

Bluetooth Master-Slave Combined Solution

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An Application for Precise Personnel Positioning Using iBeacon Technology

An application based on iBeacon technology enables highly precise personnel positioning. By deploying iBeacon beacon devices and combining advanced positioning algorithms and data analysis, we can monitor and track personnel's location information in real-time. This application can be widely used in various scenarios, including indoor navigation, security management, marketing analysis, and personnel traffic control, providing users with highly personalized and accurate location services. Our solution not only delivers outstanding performance but also safeguards user privacy, ensuring data security and reliability, offering an advanced personnel positioning solution for various industries.

System Architecture Logic

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Application Platform

Location Monitoring

Video Integration

Property Management Patrol

Visitor Management

Meeting Reservation

設備監控

Positioning Server

API Interface

Network-Based Positioning System

BLE

Bluetooth iBeacon

Bluetooth All-in-One Gateway

POE Ethernet Cable & Wireless WiFi & 4/5G Transmission

Scanning and Retrieval

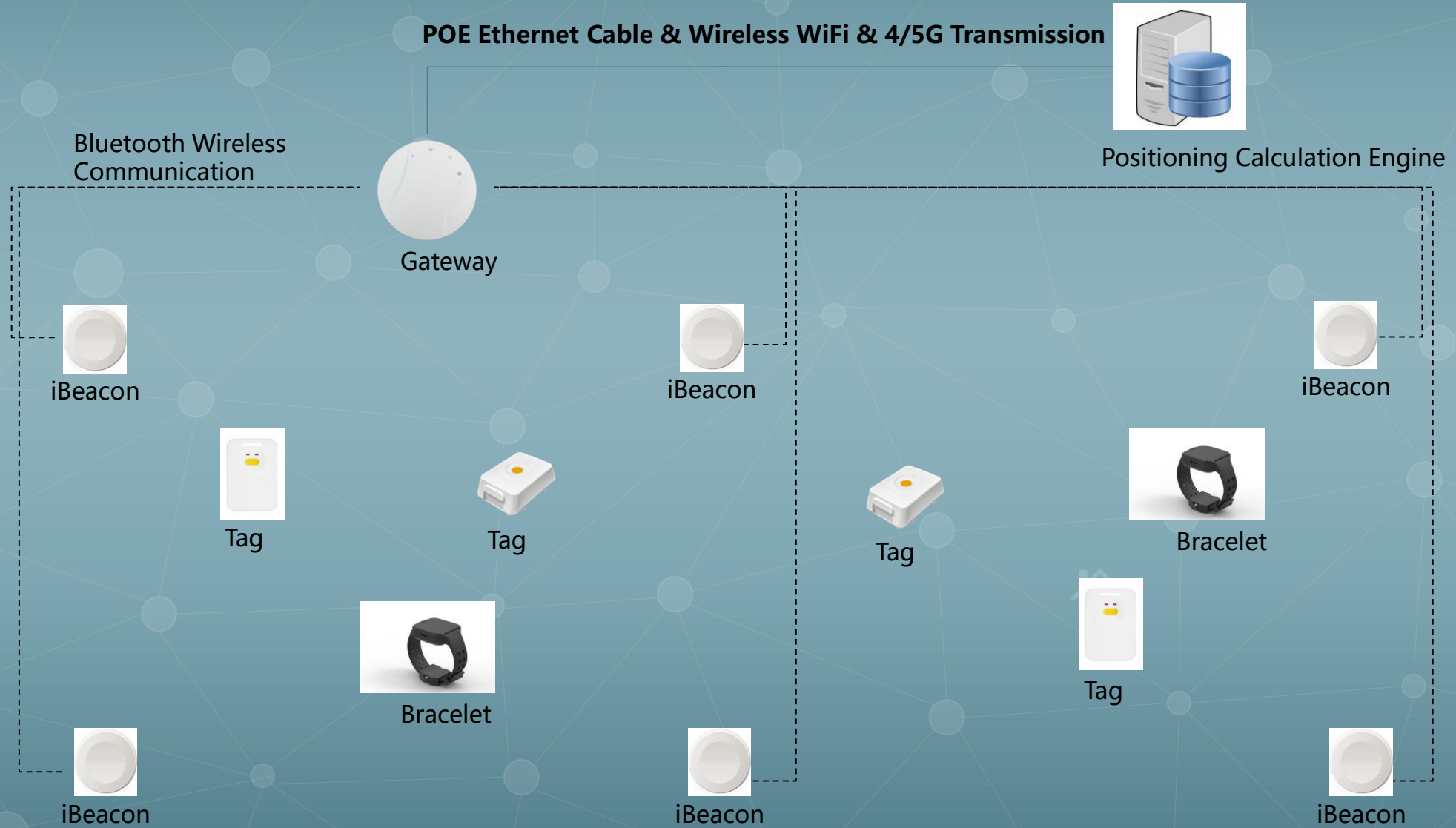
Bluetooth Broadcasting Response

Terminal

Bluetooth All-in-One Tag

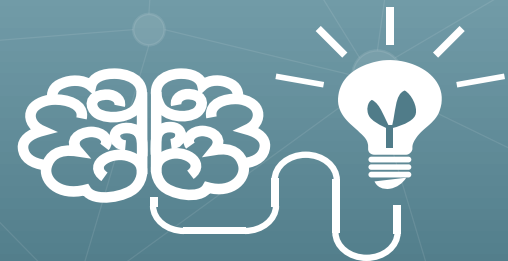
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Positioning System Architecture



Description of System Architecture

- The Bluetooth positioning system is the foundational system within a comprehensive fixed personnel management solution. This system utilizes Bluetooth architecture, iBeacon signal detection, and the Bluetooth 5.0 protocol for data transmission to provide precise personnel positioning. iBeacon devices are battery-powered, boasting an astonishing 5 to 7 years of standby time.
- Bluetooth gateways cleverly collect data at intervals ranging from 20 to 50 meters, taking into account environmental signal interference and dynamics. The deployment of iBeacon devices maintains intervals of 6 to 8 meters, installed at heights of 3 to 4 meters.
- By leveraging an internally developed proprietary fingerprint and triangulation hybrid positioning algorithm, the system delivers Bluetooth positioning accuracy within the 3 to 5-meter range throughout the designated premises. The integrated Bluetooth architecture not only ensures pinpoint accuracy but also significantly reduces the overall infrastructure wiring requirements.
- The system's functionalities encompass a range of advanced features, including indoor personnel tracking, electronic fence management, anti-loss management, video integration, and a comprehensive Bluetooth device monitoring platform.



iBeacon Parameters

- **Battery: 7600mA**
- **Battery Life: Over 7 years (default mode)**
- **Dimensions: 110 * 105 * 23.8(±0.2)mm**
- **Wireless Standard: Bluetooth® 4.2 / 5.0**
- **Frequency Range: 2400MHz—2483.5MHz**
- **Data Rate: 250kbps/1Mbps/2Mbps**
- **Wireless Security: AES hardware encryption**
- **Transmission Power: Adjustable from -20dBm to +4dBm**
- **Waterproof Rating: IP68**
- **Pressure Resistance: Over 5 tons**



- **Battery: 2400mA**
- **Battery Life: 5 years (default mode)**
- **Dimensions: 52.1 * 23.1(±0.3)mm**
- **Wireless Standard: Bluetooth® 4.2 / 5.0**
- **Frequency Range: 2400MHz—2483.5MHz**
- **Data Rate: 250kbps/1Mbps/2Mbps**
- **Wireless Security: AES hardware encryption**
- **Transmission Power: Adjustable from -20dBm to +4dBm**
- **Waterproof Rating: IP67**



Bluetooth Tag Parameters

- **Battery Capacity: 1000mAh**
- **Full Charging Time: 3.5 hours**
- **Charging Method: Magnetic suction charging cable**
- **Battery Life: 6 months (broadcast mode)**
- **Power Consumption: Standby 50uA, Location Transmission 18mA @ 0dBm**
- **Refresh Rate: 0.5Hz**
- **Protection Level: IP66 Waterproof**
- **Operating Temperature: -20 to 80°C**
- **Storage Temperature: -20 to 40°C (less than 3 months)**
- **Dimensions: 57.4*38.8*21mm (±0.5mm)**
- **Protocol: Supports BLE Bluetooth 5.0**
- **Frequency: 2400MHz to 2483.5MHz**



- **Battery: 600mAh**
- **Charging Time: 4 hours**
- **Charging Method: Magnetic suction charging cable**
- **Battery Life: 7 days in scan broadcast mode, 2 months in single broadcast mode (default mode)**
- **Power Consumption: Standby 2uA, Scanning 8.5mA, Broadcast 0.85mA**
- **Frequency: 2400 — 2483.5MHz**
- **Broadcast Range: 100 meters**
- **Wireless Standard: Bluetooth® 5.0**
- **LED Indicator Lights: Charging indicator light, operational indicator light**
- **SOS Button: Equipped with SOS button function, long press to activate/deactivate**
- **Dimensions: 85 * 54 * 7.5 (±0.3)mm**
- **Operating Temperature: -20°C to 60°C**
- **Waterproof Rating: IP66**



Bluetooth Wristband Parameters

- Motion Refresh Rate: 10Hz
- Idle Refresh Rate: 1Hz
- Power Consumption: Standby 50uA, Location Transmission 9mA @ 0dBm
- Accuracy: 3~5 meters
- Location Range: 25~50 meters
- Battery Capacity: 750mAh
- Single Charge Usage Time: 3~4 months (idle positioning)
- Operating Temperature: -20~60° C
- Charging Adapter Compatibility: DC 5V / 2A
- SOS: Equipped with SOS button function
- Acceleration Sensor: 3-axis measurement range $\pm 2g/\pm 4g/\pm 8g/\pm 16g$
- Heart Rate Sensor: Sampling rate 10~1000SPS
- Dimensions: 44mmx46mm (dial)



Bluetooth Gateway Parameters

- Outdoor Type
- Dimensions: 153mm X 137mm X 97mm
- Power Supply: DC 4.5V-12.0V, POE Power Supply
- Current: 300mA @ 5V
- Operating Temperature: -20° C to 70° C
- Interfaces: 1 WAN/LAN configurable port and power port
- WiFi Standards: 11n, 11g, 11b
- Security: WPA/WPA2, WEP, TKIP, AES
- Operating Modes: Bridge, Gateway, AP
- Bluetooth Standard: Bluetooth® 4.2
- Transmission Rate: 1Mbps
- Security: AES HW Encryption
- Coverage Range: 200/300 (without PA/with PA)
- Transmission Power: -4dBm to +20dBm
- Receiver Sensitivity: -94dBm
- 4G: Full Network Compatibility



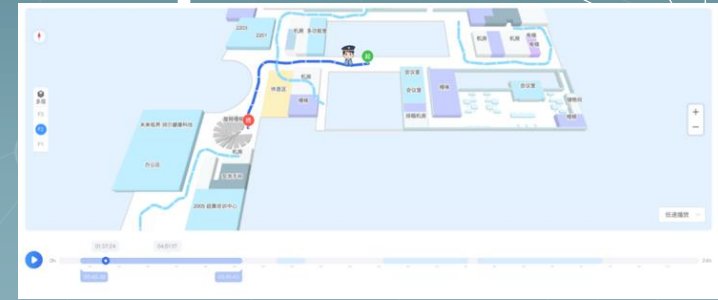
- Indoor Type
- Dimensions: Diameter 110mm; Height 35mm
- Power Supply: DC 4.5-12.0V, POE Power Supply
- Current: 200mA @ 5V
- Operating Temperature: -20°C to 70°C
- Interfaces: 1 WAN/LAN configurable port and power port
- WiFi Standards: 11n, 11g, 11b
- Security: WPA/WPA2, WEP, TKIP, AES
- Operating Modes: Bridge, Gateway, AP
- Bluetooth Standard: Bluetooth® 4.2
- Transmission Rate: 1Mbps
- Security: AES HW Encryption
- Coverage Range: 80/150 (without PA/with PA)
- Transmission Power: -4dBm to +20dBm
- Receiver Sensitivity: -94dBm
- 4G: Full Network Compatibility



Real-time Location Tracking



Functionality Description



Historical Track Replay

- To track personnel, view their activity routes, and access status information
- Select specific personnel, within a specific time frame, and track their activities/patrol routes across multiple floors, indoors and outdoors.

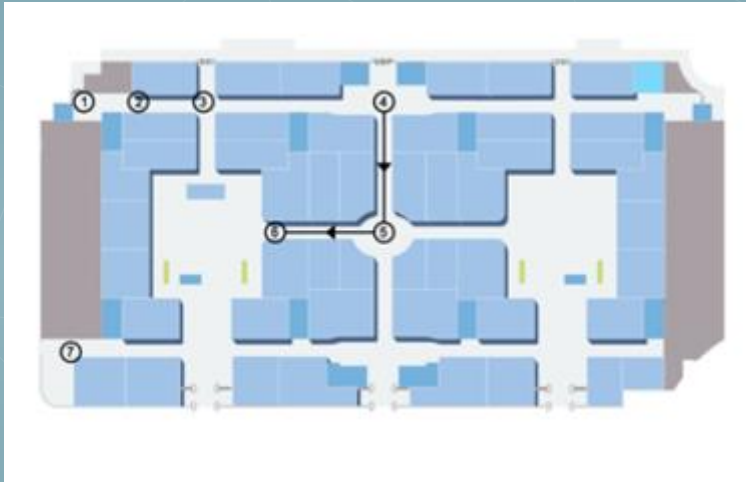
Real-time Electronic Fencing

- Static Electronic Fence of Arbitrary Shape
- Fence Construction
- Intrusion Alert
- Unauthorized Entry Alert
- Unauthorized Presence Alert
- Unlimited Retention of Alarm Information
- Real-time Display of Alarm Location, Target and Video

Real-time Video Linkage

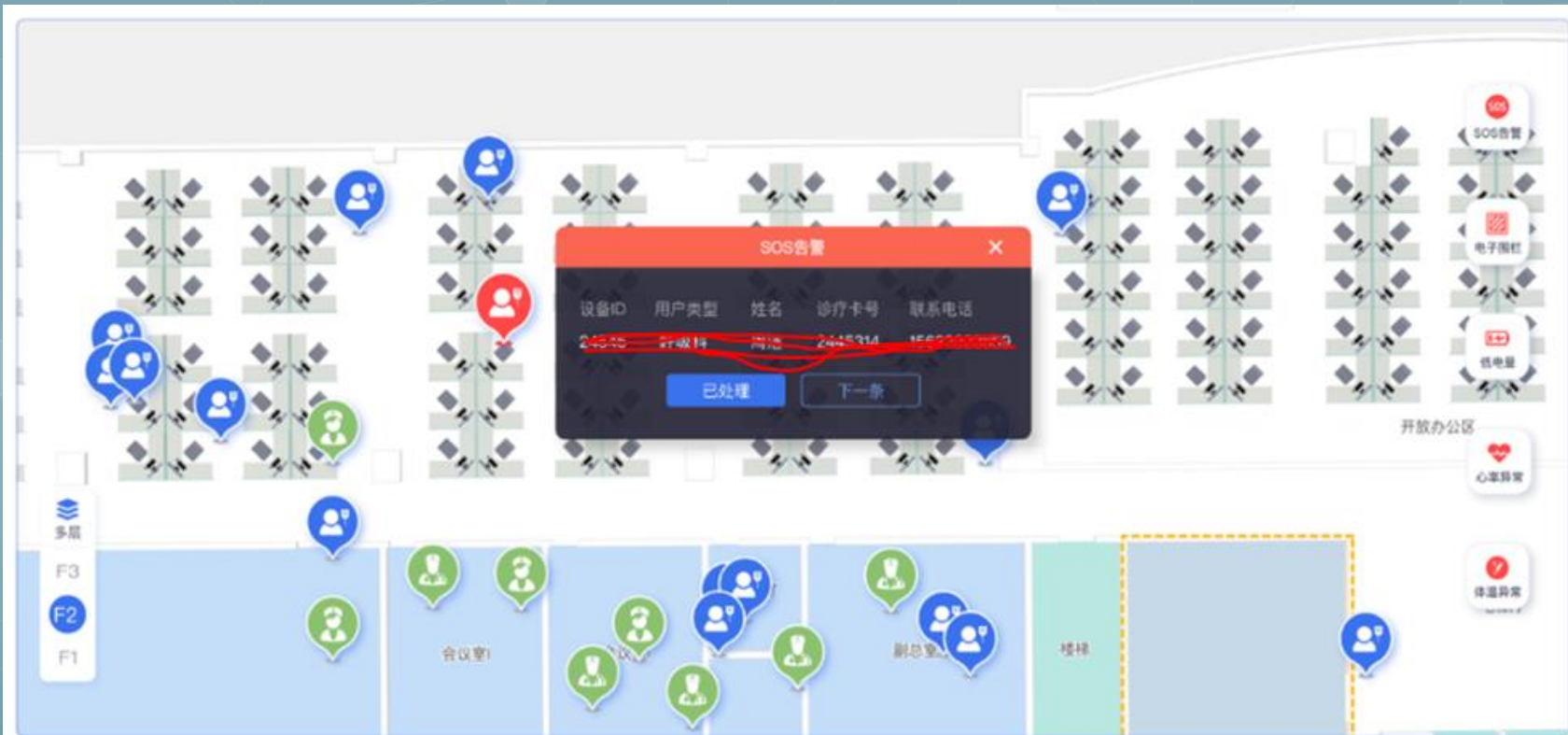
- Real-time Target Location Tracking
- Automatic Video Tracking Based on Location
- Display of Track Records
- Flexible Primary View Transition

Patrol Inspection Check-In



Online Patrol Task Management, with the ability to independently plan and combine patrol sign-in locations and task times, and instant task distribution to the patrol front-end. Real-time feedback on-site inspection status is recorded in the backend, with full process tracking of progress.

SOS Alarm Management



In the event of an emergency, when an individual sends out a distress signal:

1. The system obtains the person's location information.
2. Administrative personnel receive the LBS distress signal.
3. Deployment personnel initiate rescue operations.

System Alarm Management

The screenshot displays a web-based configuration interface for system alarm management. It features a dark sidebar on the left with navigation options like '报警管理', '报警设置', '报警通知', '报警统计', '报警日志', 'iBeacon NMS', '电子点名', and '报警日志'. The main content area is titled '报警通知' and includes a '保存' (Save) button in the top right corner. The interface is organized into several sections for different alarm types, each with a set of notification methods (web, SMS, app push) and a '关闭' (Close) button. The '系统弹框通知' section has '围栏报警' (fence) and 'SOS报警' (SOS) toggled on. The '短信推送通知' section has all notification methods disabled. The '声光触发通知' section has all notification methods disabled. The '红外报警触发阈值通知' section has '一般报警' (general) set to 40% and '严重报警' (severe) set to 20%. The '点名报警触发阈值设置' section has a threshold of '<= [] %'. The '生命体征报警触发阈值设置' section has thresholds for '一般报警' (heart rate <= [] or >= []) and '严重报警' (heart rate <= [] or >= []), with a '同一故障报警频次' (frequency) of [] min and '报警对象' (alarm target) set to '全部选择' (select all). The '消失报警时间设置' section has a duration of [] 秒 and '报警对象' set to '全部选择'.

- System Alarm Management, supporting various alarm modes including location, SOS, tampering, low battery, vital signs, electronic roll call, disappearance, and outliers.
- Supports integration with infrared beams and camera monitoring alarms.
- Allows triggering of video surveillance upon alarms.
- Supports multiple alarm notification methods such as web, SMS and app push notifications.

POI Navigation Application

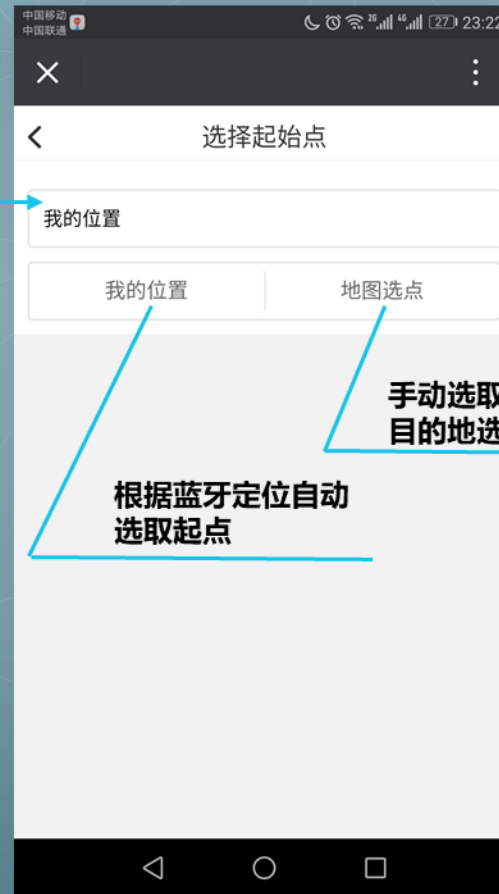
Select a Destination 选择目的地



Route Planning 路线规划



Starting Point Planning 起点规划



Start Navigation 开始导航



Benefits of iBeacon Solutions

1. **Precision Location Services:** iBeacons provide highly accurate indoor positioning and location-based services, enabling businesses to track and interact with users or assets with accuracy down to a few meters.
2. **Enhanced User Engagement:** Businesses can send personalized and context-aware notifications, offers, and information to users' mobile devices as they approach iBeacons, thereby boosting user engagement and driving sales.
3. **Improved Customer Experience:** iBeacon technology can be used to create seamless and personalized customer experiences, such as museum tours, indoor navigation in large venues, and efficient queuing systems.
4. **Efficient Asset Management:** Organizations can use iBeacons to track and manage assets, inventory, and equipment within their facilities, reducing losses and enhancing operational efficiency.
5. **Data Analytics:** iBeacons generate valuable data about user behavior and traffic patterns, enabling businesses to make data-driven decisions, optimize layouts, and refine marketing strategies.
6. **Cost-Efficiency:** iBeacons are relatively low-cost, easy to install, and have a longer battery life, making them a cost-effective solution for various applications.
7. **Versatility:** iBeacons can be deployed in various environments, including retail stores, sports stadiums, airports, healthcare facilities, and manufacturing plants, offering a diverse range of use cases.
8. **Security and Privacy:** iBeacon technology can be designed with security and privacy considerations, ensuring user data is protected and permissions are respected.
9. **Integration:** iBeacons seamlessly integrate with mobile apps and existing IT infrastructure, making implementation and scalability straightforward.
10. **Competitive Advantage:** Businesses adopting iBeacon technology can gain a competitive edge by providing innovative and convenient services to customers.



Various Applications

Elderly Care Facilities Personnel

Tracking: Track the location of personnel in nursing homes, allowing staff to view real-time positions and respond to SOS or emergency situations promptly. This enhances the safety and well-being of residents by ensuring rapid assistance when needed.



Visitor Tracking in Corporate Settings:

In corporate environments, iBeacon cards can assist in tracking the location of visitors. Through the backend system, administrators can monitor the real-time positions of visitors and define restricted areas or zones. This provides security and control over visitor access, ensuring they stay within designated boundaries.



Hospital Personnel Management and Scheduling:

iBeacon cards can simplify the management and scheduling of personnel in hospital settings. By equipping staff with Beacon cards, hospital administrators can easily locate and track healthcare professionals, improving overall efficiency in tasks like patient care assignment and emergency response coordination.



The image features a teal background with a network diagram. The diagram consists of numerous nodes, represented by small circles, connected by thin white lines. The nodes are arranged in a somewhat circular pattern, with some nodes highlighted in white and others in a light blue color. The text "THANK YOU" is centered in the middle of the diagram in a white, sans-serif font.

THANK YOU