WhereTag III TL/TLB

User's Guide

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Model Number: TFF-1011

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FCC Requirements

This device must operate in compliance with Federal Communications Commission (FCC) Rules and Regulations Parts 15. 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.

Radio Equipment Authorization:	FCC ID:	NSQTFF-1011L
	IC:	3586A-TFF1011L

RF Notice

The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
Any changes or modifications to WhereNet Corp. equipment not expressly approved by WhereNet Corp. could void the user's authority to operate the equipment.

TL version: There are no user-serviceable parts inside. Do not attempt to open the unit to change batteries.
TLB version: This product is designed to be able to replace the batteries inside. Important: refer to battery replacement instructions to avoid resetting the tag.

Contents

Introduction

This User Guide describes the features, communication formats, configuration, and operation of the WhereTag. It includes everything needed to be able to configure the tag and the communications between the tag and a host system.

Appendix A is a complete description of all the WhereTag commands together with examples of how they are used to set up and operate the WhereTag. Appendix B is a physical description of the tag.

This chapter briefly describes the major features and components of the Real Time Location System.

The Real Time Location System

The WhereNet system tracks and locates items tagged with a WhereTag. Each tag emits short, low power bursts of widely spread spectrum radio energy. These bursts are received by the system infrastructure. The infrastructure calculates the location of the tagged item based on the different arrival times of the burst.

The WhereTag III TL or TLB is a compact battery operated radio frequency device. It is a component of the WhereNet Real Time Location System.

The WhereNet Real Time Locating System (RTLS) is a precise local locating system with robust wireless telemetry capabilities. Its integrated architecture meets all the requirements for an enterprise-wide wireless infrastructure including locating, telemetry, and high-speed wireless communications.

WhereTags

WhereTags are attached to assets whose status must be quickly and accurately monitored. Examples are the movement of a shipping container through a loading yard or a trailer through a warehousing facility.

RTLS uses DSSS RF technology to determine the location of WhereTag transmitting beacons. These transmissions are extremely low power, about 2 mW. The transmissions can be received at distances in excess of 1,000 meters outdoors.

Because the transmissions are low power and spread across 60 MHz they add almost no RF pollution to the environment. They can be readily used with wireless LANs and Blue Tooth devices without adversely affecting the throughput of those systems.

The transmissions from the WhereTags are very resistant to interference because of the large amount of processing gain. The system is able to receive signals that are below the RF noise floor of the surrounding environment.

WhereTags are located by measuring the difference in the arrival time of a signal at a minimum of three fixed-position Location Sensors (the reliability increases if more than three sensors receive the signal). The WhereTags transmit their keep alive signal at a programmable interval. The Location Sensors are in a grid formation that ensures that at least three antennas can receive a blink from any place within the site. By comparing the difference in the arrival time of the beacon signal at each of the receiving antennas the system can determine the location of the transmitting WhereTag. This type of location determination is called TDOA (Time Difference Of Arrival). Tags are located to an accuracy of less than ten feet in virtually all environments, indoors and out. The accuracy can be affected by environmental factors such as concentrations of large metal objects.

Location Sensors

The Location Sensors are interconnected using standard Ethernet or connected wirelessly using 802.11b/g WiFi compliant communications. One type of Location Sensor, called a Locating Access Point, (LAP) includes a full 802.11b/g Access Point (AP). These integrated APs are from manufacturers such as Cisco, Symbol, and Intermec. Integration of these standard APs allows complete compatibility with wireless LAN infrastructure. All the wireless services required within an enterprise are then available on a single infrastructure.

WherePorts

The WherePort transmits a short range, adjustable from 5 to 20 feet, 127 kHz electro-magnetic signal. This signal defines a field. The field may indicate an entry gate or transition point. Each WherePort is programmed with its own ID. When a

tag receive a WherePort trigger it transmits the WherePort ID along with its own ID to the location server. The server then knows that the tagged object has entered the gate or completed a transition.

Because the location of the WherePorts is known, the server can locate the tag according to the WherePort field even if the tag can not be located on the full X-Y coordinate grid of the location sensors.

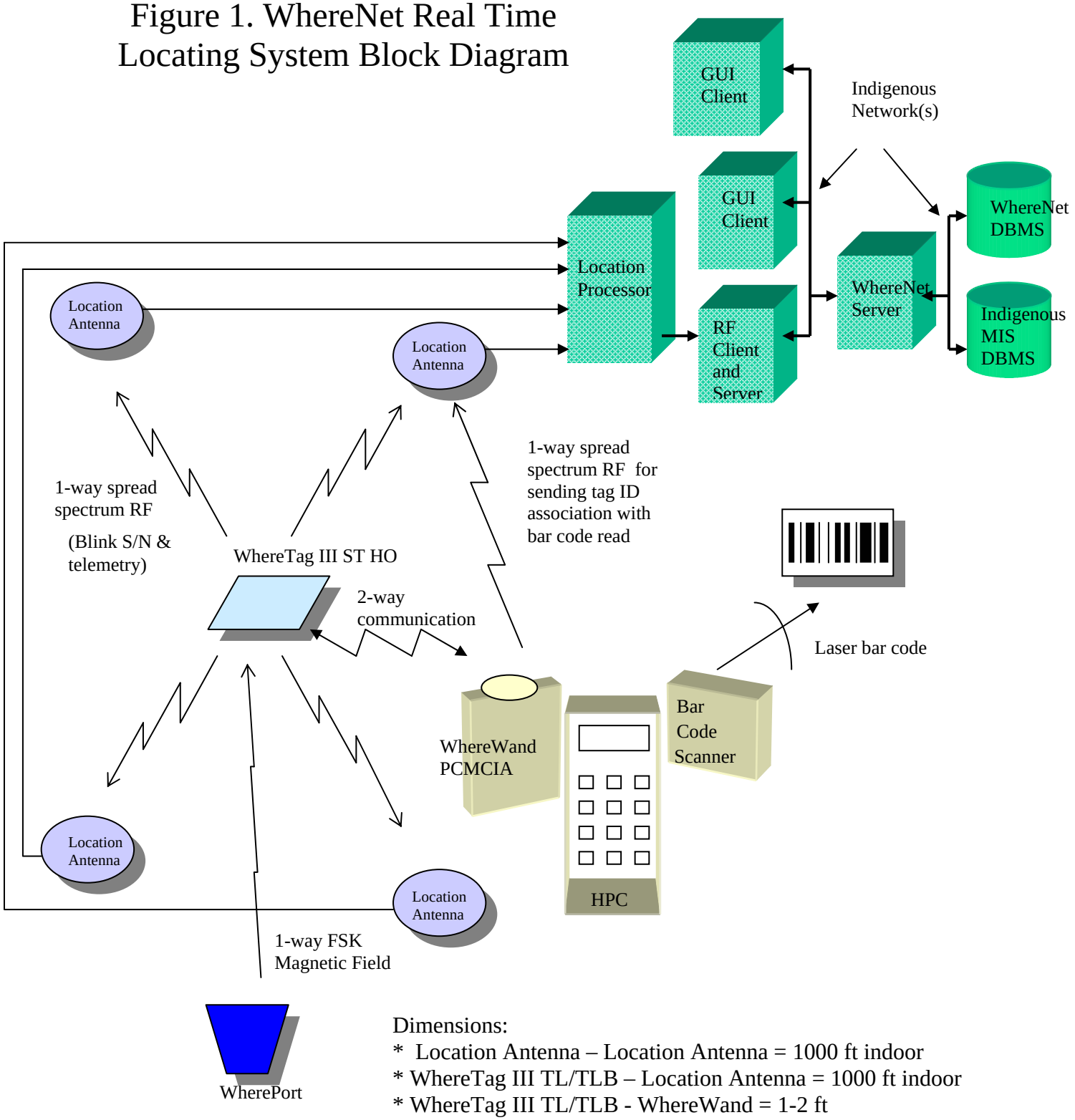
Communication

The WhereTag has multiple types of transmissions, keep alive blinks, switch blinks, and WherePort/data blinks. The keep alive blink is controlled by the WhereTag and blinks at the programmed interval. Switch blinks and WherePort/data blinks are triggered by activity on a switch, a WherePort field, or a telemetry request from the host.

There are three formats for messages, short, medium, and long. The shortest one identifies the WhereTag and is used for location processing. The longest transmission can include 88 bits of telemetry information. When connected to a host microprocessor, additional information about the tagged item and its status can be transmitted.

The WhereNet system is scalable. A single Location Sensor and server can detect the presence of a WhereTag within its 1,000 meter outdoor range. In addition, it can receive telemetry data, such as vehicle VINs, fuel status, and mileage from WhereTag equipped vehicles. Or hundreds of Location Sensors can be interconnected to cover a site of hundreds of acres and provide accurate X-Y coordinates for tracked assets on a map of the site.

Figure 1. WhereNet Real Time Locating System Block Diagram



Dimensions:

* Location Antenna – Location Antenna = 1000 ft indoor
* WhereTag III TL/TLB – Location Antenna = 1000 ft indoor
* WhereTag III TL/TLB - WhereWand = 1-2 ft
* WherePort- WhereTag III = 20 ft

Tag Mounting Options

Introduction

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

With neck lanyard for personnel as seen in photo.
Pocket clip
Adhesive tape (for attachment to equipment)

Specifications (Subject to change without notice)

WhereTag III TL/TLB (Model #: TFF-1011-00BA & TFF-1011-00DA)

CAPABILITIES

Frequency Range	2.4 to 2.483 GHz
Typical Locate Range, Indoors	100 m (350 ft)
Typical Locate Range, Outdoors	300 m (1,000 ft)
Typical Read Range, Indoors	200 m (650 ft)
Typical Read Range, Outdoors	1,000 m (3,000 ft)
User Configurable Blink Rate	5 sec to 1 hr
WherePort Activation	Up to 8 m

(20 ft) (With WherePort set for maximum power and optimum orientation.)

WIRED COMMUNICATION INTERFACE

Protocols	RS-232c RS-422/RS-485

TAG MOUNTING OPTONS

Tie wrap
Poly-lock
Adhesive tape

ELECTRICAL

Power ..... 2 x Coin Cell 3.0V Lithium Thionyl Chloride cell (The battery is not replaceable in TL.)
Typical Battery Life ..... 4.5 years (dependent on blink rate and operating temperature)

ENVIRONMENTAL / PHYSICAL

Operating Temperature Range ..... -30º C to +65º C (-40º F to +149º F)
Storage Temperature Range ..... -40º C to +70º C (-40º F to +158º F)
Durability ..... 1.8 m (6 ft) drop to concrete
Height ..... 1.0 cm (0.4 in)
Length, without mounting tabs ..... 6.45 cm (2.5 in)
Length, with mounting tabs ..... 5.1 cm (2.0 in)
Width ..... 4.4 cm (1.7 in)
Weight ..... 41 g (1.45 oz)
Environmental Sealing IP52
Case Material ..... Molded Plastic (Nylon)

REGULATORY APPROVALS

- FCC, IC and EU R&TTE Directive