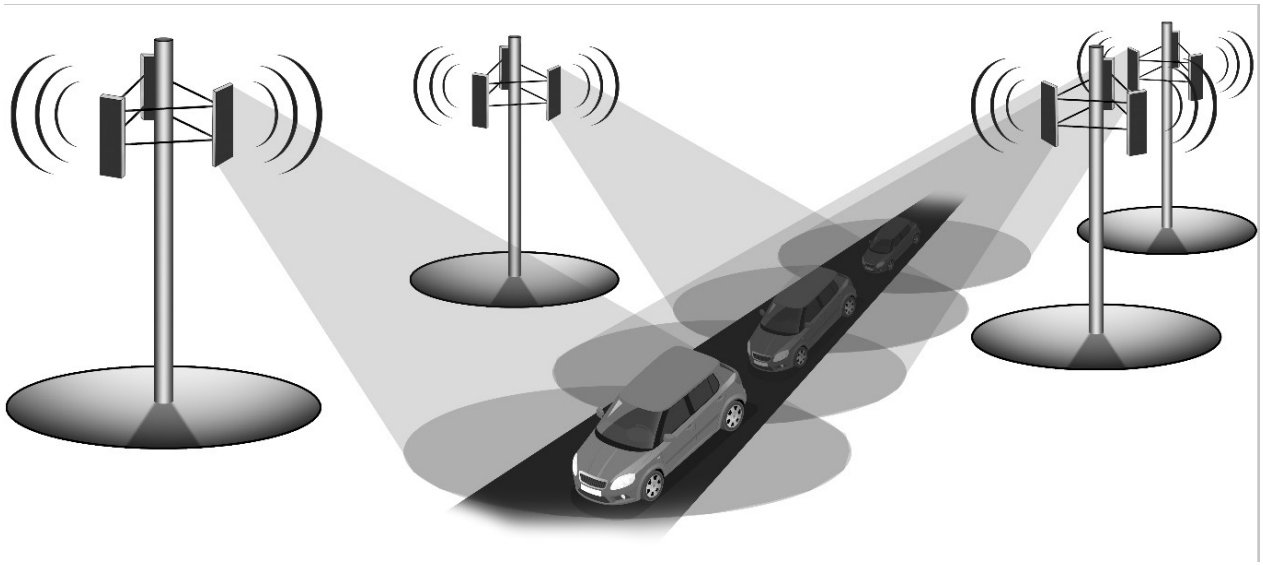
Channels must be available: In our snow example below, the phone may not be able to use the tower on the right due to an overload of calls by worried parents attempting to contact their children for an early school pickup. In this case the cell phone would connect to the next closest tower that it can obtain a signal and channels. Again, this would not be reflected in the call detail records.

Choosing a Tower: Moving Around



Intermediate Handoffs

No record of intermediate hand offs: As a phone moves around, the phone will have to use different towers. This is called handing off and for the most part is transparent to the phone user. In some cases where cellular coverage is spotty, the phone call quality may degrade before the phone hands off to the next cell tower. The important point about this as that there is no record of the towers that the phone uses during this time other than the cell tower recorded at the start of the phone call and in some network the cell tower recorded at the end of the phone call.



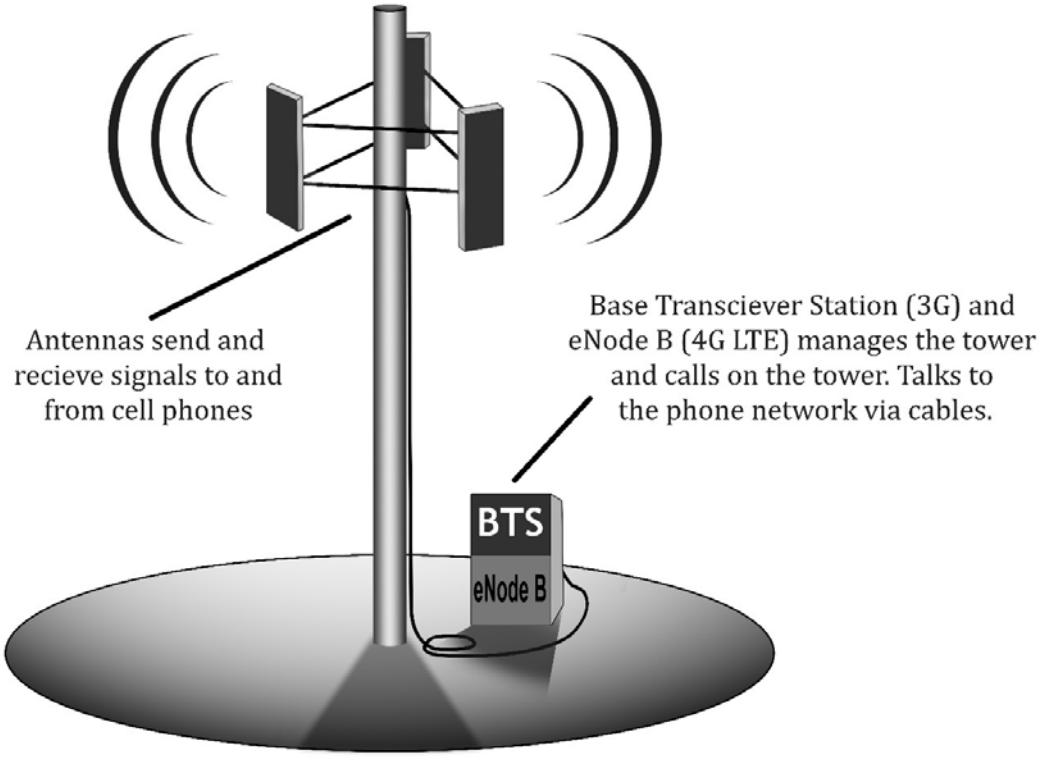
How the Cellular System Works

Cell Towers

For most of us, when we think about the cellular or wireless phone network, we may think of cell towers, as this is the only easily seen, visible part of the network. Cell towers can be hidden inside structures, mounted on top of structures like water towers or buildings and road signs. Disguised as trees or flagpoles or mounting on poles or super tall metal towers.

The Cellular System: Cell Site

More properly called a cell site, the figure below shows some of the pieces that make up a functioning cell site.



Antennas

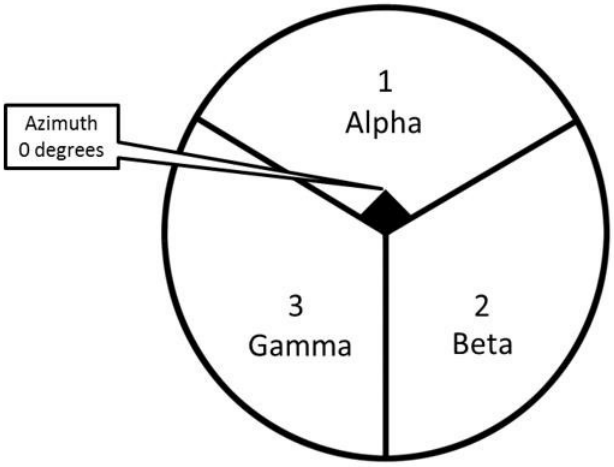
Send and receive signals to and from cell phones that in radio range of the cell site or tower.

Base Station Transceiver or eNode B equipment controls the communications of the cell site. This equipment manages the overall radio traffic that the cell site can handle. The BTS and or eNode B is connected to the standard phone network via thick network cables. Once a phone connects to a cell tower via radio, everything else uses the regular telephone system or Plain Old Telephone System (POTS).

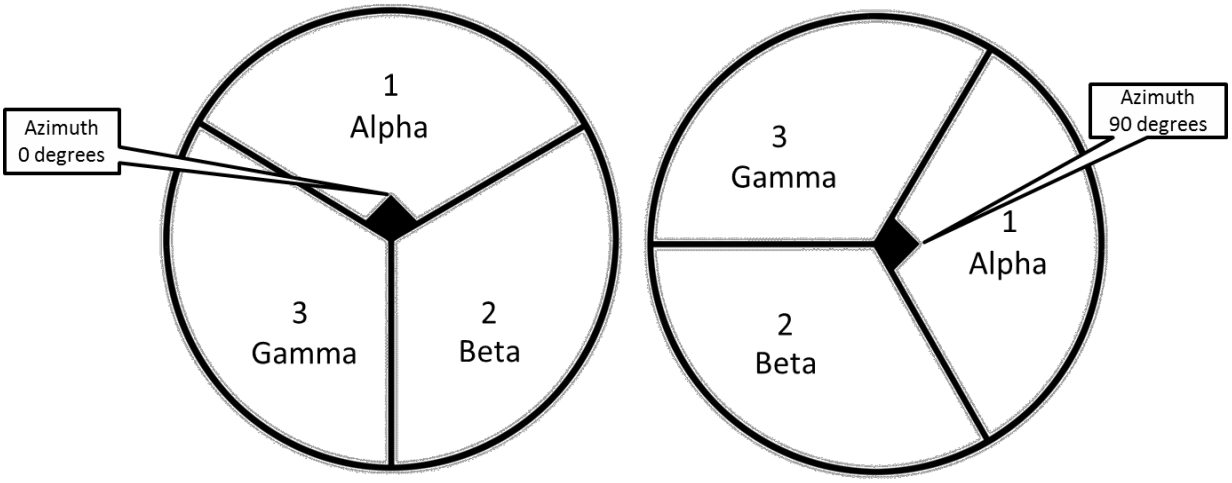
Cell Tower Sectors / Sector Layout and Azimuth

Cell towers can have from 0 to 6 sectors

The most common configuration is three sectors like the diagram below. The azimuth is the direction the antenna points, i.e. an Azimuth of 0 is due north.



The important note is that the azimuth or direction is not standard. The wireless phone company chooses which direction to point each sector for best and most efficient coverage of a particular area.



Cell Tower Coverage

Coverage area size is determined by customer needs and some radio frequency engineering limitations.

The process of cell phone tracking using call detail records and tower locations is based on the concept of radio frequency reuse planning. This is the method that cellular companies use to determine when to add cell towers to an area to accommodate increases in user demand.

At the basic level a cell phone is just a two-way radio. It requires one channel or frequency to transmit and one channel or frequency to receive. Cell phones can both send and receive at the same time, unlike a walkie-talkie that uses a single channel to send and receive where you have to wait your turn and push the button to send.

The reason that there is a requirement for radio frequency reuse planning is both simple and

practical The Federal Communications Commission, (FCC) allots a limited number of radio

frequencies to each
wireless company. The number of frequencies available is far too small to accommodate millions of phone calls at the same time.

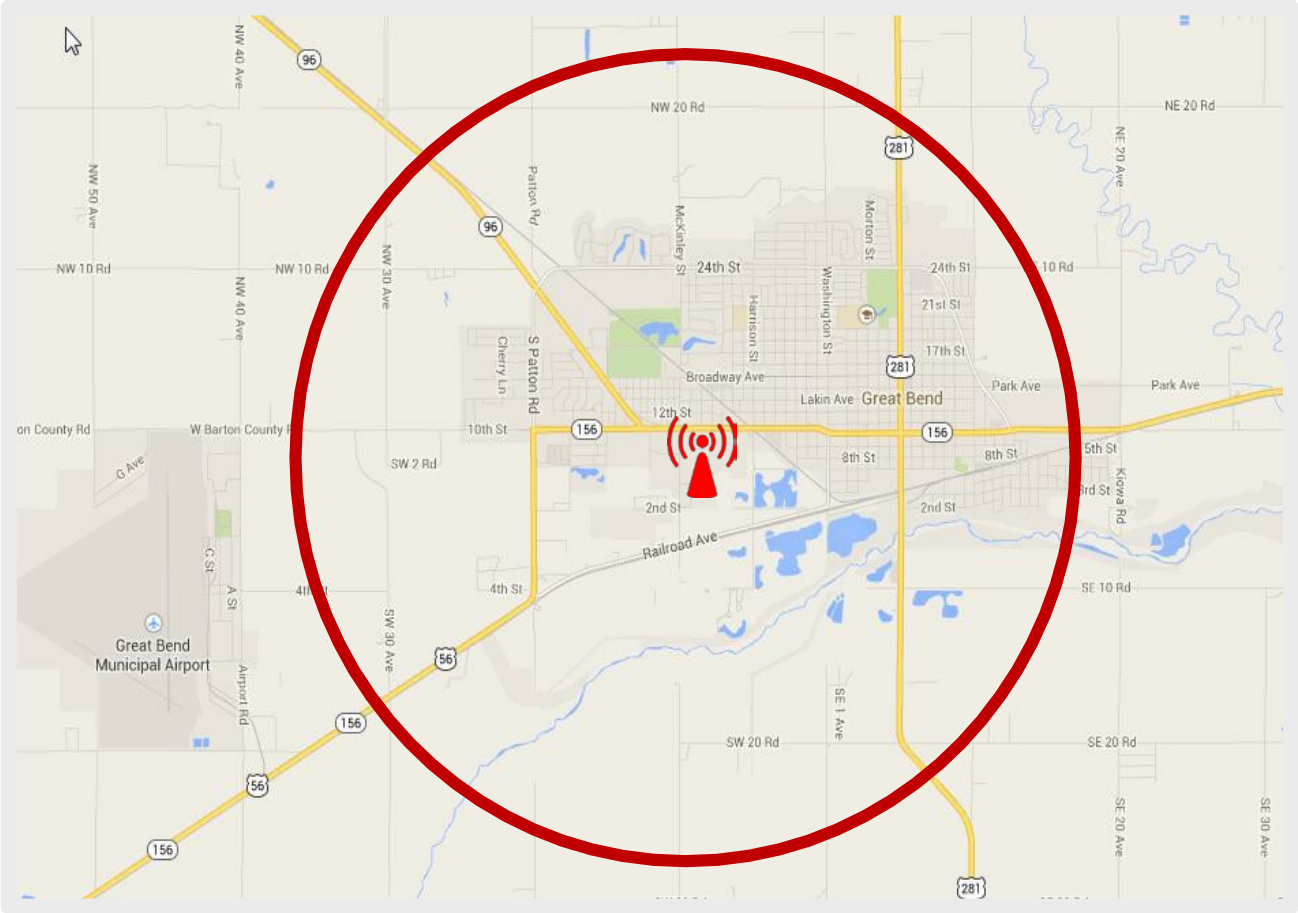
In order to compensate for this lack of radio frequencies, wireless companies use technology that allows them to split the frequencies into small sections so to speak, to allow more phones to use the frequencies than would be possible if a phone took up the entire radio channel.

The two primary methods for "sharing" radio channels are Time Division Multiple Access (TDMA) which is used in the Global System for Mobile Communications (GSM) network and Code Division Multiple Access (CDMA) which is used in the CDMA network. For instance, AT&T is a GSM wireless company and Sprint is a CDMA wireless company.

For our purposes here, the methods used to split up radio channels is not important. What is important to understand is that the wireless system needs to support a huge amount of demand for radio channels at any given time and the wireless companies had to figure out a way to do that.

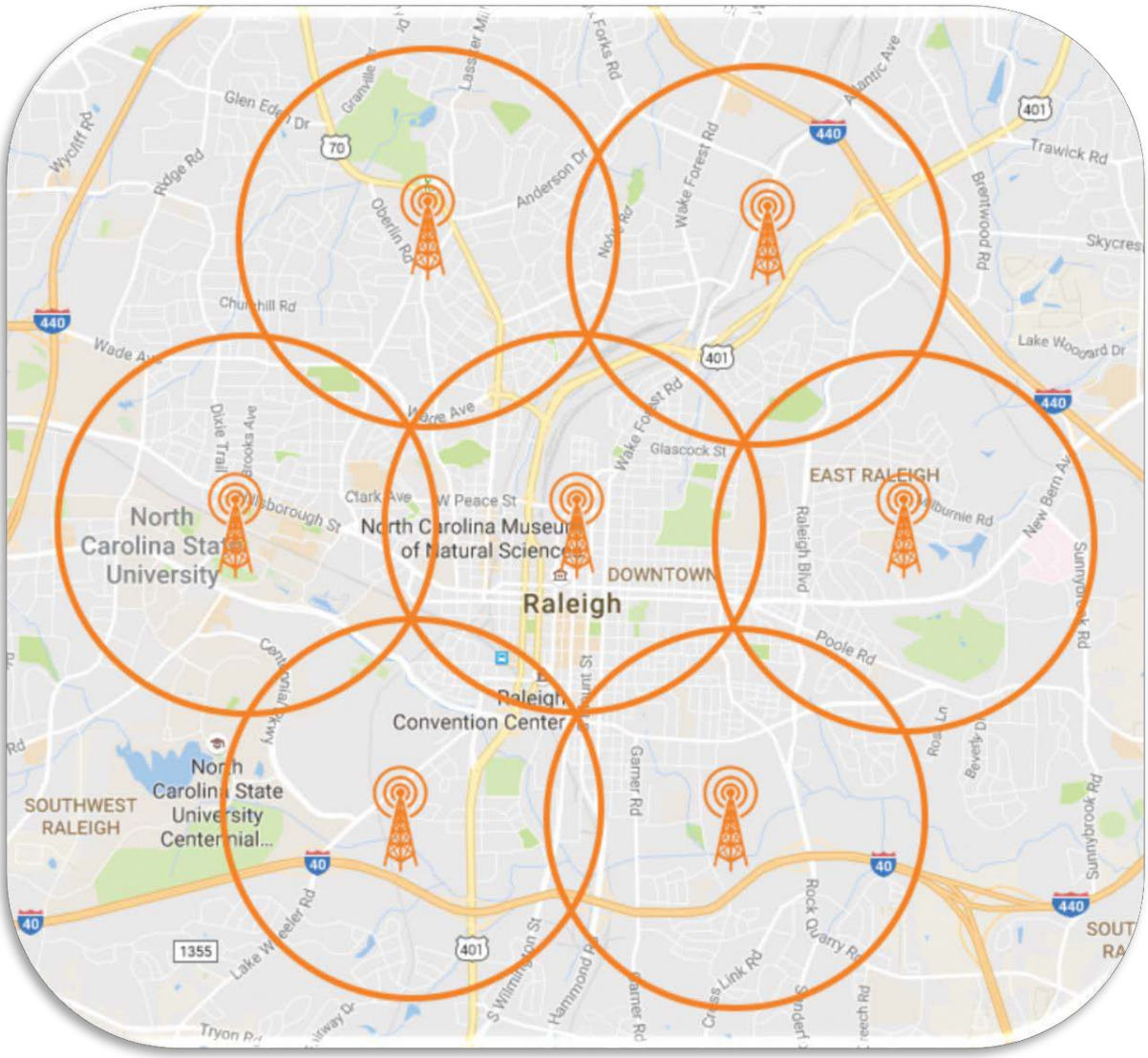
Even with the current technology for splitting up radio channels to handle more calls; that alone is not enough to cover a large number of cell phone users. To overcome that limitation, the wireless companies re-use those same radio frequencies over and over by putting them into clusters of cells, (hence the name cellular), and then separating sets of frequencies by distance so they will not interfere with each other.

When there are a limited number of subscribers in an area, such as the example below where the tower is location in a small town in the sparsely populated Midwest, a single cell tower can cover a large geographic area.



Subscriber Density

As subscribers increase: The coverage size per tower gets smaller to accommodate the larger number of cell sites are required.



How Far?

How far can a cell phone be from a tower and still make or receive a call? Assuming a perfectly flat earth, extremely tall cell tower, maximum legal power output, and no other cell towers in the area…

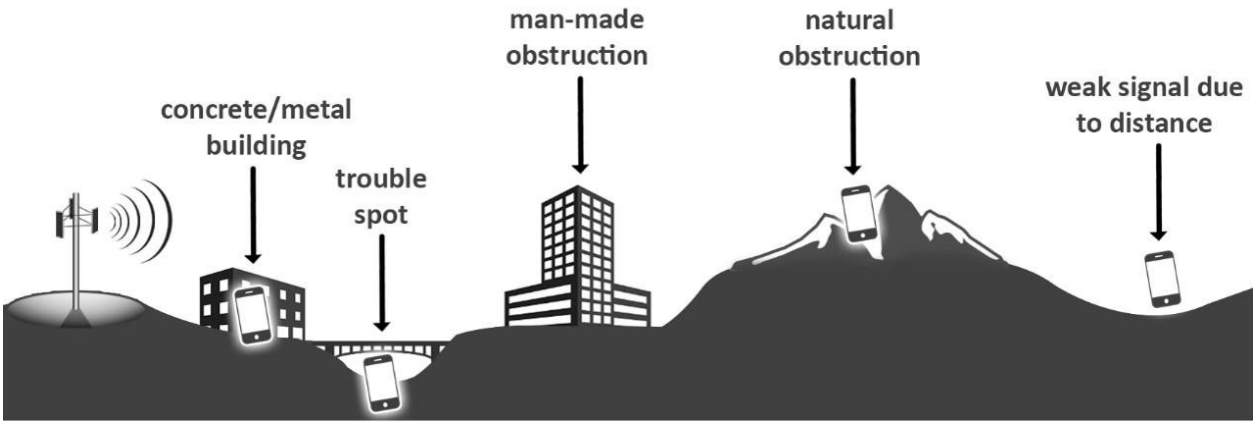
GSM (AT&T or T-Mobile) = 22 miles

CDMA (Sprint, Verizon, etc.) = 35

Miles Limiting factors

Terrain, ground clutter, proximity of other towers, signal strength, cell phone being used, tower height, radio frequency…and the list goes on…

Real World Issues



There are a number of real world factors that impact the coverage area of a cell tower or which cell tower provides service to a particular area.

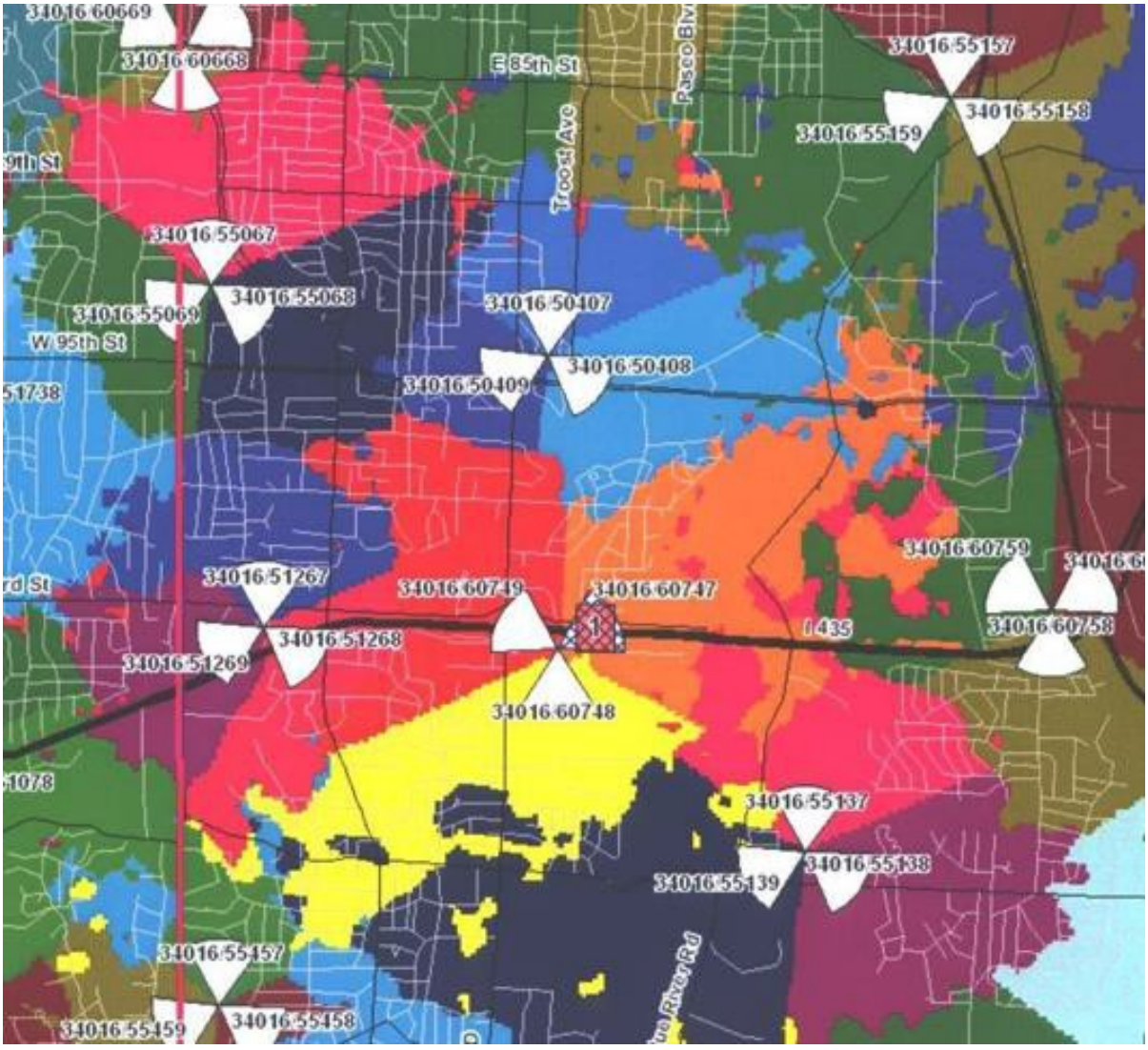
In the image above, we have cell phones in different places that can affect which cell tower would provide service to the phone or perhaps a dead spot with no service.

As discussed earlier, organic materials absorb and block radio waves. In the illustration above, we have a tall building constructed of inorganic materials. Most inorganic materials like concrete and steel will reflect radio waves.

Radio frequency map

The map below shows a prediction map of radio coverage at ground level. Note in the map that the different sector radios provide coverage in quite different patterns.

While the radio waves will project from the antennas in a basic vee shape, once the radio waves start to expand, they coverage area can be quite irregular.



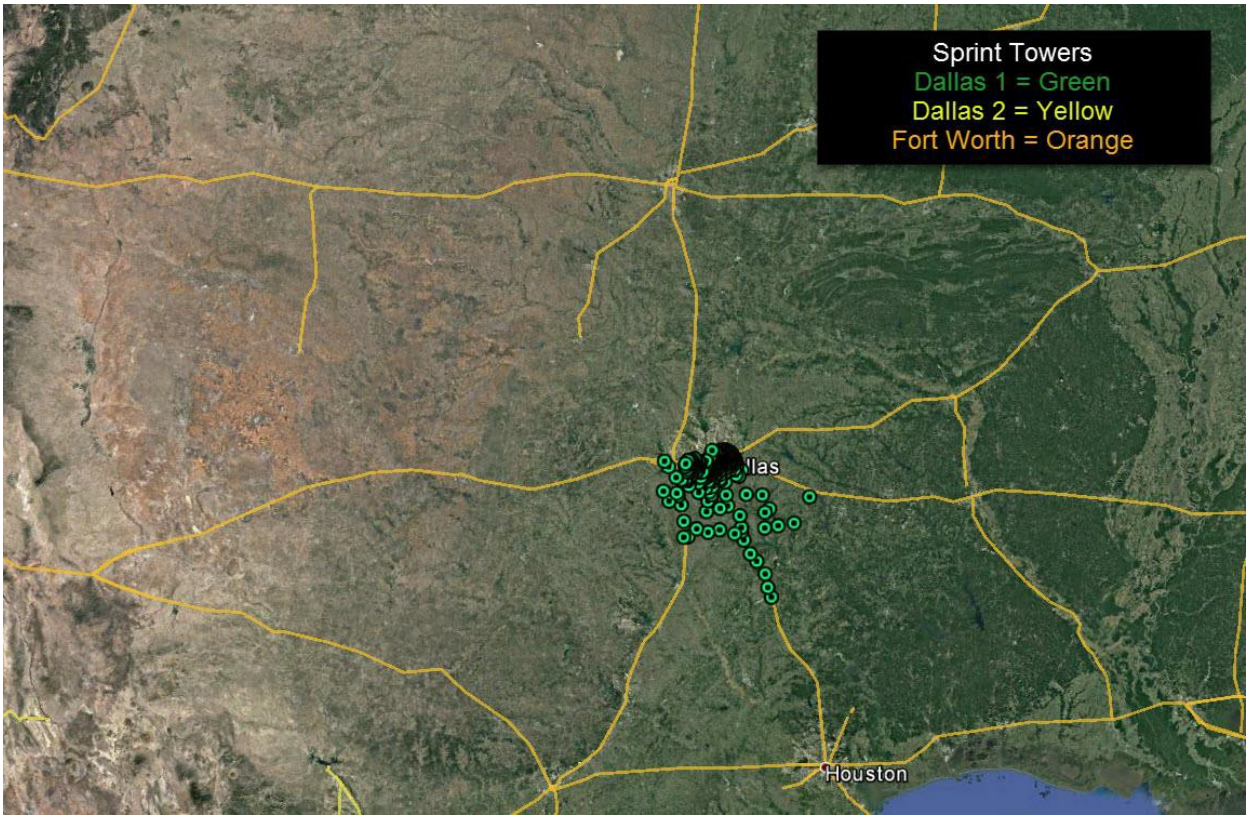
Cell Tower Grouping / Switches

The following maps show the locations of cell tower groups by various carriers at some point in time. While the map is labeled as Sprint, these are for illustration purposes and do not have any relationship to actual Sprint cell tower locations.

The point to be made here is that cell towers are grouped together by equipment known as "switches". This is important because cell tower numbers are not unique per se. In order to make sure you have the correct cell tower identified, you must combine the switch and cell tower identifier together.

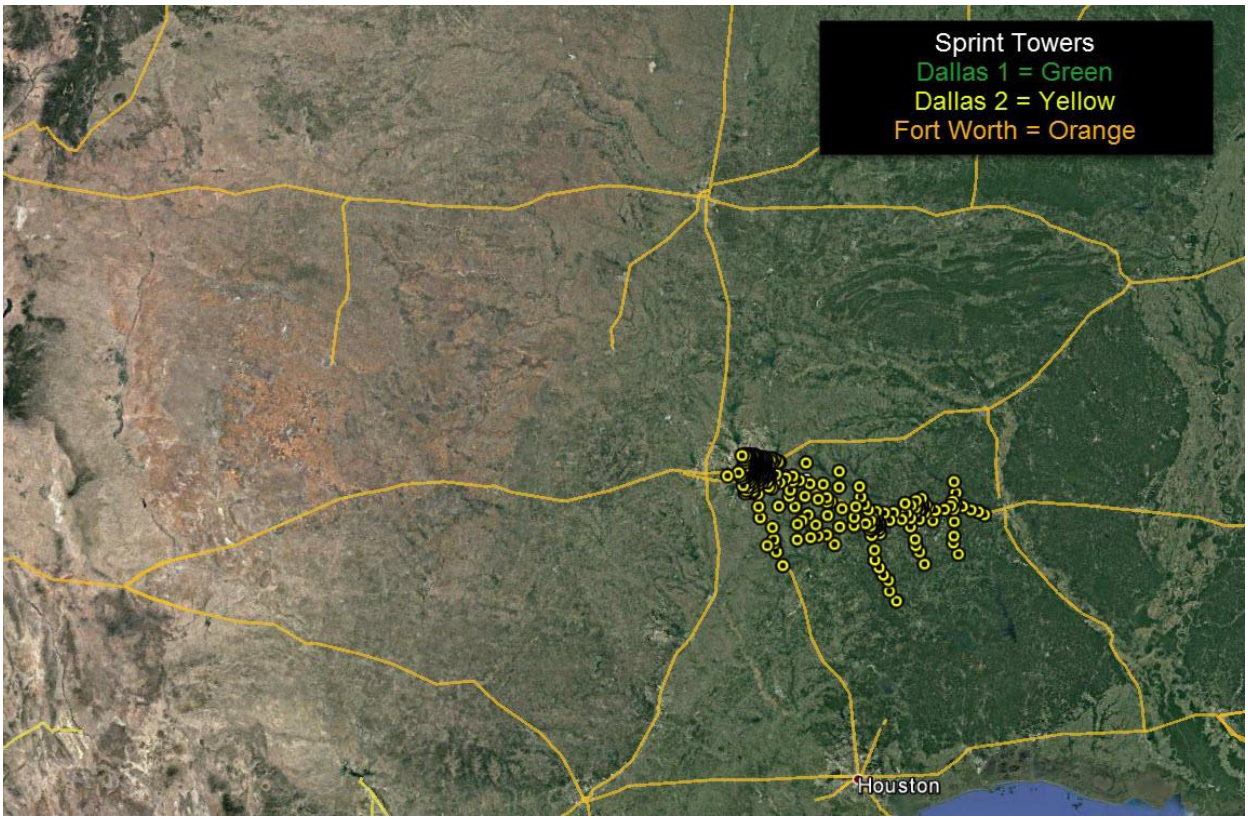
Example (Sprint Towers Dallas 1)

In the Dallas 1 illustration below, the cell towers are green.



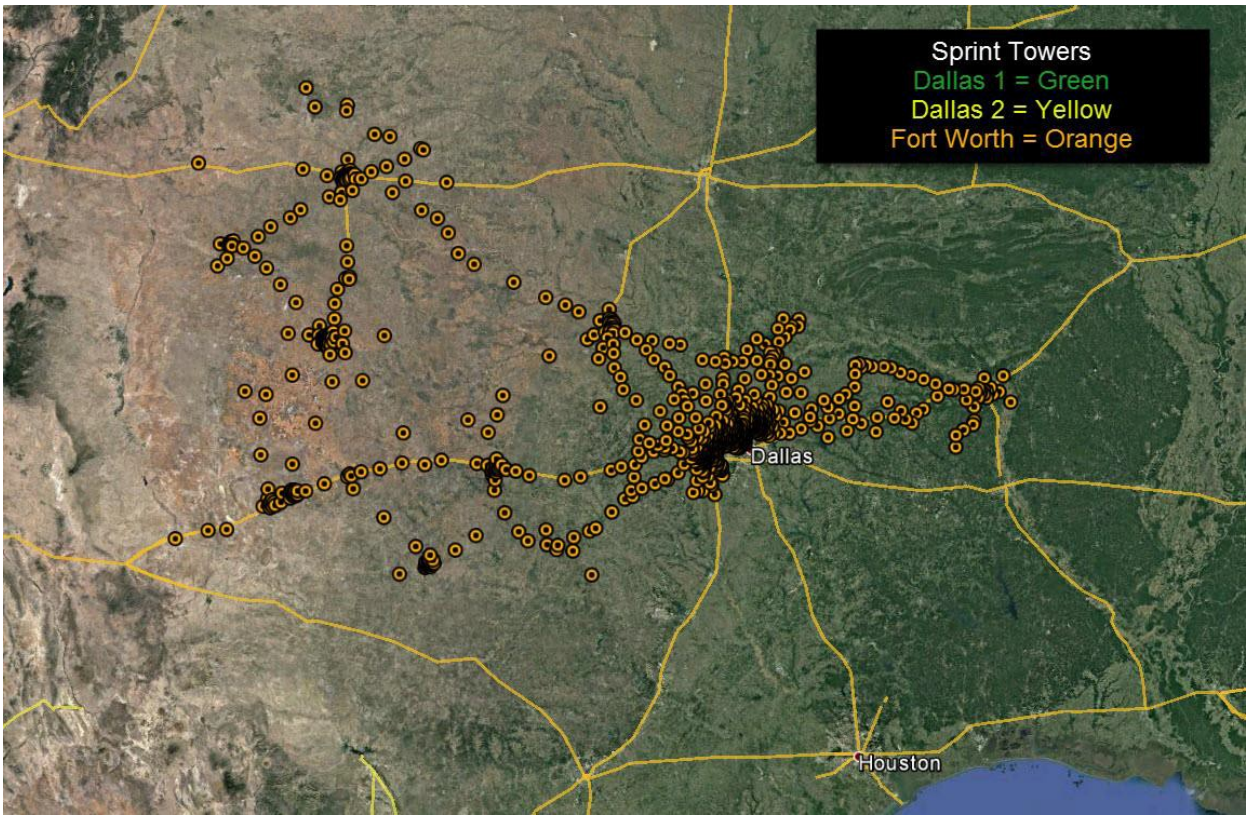
Example (Sprint Towers Dallas 2)

The Dallas 2 switch above with cell towers in yellow



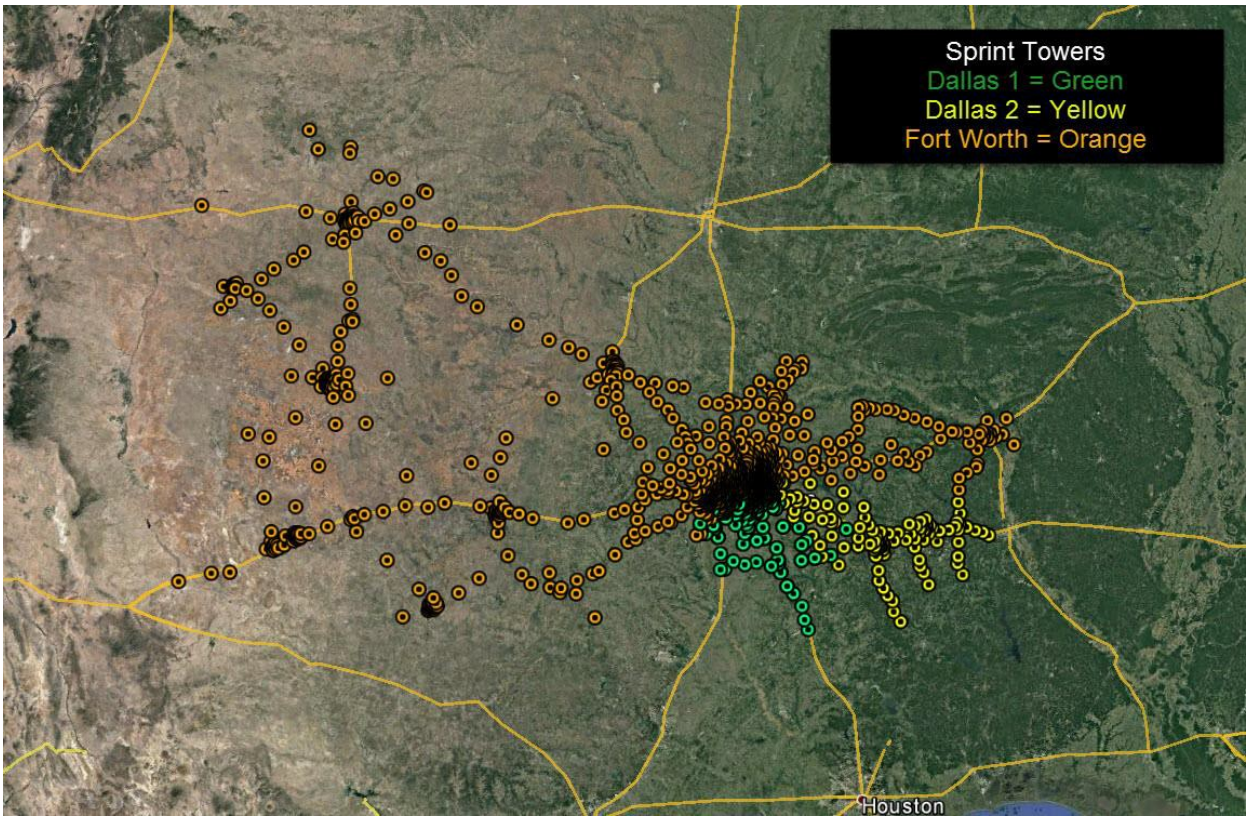
Example (Sprint Towers Ft Worth)

The Fort Worth switch has cell towers that are located a long distance from the center of Dallas, TX. The Fort Worth towers are orange.



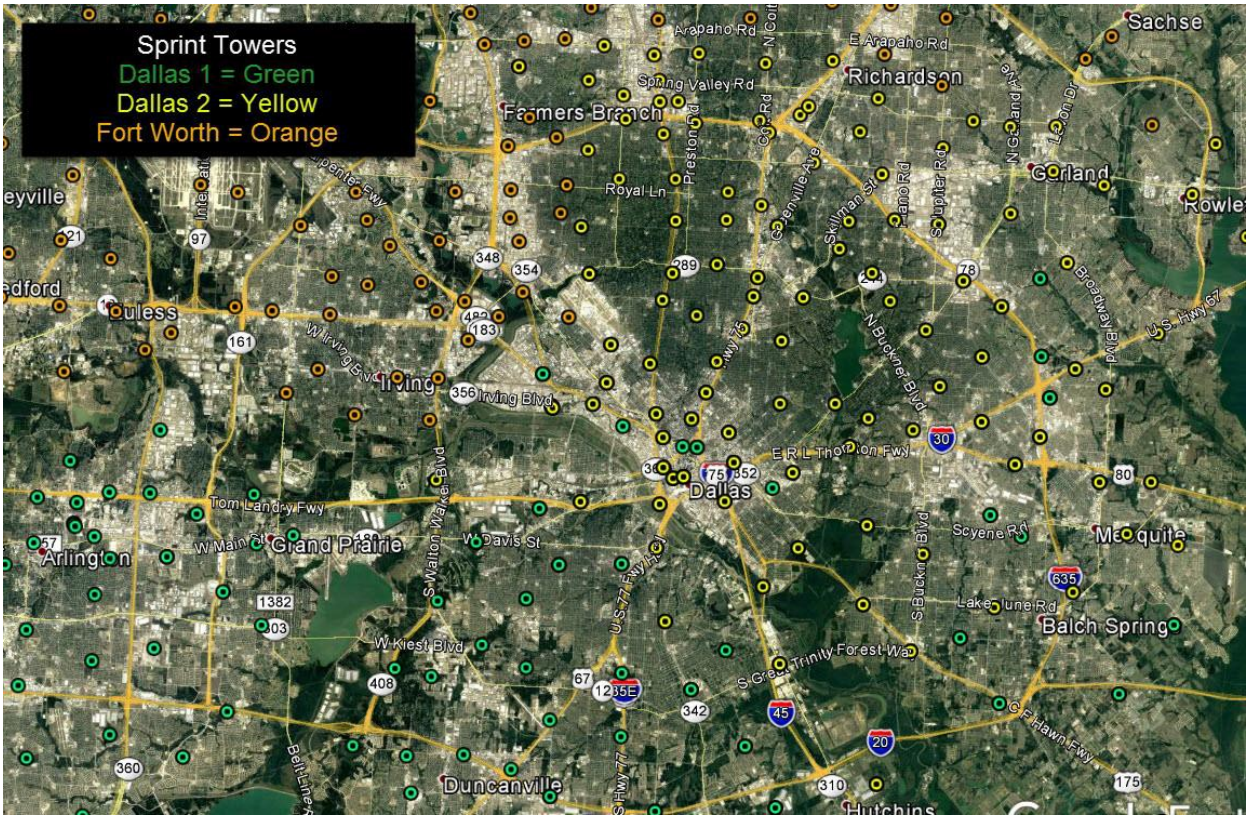
Example (Sprint Towers All)

This map shows how a heavily populated area can require multiple groups (switches) of hundreds of connected cell towers.



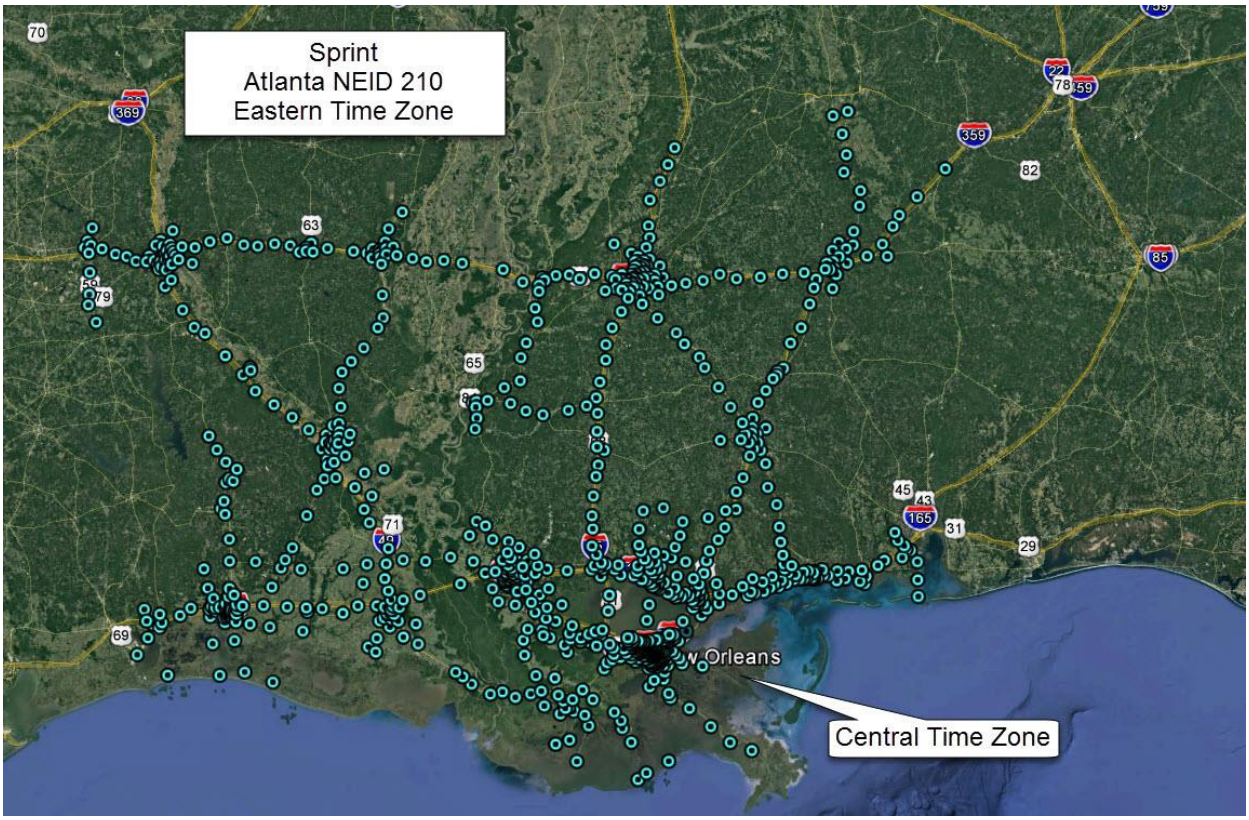
Example (Sprint Towers All) Zoomed In

The map above shows how important it is to have the correct switched information since the cell towers from the various switches are intermixed.



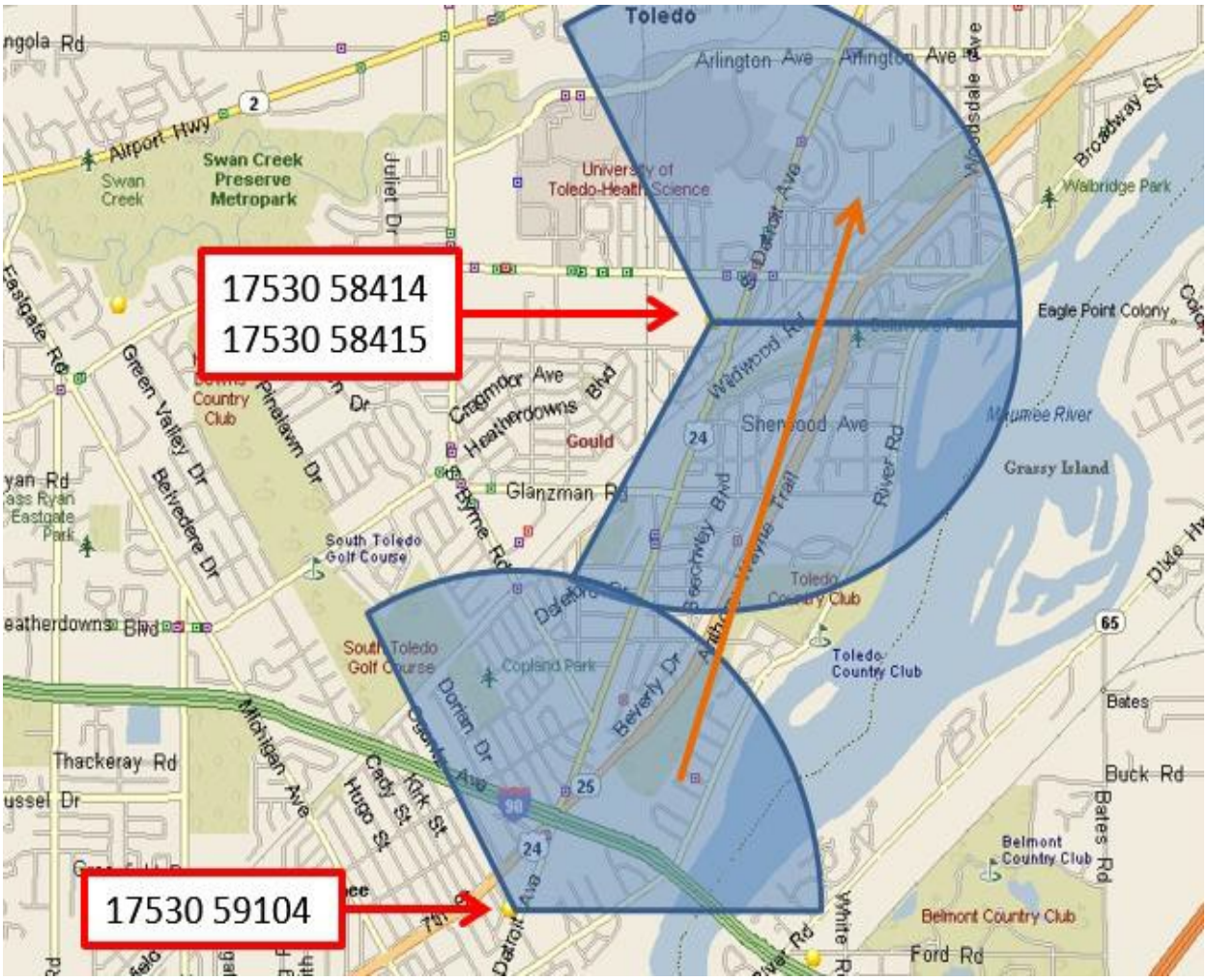
Sprint Atlanta Example

The Atlanta switch is connected to cell towers in two time zones, Eastern and Central. If a phone is in Atlanta, the records produced will be in the correct time zone, Eastern. If a phone is in New Orleans, the records produced will be in Eastern Time, even though the phone is in Central time. This must be taken into consideration with reviewing the call detail records.



Examples

The Pie-Slice!



In many cases, analyst may be using software that create pie slices like the ones in the map above.

The circles and sectors (pie wedges) drawn on maps to present this evidence are based on the idea that an "expert" can demonstrate the area covered by a cell phone by drawing circles or pie shapes on a map where the circles or pie shapes represent the approximate coverage area of a cell tower and that the cell phone will be in the area defined by the circle or pie shape.

The idea is that the expert can determine the approximate coverage of a cell tower by comparing the distance between two cell towers, account for a theoretical overlap of tower

coverage, and then draw a circle to represent the coverage area of each tower. The basis for this method is that cell towers are sectorized, meaning that a cell tower has more than one antenna, that each

of the antennas points in a compass direction defined in degrees, and that the analyst can determine how far those signals reach based on comparing the locations of the adjacent cellular towers.

However, data regarding the actual coverage area of the any tower at the time of the incident is *not* provided by the cellular carrier and there is no method that can be used to determine the coverage of a cell tower at the time of the incident based on historical call detail records. It is not possible to reliably determine the coverage area of a cell tower antenna as it relates to a particular cell phone at the time of a call simply by comparing the distance between cell towers.

"1.3. Selection of a servicing cell

If a handset is directly in front of, and with line of site to, the antenna for a given cell and with no other cells of greater or equivalent power close by, it would be unlikely to select any other cell. This means that within the service area of a given cell, there will be regions where a phone could not be reasonably expected to initiate (or respond to) a call on any other cell.

The location in question could be termed as the 'dominant' region of the cell. Elsewhere, the received signal strength of other cells will be closer to or supersede that of the cell in question. The effects of clutter (either by line of sight or the effects of localized interference, or 'fast fading') will mean that there may be marked differences of signal strength over very many small distances. If there are other cells serving the area with similar signal strengths, the cell selected as serving by the handset may change frequently. This (usually much larger) region is termed a 'non-dominant' area." (Source: Journal of Digital Investigation, Volume 8, 2012, "Historical cell site analysis – Overview of principles and survey methodologies", Matthew Tart, Iain Brodie, Nicholas Gleed, James Matthews.)

When preparing expert maps, analysts are trained to use the following methods for determining the approximate coverage area of a cell tower antenna sector:

a. Using a standard radius of 1 mile or 3 miles projected from the tower at the center, to the edge of the coverage area or,
b. Drawing the circles on the map after plotting the locations of cell towers where the circles are drawn to overlap each other based on the distance between the cell towers.
c. The compass direction of the tower sector antenna used for a phone call.
d. The beamwidth of the radio signal projected by the sector antenna, if known.

There is no factual basis for drawing coverage circles or pie shapes on a map and the cellular company does not provide such data to experts in cases. The physical location of

the cell tower masts is factual in basis because cellular carriers maintain the geo-location (GPS)

coordinates of cell towers and provide those GPS locations to the expert for use in his plotting of the locations of the towers. However, there are no published set of principles or methods governing the estimation of cell tower coverage based on simply drawing circles on a map where the circles overlap based on the distance from one tower to other adjacent towers, the size of the circles being determined by the distance between cell towers.

In fact, the distance between cell towers on a map have no real bearing on the coverage area of the cell tower at all for the following reasons:

a. Cell towers are placed based on anticipated load, which is the maximum number of cell phone calls anticipated at peak load times for the cell tower. Thus the expected coverage area can vary widely between cell towers.

b. Cell towers are not always configured to provide the same amount of antenna power output, which determines the maximum range of the signal produced by the antennas.

c. Cell towers are placed to cover specific areas by either mechanically or electronically tilting the antennas toward the ground and are not configured to cover an area shown as a perfect circle on a map.

d. Not all tower antennas have the same beamwidth. Beamwidth is the width of the antenna signal defined in degrees. The most widely used analogy to describe beamwidth is to think of the antenna as projecting a beam of light, in the same way that a flashlight beam projects. As the beam exits the flashlight it spreads out in a pattern. In the same say that some flashlights can adjust the width of the beam of light to become wider or narrower, the antennas on a cell tower can be adjusted to project a wider or narrower beam of radio signals. In the absence of the beamwidth being provided by the carrier for each sector, it is common to "assume" a beamwidth of 120 degrees. This is an assumption and should not be allowed to be used as evidence when such data is not provided by the cellular company.

e. Each cell tower that contains sector antennas can have 2 or more of these antennas pointing in different compass directions. Each of the antennas can be configured independent of the other antennas to suit the coverage need for that particular tower. In other words, the antennas can each have a different down tilt, beamwidth and a specified direction for the antenna. While the azimuth, which is the direction the antenna points, may be provided in the tower locations records, the actual coverage area of the sector antenna can vary widely even between sector antennas on the same tower mast.

f. In today's cellular system environment, many cell towers contain more than a single set of antennas for a carrier, making it even more difficult to use the standard three sector antenna idea to estimate the coverage area.

Cell tower coverage does not fit into neatly drawn circles or pie shapes. The inherent issue with using maps with circles and pie shapes drawn in to illustrate the approximate location of a cell phone is that it gives **the incorrect impression, bolstered by expert testimony, that the cell phone location is limited to the area defined by the circle or pie shape**. Since it is impossible to determine the distance the phone is from a cell tower at any particular time, suggesting that the phone is within an arbitrary boundary drawn on a map is inherently false.

The image below demonstrates the difference between an idealized layout of a cell network, and the theoretical service areas of 3 sectors within the network. (Source: Journal of Digital Investigation, Volume 8, 2012, "Historical cell site analysis – Overview of principles and survey methodologies", Matthew Tart, Iain Brodie, Nicholas Gleed, James Matthews.)

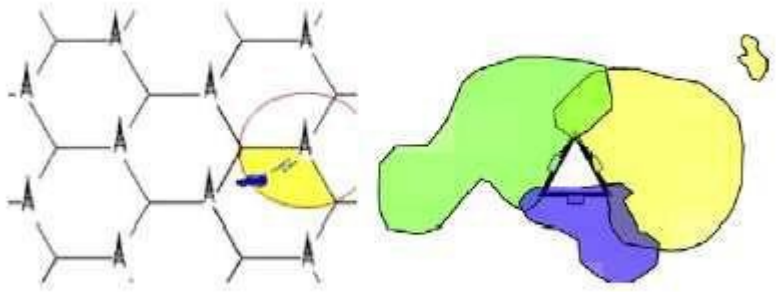


Fig. 1. Idealised layout of a network (a) and theoretical service areas of 3 sectors located on the same mast (b).

As shown in the Fig 1 above, cell sectors do not conform to a pie shape. Nor is the coverage area a circle.

"A single cell site (usually a mast or building) can contain the hardware for several cells, which are then also known as sectors. Typically, there will be three sectors per cell site and each sector will usually point in a different direction (known as the azimuth) but this can vary, usually between one and six. The sectors will operate independently of each other, having unique Cell IDs usually related to each other and similar to the code for the covering cell site. Each sector will provide service over a particular geographical area, and this area will not be uniform (i.e. it will not be a circle, a triangle or any other regular shape); there may be many different shapes according to geography and the need of the network (e.g. long thin cells on motorways). There may also be disconnected areas of service known as hotspots." (Source: Journal of Digital Investigation, Volume 8, 2012, "Historical cell site analysis – Overview of principles and survey methodologies", Matthew Tart, Iain Brodie, Nicholas Gleed, James Matthews.)

Important Cases – Pie Wedges on Maps

United States v. Antoine Jones

UNITED STATES DISTRICT COURT FOR THE DISTRICT OF COLUMBIA

918 F. Supp. 2d 1; 2013 U.S. Dist. LEXIS 8888; 90 Fed. R. Evid. Serv. (Callaghan) 648

January 23, 2013, Decided, January 23, 2013, Filed

"As explained above, defendant's premise here is incorrect; Agent Eicher does not claim that defendant's phone was within the pie-shaped wedges at the time the calls were made. *See supra*

at 2. However, the Court agrees that the use of the wedges could confuse members of the jury and mislead them into believing that defendant's phone must have been within that space.

Thus, in order to avoid any unfair prejudice to the defendant, the arcs used to depict the outer limit of the pie-shaped wedges should be removed from Agent Eicher's reports. [**14] The wedges will then appear as open-ended "V" shapes opening out in the direction of the sector used by the phone. With this modification, the Court does not believe that there is any danger of unfair prejudice."

Experts

Important Cases – Expert Testimony

State of Maryland v. Joseph William Payne & Jason Bond

Circuit Court for Baltimore County, Maryland Case Nos. K-08-0027; K-08-0026
Argued: September 10, 2014

Opinion by Battaglia, J. Barbera, C.J., Harrell and McDonald, JJ.,

concur Filed: December 11, 2014

Experts

State of Maryland v. Joseph William Payne & Jason Bond

Trial court erred by allowing a police officer, who was not qualified as an expert under Maryland Rule 5-702, to testify as to the location of the cell phone towers through which the defendants' cell phone calls were routed as determined by his analysis of the defendants' cell phone records, because such testimony requires that the witness be qualified as an expert.