Tag Tracker

ver 2.x

RFID Test Suite and Demonstration Software

User Manual

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1. Introduction

TagTracker is a demonstration application, which interacts with RFID readers in order to read RFID tags (transponders) in the range of the antenna(s). It is an application written by DataBrokers, Inc. on the base of an RFID middleware called PIRF (Platform Independent RF). PIRF is a powerful and flexible framework capable of controlling a number of typical RFID configurations. For the purposes of this demo application and to keep things as simple as possible, only a limited number of the available drivers and capabilities are included. (*See the list of supported devices in section 3.*)

2. System Requirements and Installation

2.1 System Requirements

2.1.1 Brief

- RFID reader, antenna, and tags (transponders).
- Available serial port or USB port with *USB-to-Serial* converter.
- About 50 MB of free disk space.
- Java Virtual Machine (version 1.4 or higher).

2.1.2 Detailed

Software:
TagTracker is written in Java and should be capable of running in any Java environment. A number of operation systems have been tested and reported to work, however official support is available only for Sun JRE 1.4 and above under Microsoft Windows (all versions) and SuSe Linux 9.1 and above.

During the installation process the installation application will check to make sure you have a properly installed version of Java. If you do not, you will be prompted to install it from the copy provided on the distribution CD-ROM or from the Internet.

Hardware:

You will need a RFID reader, multiplexer (if applicable) an antenna(s) connected to the computer (some RFID readers have a built-in antenna). The supported drivers interact with the reader via serial port. If you do not have an available serial port, you can use an *USB-to-Serial* converter. In this case you have to have the driver for the particular converter installed on your machine before you can start using TagTracker.

Recommended system is at least Pentium II 266 MHz and above with at least 128 MB of RAM and around 50 MB of disk free space.

TagTracker occupies approximately 6 MB of disk space, plus the installation of the JRE (Java Runtime Environment).

2.2 Installation

The installation of TagTracker is a simple task guided by a wizard. You do not need administrative privileges to do this, except in the cases when you need to setup the Java Runtime Environment (JRE).

Scenario 1: Installation from the provided CD-ROM

Place the installation CD in a local CD-ROM drive. Under Microsoft Windows operating systems the installation will auto start (unless auto-start is disabled).

If the installation does not start automatically find the file named *'setup.bat'* in the root directory of the installation CD and launch it. This could be done from a command line window, Windows Explorer, etc.

Scenario 2: Network Installation

If you don't have access to a CD-ROM drive or you are installing from the network, the recommended way of installing the software is as follows:

- copy the installation files to a temporary local folder on your computer
- if you downloaded only one big executable from the Internet - unpack the files
- start the installation program by navigating to the root of the temporary folder and launching *'setup.bat'*

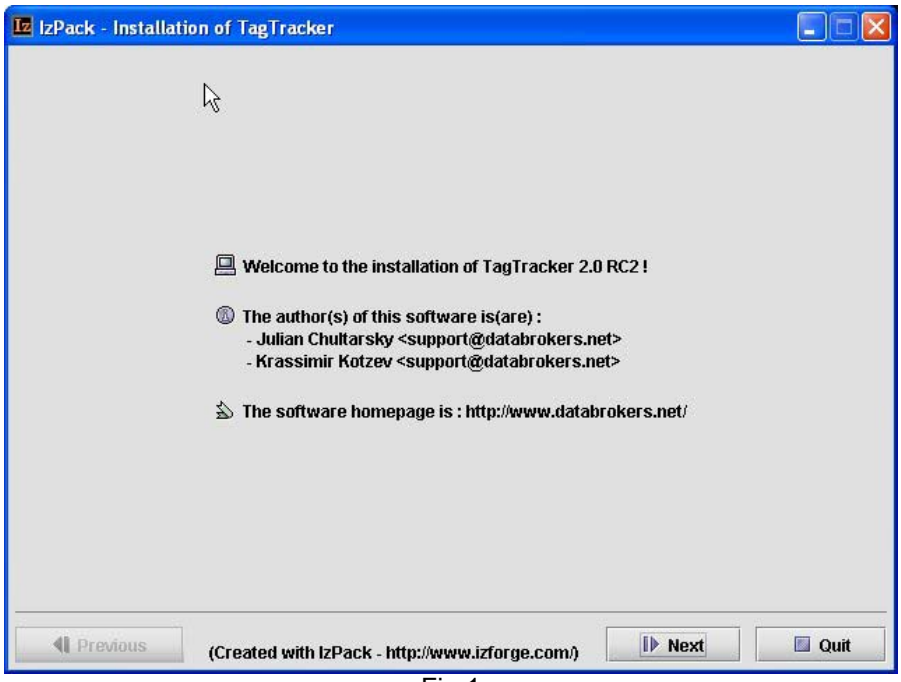

Fig.1

When the installation program starts, it will ask you to agree with the terms and conditions of the 'License Agreement'.

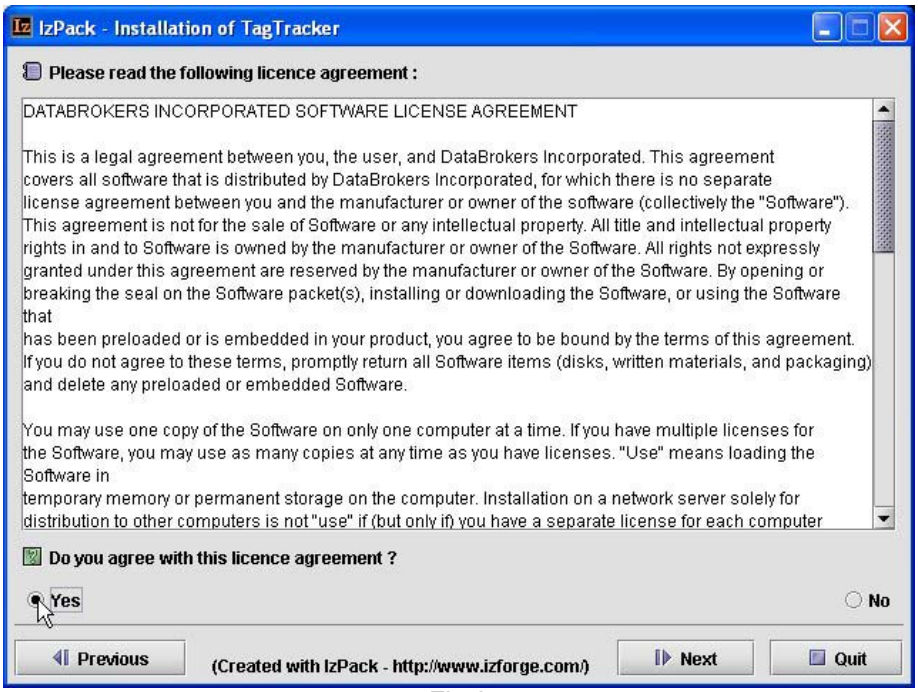

Fig.2

Then to choose a directory where TagTracker files are to be copied. The default under MS-Windows is ***'C:\Program Files\TagTracker'***, but you are free to select any other directory.

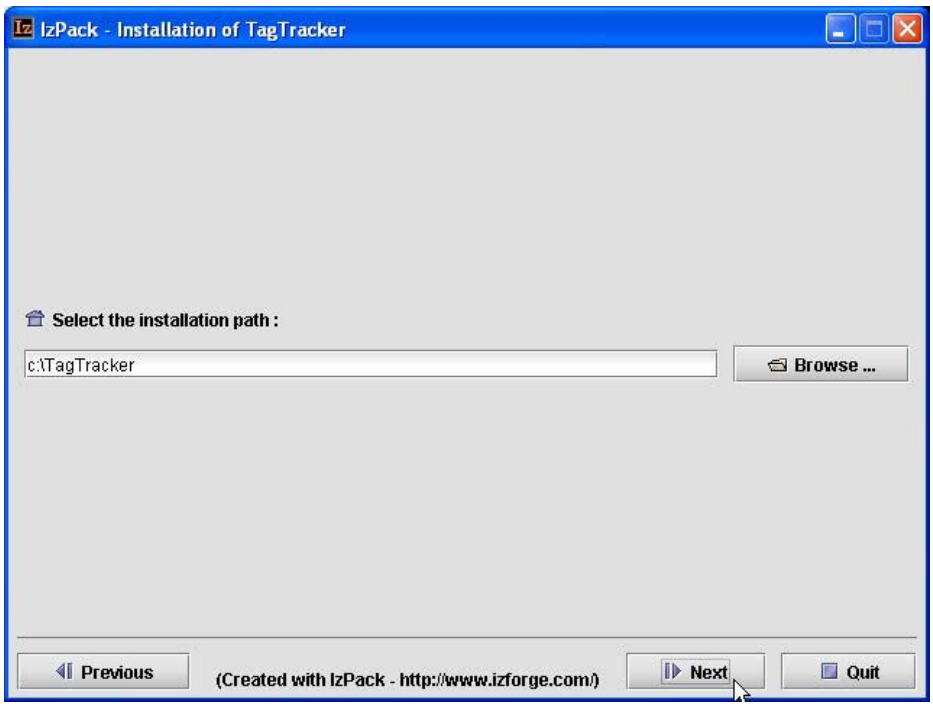

Fig.3

It will be a good idea to write down the name of the directory you have chosen to store TagTracker files. That will help you later to navigate throughout the software structure.

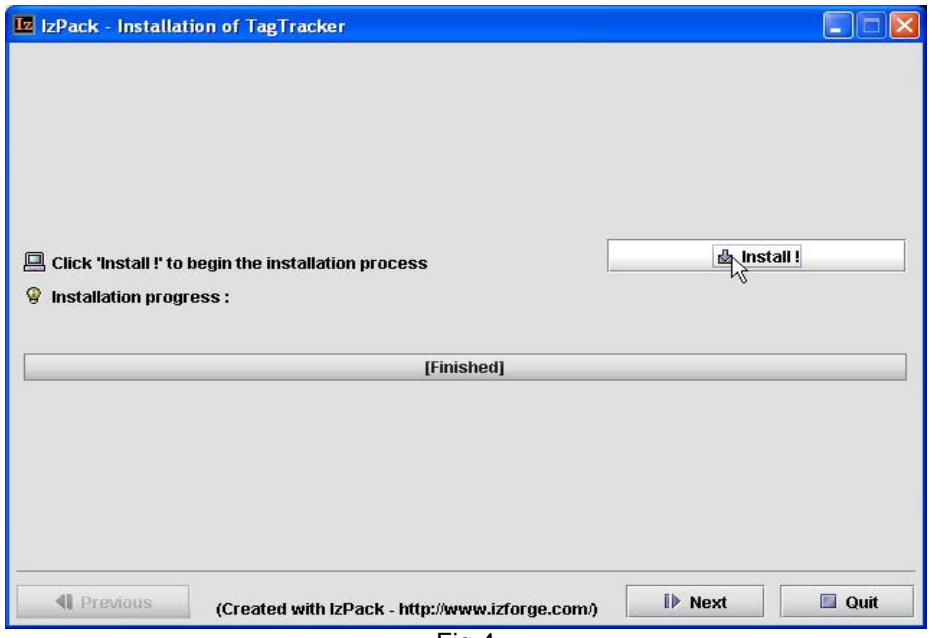

Fig.4

As a last step of the install the installation program will give you a choice to install shortcuts in the start menu and on the desktop. Choose the appropriate option, as you desire.

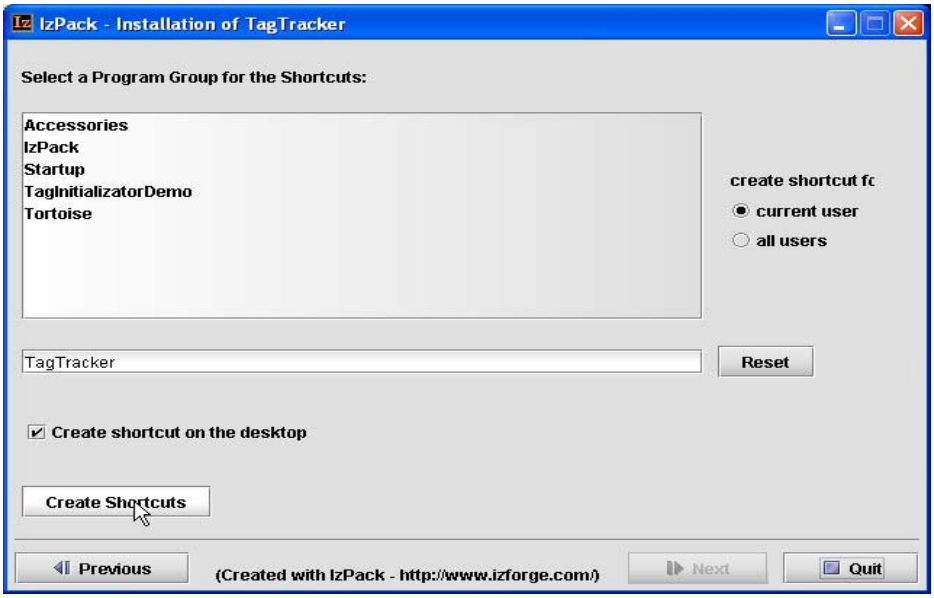

Fig.5

Keep in mind that if you choose the option “Create shortcuts for all users” you will need to have access rights to write to the “All Users” folder. Typically this means you have to have administrative privileges during installation.

After the installation has finished you can start TagTracker using the shortcut created on your desktop or by going to *'%TAGTRACKER_HOME%\bin'* and double-clicking the file *'runTracker.bat'*.

From here on *'%TAGTRACKER_HOME%'* will refer to the root folder of your installation. Typically this is ***'C:\TagTracker'***.

Once TagTracker starts it initializes itself by trying to connect to the RFID device. It will attempt to automatically detect, load and initialize the proper driver for the device attached. If the RFID hardware components (reader, antennas, etc.) are connected properly and TagTracker is able to communicate with the driver, all buttons on the GUI (Graphical User Interface) will be enabled.

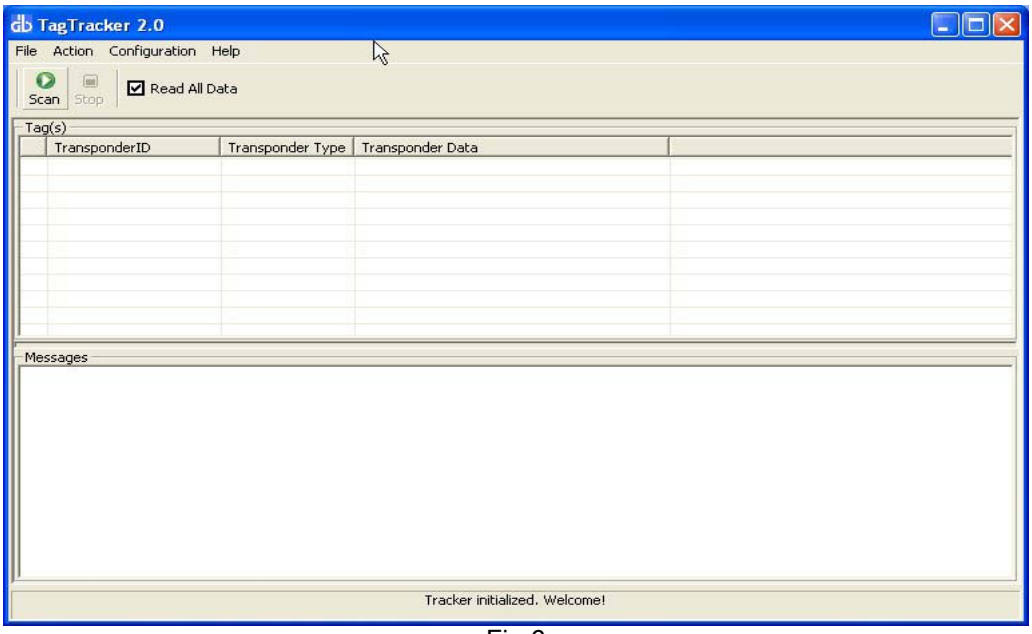

Fig.6

If TagTracker is not able to communicate with the reader because of a hardware malfunction or because an appropriate driver for that particular reader cannot be found or is incorrectly configured, then the GUI buttons will be disabled and you will receive a warning message.

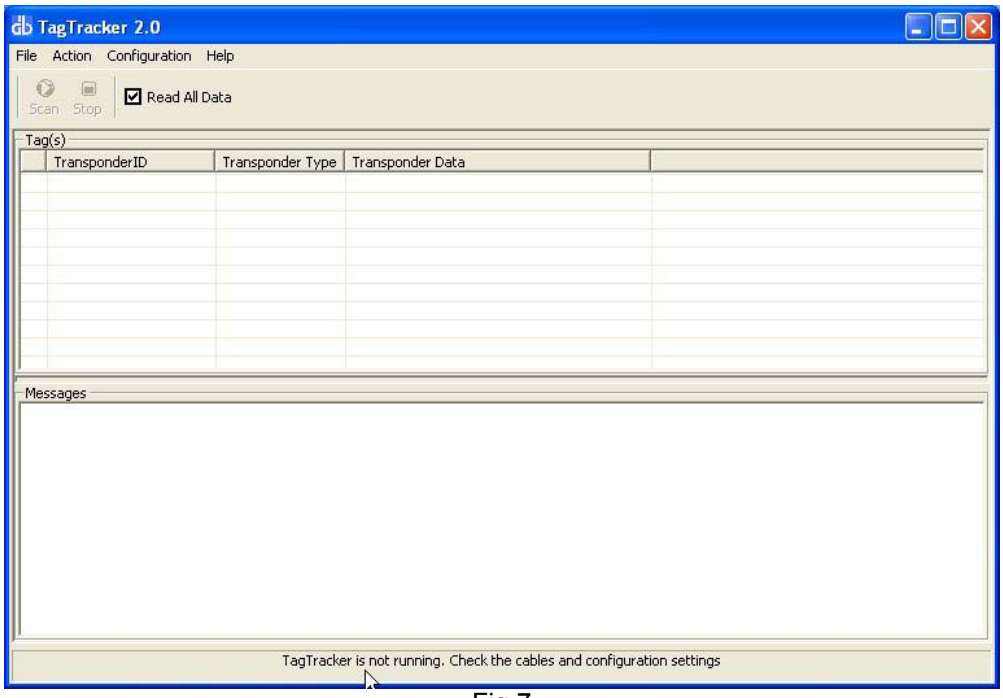

Fig.7

In that case the user should first exit the application, check the cables to verify that they are properly connected, and then restart the application. The messages shown on the message pane are a good 'first-aid' source of information about what is the problem with the system. More detailed instructions for troubleshooting can be found in the section "Troubleshooting"

3.Working with TagTracker

3.1. GUI Functionality

When you start TagTracker the GUI of the application will pop up in a relatively small window. Feel free to resize it according your preferences. The GUI can be roughly divided into two major parts:

- Menus and buttons
- Information panes

3.1.1 Menus

TagTracker's menu items are grouped in three groups as follows:

3.1.1.1. Menu **File**

- **Exit** – use this to close the application
- **Choose log file** - select a file that will contain the messages generated by the application for later reference

3.1.1.2. Menu **Action**

- **Scan** - starts the scanning process
- **Stop** - stops the scanning process
- **Clear messages** - cleans the messages from the Messages Area (Message Pane)
- **Reset cache** - removes the cached transponders information. Depending on the type of reader and type of tags used, reading all custom data from a tag could be a time-consuming operation. Some tags may hold relatively large amounts of user specific data and some reader models require that data to be read one block at a time. TagTracker will remember the details for each tag the first time they are read and will use faster operations from that point on. Using **Reset cache** option will force TagTracker to refresh the captured data during the next scan as long as **Read All Data** box remains checked.
- **Restart** - restarts the software module responsible for hardware control. You might need to use this option if configuration was changed without using the interface provided by TagTracker.

3.1.1.3. Menu **Configuration**

Launches a configuration dialog with two tabs:

Tab **TagTracker** - sets TagTracker specific settings

- Scan interval – is the delay in milliseconds between scan cycles.
- Number of antennas – is the number of antennas to be used. You can choose to use all of some of the antennas attached to the device. In most cases there is only one antenna. In some cases number of antennas are connected via a multiplexer device.
- Number of read passes – sets the number of times each antenna will be queried before switching to the next antenna in the reading cycle. Increasing this value may result in better overall accuracy of the system.
- Ignore MUX – if not checked shows that a multiplexer (MUX) will be used to switch between the antennas. If the box is checked, then the antennas parameter will be ignored and only the current antenna will be used for the scan.

> ☞ **Note:**
> The Ignore MUX setting here is very important. Do not uncheck it unless you really have a MUX connected to the reader. Otherwise you may receive error messages, or the reader will detect no tags.

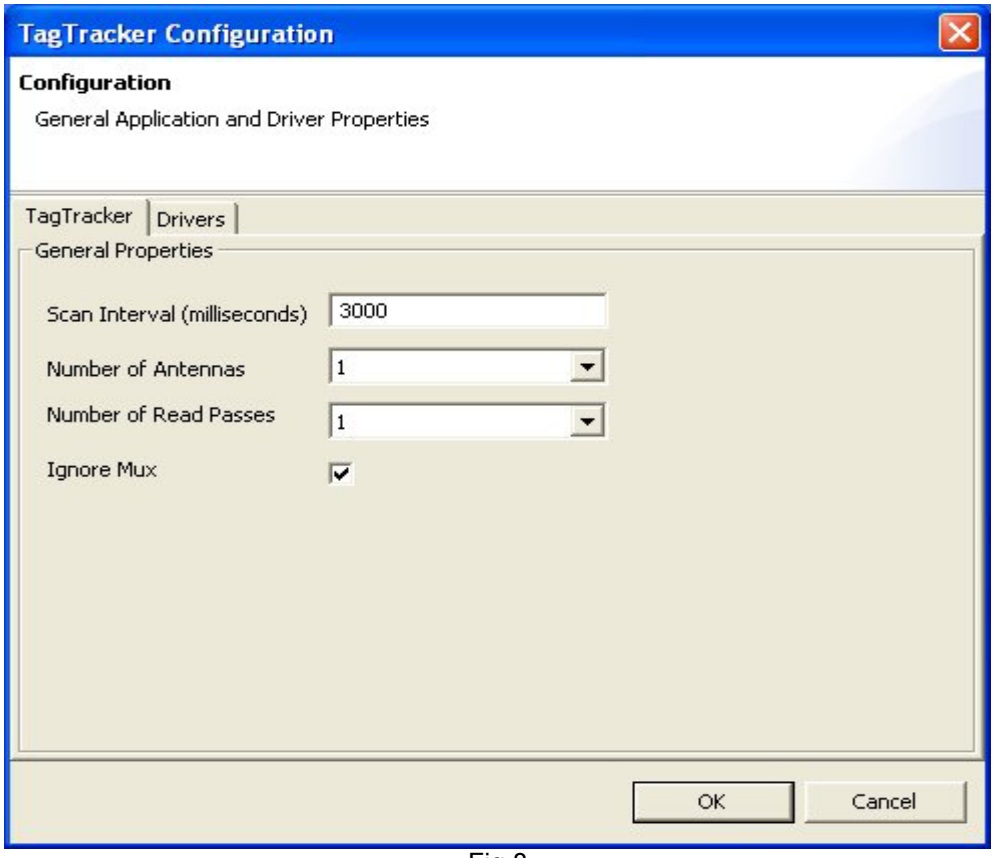

Fig.8

Tab **Drivers** - sets Driver specific settings

- **Driver** – select the driver for which you wish to change settings. This does not select the active driver. The active driver is determined automatically during startup.
- **COM** – select the COM port number where the reader will be attached
- **Baud rate** – select the communication speed on the RS-232 interface
- **Parity** – typically this is '**EVEN**', for some readers is '**NONE**', the rest of the possible values are seldom used
- **Data Bits** – number of data bits in protocol – usually **8**
- **Stop Bits** – number of stop bits in protocol – usually **1**

> ☞ **Note:**
> It is important to set all values in the Drivers tab exactly the same as they are set in the RFID reader you are using, otherwise TagTracker may fail to detect the device. Also, check if other applications are already using the same COM port.

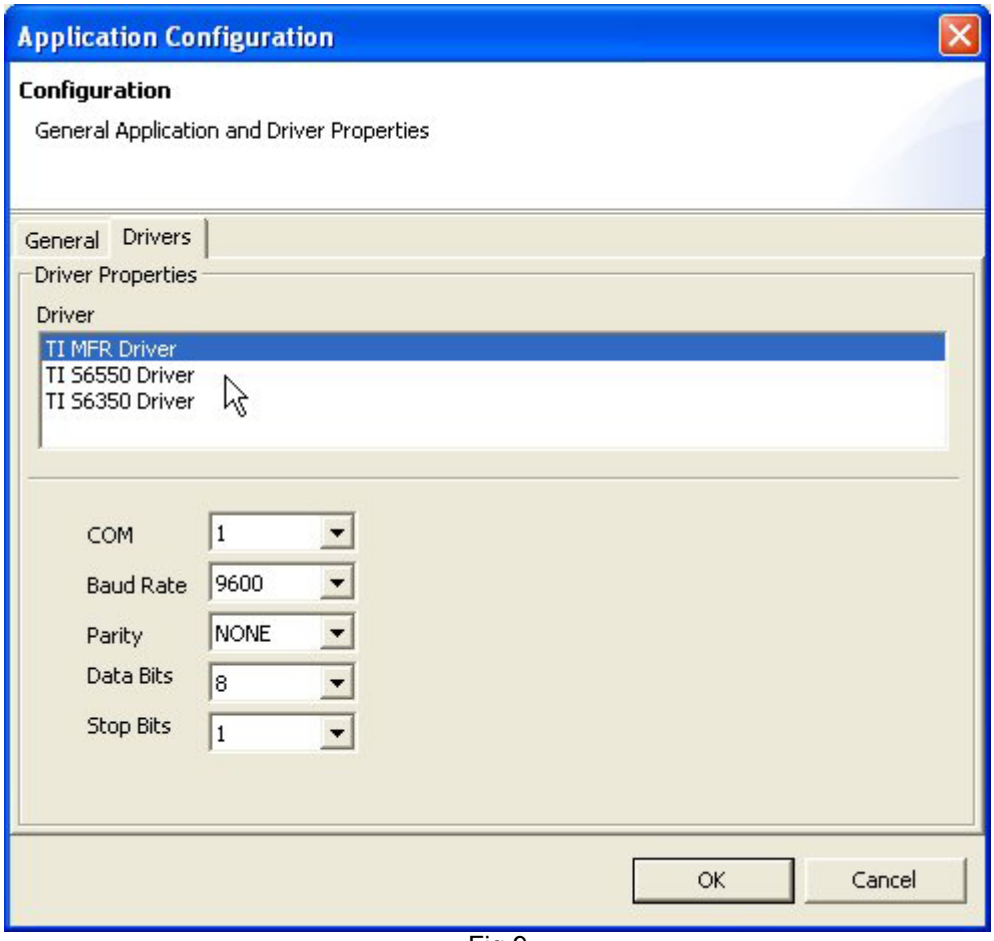

Fig.9

In most cases when you have TagTracker newly installed you have to configure it to use the COM port number where the reader cable is attached. By default this setting is COM1.
This interface actually modifies the content of the *'RFID.xml'* configuration file located in the *'config'* subfolder. In order for the changes to take place, TagTracker restarts automatically after the 'OK' button is pressed. Depending on the configuration, restart may take some time. Please, be patient.

3.1.1.4. Menu **Help**

- About – shows a dialog with the version of the software
- Help - launches the online help

3.1.2. Buttons

The two buttons and the check box provide quick alternative to using the menu options for the most frequent actions. Here is a short description of what the buttons do:

- **Scan** - Starts the scanning service
- **Stop** – Stops the scanning service
- **Read All Data** - if checked, it instructs TagTracker to read the entire custom data written on each tag. Depending on the reader and the number of transponders in the range this can be a slow operation. Hopefully, TagTracker caches the details and each transponder needs to be queried only once. The advantage of this is that after the full scan the user could see what is actually written on the transponder. When the scan is stopped the user

can modify that content by double-clicking over the row where the transponder data appears.

3.1.3. Panes

- **Tag(s)** – this is the top panel right under the buttons. It is where the transponder's data appear. Each tag will be listed with its unique serial number (Transponder ID). If TagTracker “knows” the custom data stored on the tag (see **Read All Data**) it will automatically determine its type and display the contents. Tags may dynamically appear and disappear as they are moved in and out of the reading range of the device. If you have worked with more than one antenna you have probably noticed that when the antennas are close to each other they may detect the same tag more than once because their ranges overlap. TagTracker detects and filters out any duplicates and will list each tag only once.
- **Messages** - this pane shows a variety of detailed messages about the scanning process, errors, etc.
  By default all messages you see in the **Messages** pane are saved in a file named '**messagelog.txt',** which resides in the '**output**' folder. In order to distinguish between the files created during different sessions the name of the file includes a timestamp. For example if the file is named: '**messagelog-20040724-173938.txt**' that means this file has been created on 07/24/2004 05:39:38 PM.
- **Status Bar -** this pane is located at the bottom of the main window and shows only basic messages and hints to the user.

3.2 Scanning Process

After starting TagTracker it will try to detect and load an appropriate driver for the attached reader based on the current configuration settings. On success a message saying "Tracker initialized. Welcome!" appears on the **Status pane** (at the bottom of the main application window). At this time the **Scan button** and the **Scan menu** are enabled. The **Read All Data** check box is pre-selected. The user can initiate scanning by clicking the **Start** button or by choosing the **Scan** option from the **Action menu**.

The **Read All Data** checkbox acts as a toggle button between the two scan modes:

- **Simple scan** – when **Read All Data** is unchecked, the scan process reads from the transponder only the transponder ID without attempting to read the rest of the data stored on the transponder. This mode is faster than the **Detailed scan** mode, however you will not be able to see the data stored on the tag.

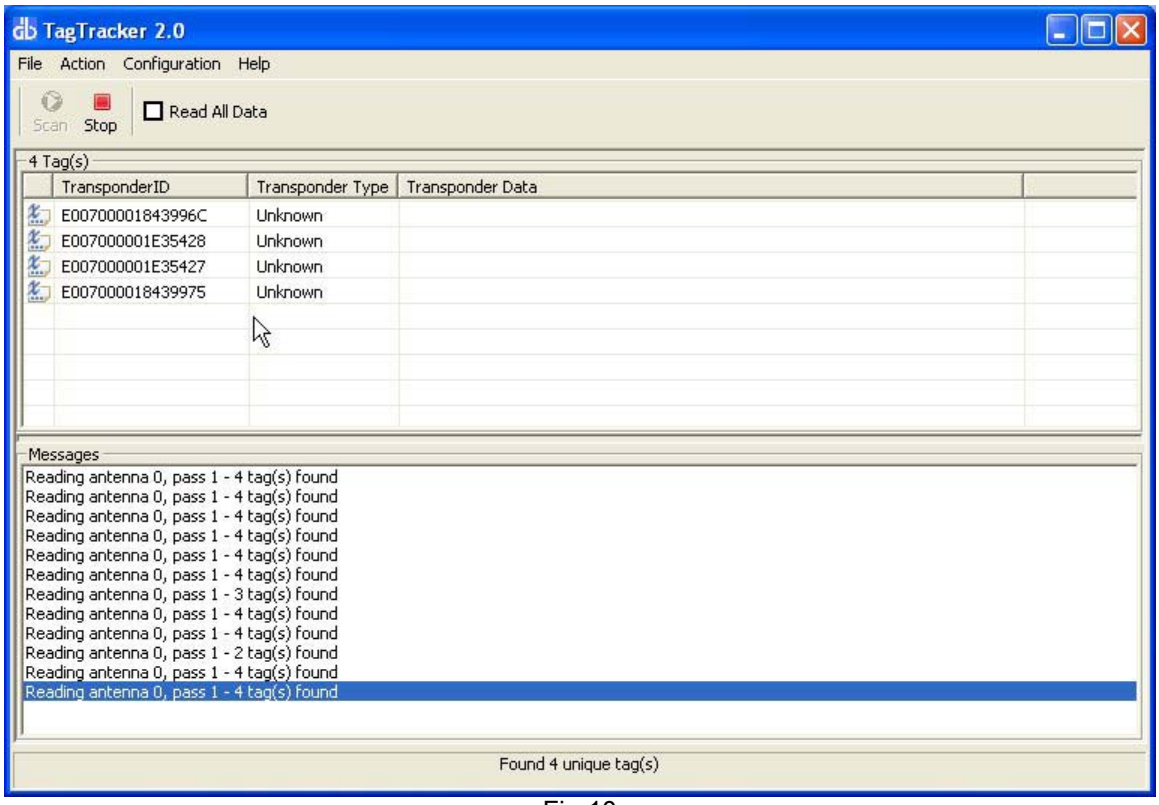

Fig.10

- **Detailed scan** – when **Read All Data** is checked, the scan process will read and cache all custom data for each transponder.

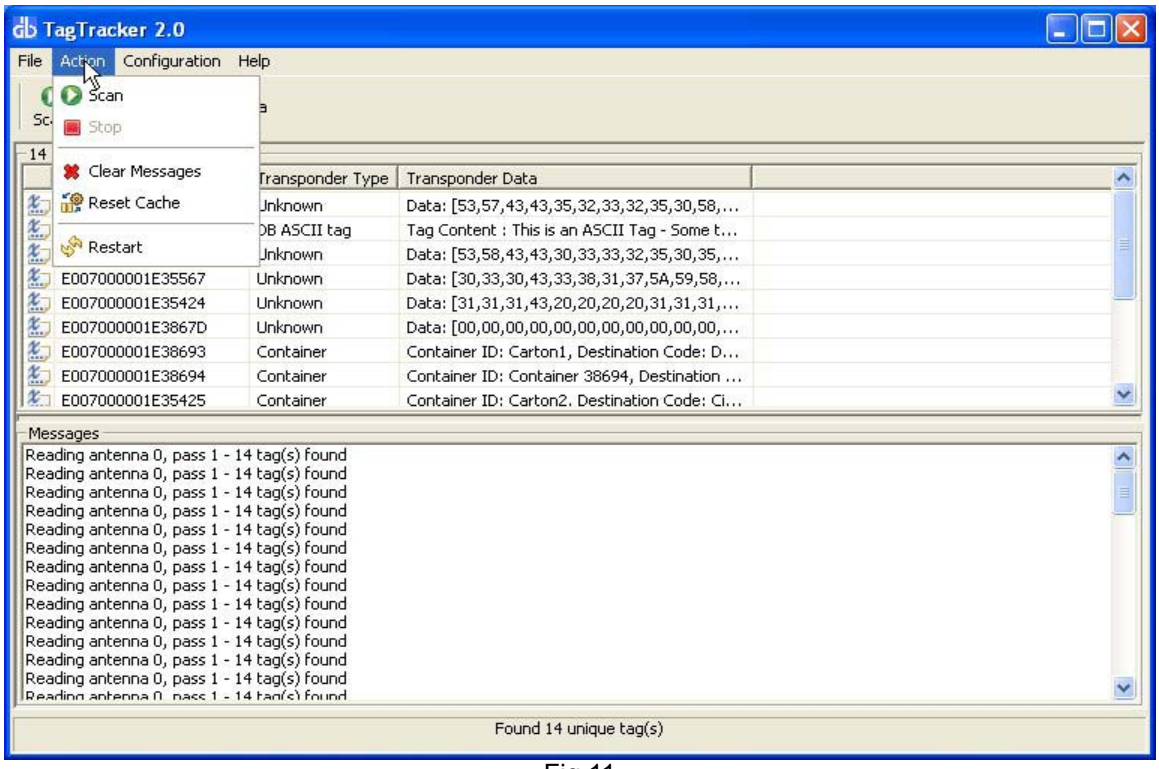

Fig.11

Reading all data from a transponder is a relatively slow process and the reading speed depends on the reader's capabilities. In order to reduce the scanning time TagTracker uses a cache mechanism for temporary storage of the detailed information. When a new transponder appears in the range of the antenna(s) it will be listed as “Unknown” and no data will be shown for this tag except for its transponder ID. After the **Read All Data** checkbox has been checked and a new scan is performed all information written on the transponder will be displayed.

The results of the scan process are stored in log files in the '**output**' folder.

3.3 Editing Transponder Data

TagTracker v2.x provides a user interface for inspecting and modifying the custom information stored on the tags. Data can be stored on the transponders in various formats. For the purpose of the demo and in order to simplify data presentation TagTracker supports the following predefined types of transponders:

- **Inventory Item Tag** – contains the following fields: SKU, Description, LOT and Expiration Date

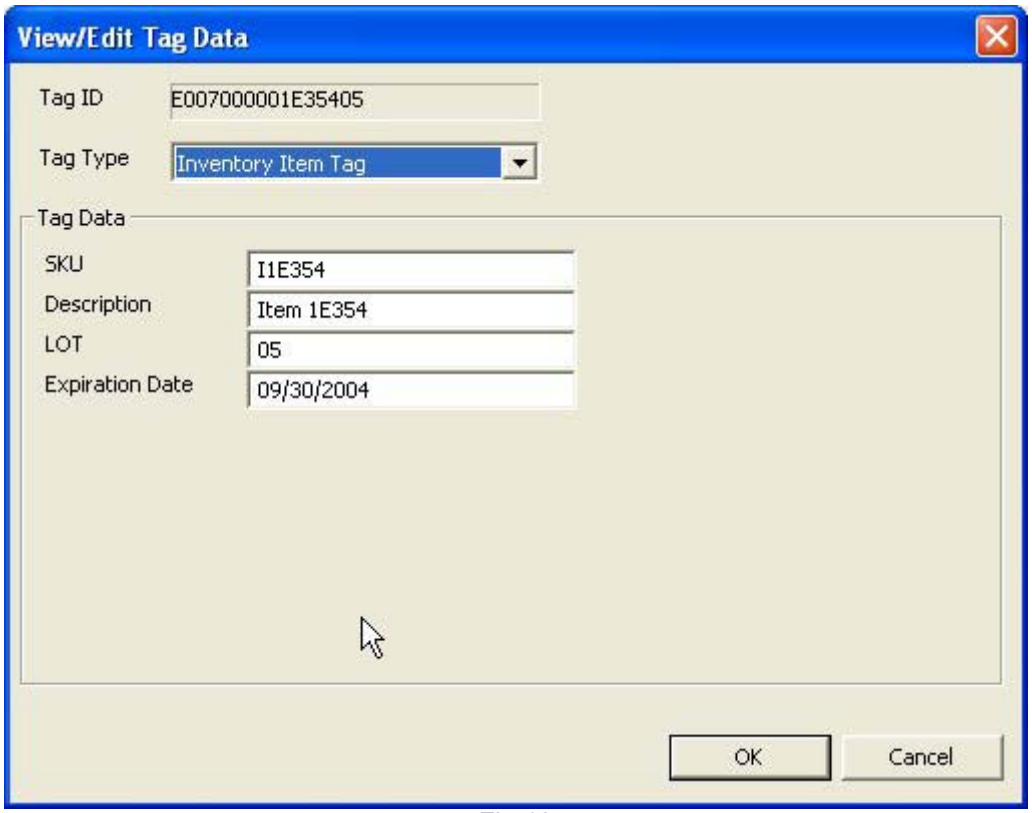

Fig.12

- **Container Tag** – contains the following fields: Container ID and Destination Code

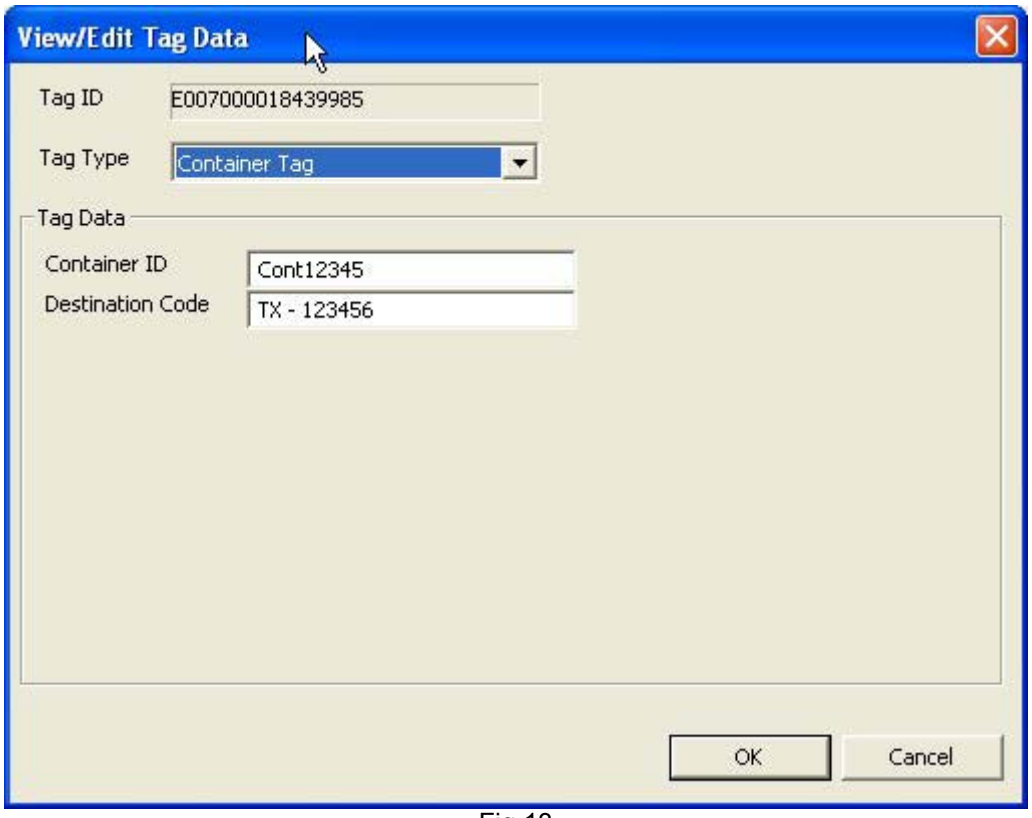

Fig.13

- **Location Tag** – contains the following fields: Location ID, Description

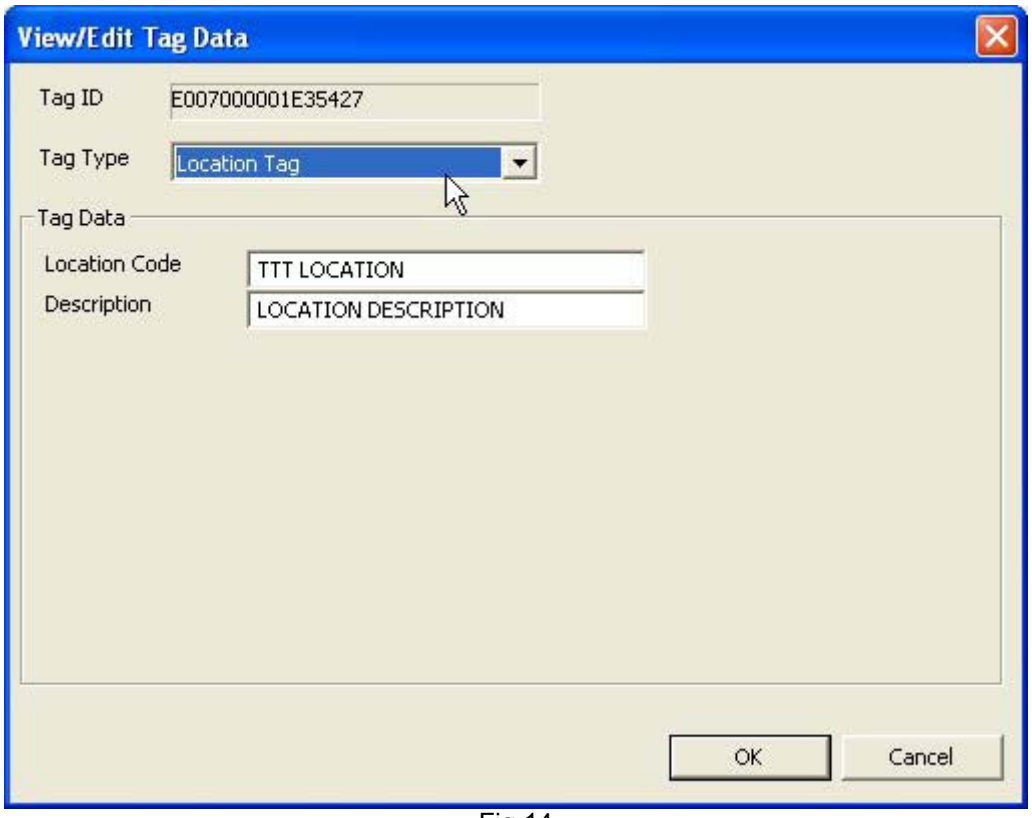

Fig.14

- **ASCII Tag** – contains only one field that represents simple ASCII text. The user may use this to store any type of information, such as names, addresses, etc. It will utilize all available memory on the tag.

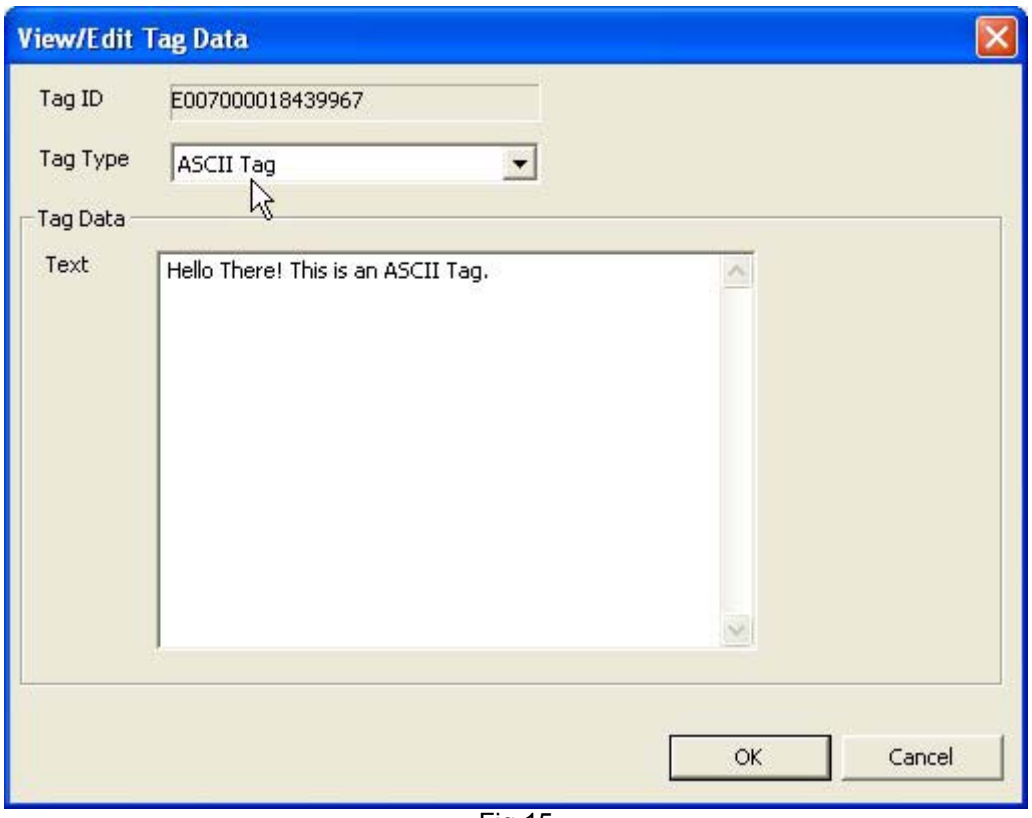

Fig.15

- **Generic Tag** – this is a read-only type. It represents all data stored on the transponder in hexadecimal format. TagTracker may not recognize tags initialized by other software.

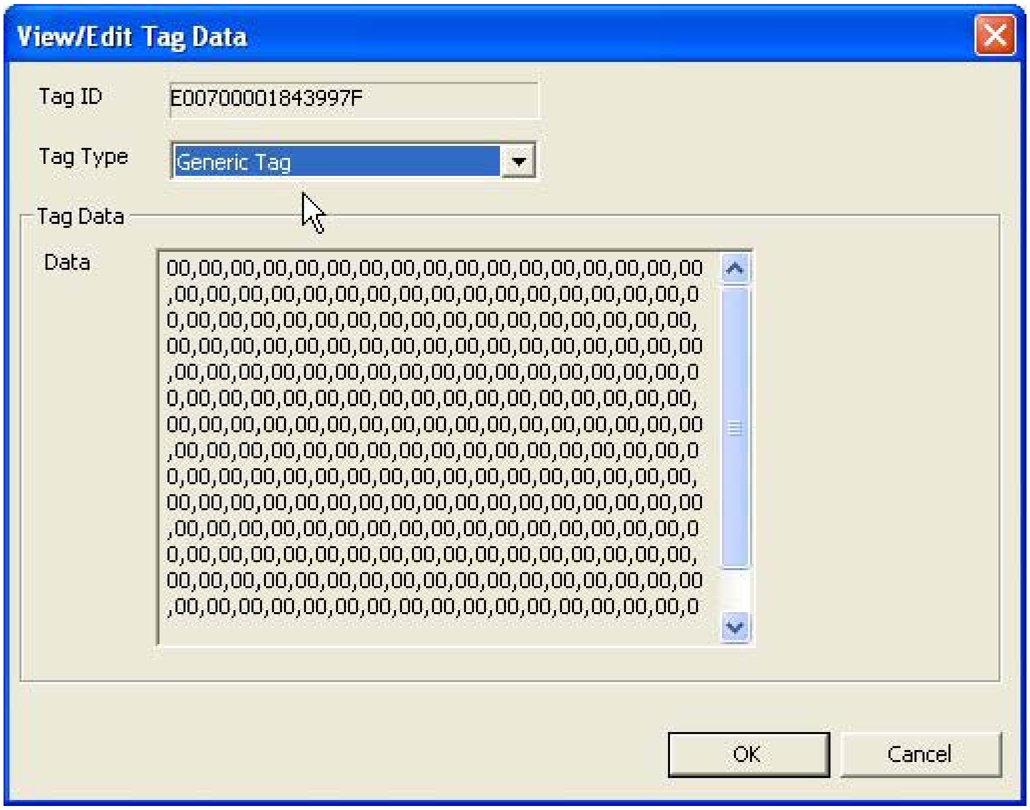

Fig.16

Please, contact us if you would like to use custom data layouts for special purposes. Such and much more are available with the commercial version of our Platform Independent RFID middleware (PIRF).

TagTracker allows the user to change the type of the transponder and respectively the information stored on it. A necessary condition for this is to stop the scanning process (if already running) first. A double-click over the row in the table where the desired transponder ID is listed will open a new window with the content of the transponder. Every time when the user changes transponder data and presses the ‘OK’ button TagTracker forces the reader to apply the changes by trying to initialize (write) the transponder. If the user has removed the transponder from the range of the antenna(s) and the reader is not able to find it, TagTracker will display an error message saying that the particular transponder cannot be initialized. In case of successful initialization a new message will appear as a last row in the message pane confirming the success.

3.4. Product Folders

Bellow you will find some details on the product folder structure and explanations about important files.

3.4.1 Folder 'config'

The folder *' %TAGTRACKER_HOME%**config'** contains 2 configuration files:

- ' **rfid.xml**' - contains some essential information like what kind of drivers are available, how many antennas will be used, the number of passes (reads) to be performed before switching to the next antenna, how many milliseconds to wait before repeating the reading cycle, etc. It is not a good idea to edit the content of *' rfid.xml'* manually. If you want to change the settings, please use the interface provided by TagTracker, which is accessible trough the Configuration menu. In most cases you will not need to modify the parameters and you can simply use the defaults.
- ' **log4j.properties'** – configures the detail level, location and format of the log file. Unless trying to troubleshoot an issue you do not need to modify this file.

3.4.2. Folder 'bin'

The folder *' %TAGTRACKER_HOME%**bin'** contains shortcuts, native Win32 DLLs and the log file.

- ' **runTracker.bat**' – startup script for the TagTracker application. This script passes two parameters to the application: the name of the configuration file to be used and the name of the output file. By default the output file is *'%TAGTRACKER_HOME%**output**\test-results.csv'*. If you need to place ' *test-results.csv*' file elsewhere or you want to rename it, you have to change the corresponding parameter in ' *runTracker.bat*'.
- A NEW file with an auto-generated number attached to the name (*'test-results'*) is created each time the application is started. That prevents the log file from growing out of control. However, you still need to check periodically for long-duration tests. It is a good idea to keep an eye on its size and content.

3.4.3. Folder 'output'

The purpose of this folder is to hold the log files with the results from scanning process. The user is advised to delete periodically the log files that are no longer needed.

3.4.4. Folder 'lib'

This folder contains the code for TagTracker as well as the libraries that TagTracker uses.

4. List of Supported Drivers

The default distribution comes with support for the following devices:

- TI S6350 and compatible
- TI S6550 and compatible
- TI MFR

If your device is not included in this list, please give us a call. We support a wide range of manufacturers and models.

5. Troubleshooting

In most cases troubleshooting consists in verifying that all devices (reader, multiplexer, antennas, etc.) are connected and configured properly, checking if all indicators (LED) are "*on*" according to manufacturers instructions, and reading the messages shown in the Message pane.

Bellow is a list of the most common things to check:

- Make sure your reader is powered on.
- Make sure it is connected to the correct COM port
- Make sure the communication settings for the COM port (baud rate, parity, etc.) match those on the RFID reader
- If you are using a USB-to-Serial converter:
  - Make sure it is plugged in and the driver is installed.
  - In MS Windows check that the COM port appears under "Device Manager" and make a note of the COM port number. Typically the COM port disappears in "Device Manager" after the converter is unplugged. If the converter is then connected to a different USB port, the COM port number might be different.
- Under Linux/Unix check the permissions to the serial device. Typically '*/dev/ttyS0*' under Linux.
- Make sure there are no conflicts with other applications using the same serial port.
- **Make sure "Ignore MUX" is checked if you don't have a MUX attached.**
- Check the log file in the bin folder. Default name is "**TagTrackerLogger.log**". You might find there some exception messages, which can give and indication as to what the problem might be.
- You might also want to adjust the log level in the *'config/log4j.properties'* file. Open log4j.properties file in a text editor. Replace the word '**ERROR**' on the first row with '**DEBUG**' and save the file. When you run TagTracker a detailed log of different events will be recorded in '*TagTrackerLogger.log*'. This might give you more information. Do not forget to change the log level back to '**ERROR**' after the problem is fixed in order to save disk space.

The resolution in many cases is device specific; so do not hesitate to contact us (see the contact information below).

6. Terms and abbreviations used

- **GUI** - Graphical User Interface
- **JRE** - Java Runtime Environment
- **MUX -** RFID Multiplexer - an RFID device that allows you to connect multiple antennas to one RFID reader and read from all of them sequentially. The MUX is the device that switches the antennas on a command from TagTracker.
- **PIRF** - Platform Independent RF. DataBrokers, Inc. PIRF is a powerful RFID middleware software product.
- **RFID** - Radio Frequency IDentification
- **RFID reader** - a device, which connects to an antenna (or has a built-in antenna) and (typically) to the serial port of the PC. RFID readers, despite the name typically can also write (store information on the RFID transponders). The capabilities of the specific RFID reader vary significantly between manufacturers and models. RFID readers are also known as “RFID interrogators”.
- **Tag initialization –** the process of writing information to the tag (transponder).
- **Transponder** - also referred to as “tag” or “RFID tag”. Tags typically have a read-only serial number etched during the manufacturing process plus some storage for custom data. A typical HF (13.56 MHz) ISO transponder might have 256 bytes of storage.

7. Contact Information

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RFID software & consulting
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Fairfield, OH 45014
phone: (513) 942-5777
fax: (513) 942-3518
e-mail: support@databrokers.net
http://www.databrokers.net

8. Last Minute Notes

This documentation describes the functionality of TagTracker 2.x, released in November 2004.
Please, report all defects and issues to: support@databrokers.net

Thank you and have fun with TagTracker!

The TagTracker Team
DataBrokers, Inc.