南京沃旭通讯
高精度定位系统提供商

UA-300 Location System User Guide

2017-03-13
V2.2

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FCC Warning: *This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*

This equipment may only be operated indoors. Operation outdoors is in violation of 47 U.S.C. 301 and could subject the operator to serious legal penalties.

Description

UA-300 is the indoor location anchor based on UWB designed by Nanjing Woxu Wireless Co.,Ltd. UA-300 is a kind of anchor with high precise, high power. Supporting TDoA and TOF location both.

UA-300 is 802.3af PoE supply, or DC 12V supply, it is very convenient to do installation and management. UA-300 is used for wired backhaul.

Main features:

- 802.15.4a UWB
- High Precise， 5cm with ranging
- High power , 300m line of sight
- External antenna

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■ 802.3af PoE power supply

Product Photo

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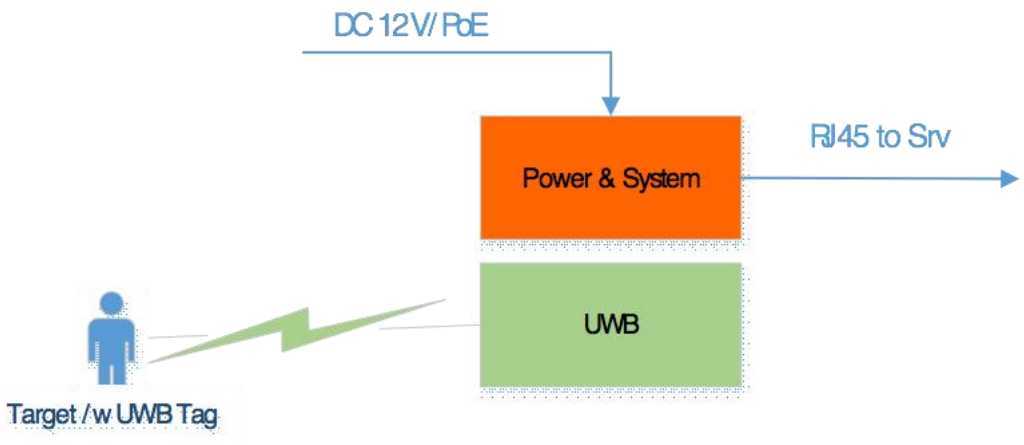
Application block diagram



Product Specification

Item	Description
Outline	
Product Name	UA-300
Standard	802.15.4a
Interface	DC Jack RJ45 10/100M LAN SMA(UWB)
Input Voltage	DC 12V ~ 57V
Average power consumption	< 2W
Installation	Wall hanging

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（UWB）RF

Working band	3.25GHz ~6.75GHz(Channel 1/2/3/5)
Physical Rate	110 Kbps
	850 Kbps
	6.8 Mbps
Output power(25℃)	-24dBm/MHz
Channel band width	500MHz
Antenna Gain	1+/-0.5dBi

Software Spec

UWB working mode	TDoA
	TOF
UWB (effective distance)	> 200 m@6.8Mbps no shelter
Range Precision	< 5cm（10000 standard deviation）
Time synchronization	wireless time synchronization
Configuration Method	Server Configuration/Web Configuration

Physical specification

Size(mm)	126×101×31mm
Weight(g)	360g

Environmental specification

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Temp.	Working: -40℃~85℃ Storage: -40ºC to 90ºC
Humidity	working： 0%～90% no condensation Storage： 0%～90% no condensation
Water proof and dust proof	IP54
RoHs	Compatible

Hardware Configuration

Anchor

Server-IP configuration (Important)

Anchor power supply (POE or 12V power adapter), and connected to the computer with a network cable. Change the local network connection IP address to 192.168.1.110, while adding IP address 192.168.57.44. Specific modification methods are as follows:

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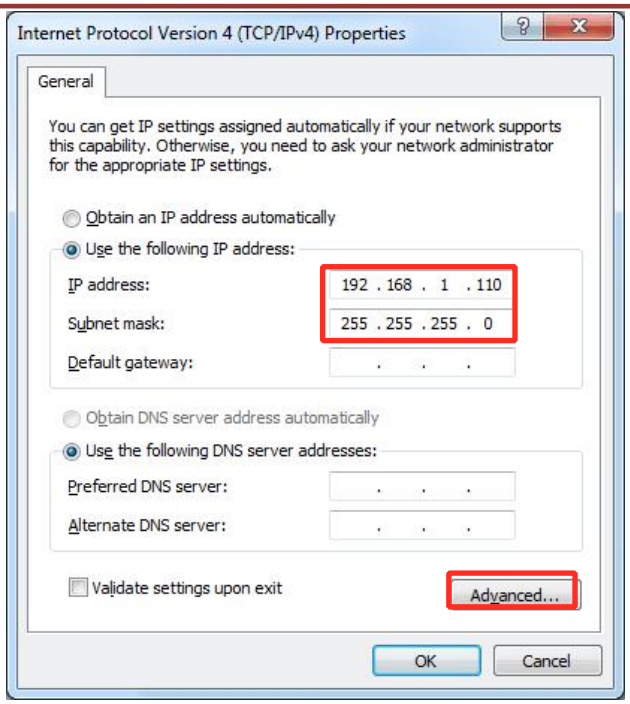
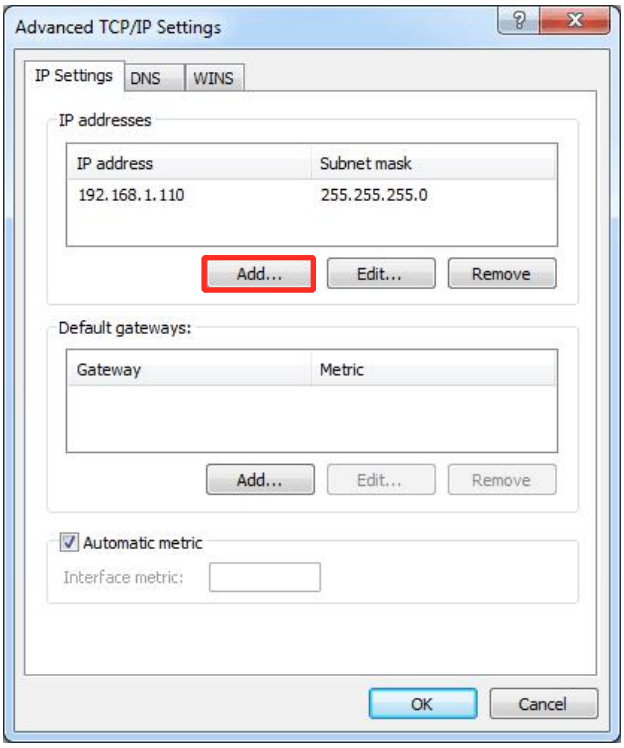


Figure 1 Server IP configure 1



2 Server IP configuration 2

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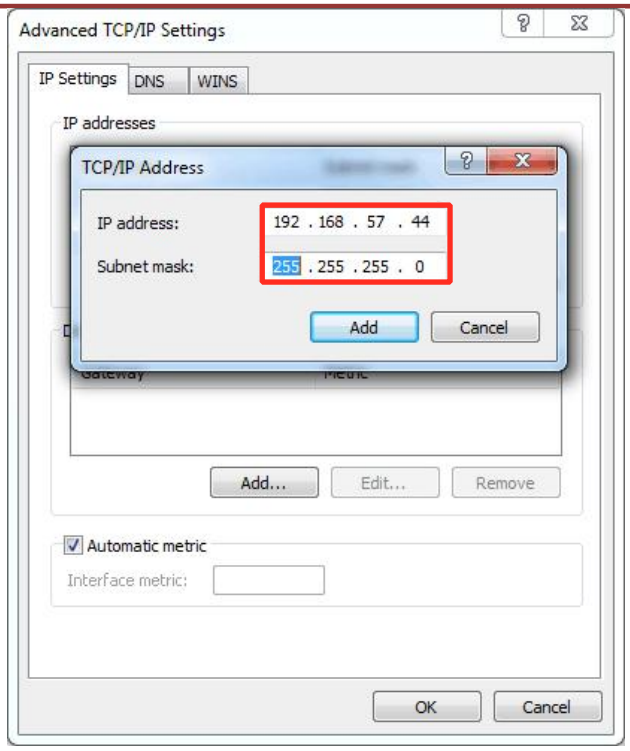

3 Server IP configuration 3

Anchor Web Configuration

Open the browser, enter the address 192.168.1.9 (Anchor default IP address) or 192.168.57.45 (Anchor default backup IP address). Open the login page, enter the account admin, password password.

4 Anchor Web log interface

After a successful login, the first anchor IP change to its own IP address, if not in the 192.168.1.X segments, you also need a PC's local IP address will be replaced by segment. It is recommended to use 192.168.1.X network, in order to follow the Anchor configuration.

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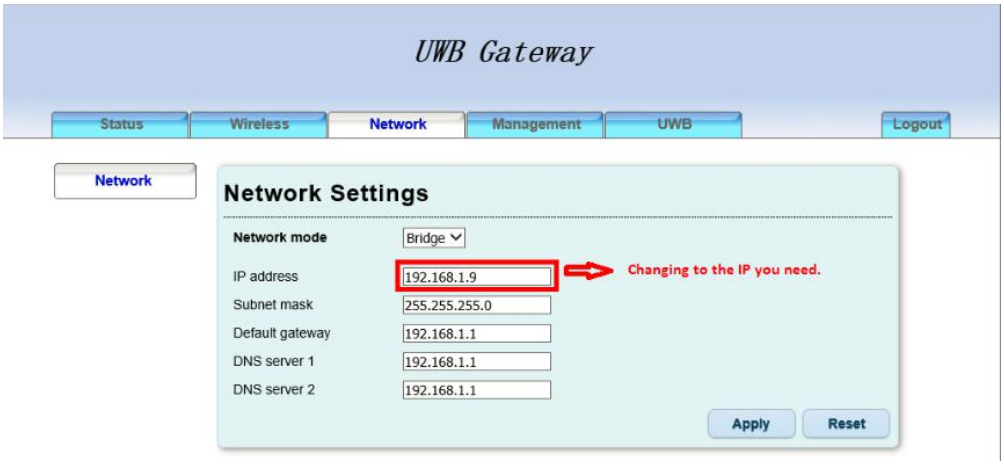
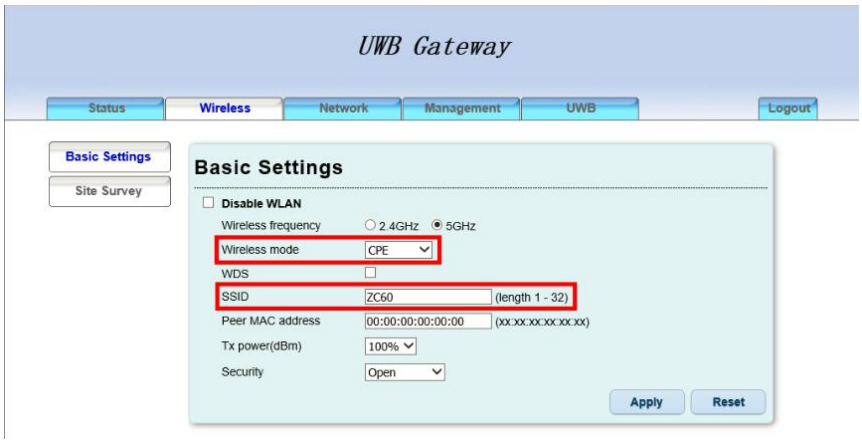


5 Anchor IP configuration

Binding Anchor and AP, click Wireless bar as below:



6 Binding of Anchor WiFi and AP-1

Default Wireless Mode of Anchor is CPE mode, you need to set one of Anchors to be worked in AP mode, in order to net all anchors. SSID could be defined by user, but the SSID of all anchors and APs must be the same. And then will be the wireless network scanning, binding Anchor and AP as below:

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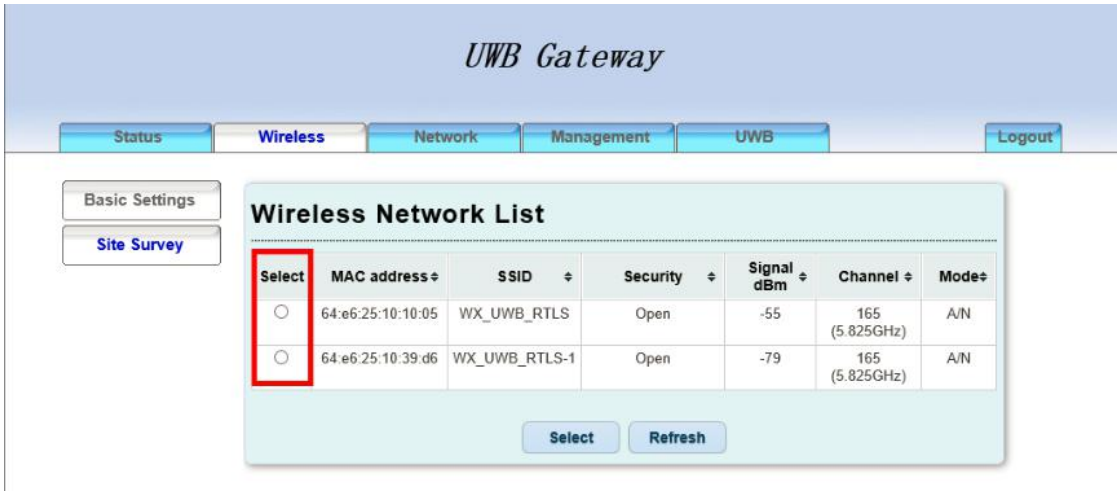
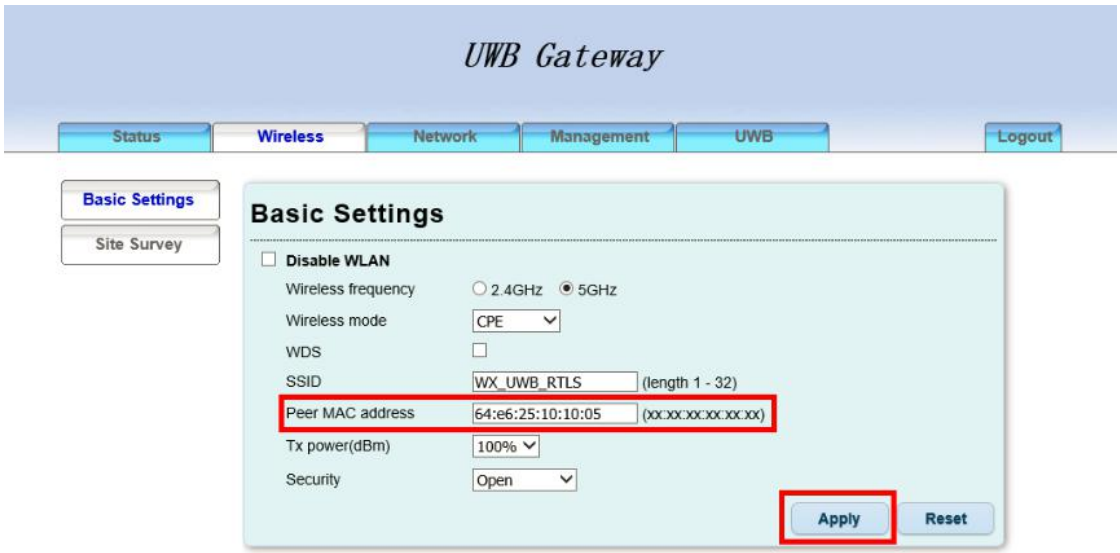


7 Binding of Anchor WiFi and AP-2

Select the wireless network in the list, and then click Select button, the interface will switch to Basic Setting automatically as below:



8 Binding of Anchor WiFi and AP-3

We can see that the MAC address is the MAC address of objective AP, click Apply, then goes to the WLAN interface of Status as below:

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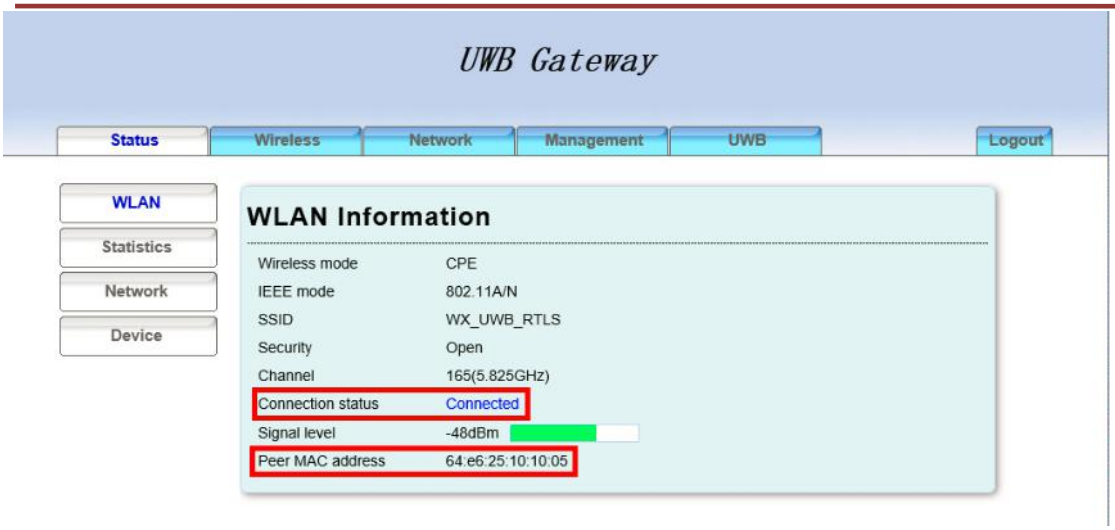
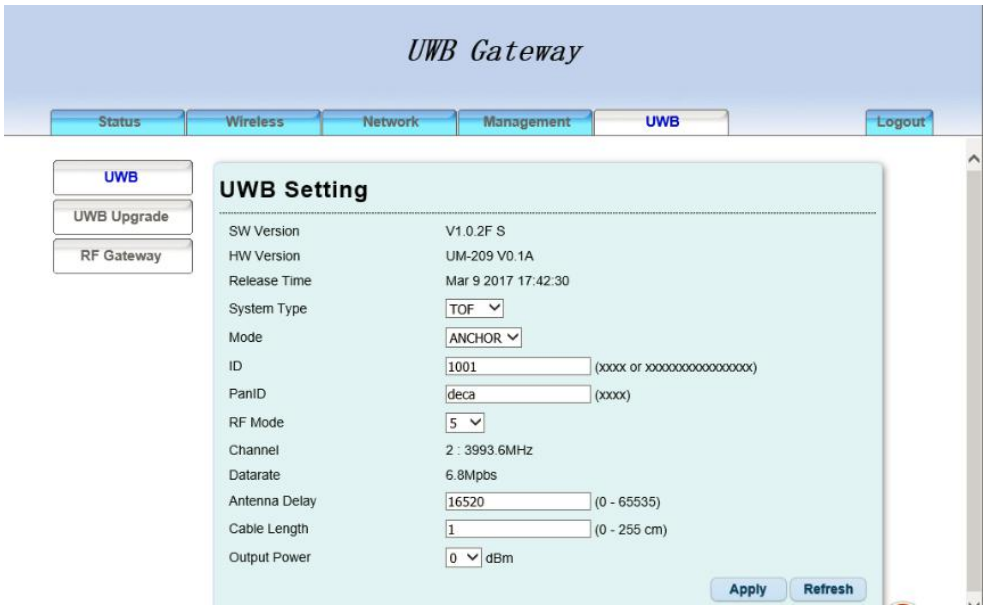


9 Binding of Anchor WiFi and AP-4

Repeat the above sets to finish the configuration of all anchors.

Check Anchor UWB Status.



10 Anchor UWB Status

The normal situation as above, the UWB Anchor working state is normal, if there is the case of N/A, please restart the Anchor several times, if still for N/A, please contact us.

After the completion of the configuration Tag (Tag and Anchor factory default is a good match, such as the need for additional configuration, the specific method see below Tag configuration) can be shown in the figure below the window to view the message with Anchor.

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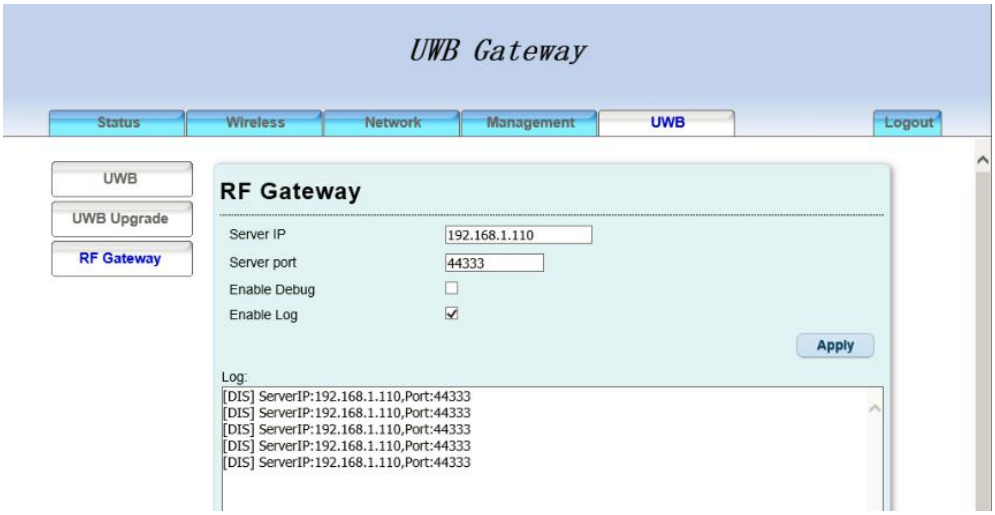

11 Anchor UWB message

seq:x，The sequence of messages that Tag sends is a successive addition.，Is a successive accumulation. If the loss occurs, the UWB signal is not good, may be due to the more serious occlusion or distance too far. Tag:xxxx, said ID's Tag number, for the 16 hex. Anchor:xxxx, said the ID of the Anchor number, for the 16 hex. Range:xxxx said the measured distance, the unit is m. If there is a large range of fluctuations in the value of the signal, the UWB signal there is interference, and more for the human body or metal surface.

Tag Configuration

Configuration tools and software

PL2303 USB convert to TTL，you can buy it from the web. connection mode：that is Tx、Rx、GND corresponding to USB Rx、Tx、GND. Driver download address：http://pan.baidu.com/s/1o6ypUyQ

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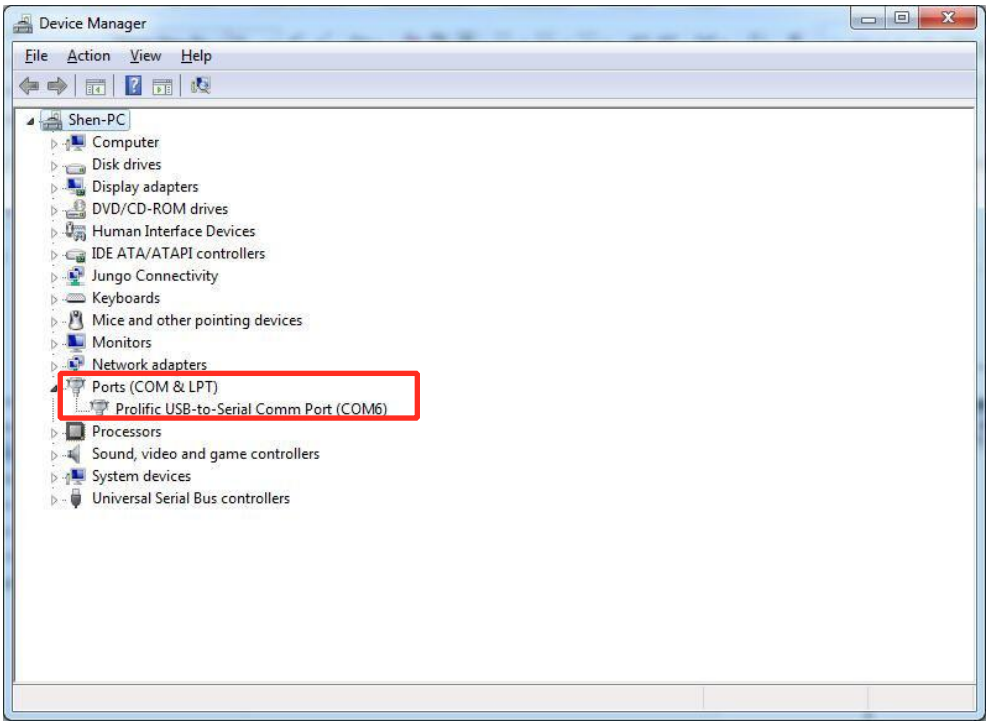
12 Tag Configuration Tool

Confirm if the installation is successful and the installation is successful as shown below:



13 Schematic diagram of successful drive installation

Install Serial port tool SecureCRT，Down load：http://pan.baidu.com/s/1gdzQrGR

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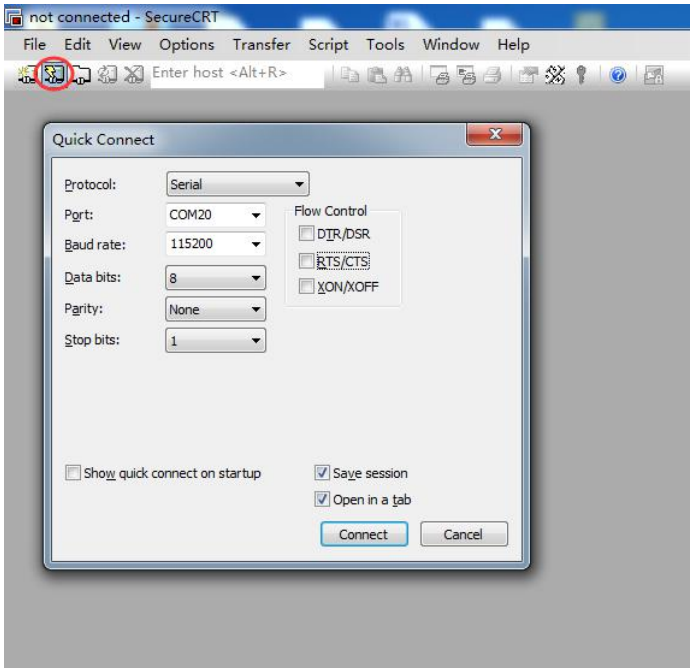
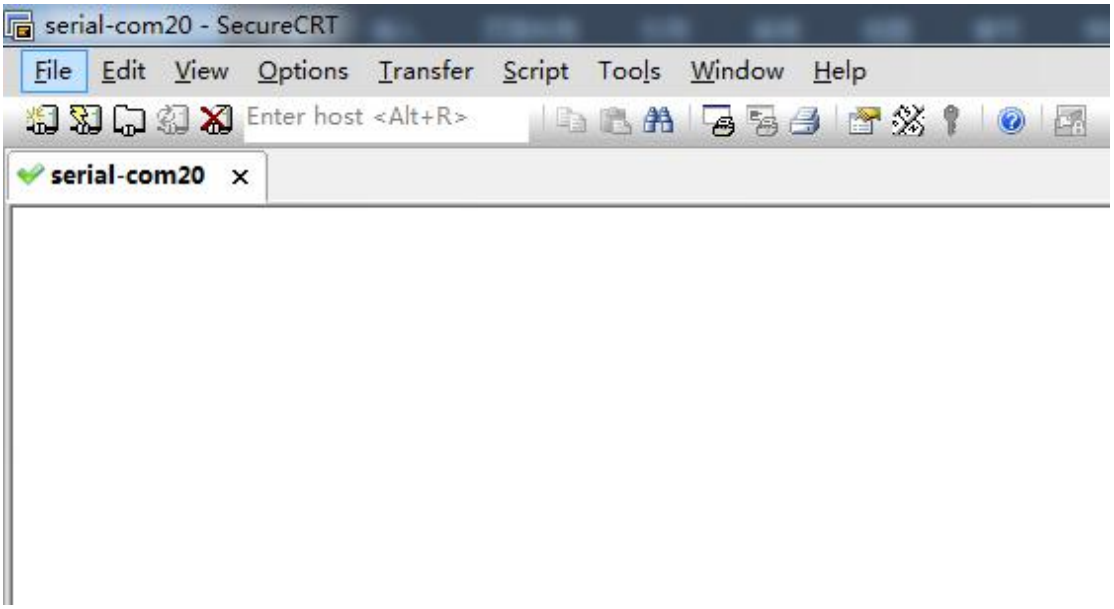
Open serial port tool SecureCRT，select fast connection, operation method is as below:



14 SecureCRT connection

The serial, protocol selection, computer identify the module of COM port, baud rate select 115200, data bits 8, parity select none, option 1 stop bits, flow control don't hook any option is chosen. Then click Connect.



15 SecureCRT connection success

Open Tag Switch，Pop up the contents shown below:

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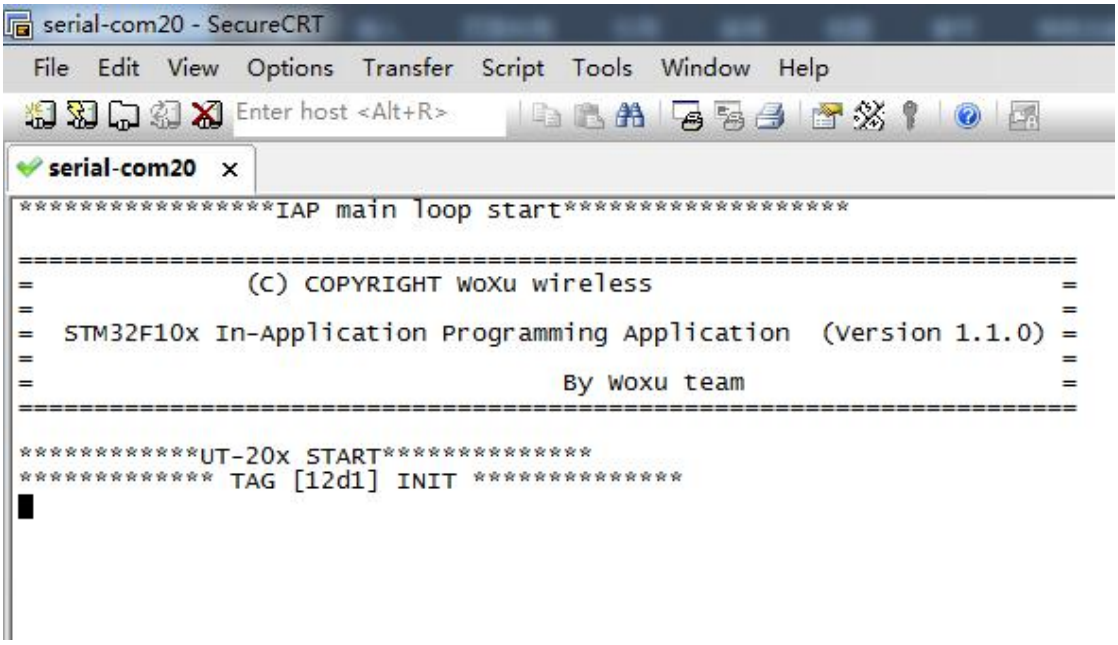
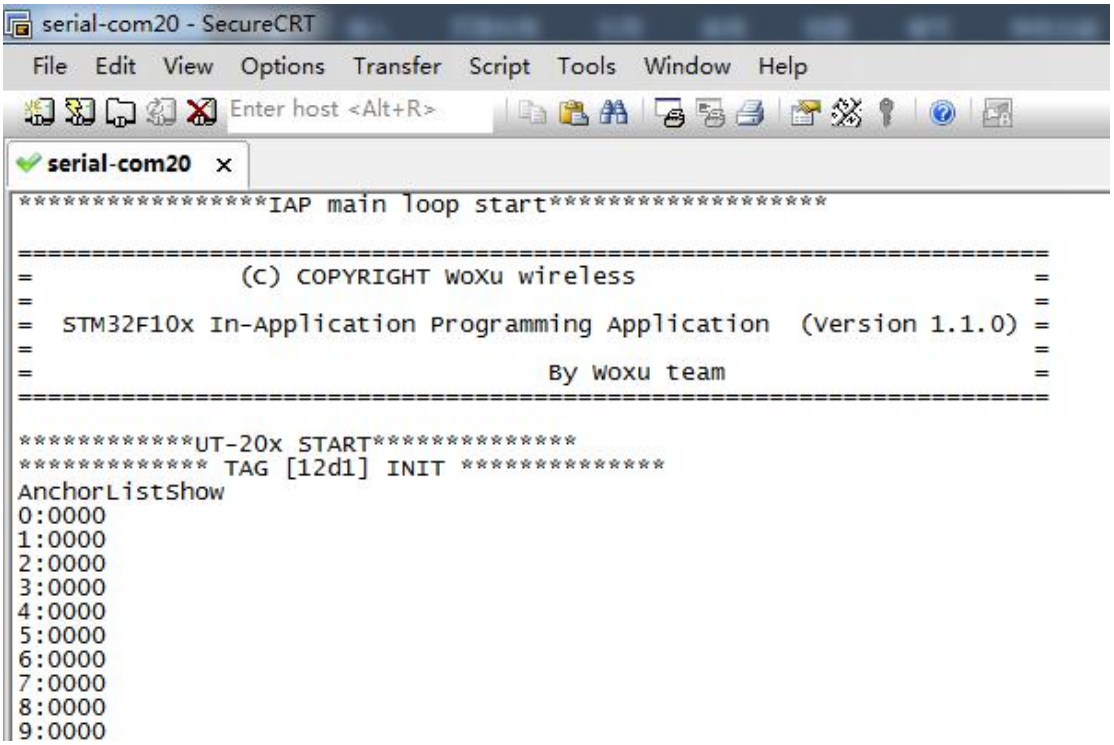


16 SecureCRT connection Tag successful

How to match the Tag and Anchor

Type AnchorListShow，check the matching about Tag and Anchor, as below：



17 Anchor list Show

0-79：serial NO. ，xxxx IS Anchor’S ID。

Input AnchorListSet+space+sequence NO.+AnchorID, Specific as shown below:

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```
76:0000
77:0000
78:0000
79:0000
AnchorListSet 0 125d
RTN : Set 0 value 125D succ !!
```

Input Reboot，Reset Tag，Enable configuration to take effect.

```
77:0000
78:0000
79:0000
AnchorListSet 0 125d
RTN : Set 0 value 125D succ !!

******************IAP main loop start********************

=====================================================================
=              (C) COPYRIGHT WoXu wireless                          =
=                                                                   =
=  STM32F10x In-Application Programming Application  (Version 1.1.0) =
=                                                                   =
=                                  By Woxu team                     =
=====================================================================

*************UT-20x START***************
************* TAG [12d1] INIT **************
```

18 AnchorListSet and Reboot

How to modify the Tag signal transmission frequency.

Input Get+Sleep_time and check Tag current frequency , as belowing:

```
******************IAP main loop start********************

=====================================================================
=              (C) COPYRIGHT WoXu wireless                          =
=                                                                   =
=  STM32F10x In-Application Programming Application  (Version 1.1.0) =
=                                                                   =
=                                  By Woxu team                     =
=====================================================================

*************UT-20x START***************
************* TAG [12d1] INIT **************
Get sleep_time
Get sleep_time value succ : 200
_
```

19 Get Sleep_time

200 unit is ms，Frequency is about 5Hz。

Input Set+Sleep_time，and input command Reboot to make the change effect.

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```
************UT-20x START**************
************* TAG [12d1] INIT **************
Get sleep_time
Get sleep_time value succ : 200

Set sleep_time 100
RTN : Set sleep_time value 100 succ !!

*****************IAP main loop start*******************

======================================================================
=              (C) COPYRIGHT WoXu wireless                           =
=                                                                    =
=  STM32F10x In-Application Programming Application  (Version 1.1.0) =
=                                                                    =
=                                  By Woxu team                      =
======================================================================

************UT-20x START**************
************* TAG [12d1] INIT **************
```

20 Set Sleep_time

At this point, we can find that the status of Tag lights flashing significantly faster, and vice versa if the sleep_time settings are larger, then the status indicator light flashes slowly. Here need to point out that the value of 0-500ms is sleep_time. 0 value, Tag in accordance with the maximum frequency of the emission signal, that is, 500Hz, because the Tag to complete a signal processing needs 2ms. Sleep_time is the interval between the two signal processing.

Other command to vies:

Enter any letter, etc., as shown in Figure:

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```
=====================================================================
=              (C) COPYRIGHT WoXu wireless                          =
=                                                                   =
=  STM32F10x In-Application Programming Application  (Version 1.1.0) =
=                                                                   =
=                                   By Woxu team                    =
=====================================================================

************UT-20x START**************
************* TAG [12d1] INIT **************
a
****************************************************
**Usage:                                          **
**       1.Reboot                                  **
**       2.Reset                                   **
**       3.Standby                                 **
**       4.Upgrade                                 **
**       5.Set paramId paramValue                  **
**       6.Get paramId                             **
**paramId(paramValue):                             **
**    operator_mode(1 TAG ,2 ANCHOR)               **
**    mac(xxxx or xxxxxxxx)                        **
**    panid(xxxx)                                  **
**    rf_mode(0,1,2,3,4,5,6,7)                     **
**    sleep_time(0-500 ms)                         **
**    is_powertest(0 not test, 1 test)             **
**    powertest_mode(0,1,2,3,4,5,6,7)              **
**    antenna_delay                                **
**    frequency_shift                              **
**note:                                            **
**    the antenna_delay , frequency_shift and mac **
**    only be set once,                            **
**    so you must be very careful !                **
**    Please follow the syntax,                    **
**    Or contact Woxu wireless.                    **
***************www.woxuwireless.com****************
```

21 other command

You can see some of the available commands, but note content to pay special attention to, improper operation may result in Tag can not work properly.

Installation

Anchor installation（important）

Indoor type Anchor front (with net mouth) marked ANT connected to the UWB antenna. 2

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antennas on the back.

22 Indoor Anchor picture

The Reset function button (RST) on the anchor, as well as the power supply interface (PWR), the default provides 12V power adapter.

Anchor lights top-down respectively: position indicating lamp, that anchor to receive the tag information, will flash; wireless Data transfer signal indication lamp; network port is connected with the indicating lamp; power indicator light;

Indoor base station installation, the base station should be as far as possible to avoid blocking. Office hanging to the ceiling, factories, warehouses generally hang up to 4~5 meters high. Base station installation location should be away from the metal surface, liquid, large machinery cabinets, etc..

Indoor basestation installation, the basestation should be as far as possible to avoidblocking. Office hanging to the ceiling, factories, warehouses generally hang up to 4~5 meters high. Base station installation location should be away from the metal surface, liquid, large machinery cabinets,
far from the door and the window at least 3 meters, etc..

When the base station is in the calibration position, it is based on the antenna (antenna is usually perpendicular to the ground).

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Location system Engine configuration

Index and notes

名称	修改日期	类型	大小
backup	2015/11/20 9:28	文件夹	
RES	2015/11/18 14:51	文件夹	
shared	2015/11/19 11:04	文件夹	
HPSocket_U.dll	2015/2/8 22:50	应用程序扩展	157 KB
res0409.dll	2015/11/18 14:43	应用程序扩展	3,231 KB
res0804.dll	2015/11/18 14:44	应用程序扩展	3,227 KB
USets	2015/11/18 14:44	应用程序	233 KB
VSets	2015/11/18 14:44	应用程序	235 KB
WxGUI	2015/11/18 14:35	应用程序	615 KB
WxGUI	2015/11/23 13:59	XML 文档	2 KB
WxLocator.dll	2015/11/19 14:56	应用程序扩展	189 KB

23 Location Engine root directory

backup directory

Store backup files, including the backup configuration file, the SQL file to initialize the database table; the proposed database backup can also be placed in the directory.

res directory

Resource files, including alarm audio; configurable icon, multi language string settings, put in the directory.

shared directory

Store data that can be shared, such as data stored by the button in the run.

WxGUI.exe

The main application, the system functions of the entry procedures.

WxGUI.xml

The main configuration file, the running parameters of the system configuration, can not be modified, can only be modified by Vsets.exe or Usets.exe.

WxLocator.dll

Algorithm library, including the pre-processing algorithm, post-processing algorithm, position calculation algorithm.

Vsets.exe

Agent configuration file modification program.

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Usets.exe

General user profile modification program.

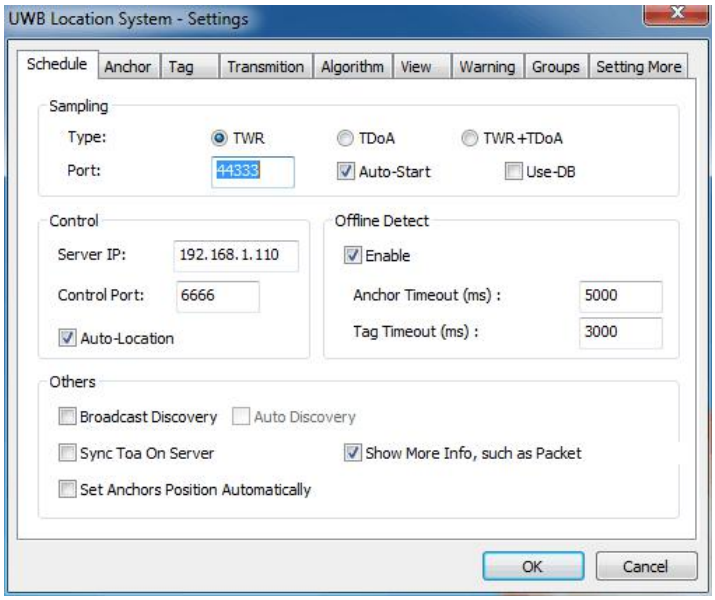
HPSocket_U.dll

Network communication library for the sampling of data, C interface data output, etc..

Location system engine configuration

Open the configuration application in the software folder named VSets.

Schedule



24 System set-Affair

(1) Using Type: That is system working mode, supports TWRand TDoA and TWR+TDoA,total three mode.

(2) Sampling port: the default 44333, which needs to be consistent with the configuration of the Anchor (with reference to the UWB page Gateway RF port settings), the default check automatically start sampling. Use the database to provide scalable database functions, the user does not use the database to further illustrate the need to develop additional support when needed.

(3) Control parameters: this part of the function is mainly used for the robot part, the default configuration.

(4)Equipment offline detection: for the detection of equipment is offline, and in the interface display online state.

(5) Other parameters: to allow the radio to find the message, the default shutdown, mainly used to send a broadcast message to the base station. Allows you to display more information, the default check, you can view more information in the software.

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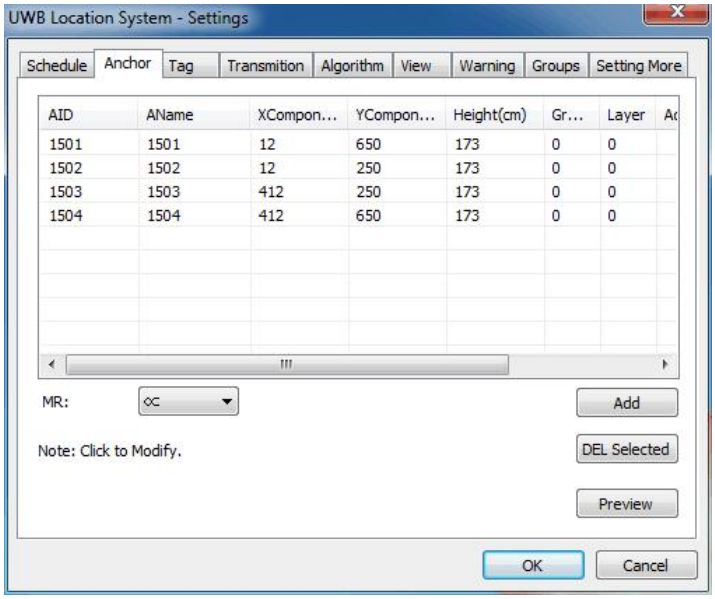
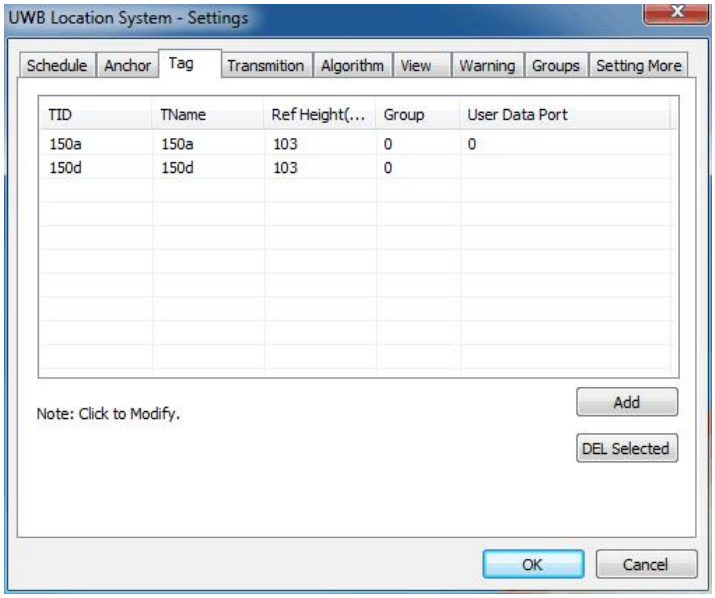
Anchor（important）



25 location system-Anchor

Used to add and remove base stations. Base station coordinate measurement method, please refer to twenty-seventh pages on the map of the coordinate system.

TAG



26 Location system-TAG

Add or delete TAG

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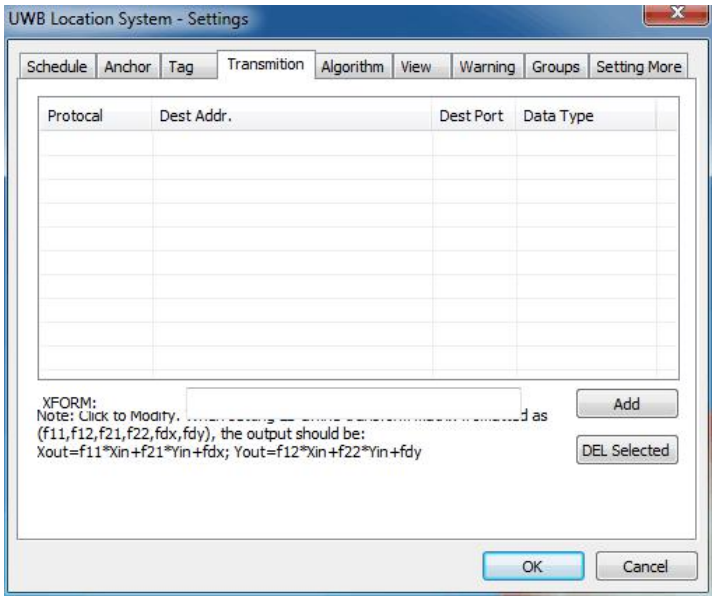
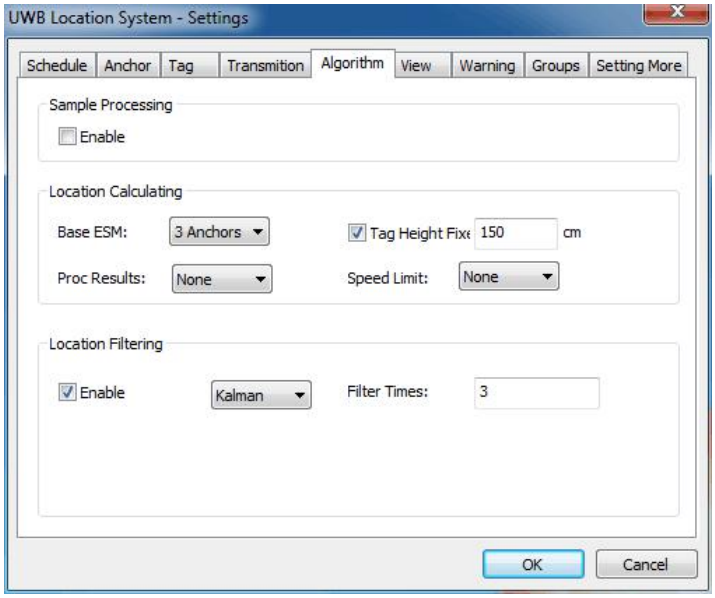
Transmition



27 Location system-forward

Used to increase data forwarding, only support UDP. Forwarding data content can only be location data or alarm data.

Algorithm



28 Location system -Algorithm

(1) Sampling process: support the use of filtering, can choose the sliding mean and Calman, the sampling parameters can be adjusted.

(2) position calculation: 3 base stations and 4 base station algorithm, the height of the tag

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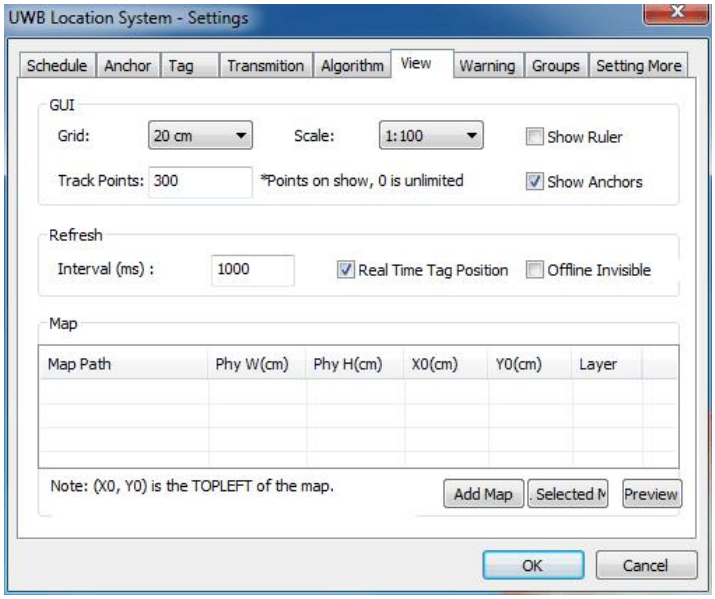
is known to be completed in accordance with the actual situation, such as tag installation height or change, then do not check.

(3) after processing: support for the sliding mean and Calman, etc., the filter parameters can be adjusted.

View



29 Location system configuration -view

(1) Graphics rendering: mainly used to adjust the presentation interface of some of the auxiliary effect.

(2) To refresh the view: set the alarm, the time interval to greater than the duration of the warning track; no alarm set, this parameter without special requirements.

(3) Map loading: for the introduction of the background map, where Y0, x0, said the origin of the coordinates.

Alarm

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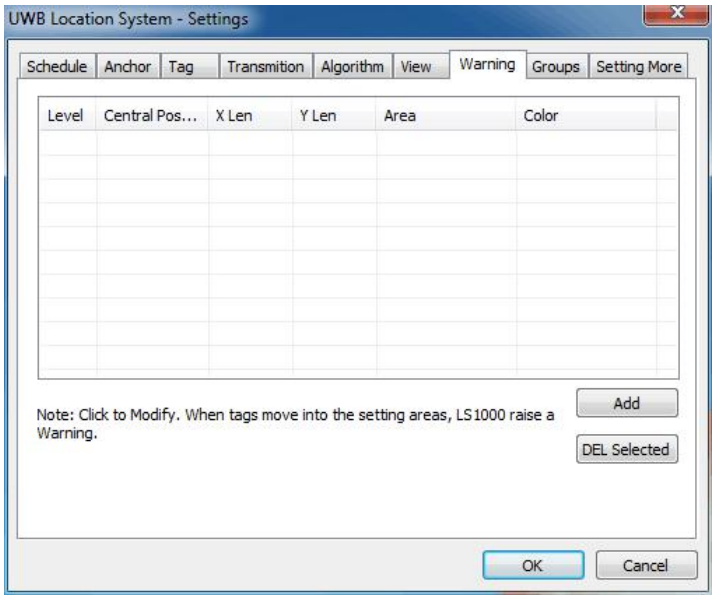
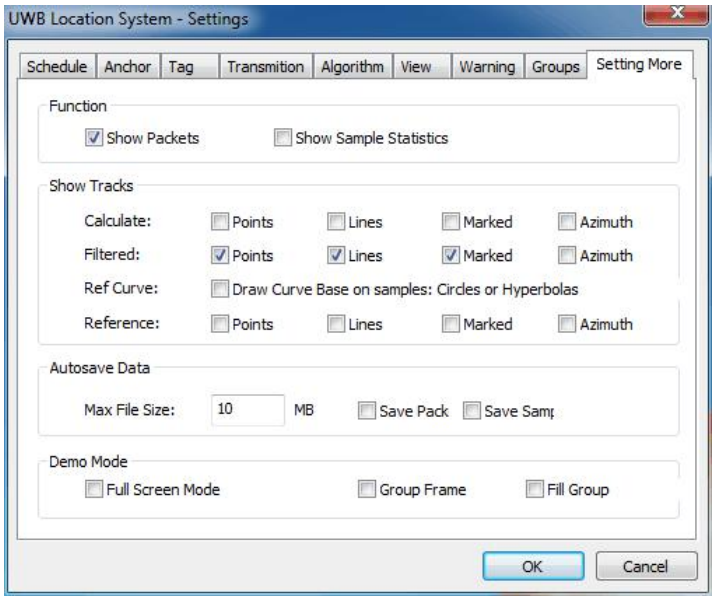


30 Location system configuration-Warning

Currently only supports adding a rectangular alarm area.

Setting More



31 Location system configuration-Setting More

（1）Function：Display real time messages, generally used as a system debugging.

（2）Present calculation results：the original data not by processing calculation result position; filtering results for sampling after filtering and processing of the calculation results of location; circular reference for analysis of data base is used.

（3）Present other data: mainly used for the data presentation of the robot

（4）Presentation: the upcoming interface full screen.

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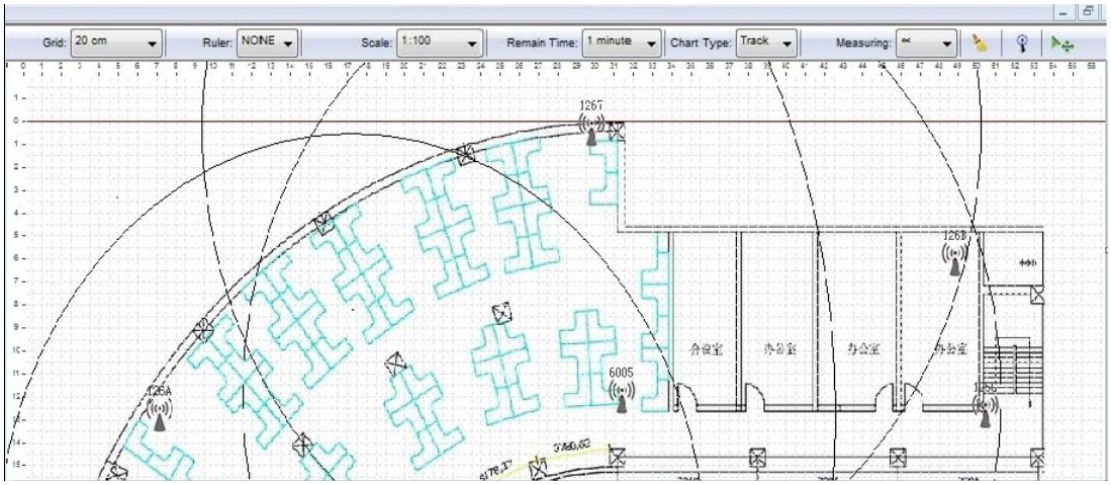
Location Engine Presentation

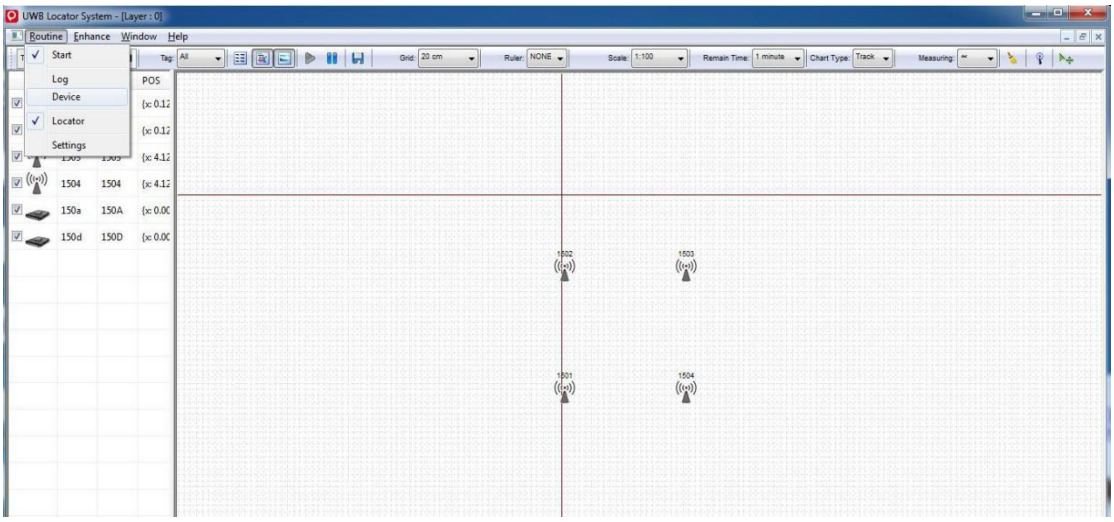
Run WxGui applications, as shown below:



32 Location Engine presentation-1

The interface is directly above the menu bar; the menu bar is below the sampling, algorithm configuration bar; the left for the equipment status bar; the middle of the data bar and the map section.

Function menu



33 Location engine presentation -2

（1）Display log

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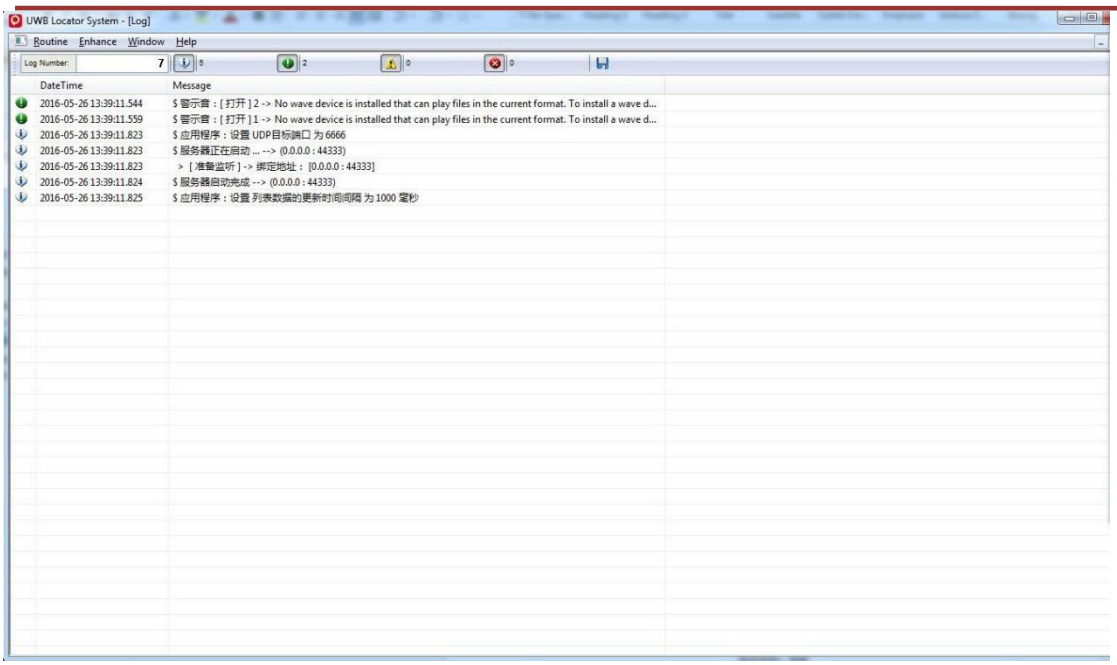
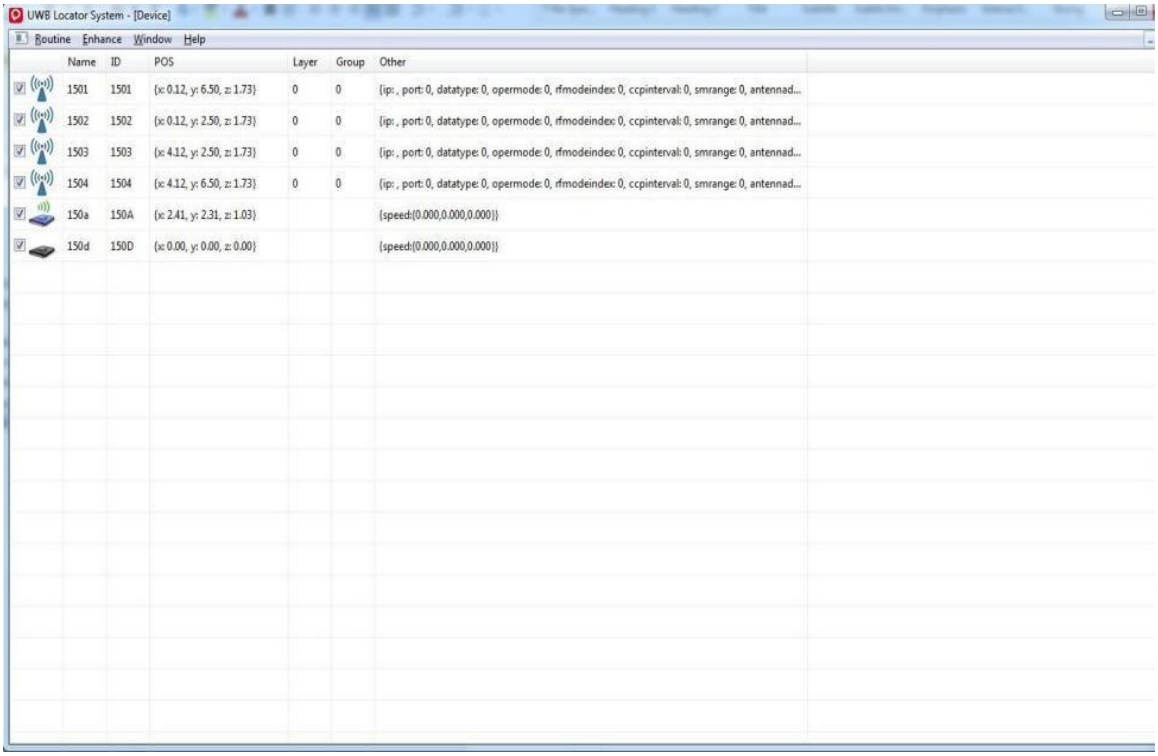


34 Location engine display log

Used to view the status of the system log, such as the server startup status, etc..

（2）Display device



35 location engine display device

Device status bar, which is used to view the status of the device, is equivalent to the device status bar on the left side of the tab.

(3) Display message

Used to view the real-time message obtained by the positioning system, mainly in order to debug

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the system analysis of the use of data.

(4) label location

This option is the default option when you open the software for switching to a location presentation interface.

(5) System configuration

Used to modify the configuration, function is same as Usets.exe。

Window

Used to switch the view window

Help

Check the location system version information

How to debug the positioning system software

Sampling and algorithm debugging menu

36 location engine sampling and algorithm debug menu

Track points: the number of points that have been obtained.

Tags: select the corresponding label ID, the map shows the corresponding choice

Algorithm: three base station or four base station, choose different algorithms to verify which is more suitable for the location of the region's needs

Input: That the input filter, the default is no

Output: That the output filter, General to use calman

Rate gate limit: Limiting the amplitude of the drift, reducing the error caused by the sampling error jump point

Calculation position: Calculation of starting position and position calculation.

Store locus: Used to save the calculated location data to the Shared folder for later analysis and debugging.

load trace point: Used to import the track points have been saved, for analysis.

Playback rate: back to the corresponding track point, the default value of 1 times.

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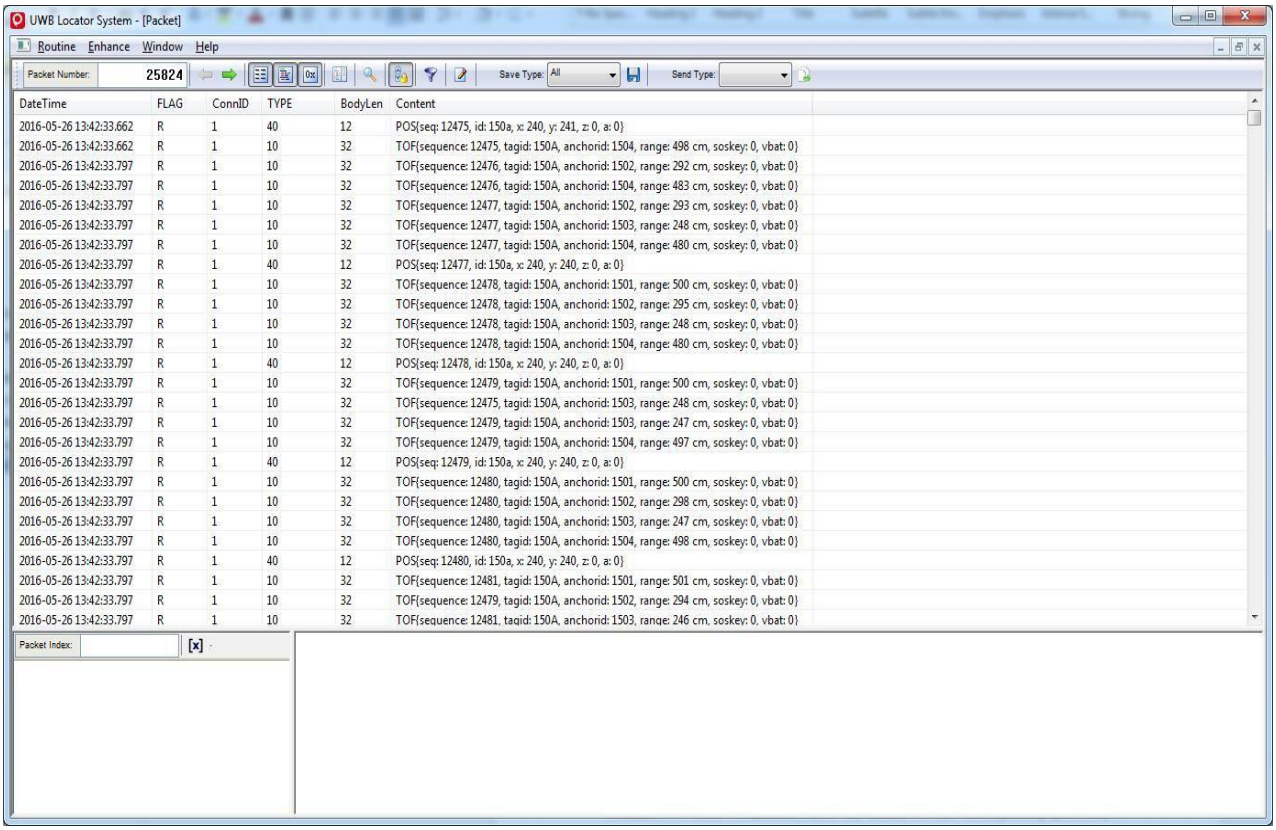
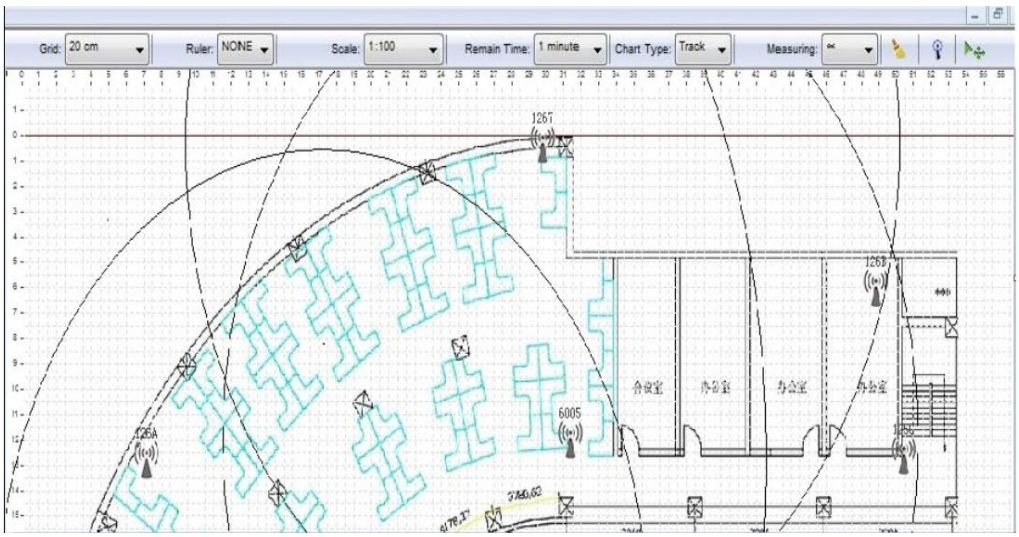
Data bar



37 location engine data bar

The sampling and reconciliation information of the corresponding label is displayed, including the time, the serial number, the coordinate, the speed, the sampling data and the check data. Its main function is to view the sample data reconciliation data whether there is an anomaly.

Map（important）



38 location engine map presentation

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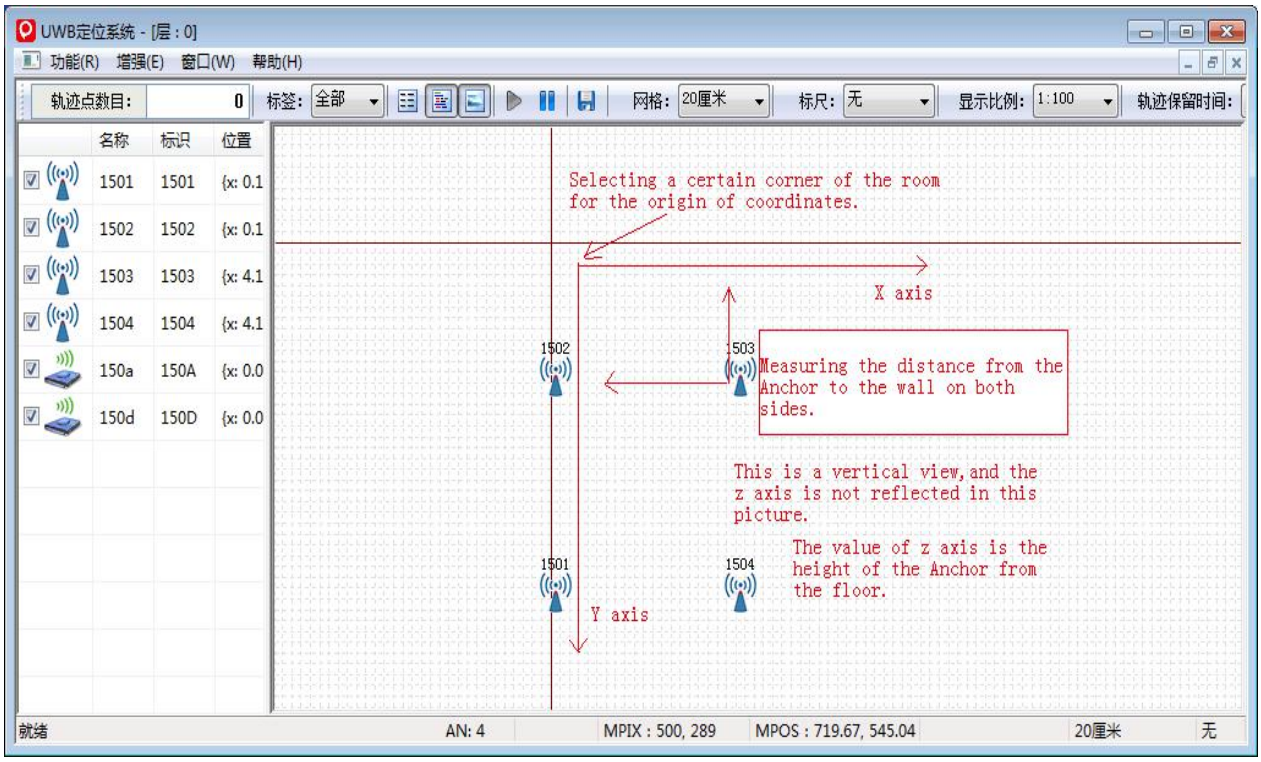
Grid: the grid is presented, which is used for reference.
Ruler: the scale is presented on the map for reference use.
Display ratio: used to adjust the proportion of the map display.
Track retention time: select the time to render the locus.
Image style: can choose to present the locus of a point or line graph.

clear data: used to clear trace

Set anchor: Used to manually move the anchor to the corresponding position, this feature is designed to not precise coordinate measurement of under, convenient and rapid deployment.

About map coordinate

Taking an indoor room as an example, when measuring the coordinates of each base station, the method is shown in the following figure:



39 Map coordinate notes

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