YCHIOT UWB multi-anchor positioning solutions

V1. 1

Contents

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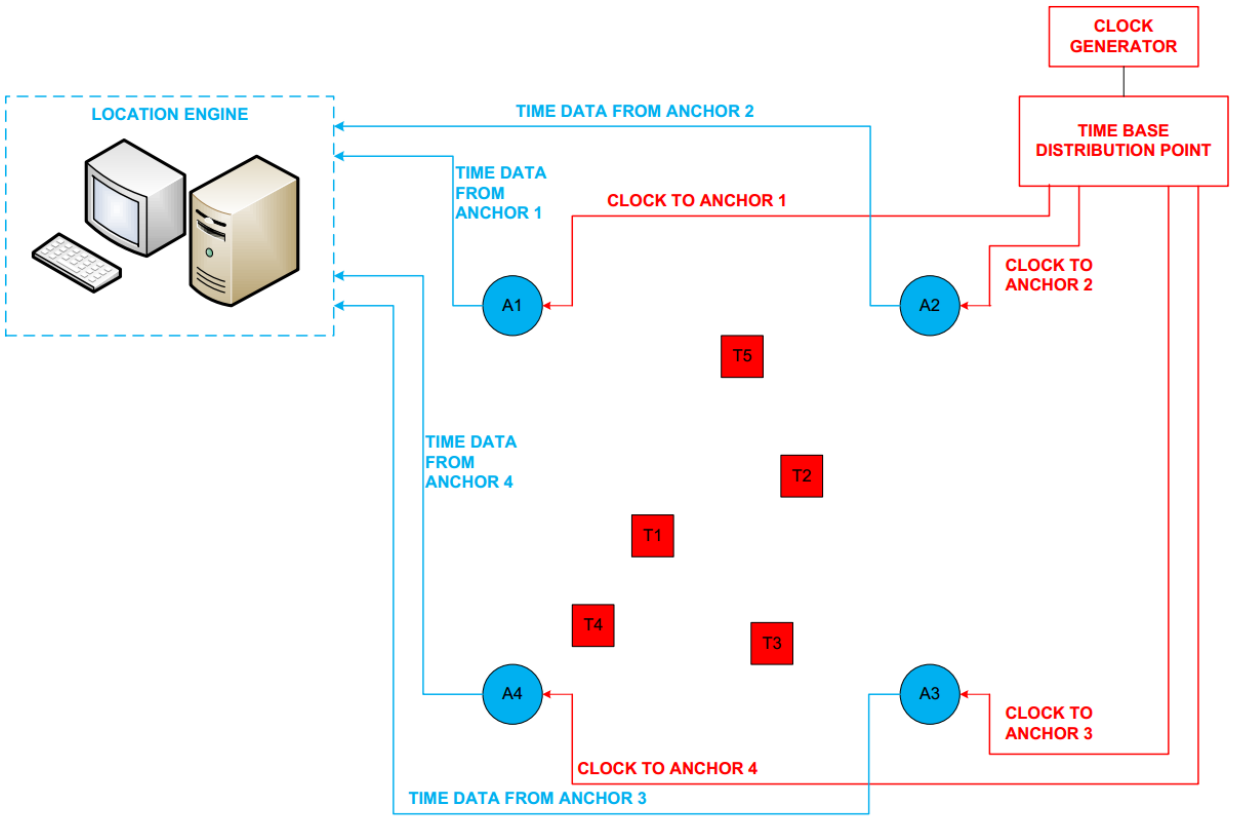
1 TDOA multi-anchor scheme based on wired synchronization

1.1 System architecture



1.2 Overview of the system principle

Adopt the TDOA approach. TDOA positioning is a method of positioning that takes advantage of time differences. By measuring the time it takes for the signal to reach the monitoring station, the distance to the signal source can be determined. The distance from the signal source to each monitoring station (centered on the monitoring station, the distance is the radius as a circle) can determine the position of the signal. However, the absolute time is generally difficult to measure, and by comparing the time difference between the signal and the monitoring station, a hyperbola with the monitoring station as the focus and the distance difference as the long axis can be made, and the intersection point of the hyperbola is the position of

the signal.

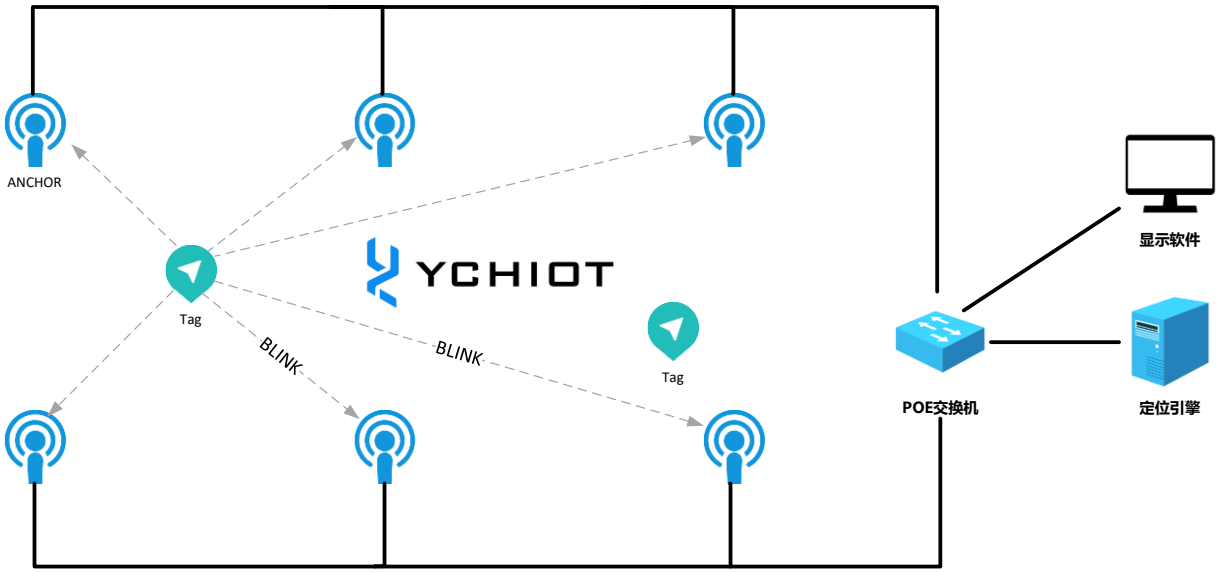
Take T1 as an example to explain the scheme. T1 sends "broadcast" frames at regular intervals, because A1, A2, A3, A4 are different from T1, and the time received is slightly different, and the timestamp is recorded; Since the time of A1, A2, A3, A4 is synchronized by wire, there is comparability, sent to the local computer for location calculation.

Advantages of this solution: At the technical level, the label only needs to send data to the anchor, and the anchor does not need to reply data to the tag, reducing the data conflict of the entire network; Since synchronizers and anchors are connected via wire, the number is highly scalable. With the increase of anchors, the positioning speed does not decrease.

Disadvantages of this scheme: the need to pull optical fiber, cumbersome site layout, and increased cost of synchronizers (each synchronizer with 4 anchors).

2 TDOA multi-anchor solution based on wireless synchronization

2.1 System architecture



2.2 Overview of the system principle

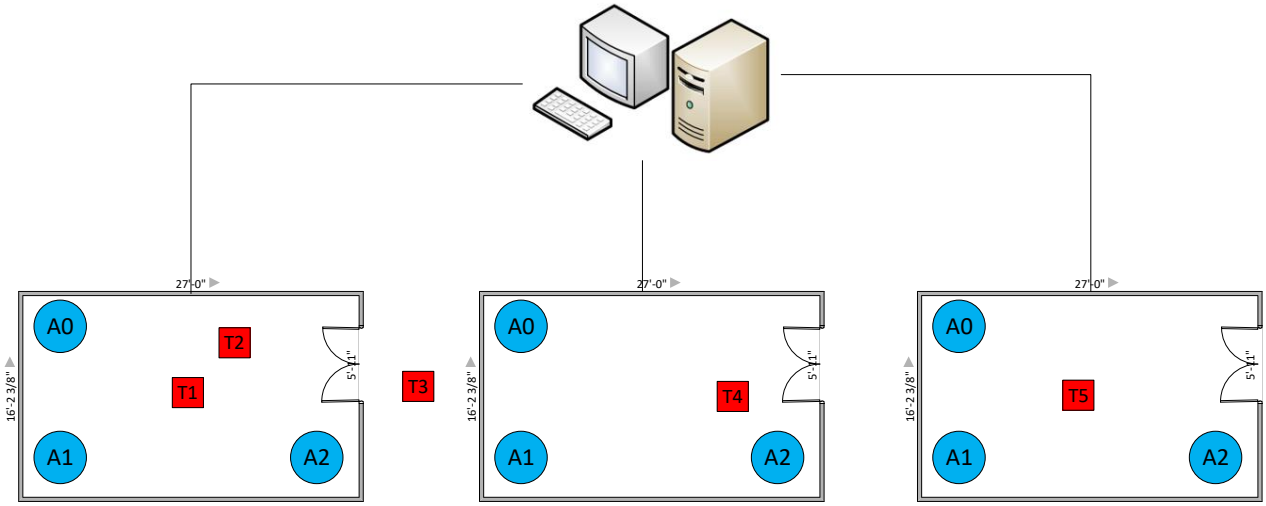
As shown in the figure above, during installation, according to the installation requirements, at least 4 anchors are installed in the positioning area, and the anchor is connected to the LAN port of the POE switch using a network cable, and the user's computer is also connected to the LAN port of the switch through the network cable. Run the D HCP server and the CLE positioning engine software on the computer to realize the monitoring of the positioning target. For UWB anchor/tag parameters, please refer to the manual: en_ap21-YCHIOT High-Precision UWB Anchor&Tag_Introduction_V1_1

The advantages of this solution are: at the technical level, the more anchors, the fewer blind spots, and the number of tags that can be supported can reach thousands. Leave complex calculations to the software engine for easy maintenance;

The disadvantages of this scheme are: the network cable needs to be pulled between the anchor and the switch, which requires certain requirements for construction;

3 TWR multi-anchor solution based on wireless synchronization

3.1 System architecture



3.2 Overview of the system principle

Using the method of regional division, 3 anchors are placed in each relatively independent area, and the anchor signals between regions and regions can cover each other. When the tag enters an area, it is automatically recognized.

The above diagram describes the workflow as an example, assuming that there are three rooms, X1 / X2 / X3. The anchors in the three rooms work in turn, and when the anchors in the X1 room interact with information, the anchors in the X2/X3 room are not allowed to send, only to receive. When the anchor in the X2 room interacts with information, the anchor in the X1/X3 room is not allowed to send, only to receive, and so on. Coordinate the working hours of the X1/X2/X3 room with a local engine (computer).

The advantages of this solution are: at the technical level, the anchor of each room is wirelessly synchronized, and each room and computer connection needs to be connected with a wired connection. The wiring is relatively simple;

The disadvantage of this scheme is that as the number of tags and the number of rooms increase, the polling time becomes longer, so this scheme is not suitable for applications with more than 50 tags.

4 Document Management Information Sheet

Subject	YCHIOT UWB multi-anchor positioning solutions
Version	V1.1
Reference documents	[1] IEEE802.15.4-2011 or "IEEE Std 802.15.4™-2011" (Revision of IEEE Std 802.15.4-2006). IEEE Standard for Local and metropolitan area networks - Part 15.4: Low-Rate Wireless Personal Area Networks (LRWPANs). IEEE Computer Society Sponsored by the LAN/MAN Standards Committee. Available from http://standards.ieee.org/ [2] Qorvo DW3000 Datasheet www. Qorvo.com [3] Qorvo DW3000 User Manual www. Qorvo.com [4] Partron (Now manufactured by Abracon) Dielectric Chip Antenna, P/N ACS5200HFAUWB (Now ACA-107-T), www.digikey.com also see www.abracon.com
Creation time	2018/06/01
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Modifier	Date	Document change history
Lynn	2018-06-01	V1.0 Release of V1.0 documentation
Lynn	2023-01-01	V1.1 Release V1.1 documentation