WiData Firefly
Real Time Locating System Tag
User's Guide

TFF-1000-00AA
March 1999

WiData Corporation
2855 Bowers Avenue
Santa Clara, CA 95051
408-845-8500

FCC Requirements

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

Model: TFF-1000-00AA

This device complies with Part 15 of the FCC Rules and RSS-210 of Industry Canada. 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 which may cause undesired operation.

FCC ID: NSQTFF-1000-00AA
CANADIAN ID:

RF Notice

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

Introduction

WiData Firefly System

The Firefly RF Location System 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 DSSS receivers each of which are capable of decoding that tag's transmission. 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.

Tag configuration parameters such as blink rate and user data to be stored in memory are loaded into the tag using a device called a Hand Held Communicator (HHC). The HHC consists of a Type II PCMCIA card inserted into a laptop or handheld PC. The PCMCIA card contains a short range (2 to 10 feet) radio transmitter and receiver which communicates with a very low power transmitter and receiver contained in each tag. This short range communication link operates at 2.4 GHz. The modulation scheme used by the PCMCIA card was chosen to minimize power consumption by the battery operated tag receiver. The DSSS transmitter allows the system to locate users of the HHC anywhere in the service area covered by the system.

The principal components of the system are shown in the following figure.

Firefly System
Block Diagram

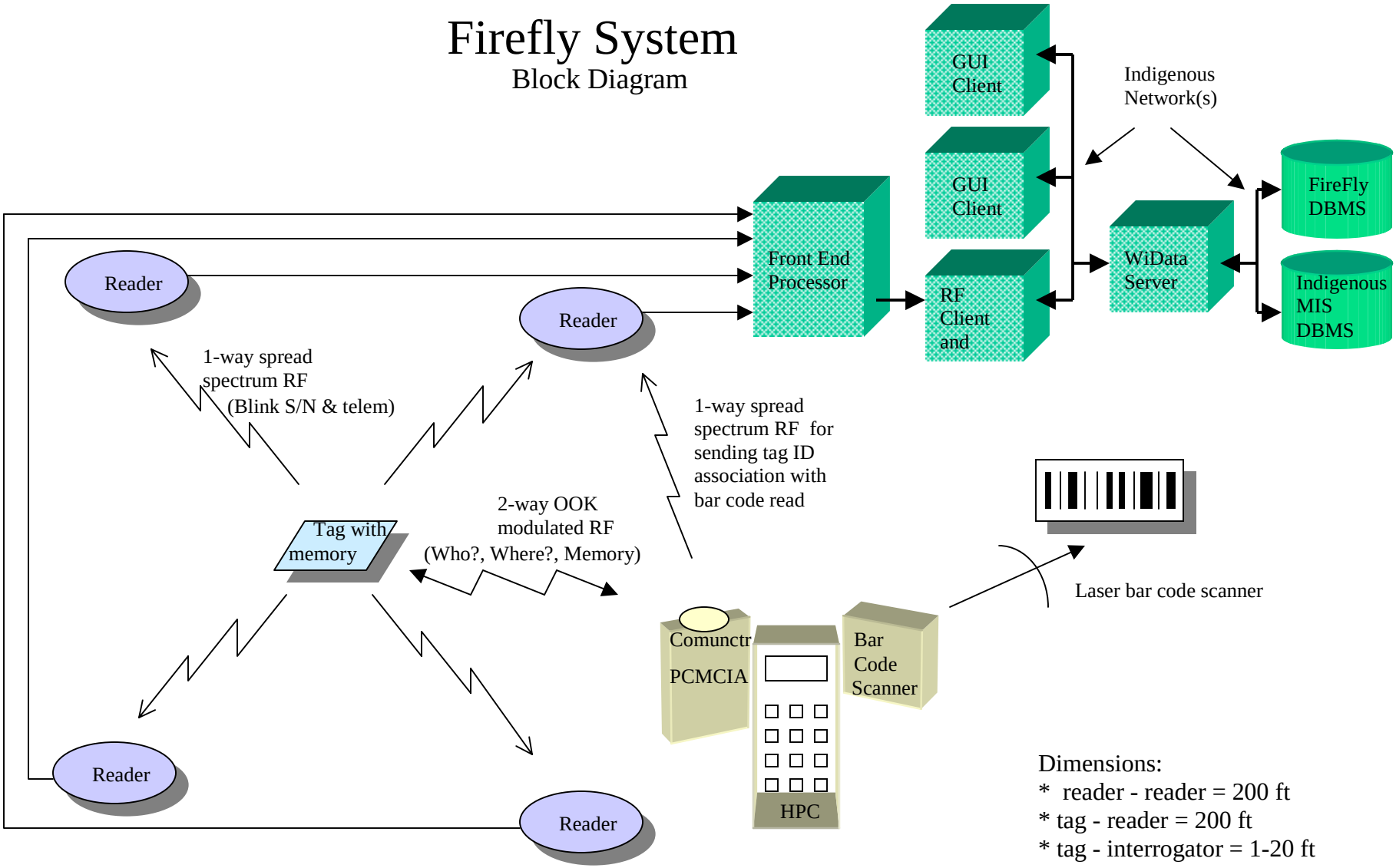

Figure 1

Instructions

WiData Model TFF-1000-00AA Tag

The WiData Model TFF-1000-00AA Tag is a compact battery operated radio frequency device which is a component of the WiData Firefly Real Time Location System. The Firefly System is designed to track and locate items tagged with Model TFF-1000-00AA tags. Each tag emits short, low power bursts of widely spread spectrum radio energy. These bursts are received by the Firefly System Infrastructure. The time difference of arrival of bursts at each Infrastructure receiver are noted and the position of tagged items are computed by multiple triangulation. Each burst contains the tag's unique identification code and a status data word that provides information on the tag's configuration, battery state and other data. These data are entered into tags using the WiData Model HPC-2000-00AA Hand Held Communicator. The tag's identification number, status data word and it's location are provided to the user by the Infrastructure. Multiple tags may be present in typical installations allowing a large number of items to be tracked and located in real time. The tags are packaged in sealed cases designed to operate in both indoor and outdoor environments. The tags have self contained antennas and have no user replaceable parts or adjustments.
Battery life under typical conditions is in excess of 5 years.

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 WiData Model HPC-2000-00AA Hand Held Communicator. The Communicator 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 the HPC-2000-00AA Communicator Users Manual.

The tag is attached using appropriate mounting hardware kits.

Operation

Configuration and Setup

The WiData Firefly Real Time Locating System Tag does not require any special configuration or setup to operate with the Firefly System.

Operation

The WiData Firefly Real Time Locating System Tag is controlled and activated using the Hand Held Communicator. Most applications allow the user perform one or more of the following functions:

- Read data from tag memory
- Write data to tag memory
- Turn tag DSSS blink on and set the blink rate
- Turn tag DSSS blink off
- List Ids of tags within the OOK/FSK range of the Hand Held Communicator
- Locate a specific tag by report the signal tag's OOK/FSK signal strength
- Upload data to the Firefly Data Base using DSSS transmit mode.

All Hand Held Communicator application software is pre-configured to individual system requirements before system installation. All available functions are menu selectable through easy on screen instructions.

Specifications

Tag

Dimensions	2.3 x 2.5 x 1.1 inches 58 x 64 x 25 mm
Weight	2 oz
Operation Temperature	-25 to +60 °C
Storage Temperature	-20 to +70 °C
Humidity	100% condensing
Drop	4 feet to concrete

DSSS RF Performance

Frequency	2441.750 MHz
Spreading (PN Code)	511 chips/bit
Chip Rate	30.521875 MHz
Power	<5mW
Range (to DSSS reader)	greater than 200 feet

OOK/FSK RF Performance

Frequency	2446.520 MHz
OOK/FSK Rates	375 kHz (Logic 0) 535 kHz (Logic 1)
Power	<1mW
Range (to communicator)	0 to 6 feet