



# Mobile Devices for GPS

**It is becoming increasingly common for the public to rely on their phones as navigation aids when recreating in the backcountry. This segment of the course will take a brief look at possible applications for this technology in SAR.**



While some 'old school' SAR practitioners may look down on the use of smartphone technology for navigation, the reality is that there are a number of tools that may be of benefit for search and rescue responders.

This is a rapidly evolving technology, but we will take a brief look at some of what is currently available.

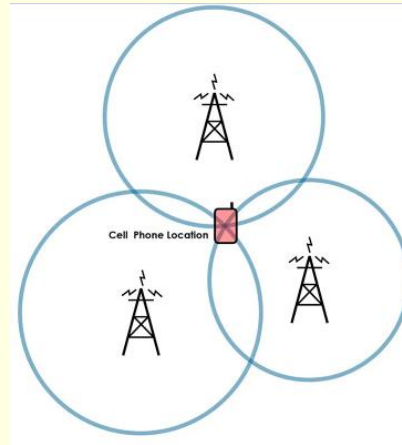
# GPS on Mobile Phones

**Cell phones use two different ways to determine your location.**

## **True GPS**



## **Assisted GPS (AGPS)**



We learned in the last section how there is a robust satellite system that supports very accurate GPS location using radio waves. Your phone has a GPS receiver in it in the same way that a handheld GPS does, and uses similar technology to obtain location information.

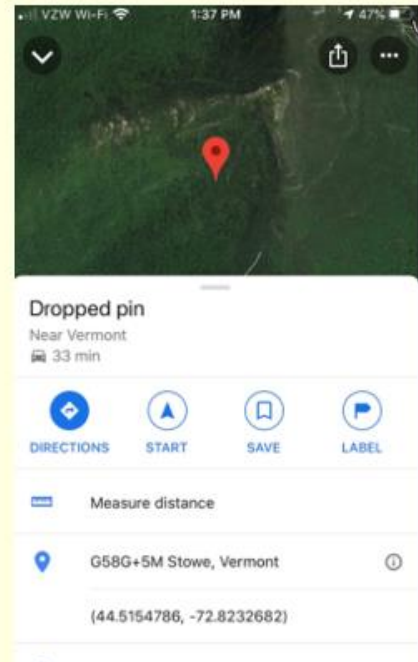
In addition your phone is constantly sending data bursts (pings) to local cell towers to determine cellular coverage. The phone can also use triangulation data from these towers to calculate its location. This is referred to as “AGPS”. Most often your phone is using AGPS for location data, the advantage being that your phone is sending these signals anyway so there is no additional battery drain. Using GPS signals takes more battery power.

If there is inadequate cell coverage (fewer than 3 towers) then the phone cannot triangulate location information so the phone will automatically switch to using true GPS.

All of this is transparent to the user. Between these two methods, phone location information is generally very accurate.

# GPS on Mobile Phones

How do I access my location information?.



Unfortunately there is very little consistency in how mobile phones actually display their location information. For Apple devices the easiest way for many people is to simply open the built-in compass app which displays LAT/LONG. You can also 'drop a pin' in Google Maps and swipe up on the screen to display location coordinates.

It is VERY important that you pay careful attention to the format of the coordinates. Note that in the two examples above they are presented in different formats of latitude/longitude. The compass is displaying Degrees Minutes Seconds, while Google Maps is showing Decimal Degrees!

This can be a very valuable tool when you are able to talk to a subject who is lost, so knowing how to instruct somebody to find their coordinates can come in very handy. If possible have them text a screen-shot of their phone (similar to what you see in the slide) to minimize any confusion that may result from having them read them to you.

You should take a minute to determine how you can get this information from your own phone. It is good to know as a potential backup or alternative to your GPS.

# GPS on Mobile Phones

## Useful Smartphone Apps



There are a number of free or inexpensive apps that will display your location information in multiple formats which can be very useful. Some can be used as a handy coordinate conversion tool.

Most of these apps can be used to send or share (text or email) your location to others. Some teams like to use this method to update field team locations rather than tying up the radio while reading off coordinates, which can also lead to errors in transcription.

# Maps on Mobile Phones

## Lots of choices!



Avenza Maps



Gaia GPS



AllTrails



Hiking Project



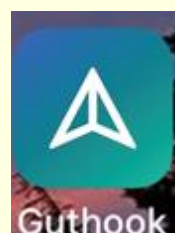
Vermont Sn...



Trailforks



rakkup



Guthook

There are many different ways to use your phone GPS in conjunction with mapping apps. As said earlier, this is becoming an extremely common way for people to get trail information and assist in navigation. The use of paper maps has significantly decreased in recent years in favor of electronic maps. The Green Mountain Club, for example has seen a large shift from sales of their traditional paper maps of hiking trails in Vermont to digital versions.

Above are just a few examples of what is available. The top row represents what might be called 'general' outdoor maps for hiking.

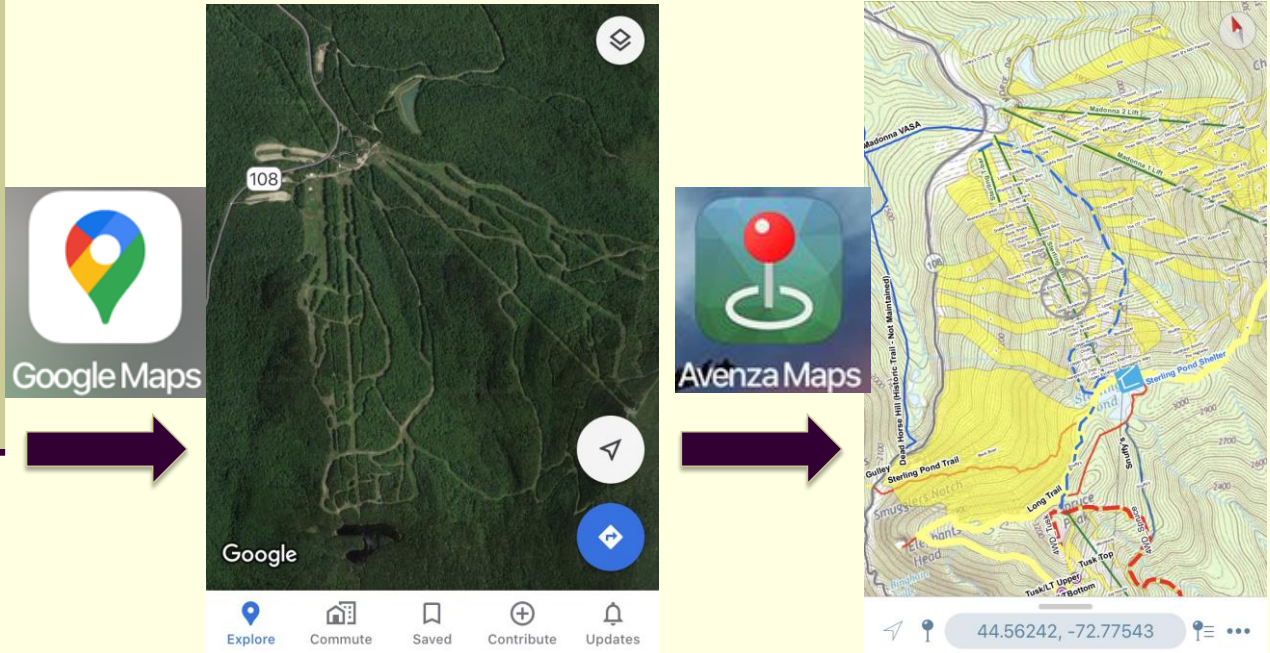
The lower row shows some examples of specialized maps that are geared toward activities like snowmobiling, mountain biking or rock climbing.

Some apps are free, some are a one time purchase and others may have an annual subscription fee.

Some of these apps will allow you to not only see your location on the map as you are moving, but also record waypoints and tracks, similar to what was discussed in the GPS section. Some are easier than others to share or export to the command post, so that needs to be a consideration for use in SAR.



# Online vs Offline Maps



It is very important to understand whether you are using an 'online' or 'offline' map.

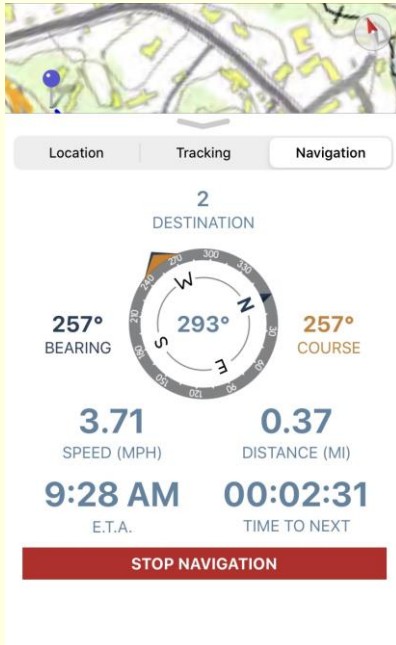
Online maps require data service in order to download the base map onto your phone. Google Maps would be an example of this type of map. We're sure everybody has had the experience of trying to look at a map when you are in an area with no cellular service and just seeing a blank screen.

The map on the right is an Avenza map of the same area. This map has been downloaded and is stored permanently on the phone so requires no cellular coverage to use it. Even in 'airplane mode' you can still use this map and the GPS on your phone will function and show you where you are on the map.

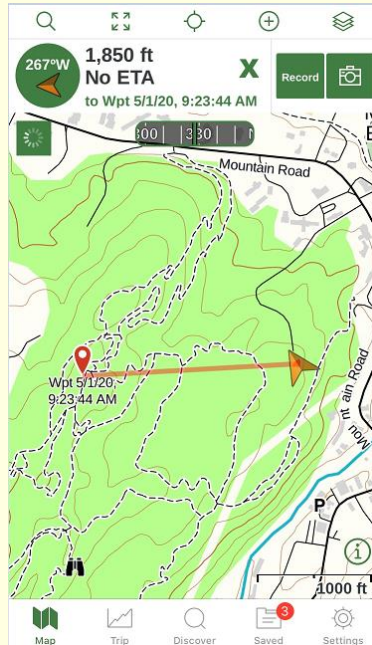
Since search and rescue missions are often in remote areas with limited or no cell coverage only downloaded or offline maps are appropriate for SAR use. In addition offline maps use far less battery which is another important consideration.

# Maps for SAR

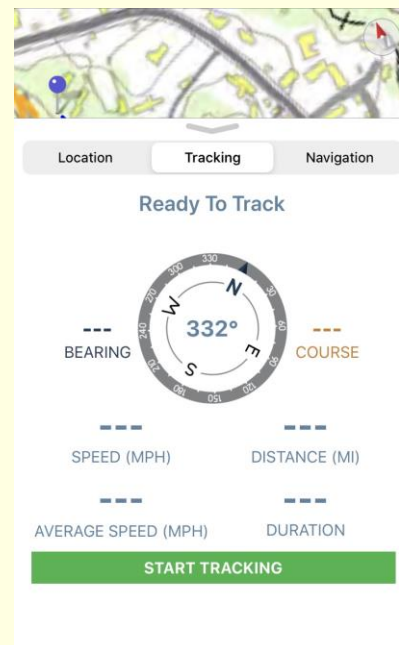
## Navigating in Avenza



## Navigating in GAIA



## Tracking in Avenza



There are a number of different ways in which digital maps can be useful for SAR. Apps like Avenza and Gaia (pictured above) have relatively sophisticated features that allow you to use them for navigation and record tracks and waypoints.

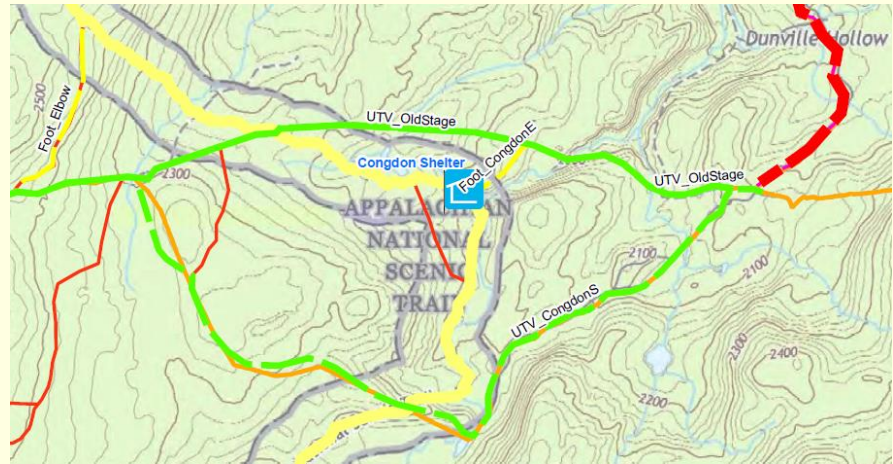
This functionality is very similar to what was discussed in the handheld GPS section.

Later in this section we'll address why you may or may not want to use this method of navigation or tracking.

# Maps for SAR

## Legend

- Point of Interest
- Building
- Keyed Gates
- ▢ Shelter
- ⛑ Tent
- VT\_E911\_Alpine\_Ski\_Lifts
- 4WD Access
- UTV Access
- ATV Access
- FOOT Access
- Catamount Ski Trail
- Long Trail
- Hiking Trails
- Biking Trails
- Nature Trails
- Recreation Path
- ++++ Rail Trails
- Snowmobile Trails
- Ski Trails



Another feature with some apps is the ability to download custom maps to your device. Vermont State Police in conjunction with some local SAR units has developed a series of maps for the Avenza app that not only contain 'regular' trails on them, but also have added emergency access routes to commonly used recreation areas.

The map above is an example and shows SAR responders some alternative routes to the area around Congdon Shelter on the Appalachian Trail, including indicating if they can be driven (and by what type of vehicle) or if they are foot shortcuts.

Maps like this where you can see your own location in real time, and the ability to track and navigate (all without cellular service) is a very valuable tool.



# Pros & Cons of Mobile Devices

## Pros:

- ✓ **Very easy to 'see' your location vs. finding your location on a paper map**
- ✓ **Virtually everybody has a phone with them!**
- ✓ **May have options for different base maps (satellite, contour)**
- ✓ **Very intuitive with minimal training**

## Cons:

- ✓ **Rely on batteries. Batteries die!**
- ✓ **Not waterproof and can get damaged in wet conditions.**
- ✓ **Can be hard to manage in cold weather (e.g. touchscreens).**
- ✓ **Some mapping apps have annual subscription fees**
- ✓ **Some features may require a cellular or wifi connection.**

There are definitely some advantages and disadvantages to using mobile device mapping applications on a SAR mission as opposed to the more traditional map, compass and GPS. As long as you understand these differences you can make informed decisions as to what to use and when.

The best solution may well be to have both with you!

Your team may also have a preference and even dictate what methods you are to use to insure compatibility with the rest of the team.

# You have finished this module

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You may close this window to return to the main course and select another module to complete.

Be sure you keep track on your course checklist so you know which modules you have completed.