

What Really Happened to Teresa Halbach?

The Way to Commit the Perfect Crime is to Have Someone Else Take the Blame for It

Imagine if a cop knocks on your door right now and tells you that your pizza delivery person has disappeared. Do you call a lawyer? LOL. The next day, the same cop tells you they found the pizza delivery guy's vehicle in your back alley. Are you calling your lawyer yet? LOL. How can any of us defend ourselves against reverse-engineered crimes? It's a pretty grim reality, actually.

Tuesday, April 19, 2016

Cell Tower Triangulation and Tracking Evidence — How It Works

By [Phil Locke](#)
June 1, 2012

First, I refer you to Martin Yant's earlier post on this subject:

<http://wrongfulconvictionsblog.org/2012/05/10/cell-phone-evidence-doesnt-always-ring-true/>

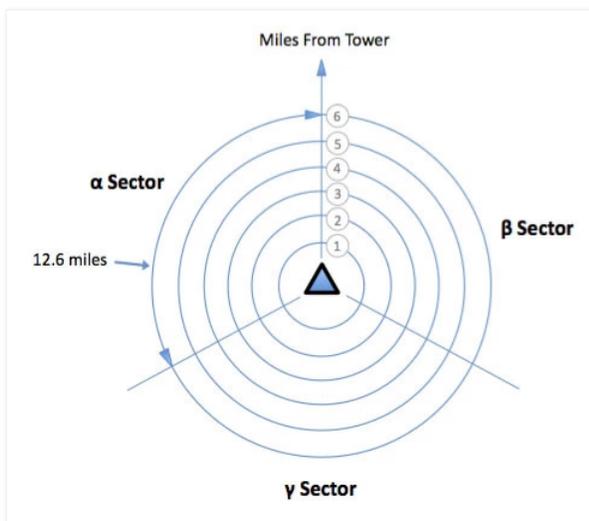
The post makes the point that data from a single cell tower is essentially worthless in trying to place someone in a particular location. The best you can expect is a band within a 120° "pie wedge" from the cell tower.

If two cell towers are used, it gets much better, and if three towers are used it gets even better yet. **But to make sure this kind of evidence doesn't get misused, and to know what it's limitations are, it's important to know how it works.**

You may have noticed that the antennas on a cell tower are always arranged in a triangle. There are some sound technical and economic reasons for this, but we won't go into that here. But it does mean that a cell tower can tell from which of the three antenna arrays it is receiving a signal. Each of the three antenna arrays covers a 120° sector with the tower at its focus, and these sectors, by convention, are referred to as alpha, beta, and gamma – **α, β, γ**.

Within each sector, the tower can make a measurement of how far away the transmitting cell phone is. This is done by measuring signal strength and the round-trip signal time. For a lot of technical reasons, this is not a very accurate measurement, and the determined distance will have a reasonably significant error band.

Here is a diagram of a **single cell tower** showing concentric bands of distance from the tower, and the three "sectors". The distance bands don't stop at "6", but this is just to give you the idea. Note that at six miles out, the arc of a sector is 12.6 miles long.



Here is how a **single-tower location** would work. The cell tower has determined that the signal is coming from the γ sector, and that the origin of the signal is approximately 4 miles from the tower. This would place the caller within the yellow band, which you can see is 8.4 miles long and "about" 1/2 mile wide – an area of 4.2 square miles.

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Don't Talk to the Police: Invoke Your Fifth Amendment Privilege

"On the advice of my lawyer, I respectfully decline to answer on the basis of the Fifth Amendment, which —according to the United States Supreme Court—protects everyone, even innocent people, from the need to answer questions if the truth might be used to help create the misleading impression that they were somehow involved in a crime they did not commit."

Contact a Lawyer Before Communicating with Law Enforcement

It is very important that any communication you ever have with an investigating police officer takes place either through a lawyer or in the presence of a lawyer. Even things that you say on the phone to a police officer can in some cases be used in court against you. Sometimes a police officer will not explain that coming into the station "for a chat" can mean being interviewed under arrest by appointment. Never discuss anything to do with an allegation directly with a police officer without having a lawyer there. In most cases, a lawyer of your choice can be provided on a legally-aided basis for free, and a police officer never will have reason to be surprised if they hear from your lawyer, and not you, first.

Translate

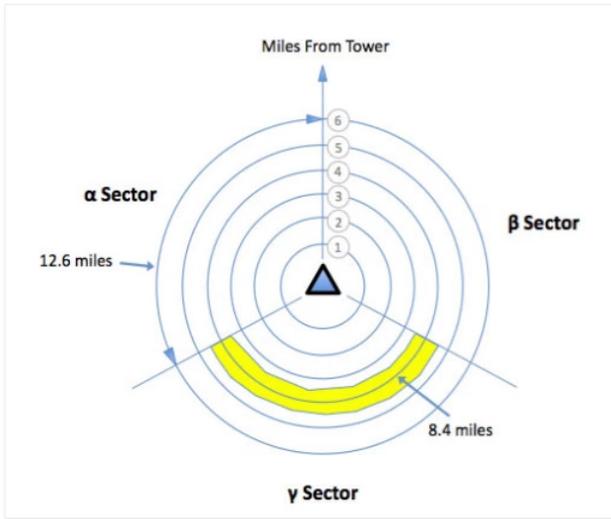
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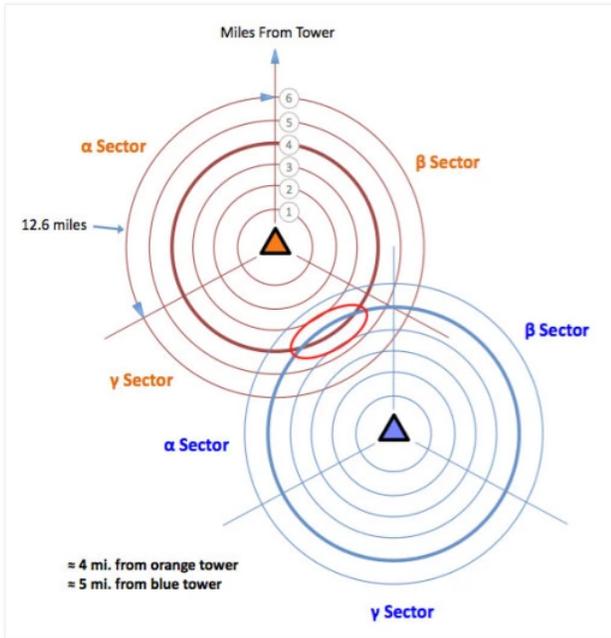
[Teresa Halbach's Cell Tower Locations, Cell Phone Records and Voicemail Records](#)

UPDATE NOVEMBER 16, 2017: Kathleen Zellner filed a "Second Supplement to Previously Filed



If the cell phone in question is also negotiating with a second cell tower at the same time (and this must be the case), the ability to locate the phone gets much better.

Here is a diagram of the situation when the phone is 4 miles from the “orange” tower in the γ sector, and 5 miles from the “blue” tower in the α sector. This will place the phone in an oval (shown in red) whose center is the intersection of the swept areas of the two towers’ approximate distance bands.



If a third tower is brought into play, and the phone in question is determined to be 5 miles from the (third) “green” tower, this diagram shows that the area of location can be estimated even more closely. Keep in mind that the phone must be negotiating with all three towers at the same time.

Motion for Reconsideration" on Novem...



Summary of Edward Wayne Edwards' Crimes (the Zodiac Killer)

The following is a summary of the crimes committed by Edward Wayne Edwards from John A. Cameron's website, coldcasecameron.com. Cameron ...



Bloodhound and Cadaver Dog Alerts Exculpated Steven Avery Yet Were Ignored

Joshua Radandt gave an affidavit, which was included in Kathleen Zellner's motion for post-conviction relief filed on June 7, 2017. ...



Teresa Halbach's Last Day

OCTOBER 31, 2005 7:00 AM Autotrader faxes Teresa her appointment sheet with Zipperer as the only lead (she uses email or an online fa...



The Last Time Ryan Hillegas Saw Teresa Halbach, She Was Dressed as a Cowgirl for Halloween

The video linked here and in the image above is a report by Action 2 News from November 4, 2005. Action 2 News reported: "Th...



Ryan Hillegas is the Prime Suspect in the Murder of Teresa Halbach, According to Steven Avery's

Post-conviction Counsel Teresa Halbach and Ryan Hillegas: the two dated "for five years or so," stretching through the end of high school and part of...



The Left Front Tire of Teresa Halbach's RAV4 Was Changed After She Disappeared and

Before the RAV4 Was Planted at Avery Auto Salvage The left front tire was changed/remounted after the photo of Teresa Halbach and her RAV4 was taken by Tom Pearce . Note the position of...



Gene Kusche May Have Personally Known the Zipperers

Gene Kusche died on February 4, 2007, the day before Steven Avery's trial began. Kusche was Chief Deputy Sheriff under Kocourek. K...

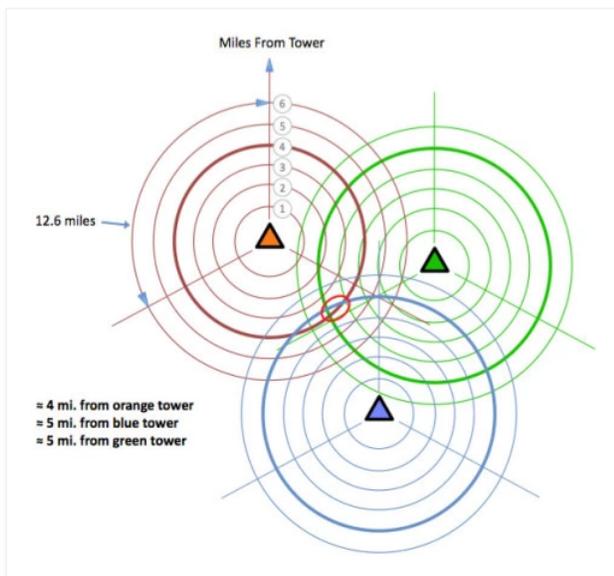


Teresa Halbach and Ryan Hillegas Talked by Phone Every Monday in October 2005

Except for October 31st (and Teresa Wasn't Returning Kelly Pitzen's Calls) Teresa and Ryan talked by phone every Monday in October 2005 except for Halloween Monday, October 31st, the day Teresa went missing. B...



Sacrificing Brendan Dassey Brendan with his mother Barb and father Peter



In densely populated urban areas, the cell towers are close together, and a much closer estimation of phone location can be made than in a rural area, where the towers are far apart.

Some of the newest cell phones can actually report a GPS location, and this is quite accurate, and doesn't rely on the cell towers at all.

Using cell tower triangulation (3 towers), it is possible to determine a phone location to within an area of "about" 3/4 square mile.

Cell tower locating evidence often goes unchallenged by the defense. Now that you have the basics, you should be in a position to challenge that kind of evidence when it's called for.

Generally speaking, if you have good line of sight, then the sectors point north, southeast, and southwest.

However, if you don't have good line of sight in those directions, they will turn them to the best positions possible to cover as much area as possible.

Therefore, in reality, it can vary very much, so the directional sectors listed below are approximated:

- 1 — approximately N to NE;
- 2 — 120° clockwise from 1 --- approximately SE to S;
- 3 — 120° clockwise from 2 --- approximately W.

By **Larry E. Daniel**
Spring 2014

It is impossible to determine the distance the phone is from a cell tower at any particular time, and suggesting that the phone is within an arbitrary boundary drawn on a map is inherently false. While some analysts will attempt to use per call measurement (PCM) data to show the distance of the phone from the tower at the time the call was made, PCM data can be off as much as four miles when actually measured against the tower locations and the PCM global positioning (GPS) coordinates provided for that particular phone call.

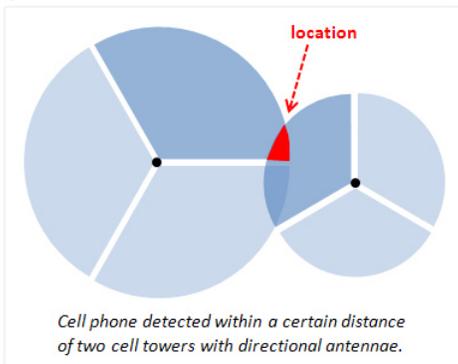
Cell sectors do not conform to a pie shape, nor is the coverage area a circle.

If you study the propagation maps at this link (pages 13-16) with the cell sectors drawn, it is easy to see that the circles and pie shapes have little to no relationship to the way that radio waves actually work.

In fact, if you look at the yellow area in the map below, you can see not only an irregular shape for the cell sector, a large portion of the cell sector's coverage is disconnected from the tower, creating hot spots where a phone can make a call without being anywhere near the tower.

The map below illustrates the wide variation in radio coverage at ground level for cell tower sectors in an area.

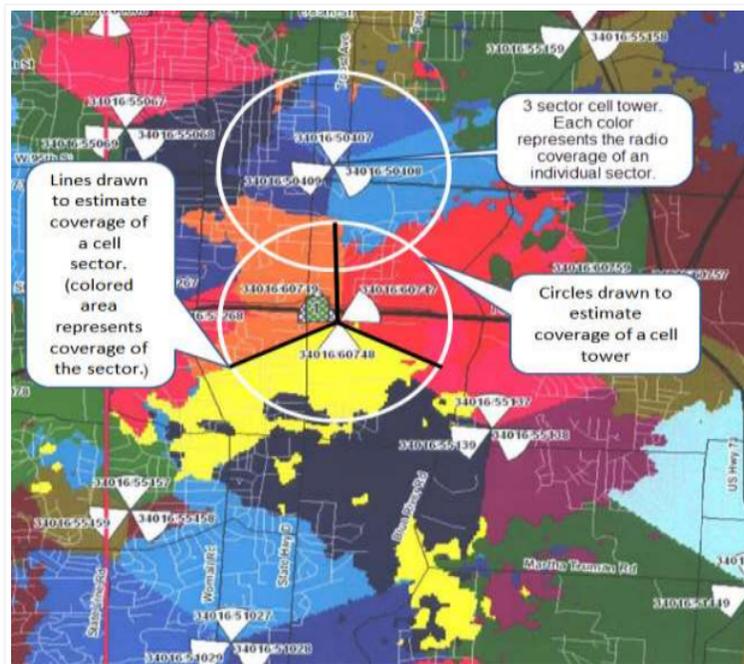
The map shows that the radio coverage of cell towers and sectors is not limited to a precise circle or pie shape and, in fact, that the radio coverage varies a great deal from tower to tower and sector to sector and from day to day.



[–]GrowingHumansIsHard wrote at Reddit: I actually am a pen pal of Brendan Dassey [who t...

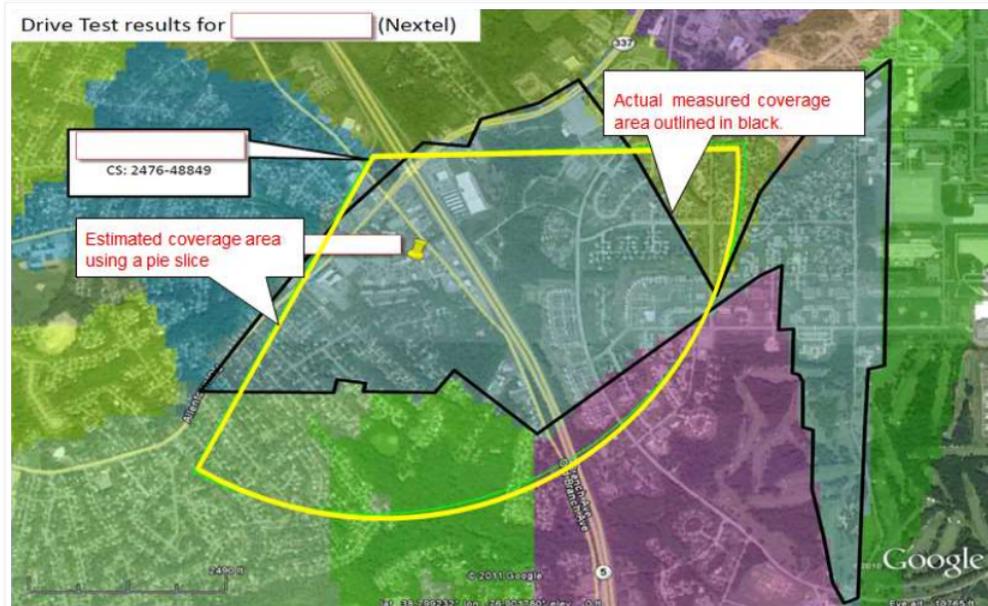
Labels

- 2:27 Caller
- Absolute Power Corrupts
- All Cops Are Liars
- Angela Schuster
- Aubrey Wygralak
- Austin's Forensic Mapping
- AutoTrader Magazine Planted on Avery's Desk
- Avery Family Sexual Abuse Accusations
- Avery Feared the Police
- Avery Was Not the Last Stop
- Avery's 1985 False Charges of Rape
- Avery's Blood
- Avery's Cut Finger
- Avery's DNA
- Avery's Interrogations
- Avery's Jury Speaks Out
- Avery's Raw Interview
- Avery's Twin Sons
- Awards Given to LE for Halbach Case
- Barb and Steven Phone Call
- Barb Janda
- Blaine Dassey
- Blood DNA Fabricated
- Blood Vials
- Bobby Dassey
- Bonfire on Oct 31st Didn't Happen
- Brady Violations
- Brendan Dassey
- Brendan Dassey Fund
- Brendan Dassey's Interviews
- Brendan Dassey's Law
- Brendan's Coerced Confessions
- Brendan's IEP
- Brendan's Overturned Conviction Upheld
- Brey
- Bryan Dassey
- Burn Barrels
- Burn Pit
- Burn Pit Photos
- Bus Driver Was Mistaken
- Bushman
- Buting
- Cadaver Dogs
- Cameron Todd Willingham
- Carmen Boutwell
- CASO Reports
- Cell Phone Records
- Cell Phone Triangulation
- Cell Tower Locations
- CFNA
- Cingular Online Account Setup
- Coached and Coerced Confessions
- COINTELPRO
- Colborn
- Corrupt US Justice System
- County Trunk Highways
- Cremains
- Crime Labs
- Crime Scene Photos
- Culhane
- Dave Begotka



Note that the drive test area of coverage outlined in black in the figure below has a vastly different shape than the pie slice shown in yellow for the coverage area. The yellow pin represents a location where the suspect was supposed to have been, but the map shows that the phone could have been in the coverage area of a different cell tower at the time of the call.

Cell phone tracking from call detail records and tower locations would not meet the criteria to be a forensically sound method; nor would drive testing or propagation modeling, as both of these methods would produce a different result over a period of time.



Properly applied and interpreted cell phone location evidence can be helpful in many cases. **The issue is the overstatement of the accuracy of the phone's location.** For instance, if the phone is using a cell tower in a particular town where an incident occurred and the person who was in possession of the phone claims to have been in a different town, it is a simple presentation to dispute the person's claim.

Another good use is for tracking a phone across a distance based on cell tower usage. While the analyst cannot claim a particular road was used, **the cellular evidence can certainly illustrate for a jury that the phone did in fact travel from one city to another or some area to another.**

In a recent case cell tower evidence was used to show that a phone call was made near the location of the defendant's home and a subsequent call was located near his place of employment. At issue was whether or not it would be possible for the defendant to travel to another location, commit a burglary and still make it to the location near his work in the time span between the calls. By combining the cell phone locations, time estimates from Google Maps and the location of the burglary, the jury was convinced that the defendant could not have committed the burglary and still made it to the location of his work in rush hour traffic in Washington, DC.

- Dawn Pliszka
- Dederling
- Denise Coakley Heitl
- Dispatch Logs
- DNA Blood Stain A23 Cargo Door
- DNA Blood Stain CX Radandt Quarry
- DNA from Teresa
- DNA Item BZ Charred Muscle Tissue
- Documents
- Don't Talk to Police
- Doug Haag
- Eagles Club
- Earl Avery
- EDTA
- Edward Wayne Edwards
- Ertl
- Fabian
- False Confessions
- Fassbender Report
- FBI Monitoring Reddit Subscribers
- Fifth Amendment Right
- Fingerprints
- Flyover Drone
- Flyover Video
- Freemasons
- Gary Kreie
- George Zipperer
- Good Ole Boys Club
- Government Complacency and Complicity
- Grand Am
- Gregory Allen
- Greisbach
- Groffy
- H&H Color Lab
- Harrington
- Hermann
- Human Trafficking
- Jambo Creek Road
- Joshua Radandt
- Jost
- Justice System in the USA
- Kachinsky
- Kelly Pitzen
- Kevin Rahmlow Saw RAV4 on November 3 and 4th
- Kocourek
- Kocourek's Sister
- Koehnke
- Kratz Doctored Teresa's Cell Records
- Kratz Killed Teresa Halbach?
- Kratz Planted the Evidence
- Kratz Scandal Links
- Kratz Sexual Predator
- Kratz Trafficked Teresa Halbach?
- Kratz's Summary Exhibits
- Kucharski
- Kusche
- Kuss Road
- Laci Peterson
- Land Grab
- Last Call Vs. Last Ping
- Lautenschlager
- Lebeau
- Lemieux
- Lenk
- Lisa Buchner
- Local's Perspective

Cellular evidence can also be used to show that a phone was near a particular area of interest with some reasonable confidence. And the more data points used can be helpful in showing that even if the analyst cannot determine why the phone picked a particular tower, dozens of uses of the same tower in a short time would lend itself to showing that the phone was using that tower over other towers nearby on a consistent basis.

Cell phones attempt to connect with the tower emitting the strongest and highest quality signal at a given moment, not the closest.

The actual determination of which cell tower is used is complex and hinges on a multitude of factors that are not memorialized in the call detail records. There is no data provided to determine why that particular tower was used for the call, only that a **particular tower was recorded in the call detail records as having been used at the time for the call.**

Many factors come into play in the selection of a tower to handle a cellular phone call, and these factors are specific to the moment in time when the call is connected. Such factors include:

- a. the loading of the towers in the area, which means, which tower has the available capacity at that moment in time to handle the call.
- b. the health of the towers in the area at the moment in time, which means, are all towers fully functioning at the time of the call.
- c. line of sight to the tower from the cellular phone itself.
- d. radio signal interference from other cell towers in the area.
- e. the make and model and condition of the particular cell phone being used.
- f. multi-pathing, which is a function of the terrain as well as both natural and man-made clutter in the area such as trees, hills, buildings and signs that cause radio waves to be either reflected or absorbed, also referred to as Rayleigh fading.
- g. the strength and quality of signal from the towers around the cell phone.
- h. whether the phone is inside a building or outside at the time the call was recorded, where structural materials may block the signal from one tower, forcing the cell phone to select a different tower than one it would be able to connect with if it were outdoors.

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 way 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 two 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, maybe 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

- Loof the Bloodhound
- Making A Murderer
- Manitowoc County Sheriff's Department
- McGrath
- Media
- Michael Morton
- Michels Materials Quarry
- Mike Halbach
- Motive to Frame Steven Avery?
- MTSO Calls to Dispatch
- MTSO Summary Report
- O'Neill Interview
- Other Theories
- Other Wrongful Convictions
- Pagel
- Pagel is Pam Sturm's Cousin by Marriage
- Pagel is Related to Scott Bloedorn
- Pagel Personally Knew the Halbach Family
- Pam Sturm
- Pam Sturm Finds Cell Phone and Papers
- Pam Sturm is Sheriff Pagel's Cousin
- Pamela Sturm Finds RAV4
- Panties Collected by Fassbender
- Parabon Snapshot
- Paul Metz
- Pelvic Bone
- Petersen
- Pevytoe
- Planting Evidence
- Police Lie Under Oath
- Prosecution's Bogus Timeline
- Prosecutorial Misconduct
- Public Outrage
- Put Teresa in Avery's House or Garage
- Quarry Bones
- Quarry Burn Pile
- Rachel Haag
- Rachel Hags
- Radandt Quarry
- Rally to Support Avery
- RAV4 at Avery Salvage Yard
- RAV4 at Crime Lab
- Rav4 Blood Planted After Removal from Avery Salvage Yard
- RAV4 Damage
- Rav4 Doors Locked at Avery Salvage Yard
- Rav4 Driver's Door Unlocked at Crime Lab
- RAV4 in Turnaround on Highway 147 Near Mishicot on 11/3 and 11/4
- RAV4 Key
- RAV4 Tires
- RAV4 Was Never in Avery's Garage
- Reddit
- Reddit Co-founder Aaron Swartz Suicide
- Reimer
- Relabeling and Swapping Forensic Swabs
- Remiker
- Remiker and Wiegert's Phone Call
- Ricky Hochstetler
- Riemer
- Robert Fabian
- Ryan Hillegas

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.

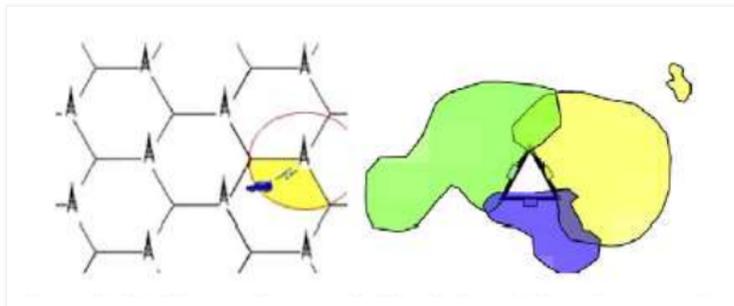
Cell tower coverage does not fit into neatly drawn circles or pie shapes.

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.

While some analysts will attempt to use per call measurement (PCM) data to show the distance of the phone from the tower at the time the call was made, in my experience, **PCM data can be off as much as four miles when actually measured against the tower locations and the PCM global positioning (GPS) coordinates provided for that particular phone call.**

The image below demonstrates the difference between an idealized layout of a cell network, and the theoretical service areas of three sectors within the network.



As shown in the figure 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.

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.

AT&T (which merged with Cingular starting in 2004) is a GSM wireless company and Sprint is a CDMA wireless company.

There are three issues that drive cell tower range:

- 1). Height. Cell phone is line of sight. In urban areas, you tend to run out of transmit power before you run out of line of sight range.
- 2). Power output. GSM defines several power output classes, depending upon the requirements. There is a minimum signal strength required to maintain an acceptable call. These are typically in the 5-20 watt class, although up to 200 watts is defined. You may find a 200 watt on top a big hill in a rural area.... The 5-20 watts effectively limits the range to something in the 5-8 mile range, somewhat more in open country.
- 3). Timing advance. GSM operates within narrow timing constraints, so that the signal arrival at the BTS has to fall within the window. To achieve this, the timing at the handset is 'tweaked' under BTS control. The limit on timing advance is 35 km (21.7479917 miles). If you want to get past 35 km, something has to give. It has been done in Rural Australia, but it means giving up 4 of the 8 time slots so that the signal from the handset no longer has to arrive within its own slot. The next time slot is sacrificed.

If you are on the roof of a two-story houses, the range can be quite long. Get down on the ground and the range becomes much shorter. **The problem is that the signal must travel by line of sight (more or less).** If you

- Ryan Hillegas Was the Last Person to See Teresa Alive
- Schetter
- Schimel
- Schmitz
- Schultz
- Scott Bloedorn
- Scott Peterson
- Scott Tadych
- Siebert
- SikiKey
- Sippel
- Skorlinski
- Snitches Evans and Rieckhoff
- Snowmobiles
- Sock Puppets
- Spoof Your Caller ID
- Stahlke
- Steven Speckman
- Steven Walter Grimm Suicide
- Strang
- Strauss
- Sukowaty
- Surveillance of Avery
- Suzuki in the Garage
- Swabs Sent to FBI for Testing
- Tammy Weber
- Teresa Halbach's Last Day
- Teresa Was Dressed as a Cowgirl for Halloween
- Teresa's Bones
- Teresa's Death Certificate
- Teresa's Laptop
- Teresa's Nuisance Caller
- Teresa's Teeth
- Tim Halbach
- Timeline 1983-2014
- Tire Track Evidence
- Todd Baldwin
- Trial Exhibits
- Trial Transcripts
- Trolls
- Trunk Highway System
- Turkey Hunters
- Vogel
- Voicemail Records
- Wendy Baldwin
- Wiegert
- Wind Turbines
- Wisconsin Mafia
- Zander Road
- Zellner's Motions
- Zellner's Post-Conviction Petition
- Ziegelbauer
- Zipperer Was the Last Known Stop
- Zipperer's Dog
- Zodiac Killer

Quotes

"The most common way for forensic evidence to be planted is by re-labeling the forensic swabs." - Dr. Karl Reich, PhD

A former New York City narcotics detective testified in court that planting drugs on innocent people was common practice, a quick and easy way to boost arrest numbers. Stephen Anderson, the former detective, is now cooperating with

can see the tower antenna, you'll probably have a full strength signal. Otherwise, the signal must travel along the slant range through (or around) all the intervening junk. What exactly is the attenuation of a UHF signal passing through brick, stone, aluminum siding, wood, reinforced concrete? **This "junk" kills radio signals.** The water in trees does a pretty good job on signals too.

If the signal can't go through, it might make it around by reflection and diffraction, but these are very local and hard to predict. This is why you might find a cell phone will work when you stand in one spot, but if you move three meters, it stops working.

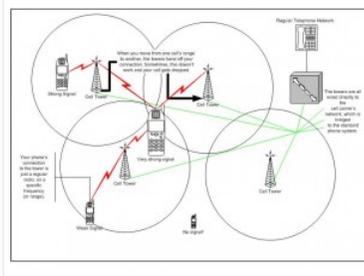
Absolute maximum range for standard GSM is 35 km. This is dictated by the Timing Advance range being restricted to values between zero and 63, with each step corresponding to 553.5 meters from the tower.

By **L. Scott Harrell**
Published 2008

I hesitated to include this article since cell phone pinging has always been something of an urban legend among the private investigation and bail enforcement communities. However, I do know for certain that it is absolutely possible and that many fugitives and abducted children have been recovered through the use of cell phone pinging by various State and Federal law enforcement agencies.

Do you remember when President Bush went to the Middle East on a surprise visit to the troops not too long ago? The media made a big deal about the fact that the Secret Service made everyone onboard Air Force One, including the President, take the battery out of their cell phones so that the "real bad guys" didn't know of their location.

Voila! (Cell phone pinging has gotten someone's attention.) I was convinced to include the article because a trusted peer indicated that he too had luck with a locate at one time, and anyone interested in locating another person may at least have the need to understand the technology and the process of locating cellular phones.



There are two ways a cellular network provider can locate a phone connected to their network, either through pinging or triangulation. Pinging is a digital process and triangulation is an analog process.

A **cell phone "ping"** is quite simply the process of determining the location, with reasonable accuracy, of a cell phone at any given point in time by utilizing the phone GPS location aware capabilities (it is very similar to GPS vehicle tracking systems).

To **"ping"** in this context means to send a signal to a particular cell phone and have it respond with the requested data.

The term is derived from SONAR and echolocation **when a technician would send out a sound wave, or ping,** and wait for its return to locate another object.

New generation cell phones and mobile service providers are required by federal mandate, via the "E-911" program, to be or become GPS capable so that 911 operators will be able to determine the location of a caller who is making an emergency phone call.

When a new digital cell phone is pinged, it determines its latitude and longitude via GPS and sends these coordinates back via the **SMS system (the same system used to send text messages).**

This means that in instances where a fugitive or other missing person has a GPS-enabled cell phone (and that the phone has power when being polled or pinged) that the cell phone can be located within a reasonable geographic area — some say within several feet of the cell phone.

With the older style analog cellular phones and digital mobile phones that are not GPS capable, the cellular network provider can determine where the phone is to within a hundred feet or so using **"triangulation"** because at any one time, the phone is usually able to communicate with more than one of the aerial arrays (antennas) provided by the phone network.

The cell towers are typically 6 to 12 miles apart (less in cities) and a phone is usually within range of at least three of them. By comparing the signal strength and time lag for the phone's carrier signal to reach at each tower, **the network provider can triangulate the phone's approximate position.**

Similar technology is used to track down lost aircraft and yachts through their radio beacons. It's not identical because **most radio beacons use satellites** and **older cell phones use land-based aerial arrays,** but the principle is the same.

Not surprisingly, **the phone network companies are shy about admitting they have this ability.**

The triangulation and pinging capability of mobile phone network companies varies according to the age of their equipment. A few can only do it manually with a big drain on skilled manpower. **But these days most companies can generate the information automatically, which makes it cheap enough to sell.**

Some nefarious service providers have indicated that they have either developed sources within mobile telephone

prosecutors and is spilling the beans on the crooked practice of framings and false arrests, often to reach arrest quotas. "It was something I was seeing a lot of, whether it was from supervisors or undercover and even investigators," Anderson testified in Brooklyn Supreme Court. "It's almost like you have no emotion with it, that they attach the bodies to it, they're going to be out of jail tomorrow anyway; nothing is going to happen to them anyway." The Drug Policy Alliance, a group that promotes alternatives to the war on drugs, issued a statement calling the case against the officers indicative of larger, systematic failures. "One of the consequences of the war on drugs is that police officers are pressured to make large numbers of arrests, and it's easy for some of the less honest cops to plant evidence on innocent people. The drug war inevitably leads to crooked policing — and quotas further incentivize such practices." - *Huffington Post*, October 13, 2011

A crucial aspect of Zellner's effort to overturn Ryan Ferguson's conviction was obtaining two recantations from key witnesses whose testimony placed Ferguson at the crime scene. They admitted to lying after being pressured by police and prosecutors. Zellner has become a standard bearer among civil rights attorneys and has long been known as a fierce courtroom advocate — armed with a recorder-like memory, trial techniques that include videotaped re-enactments of crime scenes and, perhaps most crucially for her clients, an ability to elicit the truth from co-defendants or witnesses who have previously lied about innocent defendants' involvement in crimes in order to save themselves. Quite simply, she gets people to talk. And to tell the truth. - *Chicago Lawyer Magazine*, December 2014

"What drives me is the abuse of power —the bullying and the victim. I have such a strong reaction when I see people who can't defend themselves... When I watched the Avery case, I felt that the attitude toward him by the prosecutors and the state was that he was disposable. It was almost like a class thing. [His family] didn't matter, they had no power. The longer I watched it, the more angry I got." - Kathleen Zellner, *Newsweek*, April 8, 2016

"We are continuing to examine every aspect of Mr. Avery's case and all of his legal options. We are confident Mr. Avery's conviction will be vacated when we present the new evidence and results of our work to the appropriate court." - Kathleen Zellner, *The Wrap*, January 11, 2016

"There is evidence that already exists in the case that points to a different location and a different suspect. We've got a combination of forensic evidence and a tip from somebody that we've interviewed multiple times that we think is credible... I've never seen a more graphic, compelling illustration of a crime scene that was fabricated." - Kathleen Zellner, *The New York Times*, August 18, 2016

service providers to be able to get this information upon request or have access to the software interfaces to accomplish this on their own (or some variant thereof). I highly suspect that these “cell phone ping service providers” I see advertising from time to time are actually using a good ol’ fashioned pretext to obtain the location of a cell phone rather than using an actual ping. If you do come across a real provider, please let me know.

There you have it — the short course regarding the technical capability of locating cell phones and those who possess them **either through pinging or triangulation**. Again, I cannot speak to the commercial availability of such a service but like anything else in the investigative business; for now I believe that mobile-phone pinging is largely urban myth among private investigators, fugitive recovery investigators and skip tracers.

What Your Cell Phone Can't Tell the Police

By Douglas Starr, The New Yorker

June 26, 2014

On May 28th, Lisa Marie Roberts, of Portland, Oregon, was released from prison after serving nine and a half years for a murder she didn't commit. A key piece of overturned evidence was cell phone records that allegedly put her at the scene.

Roberts pleaded guilty to manslaughter in 2004 after her court-appointed attorney persuaded her that she had no hope of acquittal. The state's attorney had told him that phone records had put Roberts at the scene of the crime, and, to her lawyer, that was almost as damning as DNA. But he was wrong, as are many other attorneys, prosecutors, judges and juries who overestimate the precision of cell phone location records.

Rather than pinpoint a suspect's whereabouts, cell tower records can put someone within an area of several hundred square miles or, in a congested urban area, several square miles. Yet years of prosecutions and plea bargains have been based on a misunderstanding of how cell networks operate. No one knows how often this occurs, but each year police make more than a million requests for cell phone records. “We think the whole paradigm is absolutely flawed at every level, and shouldn't be used in the courtroom,” Michael Cherry, the C.E.O. of Cherry Biometrics, a consulting firm in Falls Church, Virginia, told me. “This whole thing is junk science, a farce.”

The paradigm is the assumption that, when you make a call on your cell phone, it automatically routes to the nearest cell tower, and that by capturing those records police can determine where you made a call —and thus where you were—at a particular time. That, he explained, is not how the system works.

When you hit “send” on your cell phone, a complicated series of events takes place that is governed by algorithms and proprietary software, not just by the location of the cell tower.

First, your cell phone sends out a radio-frequency signal to the towers within a radius of up to roughly twenty miles—or fewer, in urban areas—depending on the topography and atmospheric conditions. A regional switching center detects the signal and determines whether to accept the call. There are hundreds of such regional centers across the country.

The switching center determines the destination of your call and connects to the land lines that will take it to cell towers near the destination. Almost simultaneously, the software “decides” which of half a dozen towers in your area you'll connect with. The selection is determined by load-management software that incorporates dozens of factors, including signal strength, atmospheric conditions, and maintenance schedules.

The system is so fluid that you could sit at your desk, make five successive cell calls and connect to five different towers. During a conversation, your signal could be switched from one tower to the next; you'll also be “handed off” to another tower if you travel outside your coverage area while you're speaking.

Designed for business and not tracking, **call detail records provide the kind of information that helps cell companies manage their networks, not track phones.**

If I make a cell call from Kenmore Square, in my home town of Boston, you might think that I'm connecting to a cell site a few hundred feet away. But, if I'm standing near Fenway Park during a Red Sox game, with thousands of fans making calls and sending texts, that tower may have reached its capacity. Hypothetically, the system might send me to the next site, which might also be at capacity or down for maintenance, or to the next site, or the next. **The switching center may look for all sorts of factors, most of which are proprietary to the company's software. The only thing that you can say with confidence is that I have connected to a cell site somewhere within a radius of roughly twenty miles.**

Aaron Romano, a Connecticut lawyer who says that he has seen many cases involving cell records, has done a series of calculations to show how imprecise these locations can be. If you suppose that a cell tower has picked up a signal from ten miles away, you're looking at a circle with a radius of ten miles, which has an area of three hundred and fourteen square miles. Cell tower coverage is divided into sectors. Most towers have three directional antennae, each of which covers one third of the circle. Including that factor gives you a sector of 104.67 square miles. “That's a huge area,” Romano said. “So how can anyone say, with any degree of certainty, that a handset was at the scene of the crime?”

Some technologies can locate you precisely. If you carry an iPhone, you're also carrying a G.P.S. transmitter, which links to a ground station and then to several satellites, which can find your location to within fifty to a hundred feet. You enable the G.P.S. when you use certain software, such as Google Maps. Similarly, **if you make an emergency 911 call, your company will use three towers to triangulate your location; if you're using a smartphone, it will use G.P.S. to pinpoint where you are.**

During a [press conference on August 26, 2016](#), Kathleen Zeller said: “[In the [post-conviction petition](#)] we're going to lay out all of our investigation that we have done that will [point to a third party](#). That was not successfully done at the trial level. I think the most reassuring thing is that we are going to get to the bottom of who killed Teresa Halbach... we're not going to disclose that until we do the post-conviction petition. But I can tell you that the testing we've already done will establish Mr. Avery's innocence. But we are going to do the whole thing; we're going to do every conceivable test. We've been contacted by scientists all over the world, volunteering, offering us ideas. And now we've got it pinned down to the testing we need to do to determine once and for all: was the evidence in the vehicle planted, was the DNA on the bullet planted, was the DNA on the car key planted? We're going to be able to answer all of those questions because it's been almost 10 years since the verdict and there have been really huge developments in forensic science... Because he [Avery] never made any incriminating statements. The [Dassey] confession has been invalidated. So you're down to the evidence at the crime scene. You're down to the key, the hood latch, the blood in the RAV and the bullet.” When asked, “Do you just have one suspect in mind or are you looking at multiple suspects?,” Zellner replied, “In fairness, yeah, we are looking at multiple people, but we are narrowing it down.” And when asked, “What can you tell us about the suspect?,” she answered: “Nothing. Nothing. Not until I file [the post-conviction petition].”

“Not 1 but 8 plants: bullets, bones, blood, camera, cellphone PDA, key, car + false confession. World's best experts on it. #MakingAMurderer” - Kathleen Zellner, Twitter, January 17, 2017

“There's always an element of misconduct. Police, prosecutors— They're actually able to sleep at night knowing they've convicted an innocent man. They rationalize it. They say 'I didn't convict him, the jury did!'” - [Paul Henderson](#), Private Investigator, May 7, 2013

“My biggest problem with police interrogations is they don't believe anything you say. So right out of the gate everyone is a liar as far as they are concerned. They are pretty much trained to be cynical of society and given power over them at the same time. They claim you are lying, while they themselves lie. To them, the end justifies the means when you're a police officer protecting the citizenry from the scum of the city.” - [Reddit](#)

“I think people become jaded when they spend too much time as a prosecutor, or if they first come to be a prosecutor after being a victim of some kind. They start seeing all of the accused as a subclass of humanity that doesn't deserve due process. Then they start watching Nancy Grace, and hanging around with the like minded, until their journey is complete. Unfortunately it

If you're the target of an ongoing investigation and law-enforcement agencies want to track you, **they can ask a phone company to "ping" your phone in real time.** (They also use that technique when trying to find a kidnapping victim.) Those methods are not what's captured by phone-company cell tower records of the sort that helped put Roberts in prison.

When investigating a crime that occurred in the past, police tend to have two options: seize the G.P.S. chip and download the locations or obtain the cell records. Wednesday's Supreme Court decision made it mandatory for police to obtain warrants before searching the cell phones of people they arrest. But the case law on getting cell tower information is split. **In most jurisdictions, police can obtain your cell detail records without a warrant.** The disparity in requirements between the two could encourage police to rely increasingly on call detail records, Hanni Fakhoury, a staff attorney for the Electronic Frontier Foundation, said.

Put another way, if I'm making a cell phone call from my couch and someone commits a murder in a bar half a mile away, my cell records may serve as corroborating evidence that I took part in the crime. That might be true if I'd claimed to be in another state at the time, but those records cannot place me next to the body. **What they don't show is the precise location of a cell phone.** Yet prosecutors often present those records as if they were DNA.

A few years ago, the F.B.I. established a unit specializing in cell records, called C.A.S.T. (Cellular Analysis and Surveillance Team), with the mission of analyzing cell location evidence. The Bureau declined requests for an interview, but C.A.S.T. agents in recent cases have asserted a different theory of how cell networks operate. **Testifying at a trial for murder and robbery in Florida in June, 2013, Special Agent David Magnuson said that the instant a call is received or placed, it's the phone that decides which tower to go to—not the software that adjusts network load—and that, "ninety-nine per cent of the time, it's the closest tower."** Although he conceded that cell records can be imprecise, he described them as "like a historical digital fingerprint." He added that the F.B.I. checks its information by doing periodic "drive tests," in which it measures radio-frequency information emitted by cell towers to see if the coverage area agrees with its models.

Independent experts I spoke to called this testimony into question—both the accuracy of the estimates and the validity of the drive tests. Conditions are so changeable that, even if a drive test confirms the model on a particular day, it may not on another, and certainly not on a day years in the past. It's a probabilistic statement, not a scientific one.

In 2012, the U.S. District Court for the Northern District of Illinois ruled that an F.B.I. agent could not testify about the location of a defendant's cell phone because the analyses did not rise to the level of trusted, replicable science. Other courts have found for the defendant after the defense attorney discredited the prosecution's expert witness.

Lisa Marie Roberts's original lawyer wasn't one of them. There were reasons to suspect her: she had a tumultuous, sometimes violent relationship with the victim, Jerri Williams. Cell records showed that at 10:27 on the morning of the murder, Roberts's phone connected to a tower within 3.4 miles of Kelley Point Park, where Williams's body was discovered. Her attorney felt that was enough to convict her.

But she was making that call while driving a red pickup truck more than eight miles away, as confirmed by a witness. The system had simply routed her call through the tower near the park. It also emerged that new DNA evidence placed another suspect, a man, at the crime scene. And another piece of evidence helped: moments earlier, Roberts had received another call that came through a different site. The two towers were 1.3 miles apart. She could not have traveled that distance in the forty seconds between the calls. And so her cell records, in a sense, helped to save her.

Posted by magiclougie at 9:50 PM



Labels: [Cell Phone Triangulation](#)

2 comments:



magiclougie May 27, 2017

[–]jeffjeffjeff1234

<http://www.newyorker.com/news/news-desk/what-your-cell-phone-cant-tell-the-police>

The paradigm is the assumption that, when you make a call on your cell phone, it automatically routes to the nearest cell tower, and that by capturing those records police can determine where you made a call—and thus where you were—at a particular time. That, he explained, is not how the system works.

When you hit "send" on your cell phone, a complicated series of events takes place that is governed by algorithms and proprietary software, not just by the location of the cell tower."

[–]Redditidiot1

Many of the circumstances are due to cell phone traffic, system maintenance, and certain switching situations which factor into the algorithm. Many of those determining factors are mitigated due to less traffic and towers in a rural community. Boston, yes, Manitowoc County circa 2005 is a different story. I have had a cell tower afficianado confirm this. Nevertheless, it can definitely exclude.

[–]jeffjeffjeff1234

I agree that that's one of the few scenarios where it could be used to support his innocence. (She pings a cell tower well

is within human nature to descend down these paths to prejudice, to form self congratulating, witch burning mobs, and to rationalize the injustices they cause by dehumanizing their victims." - [magilla39](#), Reddit, October 11, 2017

"She's not intimidated by anybody. In particular, she doesn't have much respect for authority. She has a willingness to challenge and be skeptical of authority. And she has a real compassion for the underdog. Most of the people in prison are dangerous, violent criminals who belong there—she knows that. She's not starry-eyed about criminals. But she's not starry-eyed about people in authority, either." - Robert Zellner, [January 2018](#)

U.S. Attorney General Jeff Sessions rededicated his department to working with local law enforcement on civil asset forfeiture efforts that bypass the need for criminal convictions to seize property—and also bypass state and local safeguards. Forfeited funds are split between federal and local agencies in a lucrative arrangement for everybody but the victims. "Equitable sharing" collaboration between federal and local agencies was suspended under former Attorney General Eric Holder, but the new regime is jump-starting the program. Yes, Sessions promised that "the federal government will not adopt seized property unless the state or local agency involved provides information demonstrating that the seizure was justified by probable cause." But that's cold comfort if the probable cause comes from eager cops planting bags of drugs hither and yon. The evidence—not planted—suggests that police officers don't need more incentive to falsify reasons for slapping on the cuffs. Day-to-day pressures to meet arrest quotas, out-do colleagues, or spackle over errors in judgment seem to have already done the job in spades. - [J.D. Tuccille](#), July 24, 2017

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outside range of Avery's while Avery can be proven to be at home) However, the way the info is being utilized by OP is not scientifically sound because it is based on the false assumption that cell phones connect only to the closest cell tower.

[–]JLWhitaker

but they do have to connect to a radio pointing in the direction of the location of the phone.

The one problem I had in the OP was a supposed hand off to a different segment radio. I have never heard that as a possibility.

CONTINUED...

Reply



magiclougie May 27, 2017

[–]jeffjeff1234

From that same source...

Cell phones attempt to connect with the tower emitting the strongest and highest quality signal at a given moment, not the closest. The actual determination of which cell tower is used is complex and hinges on a multitude of factors that are not memorialized in the call detail records. There is no data provided to determine why that particular tower was used for the call, only that a particular tower was recorded in the call detail records as having been used at the time for the call. Many factors come into play in the selection of a tower to handle a cellular phone call, and these factors are specific to the moment in time when the call is connected.

Such factors include:

- a. the loading of the towers in the area, which means, which tower has the available capacity at that moment in time to handle the call
- b. the health of the towers in the area at the moment in time, which means, are all towers fully functioning at the time of the call
- c. line of sight to the tower from the cellular phone itself
- d. radio signal interference from other cell towers in the area
- e. the make and model and condition of the particular cell phone being used
- f. multi-pathing which is a function of the terrain as well as both natural and man-made clutter in the area such as trees, hills, buildings and signs that cause radio waves to be either reflected or absorbed, also referred to as Rayleigh fading.
- g. the strength and quality of signal from the towers around the cell phone
- h. whether the phone is inside a building or outside at the time the call was recorded, where structural materials may block the signal from one tower, forcing the cell phone to select a different tower than one it would be able to connect with if it were outdoors."

[–]ptrbtr

This has been posted over and over. I'm telling you and anyone else that wants to just go by this information, it has little to do with the cell coverage in the Manitowoc, Calumet, Kewaunee or Brown counties in 2005.

Most of what can be determined will be because of a lack of coverage in the area. I worked and traveled that area for many years including 2005, the coverage was bad.

It's simple. If tower 1 has a signal footprint of 15 miles, with no overlap from another tower from 2 directions (which many in that area had at that time) it is easy to prove if a phone was within that 15 miles because no other tower was available. Even if TH's phone lost service and then reconnected 25 miles away on another tower it would prove she had to have traveled at least to the outer coverage of the other tower. Big gaps in the coverage area will be huge IMO.

This won't be arguing over which tower had contact, it will be pretty straight forward because of the lack of coverage.

https://www.reddit.com/r/TickTockManitowoc/comments/4szjde/the_location_of_the_tower_teresa_halbach_last/

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“The deeper we dig into the Avery conviction the more evidence we uncover of his innocence. It does not matter how long it takes, what it cost or what obstacles we have to overcome—our efforts to win Mr. Avery’s freedom will never stop,” Zellner tells *Newsweek* by email. “Giving up on his case would be accepting that someone else got away with murder and our justice system is just too incompetent, indifferent and/or inflexible to recognize this huge mistake and rectify it. We are going to keep ringing the doorbell at this so called Court of Justice until someone answers it.”



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