

QUESTION:

I noticed that the history trail of one of my vehicles follows the road with great accuracy until it enters a heavy tree covered area, at which point it begins to slightly deviate from the road. Although I can see that the route generally follows the shape of the road, it does so with much less precision. Why does this happen?

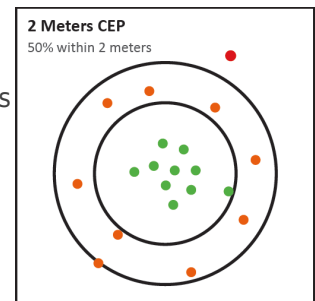
How GPS Units Track Data

A GPS unit receives data from GPS satellites that orbit 12,000 miles above the earth. There are 24+ GPS satellites orbiting the earth at any one time. GPS satellites send satellite location, time, and satellite health information using standard radio frequencies. The GPS unit picks up these radio frequencies, and calculates its location based on triangulation between **at least three** satellites. This calculation is heavily dependent on time information sent by the satellite, as the time between transmission and receiving of the signal is what is used to determine the distance of the satellite. The GPS unit communicates telematics data to GPS Insight using the cellular network based on the reporting interval for which it is programmed.



Accuracy of GPS Technology

After the GPS unit receives information from all satellites within range, the unit calculates the latitude and longitude of the GPS unit. The GPS unit is normally accurate to **within two meters** Circular Error Probability (CEP), and the accuracy is further increased through algorithms built into GPS Insight. Analysis of the GPS information provided by GPS Insight yields an accuracy rate of **approximately 99.88%**. In most cases, inconsistencies and erroneous data elements come from a single incorrect reading; as the sample set of data is increased, the more the more accurate and reliable the data becomes (see GPS drift). While not every erroneous piece of data is caught, there are many filters in place to find and eliminate erroneous readings.



Limitations of GPS Technology

Due to all of the independent technologies used to produce GPS data, there are some limitations to GPS technology, which are typically categorized as GPS Drift and Signal Bounce. These limitations are due to factors such as:

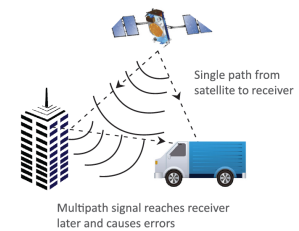
- Satellite positioning
- Satellite health status
- Radio frequency interference
- Natural and man-made obstructions
- Atmospheric interference

GPS Drift

GPS drift refers to the magnitude of inaccuracy of a device's positional data (e.g., the number of meters within CEP). Drift may occur when GPS satellite constellation patterns change, the device enters an area with poor reception, or other conditions that are out of our control. Erroneous data points that are occasionally created by GPS drift are primarily noticeable within calculations that are affected by single points of data, such as instant speed data and g-force calculations. Therefore, this type of data is best used at a summary level.

Signal Bounce

GPS satellites send signals to our units using radio frequencies, which are occasionally subject to interference and signal bounce off of large objects (e.g., buildings, overpasses, and mountains/natural obstructions). When our unit is close to these objects, there is a chance that the signal from the satellite will bounce off of these objects, and cause our unit to incorrectly calculate the timing of the signal, which will affect the unit's calculation for its location. When this issue does occur, the erroneous data is usually more pronounced than what you would find with GPS drift, and you can typically isolate the cause when reviewing vehicle history (i.e., the vehicle was driving under large overpasses on freeways or traveling through large metropolitan areas surrounded by high rise buildings).



Other Considerations

GPS Insight receives posted speed limit data from third-party vendors. The quality of this information is determined by the municipalities that provide the information to the third-party vendors. Major metropolitan areas have a very high degree of accuracy in regard to posted limits, while rural areas tend to have no posted speed limit data, or outdated data. Additional considerations that impact posted speed limit data include:

- Recent changes in posted speed limits that are not yet reflected in our data
- Construction zones / temporary speed limits
- GPS drift on highways that may be reporting the location of the vehicle on a parallel road or service road

GPS Insight provides you with the ability to **report incorrect speed limits** within the speed violations report. GPS Insight recommends that users thoroughly research and validate all speed-violation incidents prior to taking any action on a reported speed-violation. Read more about speed definitions.

More reference materials:

- Is the location of your car or truck incorrect on the map? Check out [Updating a Vehicle's Location](#).