Terms:

CDR - Call Detail Record (The details on the actual activity / can contain coordinates or a reference to beginning/ending cell towers/sectors)
Cell Tower Database - A list of cell towers, their locations and configurations to use as a cross reference for plotting from CDR
Cell - Coverage area provided by one mast
Femtocell - Antenna that covers a very small area (home, room, etc)
Picocell - Antenna that covers a smaller area (building floor, etc)
Microcell - Antenna that covers a limited area (mall, hotel, etc)
Macrocell - Antenna that covers a larger area (typically what you see on a mast / building)
Omnidirectional - When a single antenna covers a 360 degree area (no sectors)
Unidirectional - When a cell is broken up into multiple sectors, each covering a specific area (typically 120 degrees each)
Handover/Handoff - When the phone communication is transferred from one cell/sector to another due to movement, load, signal, etc.
Sector - Section of cell that covers a specific area (typically 120 degrees)
Azimuth - The center angle of a sector from 0 Degrees North
Horizontal Beamwidth - The Horizontal coverage of an antenna (this can determine if a sector covers more than 120 degrees or overlaps with another sector)
Downtilt - Physical tilting of antenna downward to limit range
Cell Site - Overlap coverage provided by a single sector on multiple cells
BTS - Base Transceiver Station (The cell/sector covering an area)
BSC - Base Station Controller (The controller of multiple BTS in an area / handles allocating radio channels, frequencies, signals and handovers/handoffs)
MSC - Mobile Switching Center (The controller of multiple BSC in an area / Handles call routing, call setup, basic switching functions)
GMSC - Acts as a gateway between two networks (ex. Cell network and land line network/PSTN)
PSTN - Public Switched Telephone Network (The network that handles home/business phones)

Cross:

1. Cell site analysis is the plotting of location information from activity on a cell phone, correct?
   This information is collected and stored by the cell phone company, correct?
   And this information is obtained through a warrant by law enforcement, correct?
   The information received in this case is historical cell site analysis, correct?
   That means that it is only a single point of reference for plotting, correct?
   This information contains the cell towers used during a call, correct?
   This information also contains a latitude and longitude location of a mast or antenna, correct?
   And in most cases also contained the configuration of the sector, correct?
   The information obtained in this case is only a single point of reference for plotting, correct?
So this single point of reference Historical Cell Site Analysis is not GPS, correct?

GPS is a much more accurate location identifier, correct?

This single point of reference Historical Cell Sites Analysis is also not Triangulation, correct?

Triangulation is when you have 3 or more points of reference with distances in order to calculate the location of a cell phone where they overlap, correct?

And Triangulation is not as accurate as GPS, but more accurate than a single point of reference Cell Site Analysis, correct?

So out of the 3, the single point of reference Historical Cell Site Analysis it the least accurate, correct?

When you plot out the location, you start with the physical location of the mast or antenna, correct?

You utilized the latitude and longitude coordinates obtained from the cell phone company, correct?

You then plot this out on some type of mapping program, correct?

In this case you utilized a program called Microsoft Streets & Trips, correct?

So after you mapped the location of the mast or antenna (cell), you then identified the sector if it was a Unidirectional setup, correct?

And a sector is just a section of coverage from a cell, correct?

These sectors are typically divided into three 120 degree sections, correct?

Like cutting a pie into 3 exact pieces, correct?

But these sectors don't have to be 120 degrees, correct?

They may be less, correct?

They may even be more than 120 degrees, correct?

This adjustment is called the Horizontal Beamwidth, correct?

And this is adjusted so there is additional coverage or overlap or more concentrated coverage, correct?

There are also multiple cells/sectors that cover a single area, correct?

And this is so cell phones don't drop calls, correct?

So that if a phone is moving, it will handoff to another cell/sector, correct?

But a handoff can happen even if a cell phone isn't moving, correct?

If a phone is between 2 sectors, correct?

If a mechanical failure happens it can handoff a call to another, correct?
And again this is so cell phones don’t drop calls, correct?
The antennas/sectors are not all the same configurations, correct?
They do not all point in the same direction, correct?
They can be pointed/aimed toward different areas for better coverage, correct?
And this pointing of a sector is referred to the Azimuth, correct?
And the Azimuth is calculated starting at 0 Degrees North, correct?
And a full circle would bring you to 360 Degrees and that is the same as 0 Degrees, correct?
So a sector with a 0 Degree Azimuth would be facing North, correct?
And a sector of 90 Degrees would be facing East, correct?
And a sector of 180 Degrees would be facing South, correct?
And finally a sector of 270 Degrees would be facing West, correct?
But it is not limited to just those 4, correct?
The antennas/sector can be pointed in any direction from 0 Degrees to 360 Degrees, correct?
I want to show you this chart... (Chart of degrees)
Cell antennas can also be adjusted to point downward, correct?
That means the antenna itself is tilted to limit the distance of the coverage, correct?
This is what is considered "downtilt", correct.
And this is to improve coverage within a specific area and also to eliminate interference, correct?
So the distance of each cell is not uniform, correct?
Depending on the location of the antenna it may need to reach farther, correct?
Or it may be configured to cover a smaller area. correct?
Now I see on your charts that you use a uniform sector size, correct?
120 Degree coverage, correct?
1.5 Miles for the distance, correct?
This is just an average that you decided on, correct?
You don’t really know the exact coverage of each sector, correct?
You can only estimate what that may be, correct?
So you do not have a true coverage propagation map for each sector, correct?

And you did not go out and perform a full cell site survey of each sector, correct?

So the coverage area of the sector may have been farther than you have depicted, correct?

Or even smaller, correct?

So let's talk about how the cells/sectors are selected when a call is made or received. By design the rule is that the strongest signal is selected, correct?

But strongest signal doesn't mean closest tower, correct?

The signal can be effected by buildings, correct?

It can be effected by radio interference, correct?

It can be effected by the wattage of the tower, correct?

And also the downtilt of the antenna, correct?

Antennas also have different frequencies, correct?

And the different frequencies mean different distances of travel, correct?

And obstructions like buildings can effect each frequency differently, correct?

So that strength of the cell can vary depending on many variables, correct?

There are also times when cells have to have maintenance, correct?

That would mean that a specific sector would not respond or even be active, correct?

So the next strongest signal would then take over, correct?

But again that does not mean the next closest tower, correct?

And you do not know if any sectors were under maintenance back in 2010, correct?

You don't have those records from the cell companies, correct?

You also do not know the exact configuration of each cell/sector as it was back in 2010, correct?

Cell phones are aware of multiple towers in an area, correct?

And this is so handoffs can happen if needed, correct?

The phone lists the towers according to signal strength, correct?

But that list is always changing, correct?

And the cell towers are aware of the signal strength of the phone, correct?
And also an approximate distance from the phone, correct?

But this information is not retained very long at the cell company, correct?

And you did not have that information in this case, correct?

So you only have a general location, that may not be the closest tower, correct?

And you only have an estimated sector size that may not be the exact coverage, correct?

That could me many square miles, correct?

Lets talk about the items you did plot...

You didn't plot all calls, correct?

You selected specific ones to plot, correct?

Lets go through the process that you used to plot out these items...