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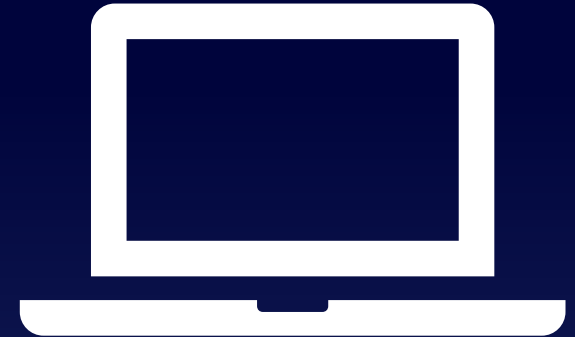


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Internet of Things (IoT) Trackers

April 12, 2023 | Presented by:

Wayne Nichols, Associate, NCJTC

D. Matthew Powell, Associate, NCJTC



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Today's Presenters



Wayne Nichols
Associate, NCJTC



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Learning Objectives

1. Overview of Bluetooth LE and Ultrawideband Technologies
2. Overview of Internet of Things (IoT) trackers
 - Apple AirTags
 - Samsung SmartTags
 - Tile by Life360
3. Common Uses of Trackers
4. Common Misuses of Trackers



Bluetooth LE (BLE)

- Low power requirements, operating for "months or years" on a button cell
- Small size and low cost
- Compatibility with a mobile phones, tablets, and computers
- Range: approximately 100 meters

Ultrawide Band (UWB)

- U1 Chip
- Like GPS but for Indoors
- Precision Tracking
- Real Time
- Multi-floor and multi-building
- Ability to penetrate walls and obstacles
- Known as "pulse radio"
- 15 feet away to inches
- 5- to 10-cm accuracy
- iPhone 11 and newer, Samsung Galaxy (Note20, S21 & newer, Z Fold 2 & newer), Google Pixel 6 Pro & 7 Pro, Xiaomi MIX4

Ultrawide Band Phones

Brand	Device name	Platform	Release date	Availability	UWB Controller
Apple	iPhone 11	iOS	September 2019	all models	Apple U1
	iPhone 12		October 2020	all models	Apple U1
	iPhone 13		September 2021	all models	Apple U1
	iPhone 14		September/October 2022	all models	Apple U1
Google	Pixel 6	Android	October 2021	Pro model only ^[3]	Qorvo DW3720 ^[4]
	Pixel 7		October 2022	Pro model only ^[5]	
Samsung	Galaxy Note20		August 2020	Ultra model only ^[6]	NXP SR100T
	Galaxy S21		January 2021	Plus (+) and Ultra models only ^[7]	NXP SR100T
	Galaxy S22		February 2022	Plus (+) and Ultra models only ^[8]	
	Galaxy S23		February 2023	Plus (+) and Ultra models only	
	Galaxy Z Fold2		September 2020		NXP SR100T
	Galaxy Z Fold3		August 2021		NXP SR100T
Xiaomi	MIX4	Galaxy Z Fold4	August 2022		
			September 2021		NXP SR100T

Source: https://en.wikipedia.org/wiki/List_of_UWB-enabled_mobile_devices

Ultrawide Band IoT Devices

Brand	Device name	Compatible platform(s)	Release date	Availability	UWB Controller
Apple	HomePod Mini	iOS	November 2020		Apple U1
	HomePod (2nd generation)		January 2023		Apple U1 ^[9]
	AirTag		April 2021		Apple U1 ^[10]
	AirPods Pro (2nd generation)		September 2022	Case only	Apple U1
Samsung	Galaxy SmartTag	Android for Samsung Galaxy devices	April 2021	Plus (+) model only ^[11]	
	Galaxy Buds2 Pro		August 2022		

Source: https://en.wikipedia.org/wiki/List_of_UWB-enabled_mobile_devices

The image shows several smart trackers. In the foreground, there is a white AirTag with the Apple logo and the text "AirTag" visible. Behind it, there are several Galaxy SmartTag+ trackers in black and grey. The text "Galaxy SmartTag+" is visible on the black ones. The background is a teal color.

IoT – Trackers

Image source: <https://www.iphoned.nl/nieuws/airtag-vs-tile/>



Apple AirTags

News Headlines

Woman accused of killing boyfriend after tracking him down with Apple AirTag

https://www.theregister.com/2022/06/14/airtag_tracking_murder_charge/

Houston woman says ex used 'Tile' device to stalk her repeatedly

<https://abc13.com/houston-woman-harassment-high-tech-device-stalking/3719155/>

Australian woman discovers boyfriend planted Apple AirTag in car to track her: 'He finally confessed'

<https://www.foxnews.com/world/australian-woman-discovers-boyfriend-planted-apple-airtag-car-track-finally-confessed>

Goals and Objectives

- How does the AirTag work
- How to find a lost or stolen AirTag
 - Bluetooth and Ultra Wideband technology (UWB)
- 'Find My' network
 - The importance of Bluetooth
- 'Lost Mode'
 - NFC-capable devices can assist with helping you retrieve your item
- How Apple has attempted to combat unwanted tracking / stalking
- Disabling AirTags
- Live demos

How Does the AirTag Work

AirTag

- Is a quarter-sized Bluetooth tracker that was designed to assist you with keeping tabs on items
 - Car keys
 - Luggage
 - Vehicles
 - Pets
- It's powered by a single CR2032 3V battery
 - Typically lasting a year before needing replacement

How to Activate an AirTag

- Activating an AirTag
 - AirTags can only be paired to iPhones running iOS 14.5 or later
 - Two-Factor Authentication, Location Services, 'Find My', and Bluetooth must all be activated / turned on
- After holding the unpaired AirTag next to your iPhone, you'll simply follow the connect prompts

Finding an AirTag

- AirTags emit a Bluetooth signal that anonymously connects to nearby Apple devices that have the 'Find My' network turned on from their device
- When a nearby Apple device connects to your AirTag, the location of where that AirTag was observed is uploaded to the cloud
 - Allowing only the AirTag owner to see that location data
 - The exact location could vary based on the strength of the Bluetooth signal that encountered the AirTag
- AirTags can also be found by two additional methods – Find My app
 - Activating the AirTag's chime (from the paired iPhone, iPad, or Mac)
 - 'Precision Finding'
 - Via Ultra Wideband supported iPhones
 - iPhone 11 and newer

Finding an AirTag

- Finding an AirTag by turning on the chime (from the owner's perspective)
 - Launch the 'Find My' app
 - Select 'Items'
 - Choose the AirTag that you want to turn on the chime
 - If the AirTag is within Bluetooth range, it will play a sound
- Finding an AirTag via Ultra Wideband (from the owner's perspective)
 - Launch the 'Find My' app
 - Select 'Items'
 - Choose the AirTag you want directions to
 - Select 'Find Nearby'

Finding an AirTag Live Demo

'Find My' Network

Find My Network

- Apple users can use the 'Find My' network by relying on the hundreds of millions of other Apple devices around the world
- However, those other Apple devices (and yours) must be participating in the 'Find My' network
 - You can check these settings from your iPhone
 - Settings > Apple ID > Find My > Find My iPhone > Find My network must be turned on
- From the 'Find My' app, users can find the locations of
 - People (who have elected to share their location with you)
 - Apple devices you own or that associated with your family members
 - Items (AirTags)

Identifying Found Items

The 'Find My' app will also be the app used to identify found items

- AirTags
- AirPods

'Find My' Live Demo

Enabling 'Lost Mode'

Lost Mode

- If you've lost an Apple device that has been registered to your Apple account AND has the 'Find My' settings turned on, you can activate 'Lost Mode'
 - Limited 3rd-party devices may also be supported
 - VanMoof E-bikes
 - Belkin SOUNDFORM earbuds
- By enabling 'Lost Mode' you can add a message and include contact information
 - If someone finds that lost item, they can use a supported device to see the 'Lost Mode' message and or contact information

Lost Mode

- Now that the AirTag is listed as lost, the 'Find My' network begins to look for the device
 - Again, this is done by relying on the millions of other Apple devices in the world
- If the AirTag is “seen”, you’ll receive a push notification with the last seen location
 - Something to note is that the user does not have control as to how fast it will take for lost AirTag to begin sending updates on its location

Enabling 'Lost Mode' Live Demo

Unwanted Tracking/ Stalking Using the AirTag

Apple's Response to Unwanted Tracking/Stalking

Full response: <https://www.apple.com/newsroom/2022/02/an-update-on-airtag-and-unwanted-tracking/>

Working with Law Enforcement

We have been actively working with law enforcement on all AirTag-related requests we've received. Based on our knowledge and on discussions with law enforcement, incidents of AirTag misuse are rare; however, each instance is one too many.

Every AirTag has a unique serial number, and paired AirTags are associated with an Apple ID. Apple can provide the paired account details in response to a subpoena or valid request from law enforcement. We have successfully partnered with them on cases where information we provided has been used to trace an AirTag back to the perpetrator, who was then apprehended and charged.

Law enforcement has shared their appreciation for the assistance we've provided in helping them find the source of unwanted tracking. We've identified additional improvements we can make in the information we share and the educational resources we provide, and we will be taking action, including making updates to our law enforcement documentation.

Recent Updates to Combat Unwanted Tracking/Stalking

- Apple will now notify you via push notification within 8 to 24 hours if there is a nearby AirTag has been separated from its owner
 - Scenario
 - I place an AirTag in my son's backpack, he along with friends (in his classroom) at school would receive a push notification on their iPhones of possible unwanted tracking
 - It's important to note that other items could also trigger an alert
 - AirPods, AirPods Pro, and AirPods Max
- An AirTag separated from its owner will also emit a sound periodically

Unwanted Tracking

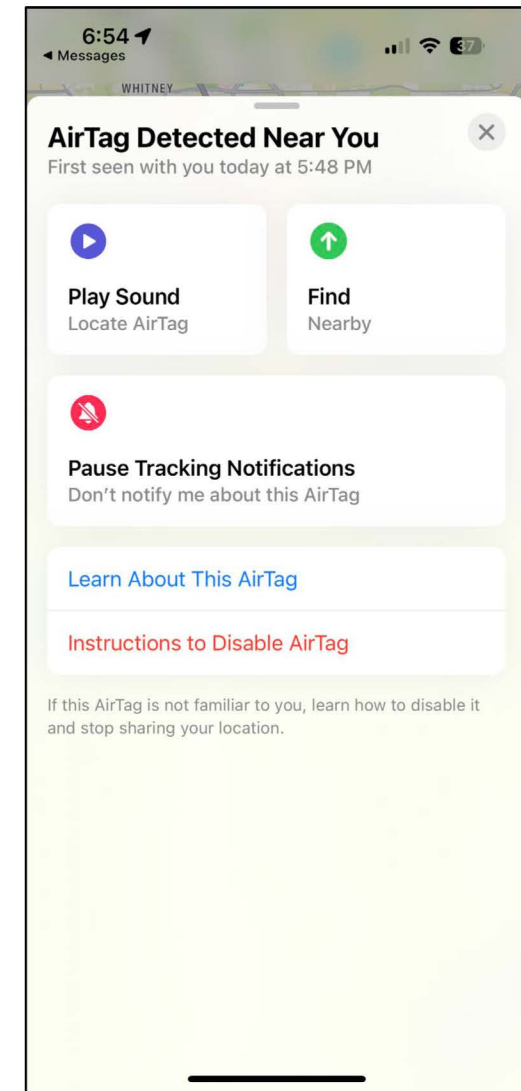
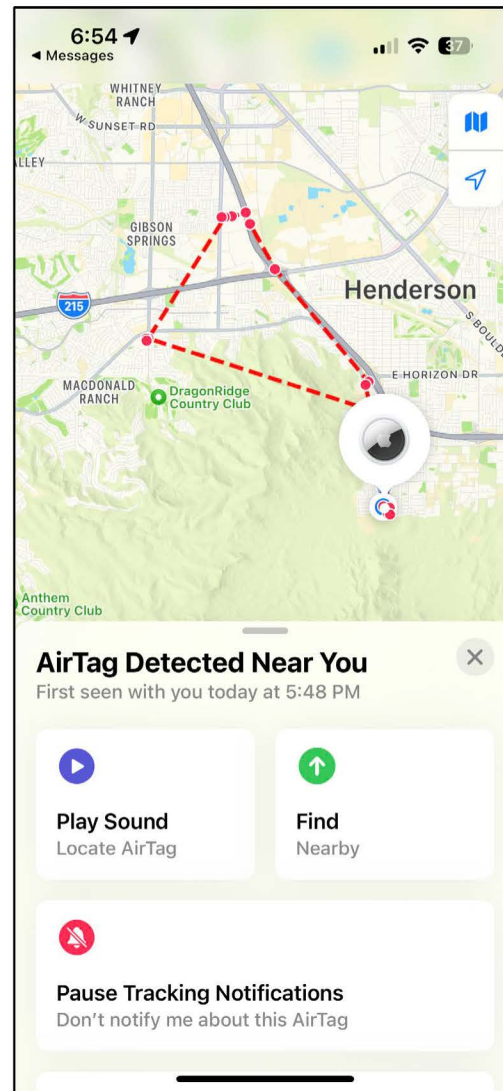
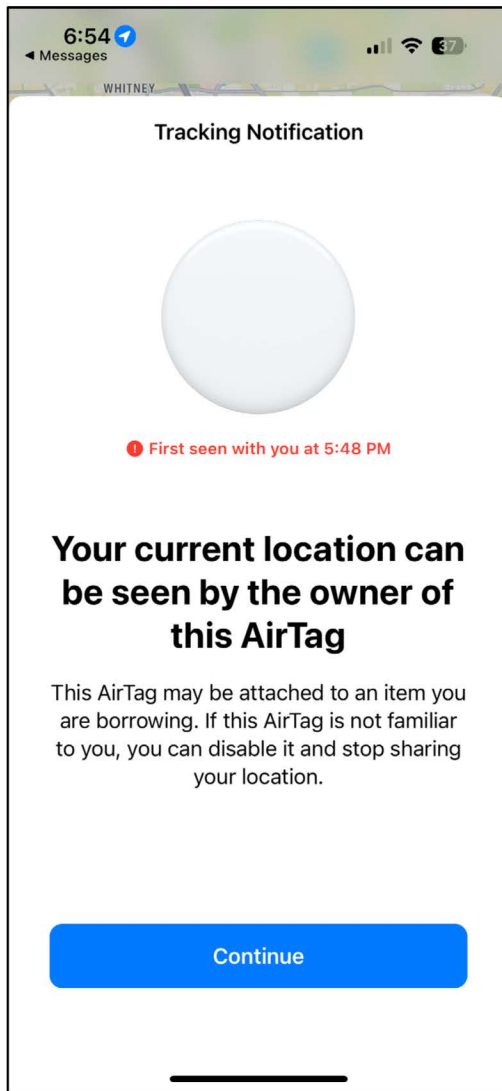
Full description: <https://support.apple.com/en-us/HT212227>

If any AirTag, AirPods, or other Find My network accessory separated from its owner is seen moving with you over time, you'll be notified in one of two ways. These features were created specifically to discourage people from trying to track you without your knowledge.

1. If you have an iPhone, iPad, or iPod touch, Find My will send a notification to your Apple device. This feature is available on iOS or iPadOS 14.5 or later. To receive alerts, make sure that you:
 - Go to Settings > Privacy > Location Services, and turn Location Services on.
 - Go to Settings > Privacy > Location Services > System Services. Turn Find My iPhone on.
 - Go to Settings > Privacy > Location Services > System Services. Turn Significant Locations on to be notified when you arrive at a significant location, such as your home.
 - Go to Settings > Bluetooth, and turn Bluetooth on.
 - Go to the Find My app, tap the Me tab, and turn Tracking Notifications on.
 - Turn off airplane mode. If your device is in airplane mode, you won't receive tracking notifications.
2. An AirTag, AirPods Pro (2nd generation) charging case, or Find My network accessory that isn't with its owner for a period of time will emit a sound when it's moved.

If you detect an unknown AirTag, Find My network accessory, or AirPods, use the steps below to learn about it, find it, and disable it. If you're using an Android device, you can download the [Tracker Detect app](#) to find an AirTag or Find My network accessory that's separated from its owner and might be traveling with you.

Unwanted Tracking/Stalking Using the AirTag Live Demo



Common Questions About the AirTag

- What's the range of an AirTag?
 - 33 feet
- Does an AirTag have a GPS?
 - No
- Does the AirTag work with Android
 - Yes and no
 - iPhone is required to setup an AirTag but can be discovered by an Android
 - 'Tracker Detector' app from the Google Play Store

Common Questions About the AirTag

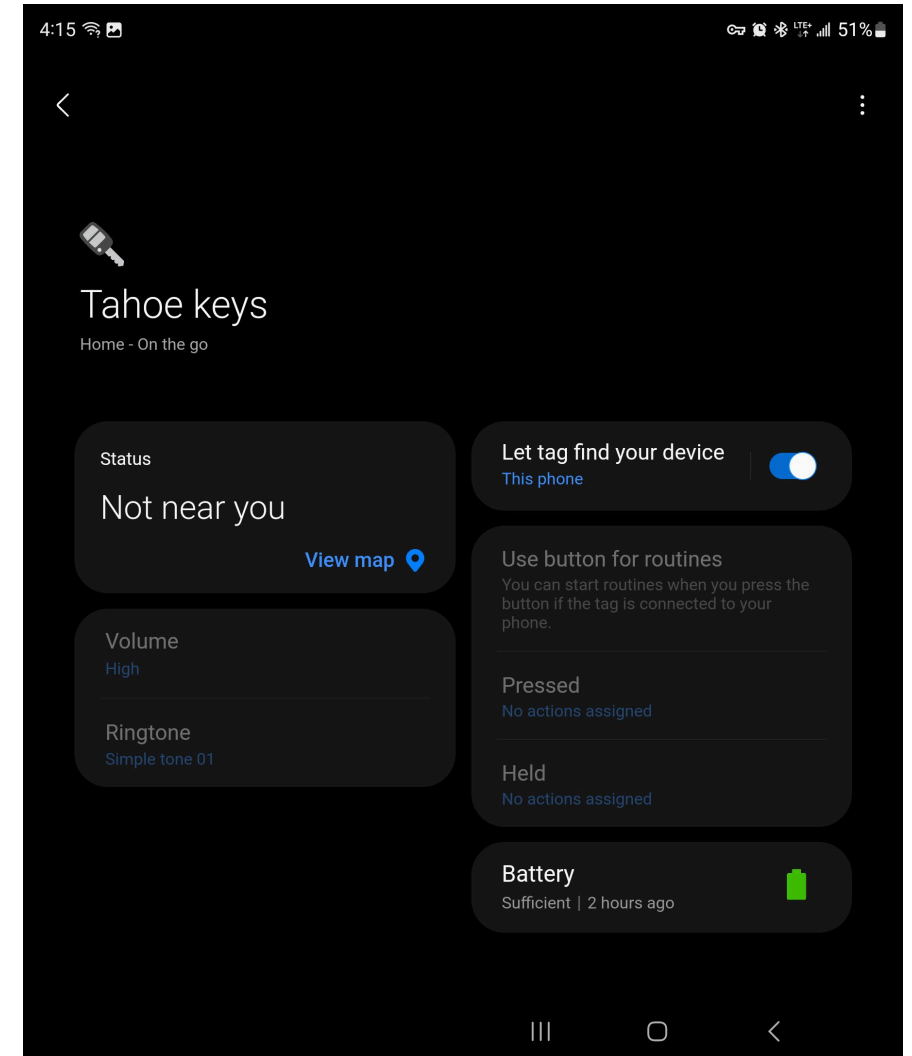
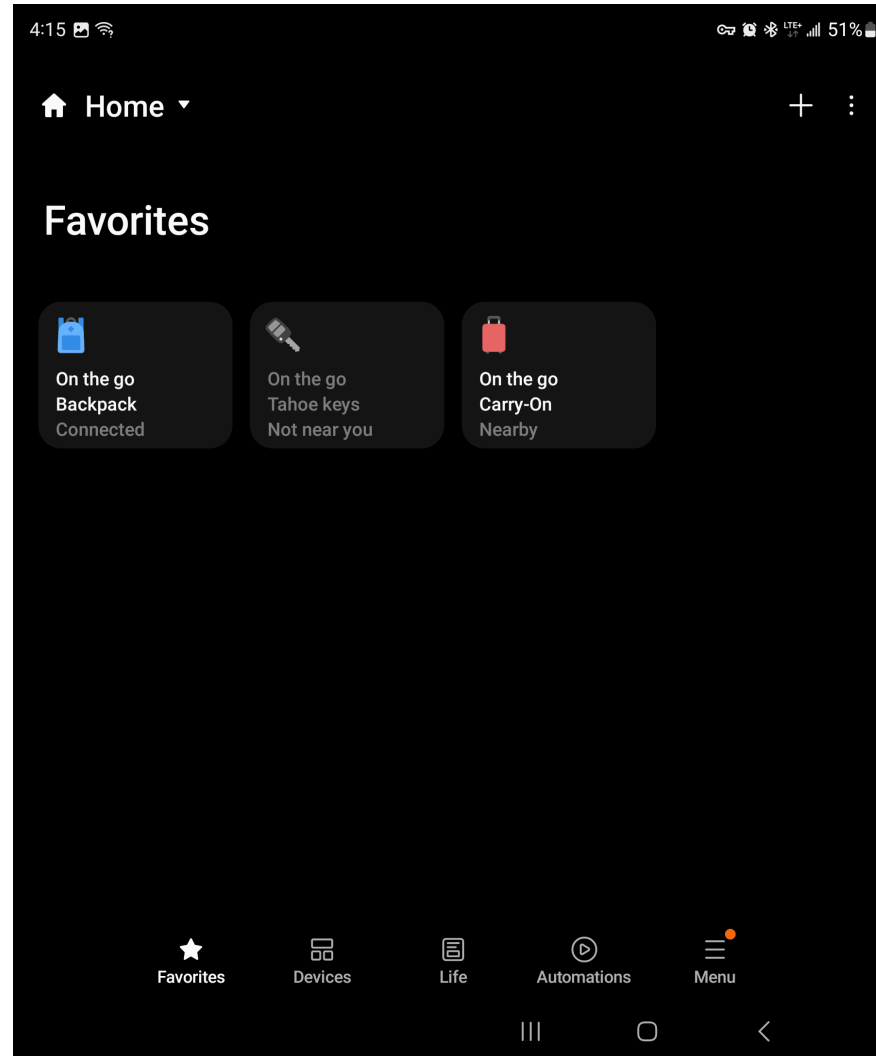
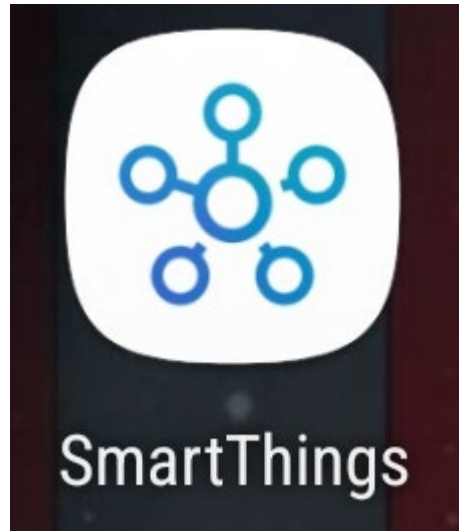
- Are AirTags waterproof?
 - They are only water *resistant*
 - 3 feet of water for 30 minutes
- Can it track a moving vehicle?
 - You would likely not be able to see the traveled route instead the destination

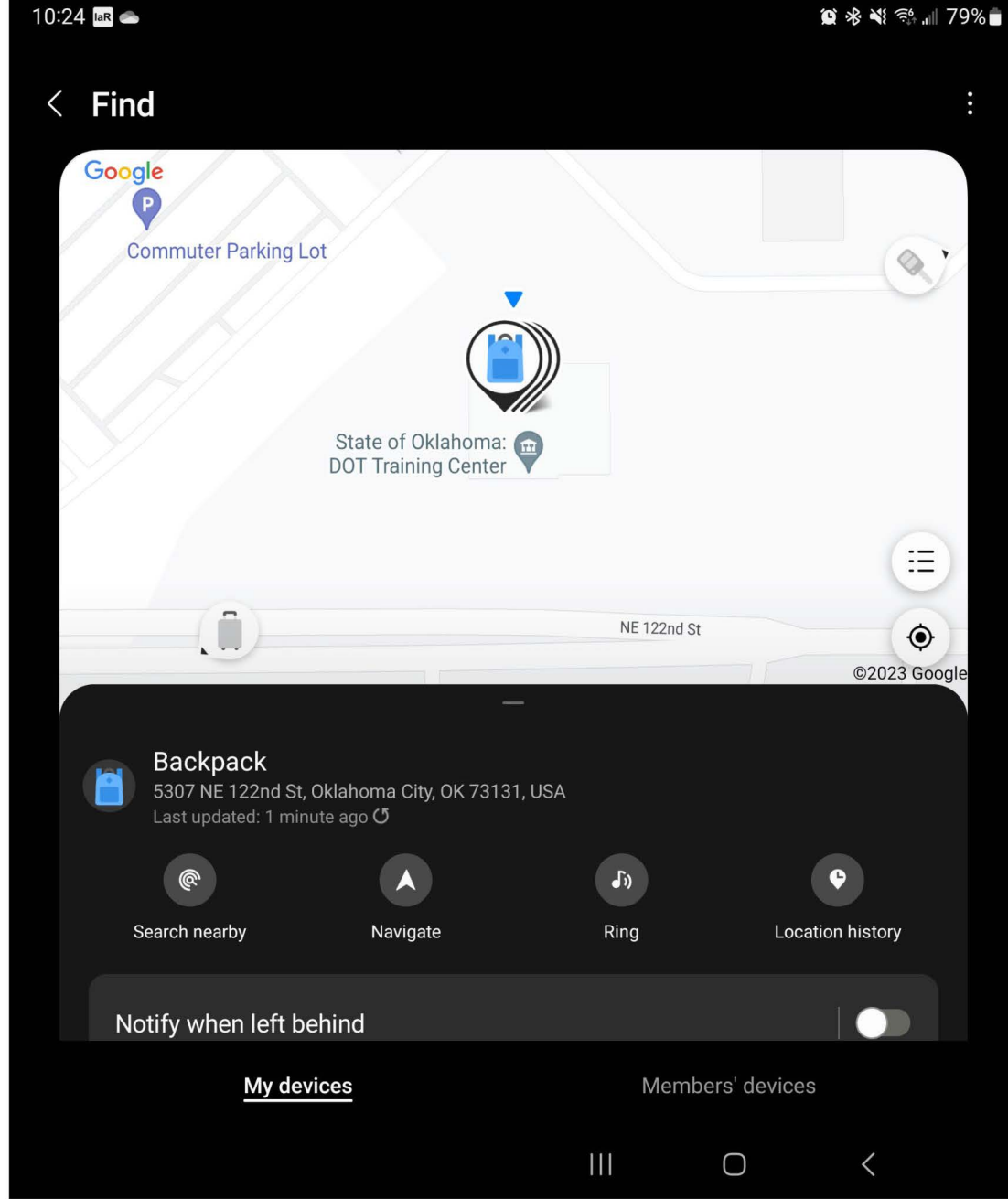
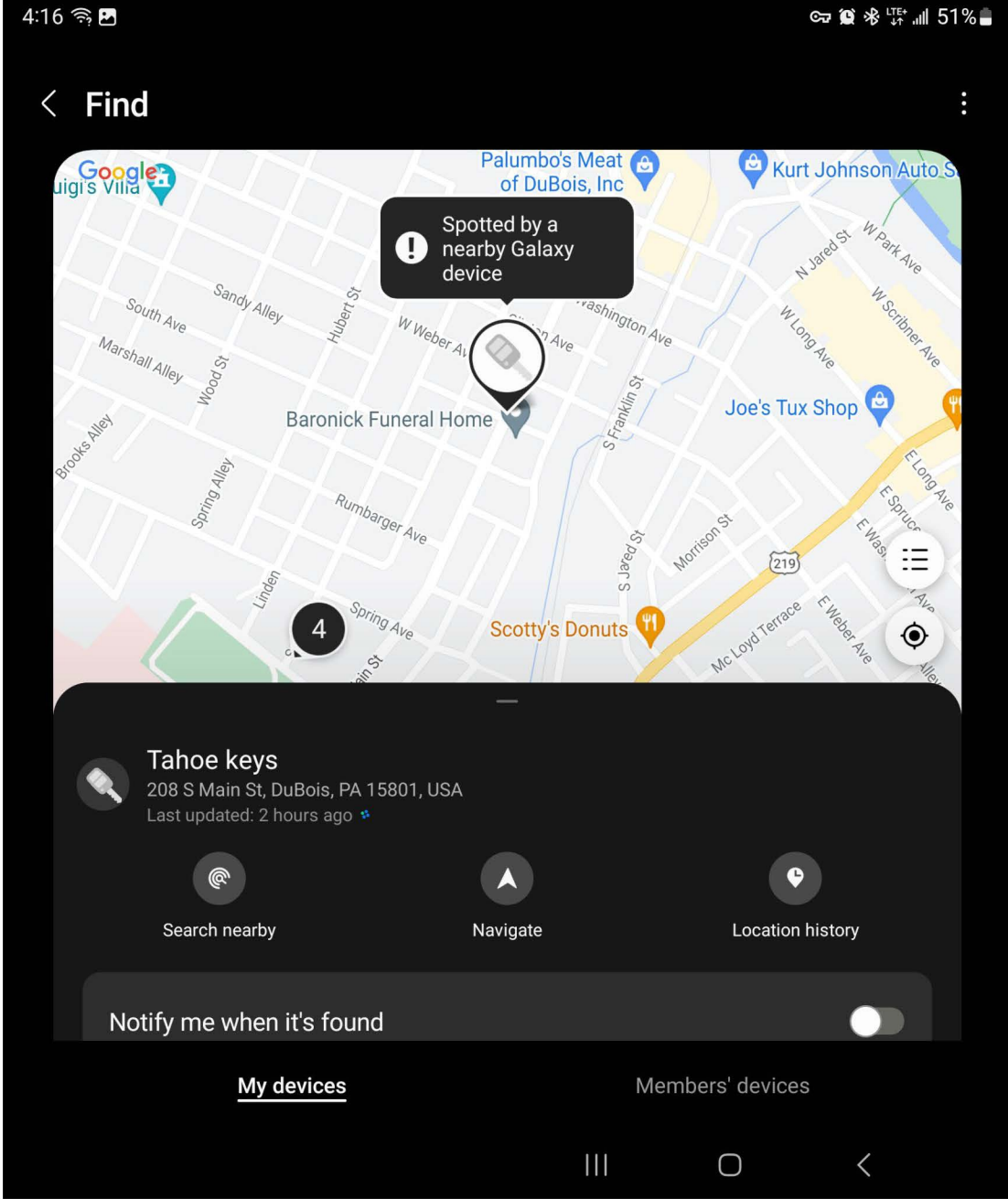
Android Trackers

Samsung Galaxy SmartTag



Samsung Galaxy SmartTag







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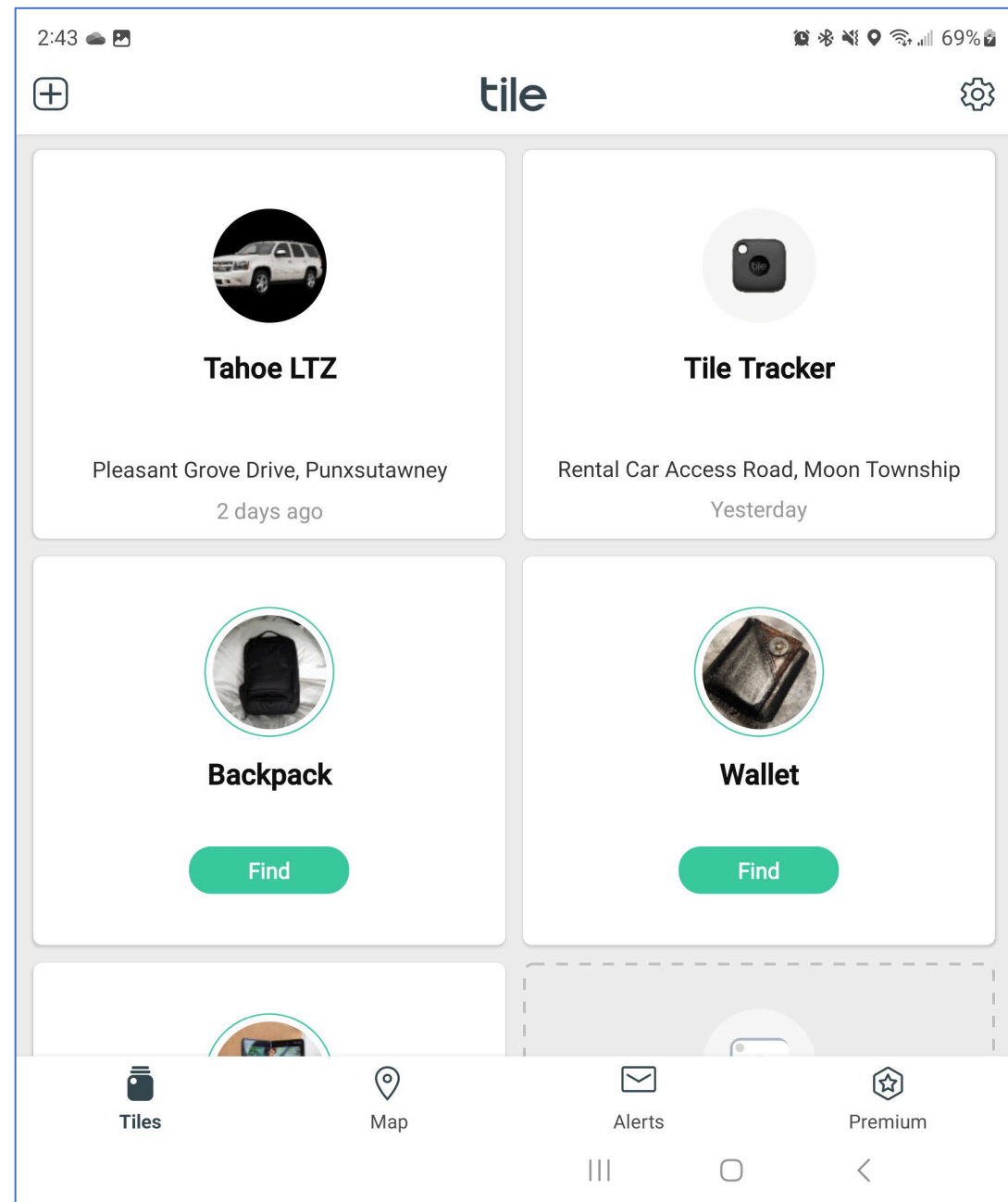
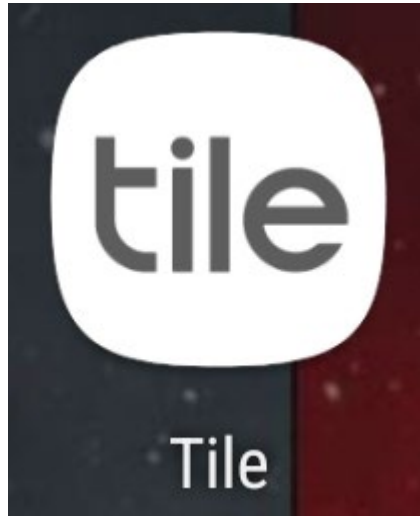
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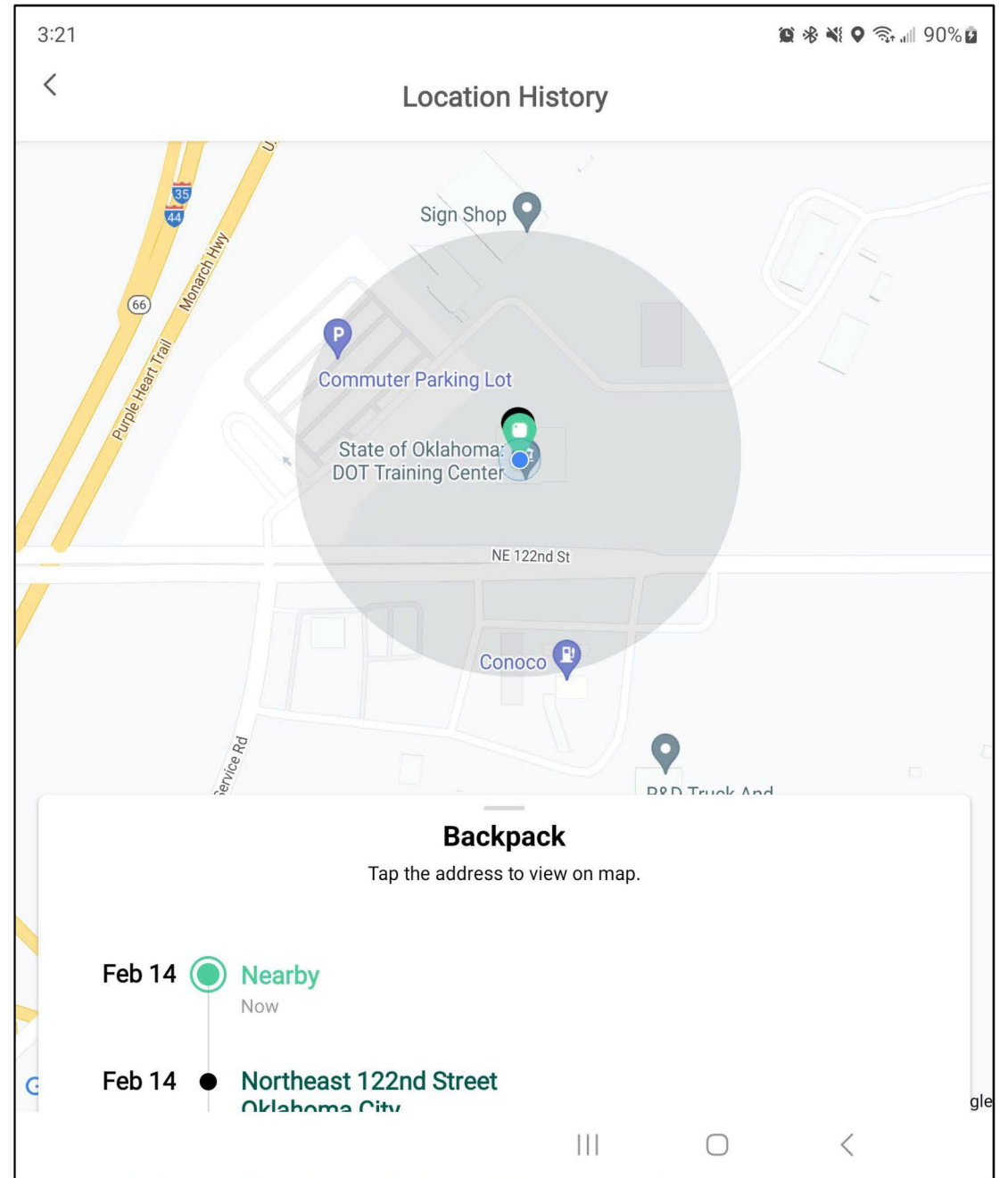
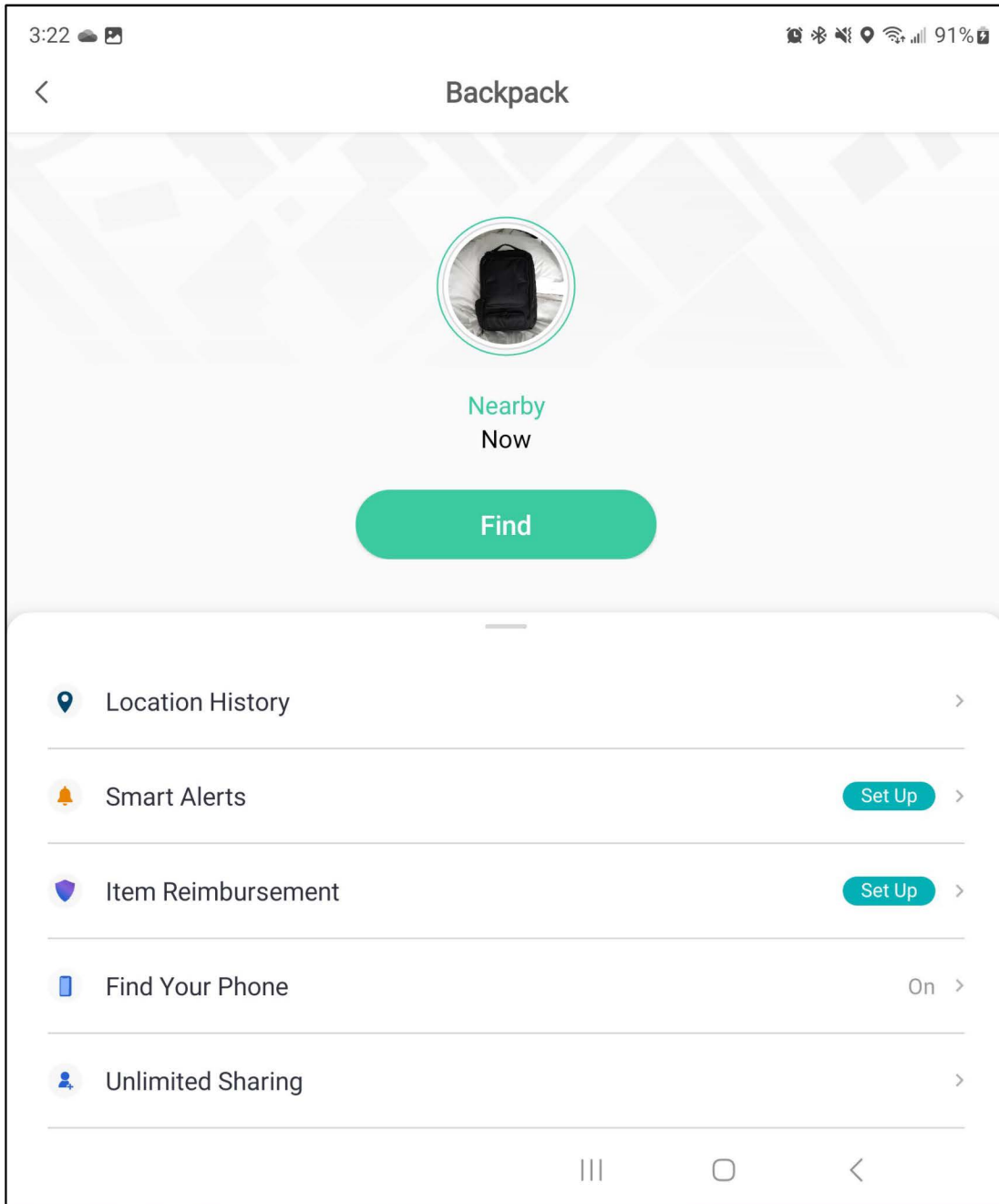


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-  **Emergency Assistance**
Expert assistance any time, anywhere.

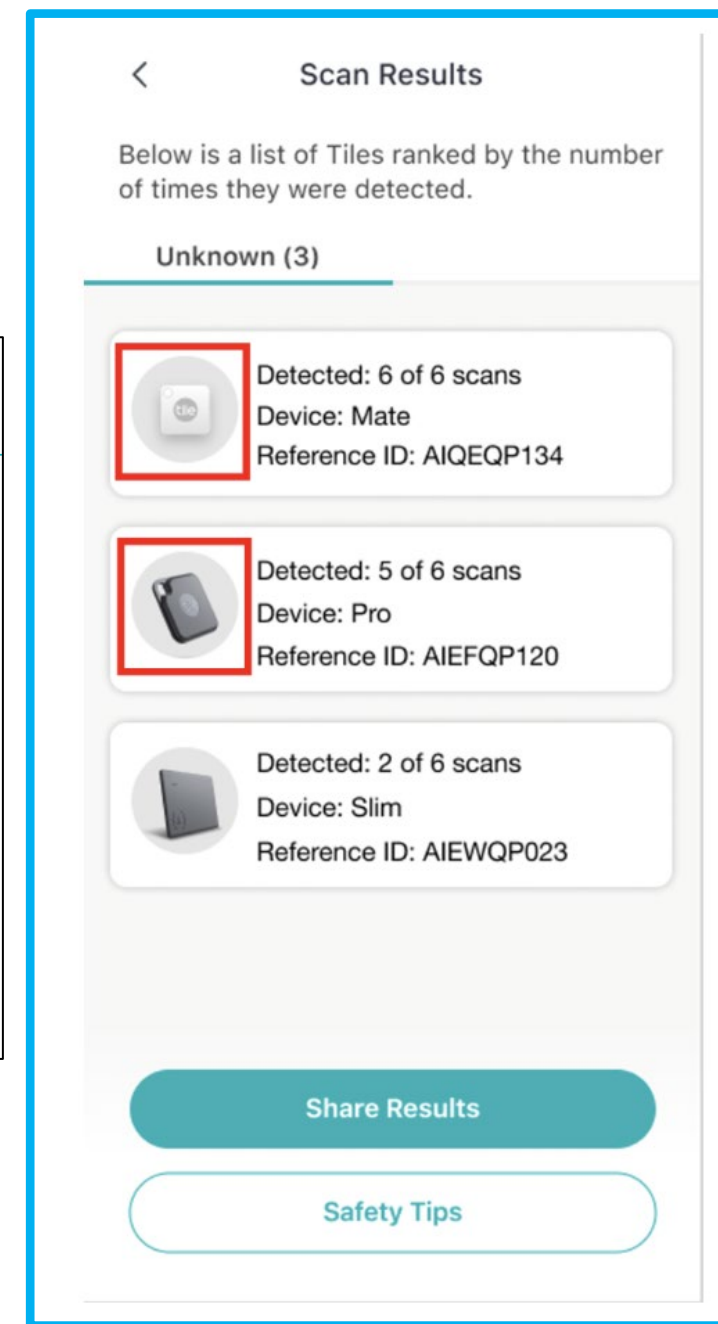
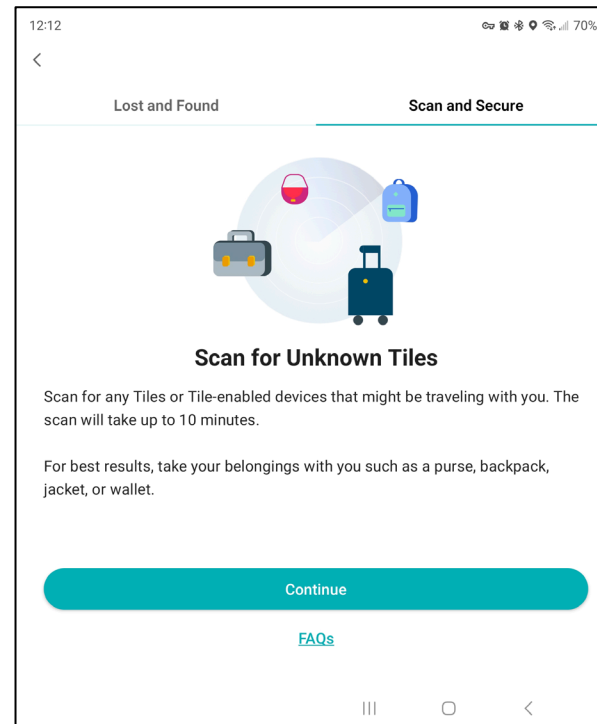
Tile App





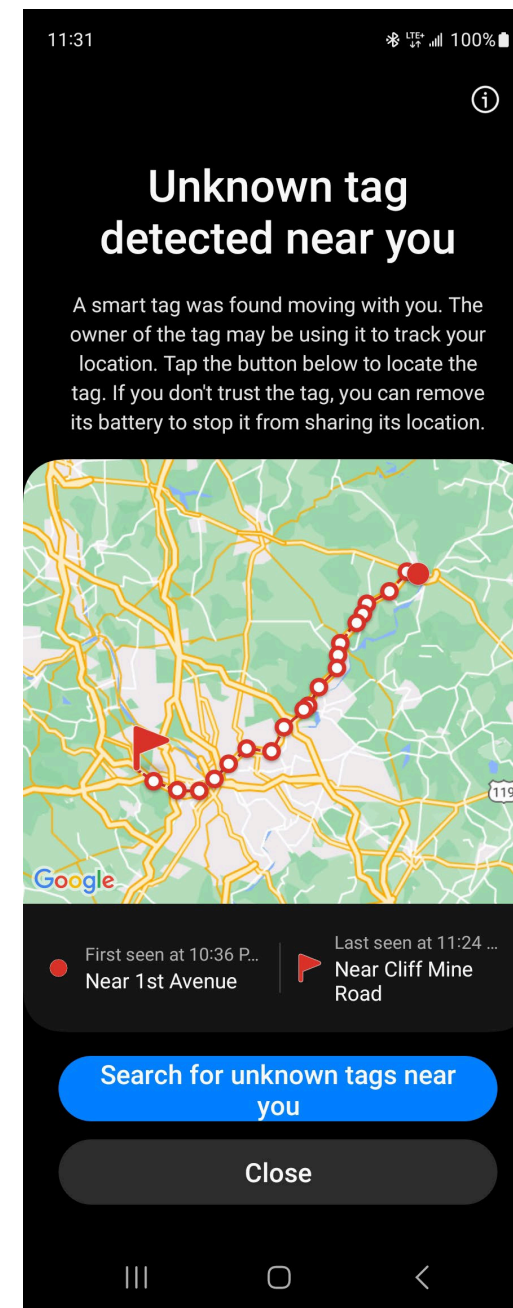
Tile “Scan and Secure”

- No Tile account needed
- Scans for any Tiles or Tile-enabled devices that might be traveling with you.
- Takes about 10 minutes to run a scan
- A Tile in Anti-Theft Mode will not appear



Tile “Scan and Secure”

- Notice of Unknown tag detected
- This notice was received without conducting a scan with the Tile app
- Similar to the iPhone detection





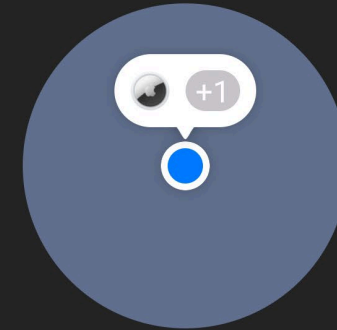
Apple's *Tracker Detect* for Android





9:57

83%

Results

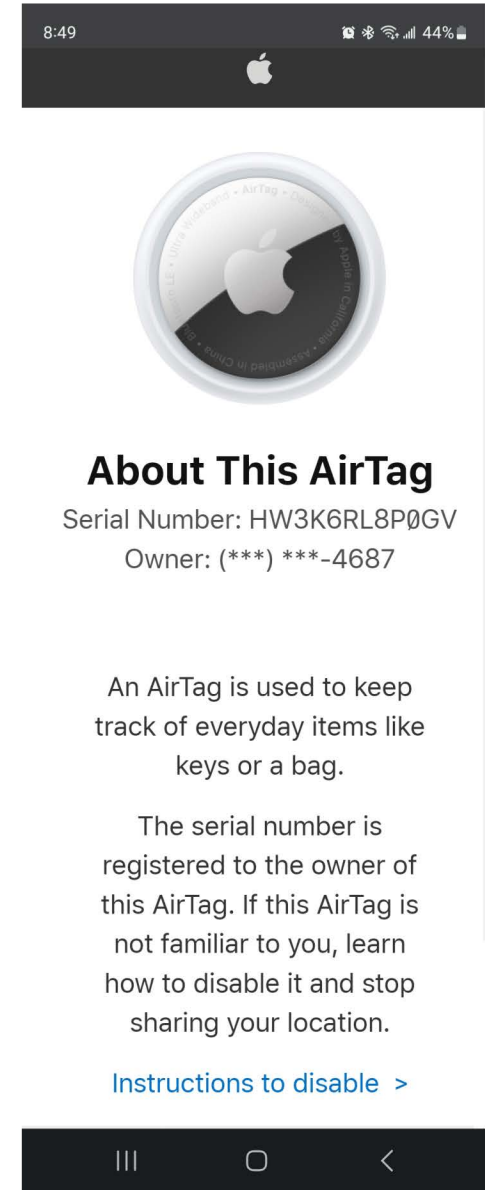
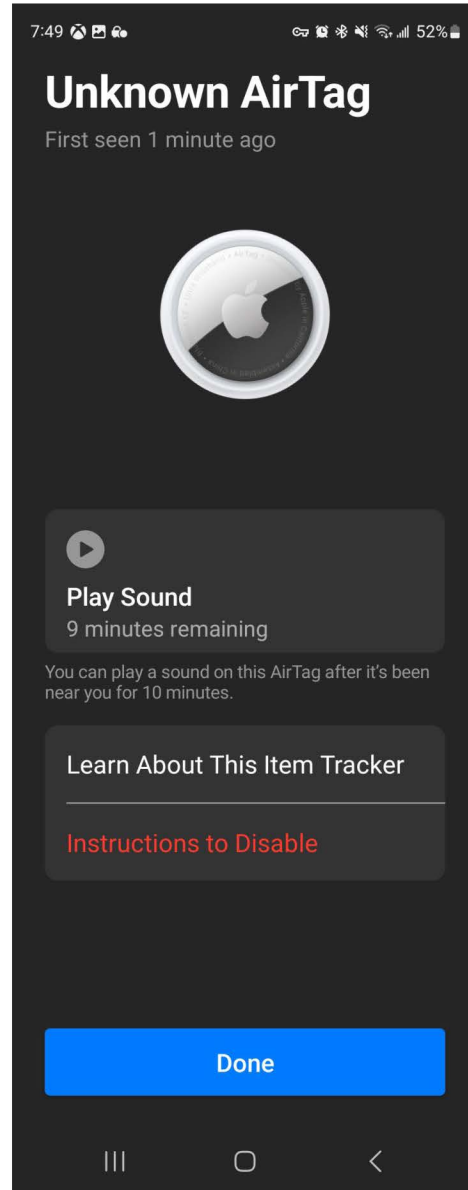
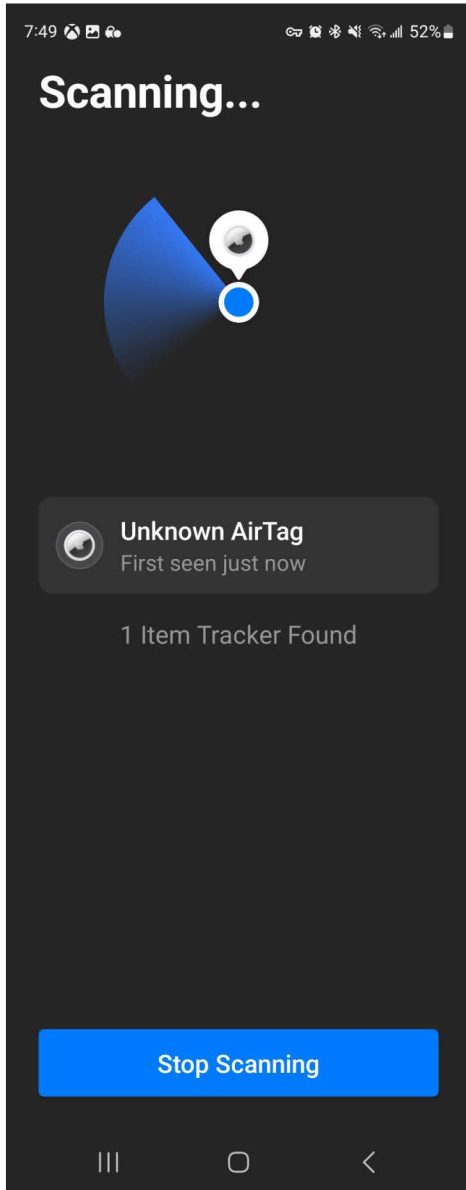


 **Unknown AirTag**
First seen 7 minutes ago

 **Unknown AirTag**
First seen 6 minutes ago

2 Item Trackers Found

Scan Again



Questions?



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IoT ListServ and Other Trainings



www.ncjtc.org

Internet of Things (IoT) National Training and Technical Assistance Program

The Internet of Things (IoT) National Training and Technical Assistance Program provides training and resources to criminal justice agencies to improve their ability prevent, solve, and prosecute crimes involving IoT devices. Training encompasses understanding these devices, the data they collect, how to properly collect and analyze the data, and its value as it relates to an investigation.

Additionally, the training and materials will enable law enforcement agencies to better inform their communities about the security and privacy issues associated with IoT devices to reduce victimization.

Upcoming Classes (IoT Classes)

Internet of Things (IoT) Considerations in Criminal Investigations

The Internet of Things involves a web of data which requires planning to access and manage. During this training, attendees will explore devices and their systems, which they connect to, to understand how they create valuable evidence and could have significance at crime scenes. Examination through live demonstrations on how to retrieve and review the data, as well as identifying applicable Fourth Amendment concepts and apply them to build a legally defensible and ethical case will be discussed.

Internet of Things (IoT), Privacy Concerns: What Communities Need to Know!

As the Internet of Things (IoT) becomes ubiquitous in our everyday lives there are privacy and security concerns that citizens should be aware of. This training will provide an overview of IoT and will teach law enforcement officials methods to engage with their communities to provide information about IoT privacy and security. Steps that community members can take to be safer with these devices, and effective teaching strategies regarding prevention will be covered.

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