



TAGcan High Performance RFID Portal





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.

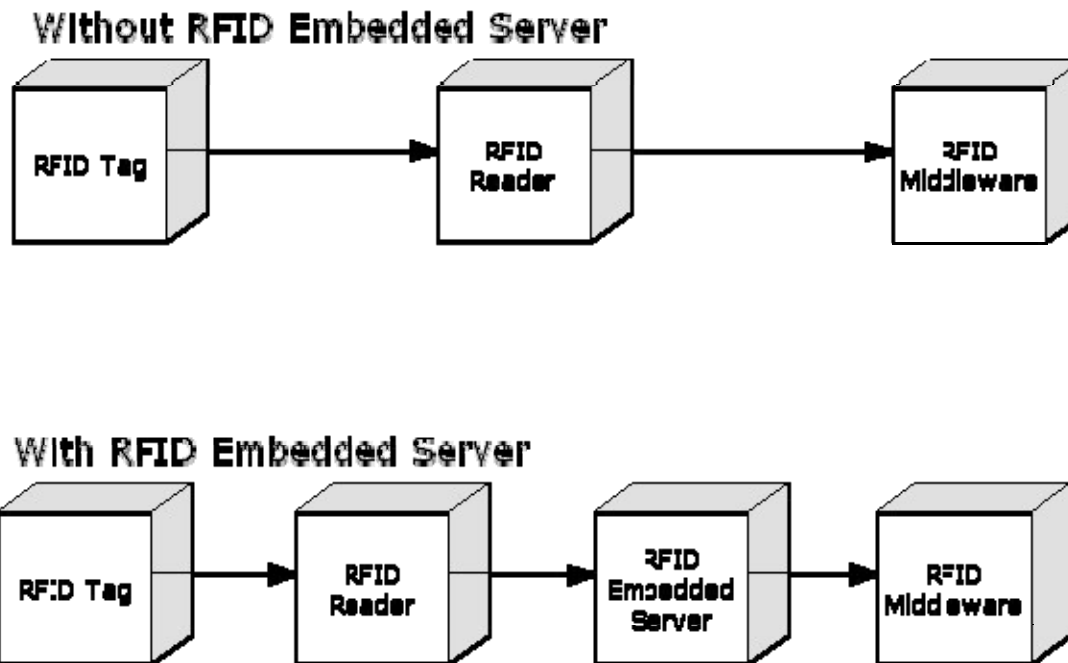


Principle



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 **Object Surveillance Status Information (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='00131F4A0000000000000000033' time='4503d128' RPL='1'/>
      <Tag raw='00131F4A0000000000000000BA'/>
      <Tag event='1' raw='00131F4A0000000000000000033' time='4503d1df'/>
      <Tag raw='00131F4A0000000000000000BA' 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='00131F4A000000000000000033' time='4503d128' RPL='1' ossi='010'/>
      <Tag raw='00131F4A0000000000000000BA' ossi='010'/>
      <Tag event='1' raw='00131F4A000000000000000033' time='4503d1df' ossi='010'/>
      <Tag raw='00131F4A0000000000000000BA' 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.



Procedure

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 formatted 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.