STATE OF INDIANA	)	MARION SUPERIOR COURT D31
	)SS:	
COUNTY OF MARION	)	CAUSE NO. 49D31-1511-MR-1041732

LARRY TAYLOR,	)
	)
Defendant,	)
	)
vs.	)
	)
STATE OF INDIANA,	)
	)
Plaintiff.	)
	)

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702 HEARING

TESTIMONY OF RICHARD MILETIC AND RICHARD FENNERN

BEFORE THE HONORABLE GRANT W. HAWKINS, JUDGE

DATE: March 22, 2021

Court Reporter: TONI M. MULLINS

APPEARANCES

ON BEHALF OF THE DEFENDANT:

Mr. Ray Casanova
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ON BEHALF OF THE STATE:

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March 22, 2021

RICHARD MILETIC, DEFENDANT'S WITNESS, SWORN

THE COURT: Would you please state your full name and spell your last name?

THE WITNESS: Richard Miletic. M-I-L-E-T-I-C.

THE COURT: Thank you, sir. Mr. Casanova.

DIRECT EXAMINATION

BY MR. CASANOVA:

Q Sir, could you -- I just want to talk briefly about your background. Can -- are you currently employed?

A I am.

Q And can you explain to the Court where you are employed?

A I own my own company called ZK Services.

Q And can you describe what type of services your company provides?

A We provide testing services to test cellular and wireless networks; performance and coverage. And we also provide this type of service in legal cases.

Q And how long have you been involved in this type of work?

A Over 30 years.

Q And can you -- briefly, can you explain what your educational background is?

A I have a Bachelor of Science in Engineering from the University of Illinois and a Master's in Business from Duvall University.

Q And in the course of your duties for the job you described, do you typically have the opportunity to determine the extent of coverage for a cell

network?

A Yes. That's mainly what we do when we test the network. We're testing the signal strength coverage, the quality of the signal, interference, and many other parameters.

Q And can you basically just briefly describe what type of tools you use in determining cell network coverage?

A It's been a long history of tools over the last 30 years. But currently, we use high speed scanner devices that can scan multiple frequencies, multiple bans; measure the signal strength along with other parameters. We also use cell phones themselves with special software that runs on the phone where we can make calls. We can do -- we can transmit the data files up and down. We can collect data through put information, voice quality information, and a host of other parameters.

Q Have you specifically developed tools of software to assist in determining cell network coverage?

A Yes. I owned a company from 1996 through 2000 and -- approximately 2013. And we developed these -- we developed design, wrote the software, developed the hardware of products that went out and that we sold to Verizon, and AT&T, and the large cell phone operators that they use to do their testing.

Q So the -- the tools and the software you developed have been generally accepted and used within the community of scientists and engineers to determine cell network coverage?

A That's correct.

Q And are there any other types of tools that are used when you're attempting to determine the coverage of a cell network?

A There's various signal strength meters and various electronic equipment. But for drive testing or walk testing, these types of tools are main tools that are used.

Q And I guess what I was referring to is drive testing. Could you briefly describe what drive testing is?

A Sure. We put this equipment in a vehicle. In some places, we call it walk testing because sometimes we walk around a venue, like a football stadium or hospital. But if you're doing a drive test, it's the same equipment, it's the same process. We have a GPS receiver, we have a scanning receiver, and we have cell phones. And they're all connected to some type of computer. Either a laptop computer or a Tagway computer, which collects all the data. We can see real-time on a map where we're driving.

All the data is collected once per second for the GPS and tagged with a latitude/longitude. So we can bring that data back to the office and we can create a map of all the different parameters that we collect. And it looks like a breadcrumb trail when you map it out. It's pretty detailed.

Q And through this work, are you -- have you become familiar with the way radio waives would actually look as they cover a cell network area?

A Yes. A lot of experience with -- with radio waves. I worked for Motorola for five years and took many radio theory classes with them. I've had various training classes on various wireless and cellular technologies over the years, starting off with analog to 2G, 3G, 4G, now 5G type of technologies.

Q And I think, is it fair to say in the course of your work, you have had contact with engineers employed by various cell network providers?

A Yeah. We work closely with -- we work closely with the cellular engineers

from the cellular operators, the RF Engineers, Assistant Performance Engineers, all over the county. I've worked all over the world as well in many different countries meeting with many different cell phone operators.

Q And have you specifically worked with engineers from Verizon?

A I have.

MR. CASANOVA: Judge, if I could have this marked for identification as Defendant's A.

THE COURT: Anything else you want to have marked while you're going up there?

MR. CASANOVA: Well, yeah, I do have a few things here.

Q And sir, I'm going to show you what's been marked for identification as Defendant's A. Do you recognize that?

A Yes.

Q What do you recognize that as?

A My resume, CV.

MR. CASANOVA: Move to admit for purposes of the hearing, Defendant's A.

MR. ANDERSON: No objection.

Q And obviously, you were contacted to review some of the cell phone network data that was collected in the case of State of Indiana versus Larry Taylor; is that correct?

A Yes.

Q And could you describe what records you reviewed in this case?

A I reviewed the -- what's called the call detail records and other Verizon calls that are RTT records.

Q And did those records, from your understanding, were they obtained through tower dumps?
A Yes.
Q And are you familiar with what a tower dump is?
A Yes.
Q Can you briefly describe to the Court what a tower dump is?
A It's a set of files that come -- that are collected and come from the network of a particular phone of interest.
Q And are -- essentially, are tower dump records historical cell phone records?
A Yes.
Q They are not live time tracking records?
A Correct.
Q Okay. And then did you also review some PowerPoints that were created by the State's witness Special Agent Fennern?
A Yes.
Q Did you also create a PowerPoint for this case?
A Yes.
Q And did you also create a slide that gathered together some of the relevant information in the tower dump records?
A Yes.
Q I'm going to show you what's been marked for identification as Defendant's B. Do you recognize that?
A Yes.
Q What do you recognize that as?

A The PowerPoint presentation I put together.

Q And I'm going to show you what's been marked for identification as Defendant's C. Do you recognize that?

A Yes.

Q What do you recognize that as?

A A summary of some of the calls from the RTT record files.

MR. CASANOVA: And for purposes of the hearing, I would move to admit B and C.

MR. ANDERSON: No objection.

THE COURT: Show B and C admitted without objection.

(DEFENSE EXHIBITS B AND C, HAVING BEEN OFFERED, WERE ADMITTED INTO EVIDENCE WITHOUT OBJECTION)

Q And before I get to the PowerPoint slide itself, I'd like to ask some questions about RTT data just generally. Do all phone providers or cell phone providers collect some form of RTT data?

A The RTT data is collected by the network hardware. So companies such Lucent, Erickson, provide the network hardware. The data is actually collected by the network hardware provided by those companies. And so generally, yes, all those companies do provide some form of RTT information.

Q So Verizon collects it, AT&T, T-Mobile, they all collect this data?

A Correct.

Q And do they all have slightly different acronyms for this data?

A Yes.

Q And can you explain to the Court what RTT data measures?

A It uses what's called Time of Arrival technology. So it calculates the time

that it takes a signal to go from the cell tower to the phone, and then back from the phone to the cell tower. And based on the time, it multiplies that times the speed of light because that's the speed in which radio waves travel. And when you multiply the time times the speed of light, the result is the distance.

Q So essentially, this data is -- is being generated kind of as a function of how long it takes for the signal from a cell phone to go to the tower and back again?

A That's correct.

Q And does this data typically generate a pinpoint location and a ranging and data as well?

A The -- are you talking about the data files --

Q Yes.

A -- the RTT data files? Yes. In the data files, the -- there is a column for the latitude and longitude of the phone. And there are columns for confidence factor and the distance from the cell and the cell ID number.

Q Okay. Now, I'm going to the confidence factor in a second. But I just wanted to ask you a few more general questions about RTT data.

A Mm-hmm.

Q Can you explain to the Court exactly what cell phone companies like Verizon use RTT data for?

A Typically, we'll use the data for troubleshooting the network identifying areas, problem -- potential problem areas in the network such as a high number of dropped calls or -- or high number of blocked calls in a -- in a certain area of the network.

Q So the cell phone companies are concerned with making sure they don't

have customers with dropped calls?

A That's one aspect. Call quality is another, call blocking is another. Those are the main ones.

Q So is it fair to say that RTT data basically is collected to see where there might be problems within the overall network in terms of call quality or dropped calls?

A That's correct. It's not the only source of data, but it's one source of data.

Q And in order to do that, can you explain, do the cell phone companies need to collect this data over a long period of time?

A That's correct. Because the network changes through -- throughout the day. It changes based on the season. During peak hours, the network might function differently as opposed to non-peak hours because of the high -- high usage of the network. So they may cut and slice the database by time of day, by -- by season, by different factors based on what they're looking for.

Q But do they have to get a large enough collection of data to make -- so it's statistically significant for them to make predictions?

A Yeah. They need a -- they need a large number of calls in order to have some -- they can't just rely on one person going down the road that has a dropped call because it may just be that person's phone or some situation with that person's vehicle or what. So they need a large number of calls that makes it a statistically valid reason to -- to make sure that there actually is a problem with the network.

Q If they don't have a large enough database to make a statistically significant prediction, in your opinion, would this data be serving the purpose

for which it was created?

A It wouldn't be valid. It wouldn't be prioritized as a high need in terms of their -- how they prioritize their -- their trouble spots.

Q And in this case, I mean, the case that you reviewed, Mr. Taylor's case, we're talking about just a handful of calls made at a certain time on a certain day. Would that provide the type of data to the cell phone providers that they would find statistically significant to make the type predictions they use RTT data for?

A Most probably not.

Q And are you familiar with -- well, let me show you what's been marked for identification as Defendant's D. Do you recognize that?

A Yes.

Q What do you recognize that as?

A It's Verizon's disclaimer on the RTT data.

Q And specifically, what's your understanding of that disclaimer?

A Let me read it again. They're -- they're stating it's -- it is not a GPS measurement. And they're stating that a higher confidence is more accurate than a lower confidence, or they don't state the meaning of their confidence factor.

MR. CASANOVA: I move to admit Defendant's D.

MR. ANDERSON: No objection.

THE COURT: Okay. Defendant's D admitted without objection.

(DEFENSE EXHIBIT D, HAVING BEEN OFFERED, WAS ADMITTED INTO EVIDENCE WITHOUT OBJECTION)

Q And from your understanding, RTT data is collected by other cell phone

providers besides Verizon. Do they all typically include this type of disclaimer against using this data as the equivalent of GPS?

A Yes.

Q I want to talk to you a little bit about error rates. You've kind of already mentioned this. First of all, can you just generally explain, do radio waves always travel in a direct path?

A No.

Q And does a handset only connect to one radio wave?

A No.

Q Can you -- does it typically collect multiple radio waves?

A Yes.

Q And can you explain, I know -- and I -- we'll use your PowerPoint here in a second. But before I do that, could you explain how the multipath nature of radio waves impact time of arrival for purposes of RTT calculation?

MR. ANDERSON: Hey, Ray?

MR. CASANOVA: I was about to project that.

THE COURT: I was hoping to get ahead of things.

MR. CASANOVA: Okay. Sorry, Judge. Give me a second.

A A handset transmits radio waves in a circular pattern coming from the phone itself. So it's not just one line of -- one -- one line of signal beam. In contrast, if you've seen microwave dishes, like a satellite dish, that transmits a single beam. A cell phone transmits a circular pattern.

MR. ANDERSON: Judge, do you want me to move that up or are you good?

THE COURT: I'm good right now.

MR. ANDERSON: Okay.

THE COURT: Everybody could -- if you move it up, not everyone can see it.

MR. ANDERSON: Well, yeah, I -- that's the best --

THE COURT: Can you see it okay?

MR. ANDERSON: Yeah, I'm fine. I've got it up on mine, too.

THE COURT: All right.

MR. ANDERSON: Or I can, I should say.

MR. CASANOVA: And actually, for some reason, I'm missing --

THE COURT: Exhibit B?

MR. CASANOVA: No. But for some reason I'm -- let me see.

THE WITNESS: It's not showing the second slide.

MR. CASANOVA: The second slide that you just --

THE WITNESS: Just hit escape and then you'll be able to see it.

MR. CASANOVA: That you just pulled up. Give me a second.

THE COURT: Well, let's --

THE WITNESS: Hit escape and then go -- and you can just click on the slide too though. Yeah, there you --

MR. CASANOVA: Right.

BY MR. CASANOVA:

Q So I think you've already described this. But essentially -- well, I think you described what you're depicting on this slide.

A Yeah. The signal takes -- since it's being transmitted in a spherical pattern, it takes many paths to get to the tower. Some of those could be blocked by trees, which I don't really show here, but -- and some could be

bouncing off buildings, etcetera.

And if you -- so if you look at -- so the -- if you go back one. So if you look at like the red line, it bounces off and then over and then back off two buildings. So if you add the distance of that line, that would be the distance that the cell tower thinks the phone is from -- from itself.

Q So you basically -- you have radio waves arriving at slightly different times to the phone; is that correct?

A That's correct.

Q And this does have an impact on this RTT calculation because it's -- it's calculated as a function of time; is that correct?

A That's correct.

Q Okay. I'd like to talk to you about a search window.

A Right.

Q Can you explain this second slide labeled Incoming Multipath Signals?

A All right. So -- so if the tower is receiving these signals at different times. Assume you're saying -- you say a sentence. And that sentence gets digitized and it's sent over the air. Well, that sentence since it's -- it's going to bounce off -- go one direction in one way. It's going to go another direction in another way. That sentence is going to be received at the cell site at different times. And so each of those peaks might be the exact same sentence but received at a different time.

So what the receiver in the cell site does, it looks for those patterns and then it combines those because it knows that those are -- that's the same sentence. So once they combine those in order to increase the -- the quality of the channel, increase the signal.

Q And how do you determine the size of the search window?

A The size of that search window is determined by the cellular engineer in order to optimize the quality of the call. So it can range from 40 to over a hundred what we call chips. And those are actually -- so I put in 60 chips as a typical for this situation. And then 60 chips equals 48.84 microseconds. So the -- so the receiver in the net -- in the cell tower has the ability to correlate signals that are within 48 and some microseconds of receiving them. Yes.

THE COURT: How long is a microsecond?

THE WITNESS: A microsecond is .000001 seconds. How many zeros --

THE COURT: So 48 -- 48 of those are what we're talking about?

THE WITNESS: Five zeros and a one. A decimal point and then five zeros and a one seconds.

THE COURT: Okay.

BY MR. CASANOVA:

Q So essentially, is it -- would it be correct that, you know, each radio wave that the -- that is being collected in the search window is linked to a specific word that's being stated?

A That's correct.

Q And some are arriving faster than others?

A That's correct.

Q And basically the phone then gathers all these together and combines them to create a signal that has significant strength and clarity to get a good reception?

A Correct.
Q These chips that you mentioned, do each of these chips have a relationship to size?
A To size? Each chip is a -- is a digital bit.
Q Okay.
A So if you think of a computer bit, like a zero or a one, each chip is a zero or a one for example.
Q But is it fair to say the longer this window is open, the larger is the area in which the phone involved in this call could be located?
A That's correct. So we can convert time in this case to distance. So if we take 48.84 microseconds, and we multiply that times the speed of light, the distance will be 14,440 meters. And converting that to miles, it's 9.3 miles. So that's the width of the search window is 9.3 miles.
Q So the search window you've depicted here is 60 chips?
A Correct.
Q And that 60-chip search window would translate to the area in which the phone that made this call could be located could be as large 9.1 miles?
A That would be the outside error, correct.
Q And we already talked about it. Is the size of a search window present in the records that you reviewed?
A No.
Q And you mentioned that cell network providers can modify the size of the search window?
A Yes.
Q In your experience, do they do that on -- is that commonly done?

A It is commonly -- it's commonly set and -- but it's not commonly modified. It can be changed by the cellular engineer.

Q And I'm assuming some -- depending on the nature of the coverage, they may set it larger for a better call quality or smaller for better call quality?

A It depends on the environment. You can imagine, if you increase the size of the window, you can bring in more multipath signals. And thus, you can combine more of those to get a better-quality channel.

But in urban environments or dense environments, if you increase the size of the window, you're going to get interfering signals from other sources that will affect. So there's an optimal size that the engineer will set.

Q Okay. In your experience, would it be unusual in an urban setting to have a search window 60 chips in size that could mean that the phone making this call could be anywhere in a 9.1-mile area?

A That'd be a typical -- that'd be your typical assignment of the search window, yes.

Q Now, you've had a chance to look at the -- the PowerPoint that was created by Special Agent Fennern, correct?

A Yes.

Q And in that -- and I think you've also had a chance to review the statements that he's given in this case?

A Yes.

Q He did discuss a search window of basically 488 meters or one chip. In your -- how common is that search in your experience, the size of that search window in your experience?

A I don't think they called it a search window. I think he called it an error

factor. But I don't -- I don't understand where he -- I don't understand where that he came up with that number.

Q Okay. So in your experience that wouldn't be a common everyday size for a search window?

A No.

Q Okay.

A Two hundred forty-four meters would equal one chip. So that would be way too small of a search window.

Q And moving on to the next slide, which is slide four. Can you explain to the Court what this is depicting and how it's related to the search window?

A This builds off the prior slide. So each of those peaks in the prior slide would be assigned what's called a finger. It's a hardware, software, combination inside this physical receiver in the phone or in the -- and also in the -- at the cell site.

So a signal comes in. It gets split up into these fingers. And then it gets combined through a better-quality channel. And then it -- it comes out.

Q And in your opinion, would the size of this search window be one type of factor in determining the quality of the RTT data as it judges distance and location?

A I would think so. But it -- it depends on what algorithms they're using to -- to calculate these distances and these latitudes and longitudes.

Q And if you could speak a little bit about that. Going back to slide three, which is the search window and you have these radio waves being collected, arriving at different times. Is the algorithm that we've kind of been discussing, is it involved in kind of interpreting or helping understand or modify the search

window?

A Yeah. These are the raw signals that are coming in at different points in time. So this is the raw input to the algorithms used to determine the location, the RTT location. But we don't know what -- how they are refining this raw information in order to create a latitude and longitude. This is kind of the crux of this. What is their algorithm to take this raw signal and output a latitude and longitude or a distance from the cell? We don't know what that algorithm -- algorithm is.

Q So it's not only the size of the search window, but how the individual provider is using their proprietary algorithm to interpret this data?

A Correct. How did they -- how did they reduce the 9.3 miles down to whatever distance they're estimating the phone is from the cell site? We don't know what those algorithms are.

Q And obviously, in your experience --

THE COURT: Excuse me, Mr. -- something --

MR. CASANOVA: Okay.

(Bailiff confers with the Court)

THE COURT: Let my blood pressure get back to normal and we can start again. Go ahead.

MR. CASANOVA: Okay.

Q So in order to understand how valid the longitude, latitude, and ranging information generated by the RTT data is, it would be important to know, one, the size of the search window that was in use at the time. And also, the algorithm that Verizon was using to interpret this data?

A Yes, that's correct.

Q Are either of those things included in the RTT data that you reviewed?
A No.
Q Can you -- I think we talked about this already. But could you explain this slide five that's entitled CDMA Chip Time - Search Window?
A Right. But first, let's pull an item up to address the 244-meter question. And so the time, if I -- if I divide that by the speed of light, I get 814 nanoseconds. So that's -- that's the size of one CDMA chip. That's one chip. A nanosecond is -- I think it's eight zeros and a one with a decimal point in front of it. So it's eight zeros and a -- eight zeros and a 814, I believe.
Q And that's set against what you see as not uncommon search window of 60 chips or --
A Right.
Q -- an area of 9.1 miles?
A Yeah. There were -- there's no -- a search window is not one chip. Well, it just doesn't exist. The rake -- (indiscernible) line two. So the rake receiver, its job is to combine those multipath signals into a better signal. So it uses -- uses those multipath signals to help improve the quality of the channel.
Q So you've already talked about -- this is slide six, Time of Arrival, Accuracy Error Factors. You've already talked about the size of the search window. The fact that radio waves take multipath to the tower and the handset. Could you also discuss the issues of interference, GPS time jitter, and island cell?
A Sure. So interference, so there's other factors that affect the error or the accuracy calculations, and so interference is one of those. If the -- if they don't -- if there's not a good signal, good quality signal, then the accuracy estimates

are not as accurate. So Ec/lo is basically signal strength over noise. So as the noise gets higher or the signal gets lower, then you got a worse -- the worst signal to noise ratio and the signal gets worse.

GPS time jitter is just -- GPS is a very -- all cellular networks run on GPS timing. So they all -- all the cell sites and the cell phones, they all have to be synchronized by the GPS time. And if there's any -- and the -- and the -- the time of arrival calculation is based on GPS as well. So if there's any different -- if there's any jitter in the timing or any change in the timing, that could affect the calculation of distance.

And jitter is cause by like noise, external noise in circuitry, or environmental noise, or anything that could affect the GPS circuits, hardware circuits, in the cell phone or in the -- in the network.

Island cell is -- it happens every once in a while, when the cell site just completely loses synchronization with the rest of the network. And that can happen from time to time. If that's the case, then the estimate of the location will not be correct.

Also, the cell phone constantly loses GPS. You may go indoors. You may go underneath trees. If you don't -- the cell phone must have line of sight to the satellites in order to get a good GPS signal. It has to see at least three satellites simultaneously. So if it doesn't, then it loses GPS and an internal clock takes over. And so depending on how accurate that internal clock is may affect the GPS timing. And so the synchronization might be off between the phone and the cell tower.

So -- so this -- this slide is to address there's lots of factors in the environment and in the circuitry that could affect the accuracy error of the

estimates.

Q The RTT data estimates?

A The RTT data estimates.

Q And before I -- I get to this -- I think this next slide basically explained what you just mentioned. You -- you have already testified that there -- there is a confidence interval in the RTT data for the records that you reviewed; is that correct?

A There is.

Q And from your review of the records, was there any way for you to quantify -- well, let me back up. That confidence interval is low, medium, and high, correct?

A Correct. It's an L, an M, and H.

Q And are these associated with -- with each of the calls in which RTT data was collected?

A Correct.

Q From your review of the data in the RTT records, were you ever able to determine or quantify, for example, what high confidence is as opposed to medium confidence?

A I did not find any correlation between the confidence factor and any other parameter such as the number of cell sites it was connected to or the signal level that was measured. I could not find any correlation.

Q Was there anything that allowed you to actually equate a value with those confidence levels?

A No.

Q And -- and specifically looking at your last slide, can you explain this is a

call that was mapped by Special Agent Fennern at 6:38:31. And you pulled some of the data out of the RTT records. Can you explain what you're depicting in this slide?

A Yes. The -- what I'm showing here is I believe it's connected to -- there's a reference cell, which is the main cell that the phone is connected to. And then there's three more cells that -- that has met -- that is -- that are providing measurements. And two of those cells, the -- well, what's called the Ec/lo or signal to noise that we talked about before, has a negative 12.5 dB. And that's a very low signal to noise ratio. And it's lower than -- it's in the poor category as a -- you know.

So -- so the question is -- the question is that must be affecting the estimate -- accuracy of the estimate. But there is no error factor associated with each of these cell -- cell sites. There's a distance -- there's a -- they provide a distance for each cell site and that's how the prosecution drew these arcs. And -- but there's no -- but each has a different signal, the noise ratios. And there's no error factor for each of these -- of these cell sites. So it -- it just doesn't make a lot of sense to me.

Q And the signal to noise ratio that you were mentioning, is there a quantity that's generally accepted for the signal to noise ratio that would indicate that it's a poor signal?

A Right. So these are negative numbers. Anything above -- a negative seven or above is typically a good call. Anything between negative seven and negative 11 is in the fair category. And these are -- these are numbers that I've discovered over many years of testing. Anything less than -- lower than negative eleven is put in the poor -- we put in the poor category.

Q And this call does indicate that there appears to be ranging data from at least three towers for this call?

A Three or maybe four. I -- yeah.

Q And this call does have a confidence interval associated with it as well?

A It does.

Q And what is that confidence interval?

A It's an M.

Q Okay. You did mention that this has very poor noise to signal ratio. But from what you reviewed, were you able to determine if this confidence level is linked solely to the noise to signal ratio or something beyond that?

A I was -- I was not able to link that to any of the data parameters. And they provide just one confidence level. I would have hoped to see an actual value and then a value for each of the cell towers that is being measured. But they only provided one and it's just a letter so. And it doesn't have any correlation that I can find of any other data in that record -- in those records.

THE COURT: And I'm sorry, this is from your witness?

MR. ANDERSON: This is from the records themselves, Your Honor.

THE COURT: Okay.

THE WITNESS: It's the actual record.

MR. CASANOVA: This would be one of -- one of the calls that was mapped by the State through the --

THE COURT: Mapped by the State using data from Verizon?

MR. CASANOVA: Correct.

THE COURT: Okay. Thank you.

BY MR. CASANOVA:

Q And then if I could just move on to -- this would be --

THE COURT: Battlestar Galactica?

MR. CASANOVA: Sorry, Judge. Sorry.

THE COURT: I just wondered if that's you or your kids.

MR. CASANOVA: Sorry. I have to change that.

THE COURT: Well, maybe not.

MS. MARTIN: He's had it for years. He's not changing it.

BY MR. CASANOVA:

Q This is I believe --

THE COURT: Exhibit C?

Q -- Exhibit C. And can you explain --

THE COURT: You might want to scroll that up one.

MR. CASANOVA: Yes.

Q Can you explain -- I'm going to scroll down two pages. Can you explain what you're -- what's depicted in Defendant's C?

A It's a bit of a summary -- well, it's a bit of -- I took -- each column is a different call. So the date and time is at the top of that -- of those calls. Call start time, which is the access time in the call. So each column is a separate call. And then the highlighted areas, so the green would be the reference cell. And then it's distance -- the estimated distance that the phone was from that cell.

So like 3 -- so if you look at the first column of colored values, 338.1 is the cell site ID and then the 1 is the sector. And then the -- just below that 1.7 is the 1.7 miles. So the phone was 1.7 -- is estimated to be 1.7 miles from the

location of that cell tower.

THE COURT: At the time of the call?

A At that time of the call. Yeah, at the access time. So that section is the access time. So it's the start of the call. And then --

Q And -- I'm sorry. Go ahead.

A And then the yellow would be cell 243, Sector 2. It was 1.1 miles. And then the blue is the same cell but a different sector. So it's sector -- cell 243, Sector 1, and then it's 1.1 miles. And then the last one was cell 217, Sector 3, and then 1.9 miles.

Q And there's a confidence interval associated with each of these calls, correct?

A Yes.

Q So for example, the first one that you've been discussing has a confidence interval of medium?

A Correct.

Q But yet, it does show that it's connected to three or more towers?

A Correct.

Q Okay. And in fact, there are confidence intervals of high for several -- the next column has a high confidence interval. It's connected to three, four towers. But there are other confidence intervals here of medium. Actually -- well, let me back up. Let me slow down for a second.

So this first column shows a medium confidence interval and it's showing ranging data from up to four towers; is that correct?

A Correct.

Q In the -- in the fourth column, this has a high confidence interval, but

it's only collecting ranging data from two towers?

A Correct.

Q So from this, does it appear from the records that the number of towers a particular call obtains a ranging data from has any impact or has an impact on what the confidence interval is?

A Yeah. I don't see any relationship between the number of towers connected to the phone and the confidence factor, because in some cases there's four towers with a medium confidence factor. In other cases, there's only two towers with a high confidence factor. So there doesn't seem to be a relationship there.

Q And again, this is the difficulty that you see in the records that there really isn't no -- there really isn't any type of error rate or quantification of this low, medium, and high confidence interval?

A There is no value to it. There is no description under the value to it. There's no description of how it was created or what it's related to.

Q I'd like to just talk to you a little bit about the difference between the ranging and location data associated with RTT data and 911 calls. Are you familiar with the technology used to locate a handset when it makes a 911 call?

A I am familiar with it.

Q And can you describe what that technology is?

A It is changed over the last six years. I believe this was in 2015, correct?

Q Yes.

A So today they use -- the main technology used is what's called assisted GPS. So it's a GPS based technology, but the GPS data is gathered by the phone and provided to the network. And then the network does the location

calculation. The phone does not do the actual calculation. And there's reasons for that, which I can get to, but -- but that's the main use of 911. It's augmented by other technologies such as Time of Arrival technology. And more recently they're using Angle of Arrival technology, which is the direction of the path. So those are the three main technologies.

Q And I think -- can you just talk generally, what is GPS?

A GPS is a -- is a series of satellites that the US Military launched I think back in the 80's. And these satellites circle the globe in a -- in a known pattern. And there are receivers that are built on the ground that receive the signals from the satellites. And you need at least -- the receiver on the ground needs at least -- needs data from at least three satellites in order to triangulate its own position. Similar to what -- you need three points to triangulate a position, so.

And that's a well-defined standard. It's -- we're able to test and verify. We can take -- we can go to a known location, a known latitude and longitude location. And we can take a GPS receiver and we can compare the data we get from the GPS receiver with the actual known location in real-time in order to verify the accuracy of that.

Q So I mean this is -- GPS is a standardized measurement?

A Standardized measurement, yes.

Q And there's a known error rate associated it?

A There are known error rates associate -- associated it with it, yes

Q And it's obviously something that's generally accepted as an accurate measure of location?

A With -- with certain error factors based on the type of equipment you're

using, factors in the field, the environment, and multipath issues. There's other same -- similar issues with GPS, but --

Q This is not historical data, it's real-time GPS?

A GPS is real-time data, yes.

Q Okay. So all the things that we've talked about that's missing in RTT data is present in GPS data? A known error factor --

A Correct. Verifiable -- we can test and verify it, yes.

Q Because it's in real-time, you can verify whether --

A That's correct.

Q -- or not the reading is correct?

A That's correct.

Q That's not something you can do with RTT data?

A We're unable to verify this data. Again, because it's -- it happened in the past, so we can't go to that point and recreate what's already happened. So it's -- it's impossible to -- to verify the -- the accuracy.

Q I'd like to just talk a little bit about -- I think you talked about that based on your work, you're familiar with the way coverage for -- real-time coverage for an actual cell network looks like, correct?

A Mm-hmm, yes.

Q And is correct that a handset will generally connect to the cell site or cell site sector that has the -- the best quality signal?

A That's typically correct. And an available channel as well.

Q And can you talk about what are some factors that impact the quality of signal from a cell site?

A The quality of signal. There could be a noise. So noise can be generated

from other phones in the network. They can be generated from other cell towers in the network. They could be generated by other -- other devices that create radio signals within that spectrum.

Q Does the amount of power that the cell phone company is directing to that particular tower influence quality of signal?

A Yes. The stronger the signal you receive and the lower the noise that's -- that you're seeing, the better -- typically, the better the quality of the channel.

Q And is also usage of a particular tower significant in determining the quality of the signal?

A I'm not sure I understand.

Q Just how many calls a particular tower is getting?

A Oh, usage. Yeah, sorry. Yeah, if -- the more calls that are generated within a certain tower, the fuller that it gets. It can get to full capacity. So then even if it's the closest cell, it has no available channels. So it will be assigned a different cell that might be farther away.

Q Does -- do things like terrain and tilted antenna also impact quality of signal?

A Yes. You may not be in a -- you may be close to a cell, but there may be an obstruction in between. So you may not see that as the best quality cell. So you may be connect -- you may connect to a cell that's further away but may not necessarily have obstructions in between.

Q And I think you testified that you did review the PowerPoint that Special Agent Fennern created, correct?

A Yes.

Q And I'm going to show you what's been marked for identification as

Defendant's Exhibit E. Do you recognize that?

A Yes.

Q What do you recognize that as?

A That is a depiction of an RTT call, a 6:38:31 call.

Q And is that from -- based on your memory, is that from detec -- Special Agent Fennern's PowerPoint?

A Yes. It's from his PowerPoint slides.

Q And can I also show you what's been marked for identification as Defendant's F?

A Yes.

Q Do you recognize that?

A Yes.

Q What do you recognize that as?

A This was a map, a heat map of actual coverage of an area. Not this -- for this location, but a -- for another area.

Q And can you explain to the Court what a heat map is?

A We take in different variables of the cell tower. The height of the antenna, the model of the antenna, the terrain, the transmit power of the antenna. We'll actually go out and do a little bit of a drive test and use that data. And then we run a model, prediction model estimation of the coverage of the radio signals. And so this is typically what cellular engineers use at Verizon and others to create a coverage map of their network.

Q And understanding that this not depicting the area in question and this may have a different number of cell towers covering that area, in your opinion, would this be helpful to the Court in understanding what a real-time depiction

of radio wave coverage for a cell network looks like?

A Yes, because it contrasts drawing a simple circle or a simple arc to really the reality of how radio waves are transmitted and measured in the field. And this is more of what it looks in -- in reality.

MR. CASANOVA: I'm going to move to admit E and F for demonstrative purposes.

MR. ANDERSON: No objection.

THE COURT: Thank you.

Q I'm showing you what has previously been marked as Defendant's E, which you identified as a slide from Detective Fennern or Special Agent Fennern's PowerPoint. And again, based on the discussion we've been having, do radio waves propagate from cell towers in these type of perfectly formed arcs?

A No.

Q And then looking at, I believe this is Defendant's E, which is the heat map you talked about. Is this a better depiction of the way the coverage actually looks?

A Yes.

THE COURT: Mr. Casanova, you've got this one as F.

MR. CASANOVA: Okay. I'm sorry. The first one, Special Agent Fennern's was E?

THE COURT: Yes, sir.

MR. CASANOVA: And this one is F. Okay. So the heat map is F, correct? Okay.

MR. ANDERSON: Can I see E real quick, Judge?

THE COURT: Say it again?

MR. ANDERSON: Can I see Defendant's E real quick? I might have noticed an error. There was a correction done to one of the addresses on this particular map, Your Honor. This was an earlier version that had a different address. It's since been corrected. But overall, it's still the same information. I just wanted to make the Court aware that that 3812 is actually 2812. It has been corrected and sent to the defense.

THE COURT: Okay. You mind if I --

MR. CASANOVA: No Judge.

THE COURT: -- fix this myself?

MR. CASANOVA: That is correct, Judge.

Q So for example, if you look at the upper right-hand corner of --

MR. CASANOVA: I'm sorry, this is F?

THE COURT: Yes, sir.

Q -- of F, we're looking at a cell tower; is that correct here?

A Correct.

Q And this is a cell sector. And this kind dark blue area would be the area of coverage?

A Correct.

Q And then we're also in the far right-hand corner and we're also looking at another cell site. And this would be a sector pointing to the lower left-hand corner. And this kind of violet area would be the actual area of coverage of that sector?

A Correct.

Q So that type of -- that coverage is very different for those two cell sectors?

A Correct.

THE COURT: Ray, would you mind coming up and marking these?

MR. CASANOVA: Yeah. Marking what I'm referring to?

THE COURT: Yes, sir.

MR. CASANOVA: Yes.

THE COURT: So that those who look at it later will know what you're talking about. What do you need?

MR. CASANOVA: I just need a pen that shows up a little better on these.

THE COURT: Don't know if we have one. You want to try hot pink or hot yellow or red?

MR. CASANOVA: Yeah.

MR. ANDERSON: A Sharpie.

MR. CASANOVA: A Sharpie. A Sharpie would help. Maybe that will work.

THE COURT: Or would arrows help? Would arrows also help a couple of things?

MR. CASANOVA: Well, they might. Yes, Judge.

THE COURT: Now, tell me what the blue arrow is pointing to?

MR. CASANOVA: The blue arrow is pointing to the cell site in the upper right-hand corner of Defendant's F.

THE COURT: Okay. And the green?

MR. CASANOVA: The green is pointing the cell site labeled Shro7-C. And specifically, the -- the sector that has the dark blue area closest to it.

THE COURT: All right. Thank you.

BY MR. CASANOVA:

Q So based upon what we've talked about, cell site sector coverage can overlap, correct?

A Correct.

Q As can cell tower coverage?

A Correct.

Q And the records can indicate that a handset connected to Sector 1 of a -- of a cell tower, but that doesn't necessarily mean that that handset -- that was the closest sector to that handset?

A Correct.

Q And that's based on the type of considerations you already mentioned earlier that impact a handset connecting with a cell site. And that is quality of signal, power to that cell site, usage for that cell site, terrain around it --

A Correct.

Q -- those type of factors?

A Yeah. And in your example, the purple, the person can be way on the opposite side on the lower to left purple area, but they're actually closer to probably two or three other cell sites.

Q And in looking at the records, were you able to -- the RTT records, was there information in that records as to the range of the towers that we're talking about?

A There is.

Q And do you recall what ranges we're talking about for these towers?

A I don't recall. But it's -- it's in the -- I thought was in the 20- or 30-mile range.

Q Okay.

A Or more.

Q If I -- if I said more like nine to seven -- seven to nine miles --

A It could be.

Q -- would that sound correct?

A It could be.

Q Okay.

THE COURT: Does that mean that something goes wrong with all the towers in my neighborhood except one, and that one is within seven to nine miles of my house?

THE WITNESS: That's correct.

THE COURT: That would pick up my phone?

THE WITNESS: That's correct.

THE COURT: Even though there might be five more that are closer?

THE WITNESS: That is correct. With the caveat though that there may be some other interference or noise in the area. But theoretically, yes.

THE COURT: Okay. Thank you.

MR. CASANOVA: Those are all the questions I have, Judge.

CROSS EXAMINATION

BY MR. ANDERSON:

Q Since it's up and we're talking about Defendant's F at this time, this heat map that you're referencing, is this a depiction of any of the towers that we're discussing in this particular case or is this just demonstrative of the kind of coverage that you might see?

A The latter.

Q So these -- these towers, while they may have different types of sector ranges and coverage, none of these is in the depiction of the range of coverage of the specific towers we're utilizing in this case, correct?

A Correct.

Q Okay. I think as the Judge pointed out, when we talk about, you know, potentially a seven- or nine-mile range, we're talking about the outer reach of a cell phone tower that could connect to your device. Again, assuming that there are other intervening cell phone towers that might have a stronger signal; is that fair to say?

A Correct, yes.

Q So in an urban setting where you may have a concentration of, you know, a dozen say towers for a particular company, would you agree that it would be unusual to see a connection with a tower that was seven or nine miles away from that device in that sort of scenario?

A Unusual? Most likely, unusual, yes.

Q You discussed 911 calls and GPS location for those kind of calls, do you agree that the type of mapping that Agent Fennern did in this case is not GPS mapping?

A It is -- it's not GPS, correct.

Q So that's a different type of activity that we're talking about, right? We're talking about a very specific location within sometimes feet in talking GPS?

A GP -- GPS you mean?

Q Correct.

A It depends on the -- on several factors. But there's been testing done.

It's -- it's multiple meters. It's not submeter but --

Q Right. But RTT is different than that?

A RTT is different than --

Q What we're talking about is an area much larger for the possible location of a device that (indiscernible) to a call; is that fair to say?

A RTT much larger. Could you re-ask that?

Q I guess --

THE COURT: Are you speaking about the size of the potential area or the accuracy of the records?

MR. ANDERSON: The size of the potential area. Thank you.

Q The size of the potential area --

A It will be -- it will be larger than GPS, I believe.

Q Okay.

A Yes, mm-hmm.

Q Okay. Different methods, correct?

A Different methods.

THE COURT: Is there a specific factor that's greater? Five times greater, a hundred times greater?

THE WITNESS: No, because we don't know what the error factor -- I think that's the point. We don't know what the error factor of the RTT data is.

THE COURT: Have you spent enough RTT data to have your own personal estimate of the error factor?

THE WITNESS: No.

THE COURT: Okay. Thank you very much. Please continue. I'm sorry for the interruption.

MR. ANDERSON: That's all right. Interrupt as you need Judge. Thank you.

THE COURT: If I didn't interrupt, I would have forgotten the question so.

BY MR. ANDERSON:

Q The -- when we're talking about error factor, you also mentioned confidence levels, low, medium, and high. I guess you say that because you don't have a specific number associated with it, you are not able to discern what that means. Is that --

A Correct.

Q -- correct? But again, it is -- you rated it low, medium, and high. You're just -- your problem with it is it doesn't give you a specific number; is that --

A Correct.

Q Correct. So the data gives you a distance. Is that fair to say when it says the time of arrival between the device and the tower, that's where that distance is coming from?

A The -- the record gives a distance for each tower and it's connected to the phone, correct.

THE COURT: But there's wiggle room --

Q You talk --

THE COURT: Sorry. There's wiggle room because of interference?

THE WITNESS: Well, we don't know where that num -- that number -- the issue is, we don't know where the number came from. How did they come up with the distance number?

THE COURT: Okay.

THE WITNESS: So when they say 1.1 miles, there's no -- they don't provide us -- Verizon doesn't provide any methodology or how they came to 1.1 miles.

THE COURT: Or they actively conceal the methodology?

THE WITNESS: They do actively conceal it because they don't provide it. It's proprietary. It's not Verizon's technology. It's -- in this case, it's Lucent.

THE COURT: Oh.

THE WITNESS: Lucent is the manufacturer of the --

THE COURT: Who made Verizon promise to keep quiet about it?

THE WITNESS: Well, I -- yeah, right. They're probably under some nondisclosure about it.

THE COURT: All right. I'm sorry again. Please continue.

MR. ANDERSON: No. That's fine.

BY MR. ANDERSON:

Q We were talking about the distance that's given as the data for that particular connection or call, correct? Either at the outset or towards the end of when that connection occurs?

A Yeah. There's a -- there's a value for distance in the call record. Distance from the cell tower to the phone.

Q And the point of that distance value, again, is to describe as best as possible the accuracy of that connection; is that fair?

A They don't describe -- the only way to describe the accuracy is the low, medium, and high confidence.

Q But the overall point I'm -- guess I'm trying to say is that the cell phone

company wants to know is this equipment working as best as it possibly can?

A I'm not sure I understand the question.

Q Why is the Verizon cell phone company so interested in RTT data?

A Well, because they use it as -- I think Ray asked the question earlier, they use it to troubleshoot the network and to prioritize problem areas. And they require a large number of calls in order to have statistically valid data that allows them to determine that it really is a network problem as opposed to some other, you know, some other issue that may be a phone issue or some other unrelate -- a network related issue.

Q Okay. You say collected over a long period of time, but this data is not retained for very long. Is that fair to say?

A As I understand, it's not retained for very long. But that varies by operator.

Q How long do you think Verizon retains this kind of data?

A I believe it's a matter of months.

Q You think it's months?

A I think so.

Q Have you testified about RTT data specifically in court before?

A I have not.

Q And we talked about drive test. And that's something that you are -- you conduct yourself, correct?

A Yes.

Q That's one person testing accuracy or other measurements of particular --

A It's testing the performance of the network in terms of -- there's various

applications for it. But we can test the user perception of the network, the coverage of the network, interference in the network, various different parameters.

Q When you yourself conduct a drive test or walk test as you stated, I don't think you would say that you were statistically insignificant with the data you produce, would you?

A Well, it's a different -- it's a different application. So they may use the RTT data to prioritize where they focus their resources. And then they may send out someone like me to actually go out to see if we can duplicate the issue.

Q So was that a yes or a no?

A What was the question again?

Q Was that statistically significant the work that you would do on a drive test or a walk test?

A In terms of the number of calls, it is not statistically significant.

Q But it's still a value?

A It is still a value.

Q You talked about obstructions and the possible issues with the network or the connection or the GPS; the number of different things that you listed. Do you have any evidence in this particular case that there were obstructions or otherwise that caused some sort of difficulty with the data that was received?

A No, I don't.

Q With defense's --

MR. ANDERSON: That's F, correct?

MR. CASANOVA: E.

Q We have Agent Fennern's depiction of some of the work that he did, correct?

A Correct.

Q And you see that there are sectors that were implicated or used in the connection with those calls, correct?

A Correct.

Q Do you disagree that the calls connected with those sectors at those times?

A No.

THE COURT: Do you want to see the exhibit, sir? It's right over here. Give him E.

MR. ANDERSON: Thank you. It's sideways at the moment.

THE WITNESS: It's the 6:38 call.

THE COURT: Okay. North is up right as you are looking at it?

THE WITNESS: I -- I don't know.

MR. ANDERSON: Yes.

THE WITNESS: I think so.

THE COURT: Well, I know that. I'm (indiscernible).

THE WITNESS: Oh, okay. Yes, it is. Thank you. Yes. Yes.

THE COURT: Well, don't agree with me unless you're sure.

THE WITNESS: The phone is connected to those sectors, yes.

THE COURT: Okay.

BY MR. ANDERSON:

Q So you agree with the -- the sector connections that we see even just --

just this example, correct?

A Yes.

Q And when you look at the sector information, even by itself it's suggesting a call coming in the area that we see depicted; is that fair to say?

THE COURT: He doesn't know the area depicted. Why don't you point to the area in question and then ask that question?

MR. ANDERSON: Certainly.

Q The red and yellow box, which in the revised version are closer together because of the address change. There's a circle near that area. Is it fair to say that just looking at the sector connections alone, we see similarity with the area that's depicted here?

A Well, let me back up. The phone is connected to one -- it communicates through one sector. But the measurements -- there are measurements from other cells. And so -- we have three other cells -- in this case, you have two other cells. But you have a reference cell, which is the cell that the phone is connected to. And I believe that is Sector 338.

THE COURT: Sir, I have to ask you to go up and point. There's a pointer right here. If you can get close enough to show me what you're talking about because --

THE WITNESS: Sure.

THE COURT: It's right there.

THE WITNESS: Okay.

A So the cell -- the phone I believe -- you can verify this. But I believe it's communicating through 338, which is this cell 338-1. So it's this sector. So it's the sector and the sector is -- so a cell -- these cell sectors are divided into

three sectors, three 120-degree sectors.

THE COURT: Roughly 120.

THE WITNESS: Roughly 120, correct.

A And so the antenna is pointing in the middle of that. And then there's a -- there's also an azimuth as well. So which direction is it pointing? So I believe that this is correct. The antenna is pointing in the middle of these -- this 120-degree angle. The direction of the antenna is pointing this way.

And the antenna has a certain pattern. And the pattern of the antenna is typically a round low looking like pattern. And it's affected by terrain and everything else. So that's probably (indiscernible) he came up with. You can't really just draw an arc or you can't draw a shaded area because that doesn't depict the actual coverage of that sector. You don't really know what the actual coverage of that sector is.

So in general, you know, it's -- it's somewhere within the coverage area I would say of this sector. What that coverage area is, I don't know.

Q So the -- the overlap of towers is not --

THE COURT: Don't leave yet. More questions.

MR. ANDERSON: I won't make him point anymore, Judge, I promise. I think that's -- that's sufficient.

Q So the overlap of multiple towers is not compelling to you; is that correct?

A It's not really compelling. All the -- all the other towers are doing is just measuring the timing. So it's measuring the timing at a distance. And since we don't know the coverage area of this sector, sometimes there's overlap, sometimes it bounces off things, we can't assume that it's just this area here.

We just can't. We can't make that --

Q Well, that'd be problematic with one tower, correct?

THE COURT: Say it again please?

Q That would be problematic (indiscernible) one tower, correct? But here you have multiple towers with overlapping coverage?

A Right but I think the way you're drawing it is somewhat misleading. Because if you start out with the real coverage areas of these towers, then you may come up with a different conclusion than what you're concluding is my point.

Q Well, you said that the signal could be anywhere seven to nine miles out, correct? I think you originally said 20 to 30, but seven to nine. So you --

A But that could be bouncing off multiple objects. So it might -- it might be some, in some other -- some other portion and not where -- where you've drawn. You know, you're assuming it's -- it's within that range. And I'm saying the coverage area may not be within that range.

Q Okay. So by your testimony, this call could have been nine miles southwest of this location at the time of this -- this information was gathered?

A Potentially.

Q Do you know what the Scientific Working Group on Digital Evidence is?

A Yes.

Q What is that? Could you explain it to the Court please?

A As I understand, it's a consortium of law enforcement, prosecution attorneys, defense attorneys, and the like.

Q Are you aware of what their recommendation is working with this kind of data and mapping this kind of data?

A I've read the document.

Q What is your understanding?

A In terms of theses arcs or --

Q Yes. The method to map this kind of data.

A They don't explain how they came up with these arcs. They don't explain the width of the arc and they don't explain -- they have a map of a -- of an arc, but they don't go into any explanation as to how they came up with that map.

MR. ANDERSON: Judge, I don't have anything else at this time. Thank you.

THE COURT: Any redirect?

MR. CASANOVA: I just have a few questions.

REDIRECT EXAMINATION

BY MR. CASANOVA:

Q When you look at the RTT data in this case, it was a massive amount of data, wasn't it?

A Yes.

Q I mean, we're talking about thousands and thousands of calls that were associated with an RTT value?

A For this particular --

Q Yes.

A I don't know if it was thousands, but there was a lot of data.

Q I mean, that's the type of size of information that we create something of statistical value that would benefit as it would -- that would address the reasons the cell phone company collects this information?

A I'm not sure I understand.

Q I guess all I'm saying is, there were thousands of calls on this RTT data. And that large sample is what's needed for the cell phone companies to make use of this information to determine coverage?

A Yes.

Q Simply pulling out a couple of calls from those thousands of calls would not create a large enough database to make statistically significant predictions?

A Correct.

Q And just a couple questions about drive tests. Drive tests occur in real-time, correct?

A Yes.

Q So actually, you can verify the information you get in real-time through -- by looking at the GPS signal and exactly where you're at?

A Correct.

Q Okay. That's not what's going on with RTT data. RTT data is historical?

A Correct.

Q This data is being interpreted several weeks after this incident occurred?

A Yes.

Q So there's no way to verify it in real-time?

A No.

MR. CASANOVA: That's all the questions I have, Judge.

THE COURT: Mr. Anderson?

MR. ANDERSON: No redirect. Thank you.

THE COURT: Can the witness be released from his subpoena?

MR. ANDERSON: Yes.

MR. CASANOVA: Yes.

THE COURT: So he's free to go?

MR. CASANOVA: He is free to go.

THE COURT: You don't want to keep him here in case?

MR. CASANOVA: Well, I mean, maybe I'll --

THE COURT: You're paying him by the minute. You sure you want to --

MR. CASANOVA: I'd like to -- no. Now, that I think of it, I'd like to keep him under subpoena until after we finish the testimony of Special Agent Fennern.

THE COURT: Okay. Given the time of day, would one of the deputies take him back to the jury room so he can see if he can work the TV and not just sit there and be in his own head all the time?

MR. ANDERSON: He gets to watch basketball while we keep doing the (indiscernible)?

THE COURT: Well, if you were watching basketball, you'd have a pro tem up here and I'd be with him. But we don't -- we don't get that. But I'm sure you can find something interesting.

THE WITNESS: Thank you, Your Honor

(Witness is Excused)

THE COURT: Anymore witnesses, Ray?

MR. CASANOVA: None from the defense, Judge.

THE COURT: Do you rest on your motion?

MR. CASANOVA: Yes.

THE COURT: Afternoon, sir.

THE WITNESS: Afternoon, Your Honor.

THE COURT: You swear or affirm under penalty for perjury the testimony you're about to give will be the truth, the whole truth, and nothing but the truth so help you God?

THE WITNESS: I do.

THE COURT: Thank you. Please have a seat.

THE WITNESS: Thank you.

THE COURT: Would you please state your full name and spell your last name?

THE WITNESS: Richard Fennern. Last name, F as in Frank-E-N-N-E-R-N.

THE COURT: F-E-N-N-E-R?

THE WITNESS: N.

THE COURT: Okay. Whenever you're ready.

MR. ANDERSON: Thank you.

DIRECT EXAMINATION

BY MR. ANDERSON:

Q Agent Fennern, where do you work?

A The Federal Bureau of Investigation.

Q How long have you worked there?

A Since 2009.

Q Tell us about your training and experience that was required to become an agent with the FBI?

A With the FBI we go through our academy at Quantico for -- it's been a while, but I believe it's about 22 weeks of training in law, firearms, defensive tactics, and investigations. After that, I became -- became an agent and will

then receive additional training with the FBI regarding cellular analysis.

Q What was your prior educational background?

A I have a bachelor's degree in Accounting and a Criminal Justice -- two-year Criminal Justice degree.

Q What unit are you currently assigned to in the FBI?

A The FBI's Cellular -- Cellular Analysis Survey Team, which I refer to as CAST?

Q And what is the CAST team?

A CAST is a group of FBI agents and task force officers that receive extensive training in cell phone records and cell phone technology. We then use that training to assist in investigations with the FBI as well as our state, local, and international partners in investigations.

Q How long have you been in the CAST unit?

A I've been in the process -- associated with the team since 2011. And then I became certified in 2013.

MR. ANDERSON: Judge, am I using numbers; is that correct for my exhibits? Thank you.

THE COURT: Yes, sir.

MR. ANDERSON: Thank you.

Q Showing you State's Exhibit 1. Is that a copy of your CV, sir?

A Yes, it is.

MR. ANDERSON: Your Honor, move to admit a copy of State's Exhibit 1.

MR. CASANOVA: No objection.

THE COURT: Thank you.

Q And if you could Agent Fennern, please outline some of the relevant training and experience you've had with the CAST Unit that would be useful for the Court's knowledge here about your testimony today?

A Okay. Our training from the CAST program is extensive training is about -- our initial training is about 300 total hours, and I'll kind of break that up. That begins with a three-day course that we give -- CAST gives to all local law enforcement, federal law enforcement, the fact of a basic understanding of how cell phone records are generated. And then what you can -- how you can use them in a criminal case.

From that point, people that are interested to learn more, we then put on a weeklong advanced course that digs into each of the records a little deeper from each of the providers to understand how each of them are unique. And then work on presenting that information to other investigators or prosecutors, or the Court.

After that, there's a selection process that go through the CAST certification program. And that's broken up into two -- two-week blocks, so a total of four weeks. That training brings in the records custodians and the -- well, the law enforcement relations and the engineers from each of the cellular providers. And then we learn what records are generated from the use of a cell phone and their network. And by that, I mean Sprint, Verizon, T-Mobile, AT&T. We learn specific to their -- from their engineers how those records are generated and what we do with that.

Additionally, we receive training from the Florida Institute of Technology from engineering professors to understand the -- how a phone operates in a cell phone network again and that whole process. Additionally, we work with other

private companies in measuring radio frequency signal, which includes drive testing to understand the true footprint of a cell tower.

All of that training ends with evaluation. A moot court experience where we are evaluated and then determined if we pass or not with the program.

Q I'm assuming you passed?

A Yes, I did.

Q Okay. Do you have annual proficiency training that you continue to -- to participate in?

A Yes. In addition, just our everyday interaction with the phone companies, we put on a recertification as we call it once a year. A weeklong where we bring in, again, the phone companies or whatever other companies, whether it's Google, Facebook, what other location information that's out there from the use of a cell phone to receive additional training.

Q So we, and I mean Judge Hawkins, Mr. Casanova, and myself, we are familiar with the kind of cell phone record usage where the tower is identified and potentially a sector as well. Nothing about the range or location of where that device might be. That's what we've typically engaged in, at least for myself especially up to this point. You are working with RTT data in this particular case; is that correct?

A Yes.

Q How is that different than the typical cell phone data that I've just described?

A Well, the typical cell phone data, obviously, we have a -- we have the strongest clearest signal event that takes place. A call is made and there's a tower and sector that's selected for that. That's required by law for the phone

companies to -- to keep that information.

What additionally they have is they actually have the details of that call. So it not only just tells us the tower and sector that was used to service it, but it tells us all the other cell towers that that phone communicated with during that call. So what that does is based on the time it takes the signal to go from the tower to the phone and back, it's able to determine the approximate location of that phone, which gives us a ranging arc from the tower. So not only the cell tower and sector, but approximately how far away that phone is from the tower.

Q And we'll talk about that ranging arc a little more here with your PowerPoint presentation. But the RTT data is much more specific in terms of a location. But it's not GPS, correct?

A Correct.

Q Why is it that RTT data is not more frequently used in criminal cases?

A Really, it comes down to one thing of knowledge of obtaining it. The other part of it is, it's perishable. Meaning, in this case, we're dealing with Verizon. Verizon has RTT, which stands for Real-time Tool. That data is essentially kept for approximately one week. If you request the records outside of that week, you do not get that data.

So in -- in Sprint, there's protocol measurement data. This is the same exact data we're talking about with RTT. That again is perishable. It loses -- as time goes on, you lose that.

And then in T-Mobile, they have timing advanced data. Again, T-Mobile actually limits you to only getting a seven days' worth when you request it from them. So each company has it. It just really comes down to the timing of

getting the records and knowing exactly what to ask.

Q So if you don't know about these records and/or you wait too long, that date is no longer going to be there?

A That's correct.

Q Why does that data -- why is it perishable?

A It's engineering data. So essentially, the engineers utilize that in real-time for Verizon to monitor the network. So if they have an issue within the network, obviously, their customers don't wait two weeks to tell them about that issue, they call in right now and say I'm having an issue with my phone. They can then utilize this data to determine where that phone was located and see the underlying data within that call from the Real-time Tool to see what was going on and why they're having that negative experience.

THE COURT: So after a week or so, the data is stale and there's no reason for them to keep it?

THE WITNESS: The reason is -- well, from the conversation with them it's two-fold. One is storage costs of just maintaining the data. And the other part is -- is being stale. They don't -- they -- they grab it right away when it happens. After that, there's no reason for them to -- to go back in time to look at that data.

Q And it's enormous the amount of data we'd be talking about to store if we wanted to keep this for months and months say?

A Yes. In some cases where you get on a phone right away when something happens. I've had where I've had second by second transactions showing the movement of that phone. So it's very voluminous data.

Q One thing we want to talk about is your training specifically with this

kind of data and the use of the data as you we will see demonstrated here in court with what you did in terms of matching it. Is this -- how long has RTT data been around?

A The first use that I'm aware of was in 2009. And that became specifically Verizon RTT. There was a missing -- a girl -- a 11-year-old girl that was kidnapped two days before Christmas in Maryland. Someone happened to know a Verizon engineer who asked them if there was any other data that we could obtain from the phone companies. And that's where lo and behold RTT became -- law enforcement became aware of RTT data. That was utilized then to find unfortunately the deceased child based on that data in 2009.

Q So it has been in use and law enforcement has utilized it for ten plus years now?

A Yes. It's -- yes.

Q And specifically with your use of these kind of records, the training that you've talked about, is that all towards this kind of data or is it cell phones generally?

A Well, it -- it includes this data. You obviously have our overarching training on everything, but a part of that is the -- is generally for this protocol or timing advanced data. And like I said, every phone company has this data. And we're trained from every phone company and how to interpret it and use it.

Q They just have different names and/or descriptions for it; is that fair?

A Correct, and it's vendor specific. For instance, RTT is -- the vendor is actually Lucent that is the person where they get the -- the data or the system from.

Q What can we use RTT data to do?

A Many different reasons. I can just go from my past week of getting these records looking for a fugitive. I have overlapping arcs from two separate towers. I go to the point of where those intersect and locate our subject for arrest. Looking for a vehicle that was used in a homicide last week. And from the ranging data from that arc -- yeah, it was RTT. Located the vehicle that was used in the homicide, obtained the license plate, and arrested the subject for that homicide.

I've -- we've used it in missing person cases in -- in the mountains. Or I've had a case last year where a woman went missing after being out. RTT data overlapped on the end of a road where there was a waterway and her vehicle was -- and her vehicle and her body was subsequently recovered where that arc showed. So really missing persons. Utilizing it to pull surveillance video to identify someone's route. It kind of goes to the creativity of what you're looking for.

Q You can also use historical data to try to map out where a location may be for a particular device at a particular time?

A Correct.

Q Is it the same methodology you're using?

A Yes. Yes. This is the data we get in real -- say in real-time. It's called Real-time Tool. But obviously when something happens, the records created. It's then historical for us. We map it to then locate in real-time or utilize it historically to -- to determine where a phone was.

Q Can you estimate the number of times that you have utilized RTT data or similar data from another phone company for this purpose you've described?

A I -- I do it almost daily.

Q And have you testified in court as an expert before regarding the use of this kind of data and/or the mapping of this kind of data?

A Yes.

Q Can you estimate the number of times you've done that?

A I haven't -- I haven't broke out for RTT and timing events specific. I've testified as an expert over a hundred times. I would say probably at least 15 to 20 of those probably, an estimate, involved this data.

Q And again, because it is somewhat rare to get it or just to have a case where someone had the knowledge to obtain it --

A Right.

Q -- in a timely fashion to use for a criminal case?

A It's part of my units push of what we do is try to get people to obtain the correct information.

Q All right. What were you asked to do in this particular case, sir?

A In this case, I was provided with cell phone records that were told to me to be the Defendant in this case and asked to map out those records for a specific timeframe on I believe November 10th of 2015.

Q And based on that data and your review of that data, you were able to map certain call times and certain call locations based on the tower information that you had; is that correct?

A That's correct.

MR. ANDERSON: Judge, I don't know if you want this submitted in printed form or on a CD, but I have both.

THE COURT: If I have to look at it later, it'd be easier to have it printed. Do you have another copy of the printed --

MR. ANDERSON: Say that again, I'm sorry.

THE COURT: Do you have another copy of the printed version?

MR. ANDERSON: This is for the Court.

Q Can you identify this, sir, State's Exhibit 2?

A Yes. This is the last version that I created for this case, yes.

Q Thank you. And there was a correction base on an address, fair to say?

A Correct.

MR. CASANOVA: No objection, Judge.

MR. ANDERSON: Offer State's Exhibit 2, Your Honor.

THE COURT: Show 2 admitted without objection.

(STATE'S EXHIBIT 2, HAVING BEEN OFFERED, WAS ADMITTED INTO EVIDENCE WITHOUT OBJECTION)

MR. ANDERSON: Permission to publish?

THE COURT: You may.

Q State's Exhibit 2 contains not only your slides, but some explanation of your process and the technology that we're talking about; is that correct?

A That's correct.

Q All right. So slide two, you talk about the nature of the request and the methodology that was used. Is this what you've just described to us in terms of what you did in this case?

A Yes. The only additional information, the methodology just talks that we receive the records. We match those up with cell tower lists that were in existence at the time that we -- the crime. And then we merge those together to provide visual illustrations of the use of the phone.

Q And when you say cell tower lists that were existing at the time, that's to

ensure that you're actually looking at data that was from a tower that was there at the time the records say there were there; is that correct?

A Correct. It would be the data in 2015 versus the tower that -- the towers that are in existence here in 2021.

Q Because those change really rather frequently?

A Correct.

Q Slide three, you've listed some cell tower examples. I think the Court is aware of the various types of cell towers. The left side, typically, it's a tower that's -- has three different sectors, correct?

A That's correct.

Q And sometimes they can appear on buildings or at other locations; fair to say?

A Yes.

Q Okay. Slide four, you talk about sectors and orientations. I think the Court is familiar with the sector --

THE COURT: You can jump ahead to six if you want to.

Q Six shows the sector area of coverage. But this is not specific to RTT data, right?

A No. This is -- this is just a -- the normal cell tower sector illustration that you'd see on a map.

Q This is what we are typically, I say "we", typically are dealing with in the kind of presentation that we're talking about, cell tower location, correct?

A Correct.

Q All right. Slide seven, tell us what we're looking at here and explain what your arc means?

A So this is now showing that -- that timing event. So this is -- when it comes from the phone company, we get a distance. So for instance, one mile. It will say that the phone is approximately one mile from the cell tower. So this illustration shows the tower, the sector. And then the dotted line in there shows you the -- the one-mile portion of that.

And we could leave the illustration to just that one line. But it's kind of -- to us and our standards of how to map it, we then apply basically a 240, 344-meter variants to that. And what that comes down to is from our teaching from the phone companies and the professors is that's the -- the chip set essentially of a chip slot within the CDMA network, which is what we're dealing with, with Verizon.

THE COURT: How do they -- how you derive the distance from the information you receive?

THE WITNESS: So that -- the distance is provided to us from -- from the phone company.

THE COURT: They just give you a number?

THE WITNESS: It'll give us a number in miles of how far that's away from the tower, yes.

THE COURT: Do you know how they come up with that?

THE WITNESS: That is based on these -- the time it takes from the signal to go from the tower to the phone and back. There is -- there's algorithms within that from the vendors that apply to that. But essentially, it comes down to that time it takes from the tower there, the phone and back.

THE COURT: Okay. Thank you.

BY MR. ANDERSON:

Q And one of the Judge's concerns or one of the questions that -- that's been posed is we don't know what algorithm is, right?

A No.

Q They don't tell us what that particular algorithm is that is in place to try to correct for some potential error; is that right?

A Correct.

Q So how do you work around or how do you -- how do you have confidence in the work that you're doing here when you are trying to map or show a location or general estimate of the distance and location from the tower?

A That'd be two-fold. The first one would be from the experience of working with these records on literally a daily basis and utilizing this to locate the phones in -- near real-time when something happens. Or to locate something based on this data that, for instance, was dropped two days ago.

The second part of that is, this is -- Verizon for instance, just them, this is a billion-dollar industry just with them. This -- these products have standards that they have to go through in order to be marketed to the cell phone companies. In addition, reliability, repeatability, is the foundation of how a phone will company operate.

So having -- having an inaccurate tool for the engineers of Verizon to be utilizing for the last 12 years would be ridiculous on one occasion. And the other part, this is what they use to manage their network. And then this is what we use in -- in real-time to locate phones.

Q This event that we're talking about here in depicting this arc and the -- the width of the potential arc, is this a method that's used in the scientific

community?

A Yes.

Q And I want to talk specifically about the Scientific Working Group on Digital Evidence. What is that group?

A That is a group -- and I don't know everyone that's in that group. But that's a group of individuals that practice cell site analysis. And they met years ago to come on -- come up with guidelines and mapping out the records. And we took part in that, representatives from the CAST team took part in that working group as well.

Q And is for their recommendations in terms of how to utilize this data knowing that it's not GPS data?

A Correct.

Q But -- but showing this range of area where it could be located, a device could have been located --

A Correct.

Q -- at the time that the signal was made?

A Correct.

Q I want to talk about the -- the straight line -- or excuse me, the dotted line in the arc. What is this arc of dotted line representing? Why is the arc across the entire sector so to speak?

A Well, because that's the data that we know. We know the tower, we know the sector, and we know the distance. So that's -- that's why we have the dotted line at that specific point.

Q So because it's not GPS, you can't say it was exactly where the phone is depicted in this particular picture, right?

A Correct.

Q So you have to say it's a mile way within that sector and across that range because that's the data?

A That's correct.

THE COURT: Okay.

Q And then the width --

THE COURT: Sorry -- sorry to interrupt. But how did you get the -- the distance of the band or the width of the band?

THE WITNESS: So this is -- that comes down to -- so there's -- that comes down to the arc distance essentially or the chip set within the -- the technology. So in that technology, you -- you can't -- without additional information, you can't get closer to that 244-meter band because we essentially know a -- essentially a timing slot that it was in.

For instance, if we broke up a clock to five minutes all around, we know what five-minute period it is in, but we may not necessarily know if it was minute one or minute five. If that makes sense to you, Your Honor.

THE COURT: Well, it makes sense, but I'm not sure it answers my question. Verizon gave you the dotted line, you know, of one mile let's say. What is the width of the -- of the band around that --

THE WITNESS: That's -- that's the 244 meters.

THE COURT: And how'd you get that number?

THE WITNESS: That again is -- in CDMA there is timing chips that -- there's timing slots essentially in that network. And they're 244 meters wide.

THE COURT: Is that -- give you some wiggle room saying, hey, it's

no further than this, no closer than this?

THE WITNESS: It's no further and I'll always say it always can be slightly closer when you get to distances that are further out. When we're dealing with something that --

MR. CASANOVA: Judge, I mean at this point -- I'm sorry to interrupt. But I'm going to have to object to this testimony. I think this is beyond his expertise. I think he is well-trained in interpreting the records and plotting the data from the records. He may have had some courses, but he does not have a background in science or engineering. And I think, at best, this is speculative as to how the width of this band is -- is generated.

THE COURT: Well, and I'm trying to find out how the band is generated and he hadn't reached the point of saying I don't know. He's saying that that's what was given to him as -- as the wiggle room. And my next question would have been how did somebody else come up with it?

MR. CASANOVA: And I guess my objection would be to that question because I do think that's beyond the scope of his expertise.

THE COURT: Well, I'm trying to find out the scope the of his knowledge.

MR. CASANOVA: Okay.

THE COURT: And this is for the purpose of deciding whether or not this kind of information is available to the jury. And we all solve problems different ways. And that's why I interrupted Mr. Anderson to ask these questions before he went onto something else and I forgot. I've got a whole page full of questions I forgot to ask, so every now and then I jump in.

With that, sir, and I think you understand where I'm going now.

The dotted line was given to you by Verizon. They know how they came up with it, but they haven't shared that with you?

THE WITNESS: To be specific, the algorithm, even the engineers don't -- that comes from another private vendor. But yes, that is specific --

THE COURT: So it's -- that's a yes. Yes (indiscernible).

THE WITNESS: That specific one is yes.

THE COURT: Okay. And the band around it, the shaded band around it, is two forty -- is it 244 meters from the outside of the band to the dotted line or from the -- from one side of the band to the other side?

THE WITNESS: So altogether, it's 244 meters.

THE COURT: Okay. Who gave you that number?

THE WITNESS: That's through our training with our engineers and the -- and with the cell phone companies as well.

THE COURT: So that's an FBI standard number?

THE WITNESS: That is a standard number within the technology, yes.

THE COURT: How'd they arrive at that number?

THE WITNESS: That's -- the chip set that I was talking about --

THE COURT: Uh-huh.

THE WITNESS: -- the timing. They are essentially 244 meters wide.

THE COURT: Okay.

THE WITNESS: And that is the -- the estimate we provide under this across all of the technologies for CDMA. The distance given to us from the phone company is .04 meters as far as what their vendor tells them as the

technol -- as the accuracy that they acknowledge.

THE COURT: All right. I'm sorry I interrupted, but you know why.

MR. ANDERSON: No. No, I --

THE COURT: Please continue.

MR. ANDERSON: Absolutely, Judge

BY MR. ANDERSON:

Q So you've explained what that line -- the line means, what the arc means. Is this the type of methodology you are using then to map the data you saw in this particular case?

A Yes.

Q Slide number eight I think is something that you -- you've already explained but correct me if I'm wrong. Did you already -- you've already explained what this means, how it's displayed on the map as it relates to the area?

A This is just removing the previous illustration or removing that dotted line and the phone from -- from that.

Q Okay. And that's what you do when you map these out. You remove that dotted line because that's just your benchmark, correct?

A Correct.

Q We get to slide nine, which is your first example of the work that you did and the method you did using the records in this case; is that correct?

A That's correct.

Q Please explain to the Judge what we are looking at here and what these overlapping arcs mean, and what is depicted in the I guess center meeting point between those arcs?

A Yes. So this is showing what actually happened during this call that happened at 6:38:31 a.m. And in that, there is four different data points at the beginning of that call that that phone's communicating with four different towers and sectors at that point.

And what it does is it lists out where it sees. For this case, I'll start at the tower at the bottom right. It says CID 217-3. That's showing you the tower and sector. It's saying at that moment in time, it sees that tower and sector at 1.9 miles -- or I should correct myself. The tower sees that phone at 1.9 miles. So that's the large arc coming from the -- the bottom right.

At the same time, there's two different readings from the tower on the bottom left, tower 336 -- 336- -- I'm sorry, 338-1, showing 1.7 and 1.71 miles from that tower. So you see the arc displaying from that tower and sector.

And then finally, on the tower at the top left, tower 243, Sector 1 and Sector 2, both of those sectors are being -- are seeing that phone at 1.1 miles away.

And what that shows then individually, you have to be within the arc of each of those. When you put those together, now you narrow down the location of where that phone has to be in order to communicate with all of those towers and sectors at the same time.

Q And again, that's based on the distance from the tower that is provided on each of these particular interactions?

A Correct. Illustration wise, whether it's the -- the band that's shown or it's a line from each of those, you know, they show the same thing.

THE COURT: So you're telling me that when someone tried to make call from that phone, it hit on all three towers and the call was accepted

by one of the towers?

THE WITNESS: So it is accepted by the one it sees the strongest clearest signal from. That's what shows the --

THE COURT: Okay. But each -- each registered, hey, this guy's calling?

THE WITNESS: No. It's not -- no. It's -- it's going to the strongest clearest signal is what is connecting to the network. That's that initial connection. But during that, these towers are able to measure that they see that phone from this distance. So those are two separate -- separate events.

THE COURT: Okay. So even though the call isn't working on a certain tower, the tower is still keeping track of the phone?

THE WITNESS: The other towers can still see where that phone is, correct.

THE COURT: And keep the records. And you get the phone dump and you know where to look?

THE WITNESS: Correct.

THE COURT: Sorry again, Mr. Anderson.

MR. ANDERSON: No, that's all right, Judge.

THE COURT: By now you're used to it.

BY MR. ANDERSON:

Q Given this kind of information that you have, I mean, we've heard testimony prior to you that there could be interference or there could be noise in the network, whether it could be obstructions that cause a distortion in that these signals could have been produced from a phone that was potentially nine miles west of this location. You agree or disagree with that conclusion?

A I disagree.

Q Why's that?

A It's not -- it wouldn't be possible. And it -- it basically goes against the entire principles of how a cell phone network is built. And the other part of it is, this is -- this is the measurement of the speed it took to get from the tower to the phone and back. So for a -- a phone to be further away from this, would then -- it would not make sense with actual -- with science and the speed of light. Because if a car can only go a hundred miles an hour, you can't go 200 miles in an hour. You can only go a hundred miles.

Q And again, this technique that you've described and demonstrated, this is a technique that you use on a daily basis?

A Correct?

Q This is used within law enforcement on a daily basis?

A Correct.

Q Is this a new or novel technique that you're using here?

A No. As again, there's publications from other law enforcement agencies, the defense as well as -- I've used the same technology overseas in Europe years ago.

Q And is this accepted in the scientific community as a methodology for the use of this data?

A Yes.

MR. ANDERSON: Judge, I have no further questions at this time.

THE COURT: Mr. Casanova?

MR. CASANOVA: Thank you, Judge.

CROSS-EXAMINATION

BY MR. CASANOVA:

Q Special Agent Fennern, you stated your background is in law enforcement, correct?

A Correct. For the -- for the last approximately 12 years, yes.

Q And you have a degree in accounting?

A That's correct.

Q You do not have a degree in engineering?

A No, I do not.

Q Or any type of science related degree?

A No.

Q And when you talk about the information and plotting this RTT data, the RTT data you're collecting is historical, correct?

A Well, it's -- yes.

Q Okay. So basically, you are looking and plotting this information for a call that was made in 2015?

A Right. For this, yes.

Q Yes. Obviously, you weren't present when that call was made?

A Correct.

Q So you had no way to confirm in real-time if these records correctly indicated where this handset was in 2015?

A Well, I'd have to -- so this shows you in real-time what happened. So this is created in -- in real-time. So this is taking a picture in 2015 of what happened with that phone during that call. So this is what happened in real-time. I am going back and mapping it historically. But it is a real-time representation of what happened during that transaction.

Q But in order to confirm the accuracy of this, I guess my point is you weren't present in 2015 when this call was made to confirm that this information is correct in terms of the location of the phone?

A I'm not present at any of the cases I work when a call is made.

Q Okay. In the sense that if you were to track somebody in real time through a GPS signal, that's something that if you had a GPS signal that somebody's located at this spot and you found them at that spot, then you could confirm in real-time that that is an accurate location?

A So to be clear, this is what we get in real-time from Verizon. Their pings as you reference the GPS, it's kind of an inaccurate -- inaccuracy that's out there. We can't just get a GPS ping on phones in real-time. What we get is this arching data from them. And we get a latitude and longitude point that is derived from this RTT data. What R -- what Verizon provides to law enforcement is that latitude and longitude point. And gives an estimate from that, whether it be a hundred meters, 1500 meters, or 5,000 meters.

What then we ask in real-time is for this data so then we can go in and locate someone. So this is what we would be evaluating I guess in real-time for your example of -- of where someone was.

Q But a GPS when you're tracking somebody in real-time, that's not a historical record, correct?

A It -- I mean, it is -- I guess I'm -- a GPS happens in -- in real-time.

Q Okay.

A And then as does -- these records do as well. And then law enforcement would then respond to that and then now it's historical, right. I mean, after it happens, everything becomes historical.

Q Correct. But we're talking about your ability to confirm the accuracy of this information. And certainly, one of the ways you could confirm the accuracy of this information is if you gathered it at the exact time it was occurring and you could confirm that in fact this handset was at this location at this exact time. Would you agree with that?

A Yes. As I said to Your Honor, that's what I do on a daily basis.

Q Okay. But this is not that situation. You're looking at information that was collected five years ago?

A I guess I'm not trying to be difficult at all. This --

Q I mean --

A This same -- this same information that I'm using in your real-time scenario, this is that exact data. So in this case, I am not going back to 2015 and finding anything there. I'm utilizing that experience that I have utilizing this on a day-to-day basis to know that the phone has to be where those arcs overlap one another.

Q Okay. So in the records that you examine, there is a confidence interval, correct?

A There is a confidence interval for the GPS or the -- now, I'm getting -- the latitude and longitude that was -- is within those records.

Q And that's low, medium, and high confidence?

A That's correct.

Q There's nothing in the records to quantify what high confidence means?

A Not in the records that they provide to -- with them, no.

Q Okay. And I think during one of our statements, you suggested that high confidence means that if -- the handset is seen by three towers?

A Depending on -- in our conversation, yes. If you're seen by more than three, your confidence level goes up.

Q Okay. But the records do indicate that even when there's information that a call was seen by three or more towers, the records do indicate even in that situation only a medium -- medium confidence interval?

A I don't know correct -- I don't know exactly. I don't -- we don't utilize that latitude and longitude point to map.

Q Okay. Well, let me show you --

MR. CASANOVA: I think it's B. I'm sorry, C.

Q Let me show you what's been marked for identification as Defendant's Exhibit C. Do you recognize that?

A I do.

Q Okay. What do you -- and you recognize that as basically a compilation of RTT data for a number of different calls?

A Correct.

Q And that RTT compilation does indicate that several of those calls were connected to three or more towers?

A Correct.

Q And it also shows that even on the occasions when it's connected to three or more towers, the confidence level is indicated as only medium?

A Some it has high for it. When it has that -- some of it's medium. It's kind of all over the place regarding all of them.

Q Okay. But I guess my point is, you certainly can't rely on information of the number of towers it's connected with to determine whether or not it's a high, medium, or low confidence interval?

A No. We're talking about two different things.

Q Okay. Now, Mr. Anderson asked you about the Scientific Working Group on Digital Evidence. And you did indicate that you're familiar with that?

A Yes.

Q Okay. And they do make a recommendation on how to plot RTT data, correct?

A Yes.

Q And their recommendation --

MR. CASANOVA: And if you could go back. Could you -- and I think it's slide -- I want to say it's slide eight. Oh, you -- you have it up there. I'm fine.

Q And looking at your slide eight, the Scientific Working Group on Digital Evidence states that if you have a known error rate, you can plot the RTT ranging data at the range from the tower. So for example, if the ranging data is 1.7 miles, the Scientific Working Group on Digital Evidence recommends that you can say that that handset is anywhere within that banded arc, any point, 7.1 miles from the tower all across that banded arc; is that correct?

A That's correct, yes.

Q Okay. The Scientific Working Group on Digital Evidence has made or at least at this point is silent as to whether or not you can map this information with anymore detail if you have ranging data from multiple towers?

A I would disagree with that.

Q Well, do you have information from the Scientific Working Group on Digital Evidence that indicates or shows mapping consistent with, for example, your slide ten?

A So --

Q Or I'm sorry, your slide eight?

A So what the Scientific Working Group on Digital Evidence tells you is the data that you get back from the phone company, as we just said, that cell tower, sector, and distance, you map it out and it could be anywhere along that arc.

Just as it does with the cell site, it does not go further into if you have the second tower, you show that as well. It's implied with the writing that if you have a second tower sector and distance at the same time, that is also mapped out. And again, taken individually, that phone is anywhere along that arc.

But then it comes down to when you have two towers at the exact same time, you don't know for it to be -- it limits it. Because anywhere along one arc, anywhere along the other, obviously, if it happens at the same time, you have to be in an area where you overlap between those two arcs.

Q Okay. You said that's implied. Are you aware of any specific publication from the Scientific Working Group on Digital Evidence confirming the way you plot this information when you have ranging data from multiple towers?

A Beyond what is in there specifically from the Scientific Working Group, no.

Q Okay. So just so it's clear --

MR. CASANOVA: I believe this may be eight.

COURT REPORTER: I think it's G.

MR. CASANOVA: G. I'm sorry.

Q And I'm going to show you what's been marked for identification as

Defendant's G. Do you recognize that?

A Yes.

Q What do you recognize that as?

A This is the recommendation for RTT and timing events or ranging data from the Scientific Working Group of Digital Evidence.

Q And to your understanding, is there any recommendation that you're aware of other than this page from the Scientific Working Group on Digital Evidence?

A No.

Q Okay.

MR. CASANOVA: And I would move to admit G.

MR. ANDERSON: No objection.

THE COURT: Show G admitted without objection.

(STATE'S EXHIBIT G, HAVING BEEN OFFERED, WAS ADMITTED INTO EVIDENCE WITHOUT OBJECTION)

Q When you talked about the width of this banded arc, am I correct you're saying the width of this banded arc is 244 meters or 488 meters?

A I'd have to look back. I believe it's 244 combined.

Q Okay. In your review of the RTT records, did you find that information anywhere in the records defining the -- the width of that banded arc in terms of ranging data?

A From the records, no.

Q Okay. And you testified a little bit about the algorithm that's used for the various cell phone providers in calculating this RTT data. And basically, you said it wasn't an inaccurate tool?

A Correct.
Q Okay. But you do not know what a particular error rate is that might be associated with these algorithmic calculations that are being used to generate the RTT data?
A The vendor does provide some -- their error rates with that as far as a -- an accuracy measure.
Q Okay. First of all, is that anywhere in the RTT records that you reviewed in this case?
A No, it is not.
Q Okay. And has the vendor specifically provided to you exactly what that error rate is for these algorithmic calculations?
A It was provided to me from a -- one of our Verizon representatives.
Q And did they establish how -- how large this error rate was?
A It depends on the technology. For this specific RTT, it's .04 miles. I think I may have misspoke earlier and said meters. But they say .04, which is I believe approximately 68 meters or so.
Q And you did not use that calculation in the presentation of your evidence here, correct?
A No, I did not.
Q Okay. And basically, from -- you don't know if that error rate is in any way connected to the low, medium, or high confidence intervals that are listed in the RTT records?
A No. Again, those two are two different things. The low, medium, high is specific to that latitude and longitude point. That has nothing to do with the -- the arc data, the range to tower data.

MR. CASANOVA: I don't think I have any further questions, Judge.

THE COURT: Mr. Anderson?

REDIRECT EXAMINATION

BY MR. ANDERSON:

Q In terms of the accuracy, again, this is a tool that you use on a regular basis and get results on in the course of your law enforcement duties with the FBI; is that correct?

A That's correct.

Q And within your -- within the CAST Unit as well?

A Correct.

MR. ANDERSON: Judge, I don't think I have any other questions beyond that. Thank you.

THE COURT: Mr. Casanova?

MR. CASANOVA: Don't think I have anything on that, Judge.

THE COURT: May the witness be released from his subpoena or --

MR. ANDERSON: Are you going to recall Mr. -- Mr. Miletic?

MR. CASANOVA: I don't think so, no.

MR. ANDERSON: He may be released. Thank you, Judge.

THE COURT: Thank you very much, sir. You're free to go.

THE WITNESS: Thank you.

(Witness is Excused)

AND THAT CONCLUDES ALL PROCEEDINGS IN SAID CAUSE

STATE OF INDIANA	)	MARION SUPERIOR COURT D31
	)SS:	
COUNTY OF MARION	)	CAUSE NO. 49D31-1511-MR-1041732

LARRY TAYLOR,)
)
Defendant,)
)
vs.)
)
STATE OF INDIANA,)
)
Plaintiff.)
)

CERTIFICATION

I, Toni M. Mullins, Court Reporter, in the Marion Superior Court, D31, do certify that the hereto attached transcript is a true and correct transcript of the direct and cross-examination of Richard Miletic and Richard Fennern from the 702 Hearing held on March 22, 2021, entitled STATE OF INDIANA VERSUS LARRY TAYLOR, cause number 49D31-1511-MR-1041732, before the Honorable Grant W. Hawkins, Judge, presiding in the Marion Superior Court, D31.

IN WITNESS WHEREOF, I hereto set my hand and seal this 23rd day of May, 2021.

/s/ Toni M. Mullins

Toni M. Mullins, Court Reporter
Marion Superior Court, D31