RFID SYSTEMS

SIMATIC RF660R Configuration Software

Configuration Manual · 12/2009

SIMATIC Sensors

Answers for industry.

SIEMENS

SIEMENS

Introduction 1

Description 2

Commissioning the RF660R configuration software 3

Parameterizing the RF660R 4

Appendix A

SIMATIC Sensors

RFID systems
RF660R configuration software

Configuration Manual

12/2009
J31069 D0170-U001-A6-7618

Legal information

Warning notice system

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.

⚠ DANGER

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

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

CAUTION

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

NOTICE

indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation for the specific task, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be adhered to. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of the Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

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.

Siemens AG
Industry Sector
Postfach 48 48
90026 NÜRNBERG
GERMANY

J31069 D0170-U001-A6-7618
℗ 12/2009

Table of contents

1 Introduction 7

1.1 Preface 7

2 Description 9

3 Commissioning the RF660R configuration software 11

3.1 Installing software packages 11

3.2 Connecting the reader to the parameterization computer 14

3.3 Starting the RF660R configuration software 15

3.4 Compatibility firmware/configuration software 15
3.4.1 Upgrading/downgrading the firmware 17
3.4.1.1 Prerequisites 17
3.4.1.2 RF660R configuration software V1.2 with reader firmware V1.2: Updating the firmware 18
3.4.1.3 RF660R configuration software V1.3 with reader firmware V1.3: Downgrading the firmware 18
3.4.1.4 Older versions of RF660R configuration software and firmware 19

3.5 General operating and display options 20

3.6 Setting up a serial connection 22

3.7 Setting-up an Ethernet connection 26

4 Parameterizing the RF660R 29

4.1 Overview 29

4.2 Using and creating templates 29
4.2.1 Parameterizing a reader using a template 29
4.2.2 Supplied standard templates 32
4.2.3 Creating a template 35

4.3 Parameterizing a reader without a template 36
4.3.1 Online configuration of a reader 36

4.4 Parameterization steps in detail 37
4.4.1 Setting-up an Ethernet port 37
4.4.2 Antenna settings 40
4.4.3 Radio settings 43
4.4.3.1 ETSI radio settings 43
4.4.3.2 FCC radio settings 44
4.4.3.3 CHINA radio settings 45
4.4.4 ISO 18000-6B protocol settings 47
4.4.5 EPC Class 1 GEN 1 protocol settings 51
4.4.6 EPC Class 1 GEN 2 protocol settings 52
4.4.7 Trigger settings 58
4.4.8 Reader mode settings 60
4.4.9 Dense Interrogator Environment 61
4.4.9.1 Settings for the DIE mode 61
4.4.10 Reader summary 64
4.4.11 Saving the reader default settings as template 65

4.4.12 Advanced options ... 66
4.4.12.1 Firmware update ... 67
4.4.12.2 Reader Reset ... 69
4.4.12.3 Boot loader update ... 70
4.4.13 Tag event monitor ... 72

A Appendix ... 75

A.1 Error messages ... 75
A.2 EPC Gen 2 session flags ... 76
A.3 Priority list for internal tasks of the reader ... 77
A.4 Service & Support ... 78

Glossary ... 81

Index ... 95

Introduction

1

1.1 Preface

Purpose of the manual

These operating instructions contain all the information you need for installing and using the SIMATIC RF660R configuration software.

It is intended for the use of installation and commissioning engineers who will be commissioning the software themselves and therefore parameterizing readers of the RF600 family.

The manual's area of application

This manual is valid for version V1.3 of the SIMATIC RF660R configuration software for the reader RF660R V1.3 (Rel.4) (MLFB: 6GT2811-0AA01) and describes the delivery status as of December 2009.

Convention

The abbreviation "configuration software" is also used within this documentation for the product name SIMATIC RF660R configuration software. Readers of the RF600 family are also referred to as RF660R or just readers.

Registered trademarks

SIMATIC ® is a registered trademark of the Siemens AG.

History

Edition	Comment
11/2005	First edition
03/2006	2nd revised edition
04/2006	3rd revised and extended edition Details in the technical descriptions were revised.
06/2006	4th revised and extended edition
07/2008	5th revised and extended edition
12/2009	6th revised and extended edition • Only the new ETSI standard EN 302 208 V1.2.1 (4-channel plan) is supported. • ETSI SRD is no longer supported. • Listen Before Talk (LBT) is deactivated.

Description

2

Application

Use the Java-based SIMATIC RF660R configuration software to parameterize readers of the SIMATIC RF660R reader under Windows XP.

Range of functions

The software offers the following functions:

Menu	Description
Reader connection	Implementing settings for communication from reader to PC.
Ethernet settings	Implementing Ethernet settings (IP address, subnet mask, listen port).
Antenna settings	Implementing settings for the antennas connected to the reader.
Radio settings	Implementing general settings regarding the radio standard used by the reader.
Tag protocol (ISO B)	Implementing settings for the communication between the reader and the tags.
Tag protocol (EPC 1)	
Tag protocol (EPC 2)	
Trigger settings	Implementing settings for the trigger function of the reader radio standard.
Reader mode settings	Setting the operating mode of the reader.
Overview	Display all parameterization settings.
Advanced options	Resetting the reader and updating its firmware.
Event monitor	Displaying statistical data for the tags.

Commissioning the RF660R configuration software 3

3.1 Installing software packages

Prerequisites

Hardware requirements

You will need a PC with Windows XP for installing the software packages that are required for parameterizing readers of the RF600 series.

Software requirements

You have two options to install the SIMATIC RF660R configuration software:

- Software package on the product CD "SIMATIC Sensors - Software & Documentation" The required installation file of the SIMATIC RF660R Configuration Software V1.3 can be found at: "daten\RF600\RF660R Configuration Software\ Config SW V1.3".
- Download of the software package via the "Service&Support" online portal (www.siemens.com/automation/service&support). Look for the delivery release of the reader RF660R V1.3.

Note

Compatibility configuration software/reader firmware

Please note that the configuration software version must always be compatible with the corresponding firmware of the SIMATIC RF660R reader. For more information, refer to Section "Compatibility firmware/configuration software (Page 15)".

Checking the DPI settings of your computer

Prior to installation of the SIMATIC RF660 configuration software (described below), please make sure that the screen display setting is 96 DPI. In case of a wrong DPI setting, display elements and buttons may be displayed corrupted on the screen.

To check your DPI settings, go to Start -> Settings -> Control Panel -> Display -> Tab 'Settings'.

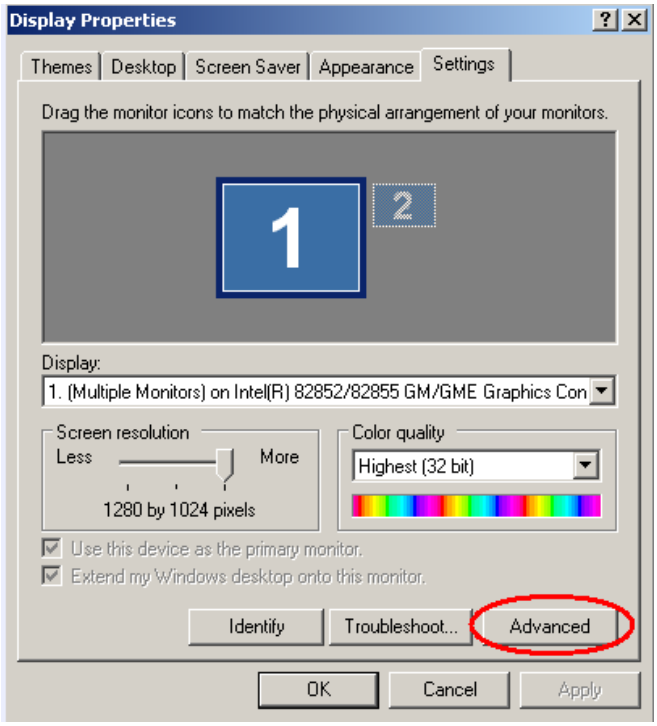


Figure 3-1 Checking the DPI settings

Then 'Advanced' -> tab 'General'

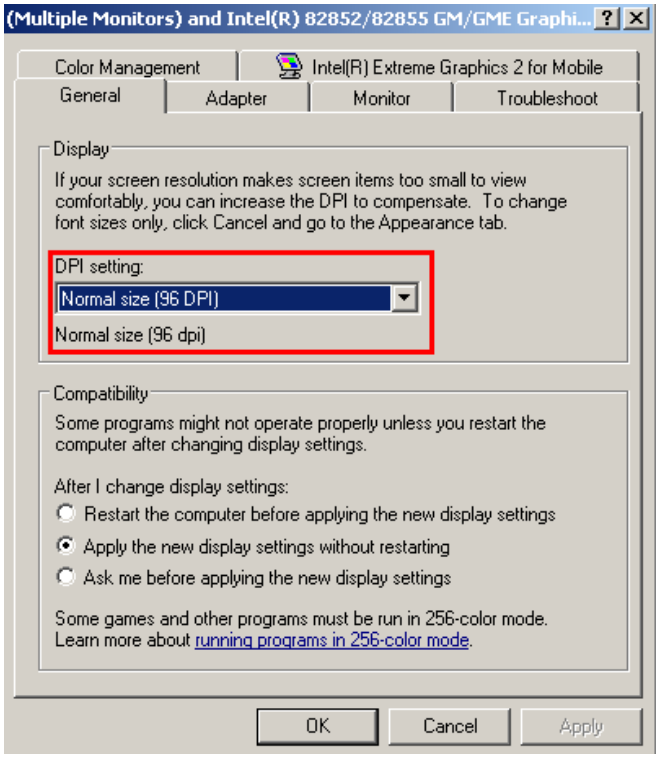


Figure 3-2 Apply DPI settings

DPI setting' -> Normal size (96 DPI) -> Apply -> OK

Installing the SIMATIC RF660 Configuration Software

To install the SIMATIC RF660R configuration software, proceed as follows:

1. Insert the product CD "SIMATIC Sensors - Software & Documentation" in the drive of your parameterization computer.
2. Enter the path "daten\RF600\RF660R Configuration Software\ Config SW V1.3" or navigate via the web interface to the directory "Tools & Applications".
3. Alternatively, you can download the software package via the "Service&Support" online portal.
4. Start the installation by double-clicking the "setup.exe" file.
5. Follow the instructions on your screen until the software has been installed.

   No you can start the configuration software either by clicking the respective desktop icon or via the Windows start menu under
   "Start > Programs > SIMATIC > RF660R Configuration Software".

3.2 Connecting the reader to the parameterization computer

You have two alternatives for connecting a reader of the RF600 series to your parameterization computer:

- Serial connection through RS232 cable.
- 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.

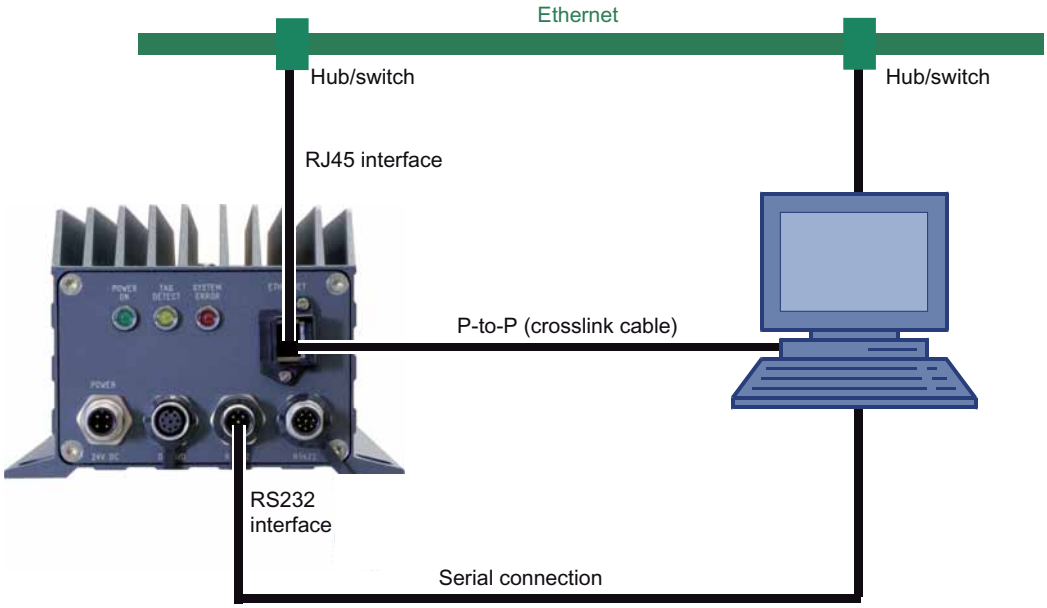


Figure 3-3 Connection options from reader to parameterization computer

Connecting the reader to the parameterization computer over a serial interface

Procedure	
1	Disconnect the reader from the power supply.
2	Connect the serial interface of the reader to a spare COM port of your parameterization computer using the RS232 cable (Order No. 6GT 2891-0GH50 or 6GT 2891-0GN10).
3	Connect the reader to the power supply.

Connecting the 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 urgently recommended that the connecting cable (Order No. 6GT 2891-0HN10 or 6GT 2891-0HN20) is used when connecting via a hub/switch. 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 point-to-point links, a crosslink cable **must** be used.
3	Connect the reader to the power supply.

3.3 Starting the RF660R configuration software

Start the RF660R configuration software by double-clicking the "RF660R Configuration Software" icon.

3.4 Compatibility firmware/configuration software

To ensure compatibility between the firmware of the SIMATIC RF660R and the configuration software/customer applications, the version of the XML communications interface is compared when establishing a connection between the RF660R reader and RF660R configuration software/customer application.

Please note that only specific versions of the reader firmware and configuration software/customer application are compatible.

The table below gives you an overview of compatibility:

Compatibility firmware/configuration software

	Configuration software version		
Reader firmware version	**V1.1**	**V1.2**	**V1.3**
V1.1	X	-	-
V1.2	Restricted functionality	X	Only permitted for firmware update
V1.3	-	-	X

Compatibility firmware/customer application

If it is a customer application, it can access the firmware version V1.3 if no commands are used which are no longer permitted in firmware V1.3.

If, for example, the customer application transmits via the fixed channel 105, this command is rejected and an error message is returned. The reason for this is that only channels from the 4-channel plan are allowed in the new firmware version V1.3.

	Customer application XML version		
Reader firmware version	**GR_XML_2.0**	**GR_XML_2.1**	**GR_XML_3.0**
V1.1	X	-	-
V1.2	Restricted functionality	X	-
V1.3	x[1)]	x[1)]	X

1) No commands may be used that are no longer permitted in firmware V1.3.

3.4.1 Upgrading/downgrading the firmware

3.4.1.1 Prerequisites

When the reader has already been operated with one version of a firmware and this version is to be replaced with another version to ensure compatibility, the following components must also be available:

Firmware upgrade V1.2 → V1.3

- SIMATIC RF660R configuration software version V1.3
- SIMATIC RF660R reader firmware version V1.3 (included in Setup under "C:\Program Files\Siemens\SIMATIC RF660R Configuration Software\Firmware")

Firmware downgrade V1.3 → V1.2

- SIMATIC RF660R configuration software version V1.3
- SIMATIC RF660R reader firmware version V1.3 (included in Setup)
- SIMATIC configuration software V1.2 for parameterizing firmware V1.2 after the downgrade

NOTICE
Reader inoperable The reader may become inoperable and can only be repaired by the Siemens Service Center for MOBY products if you do **not** perform and adhere to the operating steps of the update or downgrade process listed in the following sections in the specified sequence. Therefore follow the specified instructions exactly.

Note

Performing updates and downgrades

As the user, you are responsible for performing updates and downgrades of the firmware and software correctly. Siemens will not accept any liability whatsoever for correct performance of the processes.

Contact your technical support team or where you purchased your device to find out which RF660R reader versions are suitable for downgrades.

NOTICE
Operation of newly installed systems is not permitted in Europe You are not permitted to commission a reader with firmware V1.2 in countries in which standard ETSI EN 302 208-1 V1.2.1 applies, neither as part of a newly installed system nor as supplement in an existing system.

3.4.1.2 RF660R configuration software V1.2 with reader firmware V1.2: Updating the firmware

Update RF660R configuration software version V1.2 to version V1.3

You want to update the RF660R configuration software to version V1.3. The procedure is as follows:

1. If you no longer need the RF660R configuration software version V1.2, uninstall it via "Start > SIMATIC > RF660R V1.2 > Uninstall Configuration Software".
   However, you can still install and operate versions V1.2 and V1.3 on your system.
2. Install the RF660R configuration software V1.3 as described in Section Installing software packages (Page 11).

Updating RF660R firmware V1.2 to version V1.3

1. Replace RF660R firmware version V1.2 with version V1.3 on Bank B of the reader as described in Section Firmware update (Page 67).
2. On Bank B, implement a cold start and start up the reader.
3. Replace RF660R firmware version V1.2 with version V1.3 on Bank A of the reader as described in Section Firmware update (Page 67).
4. On Bank A, implement a cold start and start up the reader.
5. If necessary, repeat the process for other readers whose firmware you want to update.

3.4.1.3 RF660R configuration software V1.3 with reader firmware V1.3: Downgrading the firmware

Downgrade RF660R firmware V1.3 to version V1.2

1. In addition to the RF660R configuration software version V1.3 install the RF660R configuration software V1.2 as described in Section Installing software packages (Page 11).
2. Replace RF660R firmware version V1.3 with version V1.2 on Bank A of the reader as described in Section Firmware update (Page 67).
3. On Bank A, implement a cold start and start up the reader.
4. Replace RF660R firmware version V1.3 with version V1.2 on Bank B of the reader as described in Section Firmware update (Page 67).
5. On Bank B, implement a cold start and start up the reader.
6. If necessary, repeat the process for other readers whose firmware you want to downgrade.

3.4.1.4 Older versions of RF660R configuration software and firmware

Procedure

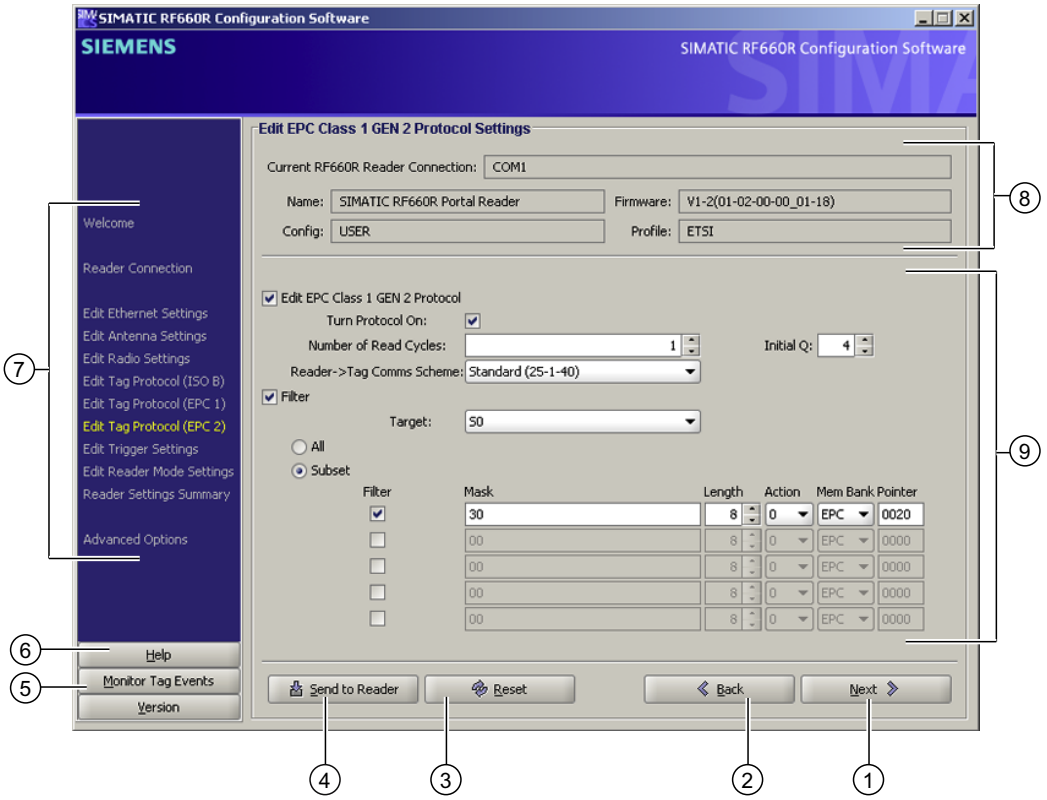
- If version V1.1 of the RF660R configuration software or firmware is installed and you want to upgrade it, you will first have to update to version V1.2.
- If you want to downgrade from version V1.3 of the RF660R configuration software or firmware to version V1.1, you need to downgrade to version 1.2 first.

Additional information is available in the "RF660R Configuration Software" configuration manual (http://support.automation.siemens.com/WW/view/en/22438685), edition 07/2008.

3.5 General operating and display options

Following successful connection buildup between the parameterization computer and the reader, the following general operation and display options are available to you in the dialog window of the configuration software:

Indication and command elements of the RF660R configuration software



Config.: With a completely new device, the RF660R displays its configuration as "DEFAULT". As soon as you have changed and saved a parameter, the RF660R reader configuration setting changes to "USER". The RF660 configuration software only checks this procedure once during establishment of the connection. This field is therefore only updated again the next time you connect to the reader.

1	Next	Jump to next dialog window
2	Back	Jump to previous dialog window
3	Reset	Restore default values of a dialog window
4	Send to Reader	Transfer the settings made in a dialog window to the reader
5	Monitor Tag Events	Display statistical information about the tags
6	Help	Display context-sensitive help topics
7	-	Selection of the display of the current dialog window (highlighted in color)

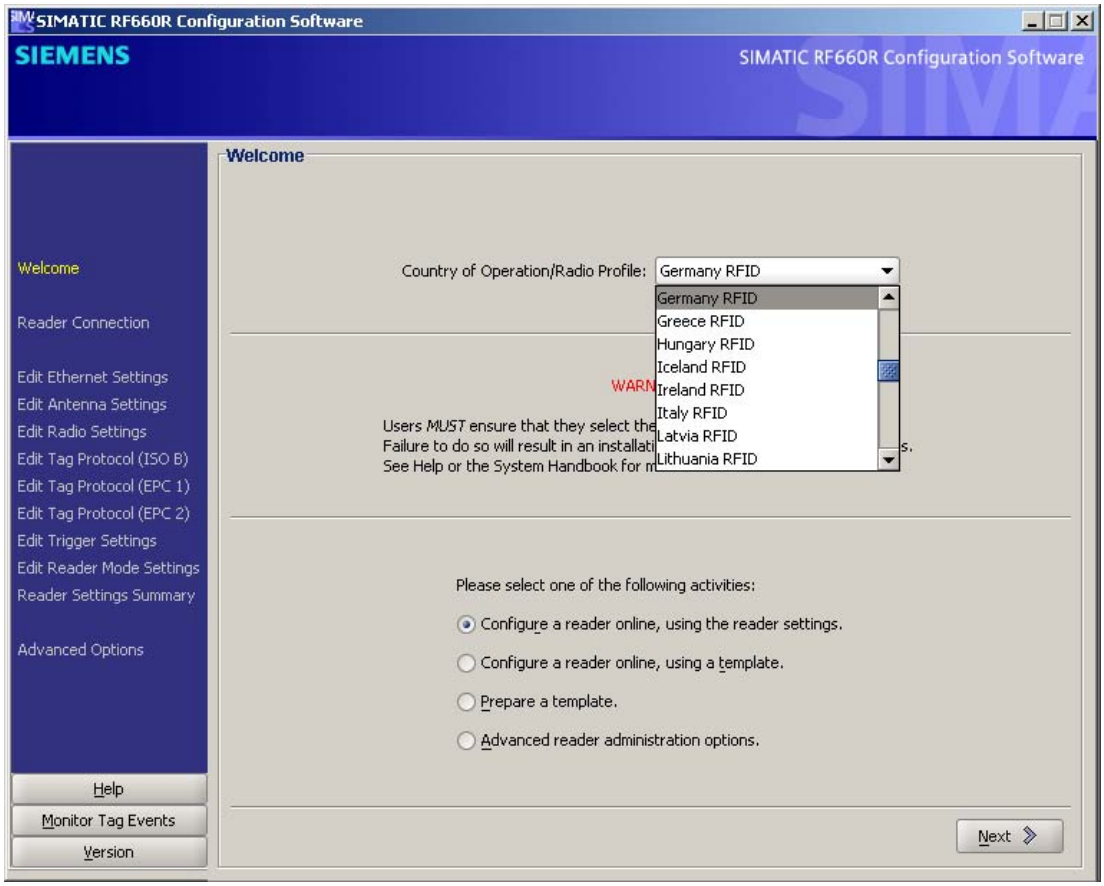
Indication and command elements of the RF660R configuration software		
8	-	Display the status information: • RF660 reader connection (connection type: serial or Ethernet) • Name (name of reader) • Config. (configuration method) • Firmware (firmware version of the reader) • Profile (radio profile ETSI, FCC)
9	-	Control panel for parameter input

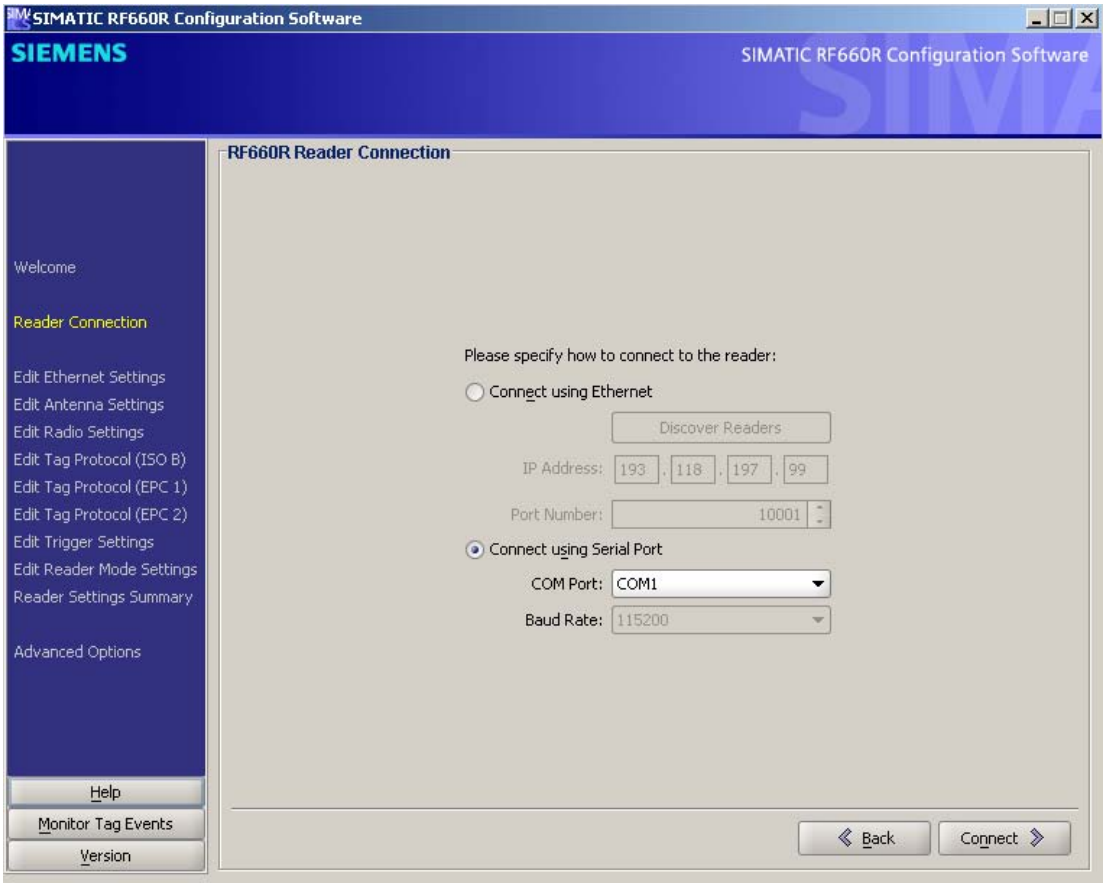
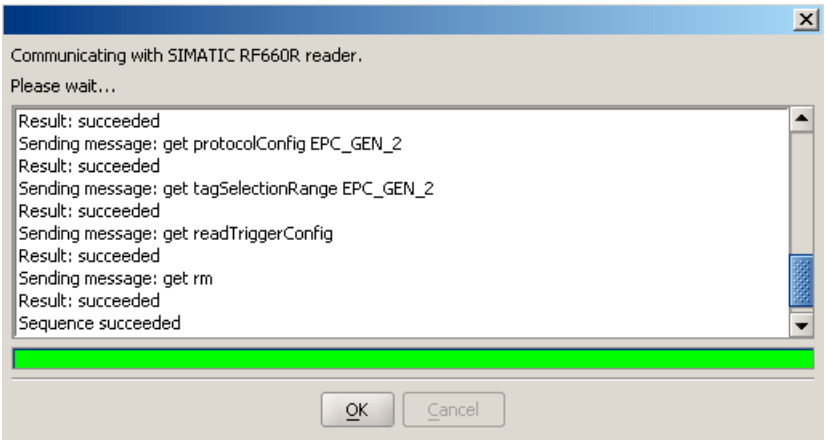
3.6 Setting up a serial connection

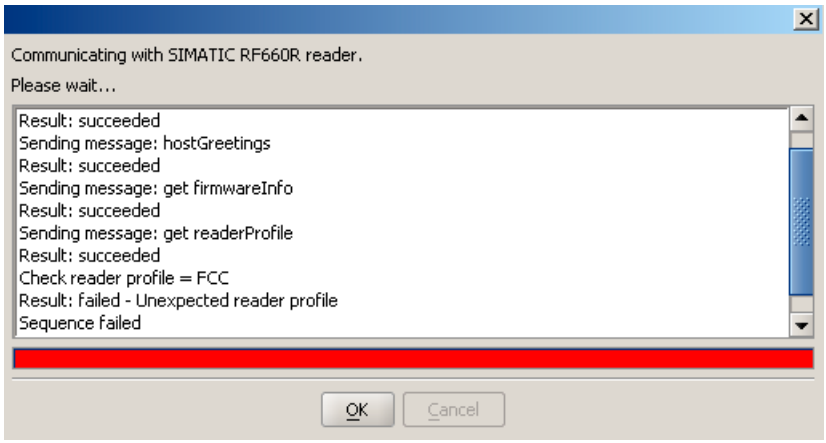
Requirement

- The reader is connected to the parameterization computer via the serial interface.
- The SIMATIC RF660R configuration software has been started.

Setting up a serial connection between the parameterization computer and the reader

Procedure for setting up a serial connection	
1	In the "Welcome" screen, you can set the country of operation for the RF660R reader.  It is very important that you select the correct country. An incorrect country setting can result in a reader configuration which does not comply with the regulations in the country in which the device is used. Select your country from the list. In the case of countries with the suffix "RFID", the reader can be configured to a maximum transmission power of 2 W in accordance with the ETSI EN 302-208 standard. In the case of countries with the suffix "FCC", the reader can be configured such that it uses the "Frequency Hopping Spread Spectrum" regulation which is permissible for North America. **Caution:** If you select the wrong radio standard, reception will be poor and you will be open to prosecution by the telecommunications authorities.
2	Select *Configure a reader online*
3	Click *Next*.

Procedure for setting up a serial connection	
4	In the dialog field "RF660R Reader Connection", select the option *Connect using Serial Port*. Then set the COM port used. 
5	Click on *Connect*. The configuration software then compares its settings with the reader.  Click *OK* if the comparison was successful.

Procedure for setting up a serial connection	
6	If the selected country (in the configuration software) is not the same as the configured one (in the reader), the comparison process will fail. If there is an error, the following error message is displayed during the comparison process (comparison failed): "This reader is preconfigured for ETSI RFID countries and you have selected the Canada FCC radio profile." 
7	The next error message in case of a failed comparison appears as follows: 
8	To avoid this error, a standard template should be used first. See Chapter "Using Templates".
9	As soon as the comparison process has been completed and you have clicked *OK*, you can change the Ethernet settings of the reader if necessary.

3.7 Setting-up an Ethernet connection

Requirement

- The first connection is generally established via the serial interface.
- The reader is connected to the parameterization computer via the Ethernet interface.
- The SIMATIC RF660R configuration software has been started.

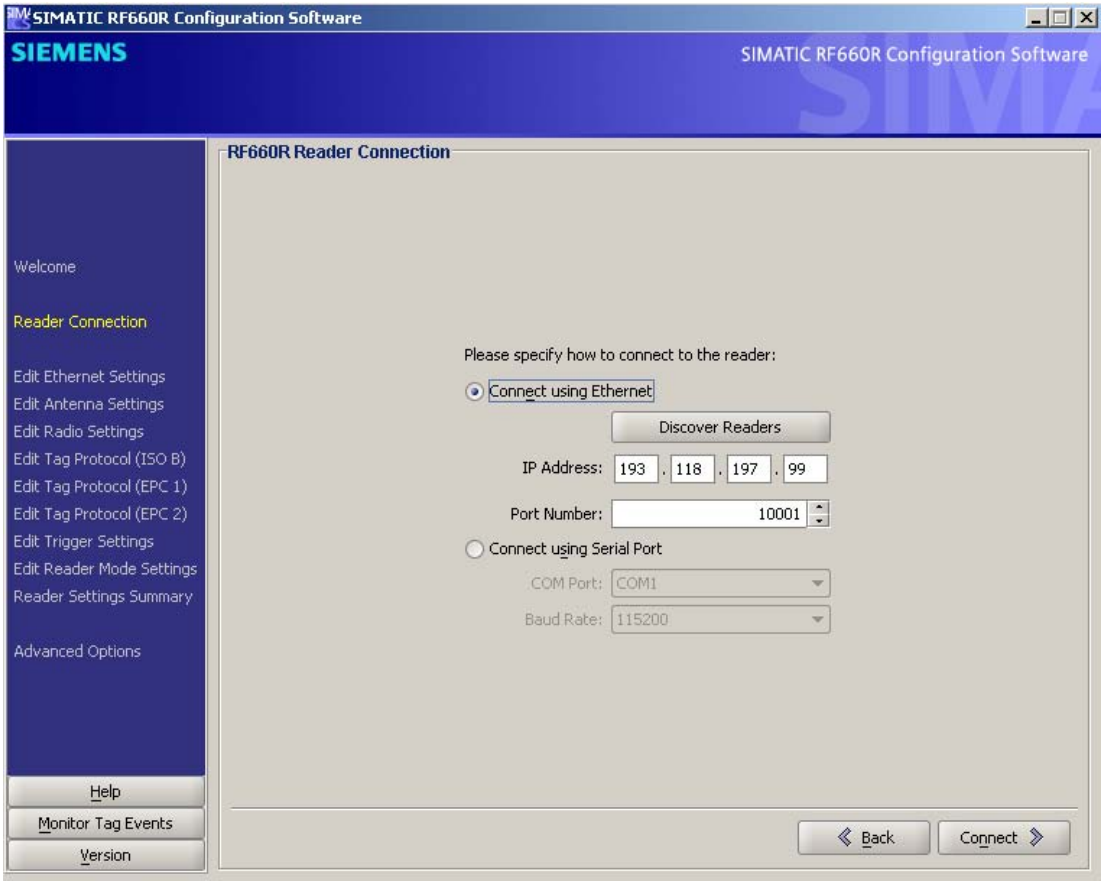
This procedure functions both with the static IP address assigned to the reader as well as with the IP address automatically assigned via DHCP.

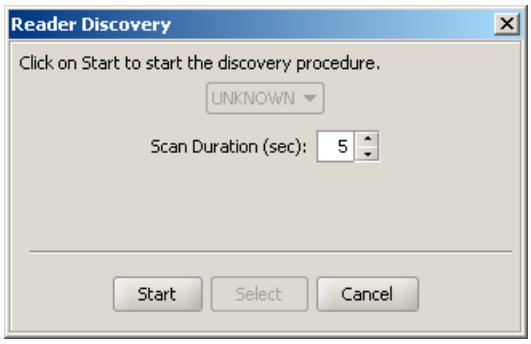
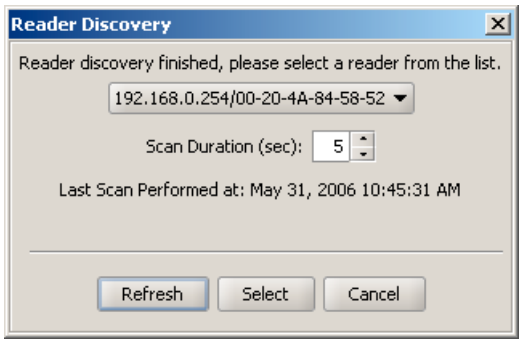
NOTICE
Deactivate firewall for Ethernet connection When you want to connect a reader of the RF600 family to the parameterization computer over Ethernet, make sure that you deactivate the firewall between the two devices before initial contact takes place. Otherwise communication might not be possible.

NOTICE
Only one network card in the computer for Ethernet connections. When you want to connect a reader of the RF600 family to the parameterization computer over Ethernet, make sure that there is only one network card in the parameterization computer. Otherwise communication might not function properly the next time the reader is booted up.

NOTICE
Communication with the reader interrupted on Ethernet link Ensure that you always enter a new port number in the input field *Port Number* for every new Ethernet connection to the reader. If you forget to enter a new port number for a new connection, communication between the reader and the host can be interrupted.

Setting up an Ethernet connection between the parameterization computer and the reader

Procedure for setting up an Ethernet connection	
1	In the *Welcome* screen, you can set the country of operation for the RF660R reader, as described in the section "Serial connection setup".
2	Select *Configure a reader online*
3	Click *Next*
4	In the dialog field "RF660R Reader Connection", select the option *Connect using Ethernet*. 
5	If the IP address and port number for connecting the reader are known, enter them in the fields provided, and then click *Connect*.
6	If the IP address and port number for connecting the reader are unknown, or if they are automatically configured with DHCP, click *Reader Discovery*.

Procedure for setting up an Ethernet connection	
7	The "Reader Discovery" dialog window will be displayed. Select the scan duration (default setting is 5 s) and click *Start*. 
8	The SIMATIC RF660R configuration software sends a message to the network, and receives a reply from all connected RF660R readers with their MAC and IP addresses.  The MAC address is predefined and is adhered to the outside of each reader. Click on the correct reader in the pulldown menu, and then click *Select*.
9	The IP address is now entered in the reader's connection list. Click *Connect* again.
10	The SIMATIC RF660R configuration software then runs through the comparison process which has already been described in the section "Serial connection setup".

Parameterizing the RF660R

4

4.1 Overview

A reader must be configured and parameterized before it can be operated.

The following parameter settings can be made:

- via supplied configuration files (templates) or
- by directly entering/selecting corresponding parameters in the configuration software

A template is a configuration file which already contains the correct country-specific parameters (such as radio and tag protocol settings) required for operating the reader.

You can modify the templates as required.

4.2 Using and creating templates

4.2.1 Parameterizing a reader using a template

The safest and fastest (initial) reader parameterization method is to call one of the 24 standard templates supplied with the SIMATIC RF660R Configuration Software.

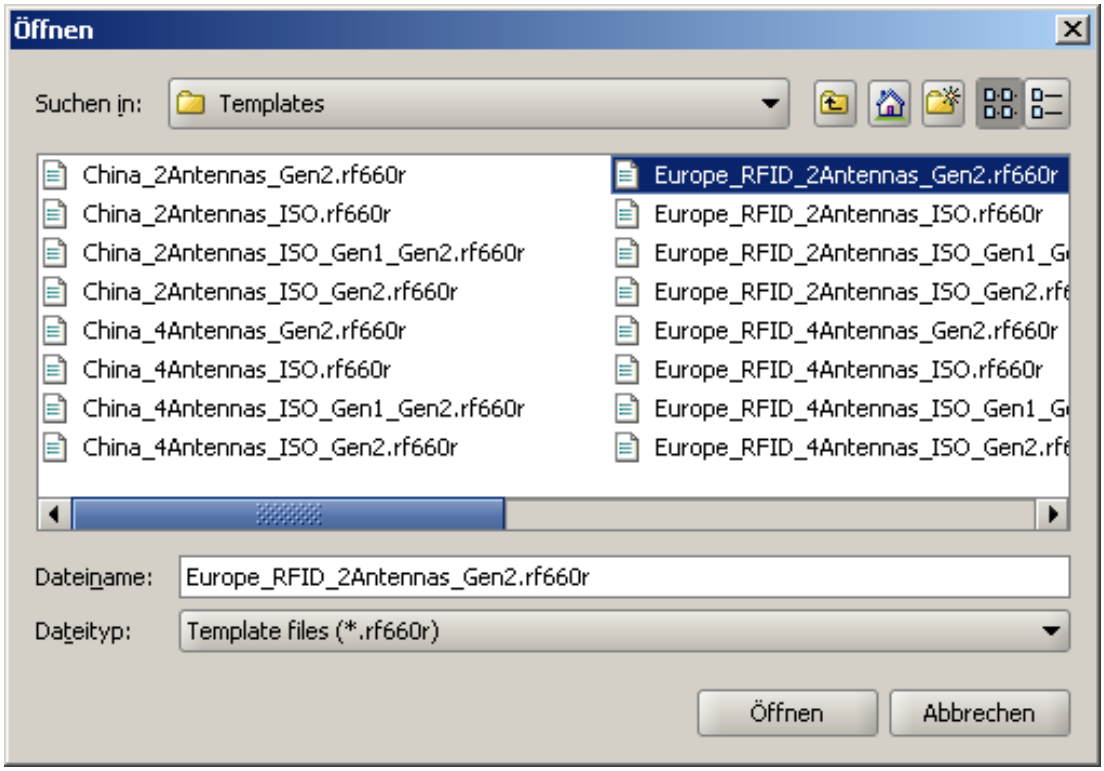
Activate the SIMATIC RF660R Configuration Software by double-clicking the RF660R Configuration Software icon.

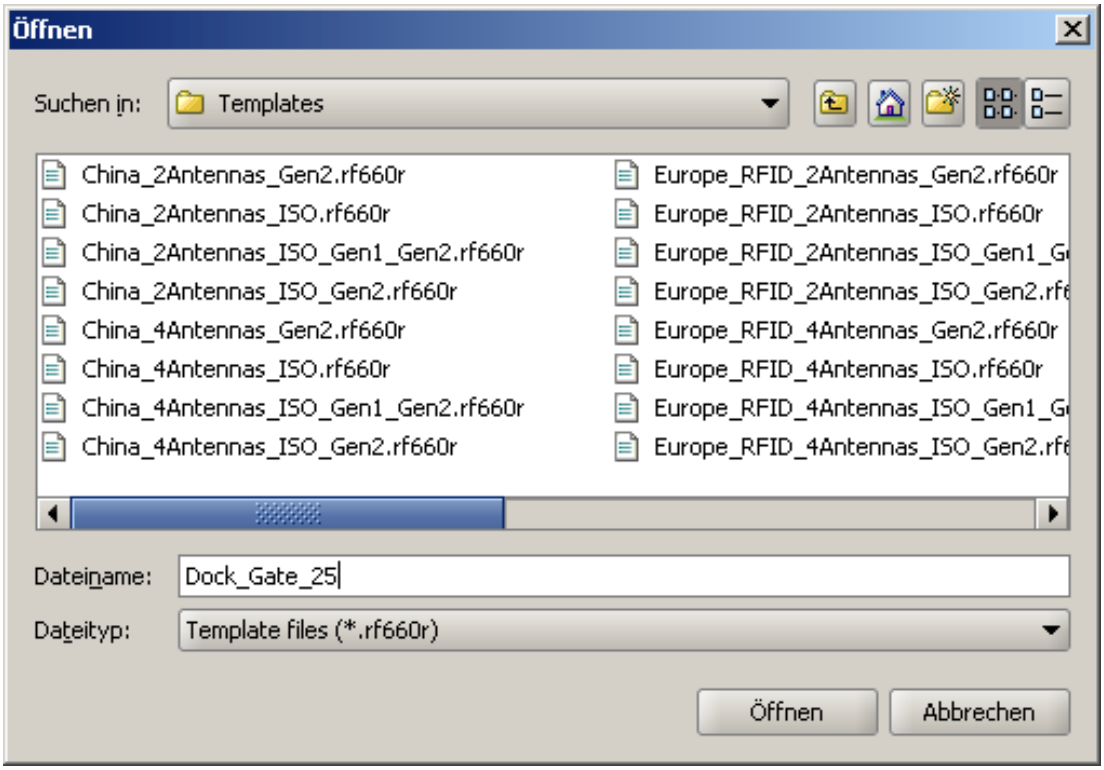
The "Welcome" dialog field opens.

Select your country in the list box.

CAUTION
If your country is not listed, operation of the reader is not permitted.

How to "Parameterize a reader online using a template"	
1	In the "Welcome" dialog field, select the country of operation/radio profile as described in the section "Serial connection setup".
2	Select *Configure a reader online, using a template*
3	Click *Next*

How to "Parameterize a reader online using a template"	
4	Select a template from the list:  The values used in the template are shown in all subsequent configuration windows. As soon as you have created and saved your own templates, these are also available here.
5	The dialog field "Reader Connection" is opened by clicking on the "Open" button
6	Select the connection method and click on the "Connect Reader" button
7	The settings are transferred to the reader and stored there.
8	If required, you can make changes in the respective windows and transfer these changes to and store them in the reader by clicking on the "Send" button in the respective window. By repeatedly clicking on "Next" you will reach the dialog field "Reader Summary". Click on "Save Template". You should save templates individually for each reader and not in a generally applicable manner such as e.g. "All readers in room 001".

How to "Parameterize a reader online using a template"	
9	 Store "Assign new file name" and click on the "Finish" button.
10	The connection with the reader is deactivated. The SIMATIC RF660R Configuration Software displays the "Welcome" screen.
11	Parameterization has been completed.
	Only the settings are adopted in the reader, not the template name.
	If the reader needs to be replaced, proceed with the new reader in the same manner as described in Step 1. The new template can be used in this case.

4.2.2 Supplied standard templates

24 standard templates are supplied together with the SIMATIC RF660R configuration software; they can be assigned to three main groups:

- For use in China where the local authorities recognize and accept it for frequencies between 920.125 MHz and 924.875 MHz
- For use in European countries which recognize the European standard EN 302-208 V1.2.1 for the four frequencies between 865.7; 866.3; 866.9; 867.5 MHz (without LBT method).
- For use in North American countries in which specifications acc. to FCC (frequency hopping) in the frequency band 902 … 928 MHz are applied.

Templates for CHINA

Templates for use in China in accordance with the regulations of local authorities for frequencies between 920.125 MHz and 924.875 MHz.

Template	File name	Description
1	China_RFID_2Antennas_Gen2.rf660r	Transmission is carried out with a max. power of 2 W, alternatively with 2 antennas (1 and 2) according to the specifications in China. Exactly one tag protocol is switched on: EPC Global Class 1 Generation 2.
2	China_RFID_2Antennas_ISO.rf660r	Transmission is carried out with a max. power of 2 W, alternatively with 2 antennas (1 and 2) according to the specifications in China. Exactly one tag protocol is switched on: ISO 18000-6B, which permits the reader to record UCODE HSL and UCODE EPC1.19 tags.
3	China_RFID_2Antennas_ISO_Gen2.rf660r	Transmission is carried out with a max. power of 2 W, alternatively with 2 antennas (1 and 2) according to the specifications in China. Two tag protocols are switched on: EPC Global Class 1 Generation 2 and ISO 18000-6B.
4	China_RFID_2Antennas_ISO_Gen1_Gen2.rf660r	Transmission is carried out with a max. power of 2 W, alternatively with 2 antennas (1 and 2) according to the specifications in China. Three tag protocols are switched on: EPC Global Class 1 Generation 1, EPC Global Class 1 Generation 2 and ISO 18000-6B.
5	China_RFID_4Antennas_Gen2.rf660r	As 1, except that all four antennas are alternatively used as senders.
6	China_RFID_4Antennas_ISO.rf660r	As 2, except that all four antennas are alternatively used as senders.
7	China_RFID_4Antennas_ISO_Gen2.rf660r	As 3, except that all four antennas are alternatively used as senders.
8	China_RFID_4Antennas_ISO_Gen1_Gen2.rf660r	As 4, except that all four antennas are alternatively used as senders.

Templates for Europe (ETSI)

Templates for use in European countries according to the European standard EN 302-208 for frequencies between 865 and 868 MHz:

Template	File name	Description
9	Europe_RFID_2Antennas_ Gen2.rf660r	Transmission is carried out with a max. power of 2 W, alternatively with 2 antennas (1 and 2) according to the specifications in ETSI 302-208. Exactly one tag protocol is switched on: EPC Global Class 1 Generation 2.
10	Europe_RFID_2Antennas_ ISO.rf660r	Transmission is carried out with a max. power of 2 W, alternatively with 2 antennas (1 and 2) according to the specifications in ETSI 302-208. Exactly one tag protocol is switched on: ISO 18000-6B, which permits the reader to record UCODE HSL and UCODE EPC1.19 tags.
11	Europe_RFID_2Antennas_ ISO_Gen2.rf660r	Transmission is carried out with a max. power of 2 W, alternatively with 2 antennas (1 and 2) according to the specifications in ETSI 302-208. Two tag protocols are switched on: EPC Global Class 1 Generation 2 and ISO 18000-6B.
12	Europe_RFID_2Antennas_ ISO_Gen1_Gen2.rf660r	Transmission is carried out with a max. power of 2 W, alternatively with 2 antennas (1 and 2) according to the specifications in ETSI 302-208. Three tag protocols are switched on: EPC Global Class 1 Generation 1, EPC Global Class 1 Generation 2 and ISO 18000-6B.
13	Europe_RFID_4Antennas_ Gen2.rf660r	As 1, except that all four antennas are alternatively used as senders.
14	Europe_RFID_4Antennas_ ISO.rf660r	As 2, except that all four antennas are alternatively used as senders.
15	Europe_RFID_4Antennas_ ISO_Gen2.rf660r	As 3, except that all four antennas are alternatively used as senders.
16	Europe_RFID_4Antennas_ ISO_Gen1_Gen2.rf660r	As 4, except that all four antennas are alternatively used as senders.

Template for North America

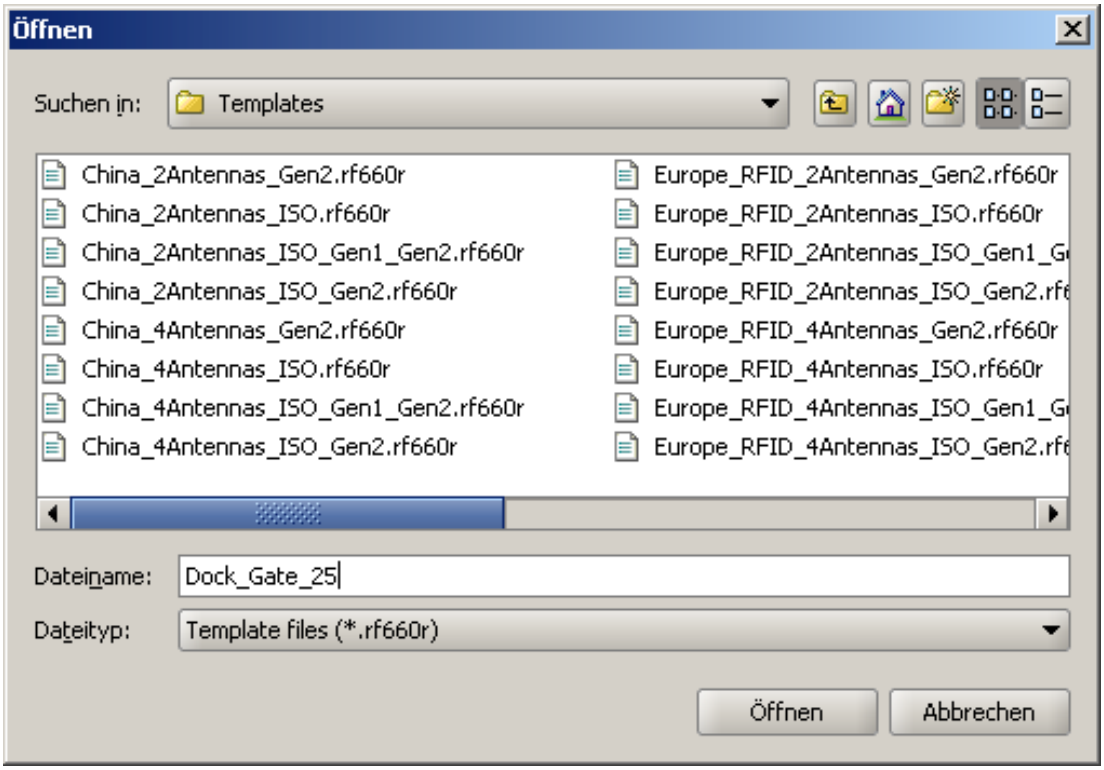
Templates which are used in North America where frequency hopping is specified as essential. Frequency band 902 to 928 MHz.

Template	File name	Description
23	NorthAmerica_2Antennas_ Gen2.rf660r	Transmission is carried out with a max. power of 1 W, alternatively with 2 antennas (1 and 2) according to the specifications in FCC Part 15.247 and RSS 210. Exactly one tag protocol is switched on: EPC Global Class 1 Generation 2.
24	NorthAmerica_2Antennas_ Gen1.rf660r	Transmission is carried out with a max. power of 1 W, alternatively with 2 antennas (1 and 2) according to the specifications in FCC Part 15.247 and RSS 210. Exactly one tag protocol is switched on: EPC Global Class 1 Generation 1.
25	NorthAmerica_2Antennas_ Gen1_Gen2.rf660r	Transmission is carried out with a max. power of 1 W, alternatively with 2 antennas (1 and 2) according to the specifications in FCC Part 15.247 and RSS 210. Two tag protocols are switched on: EPC Global Class 1 Generation 1 and EPC Global Class 1 Generation 2.
26	NorthAmerica_2Antennas_ ISO_Gen1_Gen2.rf660r	Transmission is carried out with a max. power of 1 W, alternatively with 2 antennas (1 and 2) according to the specifications in FCC Part 15.247 and RSS 210. Three tag protocols are switched on: ISO 18000-6B, EPC Global Class 1 Generation 1 and EPC Global Class 1 Generation 2.
27	NorthAmerica_4Antennas_ Gen2.rf660r	As 15, except that all four antennas are alternatively used as senders.
28	NorthAmerica_4Antennas_ Gen1.rf660r	As 16, except that all four antennas are alternatively used as senders.
29	NorthAmerica_4Antennas Gen1_Gen2.rf660r	As 17, except that all four antennas are alternatively used as senders.
30	NorthAmerica_4Antennas_ ISO_Gen1_Gen2.rf660r	As 18, except that all four antennas are alternatively used as senders.

4.2.3 Creating a template

With this action you can create a template offline.

The reader does not have to be connected via a serial port or Ethernet. (Offline)

"Create a template" procedure	
1	In the "Welcome" dialog field, select the country of operation/radio profile as described in the section "Serial connection setup".
2	Select *Create a template*
3	Click *Next*
4	Dialog field "RF660R Reader Connection", select "Option", click on "Connect"
5	Dialog field "Antenna settings", select "Option", click on "Next"
6	Dialog field "Radio settings", select "Option", click on "Next"
7	Select "Tag protocol", click on "Next"
8	Dialog field "Trigger settings", select "Option", click on "Next"
9	Dialog field "Reader mode settings", select "Option", click on "Next"
10	Dialog window "Reader Summary", check settings
11	 Store "Assign new file name" and click on the "Finish" button.
12	The reader is now configured according to your specifications
	Now you can use the template you created as described in the Chapter "Parameterize a reader online via a template".

4.3 Parameterizing a reader without a template

4.3.1 Online configuration of a reader

Procedure for "Configure a reader online"	
1	In the "Welcome" dialog field, select the country of operation/radio profile as described in the section.
2	Select *Configure a reader online*
3	Click *Next*
4	Dialog field "RF660R Reader Connection", select "Option", click on "Connect"
5	Dialog field "Antenna settings", select "Option", click on "Next"
6	Dialog field "Radio settings", select "Option", click on "Next"
7	Select "Tag protocol", click on "Next"
8	Dialog field "Trigger settings", select "Option", click on "Next"
9	Dialog field "Reader mode settings", select "Option", click on "Next"
10	Screen "Reader Summary", check settings, click on "Finished".
11	The reader is now ready to operate.
	If a template has not been used, but if the reader is connected and the comparison procedure has been executed without errors, the values saved on the reader are displayed in all configuration windows.

4.4 Parameterization steps in detail

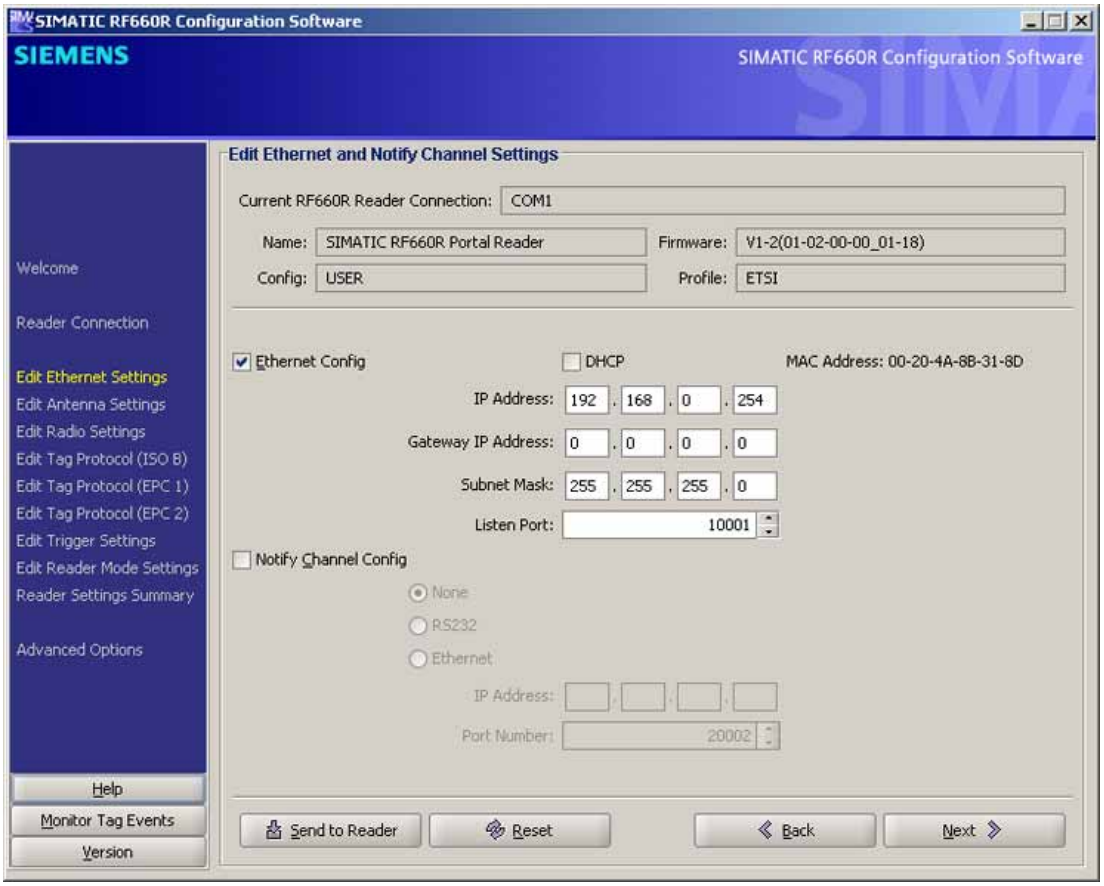
4.4.1 Setting-up an Ethernet port

Requirement

- The reader is connected to the parameterization computer via a serial connection or Ethernet connection.
- The SIMATIC RF660R configuration software has been started.
- In the SIMATIC RF660R configuration software, the connection to the reader has been made according to the information in section "Serial connection setup" or "Ethernet connection setup".

NOTICE
Communication with the reader interrupted on Ethernet link Ensure that you always enter a new port number in the input field "Port Number" for every new Ethernet connection to the reader. If you forget to enter a new port number for a new connection, communication between the reader and the host can be interrupted.

Procedure when setting up an Ethernet port

	Description
1	In the "Welcome" window, select the country of operation/radio profile as described in the section "Serial connection setup" and "Ethernet connection setup".
2	The reader is now connected, and its Ethernet parameters are displayed. 
3	In the "Ethernet and Notify Channel Settings" window, tick "Ethernet configuration". Then select either "DHCP" or enter the following parameters manually: • IP address • Gateway IP Address (the IP address and the gateway address must be in the same IP number band, e.g. both in 192.168.x.x, but the addresses must not be identical). • Subnet mask • Listen Port

	Description
4	Tick "Notify Channel Configuration" and then "None" • If the reader is connected via Ethernet, "Notify Channel Configuration" can only be set to "None" or "RS232". • If the reader is connected via the serial port, "Notify Channel Configuration" can be set to "None", "RS232" or "Ethernet". **DO NOT** use the same IP address for "Ethernet Configuration" and "Notify Channel Configuration". If you do, you are instructing the reader to send event messages to itself.
5	Click "Send to Reader" to send the settings to the reader. Transfer of the Ethernet parameters must be confirmed using a message window. Confirm transmission of the transfer data by clicking *OK*. • If the reader is connected via the serial port, the reader parameters can be changed for Ethernet and Notify Channel without interrupting the connection. • If the reader is connected via the Ethernet connection, the connection to the reader must be terminated following sending of Ethernet parameters, and subsequently reestablished.

4.4.2 Antenna settings

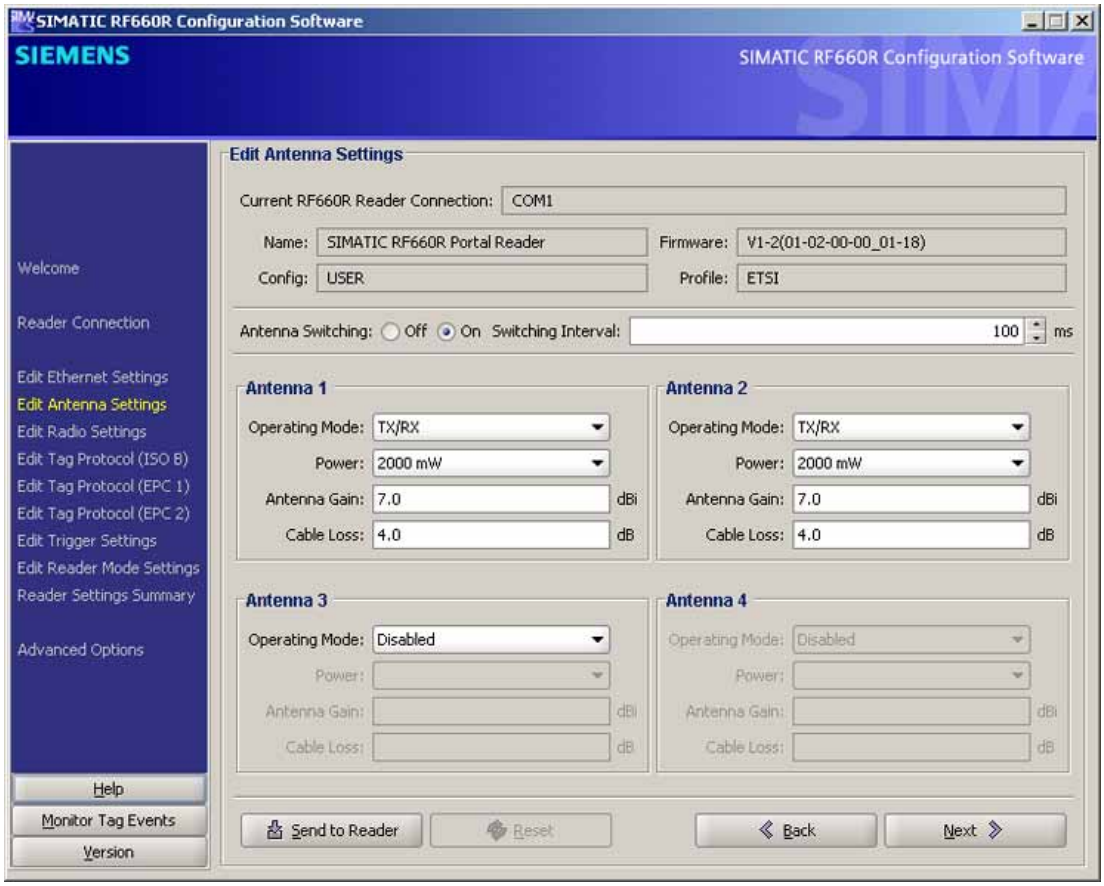


Figure 4-1 Dialog window "Edit Antenna Settings"

The response of the antenna connected to the reader can be parameterized in the dialog window "Edit Antenna Settings".

You can activate the *Antenna switching* option here that causes a switchover between the transmitting antenna and the other connected antennas using the principle of rotation, thereby changing the transmit and receive responses. The antenna switching interval can be set using the option *Switching Interval*.
In this context, you can also specify which antenna is to operate in transmit mode (TX), which in receive mode (RX) and which in combined transmit and receive mode (TX/RX).

Requirement

In the RF660R configuration software, a connection must exist between the reader and the parameterization computer.

Procedure

1. In the footer of the RF660R configuration software, click *Next* until you reach the menu "Edit Antenna Settings".
2. Set the parameters in accordance with your requirements.
3. Click *Send to Reader* to transfer the settings made to the RF660R.

Parameters

In general, it is recommended that you activate the *Antenna Switching* option and set all connected antennas to combined transmit and receive mode (TX/RX).

If your system configuration does not allow this, the rules listed below apply irrespective of how many antennas are used. These rules are integrated in the SIMATIC RF660R configuration software, which guarantees that these rules are applied.

Antenna switching	Rule
On	At least two antennas must be set to TX/RX. The other antennas must be set to RX or OFF. An antenna cannot be set to TX.
Off	Only one antenna can be set to TX. At least one of the remaining antennas must be set to RX, the others to OFF. An antenna cannot be set to TX/RX.

The antenna switching interval can be set to any value between 1 and n ms (ETSI and FCC). The default value is 1 ms.

The maximum radiated power is limited by the radio standard used:

- With the **ETSI radio standard**, the minimum radiated power is 100 mW ERP; the maximum radiated power is 2000 mW ERP. The transmission power adapted to the reader is calculated based on the entered parameters *Antenna Gain* and *Cable Loss*.
  The RF660A-EU antenna has an antenna gain of 7 dBi. The 3 m antenna cable (MLFB: 6GT2815-0BH30) has a cable loss of 1.0 dB. The 10 m antenna cable (MLFB: 6GT2815-0BN10) and the 20 m antenna cable (6GT2815-0BN20) have a cable loss of 4.0 dB each.
- With the **FCC radio standard**, the minimum transmission power is 100 mW; the maximum is 1000 mW. The set transmission power corresponds to the transmission power at the end of the antenna cable (in front of the antenna) if the reader is operated with an RF660A antenna (FCC) and 10 m or 20 m antenna cable. Based on the entered parameters *Antenna Gain* and *Cable Loss*, you can reach a maximum radiated power of 4000 mW EIRP.
  The RF660A-US antenna has an antenna gain of 6.0 dBi. The 10 m and 20 m antenna cable have a cable loss of 4.0 dB each.
- With the **CHINA radio standard**, the minimum radiated power is 100 mW ERP; the maximum radiated power is 2000 mW ERP. The set power corresponds to the desired effective radiated power. The transmission power adapted to the reader is calculated based on the entered parameters signal level at the antenna cable end and for the reader based on the entered parameters *Antenna Gain* and *Cable Loss*.
  The RF660A-US antenna has an antenna gain of 6.0 dBi. The 10 m and 20 m antenna cable have a cable loss of 4.0 dB each.

NOTICE
Restrictions in transmit power settings Only one value can be specified on the reader for the transmit power. If, for example, 2000 mW are selected in CHINA and at the same time all the sub bands with the available channels are selected, then one constant power is used across all channels. The power is derived from the minimum permitted radiation maximum within the selected channels. • When a channel is changed, the channels 150-151 only operate with 100 mW ERP and therefore the channels 152-167 also operate only with 100 mW radiated power. • If all channels 152-167 are selected, however, all channels operate constantly with 2000 mW ERP radiated power. In the first case, the reader will not be able to achieve the same maximum data access rates as in the second case.

4.4.3 Radio settings

4.4.3.1 ETSI radio settings

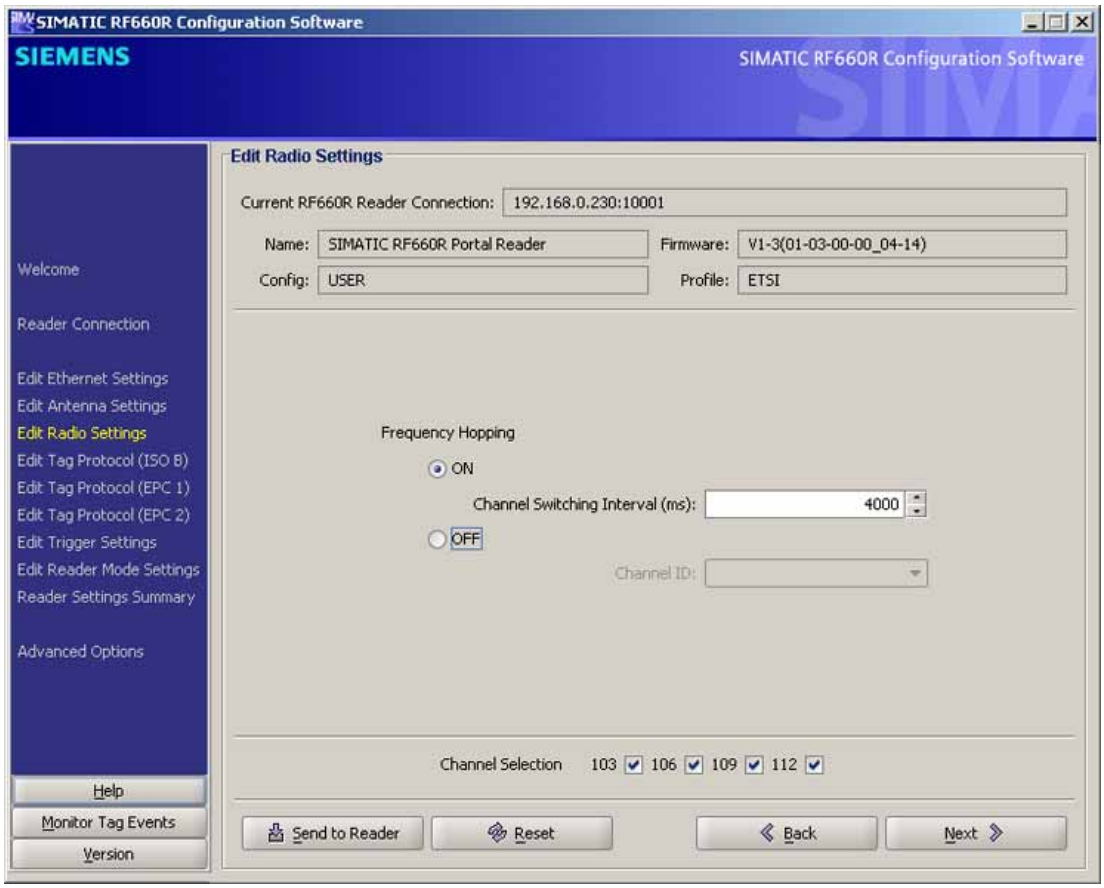


Figure 4-2 Dialog window for ETSI radio settings

In this configuration window, the frequency hopping function can be activated by selecting "Frequency Hopping ON". Frequency hopping can improve the detection rate for tags but it can also result in receive errors due to frequency overlap.

Several channels or only one channel can be activated in the ETSI profile. The channel hopping interval can be between 1000 ms and 4000 ms for the ETSI profile.

Antenna transmission power	**Channels available for:** • **Individual channel selection (Frequency Hopping: OFF) or** • **Frequency Hopping: ONE and several channels selected**
100 - 2000 mW	103, 106, 109, 112 (865.7 MHz, 866.3 MHz, 866.9 MHz, 867.5 MHz in 600 kHz increments)

4.4.3.2 FCC radio settings

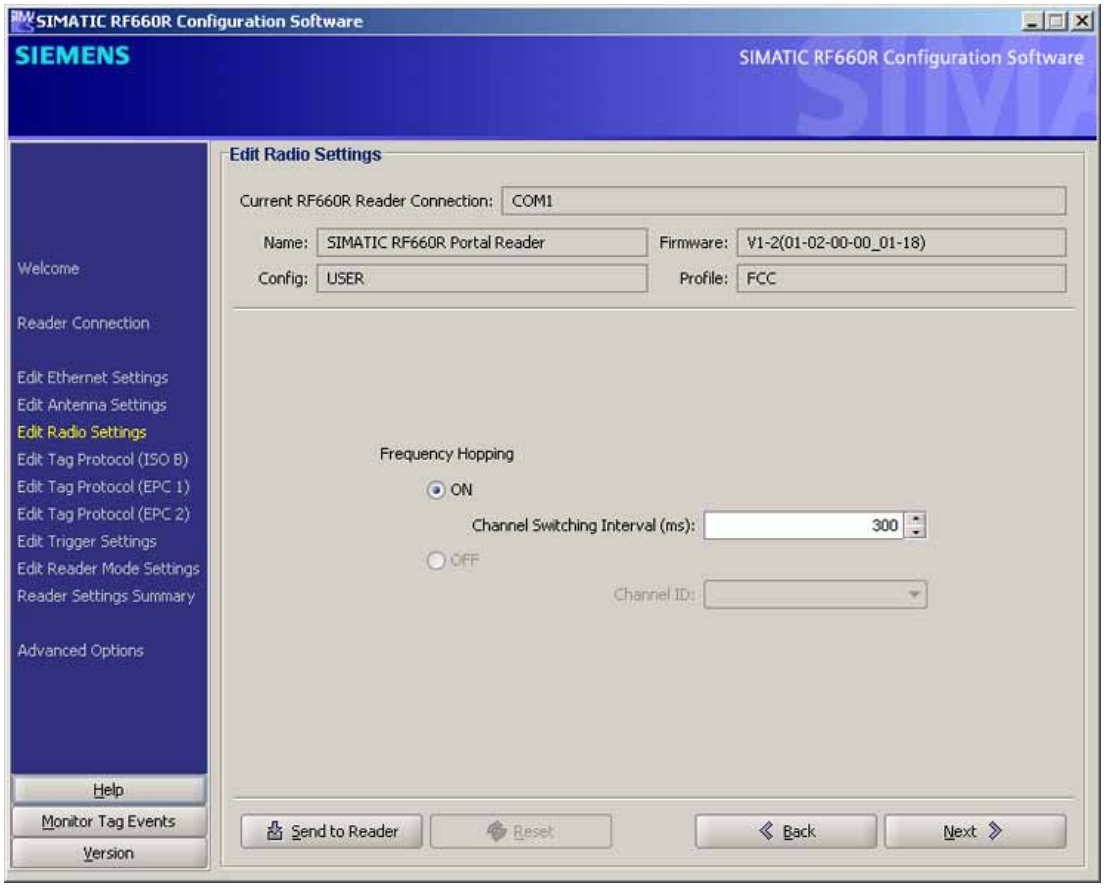


Figure 4-3 Dialog window for FCC radio settings

In this configuration window, the frequency hopping function is activated by selecting "Frequency Hopping ON". Frequency hopping can improve the detection rate for tags but it can also result in receive errors due to frequency overlap.

In the FCC profile, frequency hopping cannot be switched off. The channel switching interval can be set between 300 ms and 400 ms. The default setting is 300 ms.

4.4.3.3 CHINA radio settings

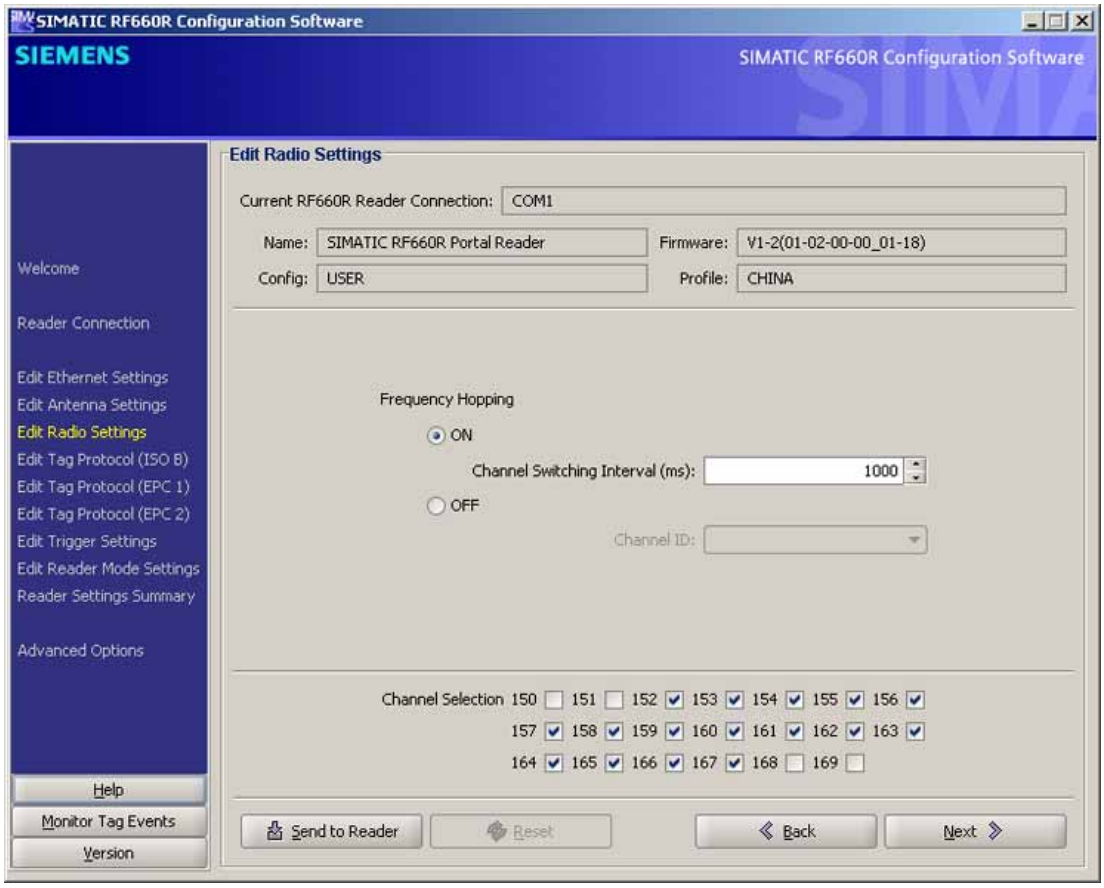


Figure 4-4 Dialog window for CHINA radio settings

In this configuration window, the frequency hopping function is activated by selecting "Frequency Hopping ON". Frequency hopping can improve the detection rate for tags but it can also result in receive errors due to frequency overlap.

In the CHINA profile, frequency hopping cannot be switched off. The channel switching interval can be set between 100 ms and 2000 ms. The default setting is 1000 ms.

In the CHINA profile, two or more channels can be activated as required. In addition, the number of available channels changes depending on the maximum power selected in the "Edit Antenna Settings" dialog field. To be sure about this, first update the "Antenna settings" and then the "Radio settings".

The channel switching interval must lie between 100 ms and 2000 ms for the CHINA profile, because the regulations for China specify channel switching after a maximum of 2000 ms.

Antenna transmission power	Channels available for: • Multiple channel selection with at least 2 channels (Frequency Hopping: ON)	Channels available for: • Frequency Hopping: ON and, for example, sending on even channels only.
100 mW	150, 151, 168, 169 (920.125 MHz, 920.375 MHz, 924.625 MHz, 924.875 MHz in 250 kHz steps)	150, 168 (920.125 MHz, 924.625 MHz in 250 kHz steps)
100 - 2000 mW	152 - 167 (920.625 MHz to 924.375 MHz in 250 kHz steps)	152, 154, 156, 158, 160, 162, 164, 166 (920.625 MHz to 924.125 MHz in 500 kHz steps)

In the CHINA profile, in the dialog field "Radio settings" at least one channel should always remain unassigned between two transmitting channels if the "EPC Global Class 1 Generation 2 Dense Interrogator" mode is to be used.

This option (always to leave one channel unassigned between two selected channels) can be meaningful if the higher-rated schemes according to "ISO 18000-6B" or "EPC Global Class 1 Generation 2" are to be used. Selection of this option reduces the probability that tag responses may be interfered with by other readers. If you only have one or two readers, it may not be necessary to use this option.

4.4.4 ISO 18000-6B protocol settings

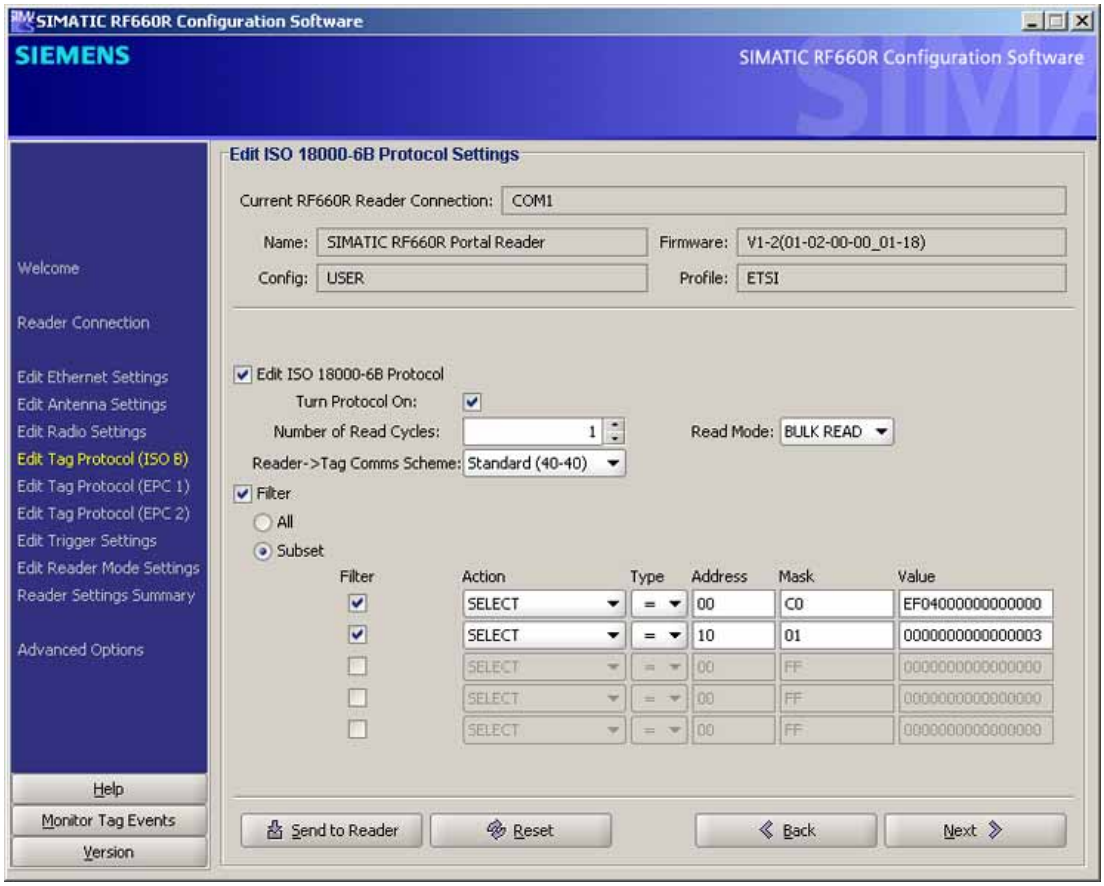


Figure 4-5 Dialog window "ISO 18000-6B Protocol Settings"

Switch protocol on

- In order to switch the protocol on, activate the checkbox *Switch protocol on*.
- In order to switch the protocol off, deactivate the checkbox *Switch protocol on*.

Number of read cycles

- Define the *number of read cycles*. This is usually 1. However, if more than one tag protocol is to be used, the time can be set here during which the reader searches for ISO tags with respect to other tag types.

Example

If two tag types are used, ISO and EPC Gen2, the number of read cycles for each of them could be set to 1; the reader will then search for ISO tags for 50% of the time, and for EPC Gen2 tags for 50% of the time.

If the ISO read cycles were set to 3 and the EPC Gen2 read cycles to 1, this would mean that the reader would search for ISO tags for three times as long as for EPC Gen2 tags.

Max. 1000 read cycles can be set.

Reader -> Tag communication scheme

Several communication schemes are possible for ISO depending on the country of use and the selected radio profile. These are the following:

Description	Reader -> Tag data rate	Tag -> Reader data rate	selectable in ETSI profile	selectable in FCC profile
Standard (40-40)	40 kbps	40 kbps	Yes	Yes
Low rate (10-40)	10 kbps	40 kbps	Yes	Yes
High rate (40-160)	40 kbps	160 kbps	Yes	Yes

Read mode

Two read mode options are available, MULTI-TAG and SINGLE-TAG

- In SINGLE-TAG mode, the reader is optimized such that it finds a single tag in the field as fast as possible. If several tags are present, it could be the case that once the first tag has been detected, the other tags present in the field are ignored by the reader.
- In multi-tag mode, the reader is set such that it finds all existing tags in the field with the greatest possible probability. This is the default setting.

Filter

The filter settings enable users to select only those ISO-B tags which are to respond. In order to use this function correctly, users require certain information concerning the tags, their memory map, and the data saved on them. In order to activate or deactivate a filter, click the checkbox *Filter*. This activates the two radio buttons *All* and *Subset*.

- Selection of *All* resets the reader to the default configuration in which it requests a response from all ISO-B tags with every read cycle.
- Selection of *Subset* permits users to limit the response criteria using filters.

Up to five filters can be specified for *Subset*. These are executed successively in the defined order. If more than one filter is active for *Subset*, the selection criteria for the set of responding tags is made up from logical ANDing of all filter expressions.

Note

The setting *Subset* always contains *All* (select all) before the first filter is applied.

Note

Care should be taken when defining the filter criteria since it is possible to generate a list of filter criteria or subsets which logically eliminates **all** tags, thus making their detection completely impossible.

Activities

Two activities are permitted:

- SELECT: This option incorporates all those tags matching the logical expression into the group of tags recorded in the current rate cycle. The logical expression consists of the type, address, mask and value. These tasks respond to the selection request with their UID, and enter their ID status.
- UNSELECT: This option removes all those tags matching the logical expression from the group of tags recorded in the current rate cycle. The logical expression consists of the type, address, mask and value. These tags ignore the selection request, and remain in the READY status.

Type

Four types are permissible:

- = EQUAL_TO
- > GREATER_THAN
- < SMALLER_THAN
- != NOT_EQUAL_TO

Address

This is an address in BYTE format which commences at the lowest address on the tag.

- With UCODE HSL tags, the most significant byte of the UID is at memory location 00.
- With UCODE EPC tags, the data are preconfigured at addresses 00 and 01, and set fixed to "EF04".
- The most significant byte of the EPC code of an UCODE EPC is at address 02.

Users can decide between UCODE EPC and UCODE UID values if they check this in the window "Tag monitor".

If the ID type is shown as ISO-B, the reader indicates a UID which commences at address 00.

If the ID type is shown as UCODE, the reader indicates an EPC whose start byte commences at address 02. The remaining part of the EPC is assigned in the memory according to the Philips UCODE specification, so that the five least significant bytes of the EPC are stored in the memory locations 03 to 07.

Mask

The mask is used bit-by-bit to identify those parts of the value field which are relevant; the value field is always 8 bytes long.

- If the "Mask" field is set to "80", only the most significant part of the value field is used for the comparison.
- If the "Mask" field is set to "0F", only the four least significant bytes of the value field are used for the comparison.

Value

The value field is always 8 bytes long and is compared byte-by-byte. The most significant byte is always present on the far left, and this is compared with the contents of the address specified in the "Address" field. The next byte of the value field is present in the memory location "Address + 1".

Examples of filtering in accordance with ISO 18000-6B

Case (a)

Here all UCODE EPC1.19 tags are selected and all tags with the value "03h" in the address "17h" are added to them.

- Subset 1: SELECT, all tags at which the data value "EF04h" is saved in addresses 00h to 01h.
- Subset 2: SELECT, all tags at which the data value "03h" is saved in address 17h.

Case (b)

Here all UCODE EPC1.19 tags are selected and then all UCODE EPC1.19 tags with the value "03h" in the address "17h" are excluded.

- Subset 1: SELECT, all tags at which the data value "EF04h" is saved in addresses 00h to 01h.
- Subset 2: UNSELECT, all tags at which the data value "03h" is saved in address 17h.

4.4.5 EPC Class 1 GEN 1 protocol settings

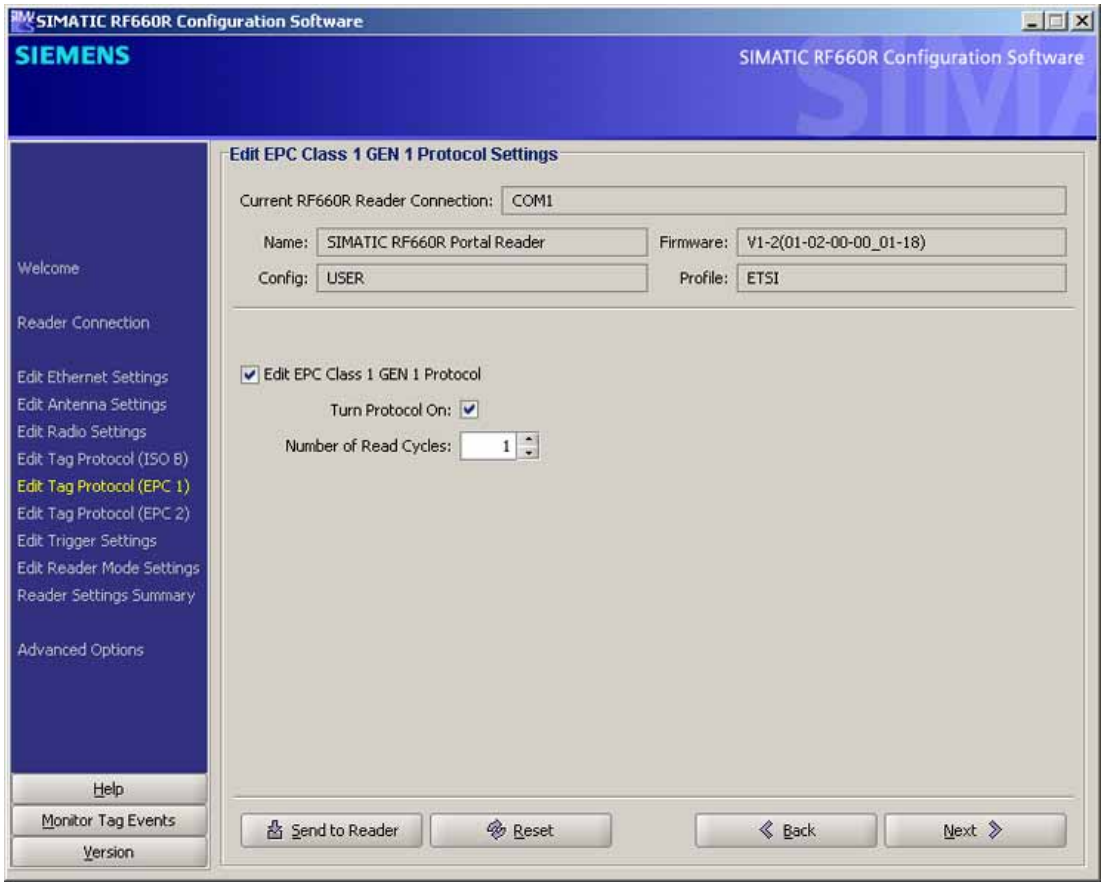


Figure 4-6 Dialog window "EPC Class 1 GEN 1 protocol settings"

Switch protocol on

- In order to switch the protocol on, activate the checkbox *Switch protocol on*.
- In order to switch the protocol off, deactivate the checkbox *Switch protocol on*.

Number of read cycles

Define the number of read cycles. This is usually 1. However, if more than one tag protocol is to be used, the time can be set here for which the reader - with consideration of other tag types - only searches for tags of type EPC Class 1 GEN 1.

Max. 1000 read cycles can be set.

4.4.6 EPC Class 1 GEN 2 protocol settings

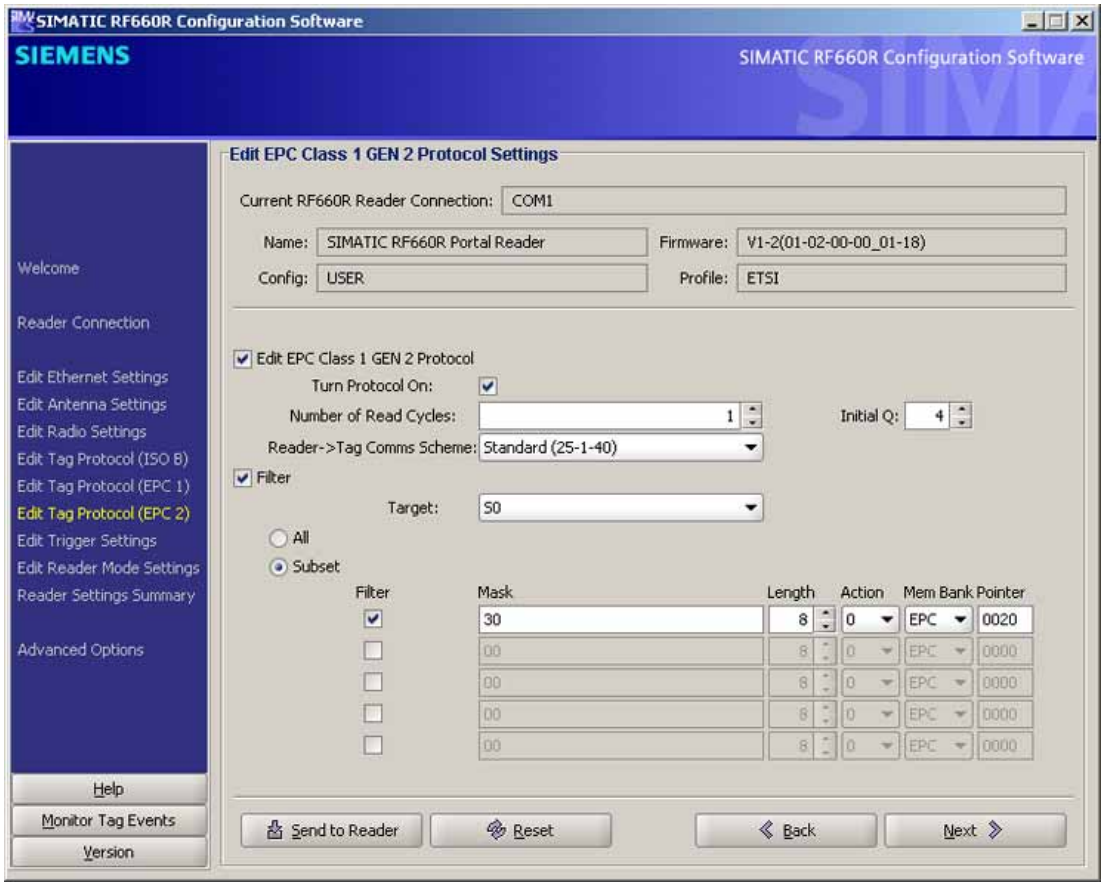


Figure 4-7 Dialog window "EPC Class 1 GEN 2 protocol settings"

Switch protocol on

- In order to switch the protocol on, activate the checkbox *Switch protocol on*.
- In order to switch the protocol off, deactivate the checkbox *Switch protocol on*.

Number of read cycles

Define the number of read cycles. This is usually 1. However, if more than one tag protocol is to be used, the time can be set here for which the reader - with consideration of other tag types - only searches for tags of type EPC Class 1 GEN2.

Max. 1000 read cycles can be set.

Reader -> Tag communication scheme

Several communication schemes are possible for EPC Class 1 GEN 2 depending on the country of use and the selected radio profile.

Note

If the Dense Interrogator mode is selected for the CHINA profile, at least one channel should always remain unassigned between two transmitting channels. Furthermore, the Dense Interrogator mode is exclusively a mode for EPC Class 1 Generation 2 and cannot be used with a different tag protocol or with a different reader -> tag communication scheme.

Description	Reader -> Tag Tari	Expected mean reader -> tag data rate	Tag reader link frequency	Tag -> Reader data rate	Selectable for ETSI profile	Selectable for FCC profile	Selectable for CHINA profile
Standard (25-1.0-40)	25 µs	26.7 kbps	40 kHz	40 kbps	Yes	Yes	Yes
Higher rate (12.5-1.0-160)	12.5 µs	53.3 kbps	160 kHz	160 kbps	No	Yes	No
Higher rate (12.5-1.0-80)	12.5 µs	53.3 kbps	80 kHz	80 kbps	No	Yes	No
Higher rate (12.5-0.5-160)	12.5 µs	64 kbps	160 kHz	160 kbps	No	Yes	No
Higher rate (25-1-160)	25 µs	26.7 kbps	160 kHz	160 kbps	Yes	Yes	Yes
Higher rate (25-0.5-160)	25 µs	32 kbps	160 kHz	160 kbps	Yes	Yes	Yes
Higher rate (6.25-0.5-160)	6.25 µs	106.7 kbps	160 kHz	160 kbps	No	Yes	No
Higher rate (6.25-1-160)	6.25 µs	128 kbps	160 kHz	160 kbps	No	Yes	No
Dense Interrogator	25 µs	32 kbps	160 kHz	40 kbps	Yes	Yes	Yes

Initial Q

This factor is the basis used for the collision decision with Gen 2. The algorithm functions by calculating a response slot number.

The following equation is used:

SlotNumberRange = 2 Q - 1

- If only one single tag is present in the field, set *Initial Q* to "0" (zero). This guarantees that the tag always responds in the first slot.
- Set *Initial Q* as standard such that the SlotNumberRange is twice as large as the maximum number of existing tags, e.g. if 4 are present, set *Initial Q* to 3.
- The standard setting for *Initial Q* is 4.
- Maximum value: *Initial Q* = 15
- If a value is set for Initial Q that is not suitable for the number of tags, the reader has an algorithm that automatically adapts the Initial Q value to the number of tags. You should, however, set the Initial Q appropriately so that the largest possible number of tags can be read as quickly as possible.

Filter

If you activate the checkbox "Filter", the pulldown menu "Target" and the radio buttons *All* and *Subset* become active.

Target

One of four targets can be specified here. These four targets are the session flags of the EPC Class 1 Gen 2 tags, and are identified S0, S1, S2 and S3.

The various "session flags" have different lifetimes in the memory if there is no power supply.

The reader uses the target S0 by default.

"Session flags" have the status A or B.

A group of subsets defined by filters limits the tags to be detected to those for which the session flag defined as target is set to A. The reader then includes exactly those tags into the stock for which the session flag defined as target is set to A.

For further information about "session flags" and their use, see the Appendix EPC Gen 2 session flags (Page 76) .

All or subset

- *All* - if the option *All* is activated, the reader is forced to select all tags by using the previously selected target.
- *Subset* - if the option *Subset* is activated, up to five filter expressions which are ANDed can be included.

Subsets are logical elements which are executed in the defined sequence. The first, non-described selection, is the selection of all tags with setting of their *target session flags* to A.

The reader will output all tags whose target is still set to the status A once all specified filters have been applied.

Mask

Mask is specified in hexadecimal notation and evaluated bit by bit. As a result of the hexadecimal notation, users might be confused by leading zeros if these are not considered in association with the used *Length* of the number format required for saving the value for *Mask*.

Length

Length is the length of the number format used for *Mask*, and is applied to check the observation of any leading zeros which may be required.

Tasks

The activity defines how the tag responds to its selected session flags when *Mask*, *Length*, *Pointer* and *Memory module* match or not.

A session flag S0, S1, S2 and S3 can have two statuses A or B.

Tasks	If tag matches	If tag does not match	Example of target to be accepted = S0
0	Set selected session flag to A	Set the selected session flag to B	Set S0 to A if the tag matches, otherwise to B
1	Set selected session flag to A	Do nothing	Set S0 to A if the tag matches, otherwise leave S0 at its current value
2	Do nothing	Set the selected session flag to B	Leave S0 if the tag matches, otherwise set S0 to B
3	Set the selected session flag to B	Do nothing	If the tag matches, set S0 to A if it is at B or to B if it is at A. If the tag does not match, do not change S0
4	Set the selected session flag to B	Set the selected session flag to A	Set S0 to B if the tag matches, otherwise to A
5	Set the selected session flag to B	Do nothing	Set S0 to B if the tag matches, otherwise leave S0 at its current value
6	Do nothing	Set selected session flag to A	Leave S0 if the tag matches, otherwise set S0 to B
7	Do nothing	Set selected session flag to its inverse function (A->B or B->A)	If the tag does not match, do not change S0. If the tag matches, set S0 to A if it is at B or to B if it is at A

Memory module

Can be either an EPC, TID or USER memory. This selection cannot be made for occupied memory modules, e.g. those containing a kill or access password.

It is generally the case until new EPC Class 1 Gen 2 tags are available that the memory module is set to EPC; the TID memory is fixed and preprogrammed; a USER memory is not present.

Pointer

The *Pointer* is a hexadecimal bit pointer which points at the first position of the selected memory module.

For example, if the memory module is set to EPC, the pointer should be set to 0020h for the first and most significant bit of the EPC. The first 16 bits are the CRC block, the next 16 bits the PC block, i.e. the EPC starts at bit address 32, corresponding to 0020h.

Examples of filtering with EPC Class 1 GEN 2

Assume four tags are present:

EF0402001122335500000000	EPC2 tag ID type
00040200111111100000000	EPC2 tag ID type
EF0402001122335500000011	EPC2 tag ID type
00040200111111100000022	EPC2 tag ID type

The filter process of EPC Class 1 Gen 2 sends a number of SELECT commands which can be used to add more tags to the *inventory round* in steps.

Assume that all are *session S0* and that the *inventory round* searches for those tags with S0 = A once the filter subsets have been applied.

Case	Mask	Length	Tasks	Memory module	Pointer	Responding tags
1	EFh	8	0	EPC	0020h	EF0402001122335500000000 EF0402001122335500000011
2	EFh	8	4	EPC	0020h	00040200111111100000000 00040200111111100000022
3	EFh 22h	8 8	0 1	EPC	0020h 0078h	EF0402001122335500000000 EF0402001122335500000011 00040200111111100000022
4	EFh 22h	0 0	0 0	EPC	0020h 0078h	00040200111111100000022

Case 1:

Set the S0 flag to A for all tags where the first 8 bits of the EPC are equal to EFh. Set the S0 flag for all other tags to B (activity = 0). Thus tags are considered which commence with EFh...

Case 2:

This applies to tags that do not begin with "EFh", e.g. 00... . Set the S0 flag to B for all tags where the first 8 bits of the EPC are equal to EFh. Set the S0 flag for all other tags to A (activity = 4).

Case 3:

Set the S0 flag to A for all tags where the first 8 bits of the EPC are equal to EFh. Set the S0 flag for all other tags to B (activity = 0). Thus tags are considered which commence with EFh...

Set the S0 flag to A for all tags where the last 8 bits of the EPC are equal to 22. Do not change the S0 flag for those flags which do not match (activity = 1). We therefore include tags which end with 22h in the list, and obtain those which commence with EFh and those which end with 22h.

Case 4:

Set the S0 flag to A for all tags where the first 8 bits of the EPC are equal to EFh. Set the S0 flag for all other tags to B (activity = 0). Thus tags are considered which commence with EFh...

Set the S0 flag to A for all tags where the last 8 bits of the EPC are equal to 22h. Set the S0 flag for all other tags to B (again activity = 0). Because activity 0 is repeated, this instruction overwrites the first instruction, and we only obtain tags which end with 22h.

4.4.7 Trigger settings

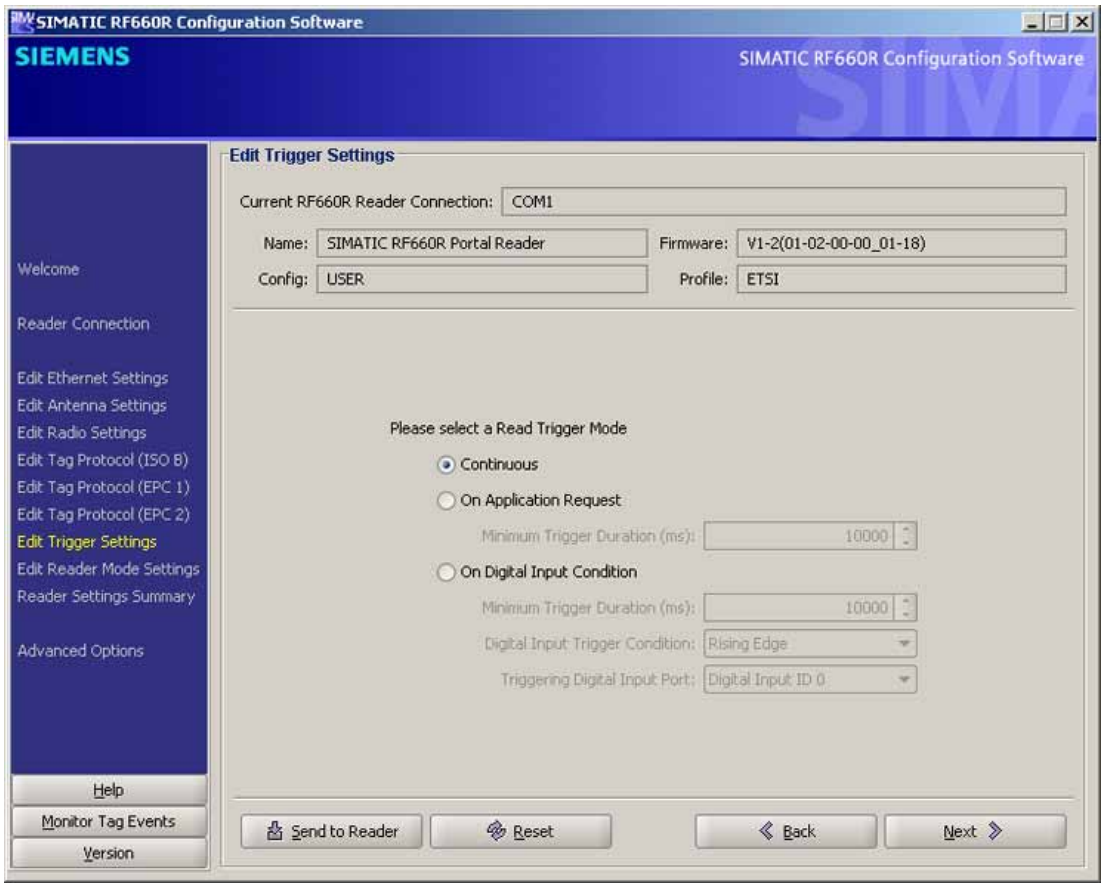


Figure 4-8 Dialog window "Edit Trigger Settings"

In the dialog window "Edit Trigger Settings" you can parameterize triggers that control the tag read functions. The parameterization depends on the radio standard used.

The following trigger modes are available:

Read trigger mode	Description
Continuous	Continuous tag reading
In case of application request	Reading of tag is triggered by XML command from a computer. This read interval corresponds to the minimum trigger duration.
through digital input	Tag reading, triggered by digital input

NOTICE
Reboot of the reader may be necessary When there are many tags inside the antenna field and the tag reading mode of operation is such that the reader mode is AUTONOMOUS and the trigger is set to CONTINUOUS then the air interface of the reader will be under heavy load. In these cases it is prohibited that reconfigurations or other commands are sent from the host to the reader. Reader configurations and other commands shall only be sent from the host to the reader when either no tags are in the field or the reader does not operate in the continuous reader mode. It is required that the tag event buffer (tag event report list) of the reader will be cleared prior to any further communication from the host to the reader. (No further tag events will be displayed.)

4.4.8 Reader mode settings

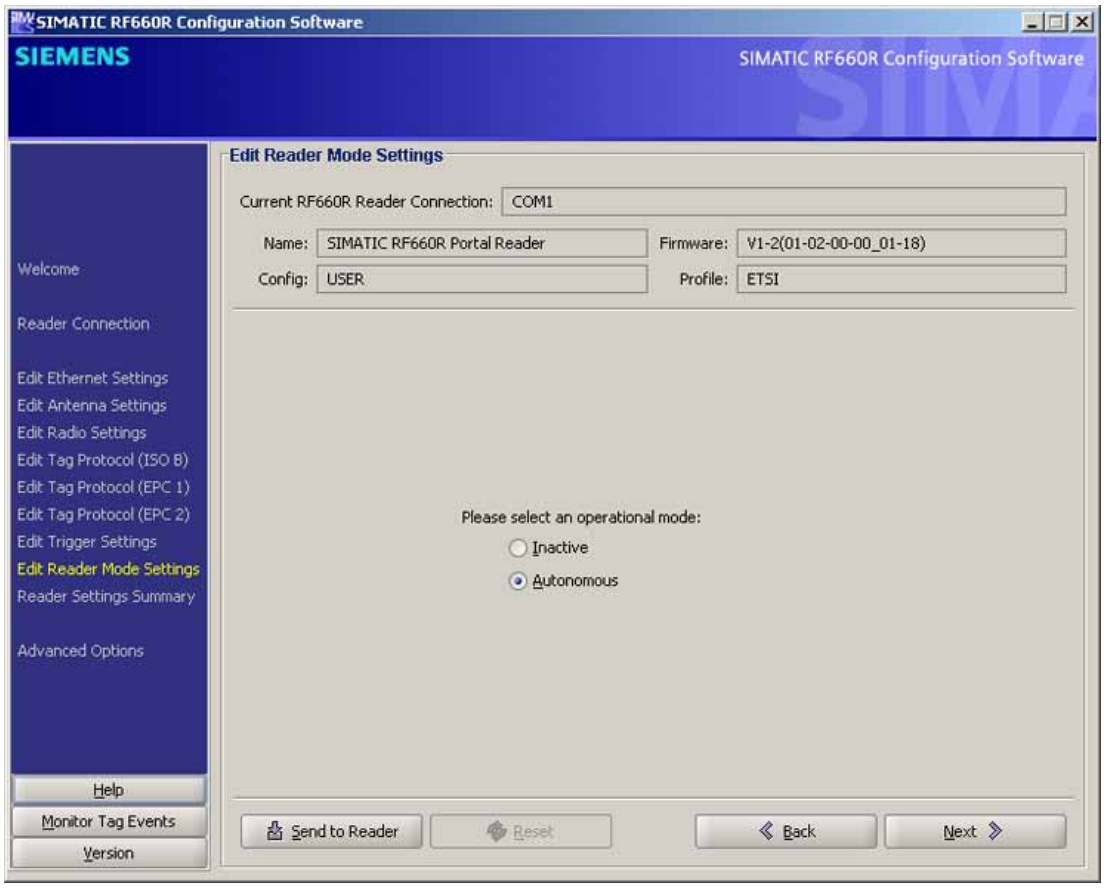


Figure 4-9 Dialog window "Edit Reader Mode Settings"

- Inactive: Transmitter switched off, tags are not being read (reader is in Standby)
- Autonomous: Transmitter is switched on

4.4.9 Dense Interrogator Environment

4.4.9.1 Settings for the DIE mode

The architecture of the RF600 system makes it possible to operate several RF660R readers in a restricted space at the same time without interference (DIE mode, Dense Interrogator Environment mode). The great advantage of this system is that the tag reading accuracy can be increased in a hall where many readers are operated within an enclosed space by application of mechanisms which minimize interference.

The Dense Interrogator mode is only defined for Gen 2 and does not function with other tag types.

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).

In accordance with EPC Global, the odd channels 103, 106, 109, and 112 are used for transmitting in this mode (communications path Reader -> Tag); the tag response is on the even channels as a result of the frequency offset. Frequency reuse only becomes possible due to this procedure. However, a prerequisite is that a certain minimum distance, and thus minimum decoupling, is observed between the antennas of adjacent readers.

If the EPC Global Class 1 Gen 2 Dense Interrogator mode is selected for the CHINA profile, at least one channel should always remain unassigned between two transmitting channels.

Several channels or only one channel can be activated in the CHINA profile. The number of available channels changes depending on the maximum power selected in the "Antenna settings" menu. To be sure, first update the "Antenna settings" and then the "Radio settings".

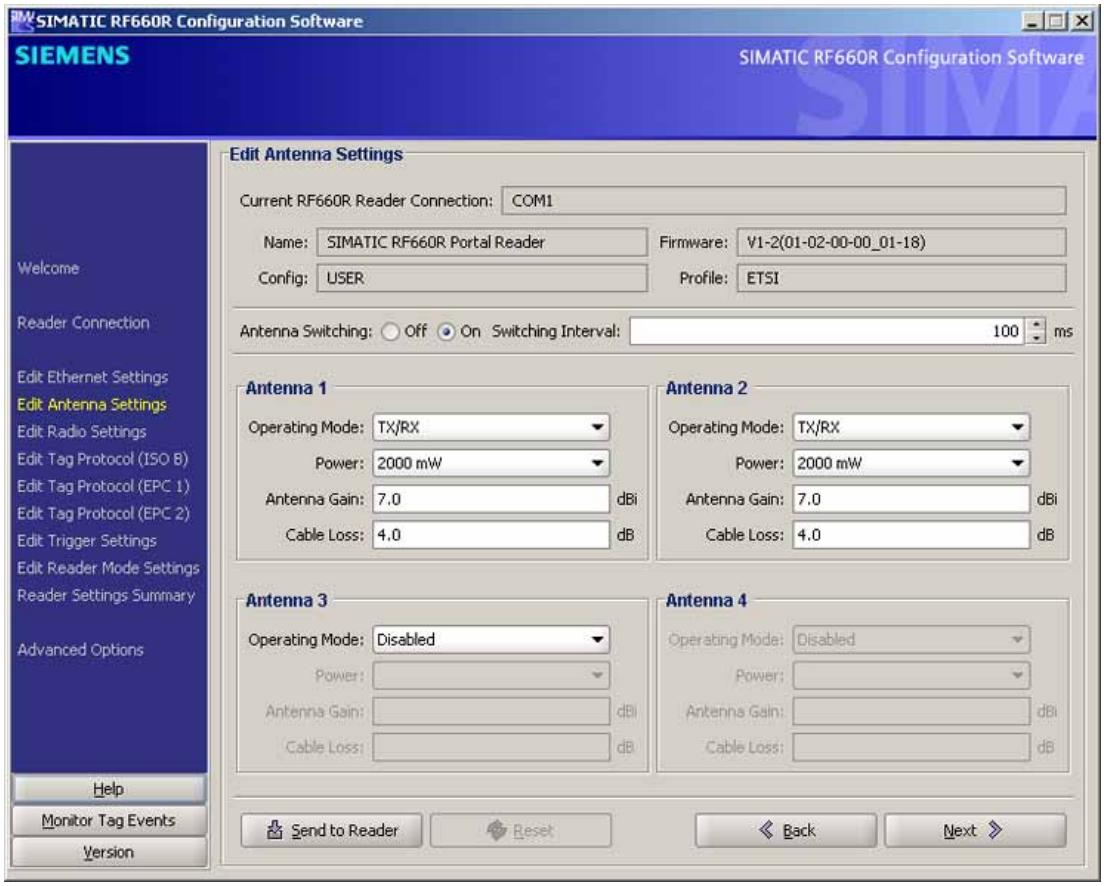


Figure 4-10 Dialog window "Edit Antenna Settings"

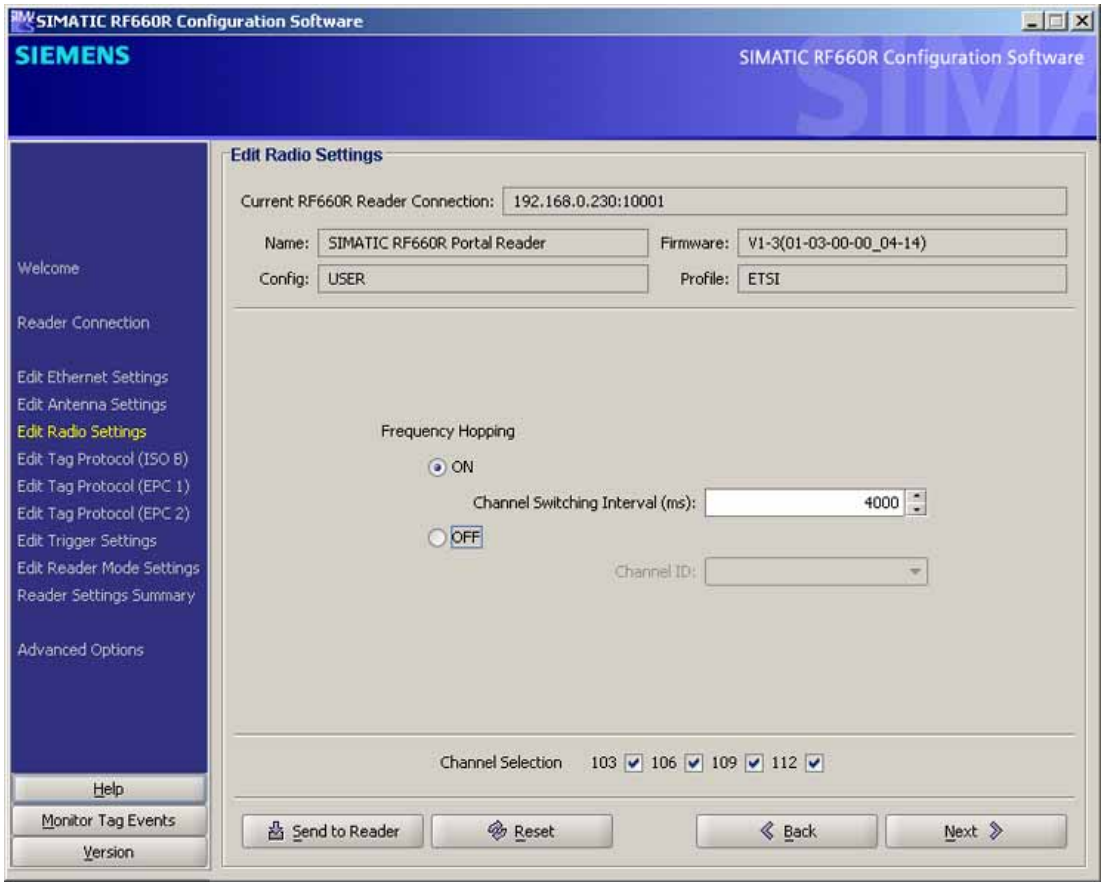


Figure 4-11 Dialog window "Edit Radio Settings"

4.4.10 Reader summary

Reader summary

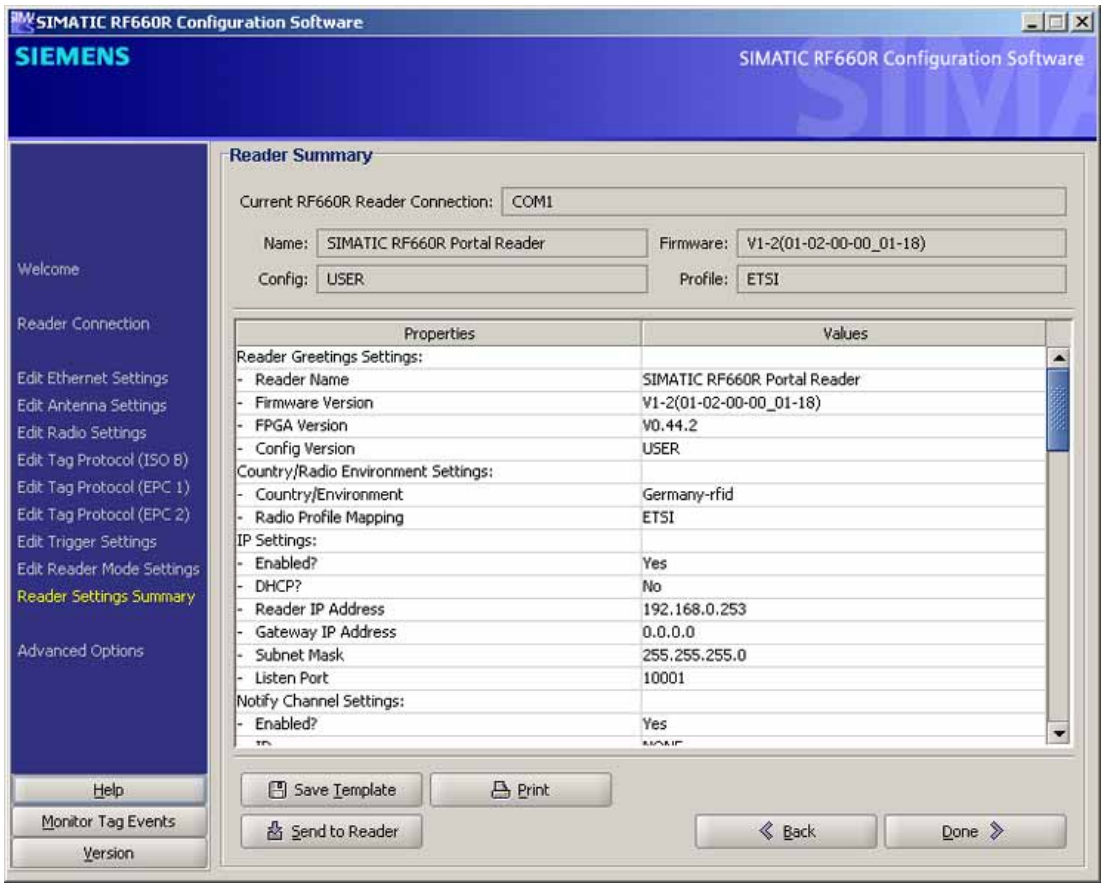


Figure 4-12 Dialog window "Reader Summary"

In the dialog window "Reader Summary", you can display the parameter settings you have made in a table.

Save Template: The existing configuration is saved as a template so that it can be imported as rapidly as possible into another reader (if reader is replaced).

Print: The configuration can be printed out for archiving purposes.

Send to Reader: The complete configuration of all individual dialog fields is transferred to the reader using this button.

Requirement

In order for the RF660R Configuration Software to function, a connection is required between the reader and the parameterization computer.

Procedure

1. In the footer of the RF660R Configuration Software, click *Next* until you reach the dialog field "Reader Summary".
2. Check the displayed settings. If you want to change any parameters, click *Back* until you reach the appropriate dialog window. Make your changes there.
3. If you do not want to change any parameters, you can confirm your settings by clicking *Send to Reader* again.
4. Click *Done* to exit the RF660R Configuration Software.

4.4.11 Saving the reader default settings as template

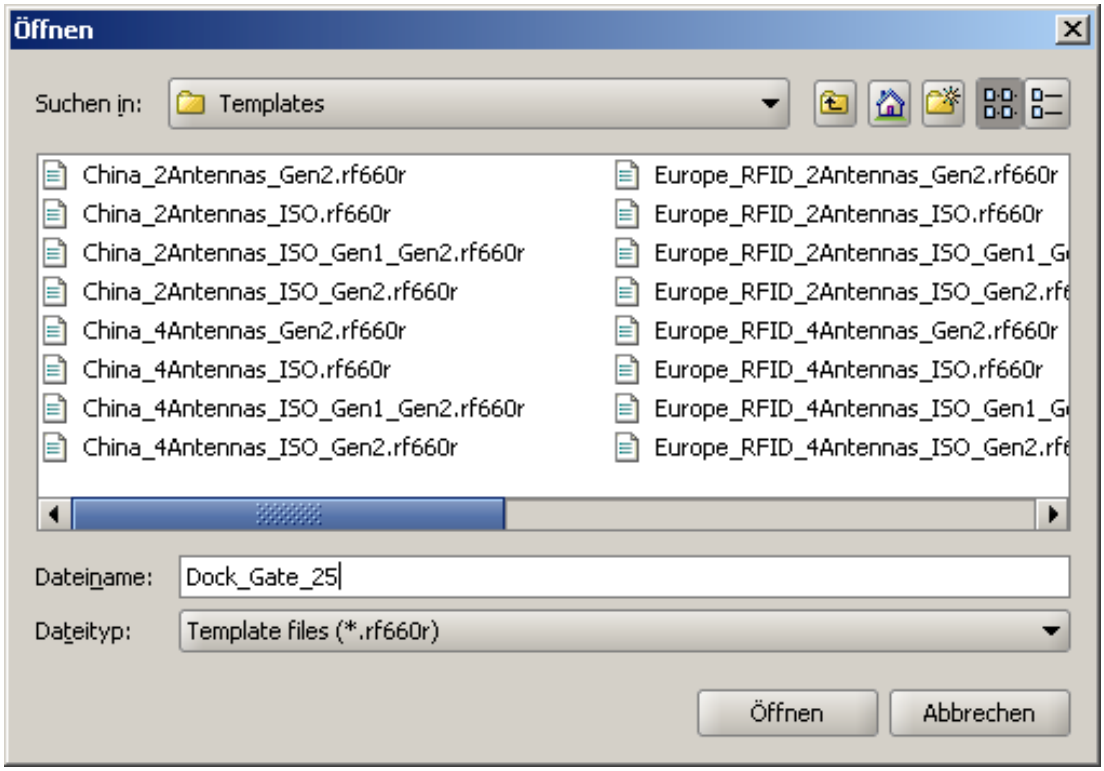


Figure 4-13 Dialog window "Saving the reader settings as template"

You should select or designate and save templates for readers on the basis of the reader name, and not e.g. "All readers in room 001", since the Ethernet configuration for the reader is also saved in the template.

4.4.12 Advanced options

Requirement

In order for the RF660R Configuration Software to function, a connection is required between the reader and the parameterization computer.

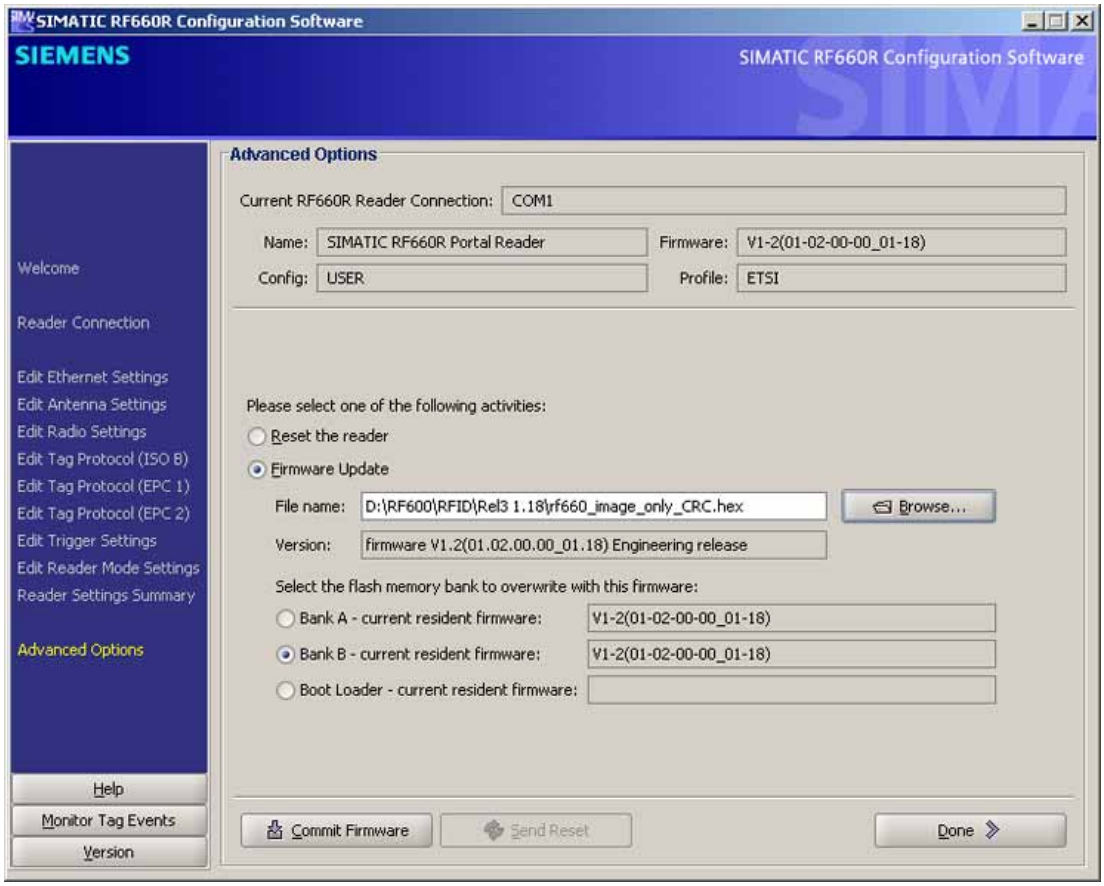


Figure 4-14 Dialog window "Advanced Options"

Procedure

Via the dialog field *Advanced Options*, you can do the following:

- Reset the reader
- Firmware update
- Boot loader update

4.4.12.1 Firmware update

Firmware update requirements

CAUTION
Risk of damage! Under no circumstances must you disconnect the RF660R unit from the power supply during the firmware update procedure.

CAUTION
Risk of damage! During the firmware update procedure, no further communication, such as triggers, must take place with the reader that should not be set at this time via the digital inputs of the reader.

NOTICE
Inoperability When updating the reader with firmware version V1.3, ensure that the identical firmware version is always used for both banks, Bank A and Bank B, e.g. V1.3.

NOTICE
Loss of all reader settings Please note that all currently active settings (antennas, radio settings, tag protocols, etc.) as well as the previously set IP address and port number will be lost after a firmware update. You will have to reset the parameters of the reader after a firmware update.

Firmware update for Bank A and Bank B

Since firmware version V1.2, you must update both banks, Bank A and Bank B, on the reader. Update the firmware of Bank B first; then update the firmware of Bank A.

Firmware updating of a bank

1. Select the option *Firmware Update*.
2. Click the *Browse* button, and select the firmware version. The typical file name for the firmware is: rf600_image_only_CRC.hex
3. Once you have selected the firmware, the application will carry out a number of tests for the integrity and type.
4. Select a bank from the options field: *Bank A* or *Bank B.*
5. Finally click the "Commit Firmware" button to transmit this image to the reader. The communication window shown below is then opened:

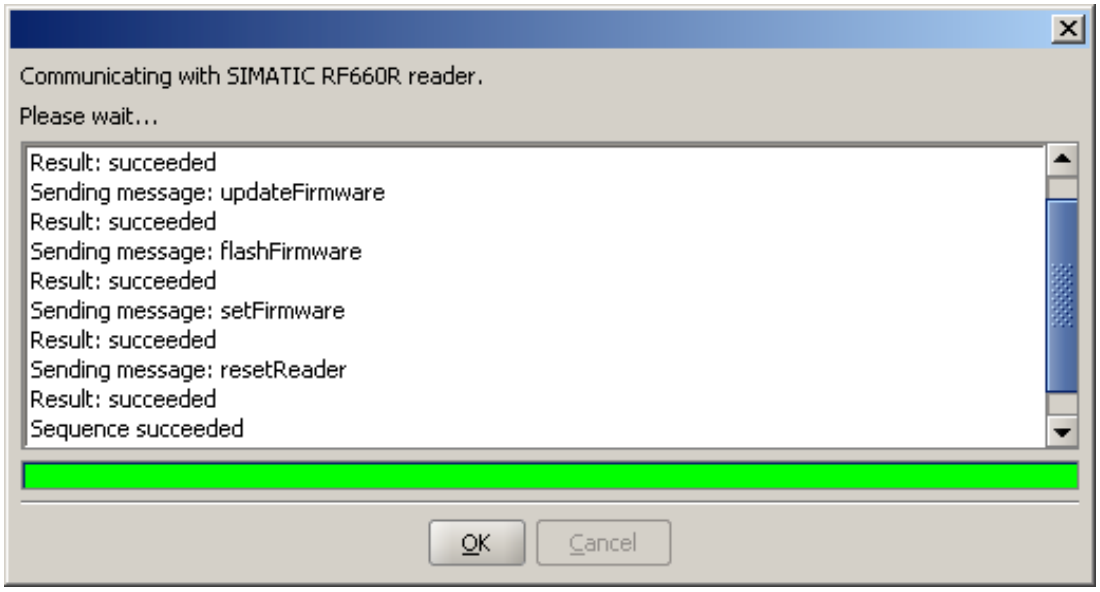


Figure 4-15 Firmware update

6. The progress bar proceeds up to the right end, and remains green following a successful update. Confirm with *OK*.
7. Wait until the yellow and red LEDs go out, and then a further 30 seconds. Then deenergize the reader (disconnect the DC power cable), wait for 10 seconds, and then reestablish the DC supply to the reader. The new firmware is then ready for use.

4.4.12.2 Reader Reset

NOTICE
Data loss If errors occurred, all error messages can be deleted and the reader can be restarted by resetting the reader. All settings that were active (antennas, radio settings, tag protocols, etc.) and the IP address/port number set by you are retained. The reader reset closes the existing connection between the parameterization computer and the reader and then reestablishes the connection.

1. In the footer of the RF660R configuration software, click *Next* until you reach the *Welcome* menu again.
2. Select "Advanced Options".
3. Click *Next*.
4. In the "RF660R reader connection" window: select "Connect using Serial Port".
5. Click the *Connect* button, confirm with *OK* -> the window "Advanced Options" is opened.
6. Select *Reset the reader* to activate the reset option. Click *Send Reset* to reset the reader.
7. The communication window shown below is then opened:

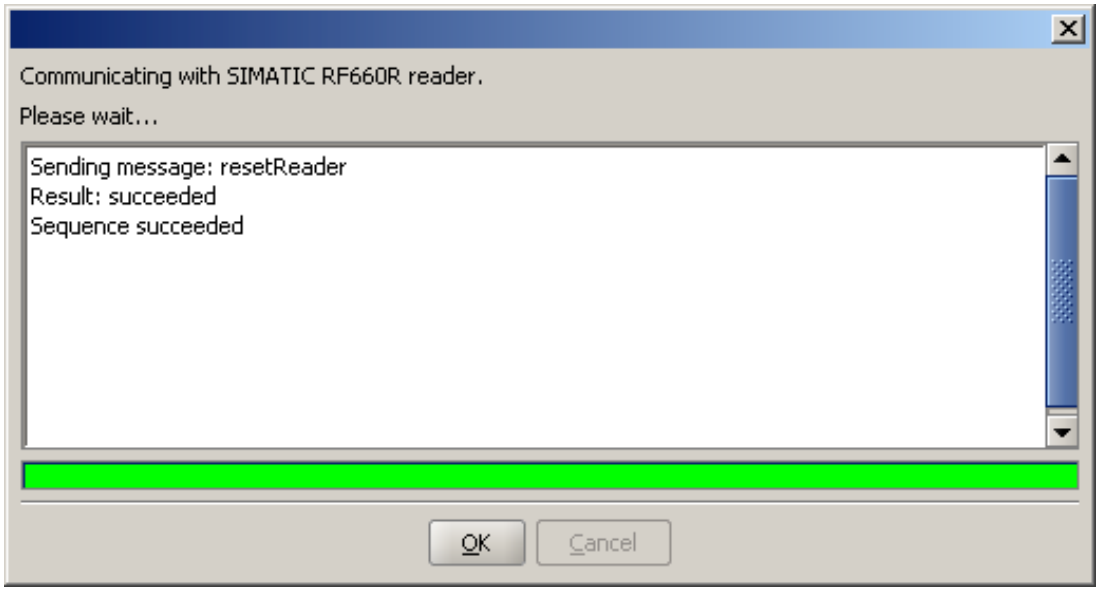


Figure 4-16 Reset the reader

8. Click *OK* to close the dialog box again.

4.4.12.3 Boot loader update

Boot loader update

1. Select the "Boot loader update" option.
2. Click the *Browse* button, and search for the boot loader image (this is located in the same directory as the normal firmware). The typical file name for the boot loader image is: bootloader_image_only_CRC.hex
3. Once you have selected the boot loader image, the application will carry out a number of tests for the integrity and type.
4. Finally click the *Commit Firmware* button to transmit this image to the reader. The communication window shown below is then opened:

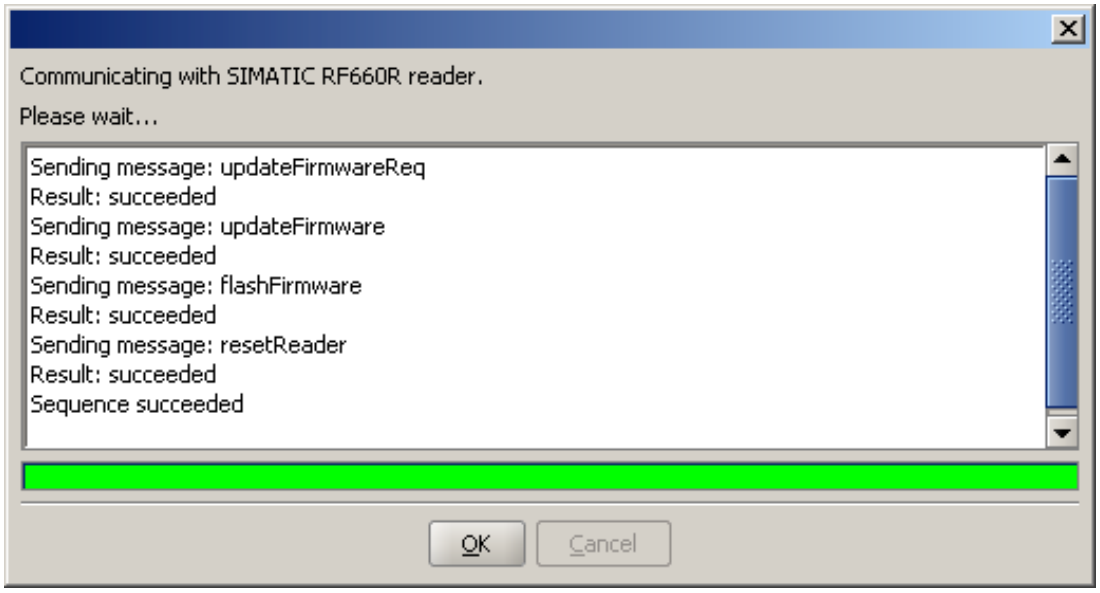


Figure 4-17 Boot loader

5. The progress bar proceeds up to the right end, and remains green following a successful update. Confirm with *OK*.
6. Wait until the yellow and red LEDs go out, and then a further 30 seconds. Then deenergize the reader (disconnect the DC power cable), wait for 10 seconds, and then reestablish the DC supply to the reader. The new boot loader firmware is then ready for use.

After the image transfer has been completed, the reader will be reset and the application will return to the "Welcome" window.

NOTICE
Damage to the reader Make sure during the boot loader update that the power supply is not interrupted and no further communication procedures, such as triggers, are sent to the reader via the digital inputs since this could damage the reader. The reader can only be repaired by a **Siemens Service Center for MOBY Products**.

4.4.13 Tag event monitor

In the *Tag Event Monitor View* window, you can display statistical data for the tags.

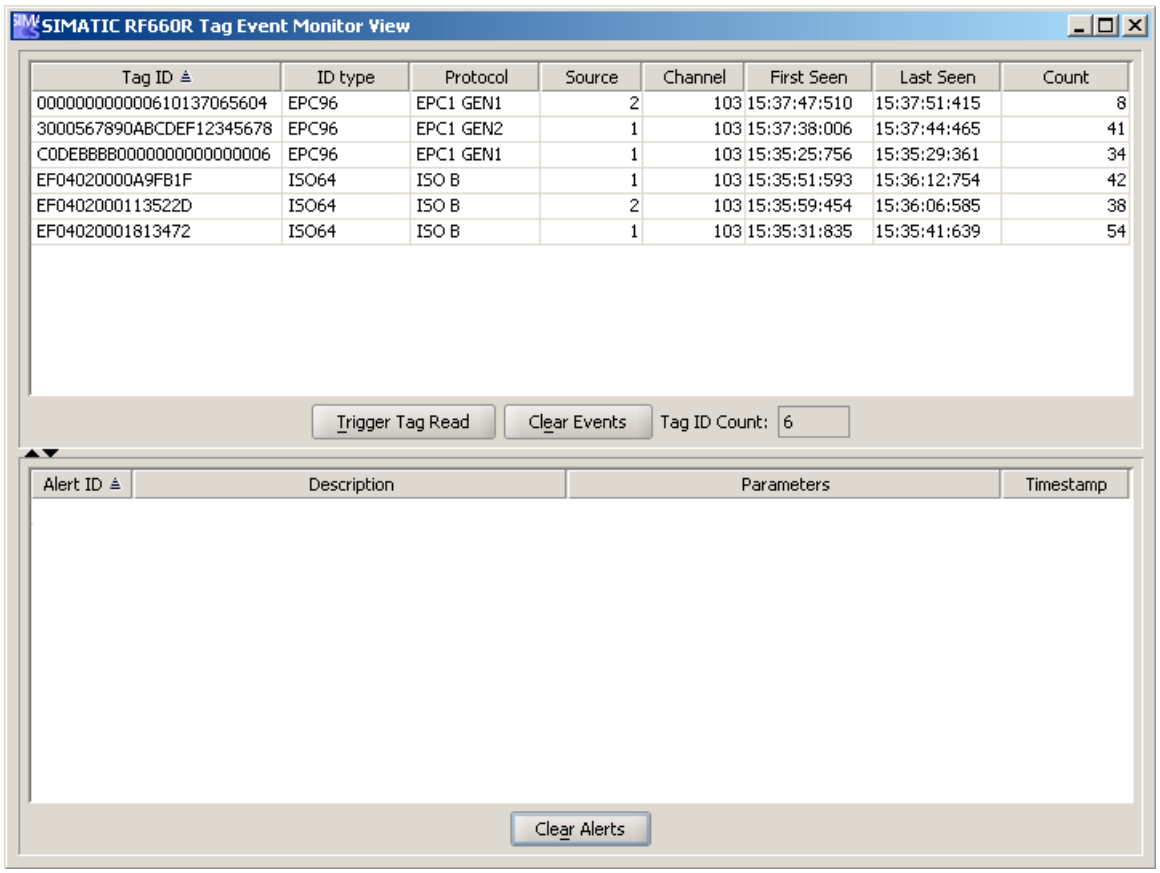


Figure 4-18 Tag Event Monitor

Requirement

In order for the RF660R Configuration Software to function, a connection is required between the reader and the parameterization computer.

Note

Following a reader reboot, a connection must be built up again before the events can be displayed.

Note

Transponders with different tag ID types that have the same ID will not be displayed as two different tags.

Note

Clearing the reader buffer

When the reader is running in the continuous tag reading mode the buffer may be filling up with tag events.

The process of the reader to clear its buffer will take, depending on the data rate and the number of accumulated tag events, up to a couple of minutes.

Procedure

1. In the left-hand menu bar, click the *Trigger Tag Read* button. The statistical data for the tags appear in the text field.
2. If you want to reset the text field and delete all tag events, click *Clear Events*.
3. If you want to reset the text field and delete all alerts, click *Clear Alerts*.

Statistical information

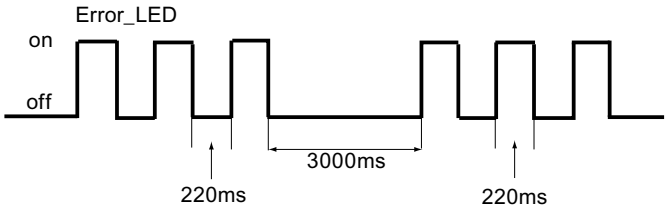
Name	Description
Tag ID	ID of the tag
ID type	Type of ID (ISO 64, ISO 96, EPC 1.19)
Protocol	Type of tag protocol
Source	Number of the tag (Tag ID)
Channel	Channel number of the reader
First seen	Date and time when this tag was read for the first time
Last seen	Date and time when this tag was read for the last time
Counter	Counter (number of read processes for this tag)

Appendix

A

A.1 Error messages

It could be the case that errors occur during operation of the reader which interfere with its function. The presence of an error is indicated by the red ERROR LED on the reader. The number of flashing pulses refers to the corresponding error.



The error message with the flashing ERROR LED is repeated following a pause of 3 seconds. In many cases, an error can be eliminated by switching the reader off and on again (power off->on).

The complete and detailed list of possible errors and their causes - which is more extensive than this table - can be found under 'Error Codes' in the Function Manual Simatic RF660R XML Interface.

Error code	Error code (description)	Number of flashes	Note
-	Reader inactive	1	Reader is inactive
1000	Fatal error: Failed to program the synthesizer	20	Serious error: Synthesizer cannot be programmed
1001	Fatal error: Antenna switch failure	20	Serious error: at antenna switch
1002	Fatal error: Unable to switch on the power amplifier	20	Serious error: the power amplifier cannot be switched on
1003	Fatal error: Unable to set Tx gain	20	Serious error: the transmission gain cannot be switched on
1004	Fatal error: Unable to set Rx gain	20	Serious error: The receiver gain cannot be switched on.
1005	Fatal error: FLASH erase failed	20	Serious error: Error on deleting the Flash memory.
1006	Fatal error: FLASH write failed	20	Serious error: Error on writing to the Flash memory.
2000	Fatal error: Software failure	20	Serious error: Software error
2001	Error: Config rollback error	20	Error: Error during configuration rollback
2002	Fatal error: Failed to save default config to FLASH	20	Serious error: Error on saving the presettings in the Flash memory.
5101	Error: Firmware running is not firmware selected to boot from	18	Error: The firmware used is not the firmware to be used for booting.
5102	Error: Antennas not connected	3	Error: Antenna not connected

A.2 EPC Gen 2 session flags

Session flags

The "session flags" (or inventory flags) and the flags selected for the application are used in selecting which tags take part in a read cycle. Each tag has 4 session flags (S0, S1, S2 and S3). The session flags can have the value "A" or "B".

Persistence periods

The session flags have different persistence periods as follows:

Flags	Tag Energized	Tag NOT Energized
S0	Unlimited	None
S1	500 ms to 5 s	500 ms to 5 s
S2	Unlimited	> 2 s
S3	Unlimited	> 2 s

Concept and benefits

The idea behind session flags is a possible approach that can be used so that neighboring readers can inventorize tags independently (but only one reader is reading tags at any time). The idea is that readers use different session flags.

A reader has alternate read cycles reading tags with their session flag set to A or B (the flag is toggled after being read).

A reader would perform a number of read cycles and then power down to allow another reader to read the tags using a different session flag. When the first reader starts again, the session flag it was using has not been altered by the second reader.

The second reader therefore has no impact on the first reader.

Typical RF660R application

The RF660R, however, uses the session flags slightly differently. Every read cycle, it sets all tags to "A" for session flag "S0" (if there is no filtering) and it then reads all these tags.

This maximizes the number of tags found in a read cycle since all tags will respond every read cycle. The other approach means you may have to wait a read cycle (for newly arrived tags or tags that missed the previous read cycle) before you detect them. Using this approach, the session flags become less relevant because two readers will not affect each other in their read cycles, even if they were using the same session flag.

Filtering works by selecting/deselecting the tag subset that will take part in a read cycle based upon a number of masks. The masks should set the target (S0, S1, S2, S3) of the tag subset to "A" and all other tags to "B". The read cycle will then only interrogate tags with a state "A" target. The target that is used has little influence on the read cycle. However, the persistence period is only valid if the transponder in the antenna field receives sufficient energy. If, for example, a transponder enters a UHF hole in front of an antenna and does not receive sufficient energy for a certain period, the tag will reset its target.

A.3 Priority list for internal tasks of the reader

The following list shows the priorities in descending order with which the RF660R firmware of the reader operates certain tasks:

Priority Ranking	Task
1 (highest priority)	Transmit Task
2	Periodic timer task
3	Receive Task
4	Physical Layer Controller Task
5	Transmit Controller Task
6	ISO B Tag Task
7	EPC1 Tag Task
8	EPC2 Tag Task
9	Comms Controller Task
10	Comms Rx Task, i.e. communication from the host to the RF660R reader
11	Comms Rx Task, i.e. communication from the RF660R reader to the host
12	Operational Controller Task
13 (lowest priority)	Idle Task

A.4 Service & Support

Technical Support

You can access technical support for all IA/DT projects via the following:

- Phone: + 49 (0) 180 5050 222
  (€ 0.14 /min. from the German landline network, deviating mobile communications prices are possible)
- E-mail (mailto:support.automation@siemens.com)
- Internet: Online support request form: (www.siemens.com/automation/support-request)

Service & support for industrial automation and drive technologies

You can find various services on the Support homepage (www.siemens.com/automation/service&support) of IA/DT on the Internet.

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 (www.siemens.com/simatic-sensors/rf).

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 (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).

Training center

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 (www.sitrain.com).

Glossary

SCM

Supply Chain Management

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

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.

AM

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

Amplitude modulation

See AM

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 transponder). 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

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 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).

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

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.

Distant field communication

RFID antennas emit electromagnetic waves. If a tag is more than a full wavelength away from the reader's transmitting antenna it is in a "distant field". If it is within a full wavelength, one refers to "near field".

The wave length of UHF-RFID systems is approx. 33 cm.

The distant field signal is attenuated with the square of the distance from the antenna, whereas the near field signal is attenuated with the cube of the distance from 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 in 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. (0dbi = - 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

See EPC global

EPC global

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

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 transmission 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)

Enterprise Resource Planning.

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 change 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, data packets are transferred between the communication partners on constantly 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.

Listing

A combination of rules which manage communications systems.

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 more than a full wavelength away from the reader's transmitting antenna it is in a "distant field". If it is within a full wavelength, one refers to "near field".

The wave length of UHF-RFID systems is approx. 33 cm.

The distant field signal is attenuated with the square of the distance from the antenna, whereas the near field signal is attenuated with the cube of the distance from 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).

Passive tag

If electromagnetic waves from the reader reach the tag antenna, the energy is converted by the antenna into electricity which provides the tag chip with current. The tag is able to return information stored on the chip. Passive tags do not usually have a battery. A battery is required if the tag has a RAM, but the battery is only used to save information in the RAM. In particular, the battery is not used for data exchange between reader and transponder.

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 duration modulation; data are present in the pulse duration.

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 S5 system consist of a central controller, one or more CPUs, and various other modules (e.g. I/O modules).

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 S5 system consist of a central controller, one or more CPUs, and various other modules (e.g. I/O modules).

PM

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

Programmable Logic Controllers

See PLC

Pulse duration modulation

See PDM

Radio Frequency Identification

See RFID.

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 mobile data memories (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.

RFID

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

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 designation (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

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.

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.

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.

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

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 is a widely used language for distributing information on the Internet. Data exchange between reader and read station is carried out using XML commands.

Index

A

Antenna settings, 40

C

Channel switching interval, 43
Connection
    Ethernet, 14, 15
    Reader to parameterization computer, 14
    Serial, 14
Country setting, 23
Courses, 79

D

Default values
    Reset, 20
Display parameter settings, 64
Displaying statistical data for the tags., 72
DPI settings, 12

E

EPC Class 1 GEN 1 protocol settings, 51
EPC Class 1 GEN 2 protocol settings, 52
Ethernet connection
    Setup, 26
Ethernet port, 38
Even channels, 43
Examples of filtering in accordance with ISO 18000-6B, 50
Examples of filtering with EPC Class 1 GEN 2, 56

F

Firewall
    Deactivate, 26
Frequency hopping, 43

H

Hardware
    Requirements, 11

I

indicators
    Reader summary, 64
Installation
    Software, 11
Installing
    Java runtime environment, 13
interface
    RJ45, 14
    RS232, 14
ISO 18000-6B protocol settings, 47

J

Java runtime environment
    Installing, 13
Java runtime environment, 13

N

Number of read cycles, 47

O

Operation and display options, 20

P

Procedure when setting up an Ethernet port, 38
Procedure when using a template, 29, 35, 36

R

Range of functions, 9
Read mode, 48
Reader mode settings, 60
Reader reset, 69
Reader summary, 64
Receive mode (RX), 40
Requirements
    Hardware, 11
    Software, 11
Reset

Default values, 20
RF660R configuration software
Starting, 15
RJ45 interface, 14
RS232 interface, 14

S

Saving the reader default settings as template, 65
Serial connection
Setup, 22
Setup
Ethernet connection, 26
Serial connection, 22
Software
Installation, 11
Requirements, 11
Starting
RF660R configuration software, 15

T

Technical documentation
On the Internet, 78
Technical Support, 78
Training, 79
Transmit and receive mode (TX/RX), 40
Transmit mode(TX), 40
Transmit power
Constraints, 42
Trigger settings, 58

Get more information

www.siemens.com/simatic-sensors

SIEMENS AG
Industry Sector
Sensors and Communication
Postfach 4848
90026 NÜRNBERG
DEUTSCHLAND

subject to change
J31069 D0170-U001-A6-7618

www.siemens.com/automation