

# Asset Tracking Devices: Getting to the Next Level







Shaping the IoT future

### Asset tracking market growth

Asset tracking technologies enable a product's status to be captured through the value chain and to identify and verify its path. Now timely knowledge of the location of assets being transported and their condition has become even more important. Moreover, a wider range of goods is being transported across wider areas including oceans and continents. There are more cargo types, some of which require special conditions

*Figure 1.* Expected asset tracking revenue values and growth rate worldwide 2023-30



in transit: for example, refrigeration for fresh foodstuffs, pharmaceuticals, and vaccines. Better location accuracy is demanded to identify cargo theft and loss, also to give shippers the ability to change routes in case of geopolitical issues. Digital Matter is working hard to bring leading edge technologies to this market.

The size of the overall asset tracking market is substantial, comprising around 24% of the total IoT market value in 2023. Included in this valuation are all location tracking applications, although some devices may also capture data on other attributes. It does not include applications where location is not monitored, such as condition monitoring and status monitoring.

The expected revenue values and growth rate for the 2023-2030 forecast period are shown in **Figure 1**. In terms of IoT connections, Beecham Research estimates that the number of active installed IoT asset tracking devices was 4.5 billion in 2023. This is predicted to increase to 14.0 billion in 2030 at a CAGR of 17.6%.

## In 2024, there continue to be many risks and challenges faced by businesses. For example:

- Cargo thefts are on the rise, at best delaying shipments and at worst resulting in the total loss of goods. In Q1 of 2024 in the U.S.A. alone, CargoNet reported 925 cargo theft incidents, worth an estimated USD154.6 million.
- Up to 20% of food is spoilt and 13% of pharmaceuticals lost globally during transportation - amounting to a huge amount of waste. In fact, McKinsey estimates that \$600 billion of food is wasted globally either during or after harvest, whilst KIWI Technology predicts that 950 million people could be fed with food currently lost to broken cold chains.
- Increasing incidences of vehicle theft impact businesses and consumers alike leading to loss of revenue and higher insurance premiums. According to Interpol, "In 2023, around 74,917 motor vehicles were identified as stolen."
- Livestock rustling continues to be a costly problem for farmers in many regions. Within South Africa alone, livestock theft cost farmers \$81 million in 2021, according to iSiTECH. Similarly, in Venezuela, around 700,000 cattle (7% of the total cattle population) are smuggled or rustled each year.
- Inability to locate equipment in hospitals wastes man hours and hinders the care of patients. A Nursing Times survey found that more than one-third of nurses spent over an hour per shift trying to locate essential medical equipment – the equivalent of 40 hours per month.

 Untracked workers in higher-risk jobs can result in unnecessary injuries or even loss of life. According to the Bureau of Labor Statistics, the construction industry recorded the third-highest rate of all recorded injuries and illnesses in the U.S. workplace, with nearly 20% of U.S. workplace deaths attributed to the construction industry.

This expectation of high demand for asset tracking is reflected in recent 2024 survey findings by Beecham Research. **Figure 2** shows an anticipated high growth in use of asset tracking over the next few years. 75% of respondents anticipated over 10% growth in the next 24 months, with 45% anticipating more than 20% growth.

**Figure 2.** How do you expect the need for asset tracking in your business to change over the next 24 months, in terms of number of connected items?



### **Digital Matter – responding to these challenges**

Digital Matter is a leading global developer of low-power GPS and IoT hardware for asset tracking and management applications, offering a large portfolio of integration-ready battery-powered asset tracking devices across a range of connectivity technologies. Headquartered in Perth Western Australia, the company was founded in 2001 and now is active worldwide, with offices in the Netherlands, South Africa and the USA.

Digital Matter's business model is to supply specialised tracking devices to channel partners that build solutions for their clients. This channel model has allowed it to scale rapidly into over 1000 partners in over 120 countries, as well as release new products and innovations into the channel.

Digital Matter's wide range of partners include:

- Telematics Businesses enabling them to enter new markets, scale, and reduce OPEX costs
- IoT Solution Providers / System Integrators, helping them to integrate, provision solutions and go-to-market faster
- Enterprise / OEMs helping them to protect and derive value from the assets that matter
- Network Operators helping them accelerate the adoption of their IoT networks and generate new revenue streams.

The company's portfolio of white-label battery-powered and wired asset tracking devices come with a range of connectivity and location technologies. They include the Oyster Edge, the Oyster3 for Bluetooth and for LoRaWAN, the Yabby Edge for cellular and LoRaWAN, and the Barra Edge. The latest product, the Manta Fusion, was launched in November 2024.

Recognising that the connectivity and component landscape is always evolving, the company aims to stay on top of the latest advances, especially concerning power consumption. Its battery-powered devices are engineered to achieve maximum battery life, with ultra-low power consumption for 'deploy once' battery life.

The portfolio also comprises GPS and IoT hardware, device management and asset tracking software, certification management, integration support, and technical and sales training. This aids partners to go to market faster with secure and reliable IoT asset tracking solutions. The company's device management platform is crucial for optimising device performance; with over 200 adjustable parameters, it ensures that partners can fine-tune performance based on their use case.

The company also collaborates with businesses to develop custom solutions; if its existing range does not meet a specific use case, it can quickly build a solution using its technology stack (PCB, firmware, housing, manufacturing, testing, certification).

In an example of a collaboration, One NZ, New Zealand's largest IoT connectivity provider, has partnered with Digital Matter to offer end-to-end IoT asset tracking solutions for New Zealand businesses. One NZ has bundled several of Digital Matter's battery-powered IoT asset tracking devices and white-label asset tracking software directly with One's best-in-class LTE-M (Cat-M1) and NB-IoT connectivity and in-house technical support, to provide a fully managed, end-to-end asset management solution.

### Manta Fusion – indoor/outdoor technology in a single, powerful solution

The Manta Fusion device is engineered to deliver reliable and highly accurate location updates with a battery life of over 10 years through movement-based tracking. Key features of the device that enable the next development in Digital Matter's tracking solutions include:

- Multi-Mechanism Location Determination: The Manta Fusion utilises a combination of true GNSS (Global Navigation Satellite System) location detection, Wi-Fi scanning, and cell tower positioning to achieve high location accuracy both indoors and outdoors.
- Ultra Efficient Low-Power Technology: The device optimises battery life without compromising performance, through the use of a low-power Sony GNSS chip similar to that used in smartwatches.
- Flexible Monitoring Capabilities: Users can prioritise location technology based on their specific use cases, ensuring that the most effective tracking method for the purpose is utilised.

Designed with a low-profile form factor, the Manta Fusion allows for discreet installation, while its rugged IP68 housing constructed from durable nylon glass material ensures exceptional protection against environmental challenges. The battery holder is integrated into the housing, providing improved heat resistance and a lower cost, while the new design allows for easy activation and tamper detection using a magnet.

Additionally, Digital Matter's upcoming Cat 1bis version of the Manta Fusion will offer global roaming capabilities with low power consumption and satellite fallback options. A further innovation, Energy Saving Protocol (ESP) will provide significant battery life improvements with on-demand location and recovery mode features, further enhancing the device's utility.

In summary, the Manta Fusion represents a significant development in tracking technology available, ideal for businesses that prioritize location determination, location accuracy, without having to compromise on performance or longevity.



#### Figure 3. Digital Matter Manta Fusion Device

### **Location Engine**

Digital Matter provides its Device Manager platform as a webbased platform solution for partners to manage devices overthe-air (OTA).

Digital Matter has developed the Location Engine (LE) as a module of their Device Manager to perform server-side processing of device data for devices that use alternative lowpower techniques, like the 'Edge' based devices. This technology allows the devices to operate at extremely low power levels. In short, the 'low power techniques' typically mean that the device quickly scans for GNSS (GPS), Wi-Fi and cell tower information, and rather than computing this on the device - the raw data is sent, to be resolved by the Location Engine.

The services included with Location Engine cover:

- Resolving GNSS scan data to locations
- Location lookups using Wi-Fi location data
- Location lookups using cell tower data (if applicable)
- LoRa Edge device management (if applicable)
- LoRa gateway triangulation (if applicable)
- Sending GNSS almanac data, and current position down to the device to ensure the GNSS performs well
- Other data enrichment processes
- The configuration and management of the processes, including which filtering options, and which location services to use

The Location Engine (LE) is a robust Cloud solution that comprises queues and scalable virtual functions to ensure that messages are processed in order and delivered to the defined Endpoint Server. **Figure 4** illustrates the steps in using the LE for a Yabby edge device:

Figure 4. Using the Location Engine with cellular devices



1. The 'Edge' device scans for GNSS, Wi-Fi and cell signals. How this is handled can be configured.

2. Devices send this 'raw' GNSS, Wi-Fi and Cell ID data to Device Manager

**3**. Device Manager manages device firmware, settings, debugging and more

**4**. A 'connector' must be set on the device to then pass the the data to the Location Engine

**5**. Data enrichment is performed. The device resolves the location via a variety of services. To compute the

lat/long from the raw data. The "Lookup Settings" can be configured via the OEM UI. These settings determine which services to use and other options

**6**. A "Forwarder" defines where the enriched data (with solved position) must go.

**7.** Location Engine also performs other important functions ensuring device performance inc. sending GNSS Almanac data and position to the device.

**8**. The customer endpoint receives the location data in JSON format.

### **Case Studies**

Tracking and Tracing use cases vary greatly in terms of functionality, device size, and power requirements. By engaging with partners, Digital Matter identifies market gaps and strives to fill them where it makes commercial sense. Below are two use cases using Digital Matter tracking technology: they entail tracking machinery and machine parts.



### Case Study – Jet Engine parts tracking

#### The Challenge

The 2020 pandemic forced a large manufacturer of aircraft parts to leave critical assets unattended in an uncontrolled environment. The assets became unusable, resulting in a substantial financial loss for the company.

To improve visibility in its supply chain, the manufacturer selected Digital Matter's Oyster Edge battery-powered Indoor/Outdoor GPS asset tracking and Bluetooth Gateway to monitor the location and condition of its critical aircraft assets as they moved globally through production, storage and delivery.

#### **The Solution**

Digital Matter's Oyster Edge device is installed on the asset's transportation stands, enabling complete visibility as the asset moves between indoor and outdoor environments. The device supports GNSS and Wi-Fi positioning technologies as well as Advanced Cellular Tower Location.

#### Other features include:

Supporting 10+ years of battery life, reducing operating costs by minimizing physical device management.

Transferring the location processing workload traditionally handled on the device to the Cloud for power savings.

Connecting to global low-power Cellular IoT Networks (LTE-M (Cat-M1) / NB-IoT) and supporting cross-network and cross-carrier roaming; affording complete visibility as the assets move regionally and nationally.

The Oyster Edge also functions as a Bluetooth Gateway to any third-party Bluetooth accessory.

The Oyster Edge also supports impact (high G-Force) monitoring with alerts, allowing the manufacturer to identify where assets are experiencing rough conditions.

The Oyster Edge is programmed, updated and debugged over the air, allowing the manufacturer to take full control of device functionalities remotely and at scale. Finally, device data is securely integrated with an asset management platform where location data, reporting, and alerts are managed.

#### **The Benefits**

By providing visibility of critical high-value assets in transit, the Oyster Edge allows the manufacturer to authenticate their location at any time, track speed of movement, arrival times, and monitor storage conditions. The Oyster Edge also enables a competitive advantage with sustainability as there is less 'waste'.

### Case Study - 'Heart of the Nation' external defibrillator

### The Challenge

Heart of the Nation is a non-profit charity which is leveraging IoT asset tracking technology to enhance Automated External Defibrillator (AEDs) accessibility across Australia. It partnered Inauro to build a comprehensive database of defibrillators across the country.

Some 30,000 Australians experience cardiac arrest each year. With 300 accessible connected AEDs already deployed and a database of over 7000 currently available, the partners have significantly increased awareness about cardiac arrest and the importance of the Chain of Survival. The Charity's vision is to enable access to AEDs within one minute of all locations across Australia.

#### **The Solution**

Leveraging Digital Matter's battery-powered GPS tracking devices and Inauro's IoT platform, Perspio<sup>™</sup>, AED locations are displayed in real-time in the Heart of the Nation Mobile App and Web Platform.

Since AED's are susceptible to theft, owners often store them in secure locations, which can hinder public accessibility when needed. To overcome this, Heart of the Nation actively encourages local councils and community clubs to ensure the security of their AEDs while still making them easily accessible. The Perspio platform offers Recovery Mode, allowing for near real-time GPS tracking to locate stolen or misplaced equipment.

In addition to ensuring that the machines are in working order at all times, Inauro's custom-built platform allows for battery data to be extracted separately from the device's location and notify owners of any maintenance required on the AED machines.

#### **The Benefits**

The collaboration between Heart of the Nation, Inauro, and Digital Matter has significantly improved public health and emergency response in Australia. Making the defibrillator database readily accessible to the public has the potential to save numerous lives.

Says Greg Page, CEO and Founder of Heart of the Nation, "The tracking and management of AEDs via the IoT is a huge step forward for making AEDs publicly accessible and helping to ensure they are always rescue-ready." **66** The tracking and management of AEDs via the loT is a huge step forward



### Conclusion

Digital Matter's Manta Fusion device is engineered to meet today's track and trace market needs, through:

• its integration ready engineering

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- its low power requirements
- the choice of connectivity making it suitable for indoor and outdoor tracking.

The portfolio also comprises GPS and IoT hardware, device management and asset tracking software, certification management, integration support, and technical and sales training to help channel partners develop their solutions. The company can also assist businesses to develop custom solutions using its technology stack (PCB, firmware, housing, manufacturing, testing, certification).

**Beecham Research** is a leading technology market research, analysis and consulting firm established in 1991. We have specialized in the development of the rapidly-growing Connected Devices market, often referred to as M2M and IoT, worldwide since 2001. We are internationally recognised as thought leaders in this market and have deep knowledge of the market dynamics at every level in the value chain.

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Our clients include component and hardware vendors, major network/ connectivity suppliers, system integrators, application developers, distributors and enterprise users in both B2B and B2C markets. We are experts in M2M/IoT services and platforms and also in IoT solution security, where we have extensive technical knowledge.



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