



How Location Tracking Works

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Tracking Technology

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Location tracking is not one, single technology. Rather, it is the convergence of several technologies that can be merged to create systems that track inventory, livestock or vehicle fleets. Similar systems can be created to deliver location-based services to wireless devices.

Current technologies being used to create location-tracking and location-based systems include:

- **Geographic Information Systems (GIS)** - For large-scale location-tracking systems, it is necessary to capture and store geographic information. Geographic information systems can capture, store, analyze and report geographic information.
- **Global Positioning System (GPS)** - A constellation of 27 Earth-orbiting satellites (24 in operation and three extras in case one fails). A GPS receiver, like the one in your mobile phone, can locate four or more of these satellites, figure out the distance to each, and deduce your location through trilateration. For trilateration to work, it

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must have a clear line of sight to these four or more satellites. GPS is ideal for outdoor positioning, such as surveying, farming, transportation or military use (for which it was originally designed). See [How GPS Receivers Work](#) for more information. Photo courtesy U.S. Department of Defense **Artist's concept of the GPS satellite constellation**

- **Radio Frequency Identification (RFID)** - Small, battery-less microchips that can be attached to consumer goods, cattle, vehicles and other objects to track their movements. RFID tags are passive and only transmit data if prompted by a reader. The reader transmits radio waves that activate the RFID tag. The tag then transmits information via a pre-determined radio frequency. This information is captured and transmitted to a central database. Among possible uses for RFID tags are a replacement for traditional UPC bar codes. See [How RFIDs Work](#) for more information.

- **Wireless Local Area Network (WLAN)** - Network of devices that connect via radio frequency, such as 802.11b. These devices pass data over radio waves and provide users with a network with a range of 70 to 300 feet (21.3 to 91.4 meters).

Any location tracking or location-based service system will use one or a combination of these technologies. The system requires that a node or tag be placed on the object, animal or person being tracked. For example, the GPS receiver in a [cell phone](#) or an RFID tag on a [DVD](#) can be used to

track those devices with a detection system such as GPS satellites or RFID receivers.

In the next section, we'll take a look at how location tracking can be used to streamline supply chains and track fleets of trucks, ships and planes.

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