TAGportal-system UHF

Typ “A” und Typ “B”

RFID Embedded Server Training

Introduction

- RFID Embedded Server is a software application designed to add **directionality detection** and **directionality reporting** to a RFID reader.

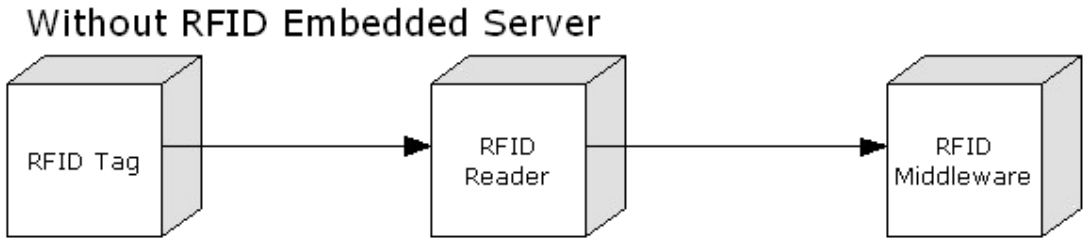
- **Some of its major advantages are:**

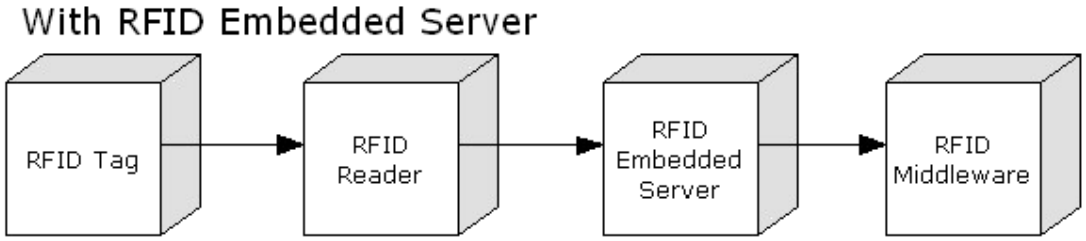
  - **Data Synchronization**. Both tag and direction data come from the reader and are fully synchronized.
  - **Middleware Compatibility**. The RFID Embedded Server XML data stream is fully compatible with any existing RFID middleware software.
  - **Cost-Effectiveness**. No microcontroller required. Only 4 sensors (1 radar and 3 light barriers).
  - **Software Based**. Developed in C# and based on the Windows .NET Compact Framework 2.0.
  - **Scalability**. With the source codes (provided separately) it is possible to customize the features of the software. For example, adding a monitoring routine to check whether the reader is working properly.

Principle

Software Architecture

- A RFID middleware will see RFID Embedded Server as a RFID reader.
- A RFID reader will see RFID Embedded Server as a RFID middleware.





UML component diagram representing the data flow from a RFID tag up to a RFID middleware

Directionality Detection
Principle

- This direction detection is based on monitoring the area inside the dock door, and recognition of how they are moved inside this area.
- The Result is the **O**bject **S**urveillance **S**tatus **I**nformation (**OSSI**)
- The directionality reporting is done by adding this parameter in the typical Motorola XR4xx XML protocol style

Directionality Detection
Software Concept

- The directionality detection implemented in the RFID Embedded Server is based on a software design pattern called state machine. Each state is based on the status of all sensors.

- State Overview base on a Pass through in one direction

	State #1	State #2	State #3	State #4	State #5
Radar	OFF	ON	ON	ON	ON
Light Barrier #1	OFF	OFF	ON	ON	ON
Light Barrier #2	OFF	OFF	OFF	ON	ON
Light Barrier #3	OFF	OFF	OFF	OFF	ON

Virtual Light Barrier Objects

- The RFID Embedded Server has been implemented with **virtual light barriers objects**. This reduces and filters out light barrier flickering.

- **This software design helped solve 2 problems:**
  - The XR4xx does not report the changes in the sensors 100% correctly. For example: in some cases it will report that 2 light barriers were blocked at the same time.
  - The complexities of handling light barriers flickering. For example: while a pallet is passing through the RFID gate, an arm, a leg or even some fingers can make the light barriers go ON and OFF multiple times and in a hard to predict fashion.

Directionality Reporting
Datastream w/o OSSI

- Typical XML stream of a XR4xx reader that send data to a RFID middleware software

```
<?xml version='1.0'?>
<Matrics>
  <EventGroup>
    <ReadPointMap>
      <Pair name='Read Point 1-1-1-1-1' id='1' zone='ImpactDoorLeft' class='Portal'/>
      <Pair name='Read Point 1-1-1-2-1' id='2'/>
      <Pair name='Read Point 1-1-1-3-1' id='3'/>
      <Pair name='Read Point 1-1-1-4-1' id='4'/>
    </ReadPointMap>
    <EventList>
      <Tag event='0' raw='00131F4A0000000000000033' time='4503d128' RPL='1'/>
      <Tag raw='00131F4A00000000000000BA'/>
      <Tag event='1' raw='00131F4A0000000000000033' time='4503d1df'/>
      <Tag raw='00131F4A00000000000000BA' time='4503d1fc'/>
      </EventList>
  </EventGroup>
</Matrics>
```

Directionality Reporting
Datastream with OSSI

- Typical XML stream of a XR4xx reader that send data to a RFID middleware software

```
<?xml version='1.0'?>
<Matrics>
  <EventGroup>
    <ReadPointMap>
      <Pair name='Read Point 1-1-1-1-1' id='1' zone='ImpactDoorLeft' class='Portal'/>
      <Pair name='Read Point 1-1-1-2-1' id='2'/>
      <Pair name='Read Point 1-1-1-3-1' id='3'/>
      <Pair name='Read Point 1-1-1-4-1' id='4'/>
    </ReadPointMap>
    <EventList>
      <Tag event='0' raw='00131F4A0000000000000033' time='4503d128' RPL='1' ossi='010'/>
      <Tag raw='00131F4A00000000000000BA' ossi='010'/>
      <Tag event='1' raw='00131F4A0000000000000033' time='4503d1df' ossi='010'/>
      <Tag raw='00131F4A00000000000000BA' time='4503d1fc' ossi='010'/>
      </EventList>
  </EventGroup>
</Matrics>
```

Open Door Alarm

- The open door alarm is a feature designed to trigger an alarm if a light barrier is blocked for more than 20 seconds.
- The alarm will go off automatically once the light barrier is no longer blocked.

Installation

Requirements

- **Hardware**
  - The only hardware requirement is the NXP RFID Gate, which comes with
    - 1 Motorola XR4xx
    - 4 Sensors (1 radar and 3 light barriers)

- **Software Tools**
  - To install, configure and operate the RFID Embedded Server you will only need the following software tools:
    - FTP client
    - Telnet client

- **RFID Middleware**
  - The RFID Embedded Server is capable of interfacing with any modern RFID Middleware Software.

NOTE: However, during the installation process and preliminary tests you may want to use a software called RFID Test Server. It is a Test Oriented RFID Middleware Software.

Proceedure

The following files need to be copied into the XR4xx reader by the use of a FTP client:

- **The Executable**
  RFIDEmbeddedServer.exe

- **The Configuration File**
  RFIDEmbeddedServer.xml

- **The Automatic Startup File (OPTIONAL)**
  RFIDEmbeddedServer.reg

Configuration

The Configuration File

- The configuration file is a XML formated file that needs to have the following content

```
<configuration>
  <entry type="embeddedserver" webport="1961" logport="1963" remotelog="true"/>
  <entry type="readerserver" webport="80"/>
  <entry type="application" ip="192.168.127.1" webport="80" running="true"
    sensoronly="false"/>
</configuration>
```

Parameter Description

- **”webport”**
  - this is the port the RFID middleware will use to connect to the RFID Embedded Server.
- **”logport”**
  - this is the port that allows remote logging. With it you are able to see the RFID Embedded Server operation in real time through a Telnet connection. Ex.: telnet [reader ip address][logport].
- **”remotelog”**
  - if you want remote logging you must set this parameter to "true".
- **”webport”**
  - this is the port the RFID EmbeddedServer uses to fetch the tag data from the reader.
- **”ip”**
  - this is the ip address of the computer running the RFID middleware.
- **”webport”**
  - this is the port that the RFID Embedded Server will use to notify the RFID middleware that there are tags available.
- **”running”**
  - if you want to make tests without any RFID middleware you should set this parameter to "false".
- **”sensoronly ”**
  - setting this parameter to “true” is useful in case you want to make some tests without processing any tags. For example: to test whether the sensors are working properly.

The Autostart File

- The RFIDEmbeddedServer.reg is the software automatic startup file. It should look like the following:

```
[HKEY_CURRENT_USER\Software\Symbol\StartUp\Programs\Prog3]
"Name"="\Application\RFIDEmbeddedServer.exe"
"Command"="/Application/RFIDEmbeddedServer.log"
"Continue"=dword:1
"ColdBootOnly"=dword:0
```

- Its location should be the same as the executable file.
- This file is optional.

Operation

Manual Startup

- **Please, follow the steps below:**

- From a DOS shell try to TELNET the reader. Ex.: telnet [reader ip address].
- Use the TELNET CD command to change to the Application directory. Ex.: cd application
- Run the RFIDEmbeddedServer.exe.

Automatic Startup

- Once you have performed several tests with your installation, you may want to have the RFID Embedded Server start automatically every time the reader boots.

To do so:

- use the FTP to upload the file RFIDEmbeddedServer.reg to the same folder where the executable is located

- reboot the RFID reader

OSSI words

CASE	OSSI value
Direction 1	'010'
Direction 2	'100'
No Pass trough	'000'
Direction Not Detected / ERROR	'111'

Error Conditions

Incorrect Directionality Reported

- The RFID Embedded Server may report the directionality incorrectly under conditions like the ones below:

- While a pallet A is going through the impact door, pallet B passes close to it but does not go through. In this case, tags of the pallet B may be reported as being moved through the RFID gate in pallet A.

Directionality Not Detected

- The RFID Embedded Server may not be able to determine the directionality of a pallet under conditions like the ones below:
- A pallet fails to leave the radar field in less than 60 seconds.
- A light barrier is blocked for more than 20 seconds.
- Two pallets A and B go through the RFID gate in opposite directions and almost at the same time.
- Employee A goes through the impact door and, almost at the same time, a pallet also goes through, but in the opposite direction.