



Managing Asset Location Tracking in a Large Industrial Site



The push to increase efficiency in manufacturing – whether driven by cost pressures or the desire for reducing waste, carbon dioxide and other environmental benefits – will tend to introduce more ‘smart’ systems such as asset location. This allows businesses to redeploy their workforce for higher skilled higher value roles.

Increased automation of plant and machinery, the need to maximise the utilisation of expensive machinery, and the management of high value goods or part completed goods, require more reliable-time access to asset location. Using a range of wireless communications protocols, the Internet of Things (IoT) technologies can deliver this data when and where you need it most.

Asset Location

Asset location has previously meant the use of GPS and other GNSS satellite systems to give position, communicating that position with wireless technologies such as cellular radio. Here at Chronos, we have been active in the GPS and GNSS space for many years, especially in detecting jamming and interference. The 'classic' use case is the hidden tracker for high value vehicles feeding back position via a 3G modem.

GNSS solutions though tend to be a heavy draw on batteries and require other technologies to backhaul position data. You also need to see the sky to use GNSS - these signals are not easily received indoors or underground, although I have talked about the possibilities of Underground GPS and GNSS in other blogs.

Other wireless technologies do, however, allow managing asset location in locations generally outside of satellite coverage. Some are suitable for indoor coverage, but some can deliver for sites requiring both indoor and outdoor coverage.

This location data can be within meters - "this room", "at the far end of this yard" or sub 50cm in three dimensions - "this shelf".

Solutions exist to deliver the appropriate resolution - sometimes in combination through the same system - with choices available to you on power draw and hence battery life.

Wireless Asset Tracking

Several wireless technologies are available to support asset tracking. These include Wi-Fi, Bluetooth and Ultra-Wideband (UWB), and some Low Power technologies (such as LPWAN). They can be used either alone or sometimes in combination.

Bluetooth

Bluetooth is a technology familiar to many of us. Beacon technologies utilising Bluetooth LE (Low Energy) such as Apple's iBeacon and Google's Eddystone can deliver location to devices 10m or more from a beacon, and a longer range up to 70m and beyond.

Scale of beacon deployment is dependent on the accuracy of position required. For example, 'same room' or 'within a certain physical distance'. In an industrial setting, 'same room' may be sufficient and so a single beacon can adequately cover a space. Deploying multiple beacons in a space though allows you to triangulate position with adequate accuracy.

It's important to remember that beacon protocols are one-way communications – the beacon transmits, and the device receives. The receiving device would typically be a smartphone running an app, and although it's possible for these app instances to be centrally managed, Standalone Bluetooth beacons do not really lend themselves to industrial applications, particularly for security, manageability and resilience - but used in conjunction with existing wi-Fi systems and utilising techniques such as Angle of Arrival; BLE solutions (for example from AiRISTA Flow) can deliver this sub metre position resolutions.

MioTy LPWAN

There are a variety of IoT devices and gateways using Low Power, license-free radio systems. Some use proprietary protocols – a reason perhaps to be very sure of their benefits for you to use them – which allows for flexibility in deployment design and management. Many rely on LoRa (derived from Long Range) and the MioTy LPWAN (Low Power Wide Area Network).

It's not possible to really comment on the pros and cons of particular proprietary systems for asset location, but many of them will be operating at MHz rather than GHz frequencies thus giving larger coverage than Bluetooth operating at 2.4GHz.

There are fundamental differences between LoRa and LPWAN that can really point you in the right direction for your application. LoRa is a point-to-point protocol whereas LPWAN is a mesh networking protocol.

If you have clear demarcation of locations or a 'same room' requirement, then LPWAN is a solution worthy of consideration. LPWAN, being a mesh protocol, lends itself to large and shifting spaces and situations that are evolving and require a more scalable system. This is often not even an 'either or' choice. WiTTTRA, for example, have gateway devices available supporting both LPWAN and LoRA systems.

Backhaul

1. LTE and 5G

Mobile carriers across the world deliver primarily backhaul services supporting NB-IoT (Narrowband Internet of Things) and/or LTE-M (Long-Term Evolution Machine Type Communication), and many IoT systems support these as well as or instead of wireless and wired networking.

In 5G, the evolution and development of NR (New Radio) is bringing solutions like RedCap (Reduced Capacity) into the industrial sphere. NR promises simple, scalable solutions and RedCap seems ideally suited to backhauling data from wearables, video surveillance and wireless sensors.

The drive for adaption of 5G technologies could offer you a great opportunity. Deploying Private 5G in your location as the communications for your Digital Transformation, as well as other voice and data servers you require.

2. LoRa

LoRa and MioTy LPWAN can also support backhaul of environmental as well as other data of use in an industrial setting, and Semtech's LoRa Edge™ technology can utilise both GNSS (outdoor) and Wi-Fi scanning for position.

Managing Asset Locations

Many of the systems for managing asset locations will include a dashboard management system. This is typically cloud-based but perhaps on premises. In the case of manufacturing goods, the system should also include planning and scheduling tools for piece parts, especially large ones that require careful movement between stations that could be some distance away.

Ultimately, I think that success in these projects is more about the company and its people rather than the technologies used in delivery. This data is too important to the company to belong to one team or small group. Creating a location silo is a recipe for failure.

The Asset Location system will probably be one of many systems deployed as your company transforms. Each system with its own platform and its own ways. The importance of a 'dashboard of dashboards' sitting above these systems cannot be understated. This will allow a holistic view of operations and facilities while allowing users to 'drill down' to the system should the need arise.

Summary

The ability to track devices, goods, and part-manufactured goods as part of a Digital Transformation process can deliver process efficiencies across your whole business. The prospect of using that very same system to track assets offsite – ultimately to your customers' premises – makes 5G technologies attractive for at least part of this transformation piece.

Whatever path you choose, don't expect to do everything at once. Don't even attempt it without wide engagement across teams and the wider company. Pilot in one or two important or easily accessible locations and be prepared to fail! It's part of the process.

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