Magic Quadrant for Indoor Location Services

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Real-time location of people and critical assets is now required for safety, compliance and cost optimization. Infrastructure and operations leaders should assess vendors based on their ability to meet multiple indoor location opportunities and address new employee safety and compliance use cases.

Market Definition/Description

Gartner defines the indoor location services market as “the hardware, software and service components that provide indoor location coordinates and services.” Indoor location solutions use differing hardware components, data collection methodologies, location data elements, location engine algorithms and architectures to achieve the core functionality of the indoor location market. Solutions look to provide the location of a static/mobile asset or person, as defined by the needs of the specific vertical market.

Location services provide the x, y and z location of business-critical assets within one meter (i.e., three feet) to address six major usage scenarios in diverse markets, including:

- Static/fixed-asset monitoring applications
- Mobile assets using location technology to address zonal requirements
- Mobile/fixed assets with real-time location requirements
- People tracking
- Critical-asset tracking
- Peer-to-peer distancing, including presence/proximity detection

Must-Have Capabilities

The must-have capabilities for this market include:

- A mobile asset tracking component that attaches to, or is integrated within, an asset that communicates data to location algorithms in a location engine to determine the location of a defined static/mobile asset or person.
- Data communicated via a defined and publicly documented API, even though the granularity of the location may depend on the vertical market where it is being used.
- A location engine that can be located as an on-premises application, on an edge computing platform or in the cloud.
- An application that provides firmware updates, OS and application updates to all components of the solution.
- An application that monitors and communicates the operational aspects of the asset tags, including battery statistics and button or light status.

Standard Capabilities

The standard capabilities for this market include:

- Indoor location solutions may collect location data by using one or more radio frequency technologies, including 125KHz, 13.56MHz, 433MHz, 900MHz, 2.4GHz, 5GHz, Wi-Fi, Bluetooth low energy (BLE) or ultrawideband (UWB), as well as optical sensors and image analytics, such as passive infrared (PIR) and computer vision-based systems.
- Indoor location solutions must use proprietary overlay infrastructures or existing enterprise network infrastructures to communicate among defined components.
- Platforms must use visible light communication, ultrasound, light detection and ranging (lidar), geomagnetism, fingerprinting or any technology or combination of technologies to provide x, y and z location data to a location engine.
- Indoor location solutions provide x, y and z coordinates for assets being tracked, but the specific granularity will depend on the market where the solution is being deployed. Most clients are looking for 1-meter granularity.
- Indoor location solutions may provide analytics that analyze the location data and provide reporting.

- Detection and alerting capability to support asset tracking in adverse conditions and movement from defined locations.
- Some vertical markets may require industrial components that meet IP64 certification or greater, meet defined U.S. military standards (MIL-STDs) or operate in explosive environments.

Optional Capabilities

Optional capabilities for this market include:

- Integration of location solutions with other sensors within the tag to monitor additional attributes, such as the temperature, humidity, vibration sensing or battery life of the tag.
- Solutions may be integrated with mapping applications, wayfinding applications, vertical market applications or software development kits (SDKs) that use the indoor location service coordinates.

Magic Quadrant

Figure 1: Magic Quadrant for Indoor Location Services

Source: Gartner (February 2024)

Vendor Strengths and Cautions

AiRISTA

AiRISTA is a Leader in this Magic Quadrant. AiRISTA provides an end-to-end solution for real-time location system (RTLS) functionality via its sofia software platform, using the company's own (people and asset) tags and third-party devices. The sofia software platform manages all location components and provides visualization of real-time asset tracking and analytics insights. The solution can ingest location data from a wide range of technologies, such as Wi-Fi, BLE, IR, passive RFID (900MHz) and near-field communication (NFC). The vendor achieves submeter accuracy with BLE angle of arrival (AoA). AiRISTA's solution integrates

with third-party infrastructures and ERP and electronic health record (EHR) applications. AiRISTA serves a global customer base across a variety of verticals.

Strengths

- **Variety of technologies and next-generation BLE AoA infrastructure:** AiRISTA supports technologies including passive RFID (900MHz) and NFC for critical asset tracking. Its 5.1 BLE AoA gateways (readers) achieve submeter location accuracy including x/y/z axis information.
- **Asset tag options:** AiRISTA has a large variety of asset tags in its portfolio, including the A7, a lower-cost BLE-enabled tag, and the W8, a reusable and recyclable wristband.
- **Low-code developer framework:** AiRISTA Flow Studio, a low-code application development framework, allows enterprises to develop customized workflows through a published API and integrate with other applications, such as Internet of Things (IoT) apps.

Cautions

- **Limited presence beyond target verticals:** AiRISTA's presence outside its core markets (healthcare, manufacturing and hospitality) is limited.
- **Potential for vendor lock-in:** Two-way communication and full over-the-air capabilities may require the vendor's proprietary asset and people tags.
- **Limited industry strategy:** For specific capabilities such as collision avoidance in the manufacturing or distribution center sectors, customers will need to turn to AiRISTA's approved partner solutions or alternative vendors.

Blueiot

Blueiot is a Niche Player in this Magic Quadrant. The BlueIOT Positioning System delivers an end-to-end RTLS platform that provides BLE tags and anchors, in addition to software and services. Blueiot's operations are geographically diversified, though its clients are located primarily in Asia/Pacific and Europe. The BlueIOT Positioning System tracks the movement of people and items with high precision in real time, using Bluetooth AoA. Blueiot focuses on employee safety, smart buildings and manufacturing.

Strengths

- **Richness of BLE offering:** Blueiot uses standards-based BLE AoA uplink and downlink tag communications. It leverages existing network infrastructure to communicate to its

positioning engine and upstream applications, which eliminates the need for proprietary infrastructure.

- **Cloud-ready open APIs:** Blueiot provides a common set of methods and protocols that allow integration of partner or third-party applications.
- **Battery life of tags:** Blueiot's tags can operate for three to five years, depending on standby time requirements.

Cautions

- **Limited ability to track people or critical assets:** Blueiot supports only BLE tags, which, because of 2.4GHz absorption, may limit its ability to track people or critical assets.
- **Limited technology integration beyond BLE:** According to client inquiries and Gartner research, multiple technologies are needed to meet the use cases identified in the market.
- **Limited sales strategy:** Blueiot generates over 50% of its revenue in Asia/Pacific and more than 28% in EMEA. Prospective customers must ensure that sales operations and support are available in their geographies.

CenTrak

CenTrak is a Challenger in this Magic Quadrant. CenTrak delivers its Clinical Grade locating solution, which includes a complete set of hardware, software and services, primarily to the healthcare sector. CenTrak's operations are geographically diversified, though its clients are located mostly in the Americas and Europe. Its RTLS/RFID solutions extend to other verticals — such as correctional facilities, hospitality, retail and senior care — leveraging its patented Second Generation Infrared (Gen2IR) solution, passive low-frequency (LF) RFID, active and passive ultrahigh-frequency (UHF) RFID, BLE, and Wi-Fi providing submeter location accuracy.

Strengths

- **Flexibility of offering:** CenTrak can use either Wi-Fi/BLE, which utilizes the existing network infrastructure, or its proprietary active UHF underlay, which provides extended battery life and faster location updates. Both can use CenTrak's Gen2IR, an infrared solution that provides room-level or better zones.

- **Vertical market scalability:** For staff duress situations, CenTrak's Connect Pulse service provides a low-latency response with the ability to scale to over 10,000 devices. CenTrak can deploy location services to markets other than healthcare via partners.
- **Integration capabilities:** CenTrak offers good integration with leading partners in the industry, such as HID Global, Cisco Systems and Hitachi, via a new cloud-to-cloud approach.

Cautions

- **Limited vertical focus:** Enterprises deploying solutions outside CenTrak's target markets (for example, in manufacturing) may have to look for different solutions.
- **Proprietary overlay network:** The UHF overlay infrastructure option adds cost to the overall solution.
- **Limited presence in Asia/Pacific:** Ninety percent of CenTrak's revenue comes from the Americas and EMEA. Prospective customers must ensure that sales operations and support are available in their geographies.

Cisco Systems

Cisco Systems is a Niche Player in this Magic Quadrant. Cisco Spaces provides Wi-Fi and BLE location services over Cisco's Catalyst, Meraki and Webex products, with end-to-end, 24/7 monitoring and support. Cisco Spaces offers a variety of services, including room and building occupancy, Wi-Fi analytics, visitor segmentation and contextual engagements that extend the solution's capabilities beyond indoor location. Cisco's operations are geographically diversified. Cisco serves clients, ranging from small to large enterprises, in all markets, and across verticals.

Strengths

- **Device/sensor marketplace:** Cisco offers a choice of more than 50 preintegrated Wi-Fi, BLE and wired devices. Cisco Spaces enables customers to onboard, manage and monitor their devices through one centralized location to avoid managing multiple solutions.
- **Extensibility:** Cisco Spaces Connector supports Connected Mobile Experiences (CMX), and Meraki and Webex connectivity, and provides a scalable and flexible cloud-managed connectivity option.

- **Pricing flexibility:** In addition to licensing based on the number of devices, customers can subscribe to a Cisco Spaces Unlimited license on a per-square-foot basis. Cisco also offers a consumer industry license and an operations license for IoT and advanced Wi-Fi location services.

Cautions

- **Marketing strategy:** Cisco is shifting its marketing focus toward facilities/real-estate managers, which means that its messaging (for Smart Workspaces, for example) for facilities buyers will differ from that used for its historical line of business.
- **Limited ability to track people or critical assets:** Cisco supports third-party Wi-Fi tags and BLE tags, which provide only 5-meter accuracy to track people or critical assets.
- **Product strategy:** For location services, Cisco has more than five offerings with differing licensing and functionality, which is confusing to customers. Some functionality is included in required licenses, while other capabilities require updated applications.

HID Global

HID Global is a Leader in this Magic Quadrant. HID Global's Location Services solution has a broad portfolio, ranging from low-cost, disposable BLE wristbands for healthcare to ATEX-certified tags for industrial solutions. HID Global's Bluzone IoT and AllGuard (formerly GuardRFID) platforms are cloud-agnostic and address the varied requirements of indoor location markets. HID Global focuses on healthcare, smart building, hospitality and industrial markets worldwide.

Strengths

- **Overall viability:** HID Global has continued to expand the diversity of its solutions in the indoor location market with the acquisitions of GuardRFID and Connexient. These extend its installed base into the healthcare and manufacturing vertical markets.
- **Flexibility via active and passive technologies:** Complex use cases require the ability to provide active and passive solutions. The acquisition of GuardRFID provides a 433MHz solution, as well as an expanded tag portfolio to address the specific requirements of healthcare use cases such as employee duress and infant management.
- **Geographical diversity:** As part of ASSA ABLOY, HID Global is able to deploy to a global client base.

Cautions

- **Limited integration of acquired systems:** HID Global has completed multiple acquisitions and is working to integrate the resulting separate solutions into a single product. Today, however, they still operate largely as stand-alone solutions.
- **Partner expertise:** Partners of companies that have been acquired by HID Global may not have the knowledge or ability to support all the technologies that HID Global offers. This shortcoming might increase project costs and limit technology options.
- **Inconsistent pricing strategy:** As HID Global continues to consolidate its acquisitions, product offerings will vary, moving from perpetual licensing to subscription licensing.

Huawei Technologies

Huawei Technologies is a Niche Player in this Magic Quadrant. Huawei Location Service is a versatile solution that focuses on the healthcare, manufacturing and retail markets. Huawei's operations are geographically diversified, though most of its clients are in Asia. The M+ Fusion Position Engine works with Huawei's campus network infrastructure. It natively provides Wi-Fi and BLE via its access point, in addition to using PCI cards and dongles to ingest location data from other frequencies. The Huawei Network Cloud Engine (NCE) management platform provides security and management for network components through tags that partners provide.

Strengths

- **Flexibility of offering:** For enterprises considering Huawei as an infrastructure solution provider, its offering has the flexibility to embed PCI boards into access points and to use dongles to gather UWB, Zigbee, Thread and RFID data.
- **No requirement for anchors or additional management or security applications:** Because Huawei's Location Service is built on its existing infrastructure, it does not need a separate management or security application.
- **Integration capabilities:** Huawei offers good integration with many location tag and vertical market application partners in China.

Cautions

- **Vendor lock-in:** Huawei's location solution requires its proprietary infrastructure, which potentially locks customers into the offering.

- **Focus of market messaging:** Huawei's location market messaging has been limited, but much of what there has been has focused on outdoor location, specifically using global navigation satellite system (GNSS) technology.
- **Geographic strategy:** The majority of Huawei's location deployments are in Asia/Pacific. Enterprises in Central and South America, the Middle East and Africa must ensure that sales operations and support are available in their geographies.

Inpixon

Inpixon is a Challenger in this Magic Quadrant. Inpixon's RTLS solution detects wireless signals up to 6GHz from its own tags or third-party devices. This allows Inpixon to use BLE, Wi-Fi, UWB, chirp, ultrasonic and cellular signals, and more, to determine location and provide robust analytics. Configurable beacon rates enable UWB tags to provide specific locations (within 1 cm). Inpixon is a global vendor focused on clients in the manufacturing (and other industrial facilities), government and corporate enterprise sectors.

Strengths

- **Platform approach:** Inpixon offers the flexibility to collect data from multiple technologies, along with the ability to address granular and long-range location requirements in industrial as well as line-of-business use cases. The data collection methods can also be combined within a single use case.
- **Tag options:** Inpixon demonstrates innovation by providing multiple tags, from disposable patient wristbands to asset tags to industrial IP68 tags, to address the needs of the manufacturing and healthcare sectors.
- **Position in targeted vertical markets:** Inpixon has a strong presence and strong brand recognition in public sector/government markets. It has also grown significantly in industrial markets with Industry 4.0 solutions and integrations with ecosystem partners like SAP.

Cautions

- **Two different location solutions:** Inpixon has two different offerings (IntraNav and Aware) with differing value propositions, which customers may find confusing.
- **Limited brand awareness:** Partly due to its acquisition of multiple companies and brands, Inpixon struggles with name recognition beyond public sector and government markets.

Enterprises may not be aware of Inpixon's capabilities outside its target markets and geographies.

- **Limited geographical market strategy:** Eighty-five percent of Inpixon's sales are made in the Americas and EMEA. Enterprises should confirm the availability of sales operations and support in their region of the world.

Juniper Networks

Juniper Networks is a Leader in this Magic Quadrant. The Juniper solution provides 1-to-2-meter location accuracy using virtual BLE arrays in combination with machine learning (ML) algorithms, and submeter asset visibility with UWB through partner integrations. Juniper serves a global customer base across various industries, with a strong implementation footprint, specifically in retail, healthcare, education and office spaces. Juniper offers a comprehensive analytics platform that provides insights into the real-time visibility of assets and trends/flow analytics based on user-defined zones. Juniper addresses transitional indoor/outdoor location scenarios using a variety of third-party GNSS-enabled tags.

On 8 January 2024, Hewlett Packard Enterprise (HPE) announced its intention to acquire Juniper. At the time of our analysis for this Magic Quadrant, however, HPE and Juniper were operating as independent entities. Gartner will provide additional insight on this topic as more detail becomes available.

Strengths

- **Open architecture:** Juniper's indoor location platform has an open, programmable architecture, enabling scalability and open APIs for integration with ecosystem partners. Juniper can address a much wider set of location scenarios via important integration partners, including Zebra Technologies and Securitas.

- **Support for multiple technologies:** Users can choose from a variety of technologies and combinations. These range from BLE with unsupervised ML in the cloud, and sensor fusion in a mobile SDK (including virtual beacons for push notifications), to UWB and computer vision systems (through technology integrations), depending on the use-case requirements.

- **Ease of deployment:** Juniper delivers autoplacement/auto-orientation algorithms for its Juniper Mist Access Points. This accelerates deployment for single- and multifloor deployments in environments like retail shops, corporate office space, places of education and airports.

Cautions

- **Vendor lock-in:** Deployment of the Juniper Mist indoor location solution requires Juniper Mist Access Points to deliver location services, complementary Wi-Fi client access services and cloud subscription licenses, which lock customers into a single infrastructure vendor.
- **No tags provided by vendor:** Juniper's product offering does not include its own asset tags, which makes it wholly reliant on ecosystem partners for asset visibility use cases.
- **Limited vertical markets:** The Juniper Mist solution is widely deployed across corporate offices, healthcare, retail and other industries, but Juniper has less experience in manufacturing environments, for which it leverages technology partnerships.

KINEXON

KINEXON is a Leader in this Magic Quadrant. The KINEXON OS platform is an end-to-end indoor location solution consisting of a set of proprietary asset tags, anchors, base stations and software (the KINEXON OS). The system can process a wide variety of location data sources, such as UWB, BLE (2.4GHz), GNSS, RFID and computer vision, to address all requirements, but with a focus on RTLS and zonal use cases. KINEXON achieves 10-cm to 30-cm location accuracy for asset tracking and 10-cm location accuracy with its people-tracking tags, providing x, y, z location coordinates in both cases. KINEXON serves a global customer base, with a focus on the manufacturing, transportation and logistics sectors. Professional sports is another key industry.

Strengths

- **Analytics and process optimization:** In addition to real-time tracking capabilities, KINEXON OS provides three no-code analytics modules: process modeling, process mining and process monitoring. These are designed to identify bottlenecks and perform process optimization in the manufacturing and logistics sectors.
- **Hardware innovation:** KINEXON's platform integrates with the KINEXON e-paper tag that enables UWB-based localization and, at the same time, automated documentation of material flow and order management. The programmable display can also be used for quality control processes and can lead to a significant reduction in paper usage.
- **Open system approach:** KINEXON OS can process location information from a variety of technologies, which provides a high degree of flexibility for clients. KINEXON can provide

centimeter-level accuracy with millisecond latency with its X-Tag, or presence detection at a lower beacon rate, depending on client needs.

Cautions

- **Potential for vendor hardware lock-in:** Although third-party solutions and hardware such as asset tags are interoperable with KINEXON's platform, KINEXON's UWB-based hardware runs best with its proprietary tags to provide granular positioning and scalability.
- **Limited industry strategy:** KINEXON's presence outside its core markets (manufacturing, transportation, logistics and professional sports) is limited.
- **Limited sales strategy:** With 84% of KINEXON's business coming from North America and EMEA, enterprises should confirm the availability of sales operations and support in their geographies.

Kontakt.io

Kontakt.io is a Challenger in this Magic Quadrant. Its Kio Cloud-powered IoT product family provides sensors, cameras, portals and tags, gateways and cloud-based management applications that leverage Kontakt.io's own location engine. The Kontakt.io management application is available only via a SaaS hosted model. Kontakt.io sells globally and is focused on healthcare and smart office workspace opportunities. Kontakt.io analyzes the orchestration of space, resources and staff for the delivery of experiences and outcomes.

Strengths

- **Flexibility of location sensors:** Kontakt.io's portal beam data collection sensor has the ability to collect BLE and IrDA location data. It also serves as a PIR sensor and has a thermal camera for measuring occupancy. All devices, gateways and sensors also provide BLE beaconing for mobile wayfinding. The product family also includes Beam Mini and Anchor Beacon 2 devices for added sensor flexibility.
- **Ecosystem partners:** Kontakt.io has a large ecosystem of tag, device and sensor partners, as well as over 1,200 software vendor partners to address different vertical market applications.
- **Flexibility of migration strategy:** The flexibility of Kontakt.io's solutions allows the ingestion of competitive BLE location data, which enables leverage of existing installations and provides a migration strategy.

Cautions

- **Limited marketing communication voice in the market:** Kontakt.io is not often mentioned by Gartner clients inquiring about end-to-end indoor location solutions. Enterprises outside its target markets and geographies may not be aware of its capabilities.
- **Need for multiple sources for granularity:** To address enterprise requirements for granular location, Kontakt.io's solution may require a portal to provide supplemental data.
- **Availability in Asia/Pacific:** Kontakt.io generates 92% of its revenue in the Americas and EMEA. Enterprises should confirm that sales and support are available in their geographies.

Litum

Litum is a Visionary in this Magic Quadrant. Its RTLS platform uses an underlay mesh network that employs UWB anchors and tags to provide granular location data. This data is combined with a rule-based application platform to locate, track and monitor assets. The platform can also integrate Wi-Fi, BLE and passive RFID, and LoRa/GNSS tags to address a variety of client requirements. Litum's operations are geographically diversified, serving more than 50 countries worldwide. Litum focuses on clients in industrial (manufacturing, logistics, construction, oil and gas, mining, defense), healthcare, corporate enterprise and government sectors.

Strengths

- **Rechargeable tags:** Litum's new-generation location tags are rechargeable, which eliminates the need to change batteries. They can also receive over-the-air remote firmware updates, eliminating the need to update each tag individually.
- **Mesh networking for installation flexibility:** The underlay's mesh-based nodes are AC-powered, with battery backup. They do not require wired connectivity, a feature that opens up new use cases.
- **Enhanced employee safety:** With tag-to-tag detection and a forklift collision warning system, Litum's solution can address employee safety and compliance challenges in its target markets.

Cautions

- **Limited marketing communication voice in the market:** Litum is not often mentioned by users of Gartner's client inquiry service. Enterprises outside Litum's target markets and geographies may not be aware of its capabilities.
- **Lack of z-axis location:** Location tags can provide x and y coordinates but cannot provide z-axis (height) information, which may be needed for industrial applications.
- **Limited sales channel presence:** With over 60% of Litum's sales occurring in the Americas, enterprises should confirm the availability of sales operations and support in their region.

Midmark

Midmark is a Visionary in this Magic Quadrant. The Midmark CareFlow RTLS solution is offered in two platforms: cloud and on-premises. CareFlow Cloud is a cloud-based BLE location offering for asset tracking, staff visibility, staff duress detection and staff reporting. In addition, Midmark has launched CareFlow Analytics, a reporting suite that uses location data to provide operational insights. Midmark's On-Premises Platform primarily uses its IR/RF wired and wireless sensor network, for patient flow, asset tracking, staff visibility, staff duress and analytics. Midmark also has the ability to use Wi-Fi location information from Cisco Spaces, which enables Midmark's solution to be deployed on Cisco's infrastructure and allows for global deployments. Midmark's solution and services are focused on healthcare in both the private and government sectors.

Strengths

- **Customer experience:** Midmark's customer success team and project management focus provide a highly rated customer experience as rated by its customers.
- **Focus on human safety:** Midmark's BLE and IR badge deployment option addresses staff duress requirements and provides operational efficiency by incorporating nurse call communications.
- **Flexibility of product strategy:** Midmark uses a combination of its own proprietary components and third-party technology such as Cisco Spaces to provide flexible deployment options.

Cautions

- **Complexity of underlay architecture:** The use of concentrators, gateways and Cat 3 UDF wiring in Midmark's wired IR sensory network creates a Midmark-specific underlay of additional components that must be managed and that may require a separate security policy.
- **Focus on healthcare:** Midmark focuses solely on the healthcare sector. Enterprises in other sectors must look to other vendors.
- **Availability outside the Americas:** Midmark's sales are concentrated in North America. Its product is not widely distributed in European and Asian markets.

Purple

Purple is a Visionary in this Magic Quadrant. The Purple platform provides asset- and people-tracking solutions for a variety of industries, including healthcare, retail and transportation. Purple's location engine is technology-agnostic and integrates with a wide variety of third-party tags (such as BLE, Wi-Fi, PIR and 433MHz). It can be deployed on-premises or in a cloud. Purple achieves 3-to-5-meter accuracy with BLE implementations and submeter accuracy with its 2D and 3D sensors or UWB-based deployments. Purple serves a global customer base.

Strengths

- **Computer vision capabilities:** Purple's computer-vision-based capabilities can track mobile assets (and people) along their path (via image "stitching"), and identify bottlenecks or other issues along the way. This technology extends to safety use cases, such as fall detection, for which it can trigger alerts.
- **Technology- and hardware-agnosticism:** Purple is a software-only company. Its location engine uses partners for asset tags, people tags, sensors and Wi-Fi infrastructure (if needed).
- **Asset tracking and wayfinding integration:** Purple's wayfinding and asset-tracking capabilities are tightly integrated, enabling users to locate assets and then navigate toward them.

Cautions

- **Lack of end-to-end offering:** Purple is primarily a software vendor that is reliant on OEMs for tags, readers and other potential infrastructure components.

- **Staff duress offering:** Purple has multiple implementations that may not address latency requirements for emergencies.
- **Limited voice in the market:** Purple's platform is largely deployed in the Americas. Enterprises may not be aware of its capabilities outside its target markets and geographies.

Securitas

Securitas is a Niche Player in this Magic Quadrant. Its MobileView platform is an end-to-end indoor location services solution that includes tags, gateway devices, wearables and several vertical applications for RTLSs. The system supports 2.4GHz, 433MHz, 125Khz, ultrasound, and infrared and passive RFID to meet asset-tracking (submeter accuracy) and people-locating (in-room/in-bed) requirements in any healthcare and assisted-living or elder-care environment. Securitas also provides RTLS and environmental monitoring solutions to other industries, including manufacturing and utilities. It serves a global client base, with a focus on North America.

Strengths

- **End-to-end RTLS offering for healthcare:** Securitas addresses a wide range of use cases when it comes to people and asset tracking for the healthcare industry. Use cases include infant protection, elder-care wander management, patient tracking, staff tracking, and asset location and security. Tag options provide motion, temperature, differential pressure and humidity-monitoring capabilities, as well as location data.
- **Partner ecosystem:** Securitas has a large catalog of partners for technologies such as nurse call systems, building automation systems and asset management systems. It also supports third-party BLE from partners such as Cisco Systems and HPE Aruba Networking.
- **After-sales support:** Securitas provides 24/7 technical support by phone. It has a dedicated customer success team that provides guidance on how to run and manage an RTLS.

Cautions

- **Limited cloud capabilities:** Securitas takes a cloud or hybrid cloud approach, but only some of its applications are cloud-based.

- **Limited use cases:** For use cases beyond Securitas' primary focus on healthcare, such as collision avoidance, enterprises may have to look to other vendors.
- **Healthcare focus:** The Securitas sales team focuses only on the healthcare sector, with all other verticals addressed via resellers. Therefore, prospective customers outside the healthcare sector must ensure that these resellers provide service for their industry and geography.

Trio Mobil

Trio Mobil is a Visionary in this Magic Quadrant. The Trio Mobil IoT Platform has several modules, including Trio Safe, FleetBridge, TRUE-AI and Trio Location. The solution uses UWB, BLE and Wi-Fi to provide less-than-1-meter location data, and can be combined with the vendor's TRUE-AI computer vision application to detect over 30 types of assets (people, forklift trucks or other equipment) for industrial use cases. The IoT platform is SaaS-hosted, while the TRUE-AI application resides locally. Trio Mobil has global operations and is active in more than 35 countries, but focuses on the U.S. and EMEA.

Strengths

- **Scalability and innovativeness of architecture:** Trio Mobil's AI-powered IoT platform combines with TRUE-AI computer vision to address complex industrial use cases such as smart geofencing.
- **Forklift safety and collision avoidance system:** This system integrates directly into the vehicle and can adjust the forklift's speed without driver intervention, depending on implemented business rules.
- **Third-party integration:** The communication method used by Trio Mobil's tags is proprietary, but location data can be shared with third-party tools and applications via APIs.

Cautions

- **Product complexity:** Trio Mobil's UWB and BLE indoor location service solutions are separate, with differing components.
- **Lack of z-axis location data:** Trio Mobil's location tags can provide x and y coordinates but cannot provide z-axis (height) information, which may be needed for industrial applications.

- **Limited marketing communication voice in the market:** Trio Mobil's marketing emphasis is on the intralogistics operations sector. Consequently, enterprises may not be aware of its abilities in other sectors.

Ubisense

Ubisense is a Leader in this Magic Quadrant. Ubisense's SmartSpace is an end-to-end platform that uses Ubisense's Dimension4 sensing architecture and integrates with a wide range of location technologies, including multiple hybrid tag options for new use cases. SmartSpace can be integrated with upstream third-party systems of record, such as ERP systems or manufacturing execution systems, via its API or deployed as a stand-alone solution. Ubisense is a global solution provider with geographically diversified operations, which include Japan (for which it has an 8GHz spectrum solution). Ubisense has been serving the market for over 20 years. It has a strong presence in manufacturing, but also serves the transportation, government and healthcare sectors.

Strengths

- **Separation of business into solutions and platform:** Ubisense's solutions business provides turnkey end-to-end solutions. At the same time its platform allows strategic partners and resellers to deploy value-added applications that extend into new markets.
- **Technology investment:** Ubisense has invested in expanding the flexibility of its tag offering, which now enables tags to be used with HPE Aruba Networking access points, provides more hybrid technology options, integrates GNSS technology into tags and provides an e-paper tag.
- **Multitechnology capability and integration:** Ubisense has installations combining several technologies, such as BLE and UWB, to address different use cases and requirements.

Cautions

- **Limited marketing communication voice in the market:** As Ubisense is a relatively small vendor that focuses on specific verticals, enterprises may not be aware of its capabilities outside its target markets and geographies.
- **Potential for improved accuracy to increase cost:** Some high-accuracy deployments may require a mesh underlay, which adds to the cost of the overall deployment.

- **Focused sales presence:** With 80% of Ubisense sales occurring in the Americas and EMEA, enterprises should confirm the availability of sales operations and support in their region of the world.

Wiliot

Wiliot is a Visionary in this Magic Quadrant. Wiliot's Visibility Platform has a battery-free active BLE sticker powered by energy harvesting from radio waves. Stickers have sensing capabilities, in addition to the ability to track location to five or six feet. Wiliot also has a location-as-a-service offering, for which the Wiliot Cloud tracks location, provides alerts, supplies geofencing information, and manages tags and gateways. Tag manufacturing and applications are outsourced to partners. Wiliot is a globally diverse vendor but is focused on North America and Europe. Its current market is large-scale, low-cost item-level tracking, sensing and inventory management in industries such as retail, food distribution, pharmaceutical and logistics.

Strengths

- **Product strategy:** Wiliot's innovative and disruptive technology enables new types of large-scale, real-time active tracking and sensing at very low prices — tags currently cost from 30 cents to 10 cents per unit in volume. Its platform is scalable to millions of tracked items per customer.
- **Technology and channel development:** Wiliot has a strong roadmap both for technology innovation and development of its partner program.
- **Use of standards:** Wiliot works with the Bluetooth Special Interest Group (SIG), the IEEE and 3GPP to standardize some elements of its technology and communication protocols in order to lower tag costs and accelerate adoption of active tag solutions.

Cautions

- **Limited scalability:** Customers may have to work with partners to access the tags, infrastructure and application software. Wiliot's current focus is on direct sales and consulting for a few large clients in industries such as retail and distribution.
- **Focused product offering:** Wiliot's very limited range of tag types and cloud-based as-a-service pricing will not suit every business case or technological need. As a result, customers may need to purchase other products to get a total location solution.

- **Sales presence:** Alliances and distributor/partner sales are mainly available in the U.S. and Europe. Prospective customers should confirm the availability of sales operations and support in their region.

Zebra Technologies

Zebra Technologies is a Leader in this Magic Quadrant. The Zebra MotionWorks Enterprise platform collects data from a diverse set of tags across many frequencies that have been optimized for specific use cases. The platform can be deployed on-premises or in a Zebra-managed cloud. Zebra's Location and Tracking business operates globally, with a focus on the manufacturing, transportation and logistics, retail and healthcare sectors.

Strengths

- **Industry knowledge:** Zebra has extensive experience of developing new solutions and of integrating technologies that it has acquired.
- **Cloud-ready APIs:** Zebra provides a common set of methods and protocols to use across heterogeneous edge devices, thus enabling cross-compatibility with its edge location sensors.
- **Data-driven, agile platform:** Zebra offers one of the most inclusive tracking platforms, which allows enterprises to select technology based on their business needs.

Cautions

- **Limited application partner ecosystem:** Zebra's MotionWorks Enterprise platform has only a limited number of indoor location ecosystem application partners in its target markets.
- **Limited sales channel presence:** The majority of Zebra's MotionWorks Enterprise sales are made in the Americas and EMEA. Enterprises should confirm the availability of sales operations and support in their regions.
- **Pricing strategy:** Gartner clients often tell us in inquiry sessions that Zebra's pricing for MotionWorks Enterprise is higher than that for other vendors' products in this market.

Vendors Added and Dropped

We review and adjust our inclusion criteria for Magic Quadrants as markets change. As a result of these adjustments, the mix of vendors in any Magic Quadrant may change over

time. A vendor's appearance in a Magic Quadrant one year and not the next does not necessarily indicate that we have changed our opinion of that vendor. It may be a reflection of a change in the market and, therefore, changed evaluation criteria, or of a change of focus by that vendor.

Added

- Blueiot
- Huawei Technologies

Dropped

- Quuppa, which did not meet the updated inclusion criterion for annual revenue.

Inclusion and Exclusion Criteria

To qualify for inclusion in this Magic Quadrant, vendors had to:

- Demonstrate relevance to Gartner clients in the indoor location services market by offering solutions that, at minimum, offer the “must have” capabilities outlined in the Market Definition/Description section.
- Produce or resell indoor location components (including sensors, underlay or overlay products, or other physical components), applications and services for general availability as of 1 July 2023. All components had to be publicly available, shipping and included on the vendor’s published price list. Products shipping after this date will have had an influence on only the Completeness of Vision axis.
- Generate a minimum of $15 million in annual revenue and have at least 125 customers that use its indoor location solution as of 1 July 2023. “Customer” is defined as a net new installed logo that has paid for the equipment and/or is paying for subscription services, depending on the purchasing model.
- Have customers in at least three regions of the world (Asia/Pacific and Japan, North America, South America, Western Europe, Eastern Europe, Middle East, Africa).

Note: Indoor location application platforms offered as stand-alone applications (such as mapping or middleware applications) are not evaluated. Our evaluation focuses on the core

components of solutions, including the location engine software, tags (if required), management software, and the main visualization, analytics or reporting software application, if applicable.

Honorable Mentions

The evaluation process identified vendors that, although they did not satisfy the inclusion criteria, offer forward-looking or specialized value to enterprises. Infrastructure and operations (I&O) leaders have many choices beyond the vendors evaluated in this research.

It is important to note that the exclusion of a vendor from this research does not mean that that vendor cannot provide value to enterprises. It simply means that the vendor did not satisfy the inclusion criteria, which reflect Gartner's view of the market. Gartner seeks to evaluate vendors that are relevant and extensible to as many Gartner customers as possible. This evaluation of indoor location service vendors focuses on providers that met the inclusion criteria for this Magic Quadrant, but other vendors also merit consideration for indoor location services and RTLS solutions.

The following vendors did not satisfy the inclusion criteria for this Magic Quadrant but merit consideration based on their platform capabilities, experience with enterprises in different verticals and ability to create related value:

- **PwC:** PwC provides indoor location services for the hospitality and healthcare industries and corporate offices. One of its main solutions is a people-safety technology: Housekeepers and other employees wear BLE/Wi-Fi-enabled devices that share their location when activated. PwC's tags come in various form factors, including wearable devices, stationary buttons and asset trackers. PwC did not meet the inclusion criterion for customers in three regions of the world.
- **Quuppa:** Quuppa's Intelligent Locating System uses multiple technologies for locating assets and mobile handsets, including Bluetooth and GPS. Quuppa delivers asset and people tracking with centimeter-level accuracy. The Quuppa Rules Engine (QRE) is a middleware platform that provides data visualization, real-time tracking and reporting via different connectors. Quuppa's partner ecosystem offers a wide selection of certified third-party tags, sensors and devices, as well as front-end application software. Quuppa did not meet the inclusion criterion for annual revenue.

- **Sewio Networks:** Sewio Networks' RTLS Studio senses via the vendor's UWB tags, which communicate through anchors on the network to its positioning server and SAGE Analytics application. Sewio Networks' solution is deployed on-premises, and its RTLS Studio application is placed in a Docker container, which makes it OS-agnostic. Sewio Networks exclusively provides a UWB RTLS tailored for the manufacturing sector. Sewio Networks did not meet the inclusion criterion for annual revenue.

- **Sonitor Technologies:** The Sonitor Sense RTLS platform couples badges and tags that use ultrasound, LF, BLE and Wi-Fi to communicate location transmitter information along with identity and status over Wi-Fi to the Sonitor Location Engine. Sonitor SenseVIEW and Software Control Engine (SCE) applications manage and monitor the health of Sonitor network components. Sonitor's primary focus is on healthcare, specifically acute healthcare, clinics and long-term care facilities. Sonitor did not meet the inclusion criteria for annual revenue and installed base.

- **Thinaer:** Thinaer offers an end-to-end RTLS solution called Sonar that includes BLE-based asset tags, gateways, and a software platform for analytics and visualization. The location engine provides x, y, z location information with 1-to-2-meter accuracy. The solution is hardware-agnostic and therefore interoperable with any third-party 2.4GHz-enabled tags. Thinaer addresses commercial and classified area asset tracking in aerospace, manufacturing, warehousing and U.S. Department of Defense environments. Thinaer did not meet the inclusion criterion for annual revenue.

- **Wirepas:** Wirepas's technology is based on a mesh network of battery-powered anchors that communicate with each other for easy installation. It achieves about 5-meter location accuracy. Each device in the network has a unique identifier, and the devices communicate with each other via locally synchronized channels during a specific time slot. Transmit power is automatically adjusted to the environment, and reporting frequency can be customized to the customer's requirements. The Wirepas solution is deployed for near-real-time asset-tracking requirements in large spaces such as warehouses, hospitals or commercial buildings with a fully wireless infrastructure. Wirepas did not meet the inclusion criteria for minimum revenue.

- **WiTTRA Networks:** WiTTRA's IoT Unification offering uses a combined received signal strength indicator (RSSI) and time-of-flight (ToF) positioning algorithm called the WiTTRA intelligent Positioning Engine (WiPE) to provide x, y, z location information with around 5-meter location accuracy. WiPE is configurable and can operate in RSSI-only, ToF-only or

combined mode. WiTTRA can meet both real-time and zonal requirements for asset monitoring and safety use cases. Its approach also provides coexisting 6LoWPAN mesh and low-power, wide-area (LPWA) network radios in a unified gateway, enabling 3D location data with the long-range connectivity options needed for mass IoT deployments. WiTTRA did not meet the inclusion criteria for minimum installations or revenue.

- **Worlds:** Worlds provides a digital twin software-as-a-service solution. The solution captures data from cameras and sensors, which is then presented via a live 4D digital twin (x/y/z location plus time), incorporating AI trained on processes and procedures specific to the adopter's organization. It captures industrial operations data in real time and generates real-time notifications and alerts. Worlds also addresses people safety for industrial environments. For example, a real-time alert system notifies of any gas leaks or flares, helping to prevent loss of life and further damage. Employee-down can also be detected. Worlds did not meet the inclusion criteria for minimum installations or revenue.

Evaluation Criteria

Ability to Execute

Ability to Execute Evaluation Criteria

Evaluation Criteria	*Weighting*
Product or Service	High
Overall Viability	Medium
Sales Execution/Pricing	Medium
Market Responsiveness/Record	Medium
Marketing Execution	High
Customer Experience	Medium

Evaluation Criteria	*Weighting*
Operations	NotRated

Source: Gartner (February 2024)

Completeness of Vision

Completeness of Vision Evaluation Criteria

Evaluation Criteria	*Weighting*
Market Understanding	High
Marketing Strategy	High
Sales Strategy	Medium
Offering (Product) Strategy	High
Business Model	Medium
Vertical/Industry Strategy	Medium
Innovation	High
Geographic Strategy	Medium

Source: Gartner (February 2024)

Quadrant Descriptions

Leaders

Vendors in the Leaders quadrant have demonstrated an ability to fulfill a broad variety of customer requirements through the breadth of their indoor location service solutions. Leaders have the ability to provide complete and differentiating capabilities as part of their indoor location offerings. This includes global service and support. Leaders have demonstrated the ability to shape the market. They maintain strong relationships with their channels and customers, and have no obvious gaps in their portfolios.

Challengers

Vendors in the Challengers quadrant have demonstrated sustained execution in the market and have clear and long-term viability, but they may not have a complete portfolio of products or services. In addition, Challengers may not have shown the ability to shape and transform the market with differentiating functionality.

Visionaries

Vendors in the Visionaries quadrant have demonstrated an ability to increase features in their offerings to provide unique and differentiated approaches to the market. A Visionary will have innovated in one or more of the key areas of its indoor location solution (such as granularity, differing usage scenarios, locating all assets requiring location services or reducing the overall solution cost). The ability to apply differentiating functionality affects a Visionary's position.

Niche Players

Vendors in the Niche Players quadrant have demonstrated a product offering targeted at a specific vertical market but may not be able to address the needs of the wider market. It may also be that part of the solution is offered through a strategic partnership. Additionally, Niche Players may lack strong go-to-market capabilities that limit their regional or global reach or service capabilities. Niche Players often have deep vertical market knowledge and may therefore be appropriate choices for users in specific sectors.

Context

This Magic Quadrant is a tool to help guide vendor selection for use cases in a growing number of vertical markets globally. Our analysis is informed by vendor surveys and briefings, as well as by user insights. Gartner continuously monitors and researches the six

subsegments of indoor location services (fixed-asset tracking, zonal asset tracking, real-time asset tracking, people tracking, critical-asset tracking and peer-to-peer asset interactions) and the nuances associated with differing vertical market implementations. Gartner also monitors adjacent markets, including location analytics, 2D mapping and wayfinding, and 3D mapping and augmented-reality wayfinding.

Gartner advises I&O leaders to carefully examine the Strengths and Cautions for each featured vendor and to assess how closely these align with their indoor location requirements.

Market Overview

Through 2023, the indoor location services market grew as organizations began to realize the business value of knowing the location of people and assets. Another notable development was GuardRFID's acquisition by HID Global. Gartner forecasts that revenue in this market will reach $55 billion by 2030, up from $1.9 billion in 2021 (see **Emerging Technologies: Revenue Opportunity Projection of Indoor Location Services**).

Gartner clients report that the ability to reliably track people for safety and compliance requirements has been a significant driver for indoor location solutions. New indoor location technologies like UWB and computer vision, and other innovations such as wireless sensing (IEEE 802.11bh) and energy harvesting, are creating ways to determine location and new location parameters, such as height or z axis. A platform approach to the requirements of indoor location engines has evolved as organizations realize that multiple technologies are required to address a growing number of specific use cases.

Gartner sees variation in the needs of vertical markets. For example, while the healthcare market may need only room-level granularity for patients, infants or elders, other sectors require less-than-1-meter accuracy to manage high-value assets. Additionally, in large facilities such as warehouses, and in transportation facilities without defined "rooms," technologies such as IrDA, 125Hz and ultrasound are not practical — other technologies are needed for more granularity. As location data becomes required to track people and assets in new markets, requirements for it have also evolved in established markets.

As a result, we have started to see six technology trends emerge:

- Aggregation of multiple technologies into hybrid tags to address new industry-specific use-case requirements.
- The need to track x, y and z coordinates.
- Synergies between location and sensing (also called “interactions” or “sensor fusion”) where monitoring of temperature or the presence of hazardous materials is important for the safety of employees.
- New partnerships, created through the licensing of differing technologies.
- Improved analytics with the use of ML and AI.
- Supplemental data points (anchors) that can be added to existing infrastructure instead of priority networks.

New architectures and technologies offer faster beacon rates and increased granularity to improve business data. Implementation costs for these new solutions continue to decrease as the cost of new sensors drops below that of legacy solutions. Additionally, improvements to battery technology allow some tags to use multiple technologies to address more use cases or increase beacon rates to improve granularity. Tag developers are also increasing the number of technologies being combined or nested into hybrid tags. Some of the newer combinations include:

- BLE and NFC.
- UWB and BLE.
- UWB, passive UHF and bar code.
- BLE and GPS.
- Wi-Fi and geomagnetic.

These new hybrid tags join a list of existing hybrid tags that includes, for example:

- Wi-Fi, BLE and IrDA.
- BLE and ultrasound.
- Wi-Fi, LF and ultrasound.
- UHF, LF and IrDA.

Additionally, we are seeing the use of computer vision to track assets, as well as video analytics to address some existing use cases.

Multiple technologies have often communicated simultaneously to address the differing requirements of people and assets as they changed or moved around an environment. This has been important in verticals such as manufacturing and warehouse distribution, where the assets needing to be tracked could be sitting in a storage location that is 20 feet off the ground. Additionally, in the past couple of years, some vendors have added GPS technology to their existing tags as a supplemental data source to track assets as they moved around outside (either between buildings or in a yard).

In 2023, we saw competing vendors continue to cooperate and integrate technology through shared APIs. We also saw demand for better analytics. Increased use of AI and ML therefore remains a priority for clients. For example, ML is being used to improve location accuracy with continuous signal monitoring and to improve “zonal” location determination.

Lastly, as infrastructure and tags move from line-of-business (operational technology) responsibility to management by the IT organization, we are seeing supplemental data anchors emerge as a component of indoor location service architectures. These devices provide additional data points and work with the existing IT infrastructure. Historically, the need for additional data was met through separate, proprietary underlay or mesh networks. These networks have fallen out of favor because they are subject to higher levels of security and require that the infrastructure be managed by IT.

Acronym Key and Glossary Terms

AI	artificial intelligence
AoA	angle of arrival
ATEX	atmosphere explosible
BLE	Bluetooth low energy
EHR	electronic health record

EMEA	Europe, the Middle East and Africa
ERP	enterprise resource planning
GNSS	global navigation satellite system
GPS	Global Positioning System
I&O	infrastructure and operations
IoT	Internet of Things
IR	infrared
lidar	light detection and ranging
LF	low frequency
LPWA	low power, wide area
MIL-STD	U.S. military standard
ML	machine learning
NFC	near-field communication
RFID	radio frequency identification
RSSI	received signal strength indicator
RTLS	real-time location system

SDK	software development kit
ToF	time of flight
UHF	ultrahigh frequency
UWB	ultrawideband

⊕ Evidence

Note 1: Location Accuracy

Location accuracy within 1 meter (or 3 feet) is required by the majority of end-user clients. Some technologies can achieve centimeter-level accuracy, as well as x/y/z-axis location of an asset.

Note 2: Passive, Battery-Assisted Passive and Active Tags

Passive tags do not use a battery to assist in their communication of information. Passive UHF tags use a backscatter communication method, while passive NFC tags use magnetic induction. Battery-assisted tags typically use embedded batteries for computing purposes, but not for communication. Active tags use the energy from batteries for both computing and communication.

⊕ Evaluation Criteria Definitions