



# Indoor Positioning System (IPS)

## Overview

Indoor Positioning Systems (IPS) are used to locate persons or objects inside buildings, as opposed to GPS which works outdoors. IPSs impact asset monitoring and automation at the enterprise level. The technology is expected to bring in integration capabilities of analytical software tools with the existing maps and navigation software.

## Applicable Industries



Aerospace



Agriculture, Forestry & Fishing



Automotive



Chemicals



Electronics & Embedded Devices

















Construction



Consumer Goods




Food & Beverage

-  Furniture & Home Appliances
-  Healthcare Services
-  Heavy Vehicle
-  Equipment & Machinery
-  Medical Devices & Equipment
-  Mining
-  Paper & Pulp
-  Pharmaceuticals
-  Plastics & Rubber
-  Rail & Metro
-  Renewable Energy
-  Shipping
-  Smart Grid
-  Telecommunications

---

Applicable Functions

-  Logistics
  -  Procurement & Sourcing
  -  Production - Manufacturing
-

## Case Studies



### Sirquel and Catalyst Workplace Activation Reveal the Future of Smart Offices

This partnership will disrupt the "traditional" office furniture conversation by examining the intersection of people, place, and technology. We realize it is increasingly evident that the design ...

## Market Size

Estimate A

The global market for indoor positioning systems is valued at USD 4.0 billion in 2018.

Source: [ABI Research](#)

Estimate B

The global indoor location market size is expected to grow from USD 7.11 Billion in 2017 to USD 40.99 Billion by 2022.

Source: [Markets and Markets](#)

## User Viewpoint

Business Value

### **How does this use case impact an organization's performance?**

The major consumer benefit of indoor positioning is the expansion of location-aware mobile computing indoors. As mobile devices become ubiquitous, contextual awareness for applications has become a priority for developers.

Applications benefiting from indoor location include augmented reality, targeted advertising, social networking, sports, indoor robotics and tourism.

System Capabilities & Requirements

### **What are the typical capabilities in this use case?**

There are four basic approaches to solving the problem of indoor positioning.

Wi-Fi Fingerprinting is a software only, device-based approach that reads the digital signatures of the WiFi network. It uses device-based software resulting in a low cost and easy calibration but it is weak in accuracy and reliability.

Bluetooth Low Energy Beacons / iBeacons are simple, low-cost transmitters that can be placed around a facility. Application software on the device and then be programmed to read these signals to drive a wide range of uses. It has a low up front cost and low maintenance and is the standard embraced by Apple and Google. However users must maintain Beacon infrastructure, which is not suitable on their ad hoc navigation.

Handset Sensor Fusion involves accessing data from multiple sensors on a screen, such as a compass or gyroscope and applying sophisticated algorithms and techniques to "fuse" these together into an optimal estimate of the device's position. It is device-based software and is low cost and easy to calibrate but like Wi-Fi Fingerprinting it suffers from poor reliability.

Cisco Mobility Services Engine (MSE) is a network-based approach that leverages an array of techniques to position all devices connecting or visible to the network, not just smartphones. This is the solution most suited to the Enterprise, as it addresses infrastructure security and management. However, with existing technology the accuracy and refresh rates are not suitable for all use cases. Cutting edge solutions merge multiple technologies to provide the optimal solution for difficult challenges.

Locating and tracking: One of the methods to thrive for sufficient operational suitability is "tracking". Whether a sequence of locations determined form a trajectory from the first to the most actual location. Statistical methods then serve for smoothing the locations determined in a track resembling the physical capabilities of the object to move. This smoothing must be applied, when a target moves and also for a resident target, to compensate erratic measures. Otherwise the single resident location or even the followed trajectory would compose of an itinerant sequence of jumps.

Identification and segregation: In most applications the population of targets is larger than just one. Hence, the IPS must serve a proper specific identification for each observed target and must be capable to segregate and separate the targets individually within the group. An IPS must be able to identify the entities being tracked, despite the "non-interesting" neighbors. Depending on the design, either a sensor network must know from which tag it has received information, or a locating device must be able to identify the targets directly.

Deployment Environment

---

**Where is the 'edge' of the solution deployed?**

IPSS can be deployed at school campuses, guided tours of museums, shopping malls and store navigation, warehouses, airports, buses, trains and subway stations, as well as parking lots, hospitals and hotels.

---

## Technology Viewpoint

Connectivity

---

**What factors define the connectivity solutions used to provide both device-to-device and device-to-cloud communication?**

GPS

---

## Implementation Viewpoint

Business &  
Organizational  
Challenges

---

**What business challenges could impact deployment?**

Most applications currently rely on GPS which functions relatively poorly indoors.

---



## IoT ONE Use Case



*Accelerating the Industrial Internet of Things*

**IoT ONE** is widely recognized as a leading Industrial IoT research firm, opinion influencer, and go-to-market channel.

- 1 Create a [free account](#) to view and download hundreds of IoT case studies and supplier profiles.
- 2 Already have an account? [Feature](#) your case studies, and your hardware and software solutions.
- 3 You can connect with us via email at [team@iotone.com](mailto:team@iotone.com).

[www.iotone.com](http://www.iotone.com)

