SIEMENS

SIMATIC Ident

RFID systems
RF-MANAGER Basic V3

Operating Manual

09/2012

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Legal information

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This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

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indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Preface

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1.1 About this manual

Purpose of the manual

This documentation provides you with a complete overview of the configuration and operation of RFID systems with SIMATIC RF-MANAGER Basic V3. The manual supports you in creating new projects, in the procedure used during configuration and in executing projects.

The manual is intended for users and project engineers involved in the configuration, commissioning and servicing of RFID systems using SIMATIC RF-MANAGER Basic V3.

Contents

This documentation will familiarize you with the components of the SIMATIC RF-MANAGER Basic V3 software:

- SIMATIC RF-MANAGER Engineering System (ES): Engineering software for creating and processing RFID projects

Basic knowledge required

General experience in the field of automation technology and RFID technology is essential for understanding this manual.

It is assumed that the reader is competent in the use of personal computers with the Windows XP Professional or Windows 7 Professional operating system.

Conventions

In this manual, the product SIMATIC RF-MANAGER Basic V3 is also referred to as RF-MANAGER Basic.

Scope of validity

The manual is applicable to SIMATIC RF-MANAGER Basic V3 and describes the status of the product as of August 2012.

History

Edition	Remarks
06/2011	First edition
03/2012	Revised and extended edition
09/2012	Revised and extended edition, updated to V3

1.2 Further information

Additional documentation

Further RFID documentation for RF-MANAGER Basic:

- **SIMATIC RF600 System Manual**

  This manual contains the information needed to plan and configure the SIMATIC RF600 system.

- **SIMATIC RF Function Manual**

  This manual is intended for advanced users and describes the XML-based programming interface of the RF600 reader family with an Ethernet interface and the system alarms.

Documentation can be downloaded from Support homepage (http://www.siemens.com/automation/service&support).

Note

Detailed information is available in the Information System

This manual provides a comprehensive overview of RF-MANAGER Basic V3. You will find detailed information about the individual topics in the Information System.

1.3 Guide to the documentation

Content structure	Content
Table of Contents	Organization of the documentation, including the index of pages and chapters
Preface	Purpose, structure and description of the important topics.
Introduction to the RF-MANAGER	Introduction to the programming interface and RF-MANAGER architecture
Installation of the RF-MANAGER Basic	Description of the installation Basic information about RFID, tag detection, and interaction with the RF-MANAGER
Working with RF-MANAGER Basic	Description of the programming interface Description for creating, testing, and transferring a project Describes all tabs of the program and their detailed functions Description for working with system functions and functions lists and their significance
Reference	Description of the system functions of RF-MANAGER Basic
Service & Support	Contacts, contact addresses, links, and further information
Appendix	Error messages and flash codes, license agreements

Introduction to the RF-MANAGER

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The RF-MANAGER Basic is used for user-friendly configuring and commissioning of RFID readers. The following RF600 readers are supported at this time:

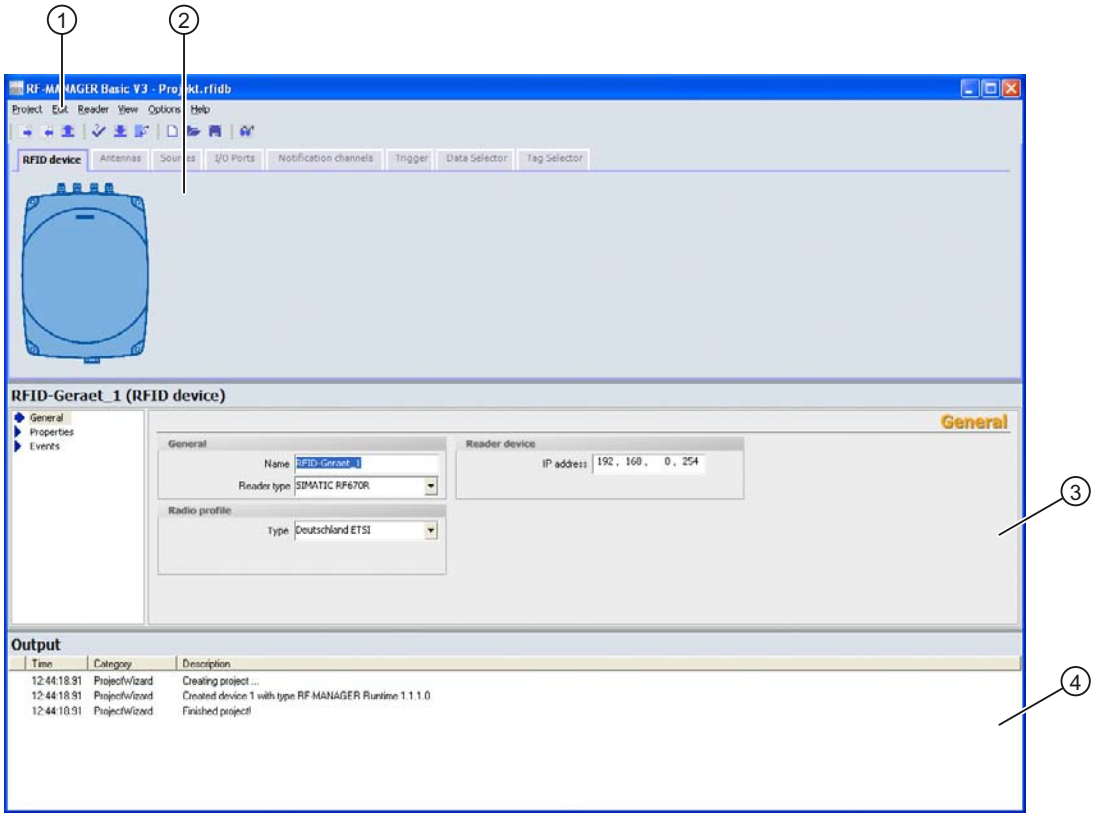
- SIMATIC RF640R
- SIMATIC RF670R

These readers can currently be operated with the following antennas:

- RF620A
- RF640A
- RF642A
- RF660A

RF-MANAGER workbench

When you create a new project in RF-MANAGER Basic or open an existing project, the RF-MANAGER workbench is displayed on the screen of the configuration computer.



① Menus and toolbars
② Workplace
③ Property view
④ Output window

Configuration via tabs

In RF-MANAGER Basic, there are special input possibilities in the various tabs for each component of the reader:

Tab	Configuration options
RFID device	Basic reader settings
Antennas	Antenna settings.
Data sources	• Which data should the reader read? • How should the data be read?
I/O Ports	Behavior of digital inputs/outputs. Here you can specify, for example, when an automatic reset should occur.
Notification channels	When should the data be sent to the user application via the XML interface.
Trigger	Here you can configure when the data should be read from the reader.
Data selector	Which data should be made available to the user application via the XML interface.
Tag selector	Definition of the memory ranges from which data is read. Definition of filter criteria.

Options after the configuration

After you have made the necessary settings for the reader, there are the following options:

- You can check the project for impermissible settings.
- You can transfer the project to the reader.
- After the transfer, you can check the real operation of the reader using a diagnostic view.
- You can export the project to an xml file. Using an application, you can transfer this file to the reader at a later time via the xml interface.

All project configuration data related to a project is stored in the project database.

2.1 Overview of the RF-MANAGER architecture

Before you configure your RFID system with RF-MANAGER Basic, you should familiarize yourself with the individual components of the system. These components are described below, on the basis of typical scenarios, and their interdependencies are presented.

2.1.1 Scenario 1: Monitoring incoming goods

The scenario comprises an RFID system with an RF670R reader. Its four antennas monitor the incoming goods portal of a production hall through which pallets are delivered. Each pallet is equipped with a tag. The tags contain user data that provide information about the sender and receiver of the goods. These data are read out and passed on.

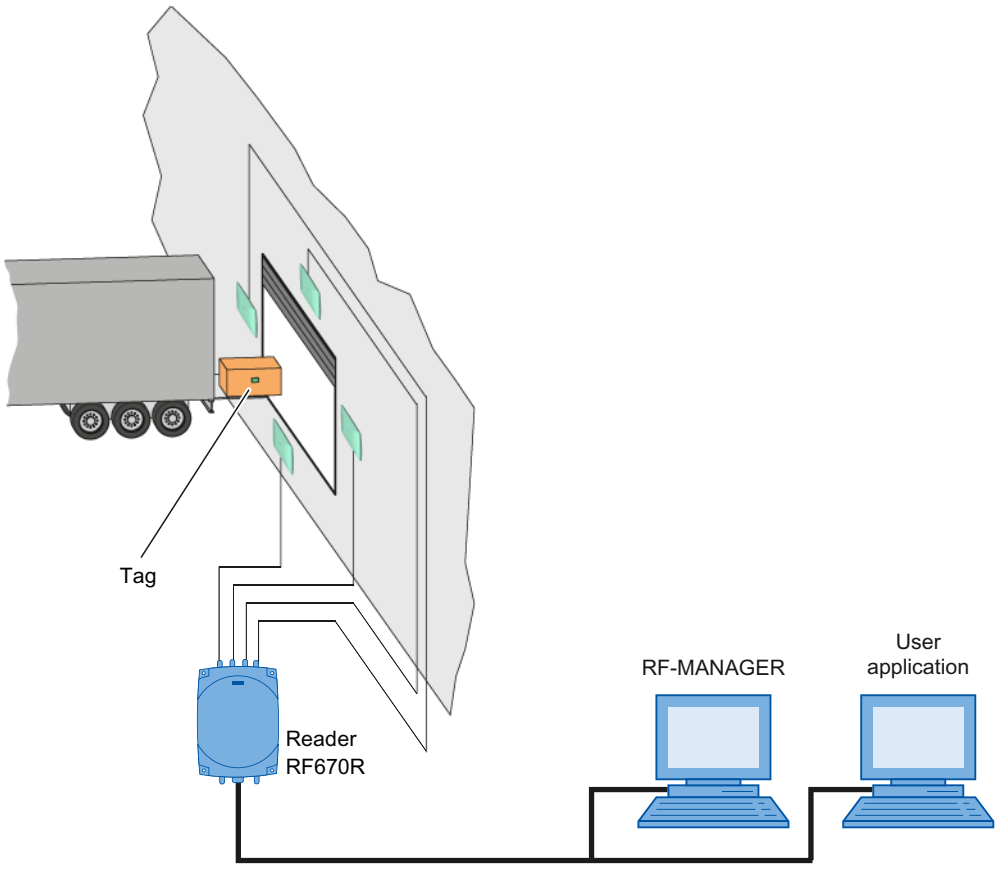
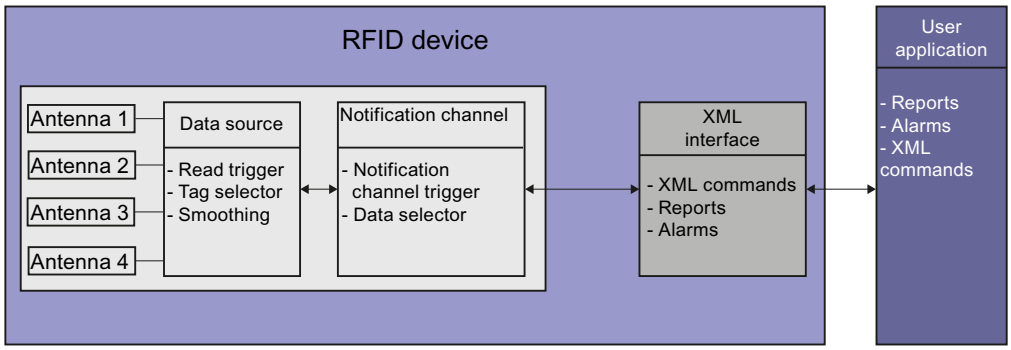


Figure 2-1 Scenario 1: Monitoring incoming goods

The reader is connected to the RF-MANAGER for configuring and commissioning and connected to an user application via an XML interface. The user application receives the data of the tags in the form of reports or by executing XML commands. For this example, you must configure the components described below in RF-MANAGER.

Diagram in RF-MANAGER



RFID device

The RFID device comprises function blocks which are configured in the RF-MANAGER and represent a reader. The following function blocks are active in this reader:

- Antennas
- Data source
- Notification channel
- XML interface

Antennas

The four antennas read the data of the tags that are attached to the pallets for incoming goods and forward the data to the data source.

Data source

Data sources are the basic components for reading RFID data. They encapsulate the antennas assigned to them and the data that is received by them through to the subsequent function units. In this example, one data source is sufficient for the four antennas assigned to it, because only the incoming goods portal is monitored.
It is a general rule that one RFID device can also contain several data sources. Various different data sources can be defined so that mutually independent tasks can be performed with the same reader.

One data source contains the following blocks:

- **Read trigger**

  Read triggers are activation mechanisms. They cause the data source to read the data from the tags that are located in the field of the four incoming goods antennas. A continuous trigger can, for example, be configured that will cause the antennas to read constantly.

- **Tag selector**

  Tag selectors are mechanisms used to forward data and to filter data. They determine which tag data areas should be read or routed on. They also define which tags should be supplied or filtered out on the basis of the contents of these data areas. In this case, a tag selector orientates itself on the tag ID or the freely parameterizable user data of the tag. In this scenario, the tag selector is use to read the recipient of the goods from the user data field and to route this information on together with the pallet ID. The user application checks, on the basis of the transferred data, whether the correct pallets have been delivered. If this is the case, the user application triggers a green signal light in the production hall by activating an output of the reader. The stock inventory is also updated. If this is a fixed filter criterion, the evaluation and control of the output can occur directly in the reader.

- **Smoothing**

  Smoothing is a technique that is used to optimize the read quality. The reader marks the read event with a status description for the tag (e.g.: detected for the first time by the inbound logistics antennas, reliably detected, lost) and adds these states to the read results. Time intervals are defined using this technique - for example, how long a tag detected for the first time has to be "seen" for it to be regarded as reliably detected. This allows tags to be excluded that have been unintentionally detected briefly in the boundary areas of the reader.

Notification channel

One or more data sources are assigned to one notification channel as data suppliers. A notification channel is used in this example to which the data source for the antennas of the incoming goods portal has been assigned. The notification channel routes on the data from this data source.

A notification channel contains the following blocks:

- **Notification channel trigger**

  Notification channel triggers are activation mechanisms. They cause the notification channel to transfer the data from the data source assigned to it. A continuous trigger can, for example, be configured that will cause data to be transferred constantly.

- **Data selector**

  Data selectors are mechanisms that process tag information and filter it. In this scenario, for example, filtering can be performed using smoothing criteria that are defined in the data source. Information is only transferred from tags that are in the reliably detected state. It can be assumed that these have been detected without errors.
  In general, the data selectors can supply additional information (reader fields). This includes, for example, the time of the read.

XML interface

The data of a reader can be made available via the XML interface of the user application. The is performed using the following read procedure:

- **Asynchronous read procedure**

  Asynchronous read procedure means that a user application logs onto the report of the XML interface and automatically receives the data. This continues until the application logs off again.

- **Synchronous read procedure**

  Synchronous read procedure means that a user application places individual queries to the reader using XML commands and receives the desired data immediately.

2.1.2 Scenario 2: Monitoring incoming goods and outgoing goods

The scenario comprises an RFID system with two readers. Reader 1 with its four antennas monitors the incoming goods portal of a production hall through which pallets are delivered. Each pallet is equipped with a tag. The tags contain user data that provide information about the sender and receiver of the goods. These data are read out and routed on - in the same manner as in the first scenario. The goods supplied on pallets undergo further processing in the production hall and subsequently exit the hall through the outgoing goods portal.

Reader 2 is controlled through light barriers and monitors the two outgoing goods portals that are assigned to different recipients with two antennas in each case. Pallets are dispatched through the outgoing goods portals. Each pallet is equipped with a tag. These tags also contain user data that provide information about the sender and receiver of the goods. The data read by the readers are checked to ensure that the pallets are at the correct outgoing goods portal. Depending on the read results of the reader, the outgoing portal opens, or it remains closed.

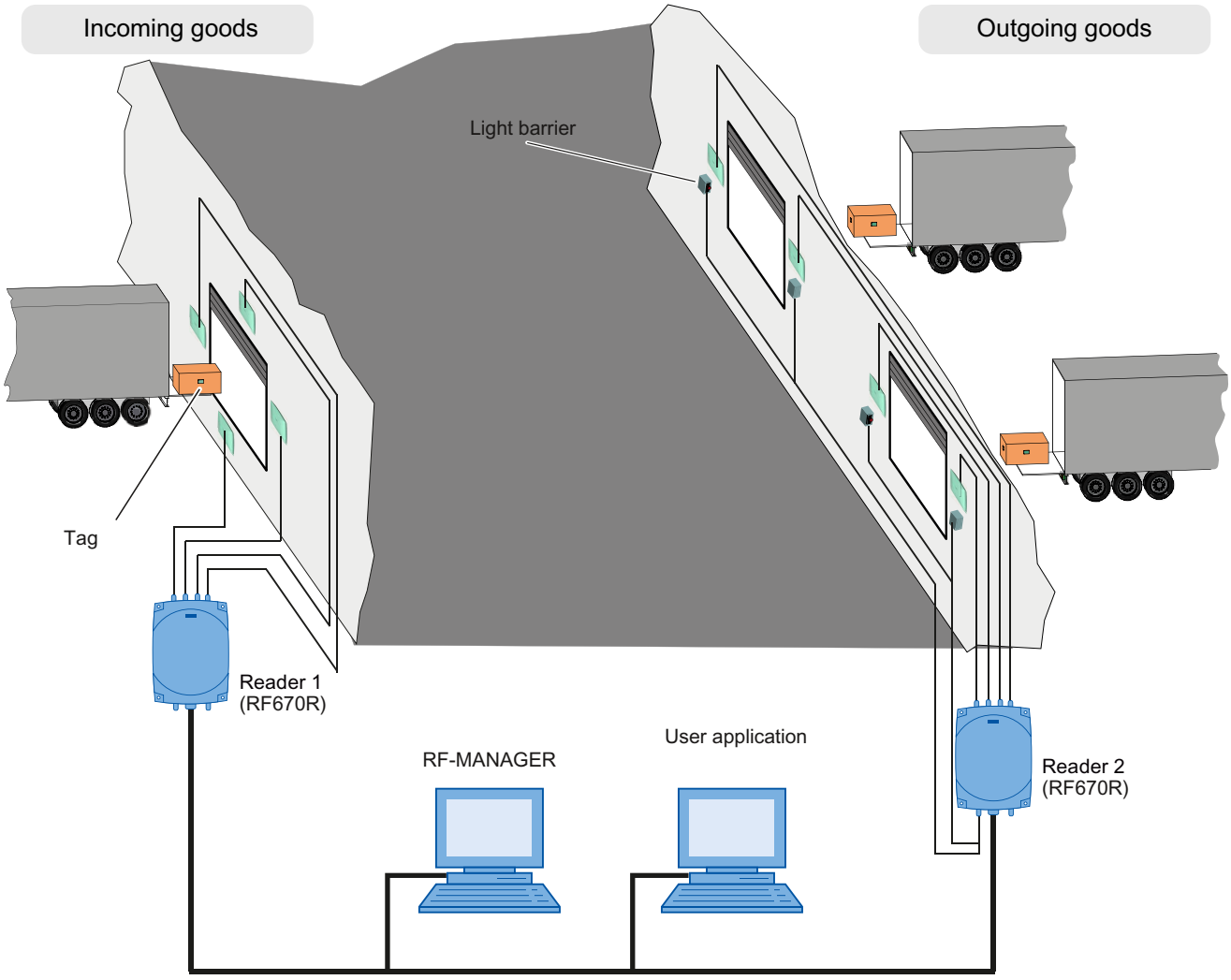
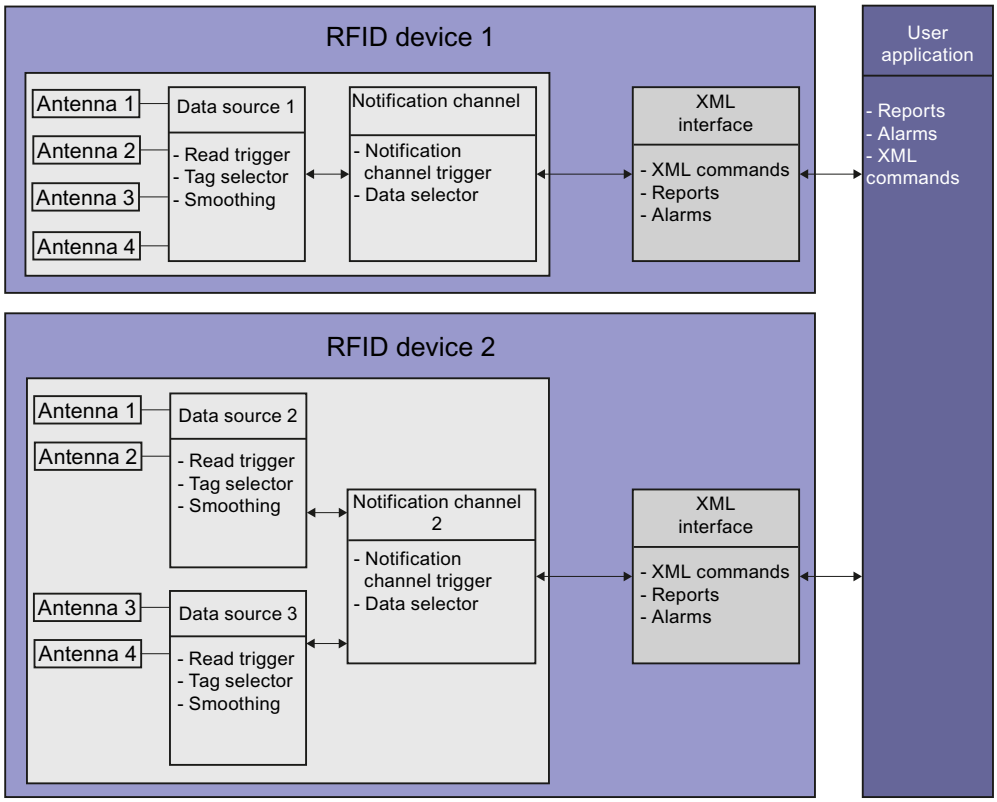


Figure 2-2 Scenario 2: Monitoring incoming goods and outgoing goods

The two readers are connected to the RF-MANAGER for configuring and commissioning and connected to an user application via an XML interface. The user application receives the data of the filtered and sorted tags in the form of reports or by executing XML commands. For this example, you must configure the components described below in RF-MANAGER.

Diagram in RF-MANAGER



RFID devices

In this scenario, there are two RFID devices. RFID device 1 is set up as for the RFID device of the first scenario - it represents Reader 1, which monitors the incoming goods portal. RFID device 2 represents Reader 2, which monitors both outgoing goods portals.

Antennas

RFID device 1 contains four antennas for the pallets that pass through the incoming goods portal. RFID device 2 contains two antennas each for the pallets that pass through the two outgoing goods portals.

Data source

For RFID device 1, one data source is sufficient, because only the incoming goods portal is monitored.
In RFID device 2, two data sources are created each with two assigned antennas - one for each outgoing goods portal. The two data sources enable two mutually independent tasks (separate read procedures for each outbound logistics gate) to be implemented.
The data sources contain the following blocks:

- **Read trigger**
  In this scenario, a continuous trigger is configured in data source 1. A trigger is configured in data sources 2 and 3 that activates the antenna for reading when the respective light barrier is interrupted.
- **Tag selector**

  In this scenario, the following actions can be performed, for example:
  The tag selector in data source 1 is used to read the recipient of the goods and to pass this information on. In the same manner as scenario 1, it orientates itself on the user data

  The tag selectors in data sources 2 and 3 also orientate themselves on the user data and the included goods recipient, but they use this information for filtering. That is: When a suitable tag is delivered, the user application automatically opens the outgoing goods gate by activating one output of the reader.

  If this is a fixed filter criterion, the evaluation and control of the output can occur directly in the reader.

Notification channel

In this scenario, there are two notification channels: Notification channel 1 refers to data source 1 and is a component of RFID device 1.
Notification channel 2 as a component of RFID device 2 and passes on the data from data source 2 or 3.

The notification channels contain the following blocks:

- **Notification channel trigger**
  In this scenario, the following triggering mechanisms can be configured, for example: The trigger in notification channel 1 operates continuously. The trigger in notification channel 2 also operates continuously so that the user system can open the outgoing goods door as soon as possible on delivery of a suitable tag.
- **Data selector**
  In this scenario, the following filtering procedures can be performed, for example:
  The data selector in notification channel 1 operates in the same manner as in the first scenario.
  The data selector in notification channel 2 supplies additional data from the reader fields along with the data of the read procedure. This is particularly useful when the loading times for pallets has to be monitored.

XML interface

In this example, there is an XML interface that queries the data from RFID device 1 (incoming goods) and a further XML interface, which queries data from RFID device 2 (outgoing goods). The blocks of the XML interface operate in the same manner as in the first scenario.

2.1.3 Scenario 3: Monitoring incoming goods, distribution of good, and outgoing goods

The scenario comprises an RFID system with three readers. Reader 1 with its four antennas monitors the incoming goods portal of a production hall through which pallets are delivered. Each pallet is equipped with a tag. The tags contain user data that provide information about the sender and receiver of the goods. These data are read out and routed on - in the same manner as in the first scenario. The goods supplied on pallets undergo further processing in the production hall and subsequently exit the hall through the outgoing goods portal.

Reader 3 is controlled by a light barrier and monitors a conveyor belt using four antennas; the conveyor transports the goods towards two output gates that are assigned to different recipients. Each item is comes with a tag. These tags also contain user data that provide information about the sender and receiver of the goods. There is a separating filter downstream of the conveyor that determines the output gate to which the goods should be directed. The separating filter is set in accordance with the results from the reader and the goods are distributed.

Downstream of the separating filter, the goods are loaded onto pallets - each pallet is marked with a tag. These tags also contain user data that provide information about the sender and receiver of the goods. The data read by Reader 2 are checked to ensure that the correct pallets are waiting at the outbound logistics gate specific to the recipient. Light barriers are installed to control the reader. Depending on the read results of the reader, the outgoing portal opens, or it remains closed.

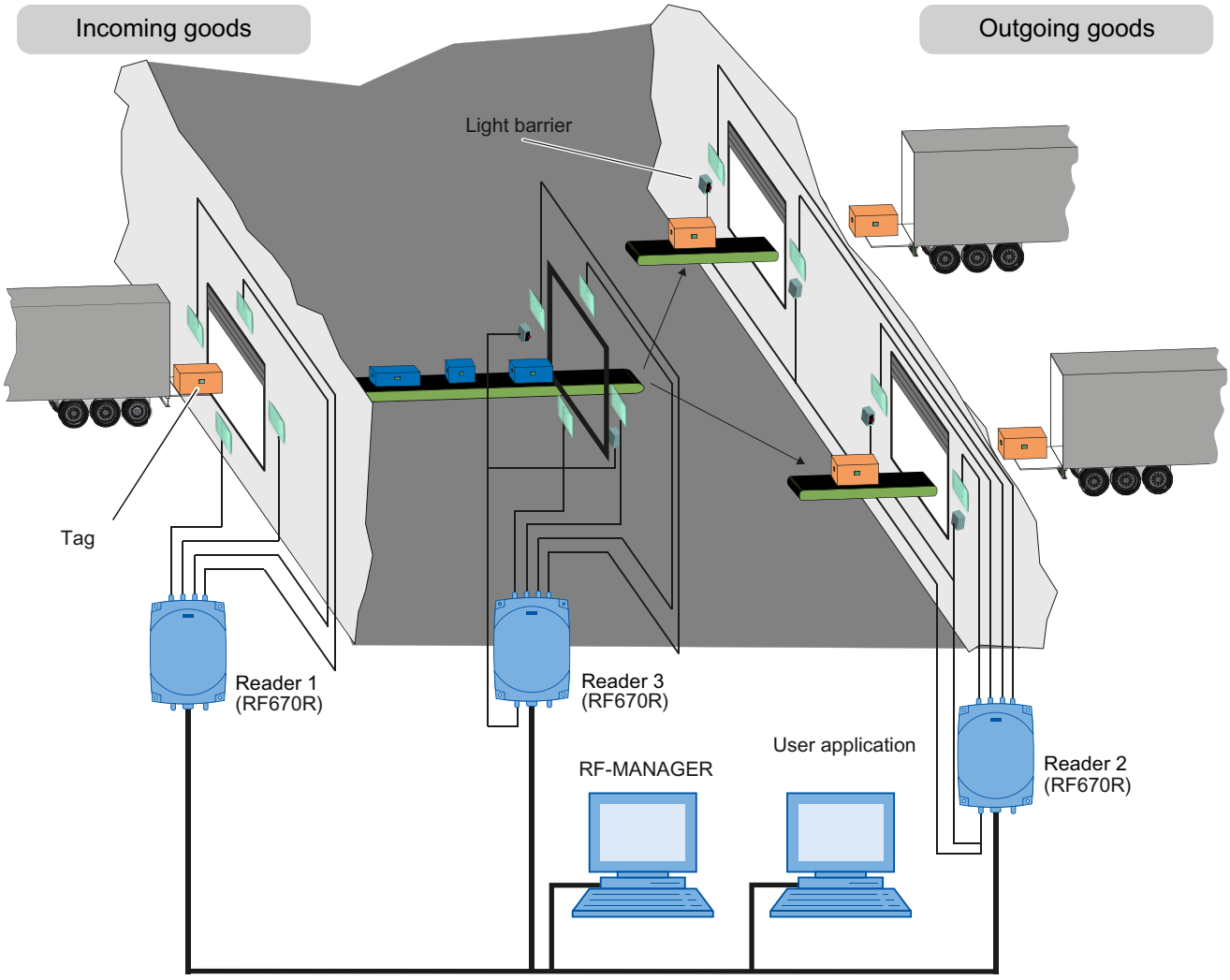
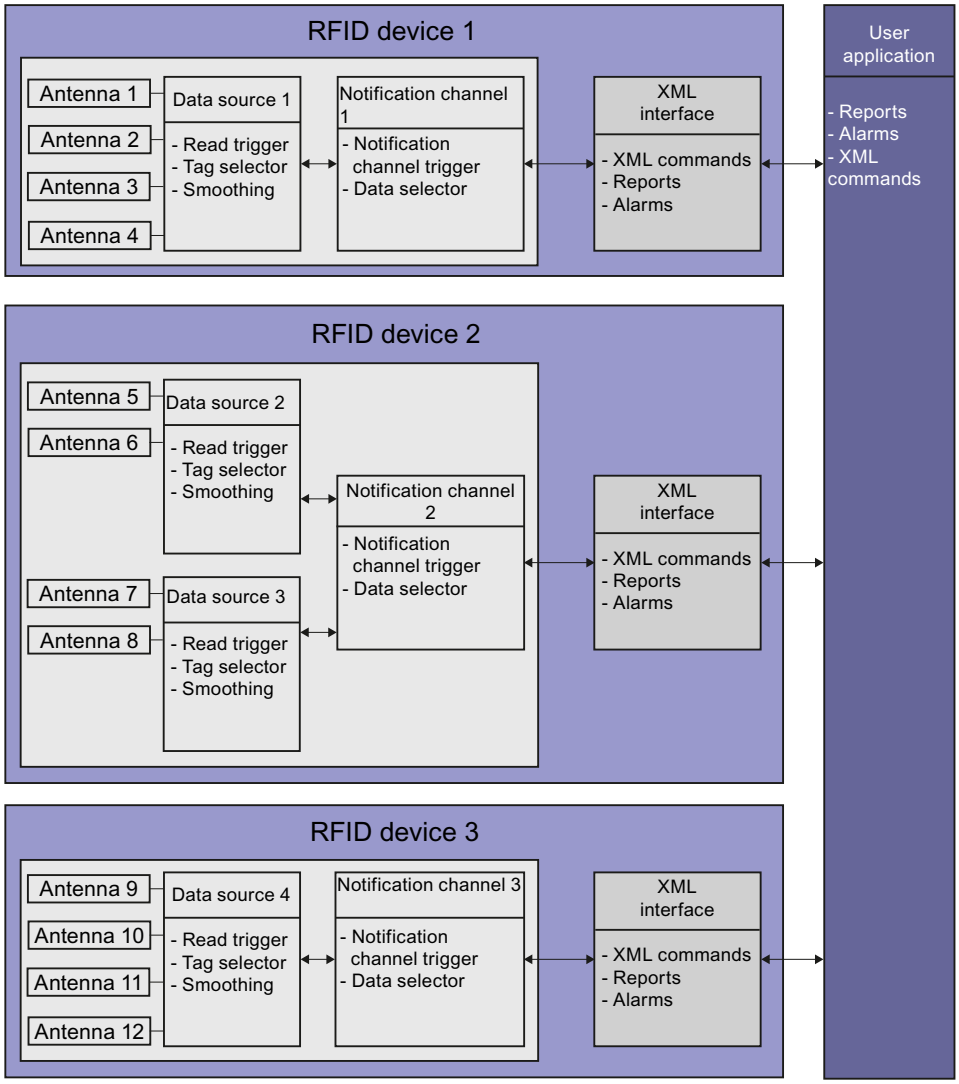


Figure 2-3 Scenario 3: Monitoring incoming goods, distribution of good, and outgoing goods

The reader is connected to the RF-MANAGER for configuring and commissioning and connected to an user application via an XML interface. The user application receives the data of the tags in the form of reports or by executing XML commands. For this example, you must configure the components described below in RF-MANAGER.

Diagram in RF-MANAGER



RFID devices

In this scenario, there are three RFID devices. RFID device 1 represents Reader (1), which monitors the incoming goods portal. RFID device 2 represents Reader (2), which monitors both outgoing goods portals. RFID device 3 represents Reader (3), which monitors the goods distribution conveyor.

Antennas

RFID device 1 contains four antennas for the pallets that pass through the incoming goods portal. RFID device 2 contains two antennas each for the pallets that pass through the two outgoing goods portals.
RFID device 3 contains four antennas for the items that pass over the goods distribution conveyor.

Data sources

For RFID device 1, one data source is sufficient, because it monitors only the inbound logistics gate.

In RFID device 2, two data sources are created, each with two assigned antennas - one for each outbound logistics gate.
A data source for the goods distribution conveyor is created in RFID device 3.
The data sources contain the following blocks:

- Read trigger

  In this scenario, a continuous trigger is required for data source 1 that activates the antennas for continuous reading.
  In each of data sources 2, 3, and 4, one trigger is configured that activates the antenna for reading when the respective light barrier is interrupted.

- Tag selector

  In this scenario, the following actions can be performed, for example:
  The tag selector in data source 1 is used to read the recipient of the goods and to pass this information on. In the same manner as scenario 1, it orientates itself on the user data

  The tag selector in data source 4 also orientates itself on the user data and passes on the goods recipient contained within. That is: On the basis of the information, the user application or reader must check the output gate for which the goods are destined. Depending on the check, the switch point is set from the user application or the reader and the goods are destined for the correct output gate.

  The tag selectors in data source 2 and data source 3 filter via the goods recipient contained in the user data. It is determined whether the goods that have been directed to the correct output gate were also loaded onto the correct pallets. It this is the case, and therefore a suitable tag is delivered, the user application or reader automatically opens the outgoing goods gate.

Notification channels

In this scenario, there are three notification channels: Notification channel 1 refers to data source 1 and is a component of RFID device 1.
Notification channel 2 is a component of RFID device 2 and refers to data source 2 or 3.

Notification channel 3 refers to data source 4 and is a component of
RFID device 3.

The notification channels contain the following blocks:

- **Notification channel trigger**

  In this scenario, the following trigger mechanisms can be configured, for example: The trigger in notification channel 1 operates continuously. The triggers in notification channels 2 and 3 also act continuously to allow the user application to make the decision for the separating filter as soon as possible or to open the goods gate as quickly as possible.

- **Data selector**

  In this scenario, the following filtering procedures can be carried out, for example:
  The data selector in notification channel 1 operates in the same manner as in the first scenario.
  The data selector in notification channel 2 also supplies additional data from the reader fields along with the data of the read procedure. This is particularly important when the loading times for the pallets are to be monitored.
  The data selectors in notification channel 3 also supplies additional data from the reader fields, for example, the name of the reader.

XML interface

In this example, there are three separate XML interfaces that query the data from RFID device 1 (incoming goods), RFID device 2 (goods distribution), and RFID device 3 (outgoing goods).

The blocks of the XML interface operate in the same manner as in the first scenario.

2.1.4 Overview of the RFID functions of the reader

The following functions are available in the reader and can be used by a user application via the XML interface.

Overview of the RFID functions of the reader
Reading tags
Writing tags
Locking tags
Erasing tag
Read user data/write user data
Set output
Read input/output
Switching RFID device online/offline
Initiating trigger
Transfer of reports/alarms: Log on/log off via an XML interface

For more information, refer to the "SIMATIC RF Function Manual" manual.

Note

Additional system functions

There are also system functions to set the outputs of the reader, which can run directly in the reader without a user application.

Installation of the RF-MANAGER Basic 3

3.1 Installing/uninstalling

3.1.1 Installing RF-MANAGER Basic

3.1.1.1 System requirements

	RF-MANAGER Basic
Supported devices	Standard PC
Operating system	• Windows XP Professional, SP3 and higher • Windows 7 Professional, SP1 and higher
CPU	at least Pentium IV, with 1.6 GHz processor
Graphic	Resolution: • at least 1024 x 768 • recommended 1280 x 1024 at least 256 colors
RAM	• at least 1.0 GB • recommended 2.0 GB
Free memory space / hard disk	At least 400 MB
	In addition to the space needed by RF-MANAGER Basic, Windows also requires space on the hard disk, e.g. for the swap file. For additional information, refer to your Windows documentation.
Additional hardware	DVD drive (for software installation)
Reader for document display	Adobe Acrobat Reader 7.0 or higher
Internet browser	Microsoft Internet Explorer V6.0 SP1 / SP2
Multiple screens	The operating system function used to visualize the screen content on several monitors (Control Panel > Display > Settings) is not released with RF-MANAGER Basic.

3.1.1.2 Installation overview

If all of these system requirements are met, you can install RF-MANAGER Basic. Then install a currently available Service Pack. The currently available Service Pack can be found on the Internet (http://www.siemens.com/automation/service&support).

Note

The most current available Service Pack contains all previous Service Pack versions. You do not have to install all available Service Packs.

NOTICE
User rights Administrator privileges are required for the installation of RF-MANAGER Basic. After installation has been completed, you require simple user rights to be able to use RF-MANAGER Basic under Windows XP / Windows 7.

3.1.1.3 Installation of the RF-MANAGER Basic

Introduction

All RF-MANAGER Basic components are installed:

- RF-MANAGER Basic
  - Help files
  - English and German languages

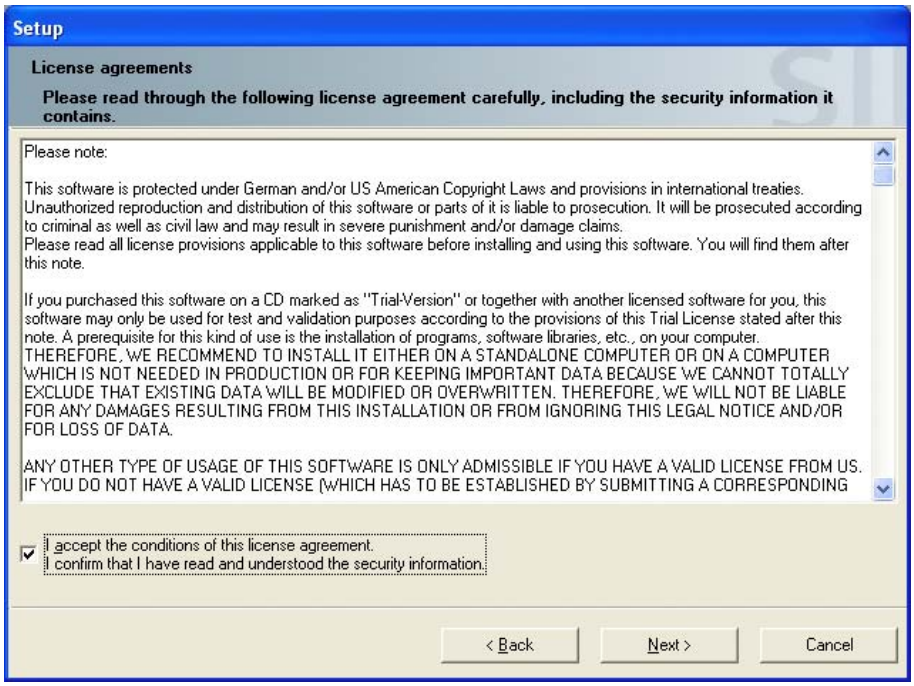
Requirement

Refer to chapter System requirements (Page 27).

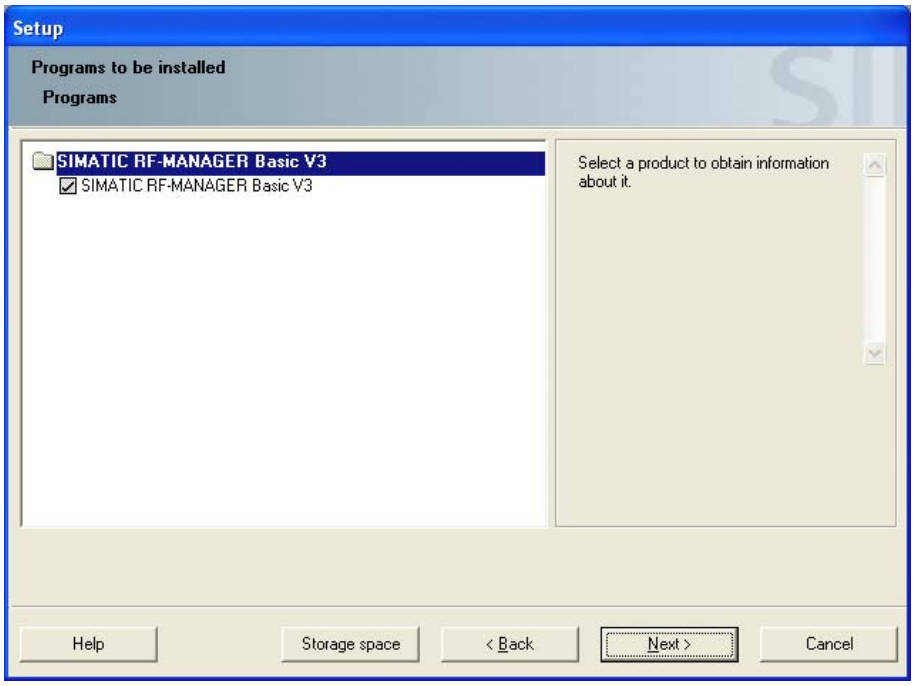
Procedure

To install RF-MANAGER Basic, follow these steps:

1. Start the installation by double-clicking on the file "Setup.exe".
2. Select the Setup language.
3. Read and accept the terms of the license agreement.



4. Select the desired installation folder. Select the component for this purpose. The "Browse" button appears. Select the installation path for these components.



   The status of the component is indicated by small icons to its left. You can display more information on these symbols by clicking the "Help" button.

5. Setup requires a restart. After the restart, log on with the same logon used for the installation process.

   The system will be reconfigured after you completed the installation. This will take a few minutes to complete.

Result

The RF-MANAGER Basic V3 has now been installed on your computer.

In the installation folder, usually "C:\Program Files\Siemens\SIMATIC RF-MANAGER Basic\SIMATIC RF-MANAGER Basic V3", you will find the following folder in addition to the standard folders:

- RF-MANAGER Basic V3 Support

  The "RF-MANAGER Basic V3 Support" folder contains a demo application with which you can test RF600 reader family with Ethernet interfaces. For more information, refer to the "SIMATIC RF Function Manual" manual.

Once the installation has completed with no errors, start RF-MANAGER Basic as described in the section "Starting RF-MANAGER Basic (Page 33)".

Note

Setup also installs the Microsoft MSDE SQL database. For details and information about any limitations, visit the Microsoft homepage at "www.microsoft.com".

When RF-MANAGER Basic is installed, all required components of the operating system that are not available yet are installed. After you have installed RF-MANAGER Basic, run "Microsoft Windows Update" to check for new security updates.

3.1.1.4 Troubleshooting

Possible errors during Setup and appropriate remedies

Error	Cause	Remedy	Procedure
Setup will be cancelled with an error message.	Wrong Internet Explorer	Make sure that Microsoft Internet Explorer Version 6.0 service pack 1 or higher is installed.	Install the latest version of Microsoft Internet Explorer from the homepage "www.Microsoft.com".
The installation will be stopped error message 1645 "Error Installing Microsoft®.NET Framework, Return Code 1601".	Wrong DCOM configuration.	Check the DCOM configuration.	Go to the Start menu of the operating system and select the "Run" command. Enter "dcomcnfg.exe" and close the dialog with the "OK" button. In the "Default properties" tab of the "DCOM Configuration Properties" dialog box, do NOT select "Default Authentication Level" = "None" and "Default Impersonation Level" = "Anonymous" at the same time.
The SQL server of RF-MANAGER Basic cannot be installed.	The "Autostart type" is disabled for the "Server" service on your PC.	Enable the "Autostart type" for the "Server" service. This service is a prerequisite for successful installation.	
Initial starting of RF-MANAGER Basic takes a long time.	A network connection is configured for a user, but not an Internet connection	Setting-up an Internet connection	
		Alternative: Disable the "Check for publisher's certificate revocation" option in Internet Explorer.	The setting is in the Control Panel under"Internet Options > Advanced > Security".

3.1.2 Uninstalling RF-MANAGER Basic

Introduction

With RF-MANAGER Basic you can also uninstall all the components.

Requirement

- Refer to chapter System requirements (Page 27).
- RF-MANAGER Basic is installed.

Procedure

1. Close all open applications, in particular RF-MANAGER Basic.
2. Select "Start > Settings > Control Panel" to open the Control Panel.
3. Double-click "Add or Remove Programs" in the Control Panel.

   This opens the "Add or Remove Program"" dialog box.
4. In the "Add or Remove Program" dialog, select the following entry and perform the steps listed below:
   – "SIMATIC RF-MANAGER Basic V3" to uninstall the RF-MANAGER Basic

   The "Change/Remove" button appears.
5. Click the "Change/Remove" button.

   The RF-MANAGER InstallShield Wizard appears.
6. Select the "Remove the Program" option and then click "Next".
7. Confirm the removal with "OK".

   RF-MANAGER Basic will be removed from the configuration computer.
8. In the next dialog box, click "Finish" to close the uninstall dialog.

3.2 Starting RF-MANAGER Basic

New entries in the Windows Start menu

After installing RF-MANAGER Basic, you will find new entries in the Start menu of the operating system under "Simatic":

- The configuration software can be found under the following entry:

  ""Start > SIMATIC > RF-MANAGER Basic V3 > RF-MANAGER Basic V3"

- The online help can be found under the following entry:

  ""Start > SIMATIC > RF-MANAGER Basic V3 > RF-MANAGER Basic V3 Help System"

- The demo application for testing the XML interface can be found under the following entry:

  "Start > SIMATIC > RF-MANAGER Basic V3 > RF Reader XML Demo"

Introduction

Start RF-MANAGER Basic in the Start menu of the operating system.

Procedure

1. In the Start menu, select the "SIMATIC > RF-MANAGER Basic V3 > RF-MANAGER Basic V3" command.
2. A new project is created and standard values are assigned to the reader components.
3. Adapt the settings to your requirements.
4. Check the consistency of the project.
5. Transfer the data to the reader.
6. Test the functionality with the reader.

3.3 Configuring RF-MANAGER Basic

3.3.1 Changing the language

Introduction

Set the menu and dialog language of your user interface. You can set up the user interface, for example, for English-speaking engineers.

Requirement

The desired user interface language has been installed together with RF-MANAGER.

Procedure

1. Select "Settings" from the "Options" menu.

   The "Settings" dialog box is opened.
2. Click on "User interface language" in the "Workbench" group.
3. In "Language", select the user interface language you require.
4. Confirm your entries.

   The dialog box closes.

3.4 Understanding and optimizing the scanning of RFID tags

3.4.1 Introduction

Configuration is easy...

The configuration tool RF-MANAGER Basic makes it easy for the user to create a configuration that enables the RFID tags to be acquired with an RFID device and this information can then be supplied via the XML interface to a user application.

When creating a new configuration when starting RF-MANAGER Basic, the parameters of all the involved components are set to a default value.

This, however, only creates the basis that allows RFID tags to be simply detected. A default setting cannot be expected to cover all the possible user scenarios, because these vary considerably. Default settings cannot be expected to provide fine-tuning to the specific application of each individual customer.

... Optimization requires system know-how

To allow various different user scenarios to be covered, it has been ensured that all relevant parameters can be changed as required. This is, however, where the challenge begins: On the one hand, there is a large number of individual parameters, on the other hand, there are special boundary conditions and dependencies between these parameters. The user therefore is able to set up a system optimally but if the configuration is incorrect, it may not be possible to acquire RFID tags correctly.

Even though the RF-MANAGER Basic configuration tool protects or warns the user against completely wrong entries, a certain flexibility must be maintained to make fine adjustments possible.

3.4.2 Objectives of this section

To improve understanding of the possible settings and to enable appropriate values to be set, this section will try to provide answers to the following questions:

- Which components are involved before the data of a transponder has been transferred from acquisition through to the end user and how do these components interact?
- Which parameters of the system should be set? Which are only needed in special cases?
- Are there dependencies or boundary conditions that have to be observed?
- Do these conditions change in accordance with the application scenarios?
- What assistance is available for detecting RFID tags with more certainty?
- What pitfalls must be avoided?

The main emphasis here is on the parameters that affect the timing aspects of RFID tag acquisition.

3.4.3 Description of the basics

The components

To optimize a system, you need to have an overview of its layout and an understanding of how the individual components interoperate. A brief introduction to the main components that are involved in the acquisition of tags using RF-MANAGER is therefore provided below.

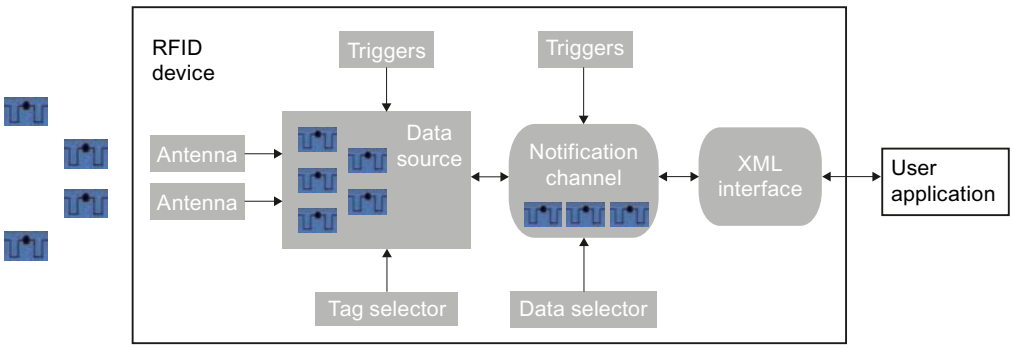


Figure 3-1 System components of RF-MANAGER Basic

The figure shows an RFID device (left-hand box) and its connection to an external application via the XML interface (right-hand box).

RFID device

The RFID device defines the reader and its basic properties. This comprises the addressing of the RFID device and the radio profiles and tag protocols that are supported.

Internally, the RFID device comprises several functional units:

Antennas

The data of a tag must be physically acquired first. This task is performed by the antennas. They communicate with the tags through radio waves and acquire the tag data.

Data source

The data source collects the tag data from the antennas. A trigger determines the frequency at which it requests data.

The collected data is then compressed in accordance with the smoothing parameter set before it is passed on.

Tag selector

The additional data of a tag can be optionally defined in the form of tag fields and read in. The tag selector not only allows additional data fields to be defined for the purpose of passing them on to the XML interface, but also to be filtered in accordance with specific values or value ranges so that the volume of tags passed on can be limited.

Notification channel

The tag data of a source is collected by the notification channel and filtered, if required, in accordance with specific tag events.

When the trigger of a notification channel is activated, all the collected data is passed on.

XML interface

The XML interface is the connection through which the external applications communicate with the RFID device. An external application can log onto the RFID device and then receive automatically all the read tag data or messages in the reader. It is also possible to launch explicit read operations via the external application in the reader using XML commands, and thus to control the reader through the application. Other actions such as the use of the digital I/O are also possible via XML commands.

3.4.4 The journey of the data of an RFID tag through the RF-MANAGER

3.4.4.1 Work steps for asynchronous automatic tag data transmission

To establish the times that affect acquisition of a tag, we will be accompanying the data of a tag on its journey from the transponder on which it is saved, through the reader components, to a user application that then accepts the data from the reader.

Overview

So that we won't get lost easily on this journey, we will subdivide the route into separate sections as shown in the following diagram.

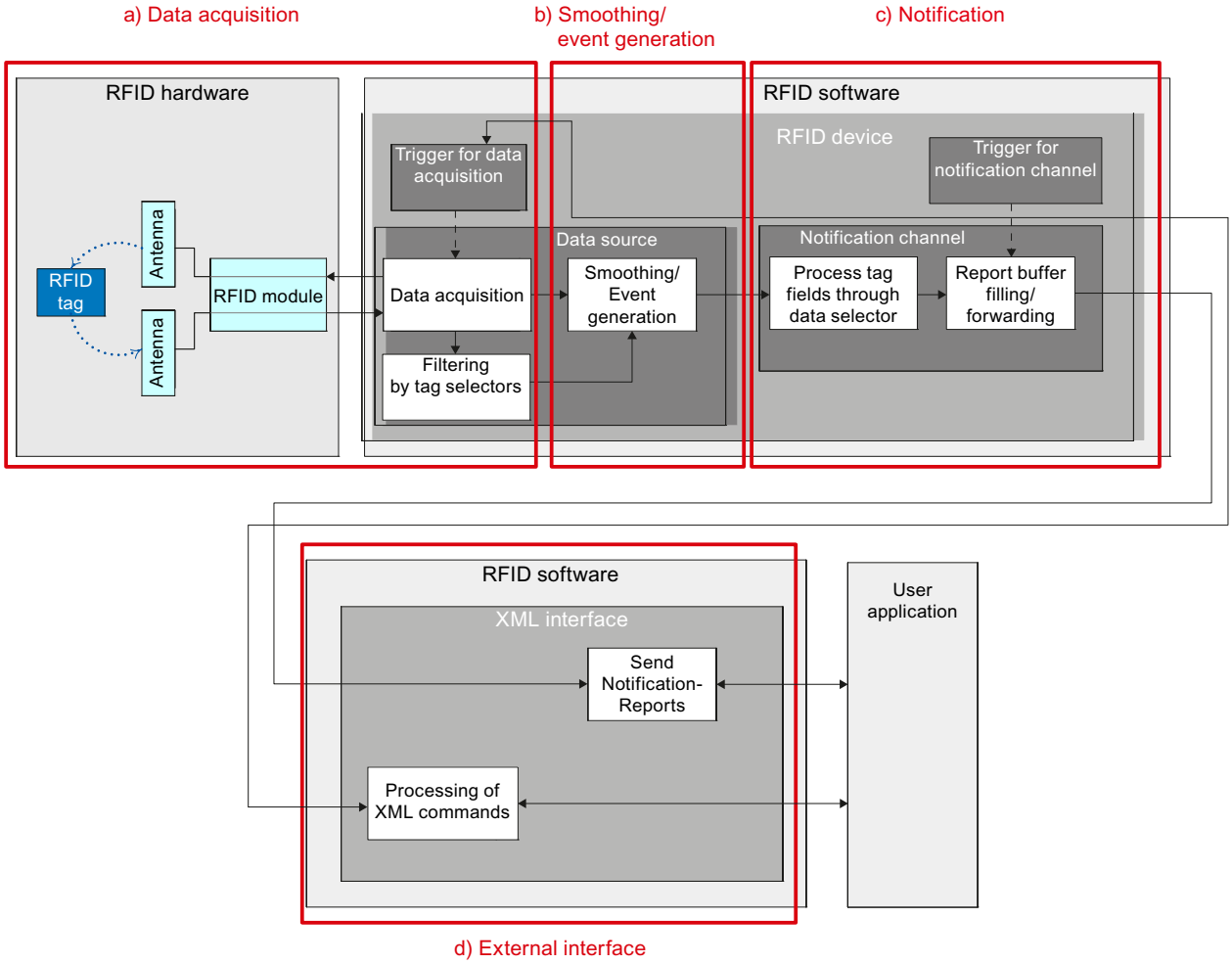


Figure 3-2 Participating system components and steps in reading an RFID tag

Why is a picture of the system components shown here again when this has already been covered in the preceding section? The difference in this figure lies in the fact that the emphasis is on the separate steps, i.e. "what is done". The steps are shown here as white boxes and the system components are shown as grey boxes. The red frames a) to d) represent the stations that are passed through in sequence.

3.4.4.2 Data acquisition

Context

To ensure that a reader can operate its antennas autonomously, an RFID device must be configured with a data source and an appropriate trigger. When the trigger is released, the data source starts acquiring the data.

This always occurs in so-called read cycles, whereby a read cycle represents one scan of the currently active tag by the reader. For this purpose, the data source sends a read command to the RFID module and activates with it creation of an inventory.

The time for an inventory is dynamic. The duration of a read cycle can vary in accordance with the number of tags that are currently located in the field or the procedure for collision detection.

There are two ways to perform data acquisition via the data source:

- Repeated reading

  In repeated reading, the configured number of read cycles is performed per trigger. For each read cycle performed, the read data or data sources are reported and can be further processed there.

  The duration of the read cycle depends on the tag population and ends after an inventory. The maximum time for all read cycles per trigger can be set via a timeout.

- Bulk reading

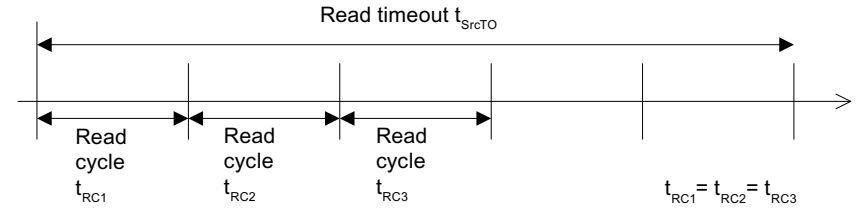
  In bulk reading, only one read cycle with the read timeout is performed per trigger. The RFID module performs the maximum number of inventories for the read duration. They are internally summarized and then reported to the data source.

Repeated reading

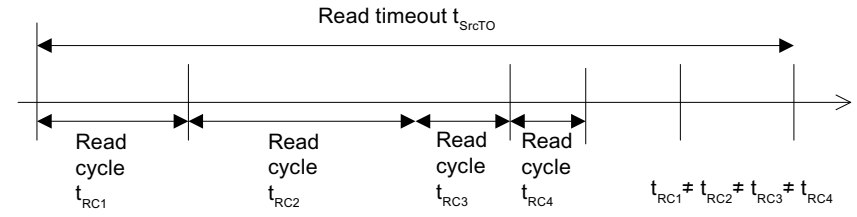
The duration of a read cycle is not fixed, so it is not only possible to configure the number of read cycles per trigger, but also a read timeout so that at least an upper limit can be set for the data acquisition time.

This time is set in the data source of an RFID device in "Properties > Radio settings > Read timeout".

a) Constant number of tags in the field



a) Changing number of tags in the field



Relationship between the read timeout and read cycle times

The figure above shows how the read cycles respond to a constant (a) or changing (b) number of tags in the field relative to the read timeout. In read cycle 2 of Figure b) there are more tags in the field than in read cycle 1 or 3 and therefore the read cycle is longer. However, even when there are no tags in the field, a certain basic time is required to address the antennas, so that a read cycle does not take less than a specific minimum time determined by the hardware.

Note

The read timeout must therefore be greater than the sum of read cycles times, if the tags are to be correctly acquired.

tCycle Data Source1 = t Read Cycle 1 + t Read Cycle 2 + ...+ t Read cycles per trigger < t Read timeout

Note

An average read cycle time can be assumed for this purpose.

tCycle Data Source1 = (Read cycles per trigger) • t Read cycle < t Read timeout

Bulk reading

Application

"Bulk reading" is available for applications in which tags need to be continuously acquired by the RFID module without interruption during a defined time interval.

Effects

The RFID module takes inventories continuously for the length of the read timeout that is set at the data source of an RFID device in Properties > Radio settings > Read timeout.

Because the RFID module can only perform one action at a time, other possible read requests from other data sources or from commands are delayed. The acquired data are delivered to the data source, where they can be further processed, only when the read timeout has elapsed. Tags that are acquired multiple times in inventories are only delivered once to the data source.

The difference compared with "repeated reading" is that the repeated reading cycle ends after an inventory is taken. If the inventory does not take long, the RFID module is only occupied for a short time, and actions can be performed almost in parallel. In bulk reading, the RFID module is practically blocked and further actions are delayed.

Note

Exceeding the read timeout

The read timeout can be slightly exceeded, as a started inventory is not canceled. At least one inventory is carried out.

If the values for the read timeout are large, the smoothing values may need to be adjusted (see Smoothing / event generation (Page 43)).

Note that a tag that has been read is only delivered once per read cycle.

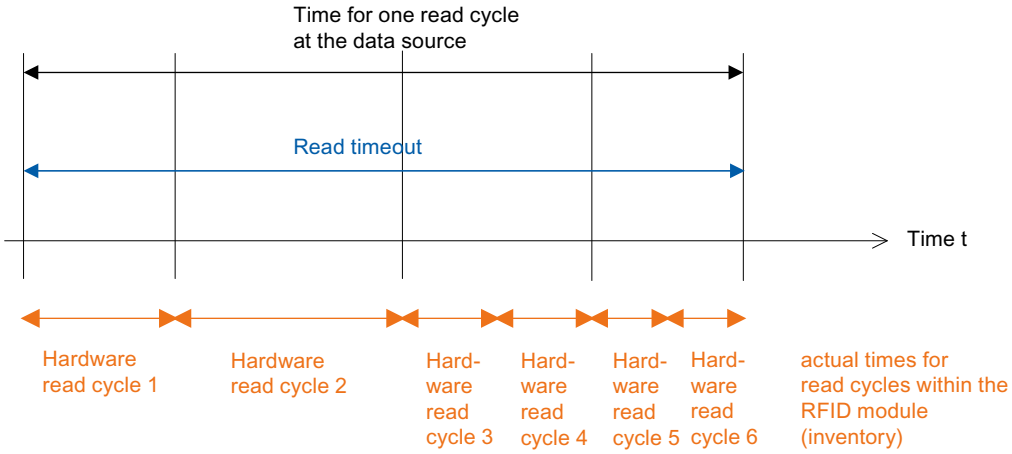


Figure 3-3 Effects of the read timeout on the read cycle time

More than one data source

If the setting "Asynchronous reader mode" is not activated in "RFID device > Properties > System", you can assign more than one data source to one RFID device.

This means that you can perform two different tasks with a single RFID device.

For example, for an RFID device with four antennas, you can specify that two antennas are assigned to each data source.

Time sequence

However, a new time effect appears here that we have to consider. Refer to the figure below that shows the time sequence of tag acquisition by an RFID device with two data sources.

When a data source is created, it is simply a new logical unit for data acquisition that is created. As there is only a single item of hardware, namely the RFID module complete with its antennas, the hardware can only process one data request. For this reason, when several data sources are configured on one RFID device, they are always processed in sequence. Processing of the next data source will not start until processing of the previous one has been completed. When all the data sources of an RFID device have been completed, processing starts with the first one again.

This results in dead times during which the data source must wait until it is assigned to the hardware again (shown in the diagram below by the arrows in broken lines).

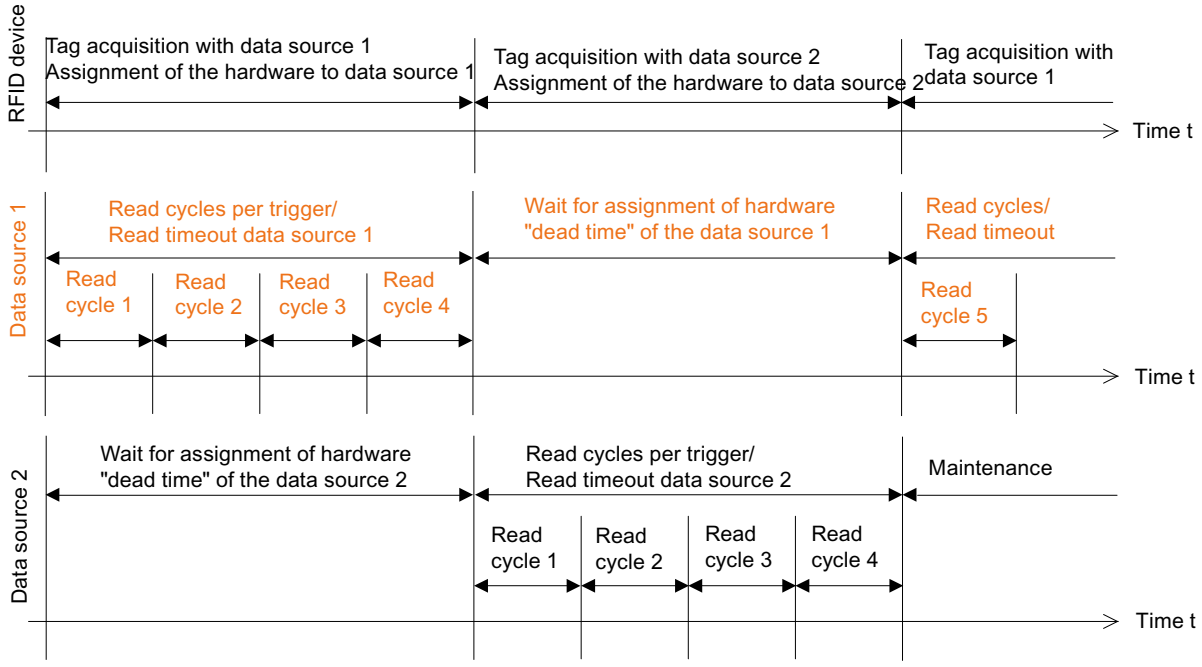


Figure 3-4 Acquisition of tags with two data sources on one RFID device

Note

The total time of a cycle for an RFID device is therefore always the sum of the times of the individual data sources.

tcycle RFID device = t Cycle Data Source 1 + t Cycle Data Source 2 +...

Note

Each data source has a dead time during which it must wait for assignment of the hardware and which comprises the sum of the cycle times of the remaining data sources.

Other influences on the acquisition times

Apart from the points already mentioned, other factors influence the acquisition times of tags. Many of these are specific to the selected tag protocol.

For example, the communication method selected for the EPC Class 1 Gen 2 protocol affects the speed at which tags can be read. If there are a large number of tags in the field, the parameter Initial-Q has a significant influence in the case of EPC Class 1 Gen 2 protocol.

Factors such as frequency hopping or antenna switching can also result in longer delay times in the response of the hardware.

To optimize these parameters settings, extensive knowledge of the respective protocol is necessary which exceeds the scope of this documentation. Further details can be found in the relevant specifications (see References).

3.4.4.3 Smoothing / event generation

Acquisition cycle of a data source

Before we consider setting the times for smoothing, it should be explained what is understood under the term "smoothing".

At the end of every read cycle, the data acquisition supplies the information "Tag detected" or "Tag not detected" for every tag. This quickly results in an extremely large volume of data. The diagram below shows the poll cycle of a data source with the parameterization of 10 read cycles per trigger. An X within a read cycle represents the status "Tag detected in field", an empty read cycle represents the status "No tag in field" or "Tag not detected". In the scenario depicted in this diagram, the information "Tag X detected" was generated seven times.

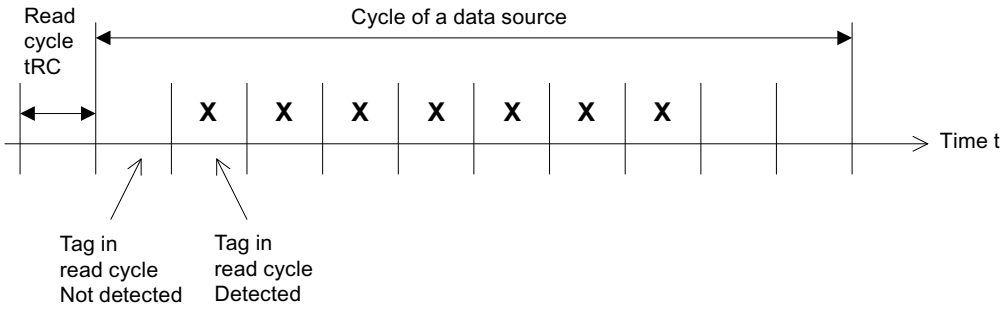


Figure 3-5 Information supplied regarding RFID tags for each read cycle

Reducing the data avalanche

Smoothing

A flood of information of this type is usually undesirable. It is important to know when the status of a tag changes, i.e. when a tag has been newly detected or can no longer be detected.

Smoothing reduces the volume of data in this manner. This subsystem notes the information about the status of every tag and updates this status information at the end of every read cycle.

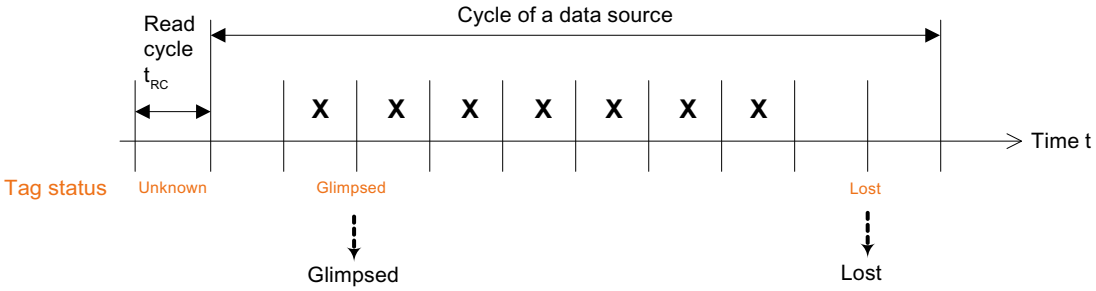


Figure 3-6 Reducing the volume of data through tag events

Tag events

Events are generated in accordance with the change in status. The following diagram shows the scenario from the figure above again. Without smoothing, the information "Tag detected" would be supplied seven times. If information is only supplied now concerning the transition of a tag from "previously unknown" to "the tag is now detected" and from "was still detected in the last read cycle" to "tag is no longer detected", only two events will be generated now.

The initial status of a tag "not yet detected" is termed "Unknown". The status "seen in current cycle" is termed "Glimpsed" and the status "no longer visible, but was seen previously" is termed "Lost".

The data source must manage the status information of every tag separately so that the events can be generated for each tag as shown in the diagram below.

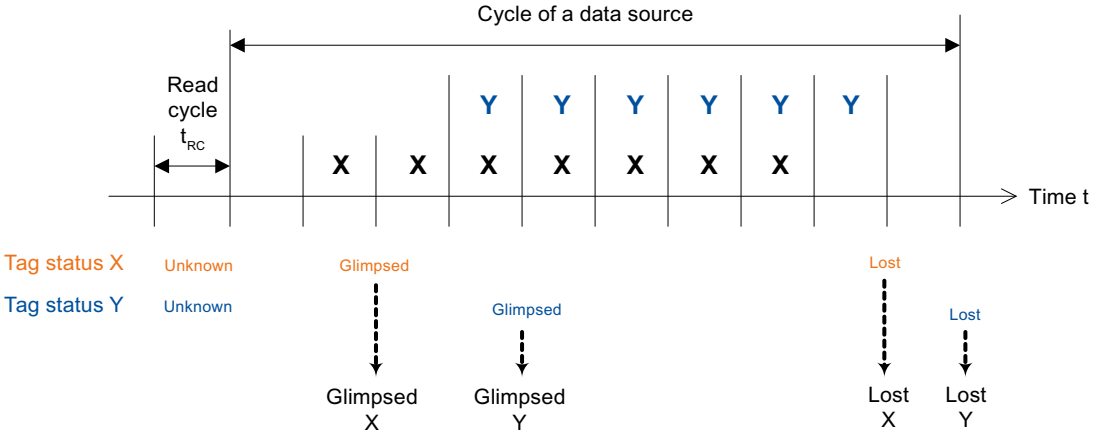


Figure 3-7 Tag events for more than one tag

Real RFID tags - not always visible

Gaps in the read cycle

When working with RFID tags, due to the properties of electromagnetic fields and the objects to be identified, it cannot unfortunately be guaranteed that all tags in the field will actually be detected in every read cycle. Gaps can often occur in which a tag is not detected. If countermeasures are not implemented, tag events are generated as shown in the diagram below.

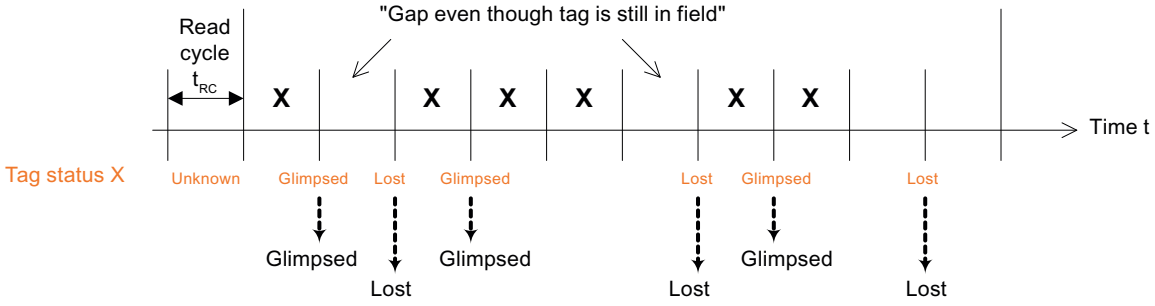


Figure 3-8 Tag events during acquisition of real tags

Observed status

To prevent Glimpsed and Lost events from being continuously generated, an additional status of "Observed" in the context of "detected continuously over the long-term" has been defined. Also, some timeout and threshold values have been included that can be used to eliminate short-term gaps in the acquisition.

The diagram below shows the new "Observed" status that will only occur after a certain time has elapsed (after the threshold for Observed status) and also shows that this status will only be exited when a certain time span - the Observed timeout - has elapsed since a tag was seen for the last time (Observed Timeout 3 in the diagram below).

If the tag is detected again at the end of a read cycle, the Observed timeout will be started again (transition from Observed Timeout 1 to 2 and from 2 to 3 in the diagram below).

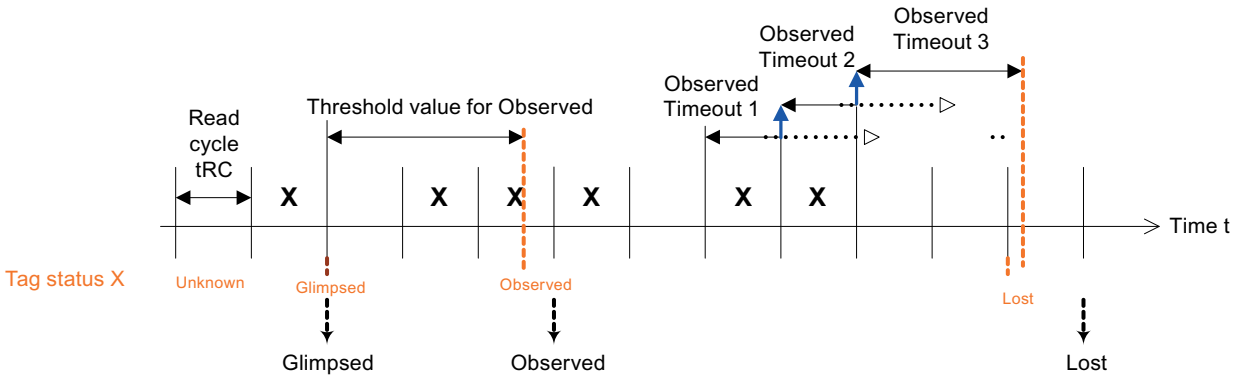


Figure 3-9 Elimination of "temporary failures" in tag acquisition

NOTICE
To smooth out "temporary failures", the Observed timeout must always be longer than a read cycle. A length of at least two read cycles is recommended.

When is a tag "Glimpsed" and when is it "Observed"?

By setting the Observed timeout, temporary "gaps" in tag acquisition can be eliminated as shown in the diagram above. But how can we handle the brief flickering of a tag?

Threshold for Observed status

The threshold for Observed status is used to specify the interval between initial detection of a tag and changeover to Observed status. This change in status is independent of the current acquisition status. This would however mean that the Observed status could be caused by a brief flicker of a tag (see left of diagram below) as well as by continuous detection of a tag (see right of diagram below).

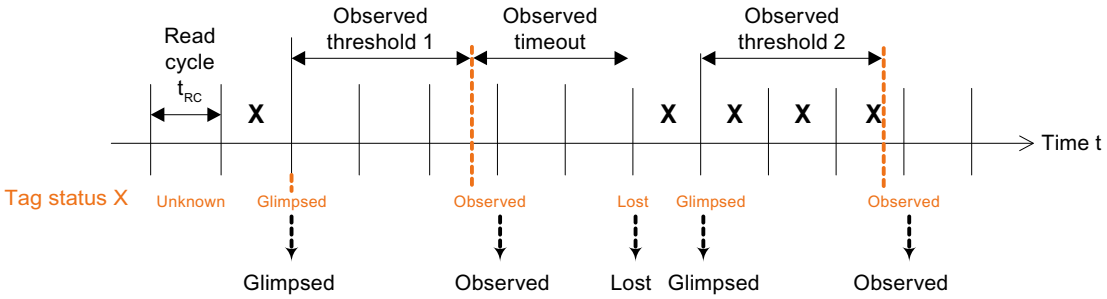


Figure 3-10 Brief "flickering" of a tag without a Glimpsed timeout

Glimpsed timeout

In most cases, however, a distinction has to be made between these two scenarios so that temporary interference can be suppressed. Another time constant, the Glimpsed timeout, exists for this purpose that is always reactivated when a tag was last detected in the Glimpsed status.

If the Glimpsed timeout elapses, the status of the tag changes again from Glimpsed to Unknown (see Glimpsed Timeout 1 in Figure a) and an Unknown event is triggered.

Every time the tag is detected at the end of a read cycle, the Glimpsed timeout is restarted (cf. Figure a, Glimpsed Timeout 2 to 3, 3 to 4). The Unknown event will not be triggered until the Glimpsed timeout has elapsed (cf. Figure a, Glimpsed Timeout 4).

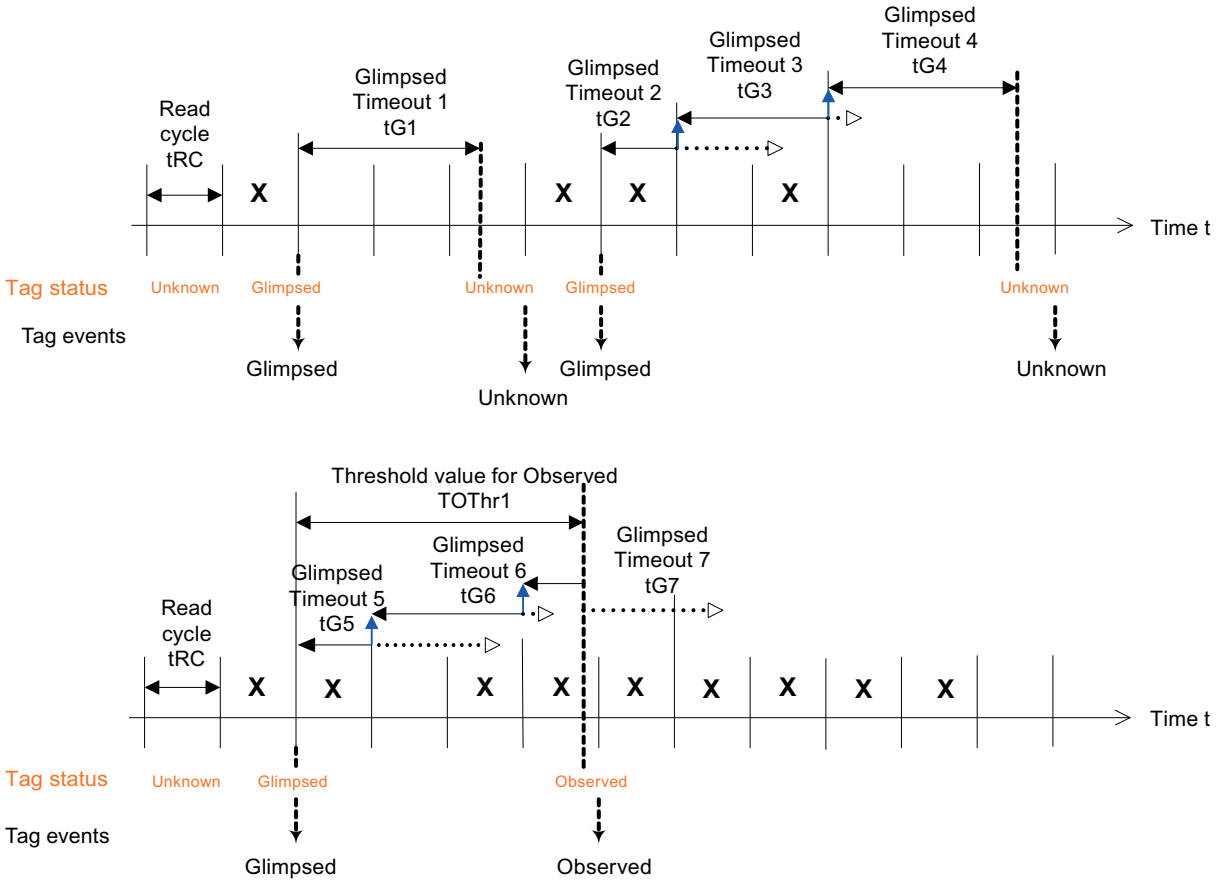


Figure 3-11 Transitions from Glimpsed status to Observed or Unknown

Figure b above shows the relation between the Glimpsed timeout and the threshold for Observed status. The Glimpsed timeout is only taken into consideration until the threshold for Observed status elapses. When the threshold for Observed elapses, the tag switches to Observed status and can then no longer return to Unknown status.

In other words, the Observed threshold can also be interpreted as an interval during which Glimpsed timeout monitoring takes place.

Note

We have already seen that a Glimpsed timeout is only appropriate if it has a lower value than the threshold for Observed status. Otherwise, a transition to Observed status will always occur and the qualitative distinction between Glimpsed and Observed is lost.

Note

Furthermore, the Glimpsed timeout must always be larger than the duration of the read cycle. If the Glimpsed timeout is smaller than a read cycle, the Glimpsed timeout can never be reset as a result of the tag being read again.

Note

To obtain an appropriate qualitative distinction between the Glimpsed and Observed states, the threshold for Observed must comprise at least two read cycles.

Note

If a distinction between Glimpsed and Observed is not necessary, the threshold for Observed status can also be set to 0. An Observed event will then be generated simultaneously with every Glimpsed event.

What if a tag disappears again?

Purged event

To round off the status model for smoothing, we must consider what happens after a tag enters the Lost state. As can be seen from the following diagram, the Lost timeout starts when the Lost state is entered. When the Lost timeout expires without the tag having been seen again, the tag returns to Unknown status whereby a Purged event is triggered (see Lost Timeout 1 in the diagram below).

This is used to detect whether Unknown status was achieved from Glimpsed status or Lost status.

If the tag is seen again before the Lost timeout elapses, it transfers directly to Glimpsed status and the Purged event is not created (see Lost Timeout 2 in the diagram below).

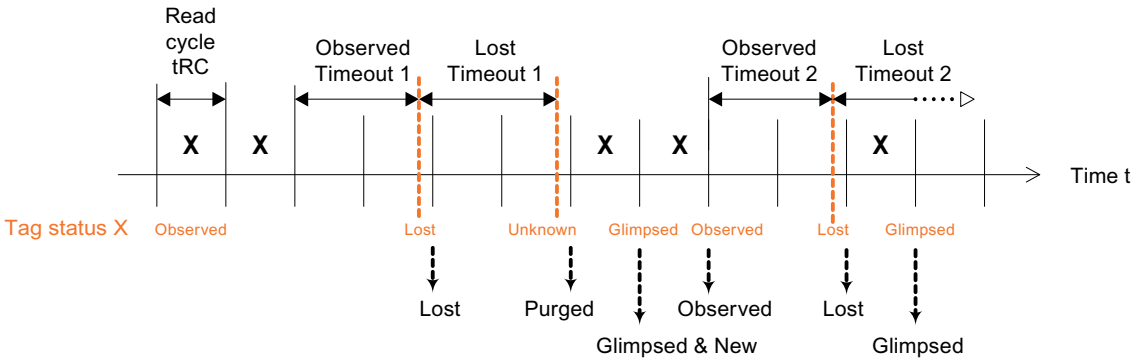


Figure 3-12 Transitions from Lost status to Glimpsed status or Unknown

Overview of all tag statuses and events

In a similar manner to the distinction between Unknown status having been achieved from Glimpsed (Unknown event) or from Lost (Purged event), a distinction is also made concerning entering Glimpsed status.

A Glimpsed event will always be triggered regardless of the state from which Glimpsed status was entered. If the transition takes place from Unknown status, a New event will also be generated.

Tag status, tag events and tag times

To conclude this topic, let us summarize all the states, events and times. The following the graphic illustrates the four states of a tag: Unknown, Glimpsed, Observed and Lost. The possible transitions are indicated by arrows, whereby the time condition for the status transition is shown in square brackets in each case and the event triggered on status change is shown with an arrow.

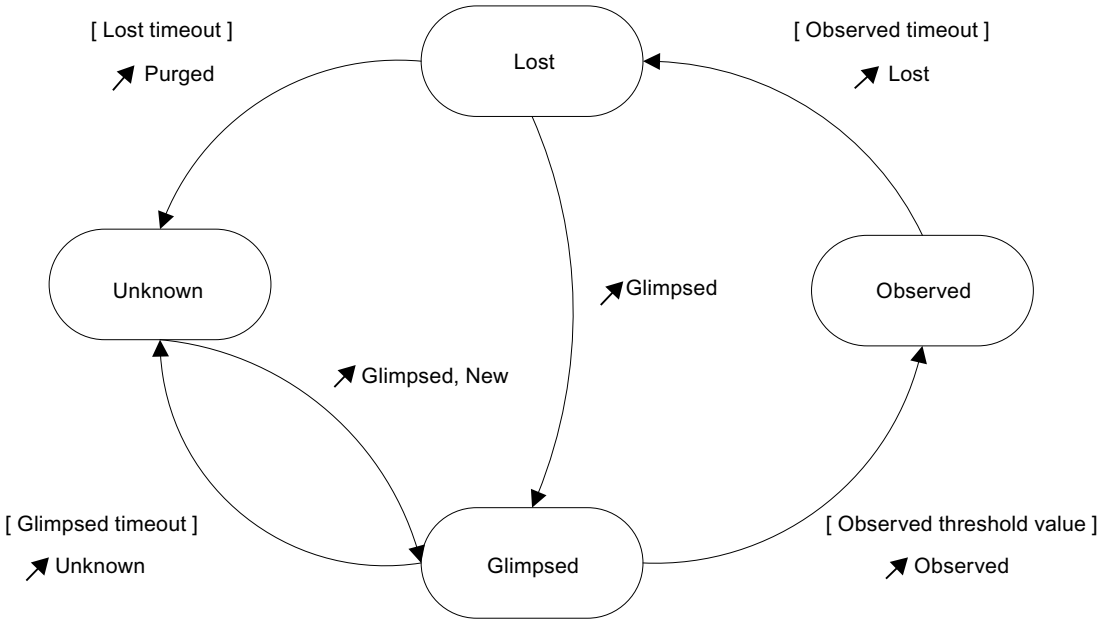


Figure 3-13 Status transitions, events and times for tags

All the specified times for timeouts and thresholds can be configured in RF-MANAGER for the RFID device in Source > Smoothing.

More than one data source per RFID device on smoothing

As already explained above, several data sources on one RFID device can only be processed sequentially (see the diagram below).

When other data sources are being acquired, a data source is unable to process read cycles and to detect new tag states.

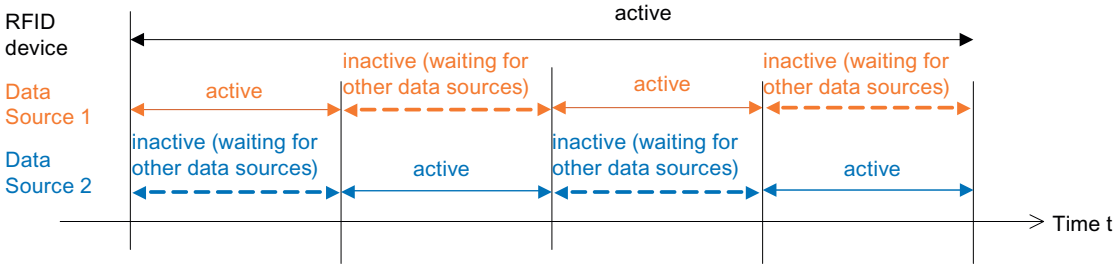


Figure 3-14 Activity and wait states of more than one data source on an RFID device

Despite this, all the time values such as the threshold for Observed continue to run as well as all timeouts. This must be taken into account when the time values are specified, otherwise smoothing would only function when a data source was currently active and it would deliver "false" states when this data source was inactive.

Note

When more than one data source exists for a device, the times for smoothing must be selected such that they always take into account the inactive time of a data source.

Does the trigger of the data source have any effect?

The short answer to this question is yes.

For a more detailed answer, we must consider again what actually happens in the smoothing system: The status of each individual tag is managed and updated at the end of every read cycle depending on whether a tag has been detected or not.

This, of course, will only work as long as the smoothing stage of the data source receives new information from the executed read cycles. As soon as data acquisition stops, the status model will become out-of-date and therefore invalid.

As long as the data source is continuously triggered, there will not be a problem, because the status of the tags will always be up-to-date. In other scenarios, however, it may only be necessary to acquire data when a light barrier is triggered, so a trigger need only be configured on the I/O edge.

If you are only interested in whether a specific tag is present, the duration of the poll cycle or the number of read cycles can be relatively small. If, however, you not only want to detect the appearance of the tag but also its disappearance, you must ensure that the read timeout and the number of read cycles per trigger are not selected too small so that the status model for the tags is executed correctly.

The number of read cycles that must be executed so that all states can be appropriately acquired depends on the one hand on the speed at which the tags move through the field and on the other hand on how the acquisition time of the data source is specified using parameters such as the read timeout.

3.4.4.4 Who do I let know?

The notification channel

Function

After the data has been acquired and the volume of information has been reduced to an amount that can be reasonably processed by smoothing, the remaining events are transferred to the notification channel.

Here, depending on the settings of the data selector, tag events will be filtered out if the associated event filter is not selected. The default setting here is that only events of the types Observed and Lost will be processed further.

All the events that occur that are not filtered out are stored temporarily in a notification buffer. When the trigger for the notification channel is activated, the current contents of the notification buffer is transferred.

In contrast to the smoothing stage of the data source, triggering of the notification channel is not critical because the data is internally buffered and no states have to be updated.

Despite this, the notification channel manages a status to determine whether new tags have arrived or active tags have disappeared. Correct functioning of this management requires that:

Note

At least one of the event filters New, Glimpsed and Observed and one of the event filters Lost, Unknown and Purged must be active for all reports to function correctly.

3.4.4.5 XML interface

The XML interface is the connection between the reader-internal functional units and the external application. The data of the notification channel are summarized in reports and sent to an external application that has logged on to this reader. Mechanisms with response acknowledgment are available to ensure secure data transmission.

XML commands

In addition to automatically providing tag data or reader messages, XML commands are available to an external application, e.g. to send explicit read commands to the reader. These additional read commands can affect the timing behavior of the automatic tag detection due to the processing times resulting from the data sources.

3.4.4.6 Conclusion

With the creation of reports and their transfer to external applications, the journey of the tag data through the RFID device ends. The acquired and filtered data leave the system and disappear from its sphere of influence.

For further information on the subject of optimization of tag acquisition, see the following literature: (available at http://www.epcglobalinc.org/standards)

- /EPC_RP/ EPCglobal. Reader Protocol Standard 1.1, Ratified Standard, June 21, 2006.
- /EPC_RM/ EPCglobal. Reader Management 1.0. Ratified Standard, December 05, 2006.
- /EPC_ALE/ EPCglobal. The Application Level Events (ALE) Specification, Version 1.0. Ratified Specification, September 15, 2005.
- /EPC_TD/ EPCglobal. EPC Generation 1 Tag Data Standards Version 1.3 Ratified Specification, March 8, 2006.
- /EPC_TDT/ EPCglobal. Tag Data Translation (TDT) 1.0. Ratified Standard, January 21, 2006.

Working with RF-MANAGER Basic 4

4.1 RF-MANAGER Engineering System

RF-MANAGER Basic is the software for future oriented RFID concepts using easy and efficient engineering.

To start RF-MANAGER Basic, either click the desktop icon on the programming device or select it from the Windows Start menu.

In RF-MANAGER Basic, you can only ever have one project open. Start RF-MANAGER Basic more than once to work on several projects simultaneously.

4.1.1 Program desktop

4.1.1.1 Desktop elements

Introduction

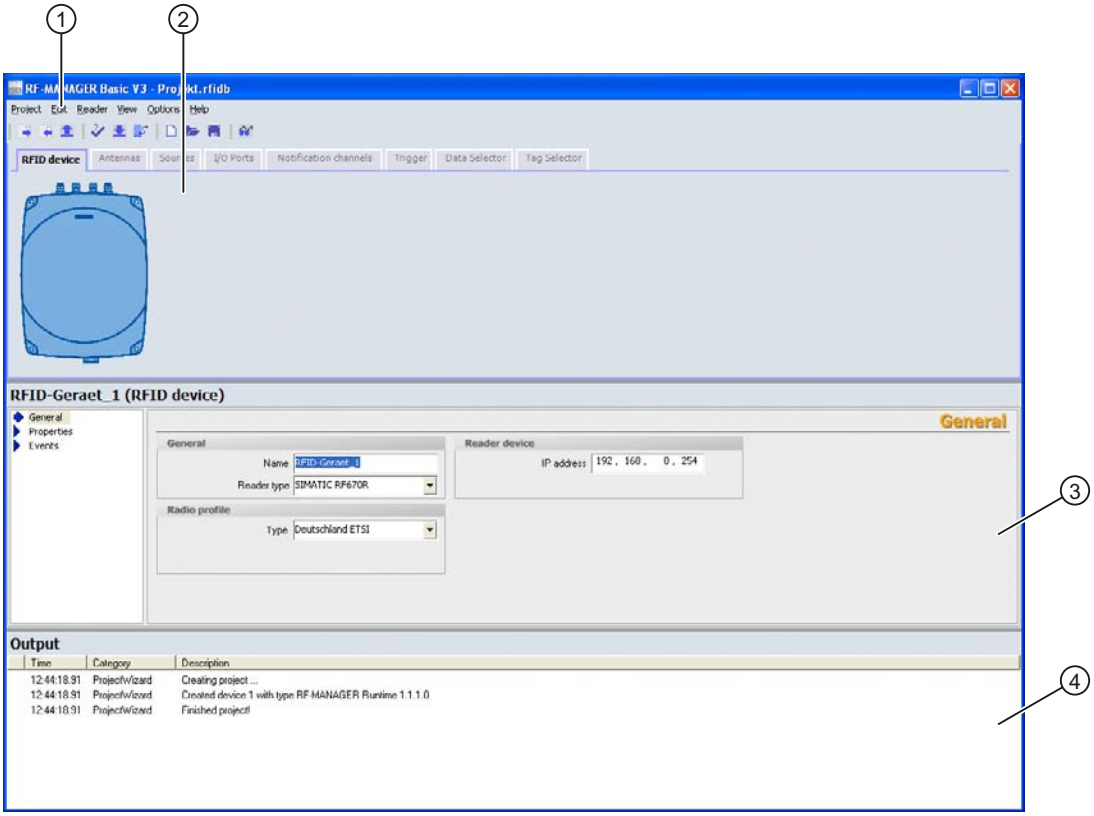
The working environment of the RF-MANAGER Basic comprises several elements. Some of the elements are linked to specific editors which means they are not visible unless the corresponding editor is active.

Elements of RF-MANAGER Basic

You can access all the functions provided by RF-MANAGER Basic by means of its menus and toolbars. When the mouse pointer is moved over a function, a ToolTip appears.

The RF-MANAGER Basic comprises the following elements:

Elements of RF-MANAGER Basic



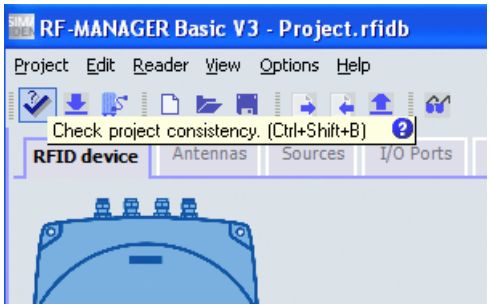
1	Menus and toolbars	The menus and toolbars provide access to all functions you need to configure your reader. When the mouse pointer is moved over a command, the corresponding ToolTip appears.
2	Workplace	Project objects are edited in the workplace. All RF-MANAGER elements are arranged on the borders of the workplace.
3	Property view	The property view is used to edit object properties, e.g. the performance settings of antennas.
4	Output window	The output window displays system alarms generated, for example, in a project test run.

4.1.1.2 Menus and toolbars

Introduction

The menus and toolbars provide access to all functions you need to configure your reader. When the corresponding editor is activated, menu commands and toolbars specific to that editor appear.

When the mouse pointer is moved over a command, the corresponding ToolTip appears.



Menus

The following menus are available in RF-MANAGER Basic:

Menu	Short description
Project	Contains commands for project management.
Edit	Contains commands for clipboard functions.
Readers	Contains commands to configure the reader, such as "Configure Reader", "Transfer to Reader", etc.
View	Contains functions to start the reader's diagnosis view.
Extras	Contains commands to change the RF-MANAGER Basic interface language.
Help	Contains commands for calling help functions.

The availability of the menus and the scope of their commands depend on the respective editor which is used.

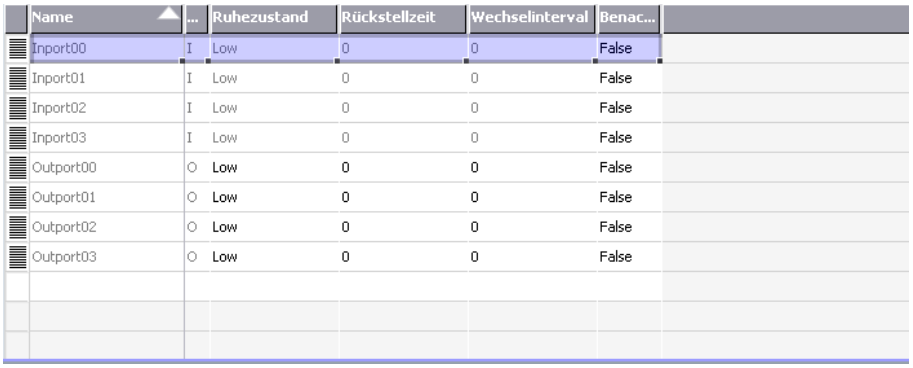
Toolbars

The toolbars provide quick access to important, frequently used functions. You can move each toolbar to suit your purposes.

4.1.1.3 Workplace

Introduction

Project data is processed in the workplace in table form.



Name	...	Ruhezustand	Rückstellzeit	Wechselinterval	Benac...
Inport00	I	Low	0	0	False
Inport01	I	Low	0	0	False
Inport02	I	Low	0	0	False
Inport03	I	Low	0	0	False
Outport00	O	Low	0	0	False
Outport01	O	Low	0	0	False
Outport02	O	Low	0	0	False
Outport03	O	Low	0	0	False

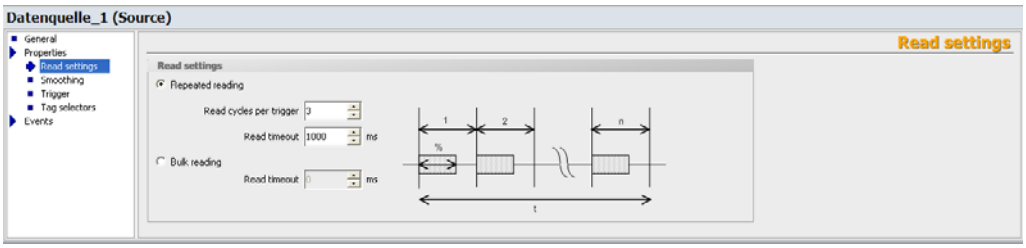
Description

Each component of the reader is opened in a separate tab on the workplace. There is only one tab active at a time. To change to a different reader component, click the corresponding tab.

4.1.1.4 Properties view

Introduction

The property view is used to edit the properties of an object selected from the workplace. The content of the property view is based on the selected object.



Description

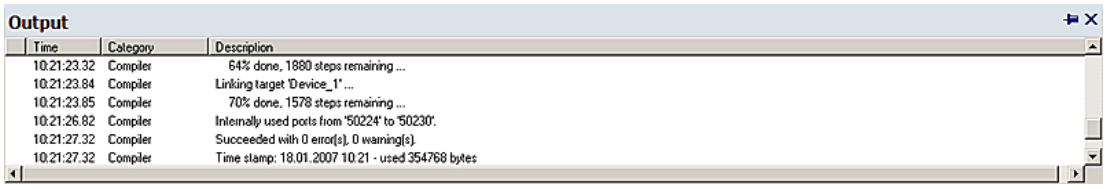
The property view shows the properties of the selected object organized in categories. The changed values take effect directly after exiting from the input field.

If you enter an invalid value, this is highlighted in color and you can correct this input error. QuickInfo provides you with information on the valid value range, for example

4.1.1.5 Output View

Introduction

The output window displays system alarms generated, for example, in a project test run.



Description

The output window normally displays system alarms in the order they occur. The categories define the corresponding RF-MANAGER module which has generated a system alarm. System messages of the "Generator" category are generated, for example, during the consistency check.

To sort system alarms, click the header of the corresponding column. The pop-up menu can be used to jump to an error location or a variable, and copy or delete system alarms.

The output window shows all system alarms of the last action. A new action overwrites all previous system alarms.

4.1.1.6 Input fields

Note

Special characters in input fields of the RF-MANAGER Basic

The following special characters may not be used in the input fields of the RF-MANAGER Basic:
< > & „ " ’

4.1.2 Switching between reader components

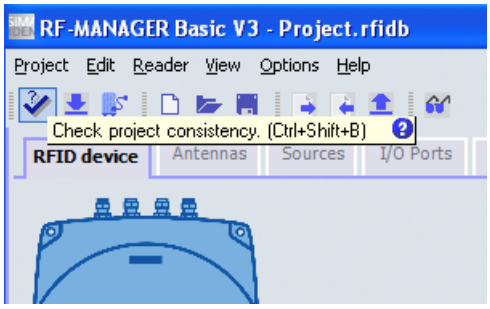
Tabs

To select a different component, click the relevant tab in the workplace. A tab shows the name of the component for easy identification.

4.1.3 Displaying Help

Shortcut help

A tooltip will appear after moving the mouse pointer over any object, icon, or dialog element.



A question mark next to the tooltip indicates that a shortcut help is available for this user interface element. To call up a more detailed explanation in addition to the short description, click on the question mark, press <F1> if the tooltip is activated, or move the mouse cursor to the tooltip.

The explanation includes references which refer users to a detailed description in the Online Help.

Online help

In the "Help" menu you can access the online help. When you use the "Help > Contents" menu command, the RF-MANAGER Basic Information System opens and displays a table of contents. Use the table of contents to navigate to the desired topic.

As an alternative, select the "Help > Index" menu command. The RF-MANAGER Basic Information System opens with an opened index. Use the index to search for the desired topic.

In order to use the full text search throughout the entire RF-MANAGER Basic Information System select the "Help > Search" menu command. The RF-MANAGER Basic Information System opens with an opened search register. Enter the desired search term.

The RF-MANAGER Basic Information System can also be opened via the Start menu in Windows. Select the menu command "Start > SIMATIC > RF-MANAGER Basic V3 > RF-MANAGER Basic V3 Help System" in the taskbar.

The Online Help system is opened in a separate window.

4.2 Working with projects

4.2.1 Basics

4.2.1.1 Configuration data

You can configure a maximum of one reader in an RF-MANAGER project.

A project in RF-MANAGER contains all your configuration data.
Configuration data includes:

- Network address settings
- Performance of the antennas
- Values for filters

All data related to a project is stored in the database integrated in RF-MANAGER.

Opening multiple sessions of an RF-MANAGER project

An RF-MANAGER project should not be opened in multiple sessions. This applies in particular to the opening of projects on network drives.

4.2.1.2 Components of a project

An RF-MANAGER project consists of all the data that the device requires.

The configuration data is compiled in RF-MANAGER according to topic categories. Each category is processed in an individual editor.

If you want to archive the project, it is sufficient to back up the files [ProjectName].rfidb and [ProjectName]_log.ldf. All other files can be created as required.

4.2.2 Multilanguage configuration

Multilingual RF-MANAGER user interface

The language of the user interface in RF-MANAGER can be selected, for example, to suit regional requirements of several engineers of different nationality working with the RF-MANAGER. Languages are selected in:
"Options > Settings > Workbench > User interface language".

Switching the Online Help language

If the Online Help system crashes when changing languages, check the version of the "hhctrl.ocx" file in the "system32" subdirectory of the installation directory of the operating system. If the file version is older than V5.2.3735.0, download a newer version from "http://msdn.microsoft.com/library".

4.2.3 Editing an existing project

If projects were created with a previous version of the RF-MANAGER Basic, these can be further edited following automatic conversion with the RF-MANAGER Basic. You will find more detailed information in the section "Converting projects (Page 73)".

4.2.4 Creating a project

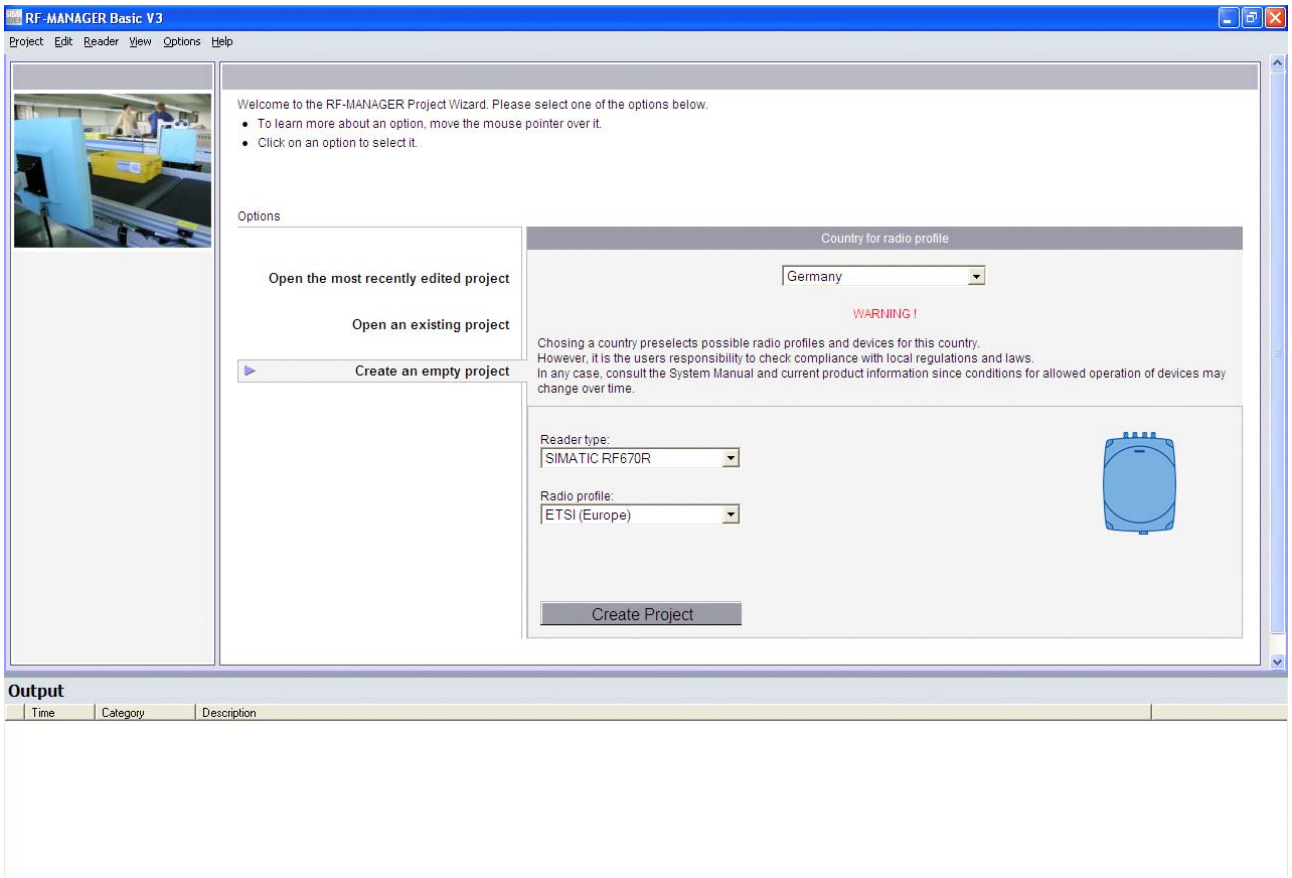
4.2.4.1 Introduction

The following chapters describe the procedure in detail for creating a new RF-MANAGER project.

4.2.4.2 Create a project

After you have started the RF-MANAGER Basic, you can select the following options:

- Open the most recently edited project
- Open an existing project
- Create an empty project



If you create a new empty project, select the relevant project data from the following drop-down lists:

- Country in which the system will be operated
- Reader type, e.g. SIMATIC RF640R or RF670R
- Wireless profile, e.g. ETSI (Europe)

4.2.4.3 Requirements for operating a project with a reader

Overview

If you want to operate a project with a reader, the following requirements must be fulfilled:

- At least one reader is connected to the PC.
- The reader must have communications capability.

Connecting stationary readers and assigning parameters

You have the following options for connecting a reader of the RF600 series to your parameterization computer via Ethernet:

- Ethernet connection (10/100 Mbit/s) via RJ45 cable, either over an Ethernet network (connection via hubs or switches) or as a point-to-point link using a crosslink cable directly between a PC and a reader.

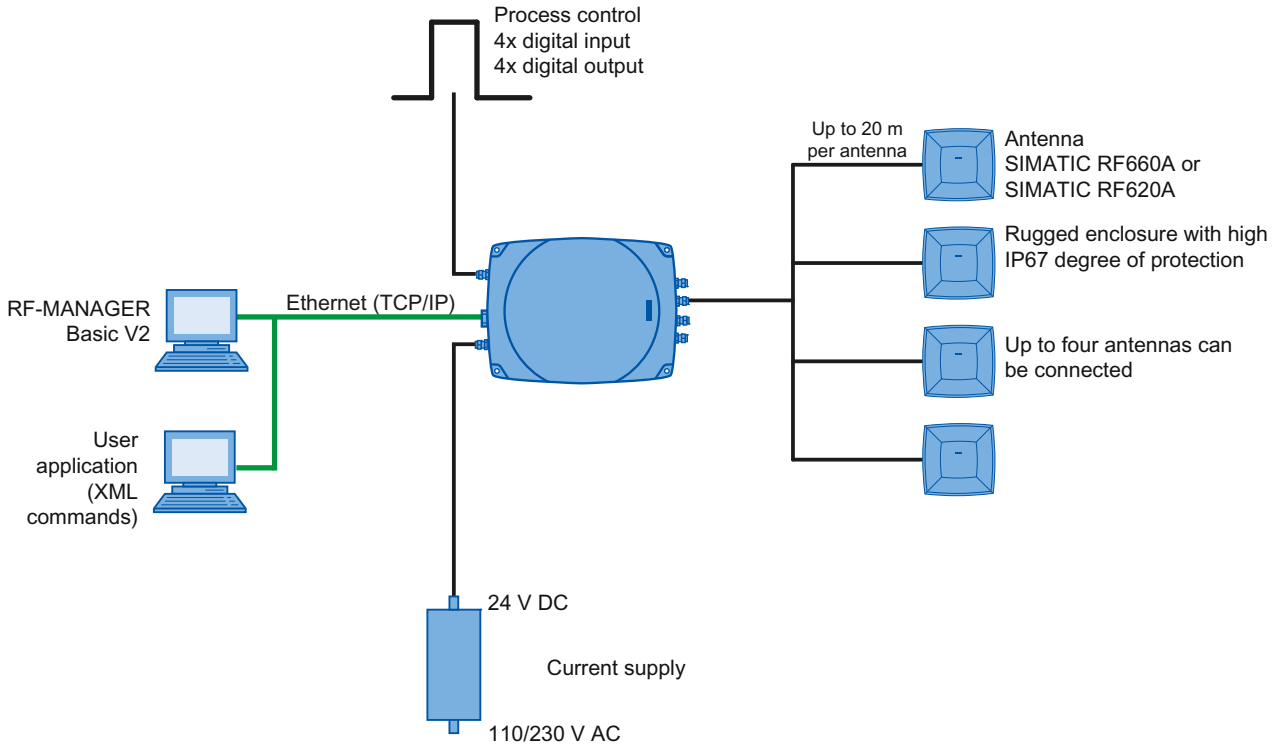


Figure 4-1 Overview of configuration of the RF670R reader

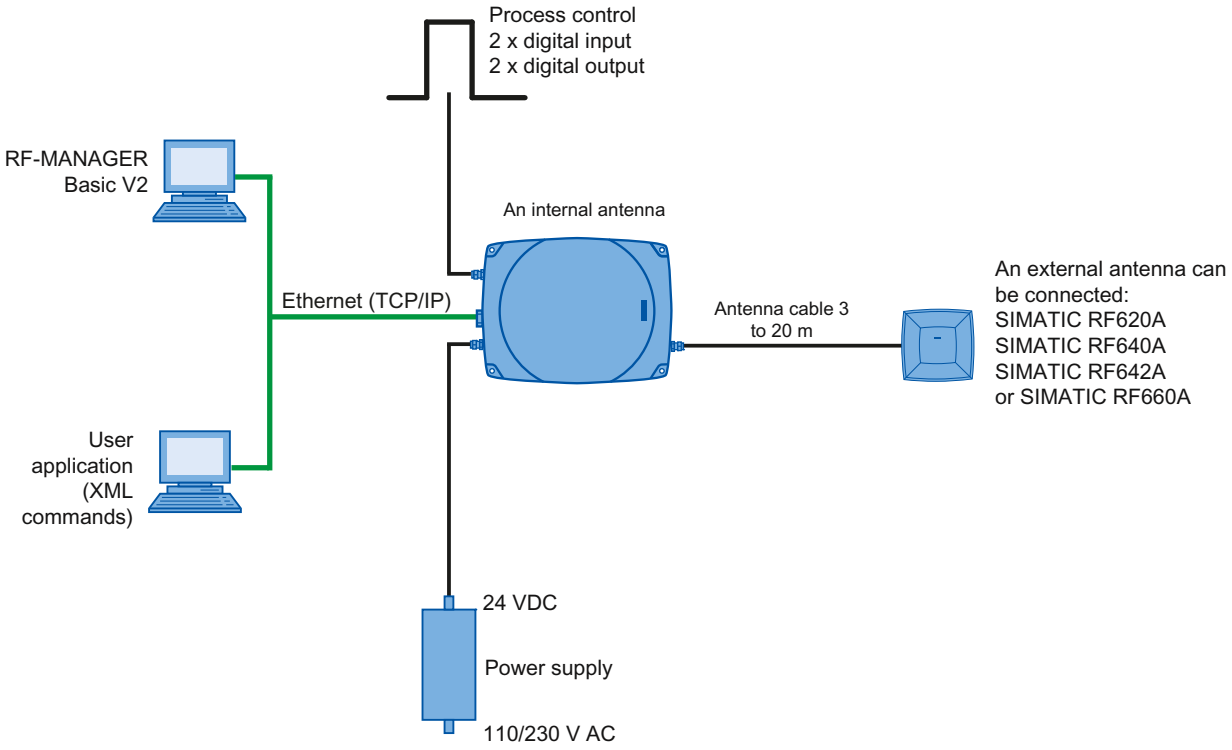


Figure 4-2 Overview of the RF640R reader configuration

Connecting the stationary reader to the parameterization computer over Ethernet

Procedure	
1	Disconnect the reader from the power supply.
2	Connect the Ethernet interface of the reader to the hub/switch to which your parameterization computer is also connected over an RJ45 cable. It is strongly advised that you use the accessory cables approved by Siemens for each reader. When using RJ45 cables from other manufacturers, there is a risk that the cable will be difficult to remove from the socket of the reader. For PnP connections, a crosslink cable **must** be used if the network card in the PC does not support autocrossover.
3	Connect the reader to the power supply.

Providing the reader with communications capability

1. In the "Reader" menu, select the command "Set Reader IP Address".
2. If the reader has not been pre-parameterized, use the Start Discovery button to activate the automatic reader search function in the application.

   All readers connected via Ethernet will be shown in the list.

   Note that the network card you have used to connect the reader is selected under the network address.

   Note

   All RF670 readers with version AX are only displayed if they are located in the same subnet.

   All RF640R and RF670R readers as of version BX are displayed even if they are not located in the same subnet.

3. Select the desired reader.

4. Click the button "Use Reader Address" to adopt the IP address in the "IP Settings".
5. In the "IP Settings" menu, you can now set new Ethernet parameters for the reader. These include:
   - The IP address,
   - The subnet mask
   - The IP address of the gateway

   Click the "Set Reader IP Address" button to transfer the new settings to the reader. Alternatively, DHCP can also be set.

NOTICE
Reader cannot be found Make sure that the DHCP server is running and the reader is entered in the list. Otherwise RF-MANAGER Basic will be unable to establish a connection to the reader. If a reader is operating in DHCP mode and there is no DHCP server, the reader can neither be found nor displayed using the "Start Discovery" button. Before the reader can be addressed, it must be reset to the default settings. See also section "Use of DHCP (Dynamic Host Configuration Protocol) (Page 67)".

NOTICE
Deactivate firewall If you want to parameterize a reader of the RF600 family over Ethernet, deactivate your firewall before communication starts between the parameterization computer and the reader. Otherwise, it may not be possible to connect.

NOTICE
Avoid simultaneous Ethernet access to readers The applications RF-Manager Basic and RF-Manager 2008 cannot simultaneously access the same reader of the RF600 family via Ethernet. Only start applications that are currently required. Make sure that all RF-Manager 2008 Runtime components are deactivated.

Note

For more information on DHCP

See section "Use of DHCP (Dynamic Host Configuration Protocol) (Page 67)".

Use of DHCP (Dynamic Host Configuration Protocol)

Introduction

A DHCP server ensures that IP addresses are automatically assigned to DHCP-capable network clients in a network segment. The DHCP server uses the MAC address of the network client for this purpose. The IP addresses are assigned due to permanent assignment of a MAC address to an IP address. The readers of the RF600 family with Ethernet connection are DHCP-capable.
Mechanisms that extend beyond this, such as dynamic assignment of IP addresses or Domain Name Service (DNS), are not supported.

Requirements for activating DHCP

A DHCP server must be present in the network segment.

An up-to-date list of permanent assignments between MAC addresses and IP addresses must be stored in the DHCP server. This list must be maintained by your responsible IT staff member.

You will find the MAC addresses of readers:

- on the enclosure next to the RJ45 socket

Note

Ensure that the DHCP server is running and the reader is entered in the list. Otherwise RF-MANAGER Basic will be unable to establish a connection to the reader following activation.

Enabling DHCP

The RF600 reader can be switched over to DHCP mode using the Configure Reader menu item in RF-MANAGER Basic.

Procedure

1. Connect the reader that should be switched over to DHCP mode to the parameterization computer via the Ethernet interface.
2. In the "Reader" menu, select the command "Configure Reader" and click the "DHCP" option to enable it.

   The DHCP mode is activated for the selected reader.
3. Click the "Set Reader IP Address" button.

   The new settings are transferred to the reader.
4. Disconnect the Ethernet connection between the reader and the parameterization computer again.

Disabling DHCP

The DHCP mode can be disabled for the RF600 reader using the Configure Reader menu item in RF-MANAGER Basic.

Procedure

1. Connect the reader for which DHCP mode should be disabled to the parameterization computer via the Ethernet interface.
2. In the "Reader" menu, select the "Configure Reader" command and click the "DHCP" option to disable it.

   The DHCP mode is deactivated for the selected reader.
3. Click the "Set Reader IP Address" button.

   The new settings are transferred to the reader.
4. Disconnect the Ethernet connection between the reader and the parameterization computer again.

Restoring default settings on a DHCP reader

If DHCP is activated on a reader but no DHCP server is available, no connection can be made to that reader because it does not have an IP address.

Procedure

To assign the reader a new unambiguous IP address, proceed as follows:

1. Disconnect the affected reader from the network and connect it point-to-point with the configuration computer.
2. In the "Reader" menu, select the command "Set Reader IP Address".
3. Click the "Reset DHCP Readers" button.

   The reader is reset to the default IP address and DHCP is deactivated.

4. Assign a new unique IP address to the reader.
5. Disconnect the reader from the parameterization computer and reconnect it to the network.

Note

Several readers with identical IP address

It is recommended that the affected reader is disconnected from the network and connected point-to-point with the configuration computer.

If the reader remains in the network, all DHCP readers in the network are restored to their default settings and thus have identical IP addresses, because the "Reset DHCP Readers" button works on all DHCP readers in the network simultaneously.

You must then disconnect all DHCP readers from the network, connect each point-to-point with the configuration computer, and successively assign each DHCP reader an unambiguous new IP address.

Result

The reader has an unambiguous IP address and can be addressed via the network, e.g. to make settings.

Resetting to the reader to the default settings

If a reader has an unknown network configuration and can no longer be located, it is possible to reset the reader to its basic settings.

Procedure

To assign the default IP address to the reader, follow the steps below:

1. Disconnect the relevant reader from the network and connect it point-to-point with the configuration computer.
2. In the "Reader" menu, select the command "Set Reader IP Address".
3. Click the "Reset RF600" button.

   The reader is reset to the default IP address and DHCP is deactivated.

4. Assign a new unique IP address to the reader.
5. Disconnect the reader from the configuration computer and reconnect it to the network.

NOTICE
Several readers with identical IP address It is advisable to disconnect the relevant reader from the network and to connected it point-to-point with the configuration computer before you click the "Reset RF600". If the reader remains in the network, all readers in the network are reset to their default settings and therefore have identical IP addresses, because the "Reset RF600" button applies to all readers in the network. To avoid this, disconnect all readers from the network, connect each one point-to-point with the configuration computer and assign each reader a unique new IP address one after the other.

Result

The reader has a unique IP address and can be addressed via the network, e.g. to make settings.

4.2.5 Project organization

4.2.5.1 Save project

Changes made in a project are only accepted after you save these. If the project is closed without saving it, any changes made are discarded. A warning appears in this case.

When a project is saved, all changes are written to the project file. The project file is stored in the Windows file system with the extension "*.rfidb".

The storage time is dependent on the duration of configuration. To keep the storage time down, save your project at regular intervals.

Procedure

1. Select the "Save" command in the "Project" menu to save the project.

   When the project is saved for the first time, the "Save as" dialog opens.
2. Select a drive and directory and then enter a name for the project.

Alternative procedure

1. Select the "Save as" command in the "Project" menu to save the project under a new name.
2. Select a drive and directory and then enter a name for the project.

Result

The project is saved as a *.rfidb file.

4.2.5.2 Exit project

When you have finished processing a project and have saved the changes, you can close the project. You can also close the project without saving your changes if you want to reject the changes. A warning will then appear that prompts you to save the project.

Procedure

1. Select the "Exit" command in the "Project" menu to close the project.

   If you have not saved your changes, a warning appears.

Result

The project is closed and the RF-Manager is ended.

4.2.5.3 Open project

You can store the project files of RF-MANAGER in a directory of your choice. Project files of the RF-MANAGER Basic have the file extension "*.rfidb". To process an existing project, open the corresponding file:

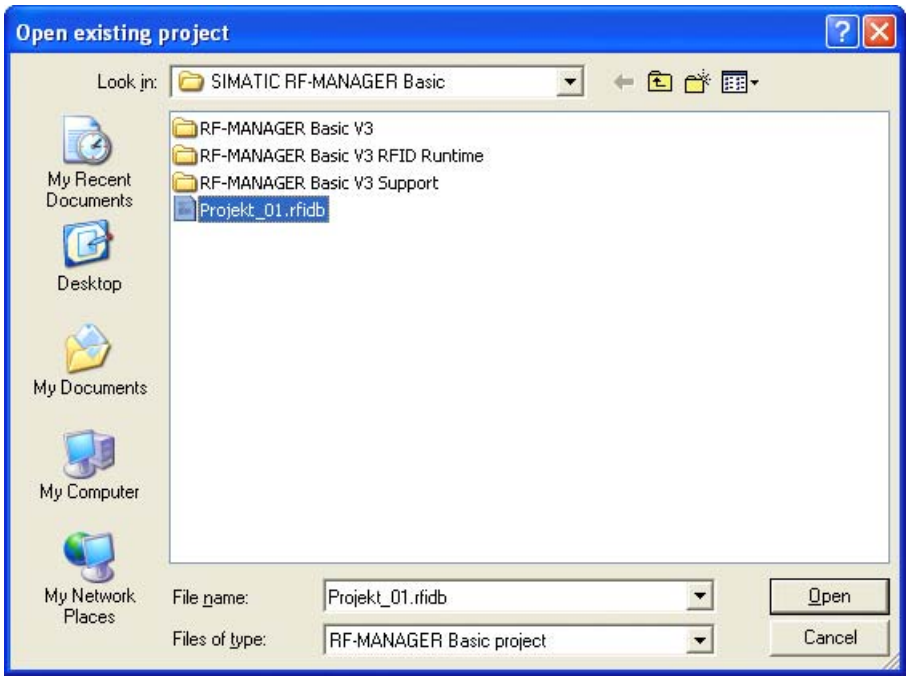
In RF-MANAGER, you can only have one project open. You must start RF-MANAGER Basic again for each additional project that want to edit at the same time.

If you open an existing project, a project that is already open will be automatically closed.

Procedure

1. Select the "Open" command from the "Project" menu.

   The "Open an existing project" dialog box opens.



2. Define the path under which the project is saved.
3. Select the project.

   Projects have the file extension "*.rfidb".
4. Click on the "Open" button.

   The Project View opens.

4.2.5.4 Managing projects in Windows Explorer

Introduction

When a project is saved, RF-MANAGER creates a project database on the hard disk. The project database is stored in the Windows file system with the extension "*.rfidb". A log file (*._log.ldf) is stored for each project database. The consistency of the data cannot be guaranteed without this log file.

The project database can be moved, copied and deleted together with the corresponding log file in the Windows Explorer, as you are used to with other files. However, ensure that the database and the log file are not separated from each other during copying and moving.

When you generate a project, additional files are created.

Requirement

The project is closed.

Procedure

1. Open Windows Explorer.
2. Execute the required file operation, e.g. move, copy or delete, on the project database.

Note

The "SQL Server IIDEXPRESS" manages all objects in RF-MANAGER during configuration. When a project is closed, it is possible that the objects are still being referenced by the "SQL Server IIDEXPRESS". If a project database cannot be moved, copied or deleted although the project is closed, you will need to stop the "SQL Server IIDEXPRESS".

To do this open "Manage" by right-clicking on "My Computer" in Windows Explorer. Under the "Services and Applications" tab on the left-hand side of the window that opens, select "Services". On the right-hand side, select the service "SQL Server IIDEXPRESS" and then select "Stop" from the options that appear on the left. The "SQL Server IIDEXPRESS" needs to be restarted after you copy, delete or move the project database.

Filing the project data on the network drive

Network problems appearing at the time you close a RF-MANAGER project you opened directly on a network drive may cause data loss when you close the RF-MANAGER session. If it is necessary to file the projects on a network drive, the projects should be copied to a local drive for editing and then, after closing RF-MANAGER, they can be copied to the network drive again.

4.2.5.5 Converting projects

Projects of different RF-MANAGER Basic versions

Introduction

RF-MANAGER Basic automatically converts projects that were created with an earlier product version of RF-MANAGER Basic to the current version. This functionality enables you to edit projects that were created with an earlier version using the current RF-MANAGER Basic version.

The system automatically converts a project from an earlier version of RF-MANAGER Basic to the current version when the project is opened.

Converting a project to the current RF-MANAGER Basic version

Introduction

RF-MANAGER Basic allows you to convert projects that were created with an earlier product version to the current version.

Due to the extended functionality of the readers, the configured systems require an updated firmware version.

Converting an RF-MANAGER Basic project from an earlier version

When you open a project from an earlier RF-MANAGER Basic version with the current version of RF-MANAGER Basic, the project is automatically converted. A backup copy of the old project is created prior to conversion. The project is automatically saved and defragmented by the system when the conversion is completed. When the project is defragmented, the project data distributed in the database is combined, rearranged and saved. This reduces the project size. If, after saving, you want to work with the original project version later, you have to use the backup copy.

Requirements

- You have a project that was created with an earlier version of RF-MANAGER Basic.
- The current version of RF-MANAGER Basic is open.

Procedure

1. Select the "Open" command from the "Project" menu.

   The "Open" dialog is displayed.

2. Go the storage location in the file system where the project from the earlier RF-MANAGER Basic version is saved and select the project.

   Projects have the file extension "*.rfidb".

3. Click on the "Open" button.

   A warning will appear prompting you to confirm or cancel the conversion.

4. To confirm, click the "OK" button in the warning message.

   The system now saves the backup copy of the project to the same folder and converts it to the current version of RF-MANAGER Basic.

Result

The project has been converted to the current RF-MANAGER Basic version. The readers in these projects should be upgraded to the new firmware version if needed.

4.2.6 Transferring projects

4.2.6.1 Requirements for transfer/back transfer

Before the transfer or back transfer can occur, the relevant reader must be selected.

The following two scenarios are possible:

- The IP address of the reader is known
- The IP address of the reader is not known

The IP address of the reader is known

To select the relevant reader, proceed as follows:

1. In the "Reader" menu, select the command "Set Reader IP Address".

   The "Communication Settings" dialog opens.
2. Enter the IP address of the relevant reader in the "IP address" input box.
3. Click "OK".

The IP address of the reader is not known

To select the relevant reader, proceed as follows:

1. In the "Reader" menu, select the command "Set Reader IP Address".

   The "Communication Settings" dialog opens.
2. Select the network to which the relevant reader is assigned in the "Network Address" box.
3. Click the "Start Discovery" button.

   The application starts its automatic reader search and lists all the readers that can be accessed in the selected network.
4. Select the desired reader from the list.
5. Click the "Use Reader Address" button.

   Enter the IP address of the selected reader in the "IP address" input box.
6. Click "OK".

Result

The reader affected by the transfer/back transfer was selected.

The IP address of this reader is used for each subsequent transfer or back transfer.

4.2.6.2 Back transfer

In a back transfer, the configuration is read out from a reader and imported into RF-MANAGER Basic for further processing.

Requirement

The IP address of the reader affected by the back transfer is shown in the "Communication Settings" dialog in the "IP address" box (see "Requirements for transfer/back transfer (Page 75)").

Procedure

To transfer the configuration from the reader to RF-MANAGER Basic, follow these steps:

1. In the "Reader" menu, select the command "Import Configuration from Reader" or click the button  .

   The "Import Configuration from Reader" dialog opens with the message "This operation will overwrite your existing project".

2. Click the "OK" button.

   The back transfer is started and the configuration is transferred from the reader to the configuration computer.

Result

The output window displays whether the transfer was successful or whether an error has occurred.

After successful transfer, the configuration is in RF-MANAGER Basic and can be edited further there.

4.2.6.3 Export

By selecting Transfer, you can copy the configuration data to the reader using RF-MANAGER Basic.

To transfer the configuration data via the XML interface on the reader using an external user application, you need a configuration file generated by RF-MANAGER Basic.

With the XML command "setConfiguration", you can then transfer this configuration file to the reader using an external user application.

For further information, refer to the SIMATIC RF Function Manual.

Procedure

To create the configuration file, follow these steps:

1. In the "Reader" menu, select the command "Export Configuration" or click the button  .

   The "Save as" Windows dialog is opened.

2. Select a file name and storage location for the file.

   A consistency check is carried out. After a successful consistency check,

   the configuration file is generated and saved.

Note

Consistency check has failed

If the consistency check fails, the export is aborted and an error message is shown in the output window.

Note

File name for export

If you export a file, the project name is assigned as the default file name with the "_export.xml" file extension.

Result

The configuration file is generated and exported to the specified storage location.

With the XML command "setConfiguration", you can transfer this configuration file to the reader via an external user application.

4.2.6.4 Import

With the import function, you can reimport a previously exported configuration file into RF-MANAGER Basic as a project.

Procedure

To import the configuration file, proceed as follows:

1. In the "Reader" menu, select the command "Import Configuration" or click the button .
2. The "Open" dialog is opened in Windows.
3. Select a configuration file in .xml format.
4. Click "Next" to confirm that you really want to import the configuration file. During the import process, you can cancel the process anytime by clicking "Cancel".

Result

You receive a confirmation that the import process has been completed successfully. A new project with the data of your configuration file has been created.

Note that an empty new project is created in the event of a faulty import.

4.2.6.5 Delete

If significant problems occur when starting up the reader, it may be necessary in exceptional cases to delete the current reader configuration.

Requirement

The IP address of the reader involved in the transfer is shown in the "Communication Settings" dialog in the "IP address" box (see "Requirements for transfer/back transfer (Page 75)").

Procedure

To delete the configuration data on the reader, proceed as follows:

1. In the "Reader > Set Reader IP Address" menu, click the "Reset Configuration" button.

Result

The current configuration on the reader is deleted. You can now transfer a new configuration to the reader (see section "Transfer (Page 78)").

4.2.6.6 Transfer

A transfer operation refers to the transfer of configuration data to the reader where the project is to run.

Requirement

The configuration has been completed and the IP address of the reader involved in the transfer is shown in the "Communication Settings" dialog in the "IP address" box (see "Requirements for transfer/back transfer (Page 75)").

Procedure

To transfer configuration data from the configuration computer to the reader, proceed as follows:

1. In the "Reader" menu, select the command "Transfer to Reader" or click the button.

   A consistency check is carried out. After the consistency check is successful, the configuration data is transferred to the reader.

   Note

   Consistency check has failed

   If the consistency check fails, the transfer is canceled and an error message is shown in the output window.

Note

Storing projects

Save your projects locally. If you do not, you will not be able to transfer them to your readers.

An error message will appear if you try to transfer a project from a non-local storage location to a reader. If this happens, restart the RF-MANAGER, reset the configuration and save the project locally.

Result

After successful transfer, the reader begins with the new configuration.

4.2.7 Testing projects

Introduction

During configuration, the data entered is automatically tested for its plausibility.

The plausibility test ensures, for example, that value ranges are maintained and incorrect input is indicated during the configuration phase.

There is no check for faulty configurations during input. The assignment is checked with the "Check consistency" function and displayed as an error.

Perform consistency check

To locate configuration errors, start the consistency test by clicking the "Check consistency" icon or with "Reader > Check consistency". All faulty points in the project are listed in the Output View. Then skip to the cause of fault. Work through the fault list from top to bottom.

4.2.7.1 Troubleshooting

Introduction

After completing the consistency test in the project, the results of the test appear in the Output View. There are three different result categories

- Notes

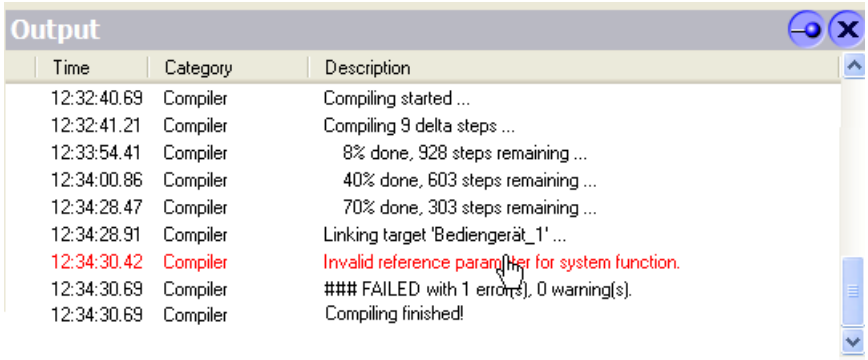
  It is possible that logical links in the project are not correct or not available. Check the logical links of the project in conjunction with the alarms. The generating operation is fully executed.

- Warnings

  The project contains errors that may lead to a restricted operation of the reader. The generating operation is fully executed.

- Error

  Errors must be eliminated so that your data can be fully transferred to your reader. The error number helps to identify the type of error.



You can obtain help on the individual messages by moving the mouse pointer to the relevant message row and pressing <F1>.

Procedure

1. Click the "Check consistency" icon to run the consistency check for the project.

   The configuration data are now verified. Notifications, warnings and faults are shown in the Output View.

2. Double-click an entry in the Output View to access the location in the project which caused the fault.

3. Clear the fault.

Note

Clear the faults in succession because follow-up faults could already have been cleared after clearing a fault.

4.2.7.2 Basic functional test of the reader using SIMATIC RF-MANAGER Basic

Requirements

If problems occur when using the RF600 reader, you can check the general functionality as follows:

- The antenna configuration must be as shown in the figure below.
- The reader is connected to the SIMATIC RF-MANAGER Basic.
- RF-Manager 2008 and RF-Manager 2008 Runtime must not have been started.

Procedure

To check whether the reader can read a tag, proceed as follows:

1. Open the RF-MANAGER Basic.
2. Select the IP address of the reader to be checked (see "Requirements for transfer/back transfer (Page 75)").
3. Hold a tag on an electromagnetically neutral base in the middle in front of the antennas.

NOTICE
As a base use wood or plastic, for example, but definitely do not use any metallic or field-influencing materials.

4. In the "View" menu, select the "Start diagnosis view" command or click the icon.

   The "Diagnosis View" dialog box is opened.
5. Click the "Start" button.

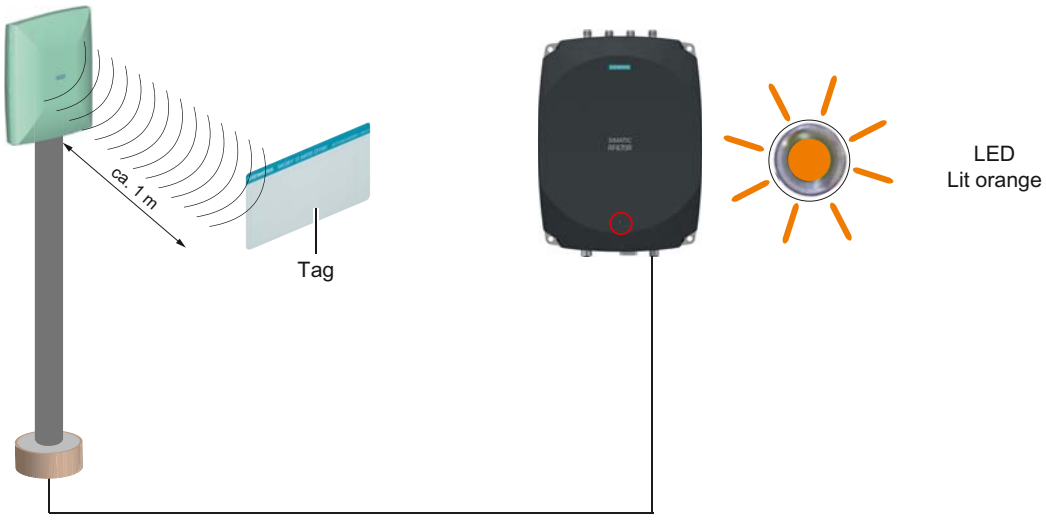


Figure 4-3 Configuration to test the reader

Result

If the tag in the field can be read by the reader, it will appear in the list in the "Diagnosis View" dialog. In addition, the orange LED of the reader indicates that a tag recognized by the reader is presently located in the field.

4.2.7.3 Diagnosis view

Diagnosis view - general

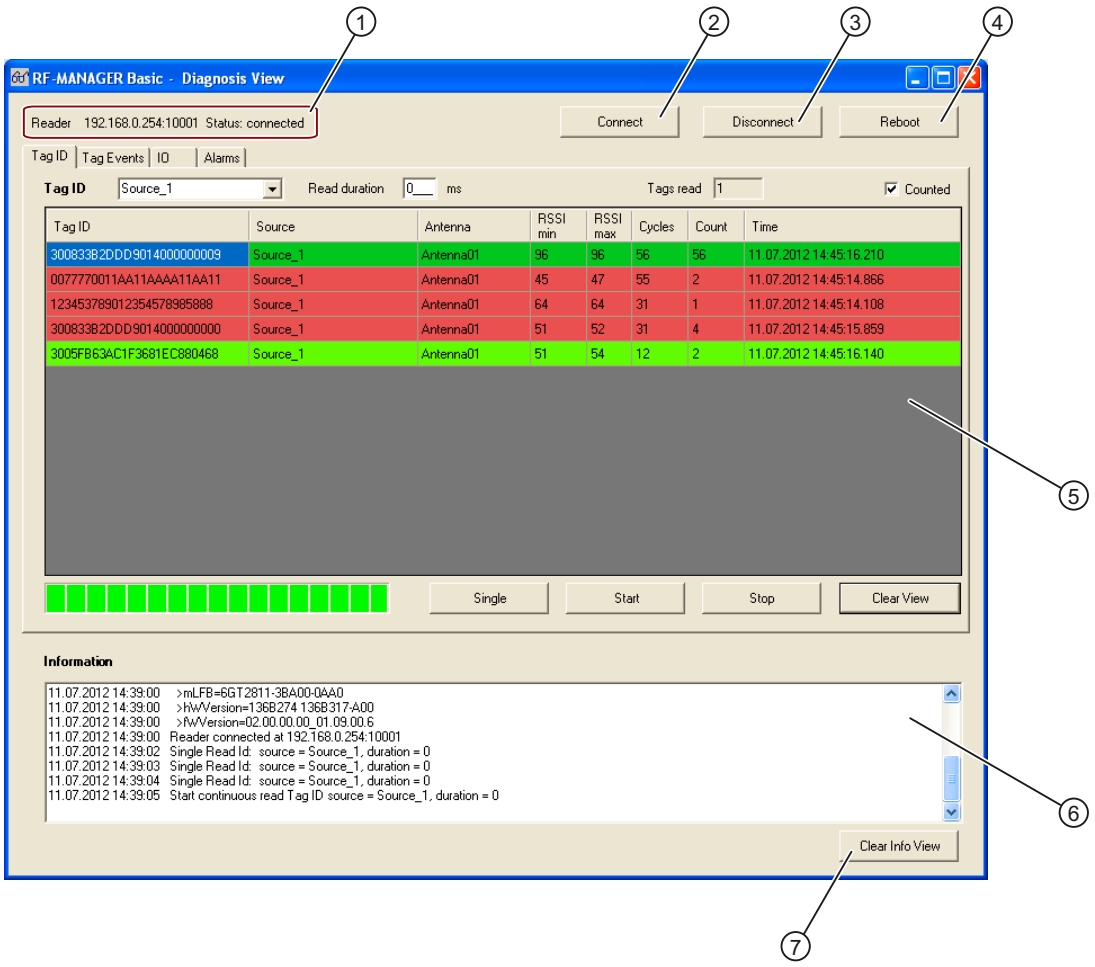
Introduction

The diagnosis view enables the reader to test the accuracy of tag detection in the following scenarios:

- Commissioning of the reader and testing of the loaded configuration
- Checking and testing the reader on commissioning in the plant

Diagnosis view

The diagnosis view can be opened in RF-MANAGER Basic with the "View > Start diagnosis view" menu command.



① Status bar
Display of reader status

② "Connect" button
Connects the reader to the configuration computer if the connection was disconnected previously by clicking the "Disconnect" button.

③ "Disconnect" button
Disconnects the reader from the configuration computer, but the reader continues to operate.

④ "Reboot" button
Disconnects the reader from the configuration computer and the reader is reset.
Each project is saved fail-proof on the reader so that after resetting, the reader starts with the project's original download state.

⑤ Tabs of the "Diagnosis View" dialog
Display of the diagnostic data

⑥ "Information" window
Chronological list of all settings made and display of additional information such as INFO message when there is an overflow of the maximum number of displayable rows in the display list and the oldest (top) rows are then discarded.

⑦ "Clear View" button
Deletes all entries in the "Information" window.

Figure 4-4 Diagnosis view - general

Diagnosis view - "Tag ID" tab

Introduction

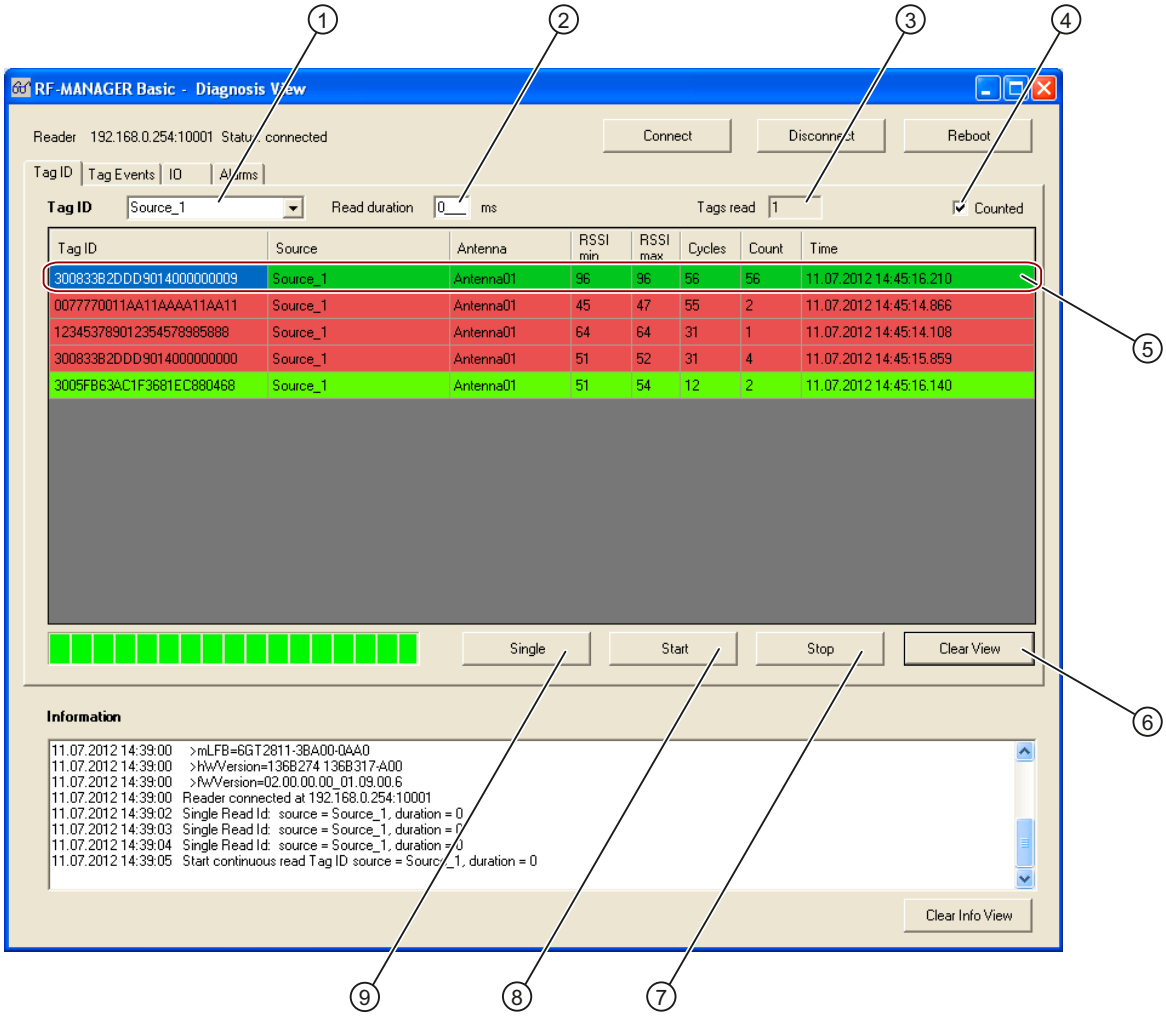
With the diagnostics data of the "Tag ID" tab, a basic functional test (Page 81) of the reader can be run, along with a test to determine how well a tag can be detected in the field.

Synchronous data scan

To access the data displayed in the "Tag ID" tab, the data source or all data sources are queried synchronously for data. One read operation (Inventory) per query is performed on the reader for each data source.

There is no asynchronous automatic data scan via the data source triggers created in the project. In this view, no tag IDs from data sources are shown that are available via Reports.

"Tag ID" tab



① Drop-down list
Select a specific data source or all data sources.

② "Read duration" input box
The default value is 0 ms so that the reader starts only one read procedure.

③ "Tags read" display box
The number of tags recognized by the reader per read procedure.

④ "Count" option
Activated:
Displays the number of read operations in which the tag was detected.
Only one row is displayed per recognized tag.
Deactivated:
Each detected tag event is listed chronologically.
The "RSSI max", Cycles and "Count" columns are not displayed.

⑤ Display list
Displays the data of a tag.

⑥ "Clear View" button
Deletes all entries in the display list.

⑦ "Stop" button
Cyclic reading is stopped.

⑧ "Start" button
Reading is triggered cyclically.

⑨ "Single" button
Reading is triggered once.

Figure 4-5 Diagnosis view window - "Tag ID" tab

Reading, read duration, and cycle

The reading process is initiated at the beginning of a read duration. Within the read duration, the reader continuously collects the data (Tag IDs) of the detected tags. At the end of the read duration, the reading stops and the data collected (Tag IDs) is transmitted from the reader to the configuration computer. Per tag only one data record (Tag ID) is sent, even if the tag is detected several times in the read duration.

This entire procedure corresponds to one cycle.

Querying data sources

Using the drop down list, a single data source or all data sources together can be selected for the data scan. The data scan can occur once ("Single" button) or cyclically ("Start" button).

If all data sources are queried once or cyclically, then the read operation is initiated for each data source in succession. The read operation can begin for the next data sources only after if it has been completed for the previous data source.

Presentation of data in the display list

The data obtained by the reader from a tag during a read cycle is sent to the configuration computer and displayed in a row in the display list per tag.

The following parameters are displayed for each tag:

- Tag ID

  The Tag ID of the tag read by the reader.

- Data source

  Display of data source from which the reader receives the data.

- Antenna

  Specification of which antenna the reader used to detect the data.

- RSSI min

  The lowest RSSI value of the tag determined so far.

- RSSI max

  The highest RSSI value of the tag determined so far.

- Cycles

  Number of read operations in which at least one tag was detected by the reader.
- Count

  Number of read operations in which the tag was detected.
- Time

  Timestamp that states when the tag was last detected by the reader.

If the "Counted" option is activated, the rows are color-coded:

Color	Meaning
Dark green	The tag was detected in the current read cycle.
Light green	The tag was detected in the previous read cycle, but not in the present read cycle.
Red	The tag has not been detected since at least the previous read cycle and in the current read cycle.

To avoid overburdening the configuration computer's memory, a maximum of 10000 lines are displayed With more than 10000 lines, an overflow occurs and the oldest (= top) row is discarded.

Diagnosis view - "Tag Events" tab

Introduction

The diagnostics data of the "Tag Events" tab can be used to test the reader to see if it detects tag status changes and displays the corresponding tag events, without requiring the corresponding hardware to be connected to the reader to fire a trigger (e.g. light barriers).

The triggers can be fired manually instead with RF-MANAGER Basic by clicking the "Single" or "Start" buttons.

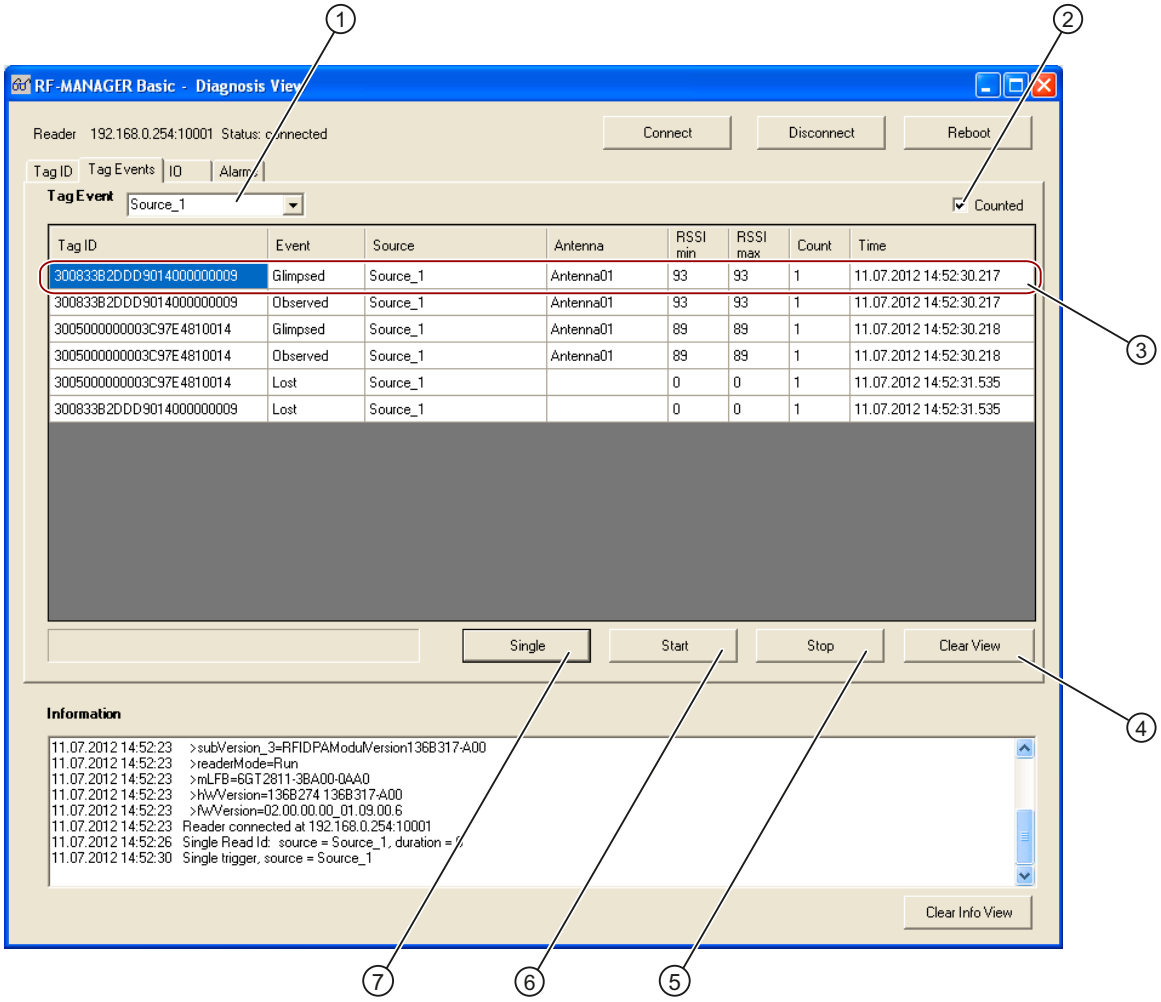
This allows the configuration and commissioning of the reader to be tested in the system.

Asynchronous data scan

To receive the data displayed in the "Tag Events" tab, the reader automatically delivers the tag events asynchronously according to the configuration loaded on the reader.

Further information on asynchronous automatic data queries can be found in the chapter "Understanding and optimizing the scanning of RFID tags".

"Tag Events" tab



① Drop-down list
Select data source

② "Counted" option
Activated:
Displays how often a tag event has been detected.
One row is displayed for each detected tag event per tag.
Deactivated:
Each detected tag event is listed chronologically.
The "RSSI max" and "Count" columns are not displayed.

③ Display list
Displays the data of a tag.

④ "Clear View" button
Deletes all entries in the display list.

⑤ "Stop" button
The data source scan is canceled.

⑥ "Start" button
The data sources are triggered cyclically.

⑦ "Single" button
The data sources are only triggered once.

Figure 4-6 Diagnosis view - "Tag Events" tab

Querying data sources

Using the drop down list, a single data source or all data sources together can be selected for the data scan. The selected data sources are triggered once or cyclically with the settings given in the RF-MANAGER Basic configuration.

The data source trigger is released only once if there is a single data source scan ("Single" button).

The data source trigger is released continually if there is a cyclical data source scan ("Start" button).

Presentation of data in the display list

The data obtained by the reader from a tag during a read cycle is sent to the configuration computer and displayed in a row in the display list per tag/tag event combination.

The following parameters are displayed for each tag:

- Tag ID

  The Tag ID of the tag read by the reader.

- Event

  The tag's current tag event detected by the reader ("Observed", "Lost", etc.), depending on the current configuration.

- Data source

  Display of data source from which the reader receives the data.

- Antenna

  Specification of which antenna the reader used to detect the data.

- RSSI min

  The lowest RSSI value of the tag determined so far.

- RSSI max

  The highest RSSI value of the tag determined so far.

- Count

  Displays how often the tag event is detected for the tag.

- Time

  Timestamp that states when the tag event was last detected by the reader for the tag.

To avoid overburdening the configuration computer's memory, a maximum of 10000 lines are displayed With more than 10000 lines, an overflow occurs and the oldest (= top) row is discarded.

Diagnosis view - "IO" tab

Introduction

By configuring the inputs/outputs, the reader's hardwired inputs and outputs can be function tested with the diagnostic data of the "IO" tab and, for example, wiring errors or physically defective inputs or outputs can be detected.

Note

Activation of the "Notification" option of "IO" in the project is required

To configure the relevant input/output in RF-MANAGER Basic, in the "IO" tab, either set the value to "True" in the "Notifications" column or activate the option "Send notifications" in the "General" properties window.

The status change is displayed only for these inputs/outputs in the display list in the "Diagnosis view" dialog under the "IO" tab.

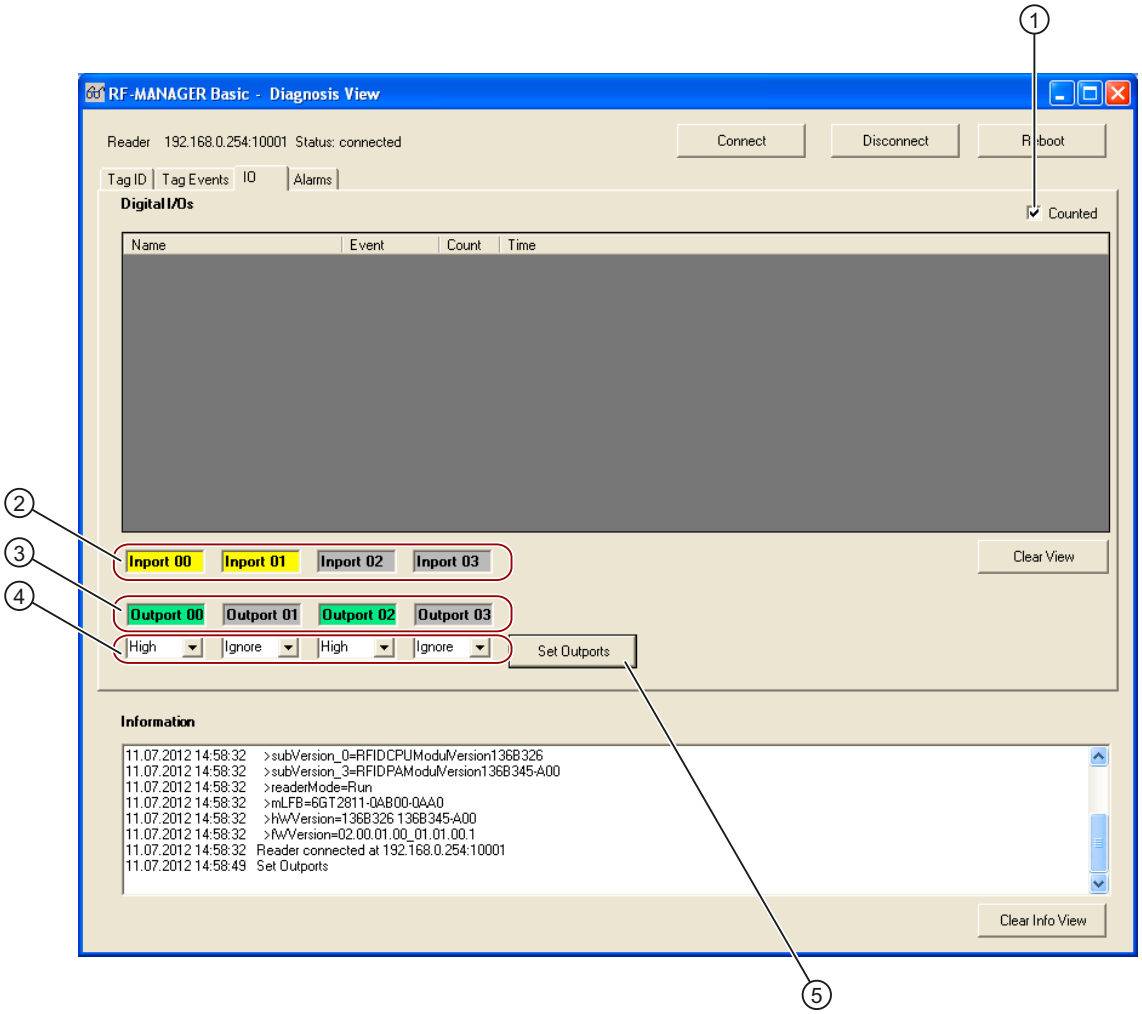
"IO" tab

Note

"HIGH"/"LOW"

The following assignment applies to the terms "HIGH" and "LOW":

- "HIGH" = "ON"
- "LOW" = "OFF"



① "Count" option

Activated:

Displays how often a status change has occurred.

A maximum two rows are displayed per input/output for the two possible values "HIGH" and "LOW".

The relevant row is updated on a status change at the input/output, e.g. if the input/output is set to "HIGH" following a status change of the input/output, the previous "HIGH" row of the input/output is updated.

Deactivated:

Each status change of the input/output is listed chronologically.

The "Count" column is not shown.

② Display fields "Inport 00" to "Inport 03"

Displays the value of each input set by hardware using a colored background:

Yellow = "ON"

Gray = "OFF"

③ Display fields "Outport 00" to "Outport 03"

Display the value of each output set by hardware using a colored background:

Green = "ON"

Gray = "OFF"

④ Drop-down list per output "Outport 00" to "Outport 03"

Manual setting of the value for the associated output.

The value in the display field for the relevant output is accepted by clicking on "Set Outports".

⑤ "Set Outports" button
The values set manually in the drop-down lists are accepted in the display fields "Outport 00" to "Outport 03".

Figure 4-7 Diagnosis view - "IO" tab

Presentation of data in the display list

One completed status change per input/output is displayed in a row in the display list.

The following parameters are displayed for each IO:

- Name

  Name of IO port.

- Event

  Display of value at input/output following a completed status change:

  – "HIGH" following a status change from "LOW" to "HIGH" (rising edge)

  – "LOW" following a status change from "HIGH" to "LOW" (falling edge)

- Count

  Registers a status change at the input/output.

- Time

  Time stamp that states when the status change at the input/output last occurred.

To avoid overburdening the configuration computer's memory, a maximum of 10000 lines are displayed With more than 10000 lines, an overflow occurs and the oldest (= top) row is discarded.

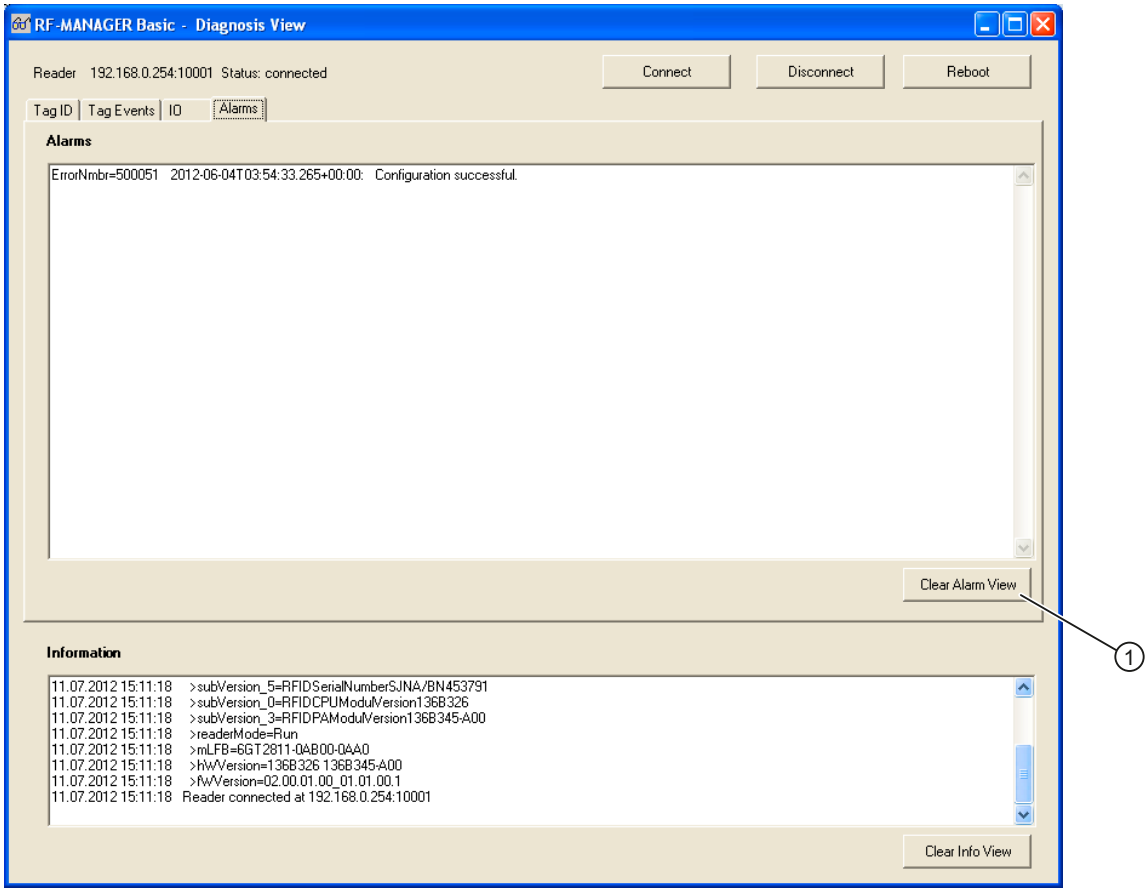
Diagnosis view - "Alarms" tab

Introduction

The "Alarms" tab displays device-specific system and error alarms from the reader.

You will find more detailed information on device-specific system alarms and error messages in the SIMATIC RF Function Manual (see the CD / DVD-ROM supplied with the RF640R/RF670R reader).

"Alarms" tab



① "Clear view" button
Deletes all entries in the "Alarms" window.

Figure 4-8 Diagnosis view - "Alarms" tab

To avoid overburdening the configuration computer's memory, a maximum of 10000 lines are displayed With more than 10000 lines, an overflow occurs and the oldest (= top) row is discarded.

4.2.8 Firmware update

The firmware update allows a specific firmware version to be transferred to the reader.

Requirement

The IP address of the reader involved in the firmware update is shown in the "Communication Settings" dialog in the "IP address" box (see "Requirements for transfer/back transfer (Page 75)").

Procedure

To update the firmware, proceed as follows:

1. In the "Reader" menu, select the command "Update firmware".

   The "Open" Windows dialog opens.

2. Select the desired file for the firmware update and then click "Open".

   The file is transferred to the reader and written to its internal memory, and then the reader is restarted. This can take several minutes. The data transfer is indicated by the LED flashing.

Note

LED display with "old" firmware versions

When you update "old" firmware versions, it is possible that the LED of the reader does not flash during the firmware update.

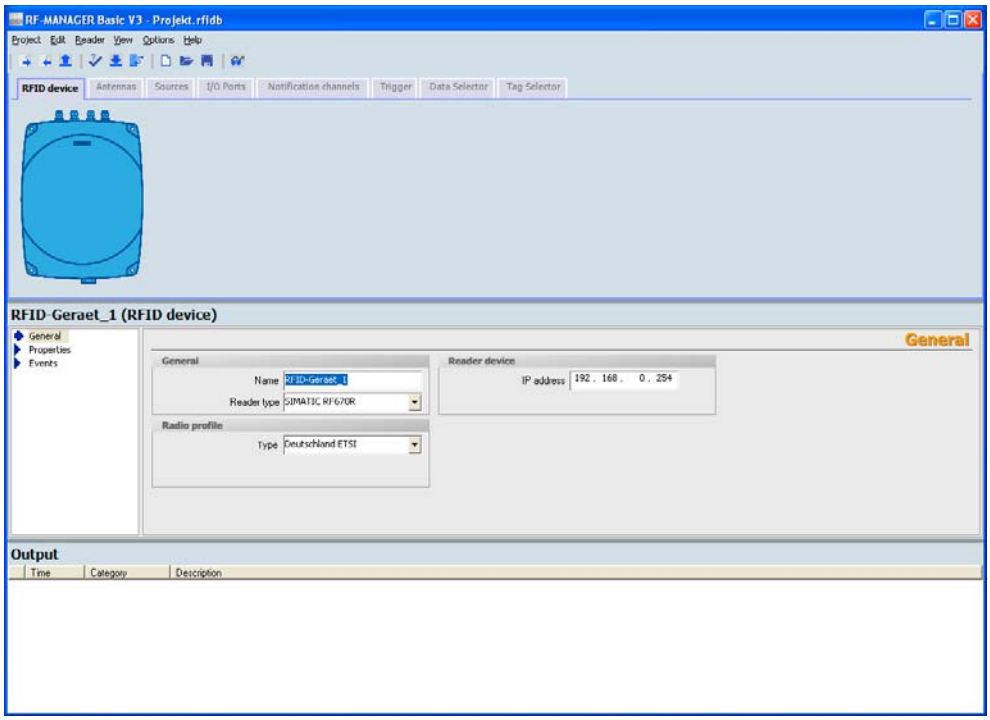
Result

After the firmware is updated, the reader's LED flashes green.

4.3 Reader parameter assignment

4.3.1 Introduction

In the workplace you can parameterize the readers of your RFID system. You can set general parameters for the antennas that are connected to the reader.



And you can create data sources for the purpose of reading tags and notification channels for transferring the scanned tags. It is also necessary to specify triggers: Triggers that activate the data sources for reading and triggers that activate the notification channels to transfer the data of the data sources that are assigned to you.

The RFID devices are parameterized in the following stages:

- RFID device
- Antennas
- Data sources
- I/O Ports
- Notification channels
- Trigger
- Tag selectors
- Data selectors

4.3.2 RFID device

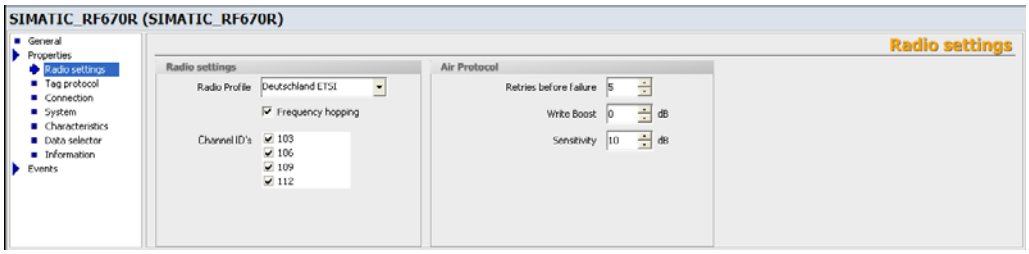
The "RFID device" menu provides the following parameter setting options:

General

Here you can enter the IP address set for the reader and the radio profile used for the reader.

Properties

- **Radio settings**



You can set the radio profile used for the reader under "Radio settings"

If your RFID system is using "Frequency hopping", here you can select the transmit channels between which the reader hops.

Frequency hopping is used to prevent mutual inference from the readers. If frequency hopping is not activated, you must permanently assign the transmission channel by means of an ID. If the FCC radio profile is used, however, frequency hopping cannot be deactivated.

You can set the following parameters under "Air Protocol":

"**Retries before failure**:

Here you can set the maximum number of repetitions of a faulty air protocol command. The command is terminated and an error reported only when the command has failed in all attempts. With this setting you can reduce the likelihood of errors when accessing tags. However, this lower error probability leads to an increased time required for command execution. The maximum execution time may increase depending on the actual number of repetitions performed. For time-critical applications, it may therefore be advantageous to turn off the repeat and if needed, to respond in the application and then selectively make the repetition.

"Write Boost"

Here you set how many decibels the antenna performance is increased for writing of data or the ID to the tag. To write data or an ID, a tag that can be read needs about 3 dB more energy at a constant distance. This increased capacity reduces interference potential and increases performance. An increase can only be up to the maximum allowed power.

"Sensitivity"

Here you set the attenuation of the tag responses in the input branch of the reader. An increase in attenuation causes weak received tag signals to no longer be recognized by the reader. A decrease means that even weak received tag signals are detected. On the other hand, decreased attenuation brings with it the disadvantage that interference can negatively affect detection. The attenuation simultaneously affects all antennas.

- **Tag protocol**

This is where you select the communication protocol to be used between the reader and tag.

With EPC Class1 Gen2, you can use "**Initial Q**" to specify the maximum number of tags that can be expected to be located in the measuring field at the same time so that collisions can be prevented.
The following formula applies: 2 $^{\text{Initial Q value}}$ = number of expected tags.
It is important to note here that the length of a read cycle increases with the value of the Initial Q value. Normally this value is automatically set by the reader. If, however, you want to optimize performance, the rule of thumb is that the value must be set as low as possible and as high as necessary.

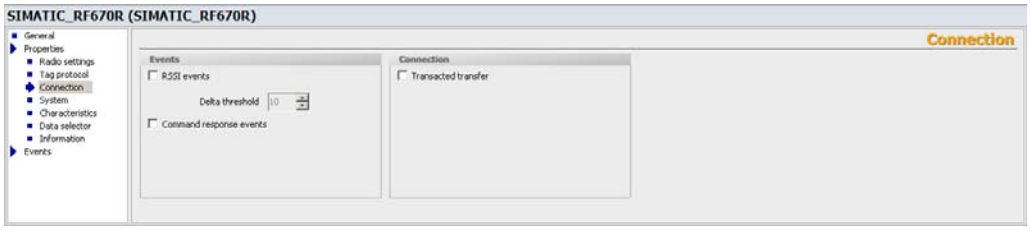
Under "**Tag communication scheme**", you can set the data transfer rates between reader and tag for EPC Gen2 (see "Tag modulation schemes (Page 104)").

See also:

Help system *Understanding and optimizing the scanning of RFID tags*

Under "**Tag ID Length**", you can select the setting "Automatic" or "Specific". "Automatic" means that tags of different lengths are detected. Select the setting "Specific" only when you are sure that there will only be tags with the same length or only specific ID lengths are desired. Tags with different ID lengths are ignored.

- **Connection**



By activating the option "**Transacted transfer**" it is ensured that all events and alarms reach the user application. In the event of network problems, events and alarms are buffered by the reader and are not lost. Note that if the function "Transacted transfer" is enabled, events and alarms must be acknowledged via XML message frames. If you do not acknowledge events and alarms in the user application, the connection to the reader is considered to be faulty and the reader sends the same events and alarms over and over again.

If "**RSSI events**" is activated, then for each tag a message containing the information "Tag ID", "RSSI value" and "active antenna" is generated for all read processes and tag commands that result in the acquisition of the tag ID at the air interface. This information can be useful during commissioning.

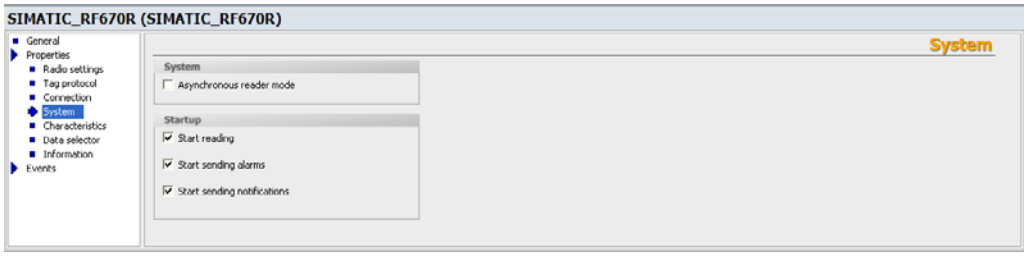
NOTICE
Very many messages Very many messages are generated for large tag populations, which can reduce overall performance and lead to overload. Disable "RSSI events" after commissioning if you work with large tag populations.

With the "**Delta threshold**" parameter you can set the difference in the RSSI value per tag from which a new RSSI message is created. If, for example, the value is set to "10" and a message has been generated at an RSSI value of 50 for the tag with ID x, a new message is created when a value of >60 or <40 is reached. No messages are generated at RSSI values in between to avoid a flood of messages on small changes.

If "**Command response events**" is activated, messages containing information such as command, ID, result of the command, RSSI value, active antenna, etc. are created for all tag command (e.g. WriteID, Kill, Lock, etc.) and for each tag. If the command was executed on several tags, separate messages are generated for each individual tag. At the end of a command execution, an additional message is created with a summary of the results (tags OK, number of tags NOK).

During commissioning, you can enable this option in order to detect problems with command execution. After the commissioning you should disable the option again, otherwise a lot of data will be generated, causing the overall performance of the system to be reduced or leading to an overload.

- **System**



Under "**Asynchronous reader mode**", you can change the operating mode of the RFID module. In asynchronous reader mode, the RFID module continuously reads tags that are present in the field. Even if always the same tag is in the field, the same tag is constantly read and the data source made available. If the option is not enabled, the RFID module will only read in response to an explicit request from the data source or in accordance with the configured trigger conditions.

You use "Asynchronous reader mode" when you want tags to be detected as quickly as possible. In this mode, the software does not provide a trigger because the reader reads autonomously. You will need this function for high-speed processes in which temporary reading pauses are not acceptable.

Note

Preconditions/settings

- Read settings: Set the threshold for "Observed" to 0.
- Set all the participating components, e.g. data sources and notification channels, to continuous triggering.

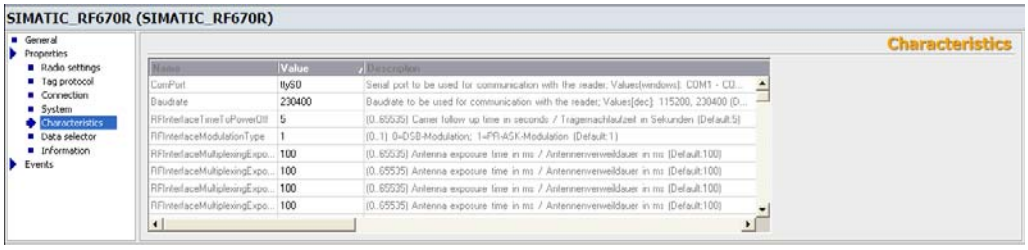
Note

Only one data source

Please note that you can only parameterize one data source for your reader in asynchronous reader mode. Scenarios with multiple data sources are not permitted!

In the "System" dialog, you can set the reader's start behavior. All checkboxes are activated by default. If the option "**Start reading**" is deactivated, the reader is in stop mode and does not read any data when it starts. If the options "**Start sending alarms**" and "**Start sending notifications**" are deactivated, neither alarms nor notifications (reports) are transmitted when the reader starts. It can make sense to deactivate this function if the reader is addressed via an XML interface and a specific startup procedure is to be ensured. Send explicit XML read commands to start a read operation on the reader from this state.

- **Properties**



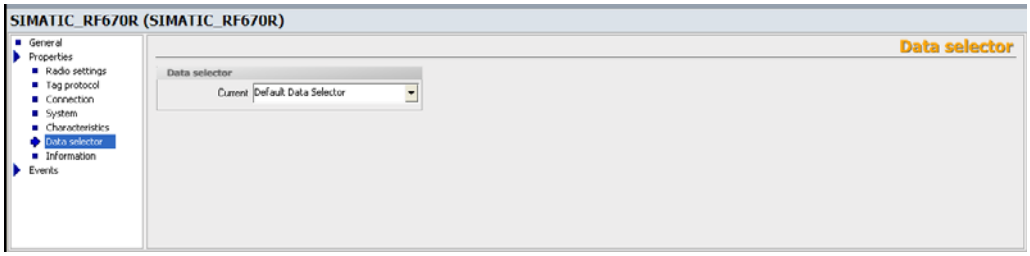
The dialog "Properties" contains expert parameters for special applications. These expert parameters permit the subsequent optimization for difficult applications.

The following expert parameters can be set in the "Properties" dialog:

Parameter	Description	Default setting
RFInterfaceModulationType	The readers provide two basic modulation types: • Double Sideband (DSB) • Phase Reversal Amplitude Shift Keying (PR-ASK) modulation.	PR-ASK modulation is the default setting and should not be changed.
TagCommUsePilotton	To ensure that the RFID module can better synchronize with the transponder response, the tag is told to transmit a pilot signal (x ms long) via the air interface. If no fault is expected in the field, the pilot signal can be switched off (minimal time savings). But the user is advised to always leave the pilot signal switched on.	ON = 255
TagCommIntelligentWrite	In comparison with the reading process, the writing process is a very slow process. The concept of intelligent writing includes reading of the special cells to be written in the tag, comparing of words (2 bytes), and word-by-word writing of only those words that deviate in content between target data and actual data. Users who would like to write the contents of the memory in any case, due to the medium-length data management period, will shut down this mechanism.	ON = 255
TagCommVerifyWrite	When writing data to transponders, the transponder can acknowledge correct writing in the event of a defective memory cell, but during the next reading, it is discovered that memory cells were not correctly written compared to the acknowledgement. In order to be able to prevent such data corruption, the corresponding memory cells are read word-by-word by the reader after writing data on tags and then compared to the writing data by default. Users who do not want to use this mode can disable the mechanism via the expert parameter defined here.	ON = 255
TagCommForcePowerOffAfterEPCWrite	In order to be able to optimize the inventory chronologically, you must ensure that a tag briefly exits the status after overwriting the EPC ID in order to be assigned a new status in a different inventory as soon as possible. This timed response can be achieved by switching off the power for X ms after the EPC ID is written.	The setting range for the wait time is 0 ms to 255 ms. The default is a pause of 5 ms.

Parameter	Description	Default setting
RFInterfaceTimeToPowerOff	This time specifies how long the carrier remains switched on after a tag operation, taking the restrictions of the selected communication standard into consideration. The advantage of selecting a sufficiently long carrier running-on time is that after data accesses, the reader leaves the carrier of a channel switched on, thus saving time when the data accesses are used again.	5 s
RFInterfaceMultiplexing ExposureTime1 ... 4	These settings only become effective when the reader is operating in asynchronous mode (see RFID device > Properties > System). In this mode, the RFID module continuously executes read cycles (inventories) and switches the antennas according to the set times. Time 1 ...4 corresponds to Antenna 1 ... 4	100
GlimpsedTimeoutCount ObservedTresholdCount ObservedTimeOutCount	Three counters are reserved in the tag list for each tag. They can be changed by the user. These settings only become effective when the reader is operating in asynchronous mode (see RFID device > Properties > System). In this mode, the RFID module continuously executes read cycles (inventories). When a tag is reported depends on the number of identifications and the resulting states. The tag status "Observed" is reported. Possible states: • Glimpsed • Observed • Lost The basic model of smoothing is described in the chapter "Understanding and optimizing the scanning of RFID tags".	GlimpsedTimeOutCount = 1 ObservedTresholdCount = 0 ObservedTimeoutCount = 5
TagCommTransmitSelectIf NoFilterIsOn	Before each read cycle, the reader sends a select command at the air interface to switch tags into a defined idle state. This procedure is only required if tags changed their states due to previous filter functions. If it is ensured that no filters affect tags via the air interface, the read performance can be increased by omitting the select command.	ON = 255
TagCommUseBlockWrite	The EPC Gen 2 air protocol supports the command "BlockWrite" for simultaneously writing several words to the tag. If only tags that support this command are used, you can activate this write mode exclusively. Word-by-word writing is then deactivated.	OFF = 0

- **Data selector**



You can select the current data selector or define new data selectors here. Please note that the data selector chosen here will only be effective in the following cases:

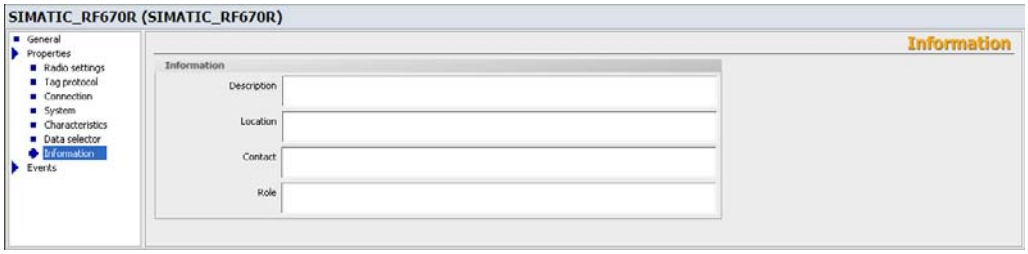
– During synchronous read procedures

– Or for notification channels for which a data selector has not been explicitly selected.

In general, data selectors are components of notification channels and are used with the asynchronous read procedure.

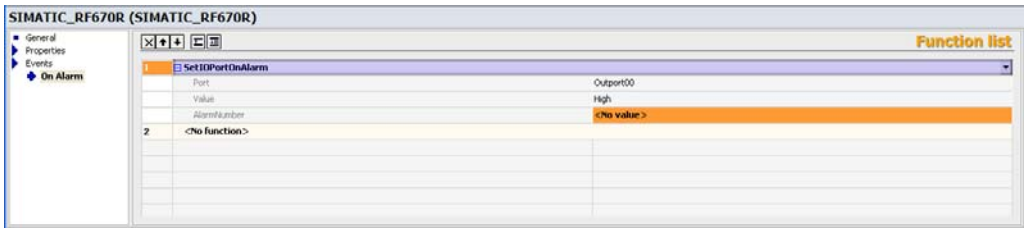
For further information on using data selectors, see "Dense Interrogator mode (Page 104)".

- **Information**



You can store descriptions regarding the reader, reader location, responsible contact person(s) and reader role here.

- **Events**



"On Alarm"

If the reader triggers an alarm, this event is triggered. You can configure function lists for the event in order to execute system functions.

You can find further information on the use of lists of functions in the chapter "Working with system functions".

4.3.2.1 Tag modulation schemes

You set the data transfer rate between reader and tag using tag modulation schemes. This parameterization is only possible with the tag protocol EPC Class1 GEN2.

EPC Class1 GEN2 tag communication schemes

Index	Reader - Tag Tari*	Reader - Tag data rate	Link frequency	Tag - reader data rate	Coding	ETSI-compatible	FCC-compatible
0	25 µs	40 kbps	80 kHz	80 kbps	FM 0	Yes	Yes
2	25 µs	40 kbps	160 kHz	160 kbps	FM 0	Yes	Yes
4	25 µs	40 kbps	160 kHz	40 kbps	Miller 4	Yes	Yes
5	12.5 µs	80 kbps	160 kHz	160 kbps	FM 0	Yes	Yes
7	12.5 µs	80 kbps	160 kHz	40 kbps	Miller 4	Yes	Yes
9	12.5 µs	80 kbps	320 kHz	160 kbps	Miller 2	Yes	Yes
10	12.5 µs	80 kbps	320 kHz	80 kbps	Miller 4	Yes	Yes
11	12.5 µs	80 kbps	320 kHz	40 kbps	Miller 8	Yes	Yes
12	6.25 µs	160 kbps	320 kHz	320 kbps	FM 0	No	Yes
13	6.25 µs	160 kbps	320 kHz	160 kbps	Miller 2	No	Yes
14	6.25 µs	160 kbps	320 kHz	80 kbps	Miller 4	No	Yes
15	6.25 µs	160 kbps	320 kHz	40 kbps	Miller 8	No	Yes

* Tari = Duration for representation of a bit with content 0.

4.3.2.2 Dense Interrogator mode

Core statement

The dense interrogator mode for Gen 2 tags (schemes with Miller coding) enables several RF600 readers to be operated without interference in close proximity to each other.

Operating principle

When using Gen 2 tags, a so-called Miller subcarrier permits readers located close to one another to use the same frequency. This is achieved by inserting a frequency offset for the signal carrier in the tag (by using a square-wave hybrid signal).

As a result of the large difference in level between the transmitter channels and the tag response channels, this technology provides great advantages for frequency reuse. However, a prerequisite is that a certain minimum distance, and thus minimum decoupling, is observed between the antennas of adjacent readers.

Note

Minimum distance between antennas

The minimum distance required between antennas using the same frequency depends on the radiated power set and the antenna alignment.

You will find information on antenna alignment and antenna clearances in the "SIMATIC RF600 (http://support.automation.siemens.com/WW/view/en/22437600)" system manual.

Optimizing tag reading accuracy

A further improvement in the tag reading accuracy in an environment with a high density of readers can be achieved by orienting the antennas toward the respective tag field, i.e. by rotating them horizontally and vertically.

The radiated power of the readers can also be reduced to the absolute minimum level at which the tags can still be detected accurately.

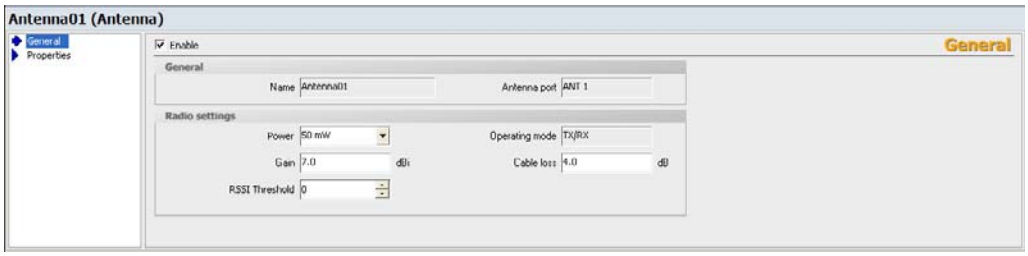
This greatly reduces the probability of interference.

4.3.3 Antennas

4.3.3.1 Antennas

The "Antennas" menu provides the following parameter assignment options:

General



In this window, you can specify the radio properties of an antenna. The "Name" of the antenna and the antenna port allocated to it are assigned automatically.

The maximum "Power" is limited by the radio profile and communication scheme used. The settings for the "antenna gain" and "cable loss" parameters are dependent on the hardware used.

With the Enable check box, you can enable the antenna.

The operating mode of the antenna with RF670R is preset to TX/RX, as the reader operates the antenna monostatically, i.e. transmitting and receiving take place simultaneously.

You will find more detailed information on the radiated power of the antennas in the RF600 system manual (http://support.automation.siemens.com/WW/view/en/22437600).

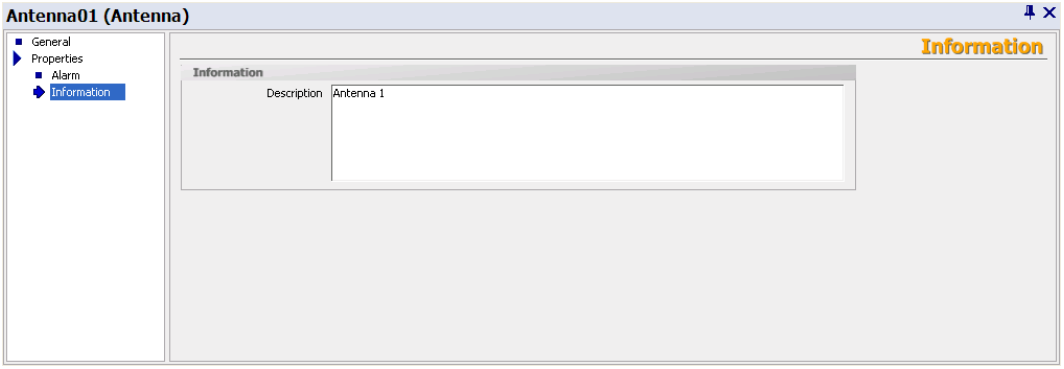
RSSI threshold value

RSSI RSSI (Received Signal Strength Indication) data provides information about the received field strength with which a tag is read. To reduce the effect of overshooting when accessing transponder data, setting a threshold allows weak received transponder signals that do not reach the Received Signal Strenght Indicator (RSSI) threshold to be discarded by the reader. An analysis of RSSI data may also help, for example, to initiate a write operation only if there is a sufficiently strong tag in the field. This can increase the writing success rate.

The value is a unitless amount without direct conversion to the level and a value range of 0-255 (default 0).

Properties

Information



You can store a description of the antenna here.

See also

SIMATIC RF600 (http://support.automation.siemens.com/WW/view/en/22437600)

4.3.3.2 Radiated power of antennas

The maximum radiated power of the antennas is restricted by the radio profile used. Parameterization of antenna gain and cable loss depends on the hardware used.

ETSI radio profile

With the ETSI radio profile, the minimum radiated power is 50 mW ERP and the maximum 2000 mW ERP. The set power corresponds to the desired effective radiate power (ERP), and is calculated for the reader based on the entered parameters "Antenna gain" and "Cable loss".

Example:
The RF660A ETSI antenna has a gain of 7 dBi, and a 10 m LMR-195 cable has a loss of 4 dB; an LMR-300 cable has a loss of 2 dB.

You will find more detailed information on antenna gain in the relevant frequency band, and on the cable loss of the antenna cables currently available, in the RF600 system manual (http://support.automation.siemens.com/WW/view/en/22437600).

FCC radio profile

With the FCC radio profile, the minimum radiated power is 100 mW EIRP and the maximum 4000 mW ERP. The set power corresponds to the desired signal level on the end of the antenna cable and is calculated for the reader based on the entered parameters "Antenna gain" and "Cable loss".

Example:
The RF660A US antenna has a gain of 6 dBi, and a 10 m LMR-195 cable has a loss of 4 dB; an LMR-300 cable has a loss of 2 dB.

You will find more detailed information on antenna gain in the relevant frequency band, and on the cable loss of the antenna cables currently available, in the RF600 system manual (http://support.automation.siemens.com/WW/view/en/22437600).

CMIIT radio profile

With the CMIIT radio profile, the minimum radiated power is 50 mW ERP and the maximum 2000 mW ERP. The set power corresponds to the required effective radiated power (ERP), and is calculated for the reader based on the specified "Antenna gain" and "Cable loss" parameters
.

Example:
The RF660A FCC antenna has a gain of 6 dBi, and a 10 m LMR-195 cable with a loss of 4 dB / an LMR-300 cable with a loss of 2 dB.

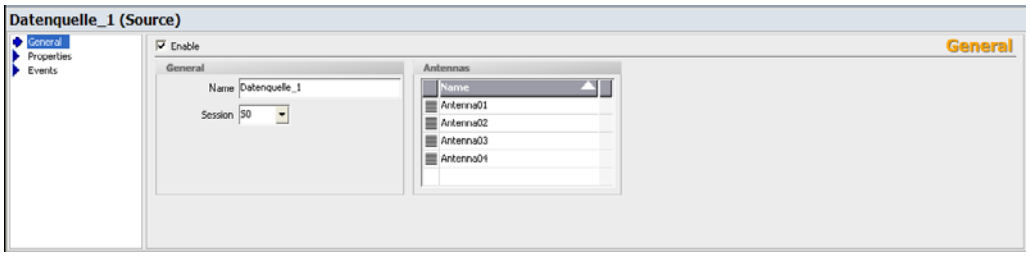
You will find more detailed information on antenna gain in the relevant frequency band, and on the cable loss of the antenna cables available, in the RF600 system manual (http://support.automation.siemens.com/WW/view/en/22437600).

4.3.4 Data sources

Data sources read the data from logically associated antennas. The data sources pass on the data that are read from the antennas assigned to them.

The "Data sources" menu provides the following parameter setting options:

General



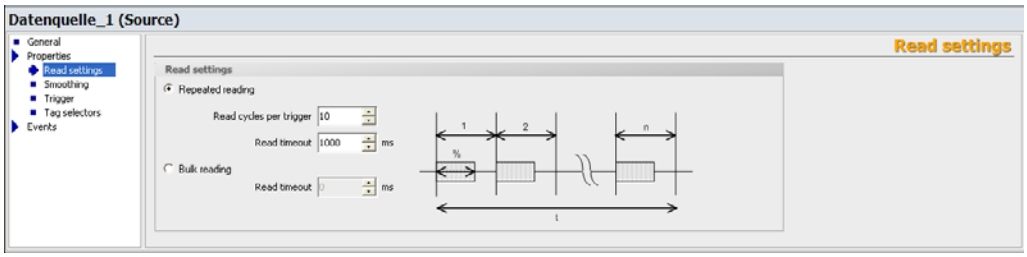
You can assign a name to the data source using the "Name" parameter. Under "Antennas", you can assign the available antennas to the data source.

If you selected EPC Class1 Gen2 as the communication protocol between the reader and the tags, you must specify the session parameters for the data source. One tag can communicate with up to 4 data sources simultaneously, so to distinguish between these data sources, a unique number S0 to S3 is assigned to each via the session parameters.

With "Activate", you can activate the data source.

Properties

- **Data acquisition**



With "Radio settings" you can choose between "Repeated reading" and "Bulk reading".

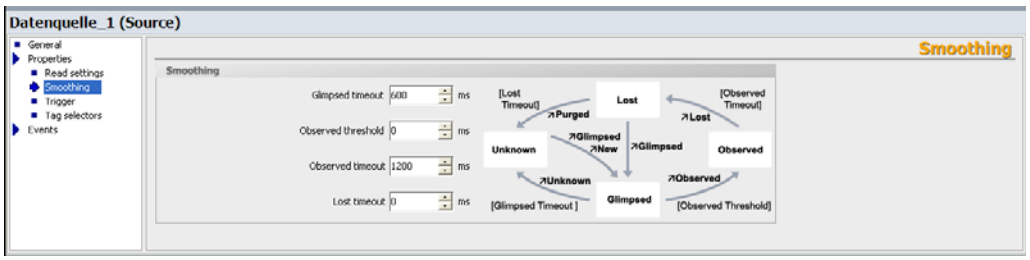
If the "Repeated reading" option is enabled, you define the number of "Read cycles per trigger". The "Read timeout" specifies in milliseconds how long the specified number of read cycle per trigger is permitted to take. When this time limit is exceeded, the read cycles are stopped even if the number of cycles that you specified has not been reached.

If the option "Bulk reading" is active, the reader continuously reads all tags in the fields in one read cycle. The "Read timeout" determines how long this continuous reading will last. Other data sources must wait during this defined read duration and are only processed when it ends.

For more detailed information and general background information, please refer to:

Help system "Getting started > Understanding and optimizing the scanning of RFID tags"

- **Smoothing**



Smoothing is a technique that is used to optimize the read quality. The reader adds a status indication for the tags to the read results.

In this window, you specify the parameters for the status indication for the tags. Here you can specify times that have an effect on the status transitions.

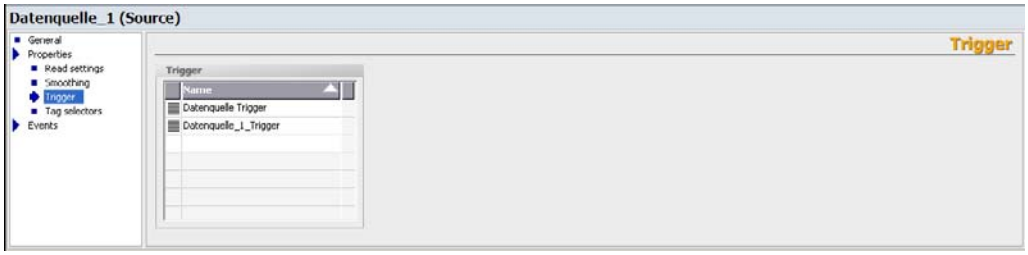
The different statuses are described below:

Status	Meaning	Description
Unknown	Unknown	The tag has this status before communication is established with the reader.
		Data selector event "Purged": Status "Unknown" is achieved due to "Lost timeout".
Glimpsed	Briefly detected	This status is assigned to the tag when it is read for the first time. Two times are activated: "Glimpsed timeout": If communication is established briefly and unintentionally, when the time Glimpsed timeout has elapsed, the status changes back to "Unknown". The tag is removed from the tag list. This is used to remove tags that have been briefly detected in the boundary areas of the reader. The rule of thumb is that "Glimpsed timeout" should be at least twice as long as a complete read cycle. "Observed threshold" If a stable connection exists beyond the time "Threshold for Observed, the status "Observed" is assigned to the tag. The rule of thumb is that Observed threshold should be at least twice as long as one complete read cycle.
		Data selector event "New": The status "Glimpsed" was achieved from status "Unknown" for the first time.
Observed	Reliably detected	An interruption in the communication that is shorter than the set time "Observed timeout" has no effect on the current status. This time interval can be used to suppress temporary interference. The rule of thumb is that Observed timeout must be twice as long as one complete read cycle. When the times of the read triggers are set longer than the "Observed timeouts", there is a danger that tags that remain stationary in the field will be lost.
Lost	Lost	When a tag exits the field of the reader, the status "Lost" will be assigned to it after the time "Observed timeout" has elapsed. If communication is established again, the status "Glimpsed" will be assigned again immediately. The "Unknown" status is activated if communication is not established before the time "Lost timeout" elapses. The rule of thumb is that "Lost timeout" must be at least twice as long as one complete read cycle.

For more detailed information and general background information, please refer to:

Help system "Understanding and optimizing the scanning of RFID tags"

- **Trigger**

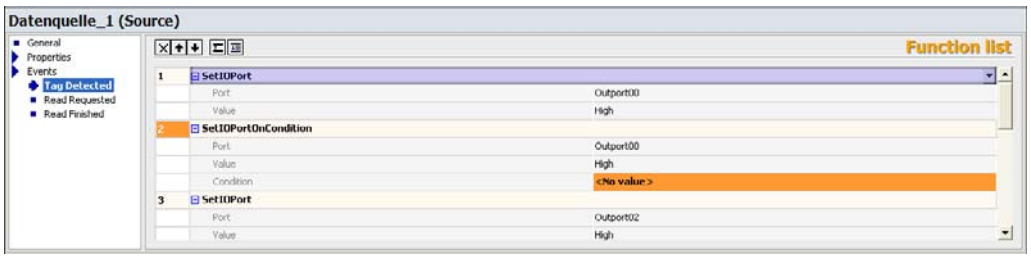


You specify the read triggers here. They cause the data source to read the data from the tags that are located in the antenna field. You can select the triggers from the drop-down list or define them yourself.

- **Tag selectors**

You assign tag selectors to the data source here. You can select the selectors from the drop-down list or define them yourself. The data to be read and filtered is specified here. If a selector is not entered here, the tag IDs will be supplied from all tags.
If several tag selectors with filter function are selected here, they will be combined with a logical **and**. If this is not desirable, you must create additional data sources.

Events



The following events to trigger system functions are available:

- **Tag Detected**

  As soon as a tag is detected by the data source, triggering is initiated. Only the system functions "SetIOPort" or "SetIOPortOnCondition" can be set as a trigger.

  By defining a tag selector for the system function "SetIOPortOnCondition", you can specify the tag data for which the output will be set.

  If several tags are recognized, triggering occurs for each tag.

- **Read Requested**

  The triggering occurs at the start of each read request to the RFID module. Only the system function "SetIOPort" can be fired at the trigger.

- **Read Finished**

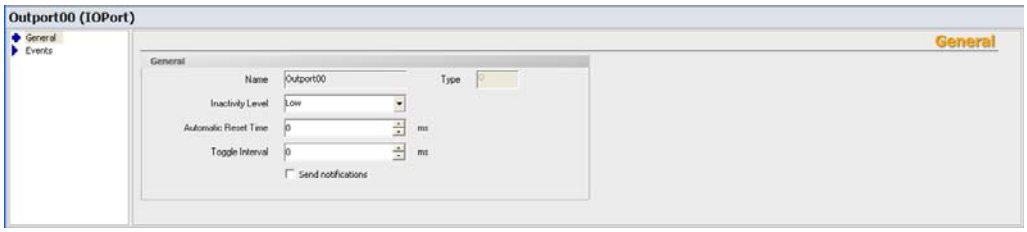
  The triggering occurs at the end of a read request to the RFID module. Only the system function "SetIOPort" can be fired at the trigger.

4.3.5 I/O Ports

The digital I/Os of the RF600 readers can be activated or deactivated individually. Via the digital inputs, for example, read operations can be triggered by means of light barriers. Pertinent visual or acoustic feedback can be output via the digital outputs.

The "I/O Ports" menu provides the following parameter setting options:

General



You can select an output from the table in the workplace. Its parameters can then be set via the Property view:

In the input field "**Inactivity Level**", you can define the state of the output (High or Low) after switching on the reader.

A time in ms can be entered in the "**Automatic Reset Time**" input field. After the reset time, a set output returns to the status defined via "Inactivity Level". If there is a further change in state during the Automatic Reset Time , the Automatic Reset Time starts from the beginning.

The "**Toggle Interval**" indicates a time interval in ms. As long as a set output is activated, it automatically switches the status of the reader output at the beginning and end of this time interval.

The parameters "Automatic Reset Time" and "Toggle Interval" can be combined with each other, so that the output automatically changes its state and after the given Automatic Reset Time returns to the level set under "Inactivity Level".

If you additionally activate the option "**Send notifications**", the reader will automatically generate an alarm after every status change.

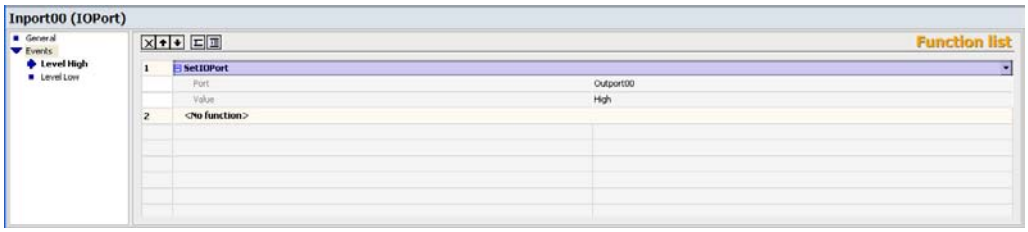
RF640R

Note that the RF640R reader has 2 digital inputs and 2 digital outputs that can be assigned parameters.

RF670R

Note that the RF670R reader has 4 digital inputs and 4 digital outputs that can be assigned parameters.

Events



- **Level High**

  As soon as an input or output is switched on, the function list configured here is triggered. Only the function "SetIOPort" can be used in the list of functions.

- **Level Low**

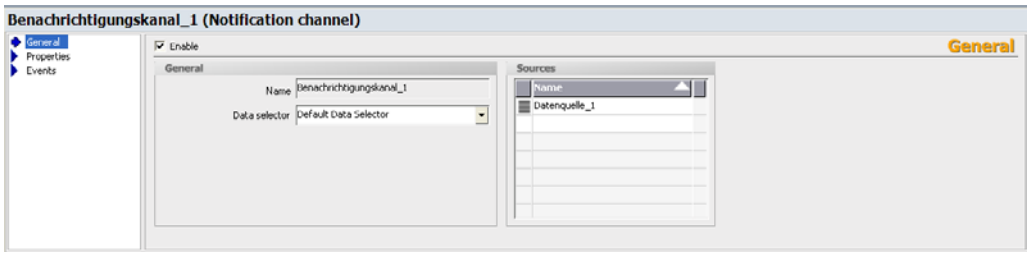
  As soon as an input or output is switched on, the function list configured here is triggered. Only the function "SetIOPort" can be used in the list of functions.

4.3.6 Notification channels

In accordance with the configured triggering mechanism and the data selector, the notification channels pass on the RFID data of the data sources assigned to them to the user application via the XML interface.

The "Notification channels" menu provides the following parameter setting options:

General



You can assign a name to the notification channel and assign a "Data selector" and one or more "Data sources" to it. You can define the data selector and the data source(s) yourself or select them from a drop-down list.

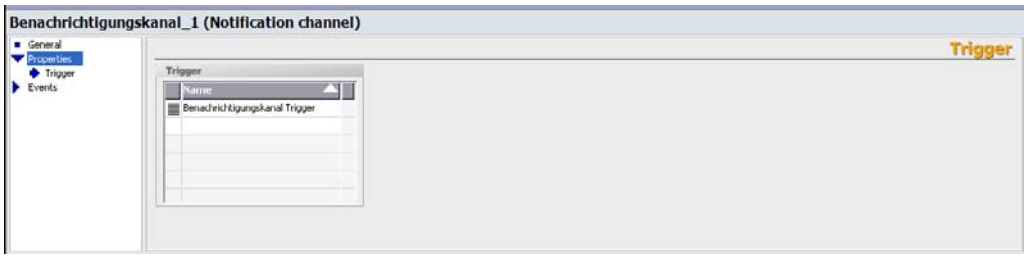
If a data selector is not defined for the notification channel, the data selector will automatically be used that was defined as current in the "Data selectors" submenu on the RFID device.

With "Activate", you activate the notification channel.

For more information, refer to the sections " Parameterizing data selectors (Page 117) " and " Data sources (Page 108) ".

Properties

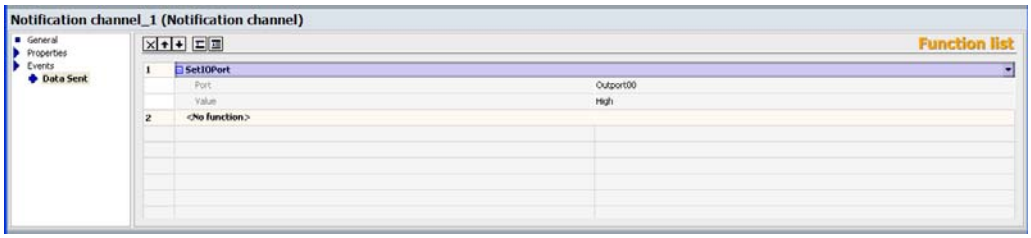
- **Trigger**



You can specify here whether the events received from the data sources should be transmitted **continuously** or whether they should be passed on dependent on the notification channel trigger. You can select these triggers from the drop-down list or create them. When you define the triggers, you can also specify when they will be activated.

You will find more detailed information in the section "Triggers (Page 115)".

Events



- Data Sent

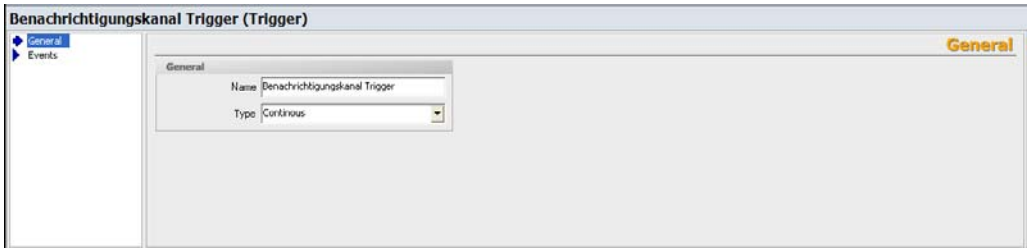
  As soon as the data supplied by the data sources is passed on to the XML interface to be sent to the application, the trigger is released. Only the system function "SetIOPort" can be set as a trigger.

4.3.7 Triggers

Triggers represent activation mechanisms that can be used to control read and notification procedures. Tag data are read at specific times or the stored tag data can be transferred dependent on triggers. Triggers can be used with data sources (read triggers) and notification channels (notification channel triggers).

The "Trigger" menu provides the following parameter setting options:

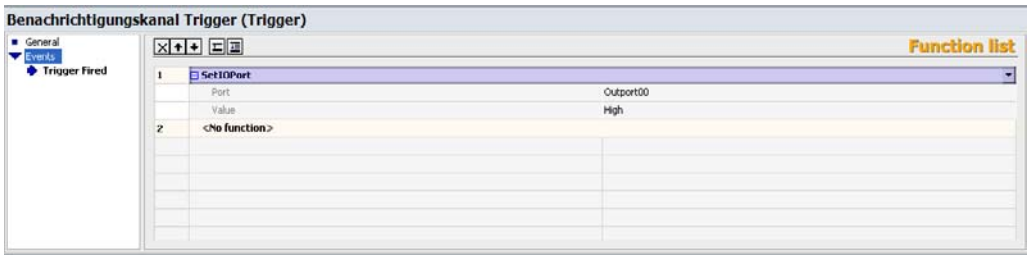
General



You can specify the trigger "Type" here and set the following parameters:

Trigger	Description	Parameter settings
Continuous	The activity is triggered as soon as possible and operates continuously. For notification channel triggers, this means that notifications are transmitted immediately via the XML interface to the user application when a new event occurs.	-
I/O edge	The activity is triggered by an external binary signal that specifies a transition: 0 → 1 or 1 → 0 (rising or falling).	The transition for the trigger ("rising" or "falling") must be specified. A digital I/O of the reader must be assigned to the trigger.
I/O signal level	The activity will be activated by an external binary signal as long as the level is *Low* or *High*.	The trigger must be set to "Low" or "High". The trigger must be assigned to a digital I/O of the reader.
Application request	The activity is triggered on request from the application via the XML interface.	-
Timer	The activity is triggered in accordance with specified time intervals.	The time ("Timer") between the triggers must be specified in milliseconds.

Events



- **Trigger fired**

  As soon as a trigger is fired according to its conditions, the function list configured here is triggered. Only the function "SetIOPort" can be used in the list of functions.

4.3.8 Tag selectors

In the "Tag selector" tab, you can define mechanisms that use HEX character strings to control the detection of tags by the reader. Tag selectors are based on the EPC data and on the freely parameterizable user data. Tag selectors are components of data sources.

In combination with tag fields, tag selectors determine which data are read. When the read data are filtered, tag selectors determine which tags are passed on and which are rejected.

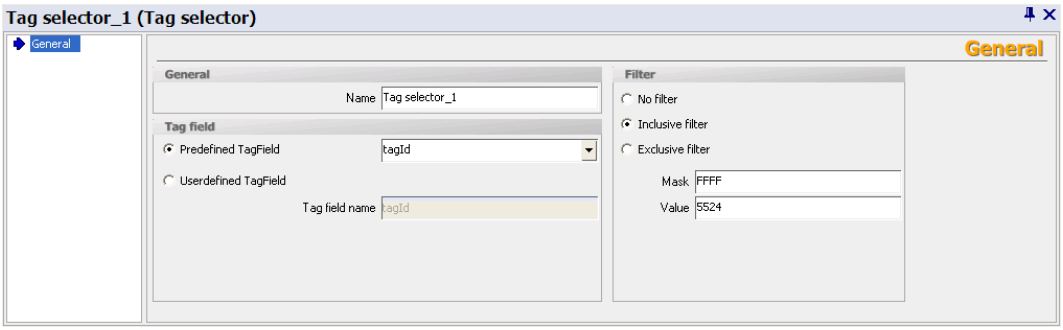
You can use the tag fields to filter on the basis of the values of the EPC components. For this purpose, you must select one of the predefined and unchangeable tag fields.

If you want to filter on the basis of freely definable user data, new tag fields must be created for this purpose.

Procedure

Select the "Tag selector" tab. You can create a new selector here by double-clicking an empty line of the table with the left mouse button. You can edit it in the property view.

General



You can assign a name to the selector in "General".

If you want to filter on the basis of EPC components, select a "Predefined tag field" ("AccessPassword", "KillPassword" or "TagID").

If you want to filter on the basis of freely definable user data, select the "User-defined tag field" option. Specify a name under "Tag field name". You can assign an address to the memory bank in "Memory bank". The "Offset" parameter supplies the start address within the memory bank in bits. Finally, enter the length of the tag field in bits in the Length parameter.

Regardless of the type of filtering, the following applies: Enter a HEX character string in "Mask" that specifies the bit positions relevant for filtering in terms of the tag fields used. "Value" defines a HEX character string that specifies the bit values for the bit positions.

Example

Contents of the freely parameterizable tag field	1	2	3	4	5	6
Mask	0	F	F	F	0	0
Value	0	2	3	4	0	0

If the "Inclusive filter" option is activated, all the tags are returned that correspond to the filter criteria - which was the case in the above example.

If the inclusive option is not activated ("Exclusive filter"), all the tags are returned that do **not** correspond to the filtering criteria. If several tag selectors are created and they are assigned to a data source, a tag will only be supplied if it matches at least one inclusive filter and does not match any exclusive filter.

If you only want to read the RFID data, activate the option "No filter" - then filtering will not be performed.

If, for example, from a large number of tags, only the tags of two manufacturers should be supplied, you will need two tag selectors. For each of these, specify a field in Tag field name that contains the manufacturer's name and enable the "Inclusive filter" option. In Mask / Value, one of the manufacturers must be set for each tag selector.

If you want to work with several tag selectors, but the parameterization does not permit it, you must configure several data sources with the same antennas.

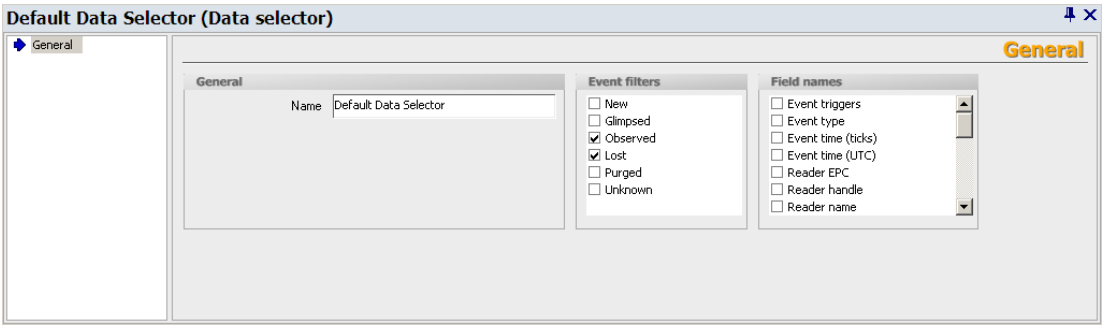
4.3.9 Parameterizing data selectors

In the "Data selector" tab, you can define selectors that will further reduce the volume of information and determine which information should be passed on. Data selectors are components of notification channels and can only be used with the asynchronous read procedure.

Procedure

Select the "Data selector" tab. You can create a new data selector here by double-clicking an empty line of the table with the left mouse button here. You can edit it in the property view.

General



You can assign a name to the data selector and link it to the tags with "Event filters" in terms of the status description - depending on with the parameter settings made in "Smoothing". The set event types are transferred to the user application. You can select up to six predefined event filters (meaning, see section "Who do I let know? (Page 50)").

You can also assign reader fields to the data selector. These determine which information (e.g. reader name or tag type) within the report will be provided to the user application.

Available reader fields	
Name	**Meaning**
Event trigger	Read trigger that led to creation of the event
Event type	Event type / Status description of the tags
Event time (ticks)	Time of event in ticks
Event time (UTC)	Time of event in UTC format
Reader EPC	EPC of the reader specified by the manufacturer
Reader handle	Number for identification of the reader
Reader name	Name of the reader
Reader role	Role of the reader
Reader time (ticks)	Time of event handover in ticks
Reader time (UTC)	Time of event handover in UTC format
RSSI value	Signal strength of the tag
Tag type	Tag type used
Tag ID	ID of the tag
Data source name	Name of the data source
Notification channel name	Name of the notification channel
Notification channel trigger	Name of the notification channel trigger
Transmitting antenna	Name of the antenna that was transmitting when the tag was detected.
All event fields	-
All reader fields	-
All notification fields	-
All supported fields	-

Note

Reader fields without data selectors

If a data selector is not configured, all the information supported by the reader is transferred as standard. This corresponds to the above-mentioned option "All supported fields".

Note

Standard data selector

RF-MANAGER Basic automatically creates a standard data selector that cannot be deleted. This is automatically assigned to the first notification channel to be created. As soon as you have created a new data selector, assignment of the standard data selector can be removed.

4.4 Working with system functions

4.4.1 System functions - basics

Introduction

RF-MANAGER provides predefined system functions for some configuration tasks. You can use them to perform tasks direct in the reader without special programming skills.

Use of system functions

System functions provide support, for example, if you wish to assign a function to events:

- Setting the output port of a reader
- Setting a reader outport for specific tags.

Purpose

You use system functions in a function list. You cannot change system functions, since system functions are pre-defined functions.

When configuring a function list, select the system functions from a selection list that is sorted by categories:

Language dependency

The names of the system functions are dependent on the set project language. The functionality can then be recognized immediately by the project planner.

4.4.2 Use of system functions

Introduction

A function list is processed in the reader when the configured event occurs. The reader triggers an event when e.g. a change at a digital input or a tag is detected.

Applications

You can configure system functions on all the objects that are able to react to an event. You can use system functions directly in function lists and thereby control the sequence.

4.4.3 Working with function lists

4.4.3.1 Basic principles of the functions list

Introduction

When the configured event occurs, you can perform several system functions with the function list.

Principle

You configure the function list for an event of an object, e.g. tag detected. The events which are available depend on the selected object.

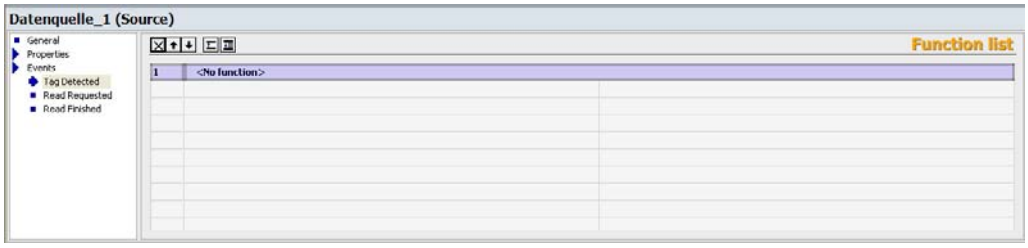


Figure 4-9 Function list

You can configure a function list precisely on every event.

4.4.3.2 Properties of a function list

Status information

During configuration the project data is tested in the background. A status information returns in each function list the status of the respective system functions.

The status information has the following meaning:

- Orange: Function list is not performed in the reader because at least one system function or a script has not been supplied completely with parameters.

Completion of system functions

System functions in a function list are processed in the reader sequentially from top to bottom.

4.4.3.3 Configure function list

Introduction

A function list is configured by selecting system functions from a selection list. The system functions are arranged in the selection list according to categories.

Requirement

Object has at least one configurable event.

Procedure

1. Open the editor in RF-MANAGER Basic in which the object is located.
2. Select the object with the mouse.
3. In the properties dialog box, click on the event in the "Events" group for which you want to configure the function list.
4. In the property view select the entry <No Function>" from the selection list with the mouse.
5. Select the desired system function from the selection list. Alternatively, enter the name of the system function.

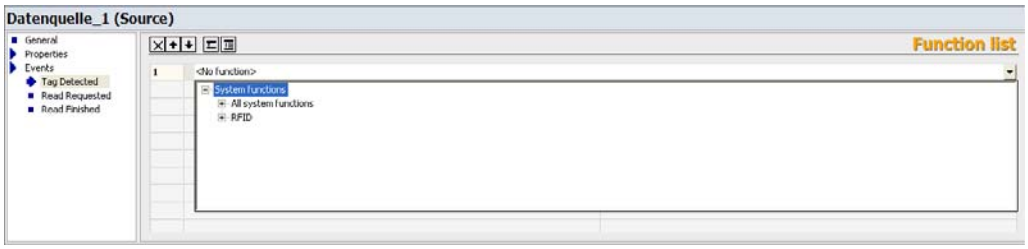


Figure 4-10 System functions

The system function is entered in the list of functions.

6. If the system function has parameters, then select the values corresponding to the parameters.

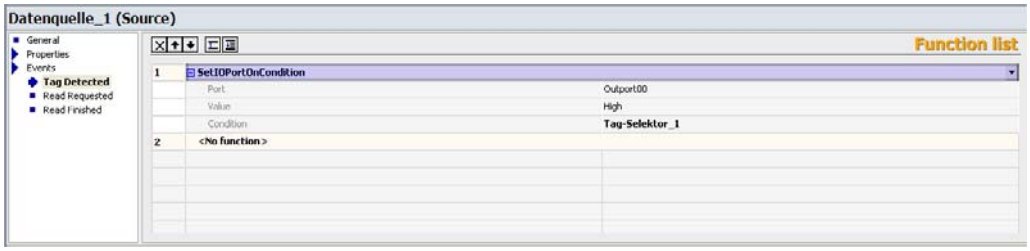


Figure 4-11 Parameter selection

7. If you want to add other system functions or functions to the function list, then repeat steps four to seven.

Result

The function list is configured. In addition to the configured event, the status of the function list is displayed in the property view. When the configured event occurs in the reader, the function list is processed from top to bottom.

4.4.3.4 Editing function lists

Introduction

A function list can be edited as follows:

- Completion order of the system functions and changing functions
- Removing system functions or functions

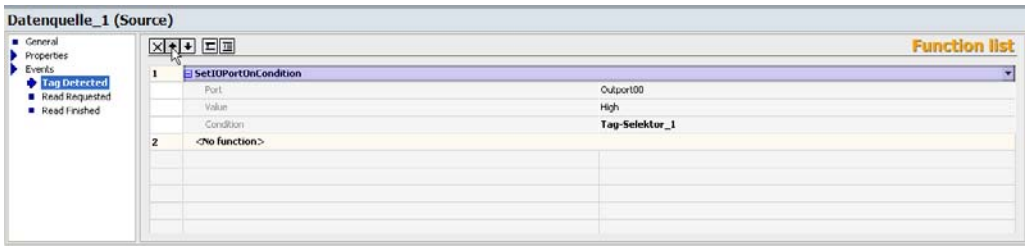
How a system function or function is added to a function list can be learned under "Configuring function lists".

Requirement

The function list is configured.

Procedure

1. Open the editor in RF-MANAGER Basic in which the object is located.
2. Select the object with the mouse.
3. In the properties window in the "Events" group, click on the event whose function list you want to edit.
4. In order to change the completion order of the function list, select the desired system function in the selection list with the mouse.
5. In the properties window click on the corresponding directional arrow until the system function is at the desired position.



6. In order to remove a system function from the function list, select the desired system function with the mouse. Then click on the "Remove" button in the properties window.

Alternative procedure

If you want to move several system functions simultaneously, you can select them in the function list. Press and hold <Ctrl> and select the required system functions with the mouse.

You can also use the drag-and-drop function to move.

Reference

5

5.1 System functions

5.1.1 Overview of system functions

The following table shows an overview of the system functions which can be executed direct in the reader.

Overview

RF-MANAGER Basic
SetIOPort
SetIOPortOnCondition
SetIOPortOnAlarm

5.1.2 Description of the system functions

5.1.2.1 SetIOPort

Purpose

Sets the specified output in the reader to the specified level.

Syntax

SetIOPort (Port, Level)

Parameter

Port

The name of the output that is set.

The following selection is possible for RF640R:

- Outport00
- Outport01

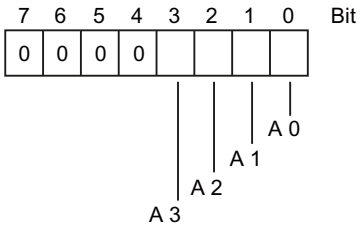
The following selection is possible for RF670R:

- Outport00
- Outport01
- Outport02
- Outport03

Level

Level to which the output must be set.

This is selected from a drop-down list: ("OFF" or "ON").



Configurable objects

Object	Event
RFID device	On Alarm
Data source	Tag detected Read Requested Read Finished
I/O Ports	Level High Level Low
Notification channel	Data Sent
Trigger	Fired

5.1.2.2 SetIOPortOnCondition

Purpose

Sets the specified output in the reader to the specified status when the specified condition is fulfilled.

The condition is determined by the use of a tag selector.

Syntax

SetIOPortOnCondition(Port, Level, Condition)

Parameter

Port

The name of the output that is set.

The following selection is possible for RF640R:

- Outport00
- Outport01

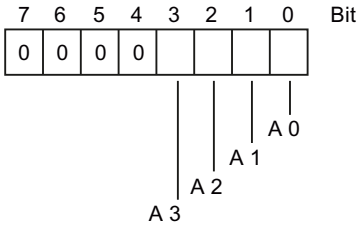
The following selection is possible for RF670R:

- Outport00
- Outport01
- Outport02
- Outport03

Level

Level to which the output must be set.

This is selected from a drop-down list: ("OFF" or "ON").



Condition

Tag selector which must be fulfilled so that the output is set.

Other information on tag selectors can be found in the chapter "Working with RFID objects".

Configurable objects

Object	Event
Data source	Tag detected

Application example

Objective

Outport 1 is to be set for a specific tag ID.

The tag ID is a 96 Bit-EPC-ID.

Notes on configuration

- Configure a tag selector with the following parameters:
  - Name = TagSelector_Condition
  - Tag field = Predefined tag field "TagId"
  - Filter = "Inclusive filter" with:

    Mask = FFFFFFFFFFFFFFFFFFFFFFFF

    Value = 30B40242201D8840000FE632
- For the data source at the event "Tag detected", configure the system function "SetIOPortOnCondition" with the parameters:
  - Port = Outport01
  - Level = HIGH
  - Condition = TagSelector_Condition

Procedure in the reader

As soon as the data source detects the tag with the defined tag ID, Outport 1 is set.

"SetIOPortOnCondition" system function with "Tag detected" trigger

The following requirements must be met if you want to use the system function "SetIOPortOnCondition" on a data source with the "Tag detected" trigger:

Prerequisites

1. Configure a tag selector with the required filter conditions and assign this to the system function as a parameter.
2. To read out the data from the tag, configure an additional tag selector with identical settings to the previously configured tag selector but without filter settings.

NOTICE
Matching the data Ensure that the data of the tag field agree completely, including the name. Predefined tag fields may also be used alongside user-defined tag fields.

3. Assign this second tag selector to the data source under "Data source > Properties > Tag selectors".

5.1.2.3 SetIOPortOnAlarm

Purpose

Sets the specified output of a reader to the specified level when a specified alarm is generated.

Syntax

SetIOPortOnAlarm (Port, Level, Alarm number)

Parameter

Port

The name of the output that is set.

The following selection is possible for RF640R:

- Outport00
- Outport01

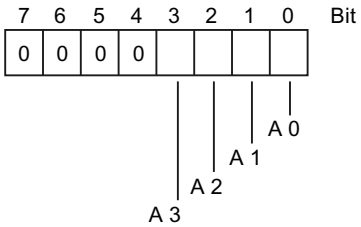
The following selection is possible for RF670R:

- Outport00
- Outport01
- Outport02
- Outport03

Level

Level to which the output must be set.

This is selected from a drop-down list: ("OFF" or "ON").



Alarm number

If this alarm number agrees with the alarm number triggered at the reader, the output is set.

Configurable objects

Object	Event
RFID device	On Alarm

Service & Support

6

Contacts

If you have any further questions on the use of our products, please contact one of our representatives at your local Siemens office.

The addresses are found on the following pages:

- On the Internet (http://www.siemens.com/automation/partner)
- In Catalog CA 01
- In Catalog ID 10 specifically for industrial communication / industrial identification systems

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- Fax: + 49 (0) 911 895 7223
- E-mail (mailto:support.automation@siemens.com)
- Internet: Online support request form: (http://www.siemens.com/automation/support-request)

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There you will find the following information, for example:

- Our newsletter containing up-to-date information on your products.
- Relevant documentation for your application, which you can access via the search function in "Product Support".
- A forum for global information exchange by users and specialists.
- Your local contact for IA/DT on site.
- Information about on-site service, repairs, and spare parts. Much more can be found under "Our service offer".

RFID homepage

For general information about our identification systems, visit RFID homepage (http://www.siemens.com/ident/rfid).

Technical documentation on the Internet

A guide to the technical documentation for the various products and systems is available on the Internet:

SIMATIC Guide manuals (http://www.siemens.com/simatic-tech-doku-portal)

Online catalog and ordering system

The online catalog and the online ordering system can also be found on the Industry Mall Homepage (http://www.siemens.com/industrymall).

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We offer appropriate courses to get you started. Please contact your local training center or the central training center in

D-90327 Nuremberg.

Phone: +49 (0) 180 523 56 11
(€ 0.14 /min. from the German landline network, deviating mobile communications prices are possible)

For information about courses, see the SITRAIN homepage (http://www.sitrain.com).

Appendix

A

A.1 Flash codes and error messages of the RF600 reader

Flash codes

Error description	Flashing of ERR LED	
	Number	Repetitions
Reader inactive, no configuration data	1	Permanent
Antenna 1 not connected or defective	3	Permanent
Antenna 2 not connected or defective	4	Permanent
Antenna 3 not connected or defective	5	Permanent
Antenna 4 not connected or defective	6	Permanent
Reading of user-defined memory has failed	11	3 times
Writing of user-defined memory has failed	12	3 times
The "SendCommand" function has failed	13	3 times
Wrong or missing password	14	3 times
Writing of the tag ID has failed	15	3 times
LOCK has failed	16	3 times
KILL has failed	17	3 times
Access to impermissible memory areas	18	3 times
Too many tags in the field	19	3 times
General software errors	20	Permanent
Impermissible message frame; Impermissible message frame parameter	29	3 times
Incorrect message frame format	30	3 times
The "SetReadProtect" NXP function has failed	31	3 times
The "ResetReadProtect" NXP function has failed	32	3 times
General error during detection of tags (inventory)	33	3 times

Error messages

A description of the RF600 reader error codes can be found in the manual "SIMATIC RF Function Manual".

A.2 Open Source Software used in this product

License Conditions and Disclaimer for Free Software

The product "RF-MANAGER" (hereinafter referred to as "Product") contains the open source software listed below in unmodified or in a form modified by us (hereinafter referred to as "Open Source Software"):

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For the complete description of copyright notices, license texts and open source software please refer to the Online Help of RF-MANAGER Basic.

Glossary

Active field

Area with minimum field strength containing the sensing range. Within this sensing range, data can be read from the tag or written to the tag.

Active surface

See active field

See active field

Active surface

See active field

See active field

Active tag/transponder

Active transponders are battery-operated, i.e. they obtain the energy required to save data on the microchip from a built-in battery. They are usually in an idle state and do not transmit data in order to increase the energy source's service life. The transmitter is only activated when it receives a special activation signal.

ALE interface

Application Level Events (ALE) specifies an interface over which RFID data can be requested from higher-level systems. The data volume is reduced via ALE connections and the quality of the data stream is improved at the same time. The ALE interface can be used by higher-level systems for both synchronous and asynchronous reading of RFID data. ALE clients therefore only have a logical view of workplaces, detailed knowledge of the RFID system or readers is no longer necessary.
For an ALE connection, ALE groups can also be configured that specify how the data records that have been passed on should be grouped for the report to the ALE client.

AM

Amplitude modulation; data are present in the changes in carrier frequency amplitude.

Amplitude modulation

See AM

Antenna switching

The change antenna function switches antennas over between transmitting (TX) and receiving (RX) in accordance with the rotation principle. In practice, the system transmits on one antenna at one time and receives on the other antennas.

Antennas

Antennas read/write RFID data from/to the tags. They pass the read data onto the data sources.

AS

See Automation system

ASM

Interface module, see communication modules

Automation system (AS)

A programmable logical controller (PLC) of the SIMATIC S7 system, comprising a central controller, a CPU and various I/O modules.

Battery-free data storage unit

Mobile data storage units which operate without batteries (see transponders). Power is supplied to the data storage unit across an electromagnetic alternating field.

Baud

Unit (digits per second).

Baud rate

The baud rate describes the data transmission's digit rate.

Byte

One byte represents a group of eight bits.

CE guidelines

See CE Label

CE Label

Communauté Européenne (product mark of the European Union)

Communication modules

Communication modules are used to integrate the identification systems in SIMATIC or SINUMERIK systems, or to connect them to PROFIBUS, PROFINET, PC or any other system. Once supplied with the corresponding parameters and data, they handle data communication. They then make the corresponding results and data available. Suitable software blocks (FB/FC for SIMATIC; C libraries for PCs with Windows) ensure easy and fast integration in the application.

Continuous Wave

See CW

CW

Continuous Wave; data are present in the carrier frequency which is switched on and off.

Data rate

The rate at which data are exchanged between the tag and reader. Typical units are bits per second or bytes per second.

Data sources

Data sources are the basic components for reading RFID data. They encapsulate the antennas assigned to them and the data received by them for the subsequent function units. In general, one RFID device can also contain more than one data source. Various different data sources can be defined so that mutually independent tasks can be performed with the same reader.

Data transfer rate

Number of characters which can be transmitted from a tag to a reader within a defined time. Baud rates are also used to specify how fast a reader can read information.

Data transmission rate

Unit of measurement for the volume of data transmitted within a unit of time, e.g. bytes/s, see also Baud

dB

See Decibel

dBm

Dimensional unit for the transmitted power in the logarithmic relation to 1 mW (Milliwatt).

0 dBm = 1 mW, +23 dBm = 200 mW, +30 dBm = 1 W

dBr

dB(relative); a relative difference to a reference value

Decibel (dB)

Unit of measurement for the logarithmic relationship between two variables.

Detuning

UHF antennas are tuned to receive a particular electromagnetic wavelength from the reader. If the antenna is too close to metal or a metallic material, it can be detuned, making the performance deteriorate.

DHCP

Dynamic Host Configuration Protocol

Distant field communication

RFID antennas emit electromagnetic waves. If a tag is further than one full wavelength from the transmit antenna of the reader, this is known as a distant field. If it is within one complete wavelength, this is known as the near field.

The wavelength in the UHF RFID system is approximately 33 cm.

The distant field weakens according to the square of the distance to the antenna and the near field weakens according to the cube of the distance to the antenna. Passive RFID systems based on distant field communication (UHF and microwave systems) have a greater read range than systems based on near field communication (typically low-frequency and high-frequency systems).

Dwell time

The dwell time is the time during which the transponder dwells within the sensing range of a reader. The reader can exchange data with the transponder during this time.

Dynamic mode

In dynamic mode, the data carrier moves past the reader at a traversing rate which depends on the configuration. Various checking mechanisms ensure error-free data transfer even under extreme environmental conditions.

EAN

European article number. Standardized barcode used in Europe, Asia and South America. Is administered by EAN International.

EBS

Equipotential **B**onding **S**trip

Effective Isotropic Radiated Power

See EIRP

Effective Radiated Power

See ERP.

EIRP

Effective Isotropic Radiated Power; unit of measurement for the transmission power of antennas (referred to an isotropic radiator) mainly used in the USA. EIRP is specified in Watt, and is not equal to ERP. (0 dbi = –2.14 dBm)

Electromagnetic compatibility (EMC)

Electromagnetic compatibility is the ability of an electrical or electronic device to operate satisfactorily in an electromagnetic environment without affecting or interfering with the environment over and above certain limits.

EMC

See Electromagnetic compatibility

EMC directive

Guidelines for electromagnetic compatibility This guideline relates to any electrical or electronic equipment, plant or system containing electric or electronic components.

EPC

Electronic Product Code. Standardized number system for identifying articles with a data width of either 64, 96 or 256 bits.

EPCglobal

The non-profit organization EPCglobal Inc. develops standards for uniform use of RFID technology throughout the entire supply chain spanning different countries and sectors. Development of the EPC (Electronic Product Code) was an important step in the direction of RFID standardization.

Equipotential bonding

Potential differences between different parts of a plant can arise due to the different design of the plant components and different voltage levels. It is necessary to compensate for these differences by equipotential bonding. this is done by combining the equipotential bonding conductors of power components and non-power components on a centralized equalizing conductor (EBS = **E**quipotential **B**onding **S**trip).

ERP

Effective Radiated Power; unit of measurement for the power of antennas (referred to an ideal dipole) mainly used in Europe. ERP is specified in Watt, and is not equal to EIRP. (0dbm = + 2.14 dBi)

ESD directive

Directive for handling **E**lectrostatic **S**ensitive **D**evices

ETSI

European Telecommunications Standard Institute

European Article Numbering

See EAN.

eXtensible markup language

See XML.

FCC

Federal Communications Commission (USA)

FHSS

Frequency Hopping Spread Spectrum; frequency hopping procedure.

FM

Frequency modulation; data are present in the changes in the frequency of the carrier frequency.

Frequency hopping

Frequency hopping technique Automatic search for free channels.

In frequency hopping mode, data packets are transmitted between communication partners on continuously changing carrier frequencies. This makes it possible to react to interference from devices transmitting signals in the same frequency range (channel). If an attempt to send a data packet is unsuccessful, the packet can be transmitted again on a different carrier frequency. By default the RF600 uses this procedure (FCC) only in the USA and Canada.

Frequency modulation

See FM.

Frequency Shift Keying

See FSK

FSK

Modulation, Frequency Shift Keying; data are present in the changes between two frequencies.

ICNIRP

International Commission of Non Ionizing Radiological Protection

ICRP

International Commission of Radiological Protection

Interface modules

See communication modules

Interrogator

See readers

ISO

International Standard Organization

ISO 18000

Standard for data exchange of RFID systems between reader and transponder. There are various subdefinitions of this standard for the various approved frequency ranges for RFID. For example, the range 865 ... 868 MHz is described in ISO 18000-6.

LAN

Local Area Network

LBT

Listen Before Talk; the reader only transmits when the channel is free.

Limit distance

The limit distance is the maximum clear distance between reader antenna and transponder at which the transmission can still function under normal conditions.

Mass recording

The capability of a reader to record several or many transponders quasi-simultaneously and to read the code. Contrary to the multi-tag capability, the reader is not able to specifically address individual tags.

MDS

Mobile data memory, see transponder

MES

Manufacturing Execution System

Metal-free area

Distance/area which must be maintained between the transponder and metal in order to prevent interference during data transfer between the transponder and reader.

Mobile Data Memory (MDS)

Mobile data memory, see transponder

Modulation

Modulation is a procedure with which one or more characteristics (e.g. phase, amplitude, frequency) of a carrier oscillation are modified according to the response of a modulating oscillation.

MTBF

Mean Time Between Failures of a device

Multi-tag capability

Multi-tag capability means that a reader can communicate simultaneously with different data carriers. Therefore the reader can specifically address a transponder with its UID (see also mass recording).

Near field communication

RFID antennas emit electromagnetic waves. If a tag is further than one full wavelength from the transmit antenna of the reader, this is known as a distant field. If it is within one complete wavelength, this is known as the near field.

The wavelength in the UHF RFID system is approximately 33 cm.

The distant field weakens according to the square of the distance to the antenna and the near field weakens according to the cube of the distance to the antenna. Passive RFID systems based on near field communication (typically low-frequency and high-frequency systems) have a greater read range than systems based on distant field communication (typically UHF and microwave systems).

Notification channels

One or more data sources are assigned to notification channels as data suppliers. Notification channels are used for asynchronous read procedures. The notification channel passes on the RFID data to the data sources assigned to it in accordance with the configured triggering mechanism (notification channel trigger) and the data selector. Notification channels can reference more than one data source. The information from notification channels (if they have been created) is also requested in the synchronous read procedure.

Passive tag/transponder

A tag without its own power supply. Passive transponders obtain the energy required to supply the microchips from the radio waves they receive.

PDM

Pulse width modulation; data are present in the pulse width.

Phase modulation

See PM

PLC

Programmable Logic Controller, see PLC.

Programmable logic controller; electronic device used in automation engineering for open-loop and closed-loop control tasks. The typical modules of a PLC are the CPU, power supply (PS) and various input/output modules (I/O).

Programmable controller: The programmable logical controllers (PLC) of the SIMATIC system consist of a central controller, one or more CPUs, and various other modules (e.g. I/O modules).

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PM

Phase modulation; data are present in the changes in carrier frequency phase.

Programmable Logic Controller

See PLC.

Programmable logic controller

See PLC

Pulse width modulation

See PDM

Radio Frequency Identification

See RFID.

Read procedures

There are two different techniques for reading the data sources:

- Synchronous read procedure
  A synchronous read procedure is when an ALE client of the enterprise system logs onto the report of the ALE interface and receives the required data automatically.
- Asynchronous read procedure
  An asynchronous read procedure is when an ALE client of the enterprise system logs onto the report of the ALE interface and receives the data automatically. This continues until the client logs off again.

Read rate

Number of tags which can be read within a defined time.
The read rate can also be used for the maximum rate at which data can be read from a tag. The unit is bits per second or bytes per second.

Reader (also interrogator)

Readers transfer data between the mobile data storage units (tags or transponders) and the higher-level systems. The data, including the energy required for processing and sending back, are transmitted to the transponder across an electromagnetic alternating field. This principle enables contact-free data transmission, ensures high industrial compatibility and works reliably in the presence of contamination or through non-metallic materials.

Reader talks first

A passive tag communicates in the read field of a reader with the reader. The reader sends energy to the tags which only reply when they are explicitly requested. The reader is able to find tags with a specific serial number commencing with either 1 or 0.
If more than one tag responds, the reader can scan all tags commencing with 01 and subsequently with 010. This is referred to as "walking" on a binary tree, or "tree walking".

Reading range

The distance within which a reader can communicate with a tag. Active tags can cover a greater distance than passive tags because they use a battery to send signals.

Report

A combination of rules which manage communications systems.

RFID

Radio Frequency Identification; a method of identifying items using electromagnetic waves. The reader supplies energy to the tag and communicates with it.

RFID device

The RFID device is a function block in RF-MANAGER and represents a reader. The following components are active in this function block: Antennas, data sources and notification channels.

RFID systems

SIMATIC RF identification systems control and optimize material flow and production sequences. They identify reliably, quickly and economically, use non-contact data communication technology, and store data directly on the product. They are also resistant to contamination.

RH circular

Right hand circular polarization

RTNC

Connector standard (Reverse TNC). Industrial coaxial connector with screw coupling, can be used for frequencies of up to 2 GHz. The mechanical design of the RTNC connector is not compatible with the TNC connector.

RTTE

Radio and Telecommunications Terminal Equipment

SCM

Supply Chain Management

Secondary fields

In addition to the main sensing range (antenna's main direction of transmission) there are secondary fields. These secondary fields are usually smaller than the main fields. The shape and characteristics of the secondary field depend on the metallic objects in the surroundings. Secondary fields should not be used in configuring.

Selectors

An RFID system that has been configured using RF-MANAGER recognizes different types of selectors. These are distinguished as follows:

- **Tag selectors**
  Tag selectors are components of data sources. They determine which tag data areas should be read or routed on. They also define which tags should be supplied or filtered out on the basis of the contents of these data areas. In this case, a tag selector orientates itself on the tag ID or the freely parameterizable user data of the tag.
- **Data selectors**
  Data selectors are components of notification channels. They further dilute the information stream and specify which information should be passed on.
  In general, data selectors can also supply additional information (reader fields). This includes, for example, the time of the read.
- **ALE selectors**
  ALE selectors reduce the data volume in accordance with the requirements of higher-level systems and pass on the information in the form of ALE reports. ALE selectors can only sort EPC data; filtering of the freely parameterizable user data is not possible.

SELV

Safety Extra Low Voltage

Sensing range

Area in which reliable data exchange between transponder and reader is possible due to a particular minimum field strength.

Smoothing

Smoothing is a technique that is used to optimize the read quality. The RF-MANAGER marks the read event with a status description for the tag (e.g.: detected for the first time, reliably detected, lost) and adds these states to the read results. Time intervals are defined using this technique - for example, how long a tag detected for the first time has to be "seen" for it to be regarded as reliably detected. This allows tags to be excluded that have been unintentionally detected briefly in the boundary areas of the reader.

SSB

Single Sideband Modulation. SSB is similar to AM (amplitude modulation), however, only one sideband is sent instead of two sidebands. This saves 50% of the spectrum required in the HF channel without affecting the signal/data rate. For RFID applications, an HF carrier must also be sent to supply energy to the tag. Sending a carrier is many times not required for other SSB applications, since the HF carrier itself does not contain any data.

Static mode

In static mode the transponder is positioned at a fixed distance (maximum: limit distance) exactly above the reader.

Tag

See transponder

Tag talks first

A passive tag communicates in the read field of a reader with the reader. When a tag reaches the field of a reader, it immediately indicates its presence by reflecting a signal.

TARI

Abbreviation of Type A Reference Interval. Duration (period) for representation of a bit with content 0.

TCP/IP

Transmission Control Protocol/Internet Protocol

Telegram cycles

A passive tag communicates in the read field of a reader with the reader. When a tag reaches the field of a reader, it immediately indicates its presence by reflecting a signal. Transmission of a read or write command is implemented in three cycles. They are called "Telegram cycles". One or two bytes of user data can be transferred with each command. The acknowledgment or response transfer (status or read data) takes place in three further cycles.

Template

The template is a configuration file (*.rf660r) which contains all of the country-specific parameters (such as radio and tag protocol settings) required for operating the reader.

TNC

Connector designation (Threaded Neill Concelman).

Industrial coaxial connector with screw coupling, can be used for frequencies of up to 2 GHz.

Transceiver (transmitter/receiver)

Combination of transmitter and receiver. A unit which can both send and receive electromagnetic waves.

Transmission distance

Distance between communication module and transponder

Transponder

An invented word from transmitter and responder. Transponders are used on the product, the product carrier, the object, or its transport or packaging unit, and contain production and manufacturing data, i.e. all application-specific data. They follow the product through assembly lines, transfer and production lines and are used to control material flow.

Because of their wireless design, transponders can be used, if necessary, at individual work locations or manufacturing stations, where their data can be read and updated.

Tree walking

See Reader talks first.

Triggers

Triggers represent activation mechanisms that can be used to control asynchronous read and filter procedures. These are distinguished as follows:

- Read triggers
  Read triggers cause the data source to read the data from the tags that are located in the field of the antennas. A continuous trigger can, for example, be configured that will cause the antennas to read constantly.
- Notification channel triggers
  Notification channel triggers cause the notification channel to transfer the data from the data source assigned to it. A continuous trigger can, for example, be configured that will cause data to be transferred constantly.

UHF

Ultra-high frequency; frequency range from 300 MHz to 3 GHz. UHF RFID tags usually operate between 866 MHz and 960 MHz. This corresponds to a wave length of approx. 33 cm.

UID

User IDentifier; the UID is an unambiguous number in the transponder, assigned by the manufacturer. The UID is unambiguous, and can usually also be used as a fixed code. The UID is used to specifically address a transponder

Ultra High Frequency

See UHF.

User IDentifier

See UID

VESA

Video Electronics Standards Association (authority that defines standards for the PC industry)

Walking

See Reader talks first.

WLAN

Wireless LAN

Workplaces

Workplaces are used as an abstraction of the hardware. The relevant data sources and notification channels are grouped here into workplaces using the RF-MANAGER. In practice, workplaces are combinations of readers.

Write/read distance

See transmission distance

writer

See readers

XML

eXtensible markup language; XML is a language derived from SGML with which other languages (document types) can be described. In the meantime, XML has become a widely used method for distributing information over the Internet. Data exchange between reader and read station is carried out using XML commands.

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