

Webinar Transcript - Connected Cars for Law Enforcement

Today's webinar is *Connected Cars for Law Enforcement*. It's presented by Andrew Vallee. My name is Michael Kalmbach I am a program manager at the National Criminal Justice Training Center of Fox Valley, and I'll be moderating the webinar today.

And this webinar is provided under a grant awarded by the Bureau of Justice Assistance, BJA, which is part of the United States Department of Justice. The opinions, findings, conclusions, and recommendations expressed in this program are those of the authors and do not necessarily reflect the views of the National Criminal Justice Training Center Fox Valley Technical College or the Department of Justice.

Next, I'd to present today's presenter. Andrew Vallee is an associate at the National Criminal Justice Training Center. Andrew has been a special agent with the Tennessee Bureau of Investigation since 2014. He is assigned to the criminal investigation division cellular analysis survey team.

Prior to joining TBI, Special Agent Vallee worked as a detective for the Metropolitan Nashville Police Department. He has worked in law enforcement for 18 years, has been a law enforcement instructor since 2004. He currently is a member of the Scientific Working Group on Digital Evidence. And thank you, Andrew, for doing this presentation today, and it is all yours.

Yes, sir. Thank you. So we'll just jump straight into this. We got a lot of material to get through. The good thing is you don't have to write all this stuff down. I'm going to give you a link at the end to a share drive that'll have a copy of this PowerPoint, minus sum of the case study. But most of the materials will all be included in that PowerPoint, as well as search warrant examples and other materials that you may find useful.

So some of the learning objectives for this webinar is being able to identify the types of data that is available from connected cars that are out there today and being able to learn the difference between network connected cars and vehicle forensics. Those are two completely separate things. We're going to talk about both of those today and how each of those can uniquely help us in law enforcement.

Students will be able to query certain vehicles to be able to determine their connection status to various service providers. There are some online tools that we can use to determine if they have service with AT&T or Verizon or T-Mobile, the car itself. Also, we'll briefly talk about drafting legal process for extraction of vehicle data. And, finally, learn some resources and tools that can assist you during your investigations.

So to start with, where do I get vehicle data from? When we talk about the internet of things and all these devices and apps that you see on the screen here, everything being connected to the internet today, the same thing applies to vehicles. Just like you would have a thermostat or a camera or a lock that's all connected to the internet to be able to provide functionality to its users. The same applies with a car, and it can provide a lot of additional investigative details that can help us during our investigations.

So just like the devices in the previous slide, they're all connected to the internet. So our vehicle, just like I just said. So because those vehicles are connected to the internet, we can possibly track those and possibly type information IP information from those particular vehicles.

So when we look at the big picture here of the internet of things and how everything is interconnected-- so you could have something set up for whenever you get up in the morning, and you tell your Alexa that you want to turn on the lights and start the coffee machine. But it could also start your car and have it warmed up for you by the time you get out there.

So it knows whenever the user starts their coffee pot in the morning that also go ahead and start the car and set the heat to 70 degrees. And so that's the kind of convenience that is kind of intended behind these connected cars, which we can then use to our advantage to show location information of where somebody was or what they were doing at a particular time.

So there are six main sources of data from vehicles that we've identified. There may be a few other ones out there, but these are the six main sources we're going to talk about throughout this webinar. And the first one is going to be connected vehicle services. These are the type of services that are provided by the manufacturers to specific makes and models of vehicles. We'll talk more in depth about these here shortly.

We also have third-party vehicle data, such as from a to-the-note-type place, from a car insurance company that may be tracking the vehicle with connected cars, things like that are third party. We also are in Wi-Fi capable vehicles, which are different than the first category we talked about.

These would have a Wi-Fi access point directly in the car where that everybody in the car would have Wi-Fi to be able to utilize when they're taking a trip or driving down the road. And those particular vehicles connect to a cell site and sector, which we can then get that information and locate a vehicle that way as well.

The next category is going to be the vehicle event data recorder, also known as the black box. This will record all the data from a crash, also known as a crash data recorder. We'll talk in depth about this as well. Not a whole lot. This class is not really focused on vehicle event data recorders. It's more on the connected access aspect of it. But we will briefly discuss this.

And then we'll have vehicle digital forensics, which is the infotainment system in the car about what you can do to exploit that data to your benefit as well. That does require having the actual car in your possession versus some of the other ones that we talked about previously, you don't necessarily have to have the vehicle. It could be the vehicle is on the run or is missing. But this is going to require having the actual vehicle.

And then, finally, the sixth one is going to be the vehicle video recording systems and devices. More and more vehicles out there today are coming with security systems that record video and audio or all around the car. And those can definitely have some great data for us in our investigations, and we'll talk about that as well.

So to start out, we're going to look at connected vehicle services. And as far as IoT and in-vehicle services, what allows in-vehicle services to work when you push the button? So when you press that OnStar button, how does it connect to an operator at OnStar? Well, in the end, it is ultimately using the cellular network as the backhaul to be able to connect you with that operator.

So there could be two ways that you could track a vehicle. You could be doing it by OnStar who could use the GPS inside the vehicle or you could also track it through the cellular connection that's going on between the car and the OnStar system.

So what does this offer you from an investigative perspective? It can give you very precise, detailed location information. It can give you very precise information about the vehicle itself, about what is it doing, how fast is it going, where is it at right now, and all kinds of other information that we'll talk about more throughout this class.

And how do we get data from these different services, which is what we're about to get into? So I'll go ahead and apologize because there is no easy way to get through this first little section where it's basically I'm just showing you slide, slide, slide, because it's all the different providers. This will all be in here in your PowerPoint for you to have to keep so you can reference back to these in the future.

But I promise, once we get through this first little section, it'll get a lot better. And it won't be just me reading a slide. So just bear with me here for just a few minutes. So to start with, we'll look at Acura. They have the AcuraLink System for the connected car. And that's going to be in any 2019 and newer vehicles. So when you're referring back to the slides, in the right hand corner, you'll see the make and the model. And then it'll tell you what years. So that way you would just know right off if a car is even capable or not. That way, that you don't wait.

And I've done my best to put links on all these slides, but these do change constantly. And these manufacturers are not great at giving out this information to law enforcement. So some of them may not have great information online. We've done our best to research and get you what we can on these connected manufacturers.

So moving on to Volvo. They have ALFA Connect, and they're going to be in 2018 and newer Volvos that are out there. Audi is going to have Audi Connect in the 2016 and newer vehicles. Their website is down there at the bottom. They'll give you some more information on what all they offer and they can do.

BMW Connected Drive is going to be in the 2016 and newer vehicles. Ford utilizes FordPass, and it's going to be 2018 and newer. And just throwing this out here. If you have a Ford vehicle in this age range that's involved in a crime, it's pretty much going to be like a golden ticket because there's going to be a ton of information that you can get from Ford vehicles, especially in their infotainment systems, which I'll show you a case study involving a Ford pickup truck that-- from BERLA. And we'll look at that in depth as well.

Honda utilizes HondaLink in all of the 2017 and newer vehicles. We also have Hyundai BlueLink in 2012 and newer. They're one of the first manufacturers that started utilizing this connected car type system back in 2012. Infinity has the Infinity InTouch system, 2020 and newer. Jaguar, InControl, 2016 and newer. And then Land Rover, Land Rover and Jaguar, Jaguar however you want just-- [AUDIO OUT] --company. So that's why you see both of those as called InControl. Lexus is going to have Lexus Link, and it's going to be in the 2020 and newer vehicles as well. Lincoln utilizes Lincoln Connect in the 2018 and newer vehicles.

Maserati is a fairly new one that has come out called Maserati Connect, and that's going to be in the 2021 and newer vehicles. Mazda 2021 and newer, Mazda Connected Services. Mercedes Benz is going to utilize the Mercedes Me Connect 2015 and newer. So they've been around for a while as well.

Mitsubishi is also brand new. We don't have a lot of information about this one because it just came out last year, 2022 and newer. But that's going to be the Mitsubishi Connect. NissanConnect is going to be 2020 and newer. It's going to utilize the Sirius XM system, which we'll talk more about in just a couple of slides going forward about what that means.

OnStar is going to be GM vehicles, which is going to include Buick, Cadillac, Chevrolet, and GMC, 2014 and newer. So they've been around for a long time. This website I have on the screen is a really good resource. It will tell you all of your first responder information, their contact numbers for law enforcement, what all they can and can't do. It's a really good resource, probably one of the better ones of all the ones we're looking at here.

They are very helpful whenever a vehicle does have OnStar. But if they do not have OnStar turned on, they're not going to be able to help you. We have to go a different route, which we'll look at that shortly. Porsche utilizes Porsche Connect, 2017 and newer. There's not a whole lot of information out here on this one either for me to give you. But you can check out that website there if you want.

So looking at-- whenever we say, Sirius XM, it does not mean Sirius XM Satellite Radio. We cannot track the satellite radio system. That's a one-way push from a satellite down to the vehicle. So there's no response from the vehicle up to the satellite. So that's why you can't track a SiriusXM Satellite Radio in a vehicle. But there is another system that is called Sirius XM Connected. They are the same parent company, but they are starting to get online with more and more manufacturers.

So right now, they have Chrysler, Dodge, Fiat, and Jeep. They also just got a contract for Nissan that we just talked about. So they'll be added to this slide as well. But more and more companies are going to Sirius XM to let them handle this part of the connected car aspect to get it away from the manufacturers. That way they can save money on this in letting another company do that.

So with that being said, Sirius XM Connected is great for law enforcement. They are very helpful. If you have a stolen vehicle, they can track the vehicle. The location data is very accurate. We have utilized them in the past several times, most recent one was on a murder case in which a stolen Jeep Grand Cherokee from the victim. And we were able to pinpoint that vehicle right in the middle of a field. So it took us right to it. So that was great from that aspect.

The one thing that I will tell you as a warning for law enforcement about Sirius XM Connected is they're great at stolen vehicles, the operators are, because they deal with stolen vehicles all the time. They're going to ask you when you call into the emergency number, have you filed a report yet? What's the report number? Have you entered it into NCIC as stolen yet? What's the NIC number, if you have? They're going to want all that type of information.

But if you're doing something under exigency, like what I was just referring to in that homicide where we had-- we thought another victim was in that vehicle, which is why we needed to track it. The operator had no clue how to handle this situation. She was asking me to go ahead and enter it into NCIC and do all this stuff. And I'm like, ma'am, we don't have time for that. We have somebody who's possibly shot. We already have one person dead, and now we're missing another one that's possibly in this vehicle. And she just couldn't understand what exigency was in this case.

So what I asked to do is ask to speak to a manager, and the manager was able to get me immediately connected to where I get the location update. So if you have something other than a stolen vehicle and you're calling into Sirius XM Connected, just go ahead and ask to speak to a manager. And they'll be able to get you what you need. But very, very helpful in the end.

Stellantis is another company that's starting to come into play. Similar to what Sirius XM connected is, except they are going to be handling all of the Dodge Ram Trucks, 2016 and newer. And it's looking like there may be some more contracts come from Stellantis as well. But they are also very helpful for law enforcement, can help you track a vehicle if it has this capability inside it.

Subaru utilizes the StarLink system, 2018 and newer vehicles there as well. Tesla, 2012 and newer has Tesla Premium Connectivity. If the subscriber has purchased this-- if they have not purchased the premium connectivity, it's kind of hit or miss as to whether you can track this vehicle or not. But there is-- the link at the bottom is a great link. It has a lot of resources on there that you can utilize.

Just click on the government and law enforcement inquiries, and it will tell you how to get in touch with Tesla to be able to track one of their vehicles. We also have Toyota Connected Services in their 2020 and newer vehicles. Volkswagen is 2020 and newer. They call theirs Car-Net. There's a website at the bottom. And then we have Volvo Connected Car, 2018 and newer as well.

So I know we just flew through all that, and [AUDIO OUT] so you have those as a reference in the future rather than talking to death about those. So we'll start getting into more in-depth part of the webinar.

So we'll next talk about third party vehicle data. So there's telematics driving usage-based auto insurance. So to start off, I'll show you this quick, little video that's kind of funny, but also drives home a point here.

[VIDEO PLAYBACK]

[AUDIO TONE]

So, Kim, you going for a big Drive Safe and Save discount?

Yep, using the app, I've been quite vigilant.

[PHONE VIBRATES]

Sharon says step on it, the meeting's started.

OK, write her back. Dear Sharon, don't mess with my discount.

Faster, mommy. I got to go to the bathroom.

I do too, honey. But we're going to hold it for mommy's discount.

[WOMAN MOANS]

Easy, easy--

But you're in labor.

Don't mess with my discount.

[CLEARS THROAT]

Get a discount up to 30% with Drive Safe and Save from State Farm.

[AUDIO TONE]

[END PLAYBACK]

So in that video, we're talking about usage-based vehicle insurance. And it has one of these little devices that will plug into the OBD 2 port. But we have several different ones out there. In fact, there are so many I started to list them in this PowerPoint, and it just got to be so many that it wasn't worth it.

So-- but most of the different insurance companies are going to have something like this where that you physically install the device in the vehicle, which would contain a GPS chip to know where the vehicle is at and then also be able to pull telematics data out of the vehicle as to how fast it's going, how many G-Forces are being applied, seat belts are connected, things like that that the insurance company cares about.

But you could, technically, serve a search warrant on one of these companies and get that data if it's still in their possession. And those devices just simply plug into this OBD 2 port, which is underneath-- typically, underneath the driver's side dash. And that will monitor speed, image parameters, engine parameters, emissions, and so on.

There's also vehicle insurance that's available on smartphones. So you can download an app and when you get in the vehicle to start driving, it knows that you're driving based on the accelerometers and the JavaScript, things like that that's inside of the phone to know that a vehicle is actually moving. So this can also transmit data back to the insurance company about where a device is at a particular time. So either way, whether it's one of the plug-in devices to the OBD 2 port or if it's a smartphone, you still should be able to get location data from the insurance provider if they have this particular service.

So how do you find out who the insurer is? Well, you can check with the bank or the financing company to see if they have that. Typically, they're going to ask you for who your insurer is whenever you purchase a vehicle and finance that. Check with your state DMV. For example, in Tennessee, we are now requiring persons to show proof of insurance whenever they get their vehicle registration.

It goes directly into the state system. So whenever you run a vehicle by VIN number through inlets, it will return back that you have Nationwide, Progressive, Allstate, State Farm, whoever it may be will be returned directly on inlet. So that would be an easy way for you to figure that out as well.

And then, finally, another way to do this is through the National Insurance Crime Bureau, and their website is on there for you. They have a system that they can look up all member companies and tell you who somebody has insurance with and what type of claims that have been filed in the past. You can also get access-- direct access to that system by signing up through NICB. It has a wealth of information in there. If you're not familiar with this, I would definitely go to this website, read about it, and look at signing up for access, which is completely free to law enforcement.

Andrew, we have a couple of questions.

Yes, go ahead.

One attendee is asking about Kias. In your first block where you gave the resources for the different cars, does Kia have a resource?

I did not find one whenever I was looking through it. Now that could have changed prior to the conference-- or after the conference happened down in Orlando, but I'm not aware of one as of right now. If somebody is, feel free to throw it into the question and answer for Mike. We'll be happy to share that with everybody. But I'm not familiar with one as of today.

OK. And the next question is, is any of the data that you're talking about located on the person's phone?

So that's kind of a loaded question there. But yes, any data could possibly be stored on the target device. Whenever they have an insurance app going, there could be some artifacts that could be recovered forensically, with digital forensics from that device. But mainly, what I'm talking about here is the data being transmitted back to the insurance company and then us serving a subpoena or a search warrant on AllState or Progressive or Nationwide and getting that data back from them directly, which they store because they do a couple of things with that data. Depending on who the company is, they use it to set your rates, obviously, because that's what the whole purpose behind the app.

But then, secondly, they're also using that to sell off your information to advertisers. Where have you been? How do you drive? And where do you go? What stores do you go to? They can extrapolate all that from the data that's transmitted and sell that information off. So they're storing that, in most cases, on a server level, at the insurance company that you should be able to retrieve.

OK, great. In regards to the question on Kia, Scott, one of the attendees, put some information in Q&A for the audience with a phone number. Not a website, but a phone number and some additional information. So you should be able to see that.

And then the next question is, what information about a vehicle is needed to call into these connect systems? Is it the VIN number or is it additional information that you need?

Sure. To start off, shout out to Scott. Thank you for throwing that into the chat. I will pull that out when the class is over and incorporate that into this particular PowerPoint. And so to answer the question that was just asked, typically, you're going to need the VIN number in order to be able to get information because the manufacturers are not going to have the license plate number on file because that's issued at the state level. So they're going to need that VIN number, typically.

Now there are [AUDIO OUT] shortly where you would need the IMEI number, but we'll talk more about that in just a second.

And there is a comment by Joseph that there is-- in addition to the Kia information that Scott put in, there is Kia Connect which is used, which is called UVO link. It allows them to see where the vehicle is located, remote start, remote lock, unlock, and send navigation routes from their phone to the car. And with that, that's all the questions so far.

Perfect. Perfect. Thank you for also putting that information in the chat as well. I will incorporate what you put in there as well. That's the thing about these particular technologies is they are-- they're new, but they're not-- they're not brand new, but they're constantly evolving. And these manufacturers are kind of tight lipped about this information. So the more that we can all throw together--

If anybody else knows of any other manufacturers out there that has some type of connected service, please throw that in the chat because I take all of these seriously. And I throw them in because all it does is helps all of us in law enforcement in the end because we will put that into this PowerPoint. So I really appreciate everybody's input.

So one of the next things, third-party holders. We'll talk about lien holder and tote-the-note trackers. Many of these lien holders will place a discreet vehicle tracker on a vehicle to recover them in case the person stops paying for that vehicle. The difference in these trackers, it's kind of a down to it, is they only check in every 12 to 24 hours.

They're not recording live data if somebody's driving down the road showing you everywhere that somebody's been because in the end all that these lien holders are really interested in is, where is the car at a certain time of day so that we can send a tow truck out there to recover it? So it may only be once or twice a day that you can get this information.

I found in the past that most of the time these lien holders are very cooperative with law enforcement. Most of you can probably figure out why that is because if they know that law enforcement is after somebody and we arrest them, then they can go back and take that vehicle and sell it again and keeping all the money they've already got from this person and sell it to somebody else. So most of the time they are very cooperative and will help us, even with that legal process. I think that [AUDIO OUT] --they're just able to give it to us.

Another-- [AUDIO OUT] data is if somebody is using a rental car. Most of these large rental car companies have some type of vehicle tracking capabilities that they can help you with. Again, these may not be real time, like a track [AUDIO OUT] on a car, maybe only every 12 to 24 hours, but they're often very, very helpful. I've also found that airport police, wherever you're at, can be very helpful with some of the local contacts for the rental car companies that may be able to give you some quick information. If you have an exigent situation going on where you just need to get some information right now, a lot of times, they are very, very helpful with that.

I've also thrown these into the PowerPoint, which you'll get a copy of these as well, the different contacts. And you'll notice that almost all of these have a 24/7 law enforcement-only number, which I've put on the screen there for you. Hertz, Dollar, and Thrifty are all [AUDIO OUT] company underneath the Hertz Corporation.

Budget and Avis are one parent group under the Avis Budget Group. And they also have a 24/7 law enforcement number there at the bottom. And Enterprise, there under the EAN Holdings is their parent company name, also have a 24/7 law enforcement number. I have dealt with Enterprise in the past, and they've been very helpful.

So that's why I had a little bit more information on Enterprise down here at the bottom in that they only retain GPS data and tolling transactions for a 14-day period. And then it's deleted. It's non-recoverable once it's deleted. But they will honor a preservation letter. If you can't get a search warrant today, you can go ahead and fill out a preservation letter and send it to them, and they will preserve that GPS and tolling data.

Now the other two parent companies I talked about, they should technically be able to give you GPS, data, and toll transactions, but I do not have a retention period that I can tell you in this class because I don't know what that is. But I can tell you that Enterprise is 14 days.

And, Andrew, couple questions.

Yes. Yes.

This question about U-Haul. Do you know if they have tracking capability?

I believe that they do have trackers on there for the purposes of if somebody does not return that vehicle, similar to what the rental cars are. But I have not personally dealt with them.

OK. And on most of these trackers, are they battery powered off the car's battery or is it an independent source of power for the tracker itself?

So on most of these types-- let me go back to-- you see one of them down here in the bottom right-hand corner of the screen. And what those do is they will plug directly into the electrical system. So you may not see connections at the battery because they're one of these to be discrete where somebody can't just open the hood up and pull these wires off and it's no longer working.

So, typically, what they'll do is they'll find a positive and a negative somewhere that's hidden inside of the car, under the car, wherever that may be, and they connect these trackers directly into one of those lines where that nobody knows where it's at. So it's going to be very discreet. That way nobody can just jerk it off.

And the final question we have now might be more complicated. If you had a Title III wiretap warrant, could you remotely listen to-- turn on the microphone in the vehicle or do some more live tracking related to a Title III?

So on a Title III, I don't know of any way that you could open up the microphone on the vehicle to be able to listen in real time like that. I've never heard of that being done. I don't think that it's-- we deal with wiretaps as well, and I've never heard of that being done or even if it's capable of it just because of the technological issues that go along with wiretaps, which are their own animal in and of itself.

As far as-- really, if you're wanting to track a car in real time and you don't have GPS capability on the vehicle for some reason, the next best bet is going to be to go with a pen register PRTT order, getting live cell site locations of where that vehicle is at.

But I really don't see the need of going to the level of a wiretap because I don't think it's going to be beneficial because you're not going to get anything other than cell sites and sectors, from what I understand.

A follow-up question to the question of battery and whether it's always powered is, does that mean that the GPS is transmitting when the car is off?

So what these-- there are several different types of trackers. Like this one here, law enforcement vehicle trackers, these are typically battery operated. This one we would just take and we would go underneath the car and strap it with magnets to somewhere on the frame.

Now we don't have time to attach these to a power source in the vehicle, so they're going to be battery operated. Versus the ones that are installed by a lien holder or a car rental company, those are typically not going to have batteries. They're going to have just connected to the 12 volt [AUDIO OUT] --means that it would only really activate whenever that 12 hour or that 24-hour mark came up.

So it's not going to be [AUDIO OUT] --pulling GPS of where that vehicle is at. It's only-- if it's programmed to pull the location of the car at midnight. So whenever midnight comes around, it's going to turn on the GPS, get a fix of where it's at, turn on the cellular modem, transmit that location out to the lien holder, and then shut itself back off.

Now it doesn't shut itself completely off, but it shuts down all those extra things that are going on, such as the modem and the GPS chip, things like that that it doesn't need because it's only checking in once a day. So that's the only time you'd be able to get the location of that particular vehicle. Any other questions in there, Mike?

Nope, that's it for now. Thank you.

OK. So the only other thing I'll mention about law enforcement vehicle trackers is if you're in the criminal investigative side and you're working on a case that you may need location, be sure to always check with your surrounding law enforcement agencies or your drug investigation unit within your department because they may have put a vehicle tracker on your suspect.

These bad guys commit more than just one type of crime. So if they're actively tracking that vehicle, that could be a gold mine for you. Which we've had this happen in the past as well where the drug investigation unit was tracking the vehicle on a drug trafficker who ended up committing homicide. So we were able to get some location data from them because we just started asking around if anybody had a tracker on this particular vehicle.

So now getting into the stuff that I really love is cellular-capable vehicles. This is what I do on a daily basis is tracking devices based on their cellular capabilities, learning what sectors that they connected to, things like that. Well, you do the same thing with a car.

So one of the first things that we have to do-- this is a really important slide whenever you get this copy, this PowerPoint because this is kind of going to be your step-by-step guide on how to see if a vehicle has cellular capabilities.

So to start with, looking at these different manufacturers, based on the year models you see on the screen, if it's a yes to one of these on the screen, then you're going to go to the next step here because all of those particular makes and models utilize AT&T. You're going to go to att.com/plans/in-car-wifi/. And once you get there, you're going to go down and click on this Get Started in the bottom left-hand corner of your screen.

That's going to pull up a place to put in the VIN number, paste and copy your VIN number in there, hit Submit VIN. And you'll notice now on the left-hand side, it says that your 2022 Ford F-150 has built in Wi-Fi hotspot. So what that now means is that you can take that VIN number and go to AT&T and be able to track this car just like you would a normal cell phone.

So you could get locates-- real-time locates or pings, however you want to call those. You can also get cellular data records that will tell you the cell site and sector they were connected to as they drove down the road and be able to track the vehicle that way.

So if your vehicle was not on the previous screen that we looked at, it is still supported by AT&T. But you're not going to be able to run it by the VIN number directly to confirm the cellular connectivity. You're going to have to get the MC or the IMEI.

That's not always very easy to do. I understand. Sometimes, you could possibly get this from the dealer to have the dealer go back and look through their paperwork to see if the IMEI or the MC for the vehicle itself is in a copy of the dealer's paperwork. That's not the quickest way to do it, but that's maybe one of the only ways to do this if you don't have the actual car in your possession.

Now if you have the car in your possession, you can get the IMEI or the MC directly out of the car. But if you have the car, you're really probably not needing to track all this like this at the time. But here's the list of everybody that is still with AT&T.

These manufacturers are supported by Verizon Wireless and to provide their cellular connectivity. You'll notice here we have Mercedes-Benz, 2018 and older. So all the other slides you've seen have all said like 2012 and newer and so on and so on. But with this slide, Mercedes-Benz initially had a contract with Verizon Wireless. So if it was manufactured prior-- 2018 or prior, then it's going to be Verizon. If it's 2019 or newer, it's going to be supported by T-Mobile, along with BMW and Volkswagen.

Unfortunately, there is no easy way to track any of these vehicles on Verizon or T-Mobile, either one of those two slides. You're going to have to have the IMEI number that's assigned to that vehicle. You're not going to be able to track it back with the VIN number, like we could do with AT&T.

Now the AT&T site that I showed you, just keep in mind that that site may not always work. That is not a law enforcement site. That is a site to be able to sign up to get cellular service in your vehicle. So we don't know how long AT&T will keep that around. So we kind of keep this hush-hush within the law enforcement community because it's always a game of cat and mouse. They find out that we know something and they change it. So just keep that in mind. It may not always work there for you.

Andrew, a couple of questions in this area.

Yes?

They're all kind of the same general type of question. Subscription versus non-subscription expired subscription, does a subscriber need to be subscribed to AT&T, for instance, in order for them to be tracked? If they were subscribe and now it's canceled, can they still be tracked? Questions along those lines.

So the amazing thing about this part of it-- so if you're talking about the connected car services, like OnStar, the answer to that one is that if they don't have a subscription, you can't track it. That's just how it is. They're not going to do it. Which doesn't make a lot of sense to us on the tech side because if I get into my Chevrolet pickup in the parking lot and I press-- I don't have OnStar connected to my vehicle.

But if I get in there and I press the OnStar button in my vehicle, it will connect me with an OnStar operator to be able to tell them, hey, I want to get service in my vehicle, which leads us to believe that it's always connected to the network because of the capability of doing that.

But OnStar and the other ones will tell you that, oh, we can't track that vehicle because they don't have a subscription. Whether that's right or wrong, it's a questionable. But as far as on this side of it, with the cellular side, if it has a modem installed in the vehicle with a SIM card installed, I would say about 90% of the time, even if they don't have a cellular capable-- a cellular activated vehicle, the capability is there, they can still track it. It still keeps connectivity. A lot of the--

So to go back here and just look at all these different manufacturers that have cellular connectivity. Let's say that they give you a 3-month trial of cellular in the vehicle and Wi-Fi access point in the vehicle and you use that 3 months. You decide not to renew it. I don't want to pay that much money for it. So you don't renew it. Well, you don't get charged for it.

But on the back end, what's happening is that a lot of these manufacturers are still paying the cell phone bill for you because they want to be able to pull data out of the vehicle, such as when was the last oil change? Where have you driven to? How many miles are you driving per day? What locations are you visiting? All of that kind of stuff because and that's big money for advertising to be able to sell off information about you.

And if you look through the fine print on your contracts, a lot of times, that language will be in those contracts that you're giving them permission to continue to track your vehicle through the cellular connectivity port on the vehicle, even if you terminate service. Unless you provide specific written objection to that, which most nobody does because you don't read all that fine print that's 30-page long contract. But that stuff is in there.

So long story short. I know I've talked a lot just then. But moral of the story is that, yes, a lot of times, we can still track the vehicle, even if they don't have an active subscription, which is great news for us on our end. Mike, was there any other ones or did I cover everything with that?

I think that covered it. There was another question. How do we get the IMEI for a vehicle device?

That's where it gets a little tricky. And the only real way to do that-- well, the easiest way, obviously, is if you have the vehicle, you can get it directly out of the car. But let's say you don't have the vehicle. Well, if you can't resolve the IMEI number back to a vehicle based on the VIN number because short of those AT&T ones I showed you at the beginning, you're not going to be able to do that.

So then what you need to do is start sending subpoenas in to the different carriers or if this is under exigency, making an exigent request as well. Let's say that-- let me just use this example to try to make this a little easier to explain.

Let's say that Mr. John Doe murders his wife. He leaves his cell phone sitting at the house. So we can't track his actual cell phone. But you know that Mr. John Doe has a 2022 Ford F-150 pickup truck, and he has fled the area in that truck and we put out BOLO's. We can't find him, but we want to be able to track him.

So what we can do is go to-- if we need to make an exigent request or issue a subpoena, whichever route you're going to go based on the circumstances, is start doing request based on the address, based on the user's name. We know his name is Mr. John Doe. We know where he lives at because he killed his wife and we're standing at the crime scene.

We probably should know his social security number as well. We can look that up. So we can run that by name, address, and social through the different cell phone companies because if he has a postpaid phone, meaning that he pays after the fact, then he has credit, essentially, and he had to have given his social security number out.

Now if this is a burner phone or a prepaid phone, that's a different story. But let's just say that it's Verizon Wireless. So we send them his social security number. They're able to say, oh, yeah, we see his handset on here for his actual iPhone. But we also see there's another account-- another number attached to this account [AUDIO OUT] --car.

And then that's whenever you tell them, we want to go up on that vehicle and start tracking where it's at. So that's going to be really the only way to do that, short of having some type of paperwork to get the IMEI from the dealer or somebody like that.

And then there's another question. Quick question, does it cell network, is it contingent upon the vehicle running?

Probably so in the fact that-- it may have a timeout. I don't have an exact answer because every vehicle is different. But the-- it's going to be depending on [AUDIO OUT] --power from the battery, the 12-volt battery, but it's also going to depend on how they have that set up. Do they want it to be able to drain the battery or do they want to just shut that down after 30 minutes of turning the car off?

So it's-- I really can't answer that because it's going to be vehicle dependent.

OK. Thank you.

Still looking at in-vehicle Wi-Fi, we have AT&T Spark, which is this-- you plug this into the OBD 2 port to be able to get power. It also is able to pull vehicle health information, and it also has impact detection. So it can tell if this vehicle's been in a wreck and transmit that back as well. But it also provides in-vehicle Wi-Fi. So if you don't have a connected vehicle with the manufacturer, like we just talked about, which has a hard-installed cellular modem in the vehicle, you could then put this in the OBD 2 port and have the exact same functionality as the ones we just talked about.

Same thing with T-Mobile. They have the SyncUp DRIVE, provides the exact same services. They're not trackable by VIN either. It would have to be tracked by account, name, address, social security number.

MetroPCS, which is also T-Mobile, they have a version of that as well. Verizon has-- it's referred to as Verizon Vehicle, which provides you cellular connectivity, Wi-Fi connectivity, and voice calling all in one single device. You have the device that plugs into the OBD 2 port to provide the actual computer part. And then we have this other piece, it clips on your visor, which provides the cellular functionality to be able to make telephone calls. This would also be searched the same way, by name, address, social security number, because it's not attached to a VIN number.

There's also a lot of other ones out there. There's no way I could possibly cover all those. These are a few examples that you may see in a vehicle. So if you see one of these in a vehicle that you're searching, it might be worth pulling that out, getting the IMEI number of it, and getting historical records to show where this device has been. Was it near the crime scene at the time of your homicide? So if you see one of these, definitely worth pulling out and looking at.

All right. Just briefly talking about the event data recorder, also known as a black box. These only record safety-related data when an event occurs. So you're not going to get a lot of additional information like [AUDIO OUT] --these are typically handled by your highway patrol and crash agencies that deal with this.

One thing I did want to point out, though, is down at the bottom here. Under the US Federal Driver Privacy Act of 2015, it clearly stated that the owner or lessee of a motor vehicle is the owner of the data that's collected on that EDR. So you're probably going to need either consent or a search warrant to obtain any data out of that box because it does not belong to the manufacturer. They made that very clear that it belonged to the owner of the vehicle.

So as far as, what does it record? It's going to record breaking status, speed, steering angle, seatbelts, all this other stuff you see on the screen. It's usually going to include only about two minutes worth of data, and it will not include any type of location data.

So a lot of time on the criminal investigation side, these are of no importance to us. These are only going to be really important on the crash side of the network. So if you're looking at this from a criminal investigation point of view, we need to go with the telematics side, which is what we're about to talk about.

It does take specialized software and hardware to download these devices. Contact your state highway patrol or NHTSA, the National Highway Traffic Safety Administration can provide you with some people that can help you download that data if you need it for your case.

So getting into vehicle digital forensics, which is what we're more interested in on the criminal side. So BERLA is probably the gold standard here because they're really the only company that's providing anything. This is not an endorsement of BERLA, but they are associated [AUDIO OUT] moderately expensive here, \$10,500 to get started and you're training's \$4,500 on top of that. So if you don't have the funds for this, you may want to talk to your state police agency, see if they have the capabilities or a larger agency that may have the system already.

So why do we focus on vehicles? Well, first of all, we may not have [AUDIO OUT] There can be encryption issues as the constant cat-and-mouse game of law enforcement finds a way around the getting to the device, the manufacturer patches that. So we constantly have encryption issues with digital forensics. We can't always rely on cell site data for precise accuracy. With what I do on the CAS team, I can put somebody in a general area of a cell site and sector. But, normally, I'm not going to be able to put them sitting in a driveway of a house. But this system could possibly do that, and BERLA can bridge the gap.

So here are some typical scenarios that have in the past. These are all real scenarios. "I know he drives to Atlanta to get his drugs, but I don't know exactly where he goes." When we arrest him, we can get his vehicle and run BERLA on it to see where he's picking those drugs up in Atlanta.

"The suspect drove off and dumped the body but turned off their cell phone." "Vehicles involved in a hit and run." So those are three examples of where BERLA can really help.

Vehicles hold a vast amount of data. All those different little tiles you see on the screen are different things that BERLA has that we can pull up. We can show patterns of life. We can show specific locations of where a vehicle has been, identifiers, all kinds of information that are out there.

Basically, the infotainment system provides vehicle performance information, your maintenance, it provides connectivity for somebody's cell phone to be able to activate through the speakers and talk through the microphone of the car, things like that.

So here-- I'll stop here for a second. This will be some of the brands that are included. You see there's a lot of the popular ones are in there, such as BMW, Chevrolet, Chrysler, Dodge, and so on. One thing I will point out is that they do provide support for over 14,000 vehicles, but that is constantly changing from day to day. They also are very good-- if you have a vehicle that's not showing support, you can contact BERLA and ask them if they have any type of extraction available in an alpha stage, which is where they're-- they're just now-- that's before you get to the beta testing phase.

And if they do, sometimes, they'll come out and help you with that with something that's not been released out to the public yet, if you have a vehicle that's not supported. But they have tools for that they're working on. It does include all of your-- the package includes everything you need to be able to remove devices from the car, all the different adapters for the different manufacturers. And they'll send you updated hardware as it comes out as well, as long as you're paying your annual maintenance fees.

This is something else I would recommend is this next slide here. Even if you don't have BERLA at your agency, I would recommend downloading the BERLA or the IVE mobile app. It's available in the Apple iOS store, app store and also available on the Google Play store. So once you have this app, you can scan the VIN number off the dash or off of the door, and it will automatically look and tell you if the vehicle is supported and what all is supported. Will it download text messages? Will it download location data, and so on and so on.

So this app can tell you ahead of time before you even bother calling an examiner or trying to find somebody that could possibly download this vehicle for you, this will tell you right there on the spot on the side of the road whether this vehicle--

So getting into this case study real quick. This is a vehicular homicide and a hit and run that occurred back in 2018. Two vehicles, it was a fatal head-on collision with the suspect fleeing on foot. One vehicle was on the wrong side of the road. It was a divided highway. There was roadway evidence the fatal crash team was able to use to reconstruct it. There was a 911 call as well. Call detail records with cell sites and sectors was also obtained, but it is just showing a large general area of where the vehicle was.

Text message content was also pulled. The event data recorder was also pulled. But then the district attorney says, I want more. I want to know where he got on the highway going the wrong way. So, basically, somehow, this vehicle got turned around on this divided highway, which is essentially interstate quality highway, somehow got turned around and started going the wrong way and hit this other victim vehicle head on.

So here's what that vehicle looked like. This was a 2016 Ford F-150 pickup, extensive damage there to the-- this is the suspect vehicle. These are just some shots from the inside kind of showing going up to the infotainment system step by step. So there it is in the dash, start removing the dash panels around it. We're going to take that screen out. And then this is what we're interested in right here, the control module. And there's what it looks like sitting on the desk right before we're going to do the extraction.

And then we take it apart to get down to where we need to to find the particular ports. Now there is very detailed instructions on how to do this step by step. It shows pictures, just like what you're seeing on my screen here, on how to do this on a target vehicle, which makes it very, very easy as well.

So in looking into some of the data here. This is going to be the data about that you enter in about what vehicles involved and the VIN number and things like that. But let's look at the location information, which what we're really interested in. That's what the district attorney wants to know, where did the vehicle get turned around at?

So we see early in the morning that the suspect's friend's residence is where this vehicle is at. All these little blue dots you see are going to be the breadcrumb trail of where this vehicle went. And if you click on any of those blue dots, it'll show you the latitude longitude of where that's at and how fast that they're going. So we know that at this-- at 5:25 AM, the vehicle is not in motion because there's nothing on speed, distance, or bearing there. So it's sitting still.

And then we know that at 5:25, it now starts moving. So we got 9.5 miles an hour. You can see that blue track leaving the suspect's friend's house traveling 38.8 miles per hour driving down the road. It's now up to 62. This is a-- the road that there [AUDIO OUT] --which is a little two-lane road. This is not the controlled access highway.

But here is where it turns into the controlled access highway. Where you see that 111 and the 27, those two highways are going to be controlled access. So that's the overall track. But we'll zoom in and look at this. So what this indicates is that the vehicle was heading southbound, the direction of that arrow. He was going 60.5 miles per hour southbound. Still going southbound, starts to slow down to 32 miles per hour and then makes a U-turn going 1.6 miles per hour.

So whenever we look at this on Google Earth-- or on Google Street View here, this is in the middle of a bridge. And for some reason, he decided to make a U-turn in the middle of this bridge and start going the wrong way. So now we can see he's now heading northbound in the southbound lanes going 33.4 miles per hour. Now speeding up to 57.7, 67.9, and then it hits head on at 71.5 miles per hour where the crash occurred at.

And now you can start to see rapid deceleration because the vehicles have just collided. You also see that there is a hard braking event that occurred at 63.8 miles per hour. So, basically, what the DA was wanting to show was that he was aware enough of his surroundings to slam on his brakes prior to hitting that vehicle, which is what this indicated.

And that's the final resting location of the suspect vehicle after the crash and we're down to 0 miles per hour. And this is the location. About where the X is right there on the screen is where this crash occurred, and you see it's a divided highway right there as well.

So the suspect fled the scene. One of the things that they were worried about was that, yes, it's the suspect's vehicle. But what if he tries to claim that he wasn't driving? Well, looking at the cellular device connection log, it actually logged the suspect's Galaxy S8 cell phone. Whenever he got into the vehicle, it just automatically connected to provide Bluetooth capabilities.

Well, whenever he did that, got in the vehicle, it logs the serial number and the device make and manufacturer, along with the latitude and longitude. So now we can directly put him with his device in that particular location where this crash occurred, based on that data. And that's just the overall track in purple there showing where he went. Just looking at it from a Google Earth point of view, exported from BERLA.

All right. So that was just a real quick case study there. Mike, do we have any other questions on any of that? Just one-- not on that specifically, but earlier it came in. Motorcycles, all-terrain vehicles, snowmobiles, do they have any capability to be tracked?

Not that I'm aware of, unless it's added by the user in the end. I've not seen that come up. I know a lot of people, including myself, I have a tractor. And I'm always afraid if somebody steals it, I'll never find it again. But what I did is took and put an Apple AirTag on my tractor. So if somebody were to steal it, I can look it up on my phone. So it may be worth asking an owner if you've got a stolen vehicle if they have an AirTag or something on it.

But other than that, I've not heard of any manufacturers of any of those type of vehicles putting those on there. But I don't claim to be the know all everything of any of this stuff. If you all know of any of those, by all means, throw them in the chat. And I will get those added to [AUDIO OUT] any snowmobiles or ATVs, stuff like that that has tracking capabilities.

And there's a question that's a case that somebody is working. It's a stalking case that involves a Mercedes and the app that has data about the location information of the vehicle. Apparently, somebody is using the app to track the victim. And there must be some type of restraining or no-contact order in effect. Do you have any experience with Mercedes in the app that they have?

No, but I would say that has to be that you're probably dealing with somebody stealing credentials from a estranged spouse or girlfriend, boyfriend, whatever it may be that they somehow had their username and password to be able to log in. And I would recommend, if they're looking at it from an investigative point of view is getting with Mercedes and getting the IP traffic of one of the log ins that are occurring. You could be able to tie it back to your suspect that way.

And then also telling your victim to immediately change his or her username and password to prevent that stalking from continuing on. But if you're looking at it from a prosecution point of view, you need to get the IP connection logs to show who is logging into that account to be able to track your victim.

OK. Thank you, and that's it for now.

All right. So getting into the last section here is vehicle video recording that's available out there. So many vehicle manufacturers are now starting to include systems within the vehicle itself to protect the vehicle against vandalism or liability, whatever that may be. And even vehicles that do not come with a video recording system may have some type of aftermarket system that may contain valuable evidence.

When we're looking at a crime scene-- let's say you have a shooting that occurred in the parking lot at a local mall. And the video from the mall is OK, but it's a good distance away. It doesn't have great pictures of the faces or anything like that, just because of the distance that we're involving here from the camera to where the person was shooting at.

So start walking through the parking lot looking to see if any of these vehicles that we're going to talk about are sitting in there because they may have caught everything on their internal camera on the vehicle. And you could then [AUDIO OUT] through the mall intercom system or whatever it is and get them to come out to the car and [AUDIO OUT] as well.

And, oftentimes, these videos [AUDIO OUT] far superior to what you're going to get at a store or a parking lot camera because they're very close to the suspect, and they also almost every one of them have high-definition cameras that provide excellent video quality.

So these are some of the examples of aftermarket surveillance cameras. So as you're walking around the parking lot, you may want to look to see if any of these are on the dash or the windshield. Some of these may not record unless the vehicle's moving. Some record all the time. So I really can't give you a definitive answer on whether it's going to be worth it or not. But in the end, I'd say if you're working something like that, a shooting in a parking lot, it's probably worth at least asking to see on something like this.

But getting into the cameras that are installed by the manufacturers, we'll start with Cadillac. They have the Surround Vision Recorder. I have the makes and models that's available on here. It utilizes four cameras, one on the front grille, one in the rear trunk lid, and one on each of the side mirrors. And it continuously records if the vehicle is disturbed or motion is detected within one foot of the vehicle.

So if somebody just walks by that vehicle as they're walking to their car or the shooting happens, it's going to be [AUDIO OUT] You don't have to actually touch the vehicle for this to start recording. It's recorded on an external [AUDIO OUT] card, which is nice because then you can just take that SD card and get that to your digital forensic examiner, and they should be able to pull that directly off for you.

The system is programmed to overwrite data when no more space is available. So it's important to try to get to these fairly quick because depending on how much data gets recorded, it could overwrite your shooting scene that we were just talking about. It typically stores these in 5-minute video files, and it is in high resolution if it's a 2020 and newer. If it's prior to 2020, it's just going to be standard definition. But most of the newer ones are all going to be high-definition video.

Rivian also has a system called Gear Guard. It's on every Rivian vehicle. The five cameras, it's going to have two rear facing on each side, one front, one [AUDIO OUT] truck bed. So that's the SUV-- that's the truck I was just talking about, the R 1T truck. The R1S SUV has the same cameras, except it doesn't have the rear truck bed because it doesn't have a rear truck bed. It's an SUV.

It also continuously records when motion is triggered. And it has an internal hard drive, and it deletes data after 10 days. And it stores in 30-second video files and is also high resolution or high definition. Tesla has Sentry Mode. So if you see a Tesla in the parking lot, it's more than likely going to have Sentry Mode in it, 2017 and newer.

It's going to utilize five cameras, two rear facing on each side, one front, one rear, and one interior. It continuously records when motion is detected. So, again, you don't have to touch the vehicle. If somebody walks near it, it's going to start recording. And just also from an OPSEC point of view, the vehicle owner can remotely view the live feed from the app on their device on a Tesla.

So if you're staking a car out in the parking lot, if it's a suspect vehicle or something, be very, very careful because they could be doing counter-surveillance on you, and you would never know it. Sentry Mode footage is stored on a user-provided flash drive. This is the only downside to Tesla versus the [AUDIO OUT] is that the other ones have internal storage that are just automatic from the manufacturer.

With Tesla, you have to add your own storage media for it to record. So if the owner never added the storage media, then you're not going to have anything in the end. It also includes high-resolution video and 10-minute video files.

So legal demands and other resources that are out there. I would highly recommend [AUDIO OUT] analytics, their Hawk Toolbox. This system is completely free. Cell Hawk is a paid system that you can use to analyze cellular data, but the Hawk Toolbox is free for law enforcement. So if you go to that link, click on Hawk Toolbox, it has a ton of information on here.

It has a lot of the connected cars data that we've just gone over. It also has the law enforcement technology, investigations resource guide, which is great for all things technology. It has a lot of other examples. It has a geofence tool for Google, if you're doing any of those, sample search warrants. The list goes on and on. But I would highly recommend checking that out. It's completely free, if you're law enforcement.

Vehicle search warrants, just a couple of quick things. Make sure that you're drawing a nexus to that vehicle. Why is this-- why do you need to search this vehicle? What is it relevant to? Not just the fact that this is the suspect's vehicle. Why is the vehicle need to be searched? Don't use any and all. As it says there, just don't do it. I know we oftentimes we want to get every piece of data that we can.

But the problem with that, one, is it could be a legal flaw, depending on your jurisdiction, pretty much any jurisdiction. But the biggest issue why I want to point this out to you though with any and all is if you send a search warrant into, say, Verizon Wireless and you say, give me any and all data regarding this cell phone number. Well, you're going to end up missing data because they're going to send you the subscriber and maybe the voice CDR's with cell sites on them.

But you're not going to get the engineering-level data. You're not going to the text message data. You're not going to get the IP traffic. You have to ask for all those individuals. That's why I say just be very careful with any and all from the point of view you're not going to get what you need, rather than from a legal point of view. Just make sure your date ranges and time ranges are correct and your affidavit and warrant mirror.

I'm also going to give you an example search warrant for being able to search a vehicle with BERLA. So that will be in that share drive as well, which here's an example of what that looks like. But I'm not going to go over this because you'll have a copy of this for you to utilize.

And to close the course down here, just remember that these investigations take a lot of work just depending on what your case is as to whether the time that you have to put into it. But it may well be worth it in the end, going through all these hoops to be able to pull up some of this data from different sources.

This is only the beginning of a long road of learning. Never stop learning. Always ask questions. If there's anything we can do to help, let us know. There's lots of other courses out there that we offer at NCJTC. You will need this in order to access the shared drive. I'll leave this up here for-- it is-- you must type the link and the password exactly as it is on the screen, the uppercase and the lowercase, or it will not work. But that should have everything that you need in there.

And with that being said, I appreciate everybody coming today. And I hope you learned something. I appreciate all of you that threw information into the chat because I'm always learning as an instructor as well. + And I will incorporate the information that you all have given us as well. So from the bottom of my heart, I appreciate all that information because it only helps other police learn down the road whenever we teach this class next time.

And with that being said, I will turn this back over to Mike.

Thank you, Andrew. And this is on the ncjtc.org website under Programs. You'll see an IoT area, internet of things area. Over on the far right there, you'll see a request IoT listserv access. If you'd like to join our internet of things listserv, just click on that button there and it will have you fill out a little form and you'll be on the listserv where you can post things and read things that others have posted about. Not only connected cars, but all of IoT type of things.

And, again, ncjtc.org for additional trainings. So thank you, Andrew, for presenting. Wonderful presentation, a lot of information. Thanks for sharing through that bitly website additional information. And, again, great job tonight. I appreciate everybody joining today and look forward to seeing you at future webinars and future IoT classes that we will be running.