DISTRICT COURT **LARIMER COUNTY, COLORADO** 201 Laporte Avenue Fort Collins, Colorado 80521	
PEOPLE OF THE STATE OF COLORADO, Plaintiff, vs. **CHRISTOPHER RUSSELL JONES**, Defendant.	▲ COURT USE ONLY ▲ Case Number: **2022 CR 196** **2021 CR 2091** Division **3B**
For the People: Andrew LeClere, Esq. 8th Judicial District Attorney's Office 201 Laporte Avenue, Suite 200 Fort Collins, Colorado 80521 Telephone: 970−498-7200 For the Defendant: Lee Christian, Esq. Lee E. Christian, P.C. 415 Mason Court, Building 2 Fort Collins, Colorado 80524 Telephone: 970-484-0300	

The matter came on for hearing on August 26, 2022, before the HONORABLE JUAN VILLASEÑOR, JUDGE of the District Court, and the following FTR proceedings were had.

At the request of the ordering party, this is a partial transcript of the proceedings held.

I N D E X

WITNESSES FOR THE PEOPLE:

WITNESSES FOR THE DEFENDANT:

NONE

EXHIBITS	IDENTIFIED	ADMITTED
For the People:		
None		
For the Defendant:		
None		

Motions Hearing

August 26, 2022

THE COURT: Okay. We are on the record in 22 CR 196, and 21 CR 2091, Christopher Jones, who is here in person with Mr. Christian, and Mr. LeClere for the People.

All right. So we -- this is part two of motions hearing; right, Mr. LeClere?

MR. LECLERE: Yes, Your Honor. In regards to the Shreck --

THE COURT: Yes.

MR. LECLERE: -- challenge to the --

THE COURT: Correct.

MR. LECLERE: -- TraX program.

THE COURT: Yes. Are you ready to proceed?

MR. LECLERE: We are, Your Honor.

THE COURT: All right. Who are you -- Mr. Tibbets, right -- is that right?

MR. LECLERE: It'd be Mr. Sy Ray, Your Honor.

THE COURT: Oh, is he on Webex or what?

MR. LECLERE: He is, Your Honor.

THE COURT: Oh, okay. Sorry, let me figure this out.

MR. LECLERE: And, Your Honor, just for clarity on the issue. Mr. Ray is testifying today for the purpose of the Shreck hearing.

THE COURT: Correct.

MR. LECLERE: The Court saw my endorsement of Christopher Tibbets for the purpose of trial.

THE COURT: Oh, that's what that is?

MR. LECLERE: Correct, Your Honor. For the expert endorsements for the purposes of trial --

THE COURT: Okay.

MR. LECLERE: -- he was endorsed.

THE COURT: All right. So I read all that for nothing. Okay. Or not for nothing, but, you know.

MR. LECLERE: Well, the preview, Your Honor.

THE COURT: Prematurely. All right -- all right.

So you're calling Mr. Ray?

MR. LECLERE: Yes, Your Honor, I am.

THE COURT: All right. Mr. Ray -- I don't know if they can hear me. Are you there, sir?

MR. RAY: Are you able to hear me?

THE COURT: Yes, very well -- very good.

All right. Mr. Ray, let me place you under oath and we can go from there. Please, raise your right hand?

Do you swear or affirm, that the testimony you're about to provide under penalty of perjury, is the truth, and nothing but the truth?

MR. RAY: I do.

SY RAY, PEOPLE'S WITNESS, SWORN

THE COURT: All right. Mr. LeClere, go ahead.

MR. LECLERE: Thank you, Your Honor.

THE COURT: Yes.

DIRECT EXAMINATION

BY MR. LECLERE:

Q Sir, if I could have you state your name and spell your last name for the record?

A My name is Sy Ray. First name is S-Y. The last name is R-A-Y.

Q And, sir, what's your occupation?

A I'm a director with LexisNexis.

Q Okay. And before being a director with LexisNexis, what was your occupation?

A I owned and operate a company called ZetX, Z-E-T-X.

Q Let me ask you, ZetX, were they the ones that essentially had the TraX program?

A Yes, TraX is a mapping product of the ZetX company.

Q Okay. And what was your role with ZetX before LexisNexis?

A I was the creator and the CEO.

Q What about your role with the TraX program?

A I initially developed the TraX program prior to actually starting ZetX. And then I would be basically in charge of the quality assurance, management of the -- the business as a whole, testimony training; pretty much the whole

gamut there.

Q Okay. If I may ask, sir, could you give the Court a brief summary of your education, and any training or specialized training that you have regarding the ZetX program and CDR mappings?

A Sure. Sure. So I have nineteen and a half years in law enforcement. During my time in law enforcement, I obtained an associate's degree, but had nothing to do with what we're talking about today. More specific to radio frequency, cell phone network engineering, I've had pretty significant training from a multitude of different providers.

I've had some basic training from the FBI early in my career, probably about a hundred and twenty to a hundred and eighty hours.

Later in my career, I was in charge of running a cell site simulator. This tool was -- was -- it gave law enforcement the capability of physically finding devices. So it had the ability to target a particular device and direction, and find or locate where that device is. In order to use this tool effectively, you have to be pretty close to the device.

So as a result of that position I had with law enforcement, I did 2500 hours of training with a company by the name of Digital Receiver Technology, DRT Inc. And this training was specific to analyzing or surveying a cellular

network, understanding (indiscernible) how the different cell sites were configured, how they were operating. At that point, we would create our own cell site. We would emulate, essentially, the network that we're targeting a device on and we could broadcast signals that would attract the target device to jump from the cellular network it was on, to our bait, or our simulated cell site, if you would imagine that (indiscernible).

And this is a really interesting component of what's going to lead into TraX, as these are real-life missions, where we analyze phone records, we analyze the cellular network, and then we physically go out into the field to find the phone. So it isn't a hypothesis. It isn't (indiscernible) or applying methodologies. You know, how -- us trying to figure out if -- if we're at it or not.

This is a scenario where we're physically going out in the field, using techniques and these methodologies and training that I'm talking about, to physically recover a phone.

I've probably conducted just over 3,000 of those missions in my career. I've also conducted those missions overseas. So I was recruited in 2010 with the DoD, to do similar type work in Afghanistan. In addition to my training with Digital Receiver Technology, I've also had significant training with Boeing, the -- the airline company, if you will,

but they also do a lot of radio frequency work. Probably had about a thousand hours of training with radio frequency engineering, simulating cell sites, creating cell sites with Boeing, as well.

And then, more recently with a company by the name of Rohde & Schwarz. Rohde & Schwarz is a -- it's a big company out of Germany, but primarily, what I've done work with them on is network surveying. And what network surveying is, is physically going out and mapping what cell sites look like, as far as their signal is concerned. Again, probably about 450 hours of training with them. But I've also consulted with them and helped design their interface for their customers on how they used the product.

And I'll spend a little time, briefly, just to kind of explain what this product is with Rohde & Schwarz, as I think it will be pretty relevant for today's hearing. This is a network survey tool. And what this tool allows us to do, is we can go out into the field and we can physically map where cellular signals, basically, interact with the -- the population within cities, within rural areas.

So this tool allows us to, if you will, drive a grid pattern through a city, or a town, or in a rural area. And we can specifically tell you, okay, the cell site number six is the primary cell site for this area, cell site number 15 is the secondary, and the third. But it also allows us to

analyze the overhead information from the cell sites, so we can actually see the difference in power levels and what those signals look like. We actually have created a database as part of this training and experience. And within this database, we have approximately 3,000,000 cell sites that we've conducted this type of analysis on throughout the United States.

In addition to that training, I've had experience doing the missions in law enforcement. I actually created the TraX program while I was in law enforcement, so I used it actively in the field to find phones. Again, so not just hypothesizing where the phone may be, but physically analyzing the records, going out into the field, and recovering the phone or the person with the phone.

When I started ZetX, that training and education continued significantly with Rohde & Schwarz. We also have created training classes for law enforcement across the United States. We've had about 15,000 law enforcement attend our training classes. I created both the -- the curriculum and all of the content if you will, for those training classes. We've also created one of the only Subject-Matter Expert recognized certifications in this field, across the United States, as well. And we've got about a hundred Subject-Matter Experts that we've certified. And it's probably worth mentioning, this isn't just law enforcement, we do have

defense experts who have attended our courses and be recognized as experts in this field.

And then I -- before I conclude with -- and I'm happy to go in more depth later if you need it, but we've also developed systems that have been used by the FBI, by the NFL for security purposes that have to do with radio frequency engineering. So an example of that would be in the 2016 Super Bowl in San Jose. It was an open-air stadium. There was a drone threat perceived by the FBI. And in that particular situation, I created and developed an anti-drone solution that would actually identify the radio frequencies associated to drones. But more importantly, it will also identify the cell phone that was connected to the drone, to give law enforcement the ability to locate whoever was operating the drone.

In summary, that would be a quick overview of -- of some of my experience and background.

Q Thank you. Give me one second here, sir, as I just -- let me ask you, sir. Have you ever testified in court about the TraX program before?

A I have.

Q As an expert?

A I have.

Q Do you recall in what states, generally?

A Not off the top of my head. Probably more than half of the states in the United States, so I would say probably

around 30 different states. I've -- I probably have testified well over a hundred times, both in State and Federal Courts.

Q But to your knowledge --

A -- to -- I'm sorry --

Q I'm sorry --

A -- I was going to say to include Colorado. I've actually testified in Colorado multiple times, as well, as an expert to the TraX program.

Q To your knowledge, sir, has the TraX program ever have been found to be unreliable in any of those testimonies?

A No, there's -- there's two testimonies in -- specifically, in which certain parts of the TraX program were not admitted, but I actually completely agree with both of those decisions. They were in reference to exhibits, where a detective had used the TraX program; had added some of their own color, I guess, if you will, to the exhibits that were being issued to the court. And I -- when I was on the stand -- I have never seen the exhibits before, and I was on the stand and provided the exhibits by the defense, I actually agreed that they were not proper, they should not have been allowed. And in those two cases, both of those out of Massachusetts, by the way -- both of those cases are the only cases in which the TraX program has not fully been used as -- as it is in this case.

That's just my testimony. We also track the

testimony of all the Subject-Matter Experts that we have certified across the country, and we are unaware of any case in which the TraX program has not been upheld as being scientifically sound.

Q One moment, sir. Mr. Ray, you said that the ZetX was sold to LexisNexis, I believe?

A That is correct.

Q Okay.

A We were acquired in May 6th of 2021; it's a little over a year ago.

Q And was there a vetting process that took place during the sale?

A Yeah, it was -- it was pretty extensive. Given the nature of the work that we do, and some of our clients or customers, if you will, we do have a lot of federal contracts. And there is a public safety, as well as a national security issue with our business if it was sold to the wrong person, or the wrong entity. So as ZetX, we had to do what's called the CFIUS review. And that's an actual hearing that goes through Congress, believe it or not. We had to turn over about 35,000 pages of documents. It was about an 18-month process, but yes, the -- the inner workings of our business, how we do things, who our customers are, the credibility of what we do was all looked at during that process.

Q And I may be using the wrong word here, but did you

pass this CFIUS review, or is there a different term that they use to approve of it?

THE COURT: I don't know that this is relevant for our inquiry. How this was sold is none of this Court's business.

MR. CHRISTIAN: The CFIUS committee?

MR. LECLERE: Understood, Your Honor.

THE COURT: I -- I -- I don't need to hear it.

MR. LECLERE: Understood, Your Honor. I -- I -- I do think that it's important for reliability purposes, but I will move on --

THE COURT: -- I -- I don't think so --

MR. LECLERE: -- I understand.

Q (By Mr. LeClere) Mr. Ray, the TraX program, just in general, can you describe to the Court what it does?

A Sure. So we take the phone records from the cellular providers in the United States, and we visualize them for a very quick explanation. And most of these records come in the format of, like, an Excel file, a TXT file. We allow the end user to upload those records into our system. And we provide some mapping visualization that helps the end user visualize what the location, or the geolocation, is associated with the data, and how it works.

Q And specifically as to any algorithms or formulas that your program uses, would you be able to explain that to

the Court?

A I would.

Q If you could, maybe just audibly and then I'll have some follow-up questions for you.

A Sure. And we've -- I've provided this testimony before, so there's nothing proprietary, necessarily, or hidden about our algorithms. Essentially, we have a cell tower database that we have built over the last 10 years. We've got about 50,000,000 cell site antennas in that database. So what this means, is we have the latitude, longitude, location of the cell sites, the sectors, or the configuration of the cell sites. And then we have the drive test data that I was talking about. And programmatically, what we do is we provide an estimated handoff range. And what an estimated handoff range means, is that it is the most likely area that the cell phone is in before handed off to another cell site. The idea here is if it leaves the shaded area that we put on the map, we would expect to see a handoff to a different cell site.

The way that we range those cell sites is a pretty simple programmatic formula. We, for lack of a better term -- now it's done programmatically so I'm going to try to visualize what the computer code is doing. But essentially, it looks at the configuration of the cell site, the specific antennae being used. And we look at a 60-degree cone extending from the cell site out -- it -- as far as the

distance, we really don't cap the distance. And what we're looking for in that 60-degree cone, is the next three closest cell sites. And we look at the distance of each of those three cell sites to the source tower, and we average that distance. We then take the average of that distance and we times it by .97, and that gives us our estimated range.

So I'm sure there's questions on, but why do you pick three of the closest cell sites? Why do you use .97? What we do on the back end, is we take drive tests and we break down these drive tests and say, okay, let's -- let's say we're talking about a T-Mobile cell site number 15. We do a drive test with that cell site. And then we review that data to see how can we reverse engineer, for lack of a better term, the estimated handoff range that we saw with that cell site. And then, how can we do that in a manner that we can replicate it across other T-Mobile cell sites.

And throughout the years, we have found that that algorithm that I just explained, gives us about a 94 to 96 percent accuracy. And -- and it's a variable because the areas that we're mapping are variable. The -- the accuracy in Manhattan is going to be reduced. It's not going to be as high as the accuracy perhaps in Fort Collins; it's a very different environment. So when I say the accuracy rate is 94 to 96 percent, that's why there's a variable to that.

But the algorithm is known. It's -- anybody can

replicate it. It's easy to test. It -- it can be tested; it can be vetted. It's been accepted in multiple reports.

Q Mr. Ray, do you have a demonstrative or any kind of visual representation of this 60-degree cone mapping that leads into the averaging of the towers?

A I do, just to kind of put a little bit of visualization behind a lot of words that I just rambled out. It -- it typically helps if people see what I'm talking about.

Q Would you be able to screen share that with the Court, so the Court can see that process?

A I can.

MR. LECLERE: And, Your Honor, if he may?

THE COURT: Yeah -- yeah, that's fine. I think he needs to do it.

MR. LECLERE: I -- I believe so, Your Honor. I've --

THE COURT: Yeah.

THE WITNESS: Okay. Hopefully, let me know when you can see the screen.

THE COURT: We see it. Well, he's typing.

MR. LECLERE: I see it, as well.

THE WITNESS: Okay. And I'm going to use a -- it's -- it's in Grand Rapids, this isn't going to be in Fort Collins. And the reason I'm using Grand Rapids, is this is actually the exact same demonstrative that I used in a prior

Federal case, in which the same challenge came up that this wasn't an accurate way to map. So this is how I explained it in that particular case, so I'm just reusing as why -- why in Grand Rapids, so. Sorry, that I --I didn't create one for Fort Collins.

But essentially, what we're looking at here is, the first thing we need to look at is cell sites. So I'm going to demonstrate (indiscernible). And the reason that's important to see before we get into this, is not all cell sites are the same thing. If you look up, kind of, in the top left corner up here, there's a big gap when we get into the rural areas. When you look into the -- the downtown area of Grand Rapids, there's obviously -- the density is a lot. It's just more dense; we have a lot more cell sites. So the ranges and handoff areas that we're going to be talking about today in this downtown area, is going to be very different than the ranges that we see on these outside areas.

And this is the whole reason the TraX program uses some type of a shaded overlay, is that for a layman to look at a map and have some type of idea what this means. If I put all of the indicators on the map that are the exact same, somebody could discern that this cell site way up here, is going to act just like the cell site down here because the mapping that we see looks the exact same.

So the challenge of what we're trying to do, is to

give a layperson a rough estimate. And it is an estimate; I -- I need to make sure that that's very clear. I don't know anything about this case or the prior testimony, but nobody should ever come into the Court, say that this is a precise science and that we know exactly where a phone is at. We're simply trying to estimate, what is the best way we can give you an idea of what the cell site handoff area looks like.

So I'm going to populate one cell site and our -- our estimated range of that particular cell site. And you see the black dot that's kind of on the right-hand side; that's the location of the cell site. The line that's extending from the cell site is the azimuth, and the azimuth is simply the direction that the antenna is pointing.

And what we do is we, programmatically, our database, we put a cone or less it looks at a 60-degree cone and that's what a 60-degree cone looks like. If we -- if we measure either side of the azimuth, it would be 30 degrees, giving us a 60-degree cone. And then our system -- because we know where all the cell sites are located in the United States, our system programmatically looks at the three closest cell sites that fall within that cone, that yellow shaded cone. We take an average of those three cell sites, and then we times that average by .97. And I can, kind of, put that formula on the map right now. So the -- the white box that just came up is the actual formula that we use. Again, it's

not, you know, somebody manually doing it. Like I just explained for each one of these, this is done programmatically. Now, we (indiscernible) some balances in place, as well.

Anytime a customer or our own employees do a drive test, they load that drive test into our system. Our system actually programmatically goes through and checks this algorithm, if you will, for accuracy. How often do we (indiscernible) into our system that shows that our range is too -- too small. And -- and just for -- for clarification, I would much rather be too big than too small. Too big gives the benefit of the doubt to the defendant and in most of the cases that we work. So when we don't know for sure, we are going to estimate larger and not smaller.

So when we have drive test data that's loaded into our system, what the system specifically looks for is how often did we see this cell site register outside of our shape that we estimated. And that's where we come up with the 94 to 96 percent accuracy. And the database that we're using to do that consists of about 3,000,000 scans. So it's a pretty significant medium, when we start to look at what is the data that we're actually coming up with that accuracy rate, if you will.

But in a nutshell, that is the formula. Like I said, I've testified to this before. I've actually used this

exact demonstrative in -- in court, so it's on the record. And it's easy to test, you know, at any point. In this particular case in Fort Collins, somebody could take a cell phone out and there's engineering modes that I can put a cell phone in, and I can see where the phone connects to a cell site. And I can reverse engineer this algorithm, and I could come into court today and actually show where we're inaccurate.

And, you know, we -- I've -- I've had this algorithm out in the public for well over two years now, and to date, nobody has ever done that. So I understand there's a lot of debate on our accuracy, and if you can rely on it and if you can't rely on it. But the bottom line is, this is the best way we have found for criminal justice entities, whether it's law enforcement or defense experts, because, again, we do have defense experts using the same system. It gives some type of an estimation of what these cell site coverage areas -- estimated coverage areas look like to a layperson.

Q (By Mr. LeClere) And now, Mr. Ray, as we can see here, the TraX program uses that parabolic shape versus simply just a wedge; why?

A Well, again, I'll -- I'll go back to the drive test. The - the concept that the covered area or handoff area -- the estimated coverage area, however somebody wants to articulate it, follows this wedge shape; it's just -- it's silly. That's

not how radio frequency works.

The best way for me to explain it, is imagine yourself in a very dark room, you're holding a flashlight, and you turn that flashlight on. Yes, the main beam of that light is probably going to be in a cone shape, very similar to what you've seen other mapping on where a cone shape is represented. But at the same time, I've illuminated some of the area outside of that cone shape. I've illuminated some of the area actually behind me. And we've had thousands of cases at this point, where we have discovered that the phone is outside of the cone shape.

One of our bigger customers is a Federal agency who goes out and hunts cell phones every single day, and we work with them daily. And more times than not, they will find the cell phone outside of the cone shape. So we know that there's what's called slide loads and rear loads. And just for clarification, the -- the shape that you see on the screen here and I'll, kind of, clean this up so we're all clear which shape I'm talking about, it's actually referred to as the radio frequency horizontal plane. This is not something that ZetX created. This is not something that I designed by any stretch of the imagination. This is a radio frequency measurement pattern.

What happens is, antenna manufacturers will test their antennas in what's called an anechoic chamber. And

basically, this anechoic chamber prevents, like, any radio frequency from bouncing off of different walls; it's a -- it's a perfectly clean, free space environment. And they'll test the energy that is emitted from an antenna. The shape that you see on the map right now, is the typical cellular energy pattern that is emitted from an antenna. We actually took the shape from the cellular manufacturers.

For example, if you look at a T-Mobile cell site and there's ways you can figure out what type of antennas are on a T-Mobile cell fight -- cell site. You can go to that manufacturer of that antenna, and you can actually download this shape from the antenna manufacturer as a representation of what the energy emitted from that antenna looks like.

So I -- I've already called it a lot of different things, but technically, it's the radio frequency horizontal plane. It is well used and documented, not only in what we do, but within radio frequency across the board.

MR. LECLERE: Sorry, one moment, Your Honor.

THE COURT: Uh-huh.

Q (By Mr. LeClere) Mr. Ray, you touched upon this --

A Yes.

Q -- with potentially other people who have critiques of the TraX program. In general, what is that critique?

A You know, it -- it -- it varies. I've seen, basically, that the cone shape is more accurate of a

representation. I -- I don't know that that can necessarily be stated, because we don't know how far that cone shape extends, is the problem. And that -- that was a problem that I ran into very early in my law enforcement career. And it was for testing, where I used a cone shape in law enforcement for years. And one of the problems that I had in court was explaining how far a cell site could potentially reach, because there's no representation to the jury. At the end of the day this exhibit goes to the jury and we're relying on laypeople to determine what that -- that -- that range looks like.

So the -- the whole TraX program was based on the fact that we're putting some type of context to that. And -- and I -- I -- I've seen some criticism and a lot of papers actually published, too, on the max distance of a cell site, which is always an interesting argument that people will try to make. But it's not the cell site that we're -- we're really looking at, it's the phone.

The cell site is much more powerful than the cell phone. When -- when we start talking max distance of a cell site, we're really talking the max distance of the phone. When we do drive tests, we can always see the cell site much further than the phone is able to connect to it because the phone doesn't have enough power to get back to the cell site. And in all of our testing, we've -- we've actually documented

where we were able to connect to a cell site up to 16 miles away, we could stream a movie, we could send text messages, we could have a phone call, but we have unequivocally proven that you can connect to a cell phone at least 16 miles away.

I -- I think I saw something in this case that there was this assumption that a cell phone or a cell site could reach 45 miles. A cell site can actually go 50 miles beyond 45 miles. So that's -- that's a common critique that we get, is that some of our ranging is too small.

We've had a lot of cases especially, in mountainous areas, where I get on top of a peak and I've got line-of-sight to a cell tower that's 40 miles away. And there's 15 cell sites in between me and that particular cell site. But my phone still connects to the one that's 40 miles away, because I've got perfect line of sight to it and I'm right on the azimuth line; that -- that center cone, if you will.

So typically, those are the -- the arguments that we hear. But I -- I think it takes away from the intent of the testimony, and the intent of what we're doing with these records for law enforcement. These are estimations. These -- these should never be relied on by themselves. At no point should a -- a map from ZetX or the TraX program come into court, and we're basing the entire court case on what that particular exhibit looks like. This is a way that we can use another layer of evidence to either corroborate or disprove

certain geo locations that are related to a case and they're estimations, that's all they are, is they're rough estimations to give us an idea of where a device is at, at a particular time.

MR. LECLERE: Thank you. One moment please, Your Honor?

THE COURT: Sure.

MR. LECLERE: Nothing further from the Prosecution.

THE COURT: All righty. And, Mr. Christian, cross-exam?

CROSS-EXAMINATION

BY MR. CHRISTIAN:

Q Good morning, Mr. Ray.

A Good morning, sir.

Q You're testifying as to a product that you've developed, and it's important that this product be declared reliable, correct?

A You know, that's an interesting question. Past a year ago, I would agree with you a hundred percent. Kind of, I'm out of it; I'm on the tail end of this. I have other things I would like to go do in my life. And for lack of a better term, I really don't have much of an interest in it anymore. I've -- I've -- I've other things to do. I've sold my company, I'm moving on. But at the same time, I -- I received this call and I was asked to testify today, so I'm

here.

Q Were you paid to testify today?

A I am not being paid to testify today.

Q When LexisNexis purchased your product, what did they pay for it?

A I'm not going to release that.

MR. CHRISTIAN: Judge?

MR. LECLERE: I'll also object to relevance as to the purchase price of the ZetX program for LexisNexis.

THE COURT: He's not going to testify at trial, right?

MR. LECLERE: He is not, Your Honor. This is for the purpose of the Shreck hearing and the reliability of the TraX program.

THE COURT: I didn't want to get into the business side of things, so I'll sustain it.

Q (By Mr. Christian) Your -- your product is mainly used by law enforcement, correct?

A Yes, absolutely, it is.

Q The -- your mission that's shown on the ZetX website is, TraX was invented by cops with real-world experience, right?

A Correct.

Q And it's in support of law enforcement agencies across the nation?

A I would agree with that, as well.
Q How many law enforcement subscribers are there?
A Law enforcement, probably, you know, I haven't looked recently, I'd say around 700. And when I say law enforcements, it will also include District Attorneys, US Attorneys, Arson Investigators -- so sometimes on the fire side, not necessarily law enforcement side, but roughly I would say around 700.
Q And the declaration of unreliability would damage your reputation with 700 law enforcement agencies, correct?
A Well, I would -- would think at this point, we -- just -- just for some -- some numbers here. Our system has mapped for over two billion phone calls, I think, at this point. So what we're looking at in this case, imagine that times two billion. Yeah, if -- if our system was unreliable, it would absolutely destroy the business plan. But at the same time, being in business for eight years and mapping two billion calls across the United States and a lot of federal agencies use our case, as well, I -- I think that unreliability would probably have been discovered long before now.
Q Well, you said that it's been declared to be reliable in the State of Colorado; is that right?
A There's multiple cases in Colorado where this mapping has been admitted as reliable.

Q And what are those cases, sir?

A I can tell you the counties. I -- I don't know that I can -- you have to understand I've testified to a lot of cases. And I was kind of brought in into this case at the last minute, so I'm not going to be able to rattle off names. There -- the County close to Fort Collins, there, and I apologize. Greely? Is it Greely that's just --

THE COURT: Weld -- it's Weld County.

THE WITNESS: Weld County, yeah. Just west of -- you guys are -- or, east of you, there.

THE COURT: East.

THE WITNESS: Multiple times down in the Colorado Springs area, which I think is El Paso County.

THE COURT: Yes.

THE WITNESS: And then also in Avon, so I -- I can't tell you what County it is Avon, but down in Colorado Springs, I think we have four or five cases that have been accepted, and then in the Weld County. And I'm sorry, the defendant's name is escaping right now. I'll --

Q (By Mr. Christian) Would it be --

A -- I think about a hearing --

Q -- would it be --

A -- Pinney Sam --

Q -- would it be Samuel --

A -- Samuel Pinney.

Q Would it be Pinney in Weld County? Is the -- is the defendant Pinney, P-I-N-N-E-Y, a murder case?

A That is correct. Yes, Samuel Pinney.

Q And it's your testimony that in the Pinney case, the court found that TraX was a reliable technology?

A In my testimony, if we're going to talk specifically about the Pinney case, was there was a challenge on the accuracy of what's called NELOS data from AT&T and how we mapped it using --

(Audio glitch for approximately eight seconds)

THE COURT: Suspense is killing me.

THE WITNESS: Map --

THE COURT: Mr. Ray, you're going to have to repeat what you said. You -- you were cut off, I'm sorry.

THE WITNESS: Oh, I'm sorry about that.

THE COURT: No.

THE WITNESS: Yes, in the -- in the Pinney case, I had a Shreck hearing. And what was being challenged was the NELOS data, which is produced by AT&T, as well as the TraX platform in mapping that NELOS data.

Q (By Mr. Christian) And -- and in the -- the transcript, it would show a finding by the court in that case that ZetX and TraX are reliable?

A I -- I haven't reviewed the transcripts, so I can't say what's in the transcript. What I can tell you is that

there was a Shreck challenge to that case. And the courts found that it was accurate, and that the TraX program was used to display the -- or visualize the AT&T records in that case in court --

Q And -- and --

A -- in which there was a conviction.

Q -- and your -- your testimony under oath is that that, that hearing was not a Shreck hearing as to the NELOS data alone?

A I -- I think if you go through the transcripts of the Shreck hearing, you will see that the -- the NELOS data was challenged, but also the ability to map that data in the TraX platform. That -- that was -- a big part of that Shreck hearing, was the -- the way that we mapped the data, as well.

Q And -- and your testimony today is that there was a specific finding by Judge Quammen in that case that TraX is reliable?

MR. LECLERE: I'm going to object. That's asked and answered at this point, Your Honor.

THE COURT: It's overruled. I mean, he -- I don't think he remembers, so could you just -- just -- just get to it, Mr. Christian.

Q (By Mr. Christian) There -- there is a finding -- specific finding by Judge Quammen that TraX is reliable in People v. Pinney?

A I -- I'm not going to speak to what Judge Quammen specifically articulated. I can tell you that the TraX program --

(Audio glitch for approximately three seconds)

A -- for Shreck hearing.

Q And you'd be able to provide Counsel with the other cases in the State of Colorado, where TraX was found to be reliable specifically by a court, correct?

A I can try. I don't know that I'm going to waste a bunch of time researching those cases. I can go back and give you the agencies that we assisted, and I'm sure somebody can piece them together. When I say TraX to you, not all of this will be my testimony; it's other testimony from other people. So before I commit to running down every case in Colorado, I -- we need to follow up on that more.

Q I'm just trying to -- you're trying to convince this Court that this is found to be reliable in the State of Colorado, and I'm just trying to check your testimony as to that by finding out in which cases it was found?

A I -- I understand, and that's why I listed the specific locations in which this happened. I didn't know that I would need to provide these cases today, or I absolutely would have done a better job in -- in doing it. What I can tell you, is I have knowledge of the challenges to our product in the State of Colorado. And I have knowledge that those

challenges were found to be scientifically admissible when the testimony came in.

Q Did Dr. Jovanovic testify in any of those cases?

A I've only been involved -- let -- let me think for a minute. I've been involved with Jovanovic's testimony or report. And I want to be careful with saying testimony, because more of my involvement has been either a -- a report that he'll generate or potentially in a hearing like this. I think a total of five times; California, New York, Michigan; I think that's all the states. I -- I do not believe I've seen anything from Mr. Jovanovic in Colorado, but I -- I don't know if -- if he's consulted on those cases or not; you'd have to ask him.

Q And -- and you won't be at trial in this case to provide the foundation necessary for the testimony of your product; is that right?

THE COURT: That -- that's why --

MR. LECLERE: -- Your Honor --

THE COURT: -- we're here today.

MR. LECLERE: I'm going to object to that.

THE COURT: That's why we're here. That's sustained.

Q (By Mr. Christian) Have you provided any written reports explaining the -- the content or the methodologies that you spoke of today?

A Written reports to who?

Q Anyone.

A Yeah, I've -- I -- I think it's important to -- to note here I -- I've probably worked on well over a thousand cases. I've generated an incredible amount of reports. There are times that I have to get a little bit more specific with some of those reports. But I would say probably more important than the reports, I've testified multiple times to exactly what I'm testifying today,

Q Are -- are the written explanations about the algorithms and methodologies used in your files, that's created by TraX?

A I don't necessarily put them off (indiscernible). Obviously, there would be transcripts that are written, you know, it's --

(Audio glitch for approximately nine seconds)

That it's a lot of intellectual property. And we're putting this out there for the world to see and examine, and potentially, it could hurt our business plan by putting this out there. So I'm not going to say I'm writing stuff. I don't write books on how to do this. I -- I strictly stay away from that, because I don't want to educate, necessarily, criminals on how to avoid this type of stuff.

So, no, I don't make it a practice of publishing what you're asking me. However, in the course of showing

scientific reliability, I have detailed this multiple times. And even further, we have -- have a website that's customer-facing and it's public-facing. It's standard.zetx.com, where I have about an hour, maybe an hour and twenty-minute video, that I explain a lot of the principles that I'm talking to you today.

I -- I don't get quite into the weeds with some of the algorithms I just talked about. It's a much higher level, but yeah, it's publicly facing.

Q You have 20 years of experience as a cop?

A That is correct.

Q Then nine years' experience running ZetX?

A Eight.

Q You have an associate's degree; is that your education?

A That is my degree. I wouldn't classify that as my education, but I do hold an associate's degree right there.

Q Do you have a degree in engineering at all?

A I do not have a degree in engineering.

Q You're not an engineer?

A I would argue that I have a really good competency and working knowledge of engineering principles, specifically to radio frequency. Probably more so than a lot of radio frequency engineers, because opposed to doing laboratory studies or getting some type of an engineering education at a

college, I've done it through the use of practical application in the field.

The ability to look at a set of cell phone records, estimate where a device is, and then physically go out in the field and recover that device; I've done well over 3,000 times. I -- I would challenge that most engineers have never taken the time to actually physically go into the -- the field, and try to find a cell phone --

Q But --

A -- kind of reversing it, like we're doing in this case. So I -- I would disagree with you. I do not have an engineering degree, but a large part of my business, which is at this point a very successful business that has been proven, is a result of my engineering capability to produce what we're doing here.

Q I see your product as finding the cell tower and putting the same blob around that cell tower as the estimated coverage?

A I -- I understand that this may -- may be how you see it, but that is not what's happening at all. I've built a database with 50,000,000 cell sites and every one of those cell sites has a unique radio frequency horizontal plane, not necessarily a blob, that corresponds to that cell site. So I -- I -- I can understand from your perspective, it looks very simple. I assure you it is not. It required a lot of

research, it required a lot of engineering, and it's never been duplicated anywhere in the world.

So I understand where you're coming from, but I assure you there's -- there's much more to it than that.

Q That wasn't my question. The same blob shape applies to every mapped ZetX estimate from a cell tower, correct?

A That is incorrect.

Q There's a -- there's a different blob other than the somewhat heart-shaped one, that is found in everything that I've ever looked at?

A Yes, I -- I would challenge your experience of what you've looked at. There are different shapes. And it's not a blob, it's a radio frequency horizontal plane.

Q Would you agree with me that in -- in the case -- this case that you've done no research?

MR. LECLERE: So, Your Honor, I'm going to object to relevance --

THE COURT: We're not --

MR. LECLERE: -- as we get into the facts of this case.

THE COURT: -- it's --

MR. CHRISTIAN: Have you done --

THE COURT: -- it doesn't really matter about this -- what he -- he was not hired to do.

Q (By Mr. Christian) Have you done any drive tests to determine the reliability of your product in Fort Collins?

A Yes.

Q And have you done it for the towers that we're dealing with in this case?

A It would not surprise me that we have mapped the cell sites that are involved in these case, just because I know what's in Fort Collins. And we've done pretty significant drive testing in Fort Collins. I can't speak to the specific cell sites because I haven't seen them.

Q And -- and you could produce those drive tests; could you not?

MR. LECLERE: And, Your Honor, I'm going to object again, as to the purpose of this hearing.

THE COURT: It's overruled. Go ahead.

THE WITNESS: Yes -- yes, we could absolutely produce drive tests. That's not a problem to do that.

Q (By Mr. Christian) I -- I would ask that you do that for the purposes of not only this hearing, but my preparation for trial.

MR. LECLERE: And, I'm going to object, Your Honor.

THE WITNESS: I -- I --

MR. LECLERE: That is --

THE COURT: That's --

MR. LECLERE: -- improper. He has not subpoenaed

about.

THE COURT: -- this is not a civil case --

MR. LECLERE: Thank you, Your Honor.

THE COURT: -- for starters.

Q (By Mr. Christian) Are you saying that the FBI has endorsed your product?

A I'm saying that we have a relationship with the FBI of which I'm not going to get into the specifics of what we do with the FBI.

Q So the answer is, "I'm not going to tell you"?

MR. LECLERE: I'm going to object (indiscernible).

THE WITNESS: The answer is --

THE COURT: It's improper; I get it.

MR. LECLERE: Understood, Your Honor.

THE WITNESS: I -- I can clarify just why I answered that. The way the FBI is a very large organization. If you're asking me if the FBI as a whole has endorsed our product, there's just no way I can feasibly answer that. I can't speak for the FBI. I can tell you that we are engaged with the FBI. That the FBI is one of our customers, and I'm not going to get into the details of what we do with the FBI.

Q (By Mr. Christian) Have you developed any other software other than TraX?

A Yes, we -- kind of going back, we talked earlier about the drone detection. We had a pretty significant suite

or portfolio there, if you will, of software that was developed.

Q Do you have any patents?

A No, we do not patent any of our stuff, simply because we don't want to disclose how we are programmatically doing the things that we are doing.

Q You said that we have done drive tests and all this to determine its reliability. Who's we?

A So as a company, we own, I think, we have four drive test scanners now that anybody, and the criminal justice practitioners can call and request. We will send you a drive test; we usually overnight them. And you can go out in the field and do a drive test, and then you load the data back into our system. So we would be, us, as a company, and then also our customers. I want to say we have -- you don't want me to do the number, but I think we have 12 different customers that also have the drive test equipment themselves, and upload that data on pretty much a weekly if not a daily basis. So we -- we wouldn't be any of our customers or associates that are using this data.

Q You -- there's no journal paper that has ever used this uniform shape to represent sector coverage, correct?

A Not only will I disagree with that, but I would refer you to Vladan's report since Mr. Jovanovic is present today. On the Merritt -- the Charles Merritt case in

California. Mr. Jovanovic actually uses both the horizontal radio frequency plane and the vertical -- or the vertical frequency plane in his paper, if you will, to show distance in space. So, not only is it used in articles, it has also been used by Mr. Jovanovic.

Q What articles has it been used in?

A I think you would be hard-pressed to do some research on radio frequency and not see the radio frequency horizontal plane. I would say what articles hasn't it been used in. The most prolific that I would refer you to is what's called Project BASTA, B-A-S-T-A. And what Project BASTA was, is essentially a -- think of it as coming to terms of how to use different terms and defining terms across radio frequency engineering. So that engineers in Europe are using similar terms to the United States, to, maybe, South America, right? And in this paper, which is a -- a scholarly paper, if you will, the radio frequency horizontal plane is clearly defined and it's used throughout the paper. And that website that I referred you to earlier, the standard.zetx.com, there's probably four or five papers that we actually have a downloadable link, that you can download today and virtually.

So, you know, I can't -- I'm not going to try here and cite thousands of papers for you. But standard.zetx.com has the Project-based BASTA paper in it and you could download it right now and look at it, and you would see the radio

frequency horizontal plane throughout that paper.

Q Has this been peer-reviewed?

A Has what been peer-reviewed?

Q Your algorithm?

A You know, defining how you want to say a peer-review, my answer is always going to be, yes. We have hundreds of customers in the field, because also remember -- in this case, we're using historical records, but we have a live system. So we also have a system that displays this type of information live for law enforcement. And we work with a lot of agencies who do cases like, for the lack of a better term, missing children. And they're looking for a missing child who maybe has a phone, and they're using this system to go out and find that child. And that's been done hundreds and hundreds of times over. It's done today. So, yes, I would say every time one of those cases happen, and somebody uses our system and they actually recover a missing child because of it; that's a pretty good peer review.

Q You know what I'm talking about as far as peer-review. An official finding by a publication that your algorithm is reliable; has that occurred?

A Yes, I don't know that we've had anybody officially look at it. I'm -- I'm -- again, I'm not going to be in the -- the market of pushing a publication on it. If somebody wants to do it, it's out there, they're more than welcome to

-- to peer review it. But the testimony that I'm giving today, I've given it a year ago with Mr. Jovanovic. He's more than welcome to actually test it. I don't know that he has, but he's more than welcome to.

Q Did you contest Mr. Jovanovic's paper in the IEEE journal?

A No, I -- I somewhat ignored it for a number of different reasons. I have -- I'm yet to see Mr. Jovanovic's opinions in this matter succeed in court. A couple of the cases that I've had with Mr. Jovanovic, one of them went all the way to the New York Supreme Court of Appeals and was upheld. So I -- for lack of a better term, I am really not paying a lot of attention to it. It wasn't peer-reviewed; it was simply published. The -- the person that helped publish it is a defense person out of another county, that we've had a lot of cases with. I've seen Mr. Jovanovic actually change his testimony, where he's said he doesn't use the radio frequency horizontal plane. And then I've actually seen him produce documents for the court, where he's using the radio frequency horizontal plane. So, for lack of a better term, I -- I'm just not going to waste a lot of time on it.

MR. CHRISTIAN: May I have a moment?

THE COURT: Yes.

MR. CHRISTIAN: I think we should get to Dr. Jovanovic. I have no person -- more questions for this

guy.

THE COURT: Okay. Redirect?

MR. LECLERE: No -- no, Your Honor.

THE COURT: Okay.

MR. LECLERE: I would ask, to the extent that Mr. Ray is available, if he could remain --

THE COURT: That's --

MR. LECLERE: -- on Webex --

THE COURT: -- that's fine.

MR. LECLERE: -- especially if we have potentially multiple Defense witnesses.

THE COURT: Yes, I -- you only have one?

MR. CHRISTIAN: Just one.

THE COURT: Okay. I do have some questions for Mr. Ray.

Mr. Ray, how did you come up with that formula? That, you know, the --

THE WITNESS: Yeah, so for lack of a better term, we started looking at just the -- the single closest cell site, and we found that there really is no reliable way to predict estimated coverage ranges using just the next closest cell site. We've gone out and looked at as many as ten closest cell sites. And essentially, what we're -- we're trying to do, is we're trying to determine how tower density of the next handoff area is. Essentially, how -- how far do I have to

travel away from one cell site, before I get to another cell site or handoff to another cell site. And that's primarily controlled by tower density.

THE COURT: Oh, gotcha.

THE WITNESS: So over the years -- by -- by tower density, yeah -- so over the years we've tried multiple different versions of this formula, and then double-checked or cross-checked our accuracy with the drive test data. And this is the one that we landed on that gave us the most accurate estimation, based on the drive testing.

THE COURT: So was it, basically, a trial and error process that you would go on the ground and drive around. You would pick a cell -- a cell -- an antenna, and drive around?

THE WITNESS: That -- that's correct, and then we would -- or, instead -- probably a better way to think of it is we would pick ten different antennas, and all of them having somewhat of a different shape because of the -- the density that each is associated with. And how could we break down the differences between number one and number eight, number seven and number six. And that's where, looking at this -- the density and coming up with this algorithm, gave us the most accurate results.

THE COURT: Okay. And so what mathematical principles do you use to come up with that formula?

THE WITNESS: That's the great part, it's actually

very simple. We look at the tower density, which is determined by the cell sites that are within the proximity of the azimuth of the target cell site. We look at the averages of how far away those cell sites are, which is what impacts the density. And then we cross-reference that with our results from the drive test, which is that .97 factor.

THE COURT: Did you consult with any engineers -- radio frequency engineers about your formula?

THE WITNESS: Not specifically on the formula. We have consulted with a lot of radio frequency engineers on the shape, if you will, of how we use it, and how we're sizing it. There are a handful that are aware of the formula. I've worked with quite a few engineers, specifically with Rohde & Schwarz, where we've demonstrated what we're doing. There's actually an appetite to replicate this in Europe, so I've worked with the engineers at Rohde & Schwarz to actually discuss how to do that.

THE COURT: What radio frequency principles are you relying on to -- for -- to support this algorithm?

THE WITNESS: So the -- the -- the best one that we are relying on is just a simple line-of-sight, what I would refer to as free space. If I am directly positioned in front of an antenna and I have line-of-sight to that antenna, based on where other cell sites in the area are at, I can start to get a determination of which one is going to provide the

strongest signal. And that is the -- the primary theory that we are behind, is that we can actually estimate that distance. Now, there's going to be times where topography comes in, and I -- I think this is probably an important piece. We're relying on some very basic principles to give an estimation.

In this case, if I was asked a year ago or six months ago or whenever it happened, to say, "Hey, could this phone had been here at this time?" This is not how I would do this, just so we're all clear. I would get equipment. I would drive out in the field and I would do a drive test. And I would have unequivocal data showing my testimony today is that, when this device is in this area, this is where it's at because of, here's all the data I have.

The principles we're talking about today is how do we estimate a general idea, or a general distance from cell site before we're going to see a handoff.

THE COURT: Okay. And what engineering -- radio frequency engineering textbooks, treatises, publications do you find this principle of line-of-sight?

THE WITNESS: It's well-documented in many. Again, I'll refer to the Boston one just because that's the one that we have publicly available. But that -- that's a very well-known principle. It's in most any radio frequency theory that you get into. That's one of the biggest things that they look at why topography is so important, is that I could be standing

on one side of the building and not have line-of-sight to a cell site on the other side of the building, and simply walk around the corner and connect to that cell site. So it's a well-known, well-documented principle.

THE COURT: Okay. The -- the other components of your formula, average distance and you divided by .97. Why .97? Where do you derive that figure -- that denominator?

THE WITNESS: Right. So, you know, I think it's important. There's two ways that we can come up with this algorithm, right? There's one way that we could sit down and we could review all the texts and all the -- the known scientific principles of radio frequency, and we can try to figure out what is the best way to approach this. Or we can do more of a data-driven approach, and that's the way that we did it.

So what we did, is we mapped every cell tower in the United States, and we have 3,000,000 drive tests. And we compare that data to say how can we represent what we're finding in our drive test data, across all 50,000,000 cell sites we're seeing the United States, if it's just an estimation? If we use 0.96 or 0.95, we start getting too small. And we find out that a lot of our drive test data is showing that the drive test scanner is connecting to that cell site outside of our -- our shape, if you will. If we go to any (indiscernible), we start to get these enormous rear loads

and side loads that never conform with the drive test. And trust me, we started at like 0.87, we've gone up to 1.6, trying to find out which one may represent drive data of the test.

THE COURT: But I -- I -- what I -- Mr. Ray, but I still don't understand is what the denominator represents. You're just giving me figures that mean nothing. So what does the denominator on your equation represent?

THE WITNESS: Well, it represents the most accurate number to replicate a drive test. If you take the -- the -- the formula that I'm giving you and you times that average by 0.95. And then you run that across our 3,000,000 drive tests, you're going to find that the shape is too small. We have drive test data that shows that we're not estimating it large enough. So we start to increase that number until we can actually mirror what we're finding in the drive test.

THE COURT: So is .97 a constant?

THE WITNESS: Yes.

THE COURT: And what is the constant? In -- in other words, let's take, for example a very famous formula, right? E = mc2, in which c is a constant and it stands for the velocity of the speed of light and you square it, right? It's Einstein's very famous formula. There were, of course, you know-- there's a lot of mathematical theory -- theoretical physics to derive the value for c, right? In a vacuum, it

travels at a certain speed and nothing, so far as we know, can exceed the speed of light.

I don't know where you derive your .97. What is the constant that it's representing, other than it seems to be what it gives you the best results?

THE WITNESS: Right. It's -- it's a data-driven number, that when we take 3,000,000 sample sets of data and we use the .97, we find that we can most accurately represent what we're seeing in drive test data.

THE COURT: Do you not see how that's problematic, sir?

THE WITNESS: I do not --

THE COURT: Okay.

THE WITNESS: -- because -- because we can replicate it. We can go out in the field and we can test it. Anybody that's in the courtroom today could go out in the field and test it. It's a specific number that can be tested and it is tested daily, and is found to stay reliable. So I -- I don't see how it's problematic.

THE COURT: Okay. And so under what radio frequency principles are you basing -- so there -- there are no radio frequency principles upon which you base the denominator, .97?

THE WITNESS: No, we're -- we're basing it on the data that has been collected through drive test; it's a data-driven number.

THE COURT: Okay. Any follow-up based on my questions, folks?

MR. LECLERE: One moment, Your Honor.

No, Your Honor.

THE COURT: No? Okay.

MR. CHRISTIAN: Thank you, Judge.

THE COURT: Mr. Ray, I mean, I don't know if you can stick around. The Prosecutor sounds like he wants you to stick around.

MR. RAY: Okay.

THE COURT: All right. Can we take a short break? I just need to.

MR. CHRISTIAN: That's fine.

MR. LECLERE: Yes, Your Honor.

THE COURT: And we -- we may --

(Court and Clerk confer)

THE COURT: Okay. We'll take a short break.

DR. JOVANOVIC: I'm sorry, how short is the short?

THE COURT: Five to ten minutes.

DR. JOVANOVIC: Okay. Thank you.

THE COURT: Yes, we'll be back.

(Requested portion of proceeding concluded at 10:23 a.m.)

CERTIFICATE

I, Julia Oketch, certify that I transcribed this record from the digital recording of the above-entitled matter, which was heard on August 26, 2022, before THE HONORABLE JUAN VILLASEÑOR, in Division 3B of the Larimer County District Court.

I further certify that the aforementioned transcript is a complete and accurate transcript of the proceedings based upon the audio facilities of these CDs and my ability to understand them. Indiscernibles are due to microphones not working properly, excessive noises or muffled voices.

Signed this 17th day of October, 2022, in Longmont, Colorado.

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