

# OpenRTLS UWB

## infrastructure-based modified COTS Technologie

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### I. APPROACH

Position of a mobile device (tag) is determined by measuring time of flight of the radio signal. The tags use predetermined timeslots (tdma). Maximum available timeslots is 8000 per second. The radio signal is a IEEE 802.15.4a UWB signal on channel 2 or 5 resp. 3.5 or 6.5GHz. The transmitted radio signal from a tag is received by 5 pre-installed receivers (anchors). The anchors are synchronized using wireless signal scheme. All data communication between anchors is done wireless, however a 10/100 ethernet connection is also possible to use. One anchor is connected to a laptop via ethernet. Every anchor has 2 or more UWB transceivers. The phase difference between 2 UWB transceivers is also used to determine the position of a tag. Anchor positions are determined using distance measurement by the system itself (auto-positioning) and verified and or adjusted using laser range finder. Calculation of the position of one or more tags is done in hardware or in software on a laptop/pc connected to the system.

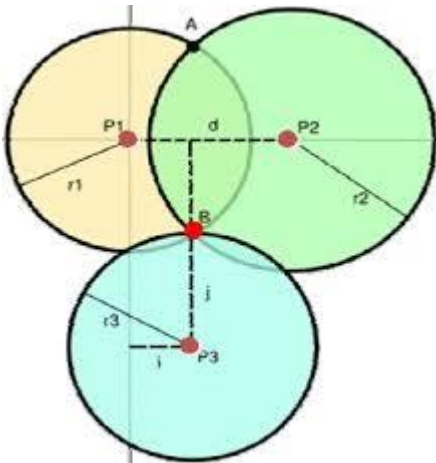


Figure 1, positioning

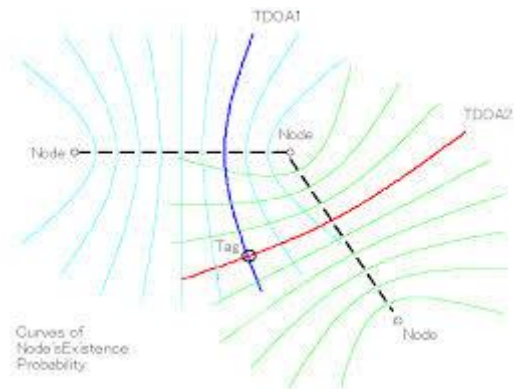


Figure 2, positioning TdoA

### II. DEPLOYMENT

A tag, operating on battery-power, has a position inside a specified area called target area. When anchors are placed at different heights the Z-axis is determined with improved accuracy. It is not mandatory to place all anchors at different heights to get an accurate Z-axis. Local features determine where anchors can be best placed in a practical way. It is preferred to keep the anchor at least 10cm or more away from large metal objects. 4 anchors are installed at different heights on tripods enveloping the target area but not necessary exactly at the corners of the target area. The 5th anchor is placed above the target area if practical. Else, it is placed at some other spot with the lowest possible RF interference relative to the target area. After physical installation of the system, deployment is ready for use after running auto-positioning function. Positioning viewing of a tag is done in a software package on the laptop. This software also configures the system properties. All data and commands are available via a API, in both JSON and binary format. The anchors are powered by Power over Ethernet, USB, 4-30VDC or via internal battery. Powerconsumption less than 1W. Anchors are IP67 rated. Anchor dimensions 150x105x27mm, excluding 3D-bracket.

