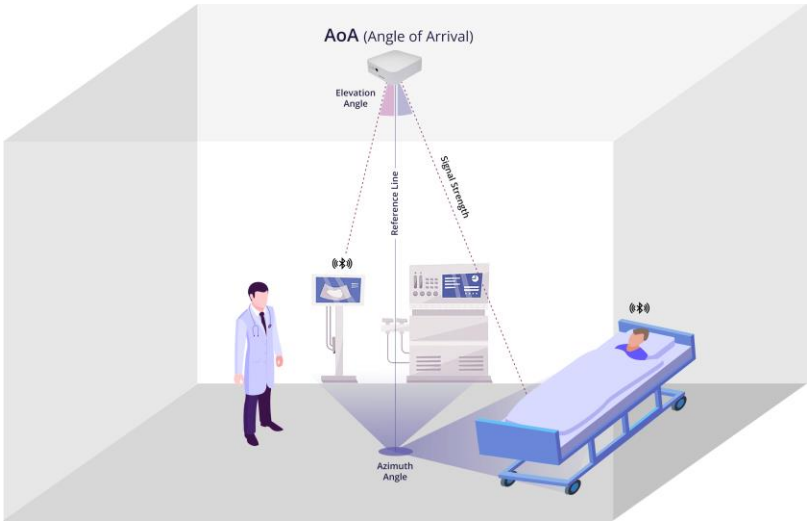
The kit is designed to provide accurate **location tracking** for **assets** and **personnel** using **BLE technology.**

VERSION 1.1

BLE AoA RTLS Evaluation Kit Startup Guide



Introduction to
BLE AoA RTLS Evaluation Kit

Overview:

This guide will help you set up and utilize your BLE AoA (Angle of Arrival) RTLS (Real-Time Location System) evaluation kit. The kit is designed to provide accurate location tracking for assets and personnel using BLE technology.

Components:

The BLE AoA Evaluation Kit includes:

- 3x ZENIX LON-2 BLE AoA scanners/locators
- 5x PINIX TOK-1 BLE AoA Personnel tags
- 5x PINIX TOW-1 BLE AoA Asset tags
- Solix Suits Subscription
- Power Adapters and POE cables
- Screws, bolts, and other mounting accessories

Understanding the BLE AoA RTLS

Principles of Angle of Arrival (AoA):

Basics of AoA: Angle of Arrival (AoA) technology determines the direction from which a radio signal is received. It relies on multiple antennas arranged in an array at a receiver (scanner/gateway). Sentrax's Zenix scanners are equipped with 12 antennae array that helps to estimate the angle of arrival of signals from the BLE tags.

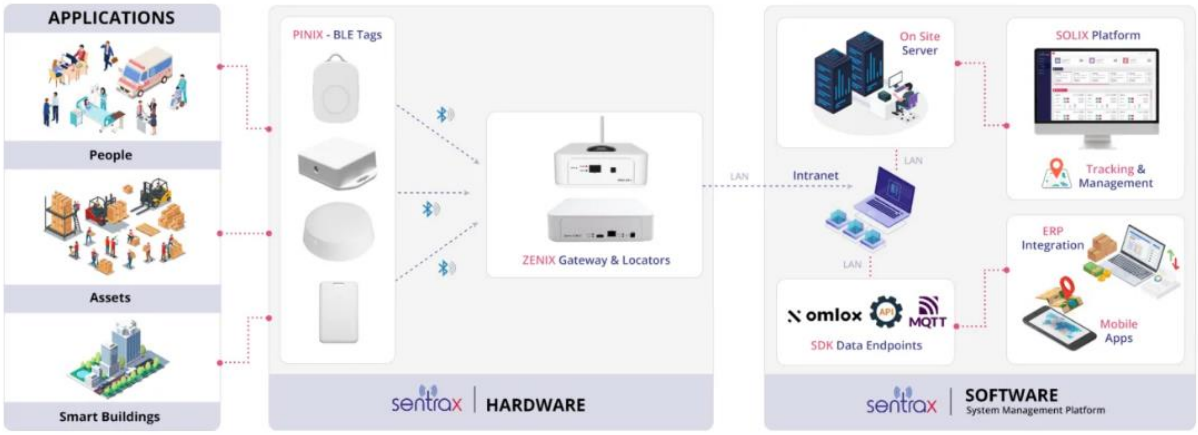
Signal Processing: When a BLE signal is transmitted from a tag, it reaches the antennas at slightly different times. The phase difference between the signals received by the different antennas is measured.

Angle Calculation: Using the phase differences, the direction of the incoming signal can be calculated using trigonometric and geometric algorithms. This calculated angle is the Angle of Arrival. Sentrax's Zenix LON-2 utilizes advance edge-computation and does the angle, SNR ratio, and other complex computation on the device itself reducing the calculation time, optimizing the accuracy, and making the deployment easier.

Enhanced Accuracy: By deploying multiple AoA receivers in a given area, each receiver can calculate the angle of the tag's signal. By using at least 3 scanners, these angles can be triangulated to pinpoint the exact location of the tag with high precision.

Reduced Interference: AoA technology can differentiate between direct line-of-sight signals and reflected signals, reducing the impact of multipath interference on location accuracy.

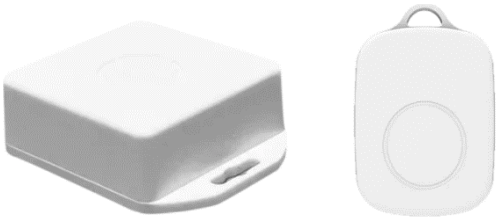
BLE AoA RTLS Overview: Architecture and components:



Tags:

Function: These are small devices attached to an asset or can be carried by personnel. They periodically transmit BLE signals containing unique identifiers in SBeacon data packet with angle information (IQ samples).

Types: There are **PINIX TOK-1 (personnel tags)** and **PINIX TOW-1 (asset tags)**, each designed for specific use cases (e.g., tracking employees vs. tracking equipment).



These are equipped with configurable advertisement intervals, offers SBeacon (mandatory for AoA), iBeacon, and Eddystone (UID & TLM) advertisement protocols, Sensors (environmental sensors in TOW-1) with accelerometer, and higher batter life-time.

Gateways (AoA Locator/Scanners):

Function: The scanners receive BLE AoA signals from the tags and use AoA technology to calculate the direction of the incoming signals.

Deployment: Typically installed at fixed locations on ceilings within the coverage area. The number and placement of gateways are crucial for achieving optimal coverage and accuracy. It is important to note that the accuracy and coverage can depend upon the height of installation and wall clearance between gateway and walls.

Data Processing: The data is processed in the **ZENIX LON-2 gateways** and this data is forwarded to the central Solix Location Engine (Can be used on Solix RTLS and IoT management platform and 3rd party software via rest APIs).

Solix RTLS Platform and Location Engine:

Solix Platform: The Solix platform acts as the central hub for the RTLS. It collects data from all the gateways, processes it, determines the precise locations of the tags, and display on the 2D map.

User Interface: Provides a user-friendly interface for monitoring and managing the tracked assets and personnel. It displays real-time location data on a map or floor plan. User can filter tags, assign icon, details to specific tags, and more.

Configuration and Alerts: Allows configuration of system parameters, such as tag identification, area definitions, alert settings, region alerts, and geo-fencing. Users can set up notifications for specific events (e.g., a tag leaving a designated area).

Analytics and Reporting: Offers tools for analyzing location data over time, generating reports, and gaining insights into asset utilization, personnel movement, and more.

API and third-party integration: Sentrax offers APIs for integration of Solix with third-party management platforms with REST APIs. For details on Solix APIs, please visit **http://api.sentrax.com/solixapi**. For more details on integration and support, please contact us at **sales@sentrax.com** and our team will be happy to help you in integrating Solix with other platforms.

OMLOX: Sentrax is also omlox certified and can provide omlox compatible platforms.

System workflow/Interaction:

Tag Signal Transmission: Tags periodically send out SBeacon BLE signals with their unique identifiers.

Signal Reception and AoA Calculation: Gateways receive these signals, calculate the AoA, and forward the data to the location engine.

Data Aggregation and Processing: The RTLS software aggregates data from multiple gateways, triangulates the tag positions, and updates the location information in real-time.

Visualization and Alerts: Users can view the real-time locations of tags on the RTLS software's interface and receive alerts based on predefined criteria.

Getting started with the BLE AoA Evaluation Kit:

Installing mobile application and computer software:

For ZENIX LON-2:

Advance IP Scanner and MQTT.fx is required. Following is the link for download:

Advance IP scanner: https://www.advanced-ip-scanner.com/

MQTT.fx : MQTT Fx Software

For PINIX Tags:

Download and install **Sentrax Device Manager application (SDM)** from apple store or Google Play store:

Play store link:
https://play.google.com/store/apps/details?id=com.sentrax.device_manager&hl=en_US

Appstore Link:
https://apps.apple.com/us/app/sentrax-device-manager/id6464280781

Hardware Setup:

ZENIX LON-2 Locators:

Open the BLE AoA Evaluation kit box and verify the hardware, not the MAC address of each locator for future reference.

Power-up and Setup the hardware.

Refer to ***ZENIX LON-2 Quick Start Guide*** for step-by-step instructions on powering up the hardware.

Once the hardware is powered on, it's time to connect the hardware with the network.

Refer to ***ZENIX LON-2 Configuration Guide*** for step-by-step instructions on getting the IP address, configuring the MQTT broker.

Update the firmware if the new version is available. Once everything is connected, you will be receiving the data on the MQTT broker.

PINIX Tags:

Power-up Test: Connect batteries and observe LED indicators.

Mode Transition: Press and hold the button for 5 seconds to switch between sleep and advertisement modes.

Install the **Sentrax' device manager** application from Google play store or Apple Appstore to get the tags configured and started.

Refer to ***PINIX TOK-1*** *User Guide* and ***PINIX TOW-1*** *user guide* for detailed step-by-step instructions on setting up and configuring the tags.

Installing the hardware:

The AoA locators/scanners are ceiling mounted and require certain height and wall clearance for optimal performance.

The scanners can be deployed on both single scanner configuration and multi-scanner configuration.

Please refer to the **ZENIX LON-2 Deployment Guide** for more details on setup and installation.

Please note: The area covered by each scanner is directly proportional to the height of installation of the locators (the higher the height, the bigger the scanning diameter). For quantities estimation for any area/use-case, please contact our sales team at **sales@sentrax.com**.

Getting started with Solix Platform:

Solix Platform comes in two packages (cloud and on-premise version) and both require different approaches.

For on-prem:

Please refer to the Solix on-premise setup guide for setting it up. You can get in touch with us for more details on Solix on-prem version.

For Solix Cloud version:

Open the browser and go to **www.app.sentrax.com**.

Log-in using the credentials provided by Sentrax's team via email.

The devices (scanners and tags) are already registered on the on these accounts.

You can add buildings/floors, deploy devices, view the heat map, reports, manage devices, add custom notification & alerts, add regions & geo-fencing and more using the **Solix Platform**.

Please refer to ***Solix Quick Start Guide*** for step-by-step guidance on how to set up the Solix account and start the data visualization.

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