![WhereNet logo]

WhereTag IV
User's Guide
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Model Number: TFF-2000-00AA

WhereNet Corp.
2858 De La Cruz Blvd.
Santa Clara, CA 95050
408-845-8500
WWW.WhereNet.COM

FCC Requirements

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.

See FCC registration label, located on the bottom of the equipment for the FCC, registration.

This equipment has been tested and found to comply with the limits for both Class A and Class B devices, pursuant to Part 15 of the FCC Rules.

This ISM device complies with Canadian ICES-001.
Cet appareil ISM est conforme à la norme NMB-001 du Canada.

RF Notice

Any changes or modifications to WhereNet Corp. equipment not expressly approved by WhereNet Corp. could void the user's authority to operate the equipment.

There are no user-serviceable parts inside. Do not attempt to open the unit to change batteries.

Contents

Introduction

System overview

The WhereNet Real Time Locating System (RTLS) is designed to permit users to determine the position of tagged assets in both indoor and outdoor facilities such as factories and freight yards. The system locates tagged assets by a process involving redundant triangulation. Each tag autonomously emits a 2.4 GHz direct sequence spread spectrum (DSSS) radio signal at predetermined blink rate. Each tag's blink rate is randomized around its predetermined value to minimize the number of collisions between transmissions made by different tags. The signal emitted by the tag is received by a minimum of four Location Antennas. A typical transmission contains a preamble which is used to synchronize the receiver, the tag's serial number which identifies the tag, a status word which monitors various tag functions, data stored in the tag's memory and finally a CRC used to assure that the tag's message is correct as received.

The principal components of WhereNet's RTLS are shown in Figure 1.

WhereTag IV Device

The WhereTag IV is a key component of the WhereNet Real Time Locating System (RTLS). It is a small device that can be attached to assets of many kinds, such as forklifts, containers, ULDs, hospital and test equipment as well as trailers and container chassis's. It is used to manage those assets by allowing them to be identified and located by the system.

The WhereTag IV "blinks" an RF transmission at pre-programmed rates ranging from 1 seconds to 5 days between blinks. The WhereNet RTLS infrastructure receives these blinks and use sophisticated Differential Time of Arrival, (DTOA), algorithms to determine the location of the tag. Accuracy of this determined location can be as low as 2 meters and is nominally within 3 meters in most installations.

The WhereTag IV complies with the ISO 24730-2 RTLS standard. It operates in the globally accepted 2.4GHz frequency band and transmits spread spectrum signals in accordance with the standard. The use of direct sequence spread spectrum technology provides extremely long range; in excess of 1,000 meter locate range outdoors, and 120 meter locate range indoors.

The WhereTag IV also incorporates an 802.11b transceiver for data communication and/or positioning by standard or location-enabling 802.11 access points.

The combination of low average power consumption and good engineering allow the WhereTag IV to operate for long periods of time without any maintenance. Battery life can be a long as 6 years depending upon blink rate and temperature.
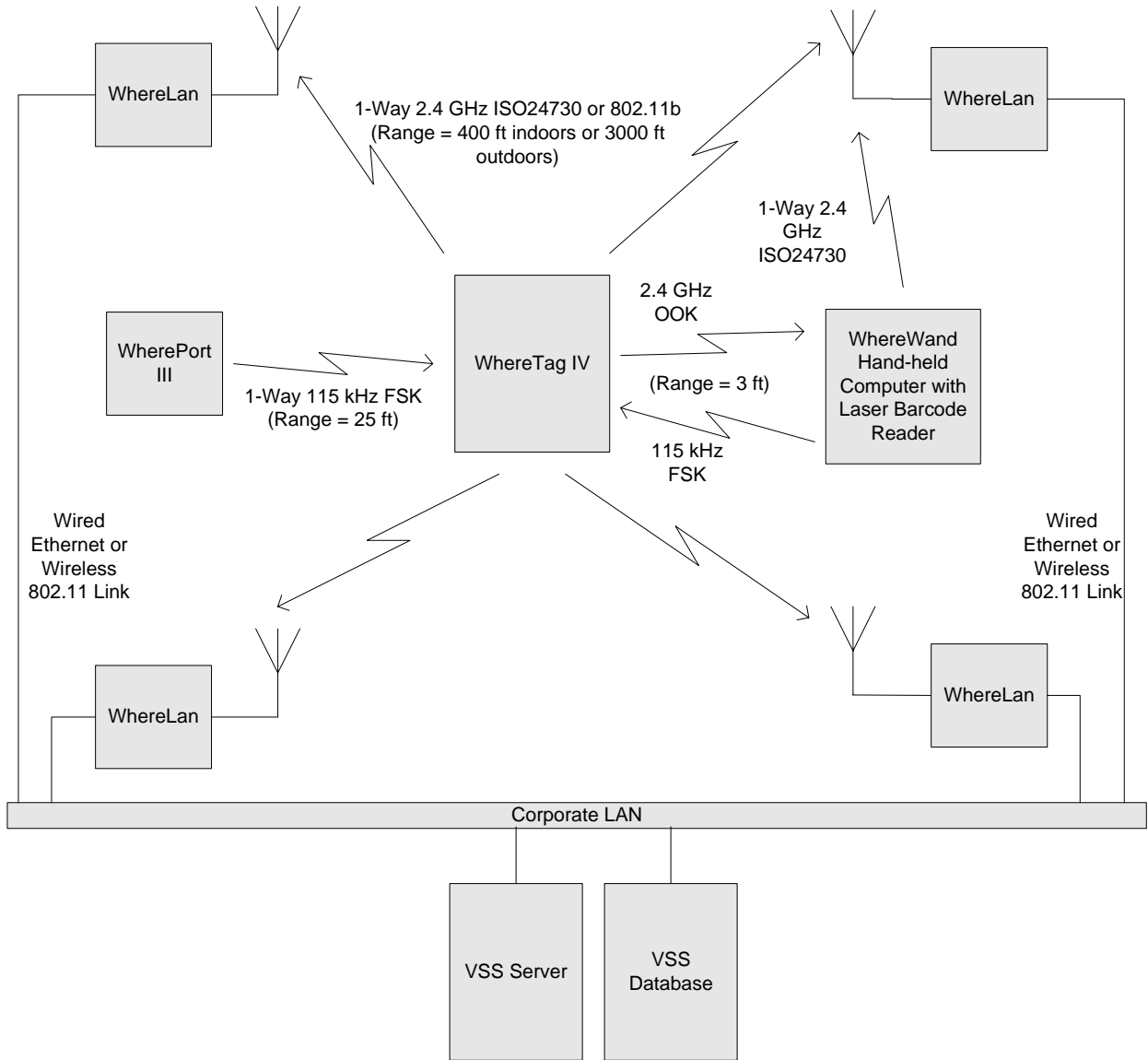
A magnetic receiver is also built into the WhereTag IV. The tag can receive low frequency magnetic signals from an exciter called a WherePort. The WherePort transmissions can be read at distances ranging from 1 to 8 meters.

Each WhereTag IV has a unique identification number that is transmitted via radio during each blink. When its battery is running low, the tag alerts the WhereNet RTLS infrastructure so that the tag can be proactively replaced. WhereTag IVs are configured with WhereNet's WhereWand.

The WhereTag unique ID number is also printed as a Code 128 on the bar code labels affixed to the tag's case. The bar code enables seamless integration with existing inventory systems and delivers a cost effective total resource visibility solution that extends beyond the range of the WhereNet RTLS.

Designed to operate in a wide range of applications, the WhereTag IV is fully sealed and will function in both indoor and outdoor environments. The tag's case is also resistant to oils, solvents and hydraulic fluids.

Figure 1: WhereNet Real Time Locating System Block Diagram

WhereLan

1-Way 2.4 GHz ISO24730 or 802.11b
(Range = 400 ft indoors or 3000 ft outdoors)

WhereLan

1-Way 2.4 GHz ISO24730

WherePort III

WhereTag IV

2.4 GHz OOK

(Range = 3 ft)

WhereWand Hand-held Computer with Laser Barcode Reader

1-Way 115 kHz FSK
(Range = 25 ft)

115 kHz FSK

Wired Ethernet or Wireless 802.11 Link

Wired Ethernet or Wireless 802.11 Link

WhereLan

WhereLan

Corporate LAN

VSS Server

VSS Database

WhereLan Location Sensor (LOS) and Location Access Point (LAP)

The Location Sensor and Locating Access Point receive the tag transmissions and forwards the information to the WhereNet Visibility Server Software which performs locations calculations, database functions and systems management. The Location Sensors and Locating Access Points communicate with each other and the Visibility Server Software via standard wired Ethernet cables or an 802.11b-compliant wireless LAN. Utilizing sophisticated DSP technology, the LOS and LAP are able to track large populations of WhereTags simultaneously. They can be installed in a grid configuration to provide ubiquitous coverage over large areas comprised of many cells. The Locating Access Point combines multiple functions: an RTLS Location Sensor and a Wi-Fi certified access point for wireless LAN clients and applications

WherePort III

WherePort III is a proximity communication device that is used to trigger a WhereTag to transmit an alternate "blink" pattern. When a WhereTag passes though the WherePort's field, the tag can initiate a pre-programmed and (typically) faster blink rate to allow more location points as a tagged asset passes through a critical threshold, such as a shipping/receiving dock door or from one zone to another. When the WhereTag is sending WherePort-initiated blinks, the tag includes the identification number of the WherePort.

WhereWand Handheld Programmer

The WhereWand Handheld Programmer consists of a handheld computer with an integrated Type II PC card and an antenna assembly. The WhereWand is capable of two-way wireless communication with WhereTag devices. The WhereWand is also capable of wired communication with WherePort devices. The third capability of the WhereWand is wireless communications with the WhereLan. The WhereWand communicates with WhereTag devices by sending magnetic FSK data to the tag and receiving on-off keyed / frequency shift keyed (OOK/FSK) RF data from the tag. Communication with the WhereTag allow the user to set tag configuration parameters such as DSSS blink intervals and tag responses to such stimuli as WherePorts and/or switch/telemetry inputs. It also allows the user to read back configuration and other data from the tag.

Visibility Server Software (VSS)

WhereNet's Visibility Server Software (VSS) is an integrated software package that provides all the tools required to effectively manage assets and resources as well as the WhereNet Real-Time Locating System (RTLS). Visibility provides all core software components to allow efficient resource management. Key among those software components is WhereSoft Locate, which is a distributed Windows Service. When WhereSoft Locate is combined with Visibility and any of the many applications available from WhereNet, it is possible to locate assets, know their status, and react to any number of user configurable alert conditions. Visibility also provides the tools required to control and monitor the Real-Time Location System (RTLS). It includes configuration tools, diagnostics, system alerts, an interface manager and installation tools.

Tag Installation and Activation

Tags are shipped with all radio emitters deactivated. Prior to installing a tag on an item to be tracked, the tag must be activated. This is done using the WhereNet's WhereWand. The WhereWand is used to configure and activate the tag, and to confirm that the tag is properly configured and operational. The detailed procedure for tag activation is covered in WhereWand User's Manual.

Tag Mounting Options

Introduction
The WhereTag IV device has a variety of ways to be mounted depending on the user's needs. The following mounting methods can be used:

WhereTag IV Snap-on Mounting Ring (The optional WhereTag IV Snap-on Mounting Ring fits onto the WhereTag IV asset tag to provide identical mounting tabs with screw and rivets holes to match the standard WhereTag III design)
Tie wrap
Poly-lock
Adhesive tape
Vehicle rearview mirror mount
Trailer, Rail Car, and ISO container mounts

Specifications (Subject to change without notice)

WhereTag IV (Model #: TFF-2000-00AA)

CAPABILITIES

Frequency Range .... 2.4 to 2.483 GHz
Typical Locate Range, Indoors .... 100 m (325 ft)
Typical Locate Range, Outdoors .... 1,000 m (3200 ft)
Typical Read Range, Indoors........................ 200 m (650 ft)
Typical Read Range, Outdoors .... 1,750 m (5700 ft)
User Configurable Blink Rate....................... 1 sec to 5 days
WherePort Range... 8 m (24 ft) (With WherePort set for maximum power and optimum orientation.)

TAG MOUNTING OPTONS

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ELECTRICAL

Power .... AA 3.6V Lithium Thionyl Chloride cell (The battery is not replaceable.)
Typical Battery Life..................................... 6.0 years (dependent on blink rate and operating temperature)

ENVIRONMENTAL / PHYSICAL

Operating Temperature Range .... -30º C to +75º C (-22º F to +167º F)
Storage Temperature Range.......................... -40º C to +85º C (-40º F to +185º F)
Durability .... 1.8 m (6 ft) drop to concrete
Height .... 2.1 cm (0.9 in)
Length, without mounting tabs .... 6.6 cm (2.6 in)
Width .... 4.4 cm (1.7 in)
Weight.. 53 g (1.9 oz)
Environmental Sealing................................. IP67 (dust tight, immersible)
Case Material .... Molded Plastic (polyester)

REGULATORY APPROVALS

North America
FCC Part 15 Class B, Part 15.247
Industry Canada ICES-003, RSS-210, RSS-GEN
ANSI INCITS 371.1-2003
Europe
CE, R&TTE Directive 99/5/EC: EN 300328, EN 301489-1/-17, EN 60950-1
Worldwide
ISO/IEC 24730-2 Compliant
Cisco CCX Compliant