Wi-Fi RTLS Systems

Real Time Locating, Auto Identification, Wireless Sensing

1. Introduction

Radio-frequency identification (RFID) is an intangible automatic identification technology. Through radio signal, RFID systems automatically identify the targets and obtain relevant data without human intervention. RFID systems identify various moving or still objects, such as, equipment, vehicles and people simultaneously. RFID is widely used in enterprise to improve the efficiency of inventory tracking and asset management.

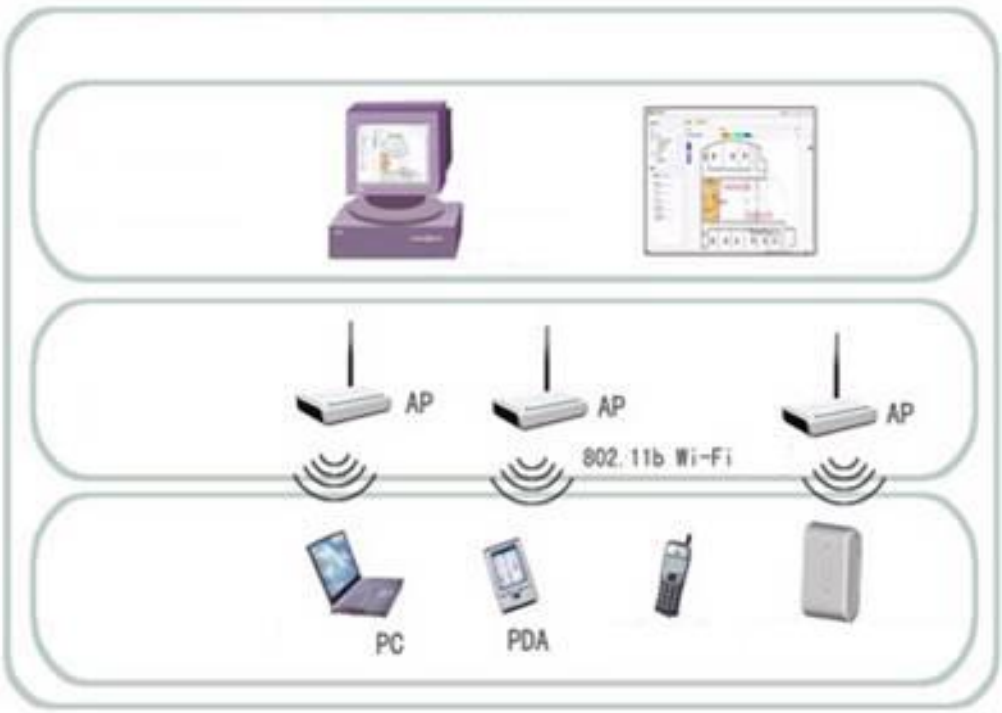
URadio Systems' innovated Wi-Fi RFID is an active RFID system based on the widely adopted Wireless LAN (or called Wi-Fi). It supports the transmit-only protocol IEEE 802.11. Wi-Fi RFID system is characterized by long range, accurate reading, low total cost of ownership, and easy use. The unique capability of Wi-Fi RFID system is to track the precise location of personnel and assets. Wi-Fi RFID system consists of tags, Wi-Fi AP (Access Point) and tracking software. URadio Systems' Wi-Fi RFID supports various ranges of APs including Cisco, Aruba, Ruckus and more.

How it works

Wi-Fi RFID tag stores the unique ID (MAC address) and sensor data in a certain format. In practice, the tag is attached to asset or personnel. Tag transmits its ID and data periodically. Wi-Fi APs automatically scan the ID and the data from the tag, and transmit to computer for further processing to achieve automatic identification and real-time tracking and locating.

System Components

Wi-Fi RFID system consists of Wi-Fi terminals, APs, and Server software, as shown in the below figure:



1. Wi-Fi Terminal
   a) URadio Wi-Fi Tags (URT-200): Each tag has unique 48 bit ID, battery powered
   b) Wi-Fi Phones, Pads, Laptops including iOS equipment
2. Wi-Fi AP
   a) Enterprise grade APs: Cisco, Aruba, Trapeze, Strix, Meru, Siemens, etc. (Note: AP or AC must support reporting of terminal MAC and RSSI function).
   b) URadio AP Locators (URL series): In addition to normal AP function, AP locator can scan Wi-Fi tag MAC and alert.
3. Tracking and Locating Server: Software for record Tag ID and calculating tag position.

Advantages

- Based on standard Wireless LAN IEEE 802.11;
- Transmit only Wi-Fi tag with low power and low cost, not required to associate with AP
- Reuse of most existing WLAN network, keeping the infrastructure cost low ;
- Identify any kind of Wi-Fi equipment, such as smart phones, Pads;
- Track the precision location of personnel and assets up to 3 meters;
- Long range up to 150 meters or more;
- Easy integration, and simple operation;

- Healthier and safer with ultra-low power consumption and no radiation pollution.

Applications

- Automatic people exit-entry management
- Underground miner tracking and locating management
- Hospital patient, staff and equipment management
- Senior care center to help elderly with wireless button call
- Warehouse inventory tracking and monitoring
- Container tracking and locating
- Manufacture work process control
- Shopping mall to track smart phones moving trace, and push ad to smart phones
- Museum to locate and push content to smart phone

2. Wi-Fi Tag

Each Wi-Fi tag has a unique 48-bit MAC address as its ID. It transmits IEEE 802.11b signal periodically. The transmit interval is set based on the customer requirement. When a Wi-Fi tag is attached to a person or an object, APs (Wi-Fi Access Points) under monitoring mode scan tag signals, and send each tag's signal strength and tag MAC address to a locating server. The applications include underground mine, factory, logistic center, hospital, elder care center, shopping center, and etc.

URadio Wi-Fi Tag supports major enterprise APs including Cisco, Aruba, Ruckus, H3C, Huawei, etc

URadio Wi-Fi Tag has 3 forms: URT270-C, URT270-CS, URT270-CB.

URT270-C/CS/CB

URT270-C supports 125kHz low frequency wakeup function. And it uses micro-USB which is the same as Android phones'. URT270-CS does not have the low frequency wakeup function. URT270-CB has the capability of scanning iBeacon RSSI instead of

low frequency wakeup function.

Specification

Name	Wi-Fi Locating Card	**Model**	URT270-CS: Wi-Fi only URT270-C: Wi-Fi and 125kHz low frequency wakeup URT270-CB: Wi-Fi and BLE to scan iBeacon RSSI
Size	86*56*8.5mm	**Weight**	~ 40g
Battery	1000mAh	**Charge**	Micro USB

Functions

- Push Button: Press button to send a signal with special information. Press button for more than 2 seconds, the LED light flashes.

  (Note: For the first time the tag is in the sleeping mode. In sleep mode, the LED light flashes once when the button is pressed. To enable the tag, press the button for 10 seconds, and the LED light flashes 5 times. This means the tag is working mode. In working mode, he LED light does not flash when the button is pressed.)
- USB port: for battery recharge, connect to USB charger or computer USB port through USB cable (see accessories). LED light turns green when it is recharged; Green is off when recharge is done;
- When the battery capacity is lower than a certain level, the LED light starts flash every 5 seconds, and the tag will transmit the signal every 60 seconds.
- Low power alarm: When the battery is low, the tag sends signals with special bit.

(Note: Please charge the tag immediately after the tag becomes low power. Warning: The battery may die completely if it is not used for over 6 months.)

3. Locators

To achieve high accuracy, there are two ways:

1. **Low Frequency Exciter**
   - Each exciter has an unique ID
   - Wi-Fi tag is awaken in the cover zone
   - Exciter requires electronic wire
   - Antenna can cover 1-5 meter
   - Tags have longer battery usage

 Indoor Exciter URWA-I 200*109*40mm	 Outdoor Exciter URWA-F 200*110*44mm

2. **BLE iBeacons**

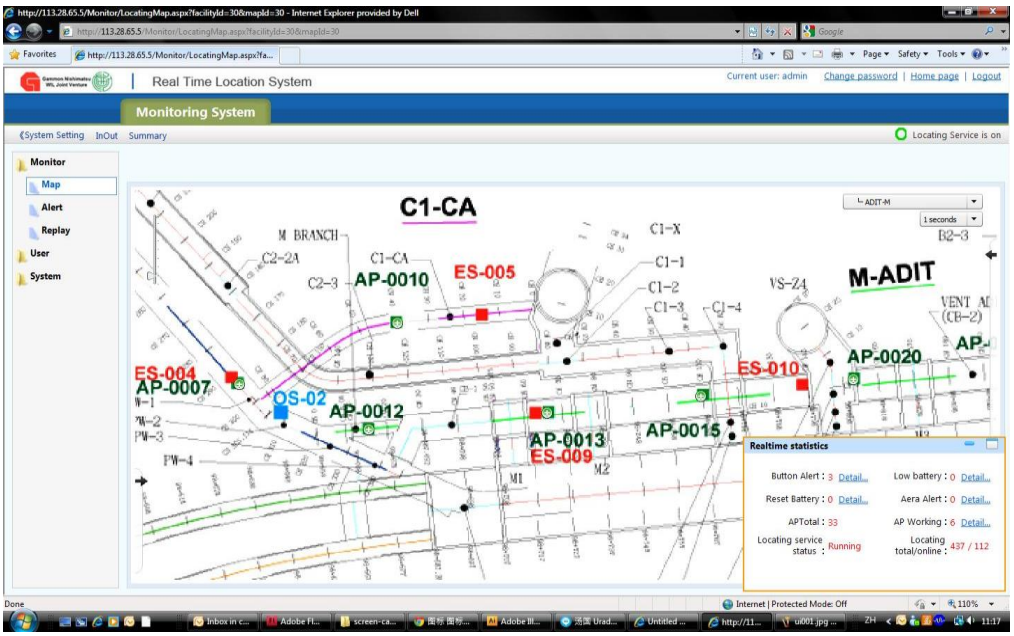
- iBeacons periodically broadcast signal with unique IDs
- No wire required to install
- Accuracy is about 1-3 meter
- Battery lasts 2-4 years
- Tags have shorter battery usage

 Indoor iBeacon URT630 95*40*22mm	 Outdoor iBeacon URT630-F 72*45*22mm

4. Locating Server Software

Locating Server consists of Locating Engine and Locating Monitor. The main functions include:

- Web based map to display position and alert
- Record and replay moving trace
- Entering/Leaving Zone Alarm, call button alarm, disappeared alarm, lower power alarm
- Warning if leaving assigned path
- Tag Management: bind tag to a person or asset
- Statistics Report
- Support APIs to integrate with other software



The software platform requirement:

1. OS: Windows Server 2008
2. .NET 4.5 above
3. Database: SQL Server 2008
4. IIS 6.0 above
5. Flash Player 10.0 above

Contact Information

URadio Systems Co., Ltd.
Address: D202-2, Phase 2, International Science Park,
1355 Jin Ji Hu Blvd., Suzhou Industrial Park,
Suzhou, Jiangsu, 215021, P.R. of China
Phone：+86 512 62621500 / +86 15371828361
Web: www.uradiosystems.com
Email: info@uradiosystems.com, admin@uradiosystems.com