

UWB Asset Tracking



The Challenge: Keeping Track of Your Important Assets

Tired of spending valuable time tracking down your key fixed or mobile assets or equipment? How about trying to improve and optimize the efficiency of your warehouse operations? Do you find yourself struggling to understand your equipment utilization? Or more importantly, are you able to warn your employees in time to keep them safe—before they enter hazardous areas?

If any of these scenarios sound familiar, then you may want to consider creating an asset-tracking infrastructure using ultra-wideband (UWB). You provide the assets and FiRa®-certified technology helps you track their precise location. The end result? Enhanced safety and loss prevention as well as a more efficient work environment.

The Solution: Asset Tracking with Uplink Time Difference of Arrival (TDoA)

Unlike other technologies, UWB provides real-time positioning with up to centimeter-level accuracy for many devices so that you can easily locate all those valuable assets. This is why the FiRa Consortium is defining powerful asset tracking solutions based on UWB technology. These solutions rely on **Uplink TDoA** and are based on a synchronized **anchor infrastructure** and simple, power-efficient, and long-lasting **tag devices** equipped with UWB.

Tags transmit UWB messages that are received by the anchor infrastructure, enabling the latter to estimate the locations of the tags attached to your (mobile) assets.

Elements of an Uplink TDoA Infrastructure

The infrastructure consists of multiple UWB-equipped anchor devices that are installed in the facility where you want to perform asset tracking. This could be a warehouse, office, hospital, or any other location with assets that need tracking. Asset tracking with Uplink TDoA is flexible and versatile, empowering you to tune it to your very needs.

The anchors are fixed UWB-equipped devices whose positions are known. Upon receiving a tag message, anchors measure the received timestamp of the message, or in other words the time of arrival (ToA) of the signal. Then anchors report their measured ToA to a localization engine that compares them, obtaining various TDoA measurements that are used to precisely estimate the location of those assets. For each message a tag transmits, the infrastructure computes one tag position. One message, one location.

To be able to locate the tags, anchors actively listen for tag messages as well as synchronization messages from other anchors, which are fundamental to performing TDoA localization. Anchors must be synchronized for the localization engine to be able to compare ToAs and obtain TDoAs. As wireless signals travel at the speed of light, anchors should have good time synchronization. While this can be a difficult endeavor for many other wireless technologies, it isn't for UWB.



Tracking Accurately

UWB's very narrow pulses provide excellent time resolution, allowing UWB receivers to precisely determine the ToA of a signal. This enables the anchor infrastructure to accurately timestamp not only the tag messages but also the synchronization messages from other anchors, easily yielding sub-nanosecond-level time synchronization. The best part is that the synchronization is wireless, reducing the complexity of deploying the anchor infrastructure.*

Thanks to these narrow pulses, UWB technology can track assets with up to centimeter-level accuracy—much more precise than other wireless technologies. Because of this, UWB excels at tracking motion and direction, and its notable accuracy can help industries such as logistics, healthcare, manufacturing, and warehousing save time and money.

*Anchors may be mains-powered and need wired connections, e.g., to communicate with the localization engine.



Tracking in Real Time with Real Benefits

With FiRa's Uplink TDoA, you can track your assets at the frequency you need whether it is many times per second or once a day. Interested in tracking semi-static objects? You can track them every hour and forget about battery life. Interested in tracking fast-moving objects? Then configure your tags to transmit multiple times per second. This capability makes UWB in general, and Uplink TDoA in particular, a key enabling technology to build a real-time location service (RTLS) at your facility. The data UWB provides gives companies valuable insight into where their fixed and mobile assets are at any given moment and helps to ensure employees are safe. This can help improve supply chains, inventory control, space utilization, workforce management, and overall costs.

These asset-tracking solutions enable real-time tracking of any asset or person. In organizations like hospitals or high-risk locations, seconds matter, which is why UWB technology's real-time capabilities matter.

UWB Asset Tracking = All-Around Operational Improvements

Once you deploy a FiRa-enabled asset-tracking infrastructure, you can start tracking all your assets and make informed decisions to improve the operational efficiency of your facility. UWB asset tracking can also help businesses save money due to the improved organizational optimization and enhanced loss prevention provided by asset location awareness.

Want to know more? Check out firaconsortium.com.