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RFID OsiSense® XG

EtherNet/IP Smart Antenna
User Manual

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www.schneider-electric.com

Schneider Electric

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

Table of Contents

Safety Information

Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a Danger safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

About the Book

At a Glance

Document Scope

This guide describes how to use OsiSense XG Smart Antenna and associated accessories.

Validity Note

This document is applicable to OsiSense XG Smart Antenna, version X.X.

The technical characteristics of the devices described in this manual also appear online. To access this information online:

Step	Action
1	Go to the Telemecanique Sensors home page *www.tesensors.com*.
2	In the **Search** box type the model number of a product or the name of a product range. ● Do not include blank spaces in the model number/product range. ● To get information on a grouping similar modules, use asterisks (*).
3	If you entered a model number, go to the **Product datasheets** search results and click on the model number that interests you. If you entered the name of a product range, go to the **Product Ranges** search results and click on the product range that interests you
4	If more than one model number appears in the **Products** search results, click on the model number that interests you.
5	Depending on the size of your screen, you may need to scroll down to see the data sheet.
6	To save or print a data sheet as a .pdf file, click **Download XXX product datasheet**.

The characteristics that are presented in this manual should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the manual and online information, use the online information as your reference.

Product Related Information

⚠ CAUTION

UNINTENDED EQUIPMENT OPERATION

The application of this product requires expertise in the design and programming of control systems. Only persons with such expertise must be allowed to program, install, alter, and apply this product.

Follow all local and national safety codes and standards.

Failure to follow these instructions can result in injury or equipment damage.

User Comments

We welcome your comments about this document. You can reach us by e-mail at customer-support@tesensors.com.

Chapter 1
General Information

Aim of this Chapter

This chapter presents the OsiSense XG Smart Antenna and the associated range of equipment.

What Is in This Chapter?

This chapter contains the following topics:

System Presentation

Smart Antenna Presentation

The Smart Antenna is a compact RFID station offering the following advantages:

- 2 Ethernet ports
- An embedded web server allowing:
  - Setup
  - Diagnostic
  - Monitoring
- Daisy chaining up to 32 Smart Antennas
- Compatible with most 13.56 MHz tags on the market.

Definition of RFID

RFID is the use of radio transmission to identify and locate objects.

An RFID system is based on 3 main components:

- A reader (Read/Write station)
- A radio antenna
- An electronic tag

Operation of an RFID System

The tag is attached on, or in, the object to be tracked or identified. There is no contact with the reader. This means that the tag can be placed inside objects (boxes, bags, and so on...) and that the reader can be positioned behind a protective screen, as long as the materials are not metallic.

When a tag enters the field generated by the reader, it detects the signal and exchanges the data (read or write) between its memory and the reader.

Presentation of the Offer OsiSense XG

OsiSense XG is an RFID system offering:

- Traceability and tracking of items
- Flexibility of production systems
- Various types of access control

An open system:

- System compatible with tags that comply with standards ISO 14443 and ISO 15693
- Modbus, Modbus TCP/IP, EtherNet/IP, PROFIBUS DP, and Uni-Telway protocols

A simple system:

- No station programming
- Data formatted in accordance with PLC standards (16-bit words)

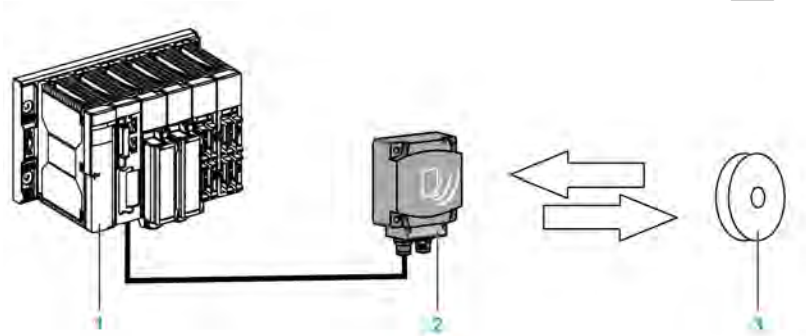
- Automatic configuration of communication parameters (speed, format, and so on...)
- Quick wiring using M12 connectors
- Extensive range of cables and mounting accessories
- Possibility of using metal supports

Integrated system:
- Reader, radio antenna, and network functionalities in one device
- The smallest industrial RFID reader

Exchange Principle

Presentation

The OsiSense XG Smart Antenna is used to send information from the tag to the PLC and vice versa, as described below:



1 PLC
2 Smart Antenna
3 Tag

Phases in the Process

The table shows the various exchange phases:

Phase	Exchanges	
	PLC **Smart Antenna**	**Smart Antenna** **Tag**
1		Look for a tag in the dialog zone →
2		Positive response ←
3	Send a read/write command →	
4		Execution of the command (with checks) ↔

Phase	Exchanges			
	PLC	Smart Antenna	Smart Antenna	Tag
5	Send back report 			

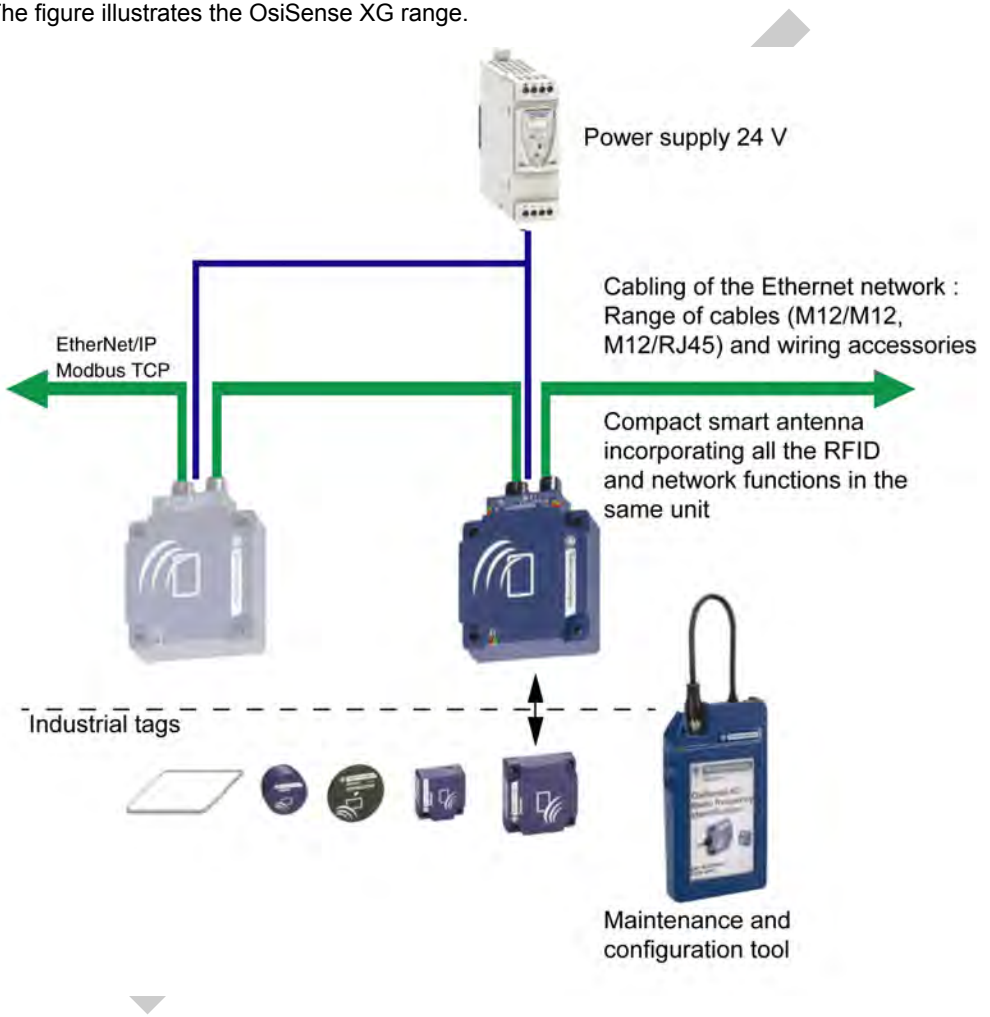
NOTE:

- If phase 3 is carried out with no tag present, a detected error message is sent back to the PLC.
- If a detected error occurs in phase 4, this phase is automatically restarted (up to 3 times). If a detected error is still detected at the end of phase 4, a detected error report is sent back in phase 5.

Overview of the OsiSense XG Range

Introduction

The figure illustrates the OsiSense XG range.



System View

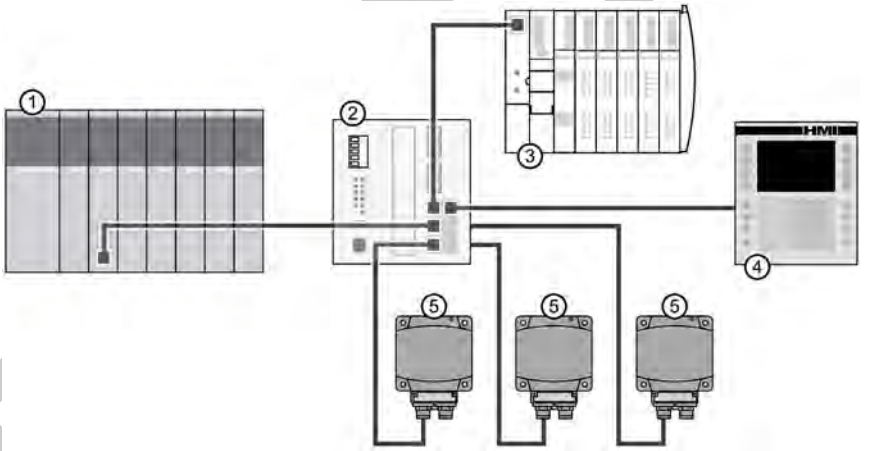
Description

OsiSense XG Smart Antenna can be used with a protocol compliant scanner as part of control system architecture. The built-in unmanaged 2-port Ethernet switch of the Smart Antenna allows you to use the network topology that meets your application needs. These topologies include the following:

- star
- daisy-chain
- ring (daisy-chain with loopback)
- combination of star and daisy-chain

Star

Star topology allows you to connect additional network equipment. Performing maintenance on one module—for example, by removing the network cable, or by cycling power to the module—does not affect other modules.



1 Quantum PLC
2 Ethernet switch
3 Advantys STB Island
4 Magelis HMI device
5 OsiSense XG Smart Antenna

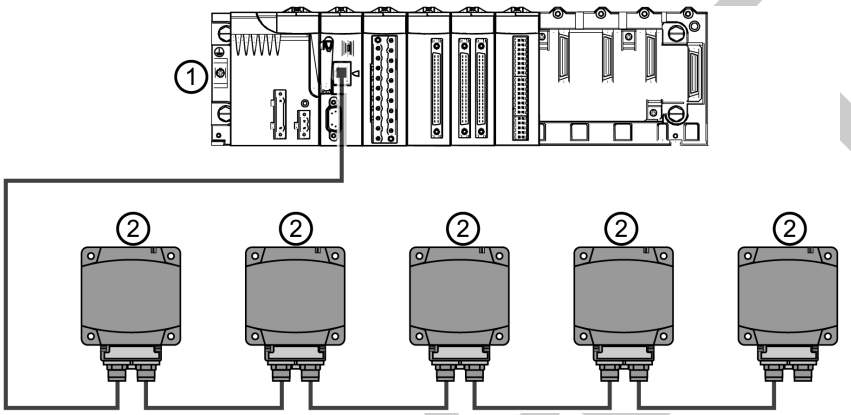
Daisy-Chain

You can create a daisy-chain topology by using the embedded switch ports to connect a series of up to 32 OsiSense XG Smart Antennas.

NOTE:

When considering the daisy chain topology, note that:

- Performing maintenance on any module not physically located at the end of the daisy chain—for example, by removing the network cable, or by cycling power to the module—affects any modules located down the chain from the maintained module.
- The embedded dual port Ethernet switch located in each module eliminates the need for additional Ethernet switches.



1 M340 PLC
2 Ethernet switch
3 OsiSense XG Smart Antenna

Ring

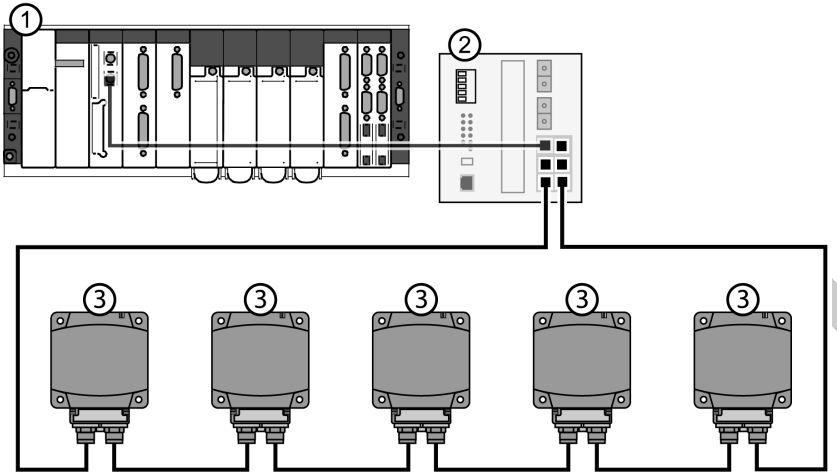
You can create a ring topology by using a switch with redundancy management protocol (for example ConneXium TCSESM043F23F0).

You can connect a series of up to 32 OsiSense XG Smart Antennas.

NOTE:

When considering the ring topology, note that:

- If a network segment becomes inoperable or is cut, all Smart Antennas remain operational.



1 Premium PLC
2 Ethernet switch with loopback function
3 OsiSense XG Smart Antenna

The table shows the ConneXium switches with redundancy function compatible with Smart Antennas:

Reference	Description
TCSESB083F23F0	8 port basic managed switch 8TX
TCSESB083F2CU0	8 port basic managed switch 6TX – 2FX multi mode
TCSESB093F2CU0	9 port basic managed switch 6TX – 3FX multi mode
TCSESM043F1CS0	4 port managed switch 3TX – 1FX single mode
TCSESM043F1CU0	4 port managed switch 3TX – 1FX multi mode
TCSESM043F23F0	4 port managed switch 4TX
TCSESM043F2CS0	4 port managed switch 2TX – 2FX single mode
TCSESM043F2CU0	4 port managed switch 2TX – 2FX multi mode
TCSESM083F1CS0	8 port managed switch 7TX – 1FX single mode
TCSESM083F1CU0	8 port managed switch 7TX – 1FX multi mode
TCSESM083F23F0	8 port managed switch 8TX
TCSESM083F2CS0	8 port managed switch 6TX – 2FX single mode
TCSESM083F2CU0	8 port managed switch 6TX – 2FX multi mode
TCSESM103F23G0	10 port managed switch 8TX/2TX-GBIT
TCSESM103F2LG0	10 port managed switch 8TX/2SFP-GBIT

Reference	Description
TCSESM163F23F0	16 port managed switch 16TX
TCSESM163F2CU0	16 port managed switch 14TX – 2FX multi mode
TCSESM163F2CS0	16 port managed switch 14TX – 2FX single mode
TCSESM243F2CU0	24 port managed switch 22TX – 2FX multi mode
TCSESM083F23F1	8 port extended managed switch 8TX
TCSESM063F2CS1	8 port extended managed switch 6TX – 2FX single mode
TCSESM063F2CU1	8 port extended managed switch 6TX – 2FX multi mode

Chapter 2
Specifications and Physical Description

Aim of this Chapter

This chapter presents the specifications and the physical description of the OsiSense XG Smart Antenna.

What Is in This Chapter?

This chapter contains the following topics:

Smart Antenna Characteristics

Characteristics

The table gives the technical characteristics of the Smart Antenna:

Characteristic		Description
Temperature	Operation	–25...+70 °C *(–13...+158 °F)*
	Storage	–40...+85 °C *(–40...+185 °F)*
Degree of protection		IP65 according to IEC60529
Vibration resistance EN 60068.2.27 EN 60068.2.6		2 mm *(0.078 in)* from 5 to 29.5 Hz / 7 g *(7 gn)*from 29.5 to 150 Hz 30 g *(30 gn)* / 11 ms
Resistance to mechanical shocks		IK02 according to EN 50102
Standards/Certifications		UL 508, CE, EN 300330, EN 301489-01/03
Immunity to disturbances		Immunity to electrostatic discharges, radiated electromagnetic fields, fast transients, electrical surges, conducted and induced interference and power frequency magnetic field according to IEC61000/EN 55022
Unit dimensions		80x93x40 mm *(3.15x3.66x1.57 in)*
RFID frequency		13.56 MHz
Type of associated tag		Standardized ISO 15693 and ISO 14443 tags Automatic detection of the tag type
Nominal range		20...100 mm *(0.78...3.94 in)* depending on associated tag
Power supply		24 Vdc PELV Connection on M8 4 pins male socket
Power supply voltage limits		19.2...29 V including ripple
Power consumption		< 150 mA
Communication	Interface	Ethernet dual port 10 BASE-T/100 BASE-TX
	Connection	2 M12 D coded female sockets for chaining
Display		- 2 dual color LED for RFID communication - 4 dual color LED for Ethernet communication
Tightening torque for the mounting screws		< 3.6 Nm *(31.9 lbf-in)*

WARNING TO USERS IN THE UNITED STATES AND CANADA

WARNING TO USERS IN THE UNITED STATES

Federal Communication Commission Interference Statement

47 CFR Section 15.105(b)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device Equipment name complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

NO UNAUTHORIZED MODIFICATIONS

47 CFR Section 15.21

CAUTION: This equipment may not be modified, altered, or changed in any way without signed written permission from SCHNEIDER ELECTRIC. Unauthorized modification may void the equipment authorization from the FCC and will void the SCHNEIDER ELECTRIC warranty.

WARNING TO USERS IN THE CANADA / *ATTENTION POUR LES UTILISATEURS AU CANADA*

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

1. this device may not cause interference, and
2. this device must accept any interference received, including interference that may cause undesired operation of the device.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. *il ne doit pas produire de brouillage, et*
2. *l'utilisateur du dispositif doit être prêt a accepter tout brouillage radioélectrique reçu, même si ce brouillage est susceptible de compromettre le fonctionnement du dispositif.*

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l' intention d'autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

References:

Reference	**XGCS850C201**
FCC ID	Y7HXGCS85
IC info	7002C-XGCS85

Tags Characteristics

Tag Characteristics

The table gives the technical characteristics of the tags with EEPROM memory:

Type of Tag	XGHB445345	XGHB444345	XGHB320345	XGHB221346	XGHB211345	XGHB90E340
Operation temperature	–25...+70 °C *(–13...+158 °F)*					–25...+55 °C *(–13...+131 °F)*
Storage temperature	–40...+85 °C *(–40...+185 °F)*					–40...+55 °C *(–40...+131 °F)*
Degree of protection	IP68		IP65	IP68		IP65
Standards supported	ISO 14443		ISO 15693			
Vibration resistance EN 60068.2.27 EN 60068.2.6	2 mm *(0.078 in)* from 5 to 29.5 Hz / 7 g *(7 gn)*from 29.5 to 150 Hz 30 g *(30 gn)* / 11 ms					
Resistance to mechanical shocks	IK02 according to EN 50102					
Dimensions	40x40x15 mm *(1.57x1.57x0.59 in)*		∅ 30x3 mm *(1.18x0.12 in)*	26x26x13 mm *(1.02x1.02x0.51 in)*	∅ 18 mm *(0.70 in)*	58x85.5x1 mm *(2.28x3.34x0.039 in)*
Casing materials	PBT		PC	PBT		PVC
Mounting method	Screw or clip		Screw	Screw or clip	Threaded hole	-
Tightening torque for the mounting screws	< 1 Nm *(8.85 lbf-in)*				-	-
Memory capacity (bytes)	13 632	3 408	112	256	256	256
Type of memory	EEPROM					
Type of operation	Read/Write					
Nominal range (Read/Write)	40 mm *(1.57 in)*	48 mm *(1.89 in)*	65 mm *(2.56 in)*	55 mm *(2.16 in)*	20 mm *(0.78 in)*	100 mm *(3.94 in)*
Number of read cycles	Unlimited					
Number of write cycles	100000 provided over the entire temperature range					
Number of write cycles at 30 °C *(86 °F)*	2.5 million typical cases					

Type of Tag	XGHB445345	XGHB444345	XGHB320345	XGHB221346	XGHB211345	XGHB90E340
Read/Write time	Read/Write time *(see page 25)*					
Retention period	10 years					

The table gives the technical characteristics of the tags with FeRAM memory:

Type of Tag		XGHB320246	XGH440245	XGH440845	XGHB443245
Temperature	Operation	–25...+70 °C *(–13...+158 °F)*			
	Storage	–40...+85 °C *(–40...+185 °F)*			
Degree of protection		IP65	IP68		
Standards supported		ISO 15693		ISO 14443	
Vibration resistance EN 60068.2.27 EN 60068.2.6		2 mm *(0.078 in)* from 5 to 29.5 Hz / 7 g *(7 gn)*from 29.5 to 150 Hz 30 g *(30 gn)* / 11 ms			
Resistance to mechanical shocks		IK02 according to EN 50102			
Dimensions		∅ 30x3 mm *(1.18x0.12 in)*	40x40x15 mm *(1.57x1.57x0.59 in)*		
Casing materials		PC	PBT		
Mounting method		Screw	Screw or clip		
Tightening torque for the mounting screws		< 1 Nm *(8.85 lbf-in)*			
Memory capacity (bytes)		2 000	2 000	8 192	32 768
Type of memory		FeRAM			
Type of operation		Read/Write			
Nominal range (Read/Write)		65 mm *(2.56 in)*		39 mm *(1.53 in)*	
Number of read cycles		Unlimited			
Number of write cycles		10^{10} provided over the entire temperature range			
Read/Write time		Read/Write time *(see page 25)*			
Retention period		10 years			

Tag Memory Zone

These tags are addressed according to the table below and are accessible in Read/Write mode.

The Smart Antenna can read any tag in the XGHB range (automatic detection of the tag type).

Tag Reference	Memory Size	Range Addresses	
		Dec	Hex
XGHB320345	112 bytes	0...55	0...37
XGHB90E340	256 bytes	0...127	0...7F
XGHB211345	256 bytes	0...127	0...7F
XGHB221346	256 bytes	0...127	0...7F
XGHB440245	2000 bytes	0...999	0...3E7
XGHB320246	2000 bytes	0...999	0...3E7
XGHB444345	3408 bytes	0...1703	0...6A7
XGHB440845	8192 bytes	0...4095	0...FFF
XGHB445345	13632 bytes	0...6815	0...1A9F
XGHB443245	32768 bytes	0...16383	0...3FFF

NOTE: If an address requested is out of the range address of the tag, a detected error code is generated.

NOTICE
UNINTENDED OPERATION Do not use in the same tag application XGHB445345 and XGHB444345. **Failure to follow these instructions can result in equipment damage.**

NOTE: Once the Smart Antenna has auto-detected the XGHB445345 tag, it will no longer recognize the XGHB444345 tag.

Read/Write Time and Tags Maximum Speed

The table shows the calculation of read/write time in static, and the tags maximum speed in dynamic:

Tag Reference	Static		Dynamic		
	Access Time Calculation		Tag Maximum Speed (m/s)		
	Read Time (ms)	Write Time (ms)	Read a Serial Number	Read a Word*	Read or Write 10 Words*
XGHB320345	12 + 0.825 x N	12 + 5.6 x N	5.8	2.7	0.9
XGHB90E340	12 + 0.825 x N	20 + 11.8 x N	7.1	4.0	0.8
XGHB211345	12 + 0.825 x N	19 + 4.1 x N	3.2	1.1	0.6

Tag Reference	Static		Dynamic		
	Access Time Calculation		Tag Maximum Speed (m/s)		
	Read Time (ms)	Write Time (ms)	Read a Serial Number	Read a Word*	Read or Write 10 Words*
XGHB221346	12 + 0.825 x N	20 + 11.8 x N	4.2	2.6	0.5
XGHB440245	7 + 2 x N	7 + 2.4 x N	3.5	2.5	1
XGHB320246	7 + 2 x N	7 + 2.4 x N	3.5	2.5	1
XGHB444345	9.25 + 0.375 x N	13 + 0.8 x N	4.8	2.7	1.8
XGHB440845	6 + 0.25 x N	6 + 0.25 x N	3.8	3.0	2.6
XGHB445345	16.25 + 0.375 x N	20 + 0.8 x N	4.2	2.0	1.5
XGHB443245	6 + 0.25 x N	6 + 0.25 x N	3.8	3.0	2.6

N: Number of 16-bit words

*: with use of the “Auto read/write” function

Description of the Smart Antenna

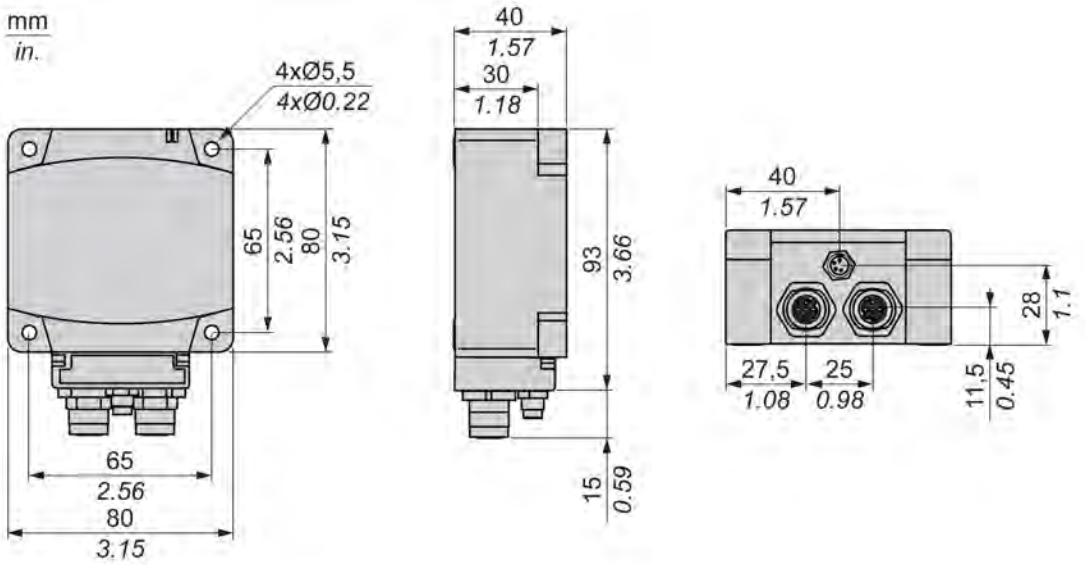
Presentation of the Smart Antenna

The figure presents the Smart Antenna:

No.	Description
1	TAG: Tag LED
2	COM: Communication LED
3	NS: Network Status LED
4	LK/SP: Ethernet communication port No. 1 LED
5	M12 socket, Ethernet port No. 1
6	M8 socket, 24 Vdc power supply
7	M12 socket, Ethernet port No. 2
8	LK/SP: Ethernet communication port No. 2 LED
9	MS : Ethernet Module Status LED

Dimensions

The figure shows the dimensions of the Smart Antenna:



Connecting the OsiSense XG Smart Antenna

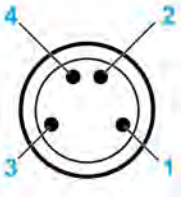
Introduction

The Smart Antenna is equipped with:

- a male M8 connector for the power supply,
- 2 female M12 D-coded connectors for Ethernet communication.

Power Supply Wiring

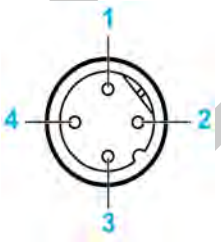
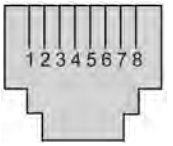
The table describes the M8 connector pinout:

M8 Connector	Pin No.	Signal	XZCP0941L• Wire Color
	1	+24 V ⎓	Brown
	2	Not connected	White
	3	0 V ⎓	Blue
	4	Not connected	Black

NOTE: Use a PELV power supply and fuse protection (1 A). The power supply used must be class II according to VDE 0106 (for example: Phaseo ABL 7/8 range of Schneider Electric). The 0 V must be connected to the ground to increase EMC strength.

Communication Wiring

The table describes the M12 connectors pinout and the correspondence with the RJ45 connector of communication cables *(see page 30)*:

M12 Connector	M12 Pin	Signal	Description	RJ45 Pin	RJ45 Connector
	1	TD+	Transmit Data +	1	
	2	RD+	Received Data +	2	
	3	TD–	Transmit Data –	3	
	4	RD–	Received Data –	6	
	-	-	Not connected	4	
	-	-	Not connected	6	
	-	-	Not connected	7	
	-	-	Not connected	8	

Wiring Accessories

Introduction

The range of accessories is composed of power supply cables, communication cables, and Ethernet connection accessories.

Power Supply Cables

The table shows the range of power supply cables:

Description	Length	Reference
Pre-wired M8 connector	2 m *(6.56 ft)*	XZCP0941L2
	5 m *(16.4 ft)*	XZCP0941L5
	10 m *(32.8 ft)*	XZCP0941L10

Communication Cables

The table shows the range of communication cables:

Description	End Fittings	Length	Reference
Copper connecting cables, straight	1 x IP67 M12 4-pin connector and 1 x RJ45 connector	1 m *(3.28 ft)*	XGSZ12E4501
		3 m *(9.84 ft)*	XGSZ12E4503
		10 m *(32.8 ft)*	XGSZ12E4510
	2 x IP67 M12 4-pin connectors	1 m *(3.28 ft)*	XGSZ12E1201
		3 m *(9.84 ft)*	XGSZ12E1203
		10 m *(32.8 ft)*	XGSZ12E1210
		25 m *(82 ft)*	XGSZ12E1225
Copper connecting cables, elbowed	1 x IP67 M12 4-pin elbowed connector and 1 x RJ45 connector	3 m *(9.84 ft)*	XGSZ22E4503
		10 m *(32.8 ft)*	XGSZ22E4510
Ethernet copper cable (2 x 24 AWG shielded twisted pairs)	Connectors to install	300 m *(984.2 ft)**	TCSECN300R2
RJ45 connector	Conforms to EIA/TIA-568-D	-	TCSEK3MDS
M12 connector	Conforms to IEC 60176-2-101	-	TCSEK1MDRS

* The maximum length of Ethernet connecting cables made up in this way is 80 m *(262.5 ft)*.

Ethernet Connection Accessories

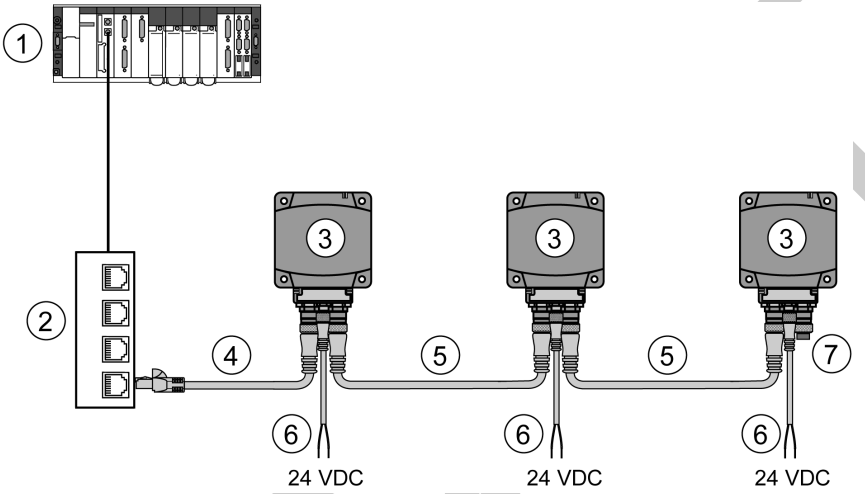
The table shows the range of Ethernet connection accessories:

Description	Reference
ConneXium M12 Ethernet switch IP67	TCSESU051F0
ConneXium Ethernet switch with loopback function	TCSESB•••••••• TCSESM••••••••
M12 female / RJ45 adaptor	TCSESAAF11F13F00
M12 connector cap for Smart Antenna	ASI67FACC1

Smart Antennas Wiring Example

Connection Diagram

Example of an Ethernet TCP/IP network setup with Smart Antennas:



1 PLC
2 Ethernet switch
3 Smart Antenna
4 Ethernet cable XGSZ12E45••
5 Ethernet cable XGSZ12E12••
6 Power supply cable XZCP0941L•
7 M12 connector cap ASI67FACC1 (2 caps are supplied with the Smart Antenna)

The maximum length of each segment is 100 m *(328 ft)*.

In this example, the maximum bus length is 400 m *(984.2 ft)*:
- 100 m *(328 ft)* between the PLC and the Ethernet switch,
- 3 x 100 m *(328 ft)* between each Smart Antennas.

NOTE: It is possible to chain up to 32 Smart Antennas.

Chapter 3
Installing the System

Aim of this Chapter

This chapter describes the procedure for installing the OsiSense XG Smart Antenna.

What Is in This Chapter?

This chapter contains the following topics:

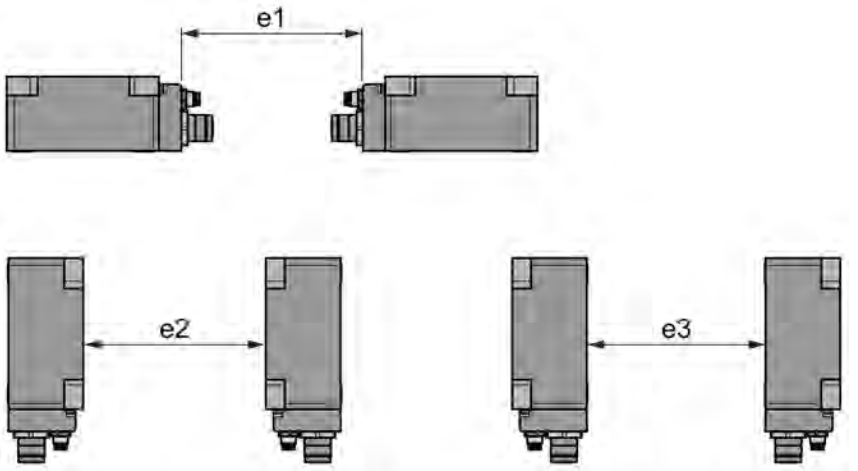
Installation Precautions

Distances Between Smart Antennas

When 2 Smart Antennas are too close, there is a risk of mutual disturbance.

NOTICE
UNINTENDED OPERATION Follow the installation precautions given in this chapter on distances between 2 Smart Antennas. **Failure to follow these instructions can result in equipment damage.**

Distances between 2 identical Smart Antennas depend on the tag used:

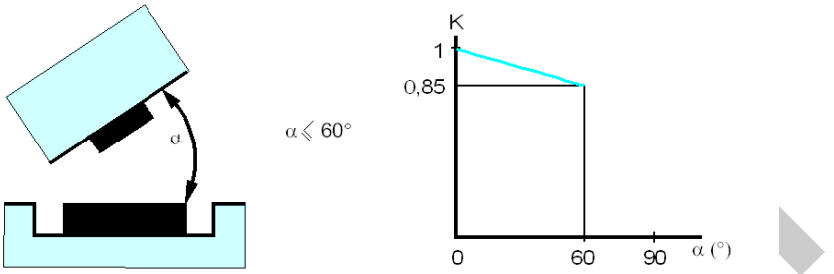


Minimum distances in mm *(inches)*:

Tag Reference	**Minimum Distances in mm** *(inches)*		
	e1	**e2**	**e3**
XGHB90E340	430 *(16.92)*	750 *(29.52)*	280 *(11.02)*
XGHB221346	280 *(11.02)*	530 *(20.86)*	260 *(10.23)*
XGHB320•••	310 *(12.20)*	540 *(21.25)*	240 *(9.44)*
XGHB211345	200 *(7.87)*	370 *(14.56)*	170 *(6.69)*
XGHB44••••	310 *(12.20)*	400 *(15.74)*	160 *(6.29)*
XGHB123345	200 *(7.87)*	370 *(14.56)*	170 *(6.69)*

Angular Positioning

The angle between the Smart Antenna and the tag modifies the dialog distance according to the graph below:

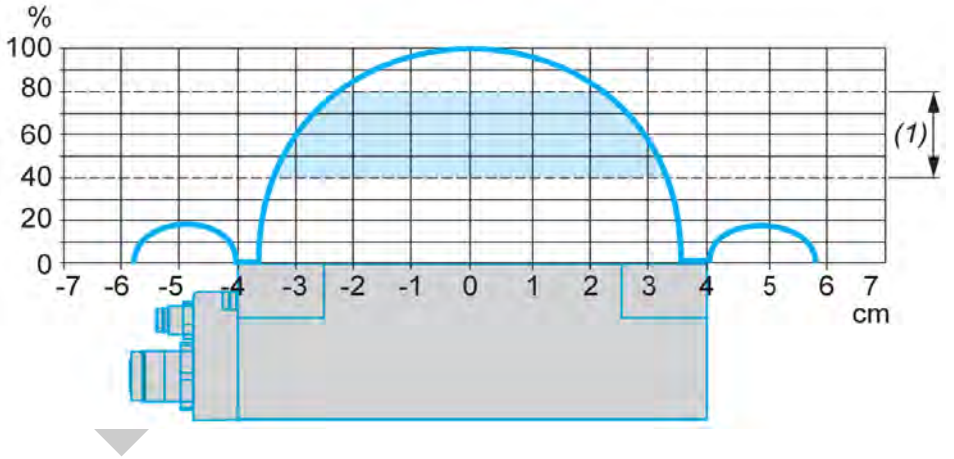


K = correction factor to be applied to the nominal range.

Reading distance = nominal range x K.

Sensing Zones

The dialog zones of the Smart Antenna are circular. There is no recommended direction for the movement of the tag. The following diagram shows the dialog zones of the Smart Antenna:



(1) Movement zone consulted: between 0.4 and 0.8 of the nominal range.

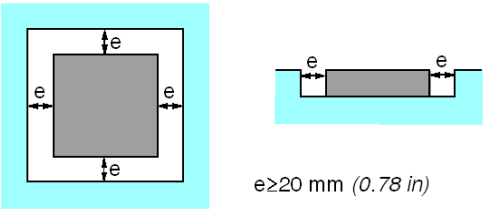
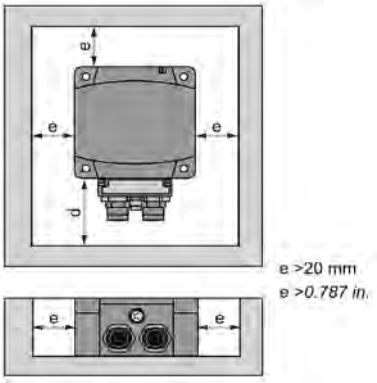
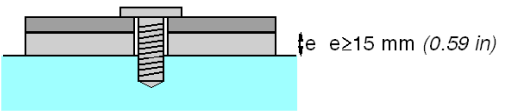
NOTE: Nominal range (Pn)

The conventional range does not take the dispersions (manufacturing, temperature, voltage, assembly in the metal) into account.

Mounting in the Metal

The presence of metal near the tags and the Smart Antenna affects the nominal range (Reading/Writing distance).

The table shows the minimum assemblies allowed in a metal block:

References	Description
XGCS4901201 XGCS8901201 XGHB221346 XGHB44•••	The product is positioned in a steel block: 
XGCS850C201	The Smart Antenna is positioned in a steel block:  **d** depending on the connector size
XGHB90E340 XGHB211345	No metallic piece is less than 25 mm *(0.98 in.)* from the tag.
XGHB320246 XGHB320345	The tag is fixed with an M4 steel screw (tightening torque = 1 Nm *(8.85 lbf-in)*). It is necessary to insert a non-metallic wedge between the tag and the metal tag: 

The table shows the effect on the nominal range when the Smart Antenna and the tag are assembled in metal according to the most unfavorable cases shown above:

Reference	Memory Size (bytes)	Dimensions	Reduced Sensing Distance with Presence of Metal	Nominal Sensing Distance
XGHB90E340	256	Badge of 85x58x0.8 mm *(3.35x2.28x0.03 in.)*	80 mm *(3.15 in.)*	100 mm *(3.94 in.)*
XGHB221346	256	26x26x13 mm *(1.02x1.02x0.51 in.)*	33 mm *(1.29 in.)*	55 mm *(2.16 in.)*
XGHB320345	112	∅ 30x3 mm *(1.18x0.12 in.)*	56 mm *(2.20 in.)*	65 mm *(2.56 in.)*
XGHB320346	2000	∅ 30x3 mm *(1.18x0.12 in.)*	56 mm *(2.20 in.)*	65 mm *(2.56 in.)*
XGHB211345	256	∅ 18x12 mm *(0.70x0.47 in.)*	15 mm *(0.59 in.)*	20 mm *(0.78 in.)*
XGHB444345	3408	40x40x15 mm *(1.57x1.57x0.59 in.)*	34 mm *(1.33 in.)*	48 mm *(1.89 in.)*
XGHB445345	13632	40x40x15 mm *(1.57x1.57x0.59 in.)*	28 mm *(1.10 in.)*	40 mm *(1.57 in.)*
XGHB440245	2000	40x40x15 mm *(1.57x1.57x0.59 in.)*	45 mm *(1.77 in.)*	65 mm *(2.56 in.)*
XGHB440845	8192	40x40x15 mm *(1.57x1.57x0.59 in.)*	39 mm *(1.53 in.)*	28 mm *(1.10 in.)*
XGHB443245	32768	40x40x15 mm *(1.57x1.57x0.59 in.)*	39 mm *(1.53 in.)*	28 mm *(1.10 in.)*

Distances Between Tags

NOTICE

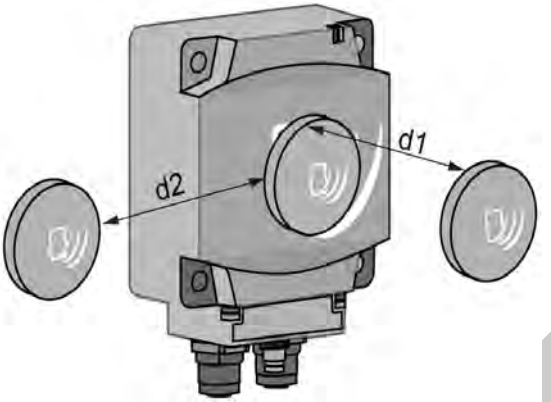
UNINTENDED OPERATION

Follow the installation precautions given in this chapter on distances between 2 tags.

Failure to follow these instructions can result in equipment damage.

NOTE: When 2 tags are too close to one another, this may trigger dialog errors.

This figure illustrates the minimum distance between 2 identical tags:



Minimum distances between 2 identical tags according to their positioning:

Tag Reference	Minimum Distances in mm *(inches)*	
	d1	**d2**
XGHB90E340	140 *(5.51)*	110 *(4.33)*
XGHB221346	50 *(1.96)*	120 *(4.72)*
XGHB320345	60 *(2.36)*	190 *(7.48)*
XGHB320246	60 *(2.36)*	190 *(7.48)*
XGHB211345	20 *(0.78)*	120 *(4.72)*
XGHB444345	40 *(1.57)*	70 *(2.75)*
XGHB445345	10 *(0.39)*	60 *(2.36)*
XGHB440845	10 *(0.39)*	60 *(2.36)*
XGHB443245	10 *(0.39)*	60 *(2.36)*

Electromagnetic Disturbances

NOTICE

UNINTENDED OPERATION

Do not install the Smart Antenna less than 300 mm *(12 in)* from a device generating electromagnetic disturbances (electric motor, solenoid valve...).

Failure to follow these instructions can result in equipment damage.

NOTE: Electromagnetic disturbances may block the dialog between the Smart Antenna and a tag.

IP Address Configuration

Introduction

IP address: Every item of equipment connected to an Ethernet network must have a unique IP address. This address makes it possible to refer to a specific unit.

Subnet mask: The subnet mask defines a range of IP addresses that can be accessed from an item of equipment.

The table describes the standard IP subnet masks:

Network Class	Host Bits	Subnet Mask
A	24	255.0.0.0
B	16	255.255.0.0
C	8	255.255.255.0

The table gives an example of accessible address ranges depending on the network class:

Network Class	Addresses	Accessible Addresses Ranges
B	IP: 192.168.0.1 Mask: 255.255.0.0	IP: 192.168.xxx.xxx
C	IP: 192.168.0.1 Mask: 255.255.255.0	IP: 192.168.0.xxx

NOTE: xxx represents a possible value from 0 to 255.

Address Configuration

The factory default address is 192.168.0.10.

The configuration of the IP address is made by setting parameters in the web server embedded in the Smart Antenna to:
- manually set the IP address,
- automatically get an IP address from the DHCP server.

NOTICE

UNINTENDED EQUIPMENT DAMAGE

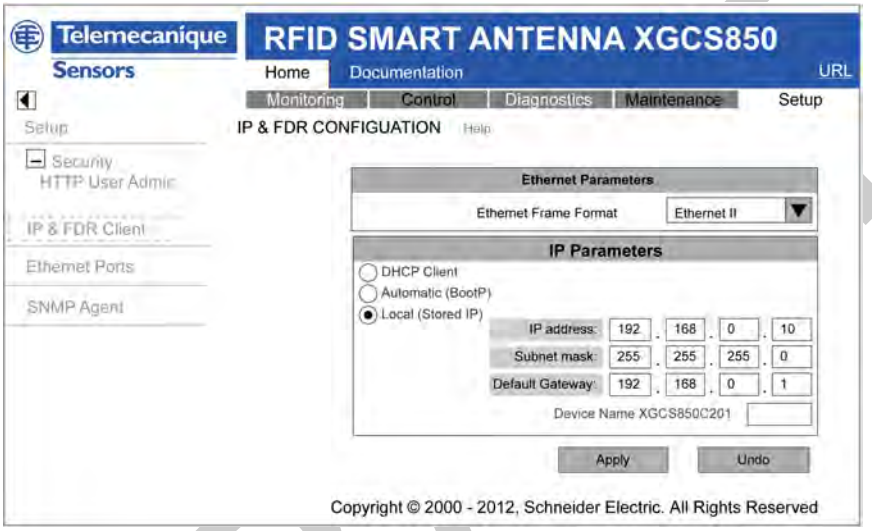
- Do not use factory configured IP address for operation.
- Assign a new IP address for operation.

Failure to follow these instructions can result in equipment damage.

NOTE: Two or more Smart Antennas with identical IP address on the same network generate a duplicate IP condition (Smart Antenna Diagnostic LEDs *(see page 126)*).

Configuring IP Address in the Web Server

The graphic shows the Smart Antenna web server **IP & FDR CONFIGURATION** page:



The table describes the steps to follow to configure the IP address in the **IP & FDR CONFIGURATION** page:

Step	Action
1	Access to the web server *(see page 116)*.
2	Click the **Setup** tab on the **Home** page.
3	Click the **IP & FDR CONFIGURATION** link on the **Setup** page.
4	Select the type of IP addressing: ● DHCP Client ● Automatic (BootP) ● Local (Stored IP)
5	If local addressing is selected, set the parameters of the Smart Antenna ● IP address ● Subnet mask ● Default Gateway
6	Click **Apply** to validate the settings.
7	Cycle the Smart Antenna power off and on to apply the new settings.

NOTE: The network configuration of the PC must be compatible with the IP address range of the Smart Antenna.

Chapter 4
Operating Principles

Aim of this Chapter

This chapter describes the system operating principle based on memory zones.

What Is in This Chapter?

This chapter contains the following topics:

Read/Write Operating Mode

Introduction

For read/write operations 2 operating modes are available:
- Static read/write: applications where the tag is stopped in front of the Smart Antenna.
- Dynamic read/write: applications where the tag does not stop in front of the Smart Antenna.

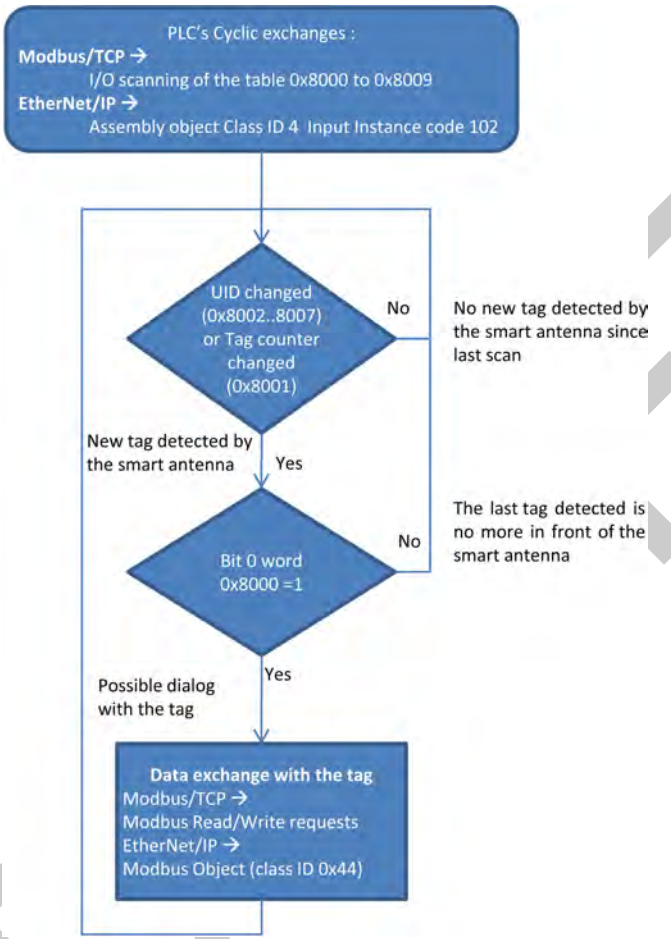
Static Read/Write

The controller must run cyclic scanning of the status of the Smart Antenna before sending read or write requests addressed to the internal memory of the tag.

A table of words in the system memory area of the Smart Antenna is dedicated to this function:
- Status word: a bit of this word is set to 1 when a tag is detected by the Smart Antenna.
- Tag counter: this word is incremented each time a new tag is detected by the Smart Antenna.
- UID: a group of 8 words where the UID of the last tag detected by the Smart Antenna is stored.

The combination of these information gives the exact status of the system:
- Arrival of a tag in front of the Smart Antenna.
- New tag or same tag as previous one.
- Read/Write operations in the tag possible or not.

This diagram illustrates static read/write operations:



Dynamic Read/Write

The Smart Antenna can be configured to run automatically read/write commands each time a new tag is detected. The results of the last commands are permanently accessible in the system memory of the Smart Antenna (Reading Table *(see page 54)*). Synchronization between PLC application program and tag presence is no more necessary.

First, the controller must send writing requests to the Smart Antenna to configure and activate the automatic R/W commands *(see page 51)*.

Then, the controller must run cyclic scanning of the reading table of the smart antenna:

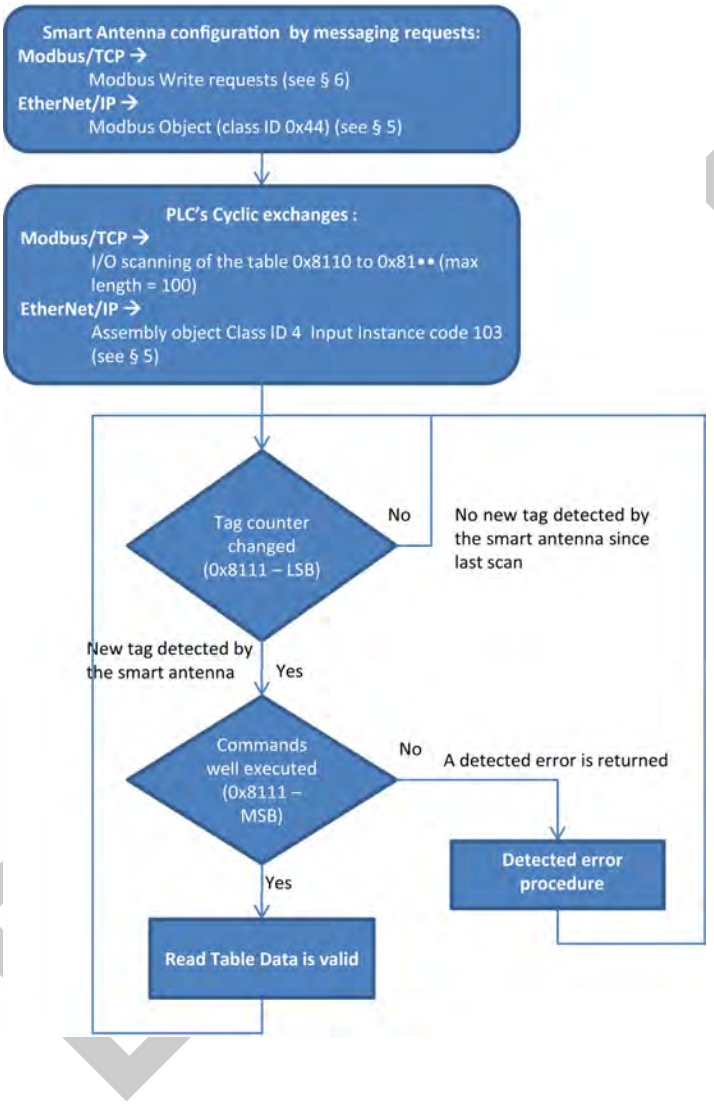
- First word: Status, a bit of this word is set to 1 when a tag is detected by the Smart Antenna.
- Second word: tag counter and detected error code.
- Third…X words: results of read commands.

The combination of these information gives the exact status of the system:

- Arrival of a tag in front of the Smart Antenna.
- New tag or same tag as previous one.
- Data read from the last tag detected by the Smart Antenna.

All data will be overwritten by the arrival of the next tag.

This diagram illustrates dynamic read/write operations:



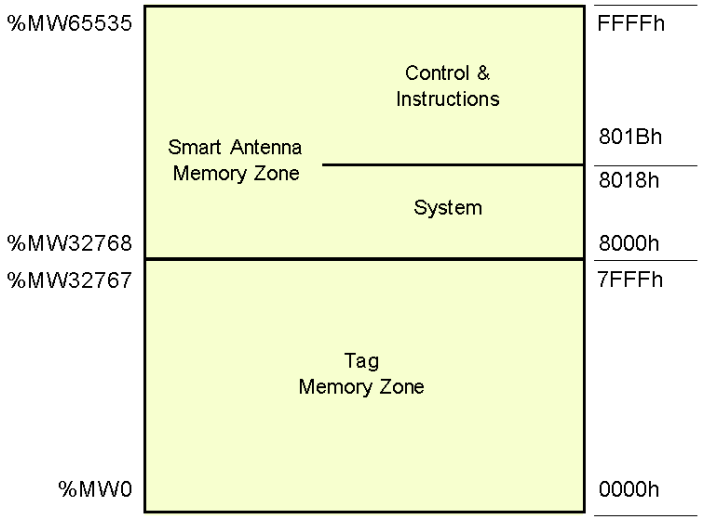
Memory Zones

Presentation

The addressing memory zone is divided into 2 zones:

- The tag Memory Zone *(see page 24)*
- The Smart Antenna memory zone:
  - System Zone *(see page 49)*,
  - Command/instructions zone *(see page 51)*.

Definition of the address zones of words used:



Smart Antenna System Memory Zone

Description of the Zone

Composition of the system zone:

No. of Object	Description	Access [1]	Protected
8000h	Tag family present / Tag system flags	R	No
8001h	Tag counter	R/W	No
8002...8009h	UID	R	No
8018h	Smart Antenna address	R/W	Yes

[1] R = Read, W = Write

Modifications to values in this zone are taken into account by the Smart Antenna immediately.

Object 8000h

Status:

MSB		LSB	
Tag family present Indicates the tag family while it is present. Reset when no longer present.		**Tag system flag** Real-time updating.	
Bit		Bit	
8	15693	0 (LSB)	Tag present
9	Icode	1	Initial parameter-setting phase following boot-up
A	14443A	2	Reserved
B	14443B	3	Reserved
C	Inside	4	Reserved
D	Reserved	5	Present configuration badge
E	Reserved	6	Reserved
F (MSB)	Reserved	7	Reserved

Object 8001h

Tag counter:

MSB	LSB
Incremented each time there is a new tag. RAZ at each power switch-on. Possible written access to predefine a value in the counter.	

Objects 8002h...8009h

UID:

MSB	LSB
Updated each time there is a new tag and valid if tag present.	

Each tag has a different single code (UID). This code is distributed in 16 bytes.

Object 8018h

Smart Antenna address:

Reading request:

Response to the reading request:

MSB	LSB
0	Smart Antenna address

Writing request:

Writing Request		Result
MSB	LSB	
0...1E	Smart Antenna address	No action
1F	Smart Antenna address	The new Smart Antenna address is effective immediately.

Smart Antenna Command/Instructions Memory Zone

General Description

The zone can activate the commands or operating modes and consists of:

Address	Table	Description	Access *	Protected
801Bh	Command	Activates operations such as initialization, automatic reading or writing, sleep mode, etc.	R/W	No
801C...80AFh	Reserved	Reserved	-	-
80B0...80FF	Instruction block	Sets parameters by up to 10 instructions, which will be executed sequentially.	R/W	No
8100...810Fh	Reserved	Reserved	-	-
8110...817Fh	Reading table	Stores the results of the tag-reading operations and monitors the execution of the instructions.	R	No
8190...81E6h	Writing table	Stores the data which are to be written in the tags.	R/W	No
81E7...FFFFh	Reserved	Reserved	-	-

*: R = Read, W = Write

801Bh Object: Command

This object executes the following commands:

- **Reset:**
  - reinitialization of the default factory adjustments
  - launching the initialization sequence
  - the Command/instructions memory zone is reset to zero
  - the sleep mode is deactivated
- **Init:**
  - Smart Antenna reinitialization
  - launching the initialization sequence
  - the Command/instructions memory zone is reset to zero
  - the sleep mode is deactivated
- **Sleep Mode:**
  - activation/deactivation of the Sleep Mode,
  - emission of the electromagnetic field of the Smart Antenna is activated only when receiving a reading or writing request. This mode reduces the Smart Antenna consumption and frees it from interferences when the Smart Antenna is close to another one.
- **Execution of the instructions block:**

- defines the occurrence of executing the instructions block in the Smart Antenna
- unit execution command: the instruction block is executed once after detecting the first tag
- automatic execution command: the instruction block is executed at each tag detection up to the next reset or when the Smart Antenna is switched off

NOTE: To be able to use the execution commands of the instructions block, the "Sleep" mode must be deactivated. Since this mode cannot detect the presence of a tag in the dialog zone.

Command	Activation	Deactivating the Command	Comment
Reset	4040h	-	After executing the command, the 801Bh object automatically retrieves its default value.
Init	2020h	-	
Sleep Mode	1010h	1000h	After restarting the Smart Antenna, the Sleep Mode is deactivated.
Execution of the instructions block	0101h	0100h	Single execution when a tag is present in front of the Smart Antenna.
	0202h	0200h	Execution performed each time a new tag is present in front of the Smart Antenna.

NOTE: After restarting the Smart Antenna, the 801Bh object automatically retrieves its default value.

80B0...80FFh Object: Instruction Block

The instructions block predefines up to 10 instructions. The instructions are executed (in the ascending order) when a tag is detected by the Smart Antenna.

Each instruction consists of 8 16-bit words which define the parameters associated with it. The number of words used to set the parameters of different instructions varies. The words that are not used must be defined at 0000h.

The first word of each instruction is divided into 2 parts:
- The high-weight byte defines the type of instruction to be executed.
- The low-weight byte defines the number of words processed by the instruction.

Data entry or instructions output is contained in the 2 tables:
- a writing table containing the data to be written in a writing instruction
- a reading table containing:
  - diagnostic information associated with the execution of the instructions block
  - data read in a reading instruction

Reading Instruction (C1)

Instruction structure:

Word	Instruction Field	Type	Value	Comment
1st (MSB)	Instruction code	Byte	C1h	C1: **C**opy **I**n
	Number of words	Byte	01...40h	Number of words to be read
2nd (LSB)	Address	Word	0000...FFFFh	Address of the first word to be read from the Smart Antenna or tag
Reserved		Word	0000h	-
Reserved		Word	0000h	-
Unused		Word	0000h	System words to be defined at 0
		Word	0000h	
		Word	0000h	
		Word	0000h	

Writing Instruction (C0)

Instruction structure:

Word	Instruction Field	Type	Value	Comment
1st (MSB)	Instruction code	Byte	C0h	C0: **C**opy **O**ut
	Number of words	Byte	01...40h	Number of words to be written
2nd (LSB)	Address	Word	0000...FFFFh	Destination address of the first word to be written from the Smart Antenna or tag
Reserved		Word	0000h	-
Reserved		Word	0000h	-
Unused		Word	0000h	System words to be defined at 0
		Word	0000h	
		Word	0000h	
		Word	0000h	

Copying instruction(CD)

Instruction structure:

Word	Instruction Field	Type	Value	Comment
1st (MSB)	Instruction code	Byte	CDh	C0: **C**opy **D**ata
	Number of words	Byte	01...FFh	Number of words to be written
2nd (LSB)	Data	Word	0000...FFFFh	Value to be copied
3rd	Address	Word	0000...7FFFh	First memory zone address to be written
4th	Iteration	Word	0001...1FFFh	Number of iterations to be executed
Unused		Word	0000h	System words to be defined at 0
		Word	0000h	
		Word	0000h	
		Word	0000h	

8110...8174h Object: Reading Table

The reading table stores the consecutive result in a reading instruction (C1) as well as review the execution review of the instructions block (2 words). Reading this review monitors progress of the instructions sequence.

Structure of the reading table:

Address	Description		
	MSB		LSB
	PF Quartet	Pf Quartet	
8110h	Smart Antenna status (image of the 8000h word), see Object 8000h *(see page 49)*		
8111h	Instruction no.	Detected error code	Tag counter (image of the 8001h word), see Object 8001h *(see page 49)*
8112h	Data read as 1, 1st reading instruction		
8113h	Data read as 2, 1st reading instruction		
...	...		
...	Data read as N, 1st reading instruction		
...	Data read as 1, 2nd reading instruction		
...	Data read as 2, 2nd reading instruction		
...	...		
...	Data read as N, 2nd reading instruction		
...	Data read as 1, nth reading instruction		
...	Data read as 2, nth reading instruction		
...	...		

Address	Description		
	MSB		LSB
	PF Quartet	Pf Quartet	
...	Data read as N, nth reading instruction		
...	...		
8174h	...		

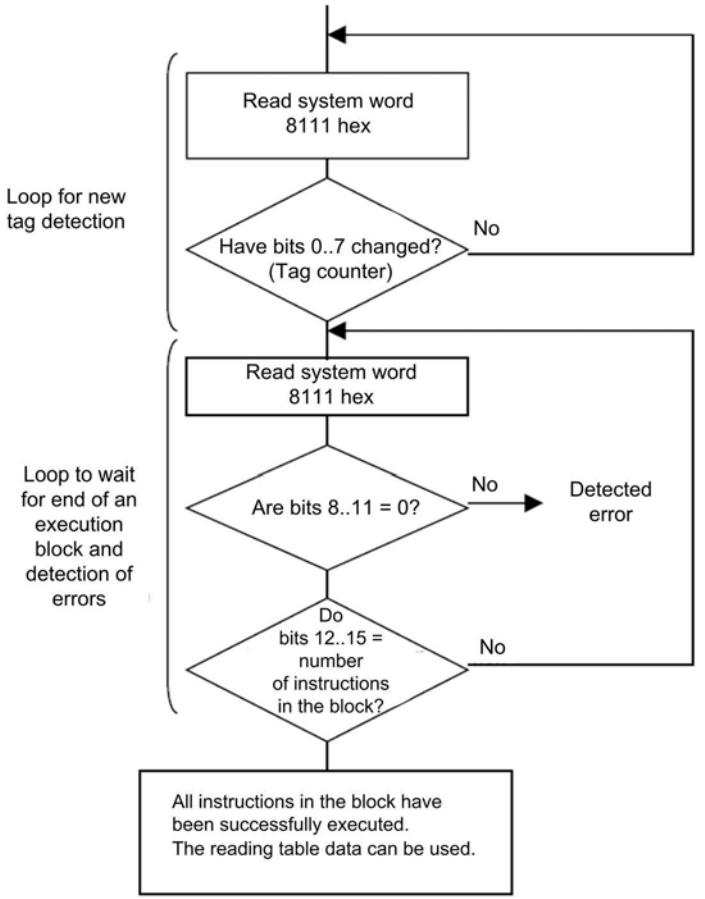
NOTE: All reading instructions must not exceed the table capacity of 100 words.

Description of the 8111h object:

Bit	Signification	Description
15...12	Instruction no.	Number of the last instruction executed without detected error, such as "Detected error in the 3rd block instruction, therefore, the instruction no. = 2h"
11...8	Detected error codes	Modbus detected error codes: ● 1h: unknown function code or incorrect request format ● 2h: incorrect address, prohibited or protected zone or address not lying in the tag memory zone ● 3h: incorrect data. Too much data in the frame or insufficient or quantity = 0 or incompatible data ● 4h: execution fault detected (in reading, writing, or tag missing)
7...0	Tag counter	Image of the 8001h tag counter

Monitoring the Execution of the Instructions Block

Reading the 8111h system word of the Smart Antenna controls the execution of the instructions block:



8190...81E6h Object: Writing Table

The writing table stores the data to be written in a writing instruction.

Structure of the writing table:

Address	Description
8190h	Data to be written as 1, 1st written instruction

Address	Description
8191h	Data to be written as 2, 1st written instruction
...	...
...	Data to be written as N, 1st written instruction
...	Data to be written as 1, 2nd written instruction
...	Data to be written as 2, 2nd written instruction
...	...
...	Data to be written as N, 2nd written instruction
...	...
...	Data to be written as 1, nth written instruction
...	Data to be written as 2, nth written instruction
...	...
...	Data to be written as N, nth written instruction
...	...
81E6h	...

Application Example

In the following example, you will define an instruction block containing 3 instructions:

- a reading instruction of 3 words at the 0001h address
- a writing instruction of 2 words at the 0010h address
- a reading instruction of 4 words at the 0020h address

Definition of the instructions block:

Address	Value		Instruction no.
	MSB	LSB	
80B0h	C1h	03h	1
80B1h	0001h		
80B2...80B7h	0000h		
80B8h	C0h	02h	2
80B9h	0010h		
80BA...80BFh	0000h		
80C0h	C1h	04h	3
80C1h	0020h		
80C2...80C7h	0000h		

Definition of the writing table (data to be written in a writing instruction):

Address	Value	Instruction Associated
8190h	For example, FEFEh	2
8191h	For example, 0A0Bh	

Setting the parameters to activate the commands for each tag movement:

Address	Value	Instruction Associated
801Bh	0202h	Executing the instruction block at each new tag

Data received in the reading table after executing the instructions block:

Address	Value		Instruction Associated
	MSB	LSB	
8110h	Smart Antenna status		-
8111h	30h	01h	Composition: ● 30h (MSB) = 3 instructions executed without detected error ● 01h (LSB) = 1st tag detected by the Smart Antenna
8112h	0001h word content		Result of instruction number 1 (reading 3 words)
8113h	0002h word content		
8114h	0003h word content		
8115h	0020h word content		Result of instruction number 3 (reading 4 words)
8116h	0021h word content		
8117h	0022h word content		
8118h	0023h word content		

Example of data received in the reading table after executing the instructions block containing detected errors:

Address	Value		Instruction Associated
	MSB	LSB	
8110h	Smart Antenna status		-

Address	Value		Instruction Associated
	MSB	LSB	
8111h	14h	01h	Composition: ● 14h (MSB) = execution of the instructions block was stopped due to a dialog detected error with the tag in instruction number 2 (instruction number 1 was executed correctly and instruction number 3 was not executed) ● 01h (LSB) = 1st tag detected by the Smart Antenna
8112h	0001h word content		Result of instruction number 1 (reading 3 words)
8113h	0002h word content		
8114h	0003h word content		

Definition of an instruction block that can delete the first 50 words in each tag which is to be shown in front of the Smart Antenna:

Address	Value	Instruction Associated
80B0h	CD0Ah	CD: Copy Data / 0Ah = 10 words deleted per iteration
80B1h	0000h	Filling with the 000h value
Address	0000h	First memory zone address to be written = 0000h
Iteration	0005h	Number of iterations to be executed = 5

Chapter 5
EtherNet/IP Communications Support

Introduction

This chapter describes how a Smart Antenna can be accessed from other devices on an EtherNet/IP fieldbus network.

What Is in This Chapter?

This chapter contains the following sections:

Section 5.1
Object Model

Introduction

This section describes the object model for the EtherNet/IP NIM. For general information about the object model for a particular EtherNet/IP device, refer to ODVA specifications.

What Is in This Section?

This section contains the following topics:

About the Object Model

Introduction

An EtherNet/IP node is modeled as a collection of objects. Each object provides an abstract representation of a particular component within a product.

An object model defines the device's:

- I/O data format
- configurable parameters

The above information is made available to other vendors through the EDS of the device.

This chapter describes the implemented objects of the Smart Antenna in terms of:

- supported class attributes
- supported class services
- supported instance attributes
- supported instance services

Further details can be found in Chapter 5 of [28] The CIP Networks Library Volume 2 EtherNet/IP Adaptation of CIP.

Addressing Object Attributes

Objects: Objects provide services and implement behaviors.

Attributes: Attributes (object characteristics) for particular objects are addressed with integer values that correspond to this hierarchy:

- MAC ID (node ID)
- class ID
- instance ID
- attribute ID

Supported Objects

This table lists the EtherNet/IP objects supported by the Smart Antenna:

Object Class	Class ID	Instance ID	Messages	Description
Identity Object	1	1	explicit	This object returns the device type, vendor ID, serial number, and so on.
Message Router Object	2	1	explicit	This object returns information about message router implementation.
Assembly Object *(see page 65)*	4	0x62, 0x66, 0x67 (98, 102, 103)	implicit I/O or explicit	This object provides a collection of other attributes of object.
Connection Management Object	6	0x01(1)	explicit	This object allows explicit messages to be conducted.

Object Class	Class ID	Instance ID	Messages	Description
Port Object	0xF4 (244)	1	explicit	This object returns information about the Ethernet port.
TCP/IP Interface Object	0xF5 (245)	1	explicit	This object defines the number of IP address configuration options for the device.
Ethernet Link Object	0xF6 (246)	1	explicit	This object tracks configuration and diagnostics information for the Ethernet port.
Modbus Object *(see page 67)*	0x44 (68)	1	explicit	This object translates EtherNet/IP messages into Modbus requests (code function 0x3 and 0x10).

Assembly Object (Class ID 4)

Introduction

The assembly object groups different attributes (data) from a variety of application objects into a single attribute that can be moved with a single message. This message provides the I/O data and status of the Smart Antenna. Assembly objects can be used to bind input data or output data, as defined from the network's perspective. (That is, an *input* produces data on the network and an *output* consumes data from the network.) For the Smart Antenna assembly object:

- The class ID is 4.
- The instance codes are 98 for the output instance, 102 and 103 for the input instances.

Class Attributes (Instance 0)

The assembly object supports these class attributes:

Attribute ID	Name	Access	Description
0x01	Revision	R	This attribute returns the revision of the CIP object (0x02).
0x02	Max Instance	R	This attribute returns the maximum value of the instance number (102).
0x03	Num Instances	R	This attribute returns the number of class instances. The value is 2.
0x06	Max. Class Attribute	R	This attribute returns the numeric value of the highest class attribute (7).
0x07	Max. Instance Attribute	R	This attribute returns the numeric value of the highest instance attribute (4).

Class Services

The assembly object supports these class services:

Service Code	Name	Description
0x0E	Get Attribute Single	This service returns the value of the specified attribute.

Instance Codes

The Smart Antenna provides 3 instances of the assembly object class:

Instance ID	Access	Size (Bytes)	Description
98	R/W	2	Tag counter (Object 8001h *(see page 49)*)
102	R	20	General status (Objects 8000...8009h, Smart Antenna System Memory Zone *(see page 49)*)
103	R	200	Read table of 100 words (8110...814Fh Object: Reading Table *(see page 54)*)

NOTE:

- For Rockwell PLC, one instance can be configured (98,102 or 103).
- For Schneider Electric PLC under Unity environment, the 3 instances can be configured and used in one application.

Instance Attributes

The assembly object supports these instance attributes:

Attribute ID	Name	Access	Description
1	Number of members	R	This attribute returns a word value of the number of members in the instance.

2	Member list	R	This attribute is an array of structures in which each structure represents one member and consists of:
			● *member data size*: a word containing the member data size (in bits)
			● *member path size*: a word containing the byte size of the subsequent EPATH:
			  ● 0: unused space between members
			  ● 0x09: actual members
			● *member path*: the EPATH representing the member (For example, "20 04 24 65 30 28 01" is member 1 of instance 101.)

3	Instance data	R/W	This attribute returns instance data as an array of bytes. Access is: ● *read (only)*: input data assemblies ● *read/write*: output data assemblies
4	Instance data size	R	This attribute returns a word representing the instance data size in bytes. (The size depends on the particular I/O modules configured on the bus.)

Instance Services

The assembly object supports these instance services:

Service Code	Name	Description
0x0E	Get Attribute Single	This service returns the value of the specified attribute.
0x010	Set Attribute Single	This service modifies an assembly object instance attribute value.
0x018	Get Member	This service reads a member of an assembly object instance.
0x019	Set Member	This service modifies a member of an assembly object instance.

Modbus Object (Class ID 0x44)

Introduction

The Modbus object is assigned a vendor-specific class ID of 68 (0x44). The Modbus object is an application object that provides the read/write requests of the Smart Antenna memory zones. For the Smart Antenna Modbus object:

- The class code is 0x44 (68).
- The single supported instance is 1.

Instance Services

The Modbus object supports these instance services:

Service Code	Name	Description
0x4E	Read holding registers	This service sends a read request of the specified registers (123 words maximum).
0x50	Write holding registers	This service sends a write requests of the specified registers (123 words maximum).

Service Code 0x4E Description

The table describes the service parameters of the read holding registers request:

Name	Data Type	Description	Semantics of Values
Starting address	UINT	Offset in table to begin reading from[1]	Zero based
Quantity of holding registers	UINT	Number of holding registers to read[1] (Max number = 123)	-

[1]The request parameter is little indian. The Modbus protocol is big endian. You may have to swap bytes depending on the Modbus subsystem implementation.

The table describes the service parameters of the read holding registers response:

Name	Data Type	Description	Semantics of Values
Holding register values	Array of 16-bit word[1]	Holding register values read[2]	-

[1]The data is returned as 16-bit entities for each register. The actual data type of the values is unknown.

[2]The response data is little indian. The Modbus protocol is big endian. You may have to swap bytes depending on the Modbus subsystem implementation.

Service Code 0x50 Description

The table describes the service parameters of the write holding registers request:

Name	Data Type	Description	Semantics of Values
Starting address	UINT	Offset in table to begin writing to[1]	Zero based
Quantity of outputs	UINT	Number of output registers to write[1] (123 maximum)	-
Output values	Array of 16-bit word	Output register values	-

[1]The request parameter is little indian. The Modbus protocol is big endian. You may have to swap bytes depending on the Modbus subsystem implementation.

The table describes the service parameters of the write holding registers response:

Name	Data Type	Description	Semantics of Values
Starting address	UINT	Offset in table where writing began[1]	Zero based
Quantity of outputs	UINT	Number of outputs forced[1]	-

[1]The response parameters are little indian. The Modbus protocol is big endian. You may have to swap bytes depending on the Modbus subsystem implementation.

Section 5.2
Unity Pro: EtherNet/IP Application Example

Introduction

This example illustrates the configuration of a Smart Antenna on an EtherNet/IP network to communicate with a Premium PLC on Unity Pro.

What Is in This Section?

This section contains the following topics:

Presentation

Overview

This example illustrates the Smart Antenna on an Ethernet/IP network to communicate with a Premium controller on Unity Pro.

It is a walkthrough for the configuration of the Smart Antenna with the following steps:

- Create the required Premium platform on Unity Pro
- Configure the Smart Antenna
- 1 command examples

NOTE: This example will not provide explanations on how to install the hardware, refer to the document of the controller for this purpose.

Hardware Requirement

The hardware required to set up this example is the following:

- A Premium controller TSXP576634M
- A TSXETC101 Ethernet module
- Smart Antenna

Software Requirement

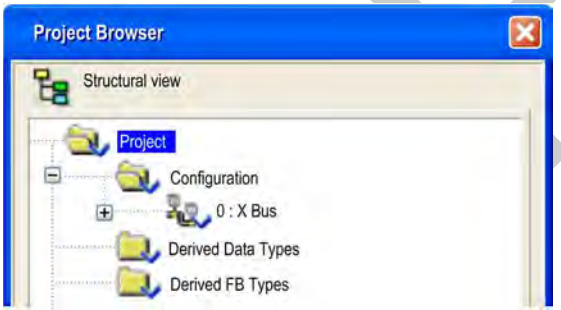
The software required to set up this example is the following:

- Unity Pro (version 6.0 or better)

Creating a Project

Procedure

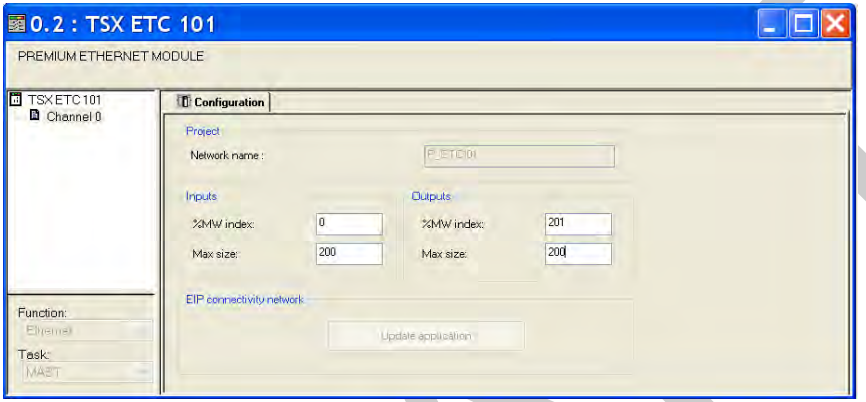
Use Unity Pro to create a new project:

Step	Action
1	Launch Unity Pro.
2	In the Unity Pro main menu, select **File** → **New...**. The **New Project** window opens displaying a list of Schneider-Electric controller types.
3	In the **New Project** window, open the Premium sub-list and select the controller TSXP576634M.
4	Click **OK**. The **Project Browser** opens: 
5	In the **Project Browser**, double click **Local Bus**. Unity Pro displays: ● the **Hardware catalog**, and ● a **Local Bus** window with the selected CPU in the second position (slot 0) and a TSXPSY2600M power supply in the first position
6	In the **Hardware catalog**, use your mouse to drag a TSXETC101 EtherNet/IP communication module from the **Communication** section to a position in the backplane. In this example, the module is placed in the third position (slot 2).
7	To open the configuration window for the TSXETC101, do one of the following: ● double click the left mouse button on the TSXETC101 module in the **Local Bus** window above, or ● click the right mouse button on the module, then select **Open Module...** in the popup menu The module configuration window opens, where you can configure the properties for the TSXETC101.

Configuring the TSXETC101 EtherNet/IP Communication Module

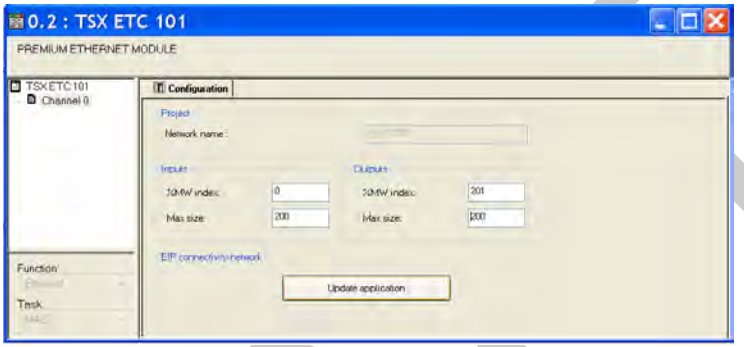
Setting Input and Output Memory Addresses and Naming the Module

The **Configuration** page looks like this:



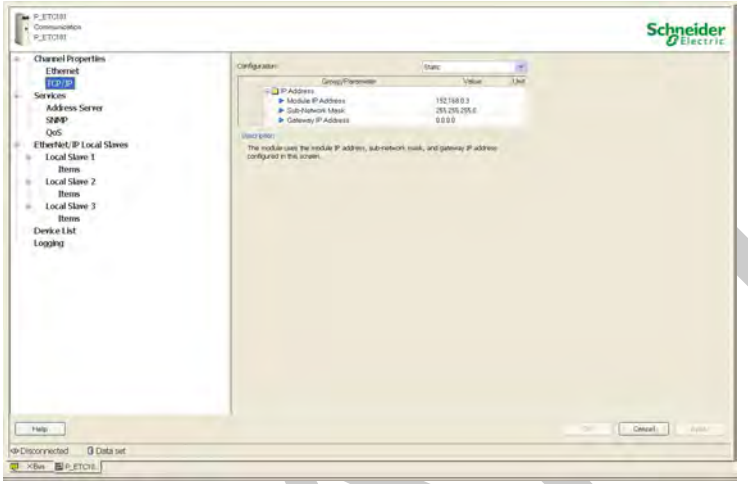
In the **Configuration** page, perform the following steps to name the module, and to set addresses and sizes for both inputs and outputs:

Step	Action
1	In the **Project** section, type in a name for your network in the **Network name** input box - in this example: **P_ETC101** **Note:** After the module name is entered and the EtherNet/IP configuration is validated (by clicking the  button), the module name cannot be edited.
2	In the **Input area** and **Output area**, type in the size and starting position of both the inputs and outputs. These values can be edited later. For this example, the following values are entered: In the **Input area**: ● In the **%MW index** field, type in a starting address for inputs—in this example: **0**. ● In the **Max size** field, type in the maximum number of 16-bit words dedicated to inputs—in this example: **200**.) In the **Output area**: ● In the **%MW index** field, type in a starting address for outputs—in this example: **201**. ● In the **Max size** field, type in the maximum number of 16-bit words dedicated to outputs—in this example: **200**.) **Notes**: ● The inputs and outputs can be located at any available address, and do not need to be located in adjacent areas. It is important only that the space allocated to inputs and outputs do not overlap ● The specified %MW range for both inputs and outputs must be available in the CPU. For more information, refer to the Unity Pro help file topic *Processor Configuration Screen*.

Step	Action
3	In Unity Pro, select **Edit** → **Validate** (or click the **Validate** button) to: ● save the EtherNet/IP network name—which becomes a non-editable, read-only value, ● save the address and size settings for inputs and outputs.
3	In the **EIP connectivity network** area, click the **Update application** button: 

Configuring the TSXETC101 Module Address

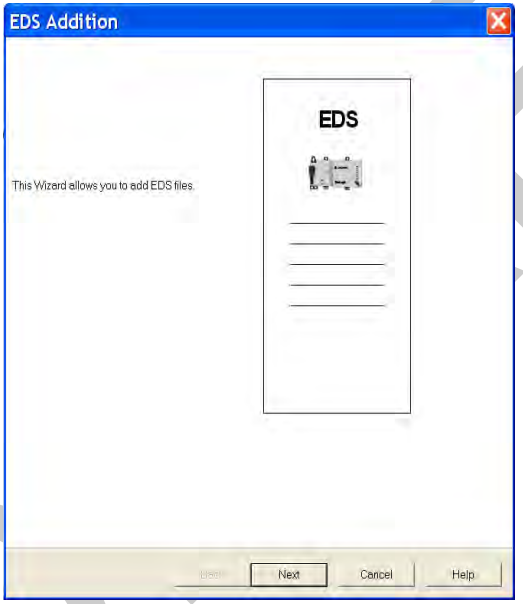
Step	Action
1	Select **Tools** → **DTM Browser**.
2	Double-click the **P_ETC101** Ethernet module.

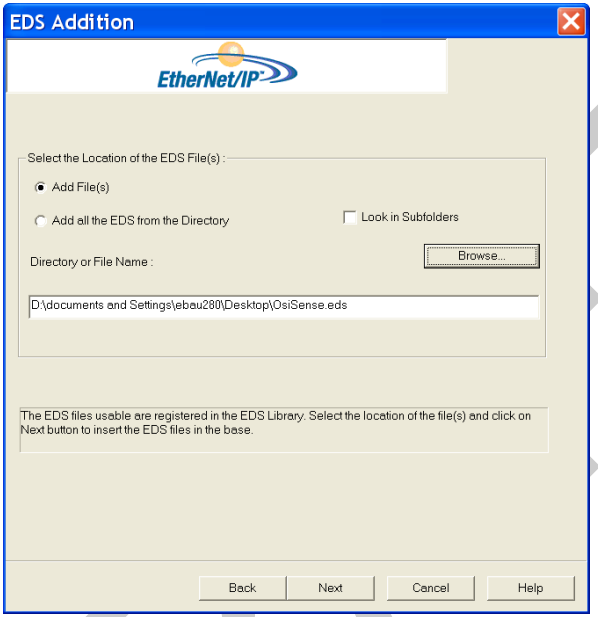
Step	Action
3	In the **Channel Properties** entry click the **TCP/IP** subentry. 
4	Double-click the **Module IP Address** and set the IP address to 192.168.0.3 (master address) then press `Enter`.
5	Click **Apply**.

Configuring the Ethernet Smart Antenna

Adding the Ethernet Smart Antenna EDS File

Follow this step if you have not added the Smart Antenna EDS file before:

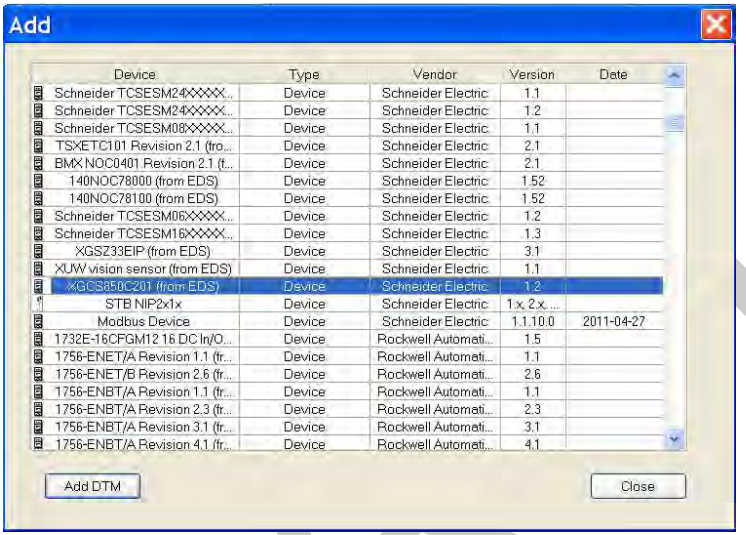
Step	Action
1	Click **Tools** → **DTM Browser**.
2	In the **DTM Browser**, right-click the **P_ETC101** Ethernet module. Click **Device menu** → **Additional functions** → **Add EDS to library**. The **EDS Addition** window appears: 
3	Click **Next** button.

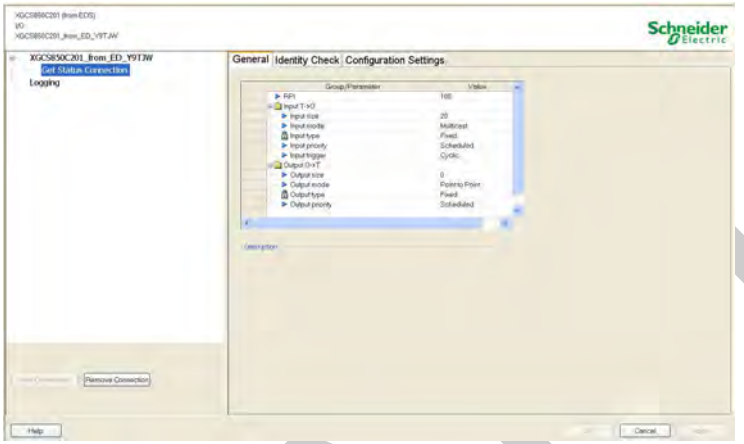
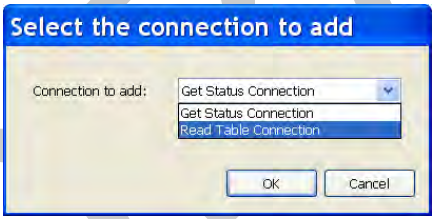
Step	Action
4	Click **Browse** and browse your computer folders to the location of the file `OsiSense.eds` select the file and click **Open**. 
5	Click **Next**.
6	Click **Finish**.
7	Click **Tools** → **Hardware Catalog**.
8	In the **Hardware Catalog** window, select the **DTM Catalog** tab and click **Update**.

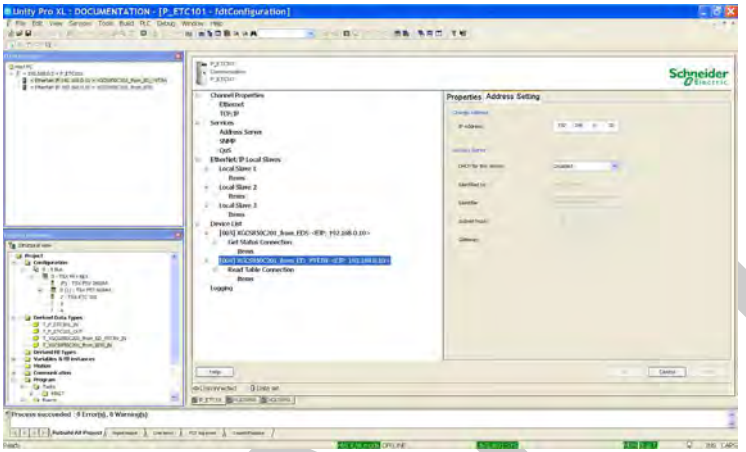
Adding and Configuring the Ethernet Smart Antenna Devices

The Smart Antenna uses 2 connections to communicate on EtherNet/IP network, the **Get Status Connection** and the **Read Table Connection**:

Step	Action
1	In the **DTM Browser** window, right-click the **P_ETC101** Ethernet module and click **Add...**.

Step	Action
2	Select the **XGCS850C201** device in the list and click **Add DTM**: 
3	Click **Ok**.
4	In the **Device List** entry, click the Smart Antenna and select the **Address Setting** tab: 
5	Click **IP Address** and set the IP address to 192.168.0.10 then press `Enter`.
6	Click **Apply**.
7	Repeat the steps 1 to 6 to add another Smart Antenna device with the same IP address.

Step	Action
8	In the **DTM Browser** window, double-click the new device. This window appears: 
9	Click the **Get Status Connection** entry.
10	Click **Remove Connection**.
11	Click **Add Connection**.
12	Select **Read Table Connection** in the list and click **Ok**: 
13	Click **Apply**.
14	Click **Build** → **All Project**.

Step	Action
15	The Smart Antenna is now configured to communicate on EtherNet/IP network. 

Read Application Example

Introduction

This example describes the implementation of the Modbus object *(see page 67)* for reading 123 words using the **DATA_EXCH** function. Refer to the Unity Pro online help for more information about explicit message.

Example

```
(* EtherNET/IP Explicit Message Example : Read Modbus Object *)

IF START and not TableGest[0].0 THEN


        (*TableRecep:=0;*)
        MOVE_INT_ARINT(0,TableRecep);    (* RAZ Reception table *)
        TableGest[2]:= 5;                (* TIMEOUT BASE 100ms *)
        TableGest[3]:= 10;               (* Length of data ToSend parameter, in Bytes *)

        DataToSend[0]:= 16#024E;         (* CIP request service information *)
        DataToSend[1]:= 16#4420;         (* CIP request class information *)
        DataToSend[2]:= 16#0124;         (* CIP request instance information *)
        DataToSend[3]:= 16#0001;         (* address of the first word to be read*)
        DataToSend[4]:= 16#007B;         (* Number of word to be read*)


        DATA_EXCH (ADR := ADDM('0.1.0{192.168.0.10}UNC.CIP'),
             TYP := 16#01,
             EMIS := DataToSend,
             GEST := TableGest,
             RECP => TableRecep);

End_IF;
```

CIP Request Description

The **DataToSend** variable identifies the type of explicit message and the CIP request:

Variable	Description	Value (hex)
`DataToSend[0]`	CIP request service information: ● High byte = request size in words: 16#02 (2 decimal) ● Low byte = service code: 16#4E (78 decimal)	16#024E
`DataToSend[1]`	CIP request class information: ● High byte = class: 16#44 (68 decimal) ● Low byte = class segment: 16#20 (32 decimal)	16#4420
`DataToSend[2]`	CIP request instance information: ● High byte = instance: 16#01 (1 decimal) ● Low byte = instance segment: 16#24 (36 decimal)	16#0124

Variable	Description	Value (hex)
DataToSend[3]	Starting register (for example, %MW01): ● High byte = 16#00 (0 decimal) ● Low byte = 16#01 (1 decimal)	16#0001
DataToSend[4]	Number of registers to read: ● High byte = 16#00 (0 decimal) ● Low byte = 16#7B (123 decimal)	16#007B

The **TableGest** variable identifies the communication management table:

Variable	Description	Value (hex)
TableGest[0]	Data managed by the system: ● High byte = exchange number ● Low byte = activity bit)	-
TableGest[1]	Data managed by the system: ● High byte = operation report ● Low byte = communication report	-
TableGest[2]	Timeout (100 ms base)	16#0005
TableGest[3]	Length of data to send (in bytes)	16#000A

The **TableRecep** variable is the reception table:

Variable	Description
TableRecep[0]	Received data (value of the 123 words read)
...	
TableRecep[122]	

Section 5.3
RSLogix: EtherNet/IP Application Example

Introduction

This example describes the configuration of a Smart Antenna on an EtherNet/IP network to communicate with an Allen Bradley PLC.

What Is in This Section?

This section contains the following topics:

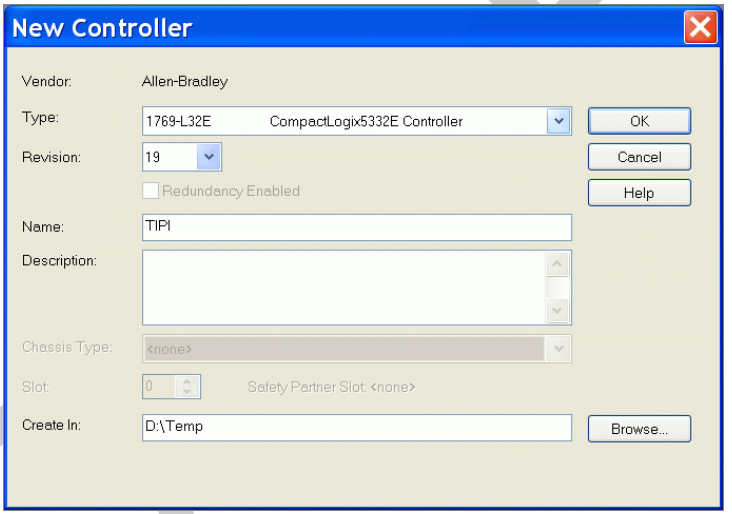
Configuring a Smart Antenna on an EtherNet/IP Network with a ControlLogix PLC

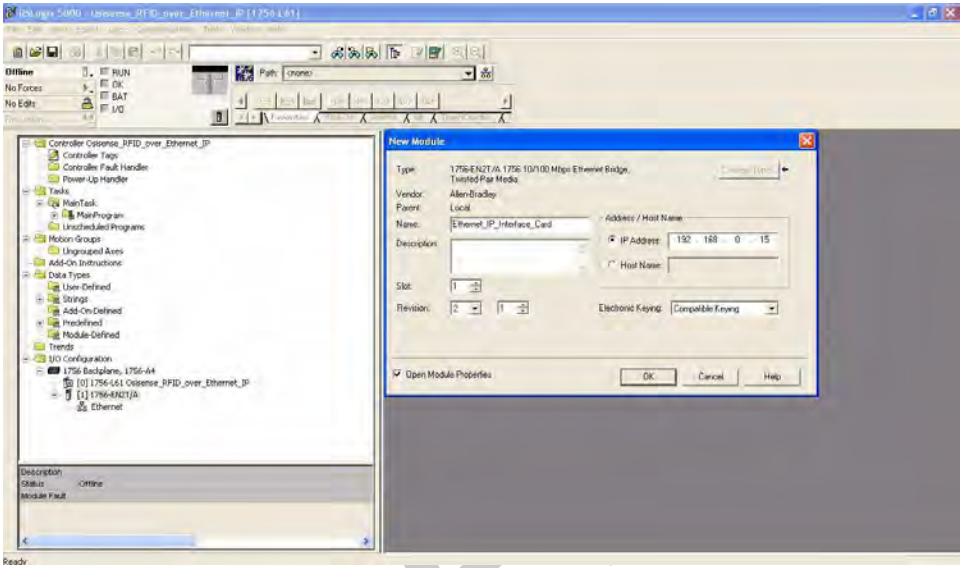
Introduction

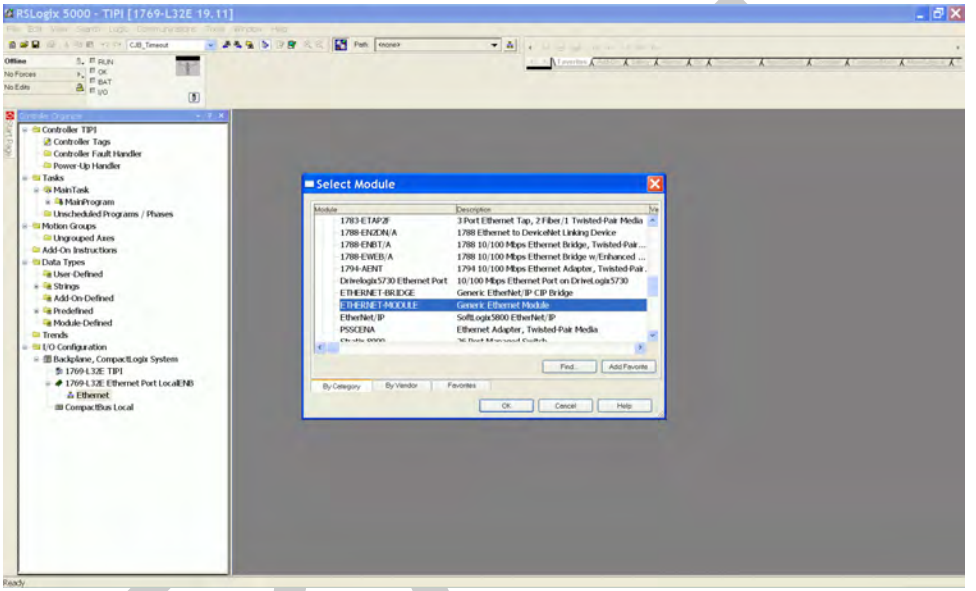
This topic illustrates how to configure a Smart Antenna on an Ethernet/IP network to communicate with an Allen Bradley ControlLogix PLC through an Ethernet cable.

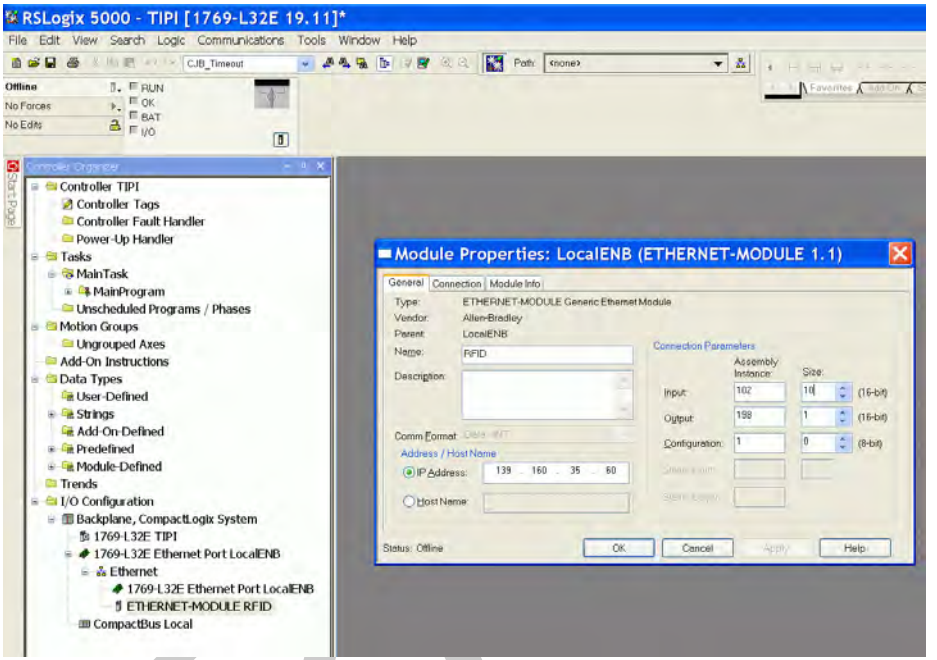
ControlLogix PLC Setup

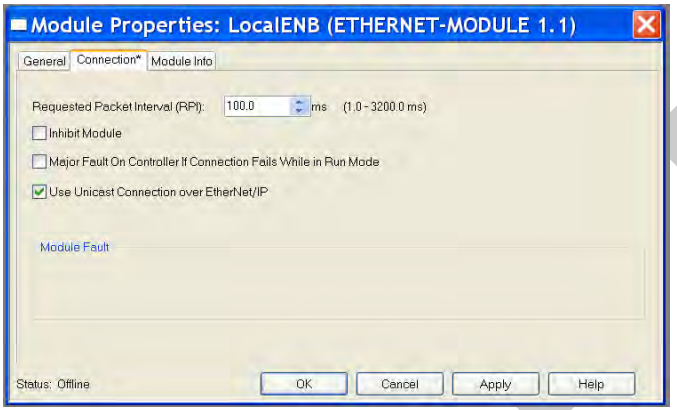
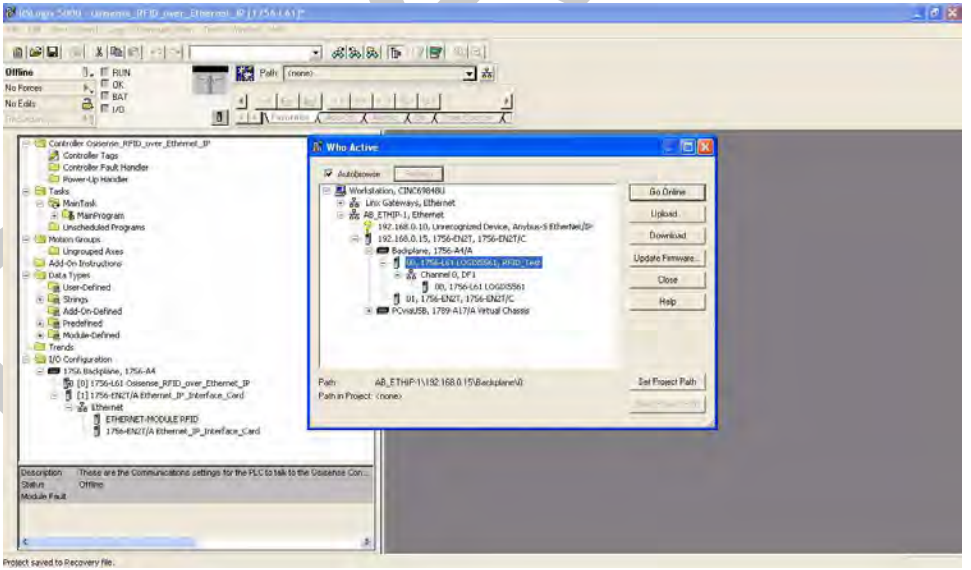
This table covers the steps necessary to program the ControlLogix PLC using RSLogix 5000 software:

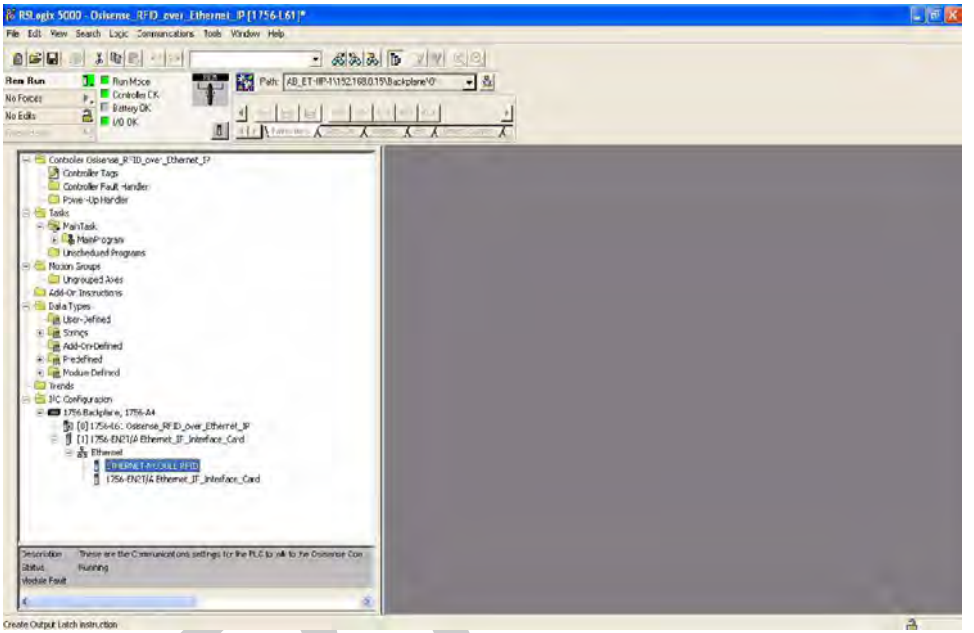
Step	Action
1	Start the RSLogix 5000 software.
2	Select **File** → **New**. The **New Controller** dialog box opens. 
3	Configure the controller by completing the required information.
4	Click **OK**.

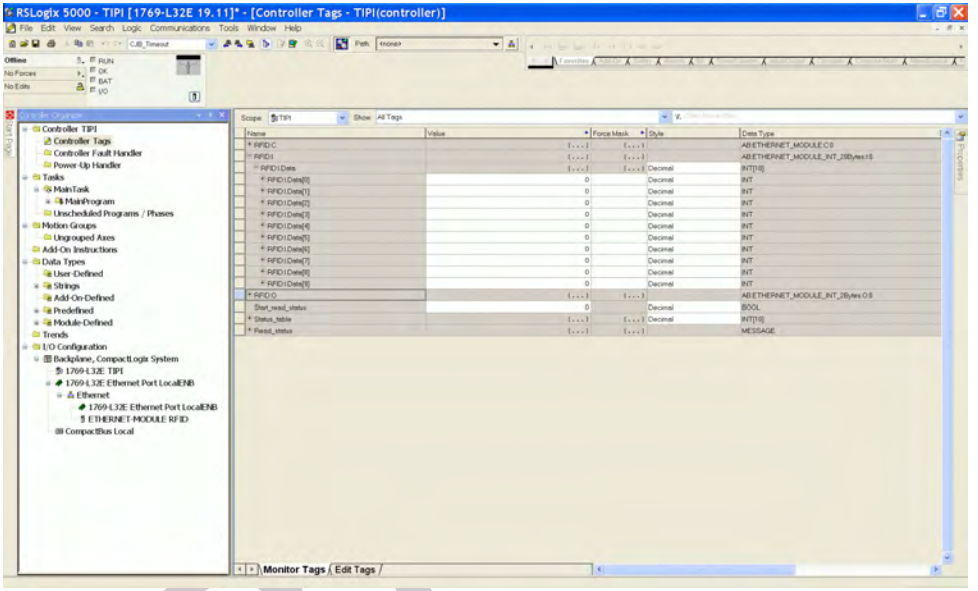
Step	Action
5	Configure the Ethernet/IP card by completing the appropriate fields. 
6	Click **OK**.

Step	Action
7	Configure the communication module to communicate with the Smart Antenna: ● From the **Select Module** dialog box, select **ETHERNET-MODULE**. ● Click **OK**. 

Step	Action
8	Configure the Ethernet parameters to communicate with theSmart Antenna:  For the input parameters use: ● **Assembly Instance** 102 (size 10) for the General status *(see page 65)*, ● or **Assembly Instance** 103 (size 100) for the Read table *(see page 65)*. For the output parameters, use the **Assembly Instance** 198 (size 1).
9	Select the **Communication** tab.

Step	Action
10	Change the **Requested Packet Interval (RPI)** value to 10...100 ms. 
11	Click **OK**.
12	Save and download the configuration to your ControlLogix PLC by selecting the module and clicking the buttons on the **Who Active** dialog box to perform the various functions as necessary. 

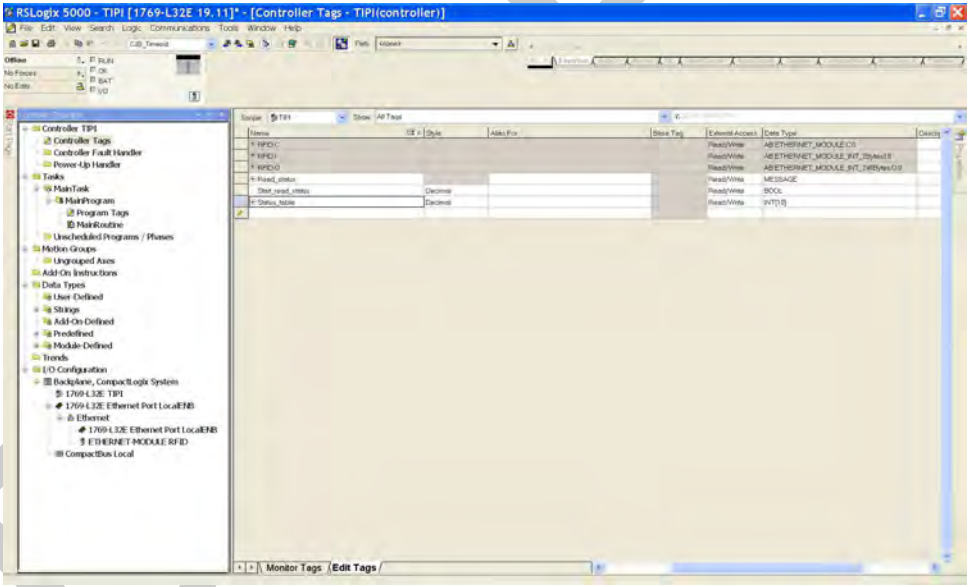
Step	Action
13	When the download is complete, a prompt displays to place the ControlLogix PLC in Run Mode. 

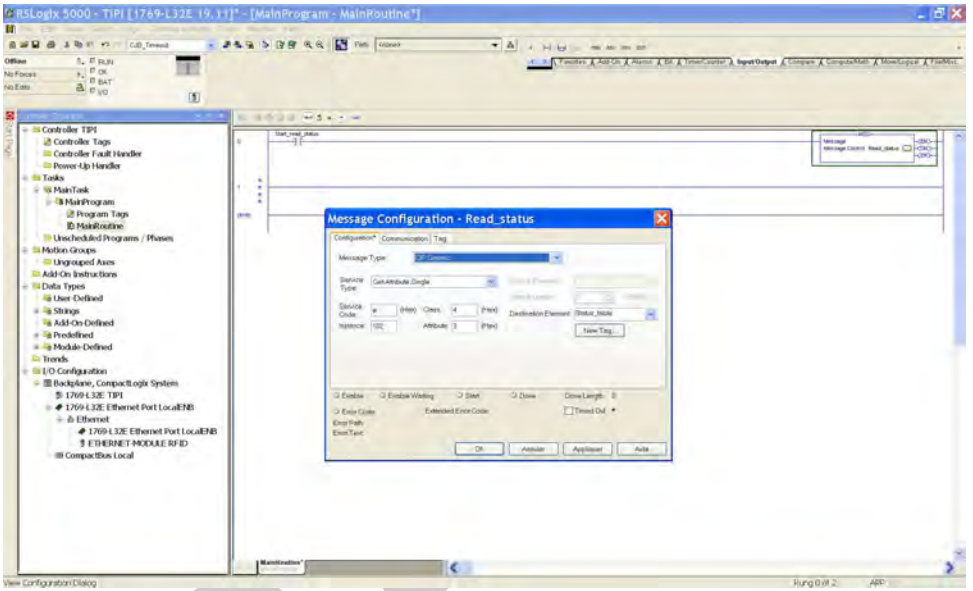
Step	Action
14	Select **Controller Tags** from the navigation panel located on the left side of the window. The controller tags that are used to communicate with the Smart Antenna appear on the right side of the window. 
15	The configuration of the communication from a ControlLogix PLC to a Smart Antenna system using the Ethernet/IP protocol is complete.

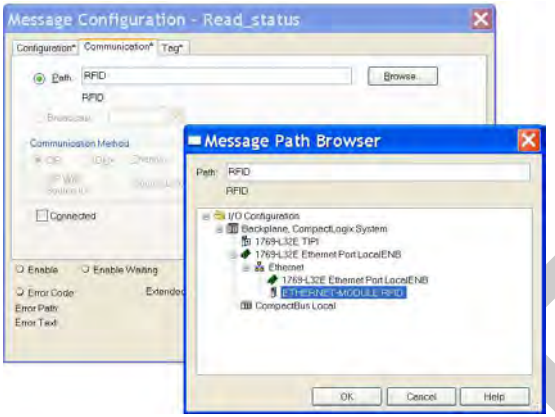
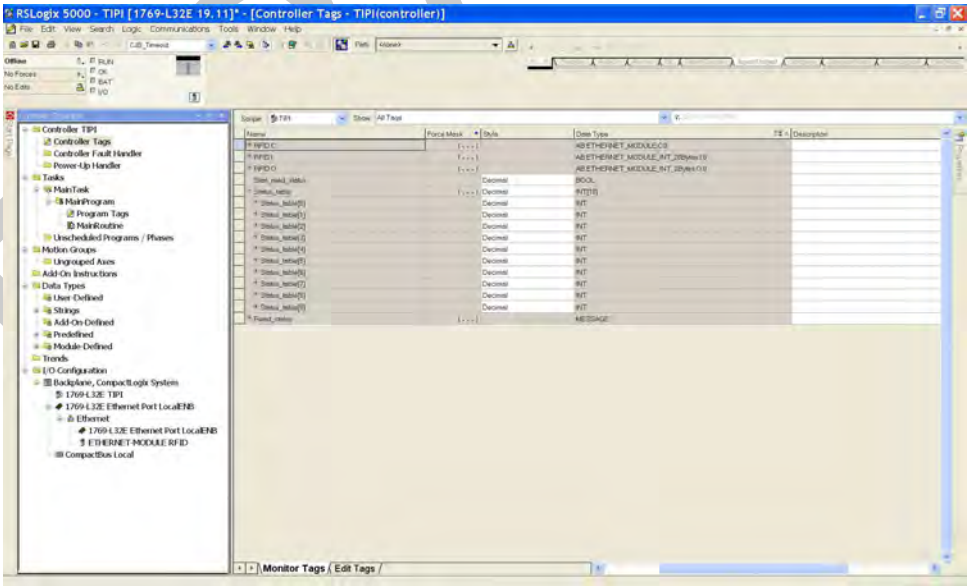
Read the Assembly 102 (General Status) or 103 (Read Table) Using an Explicit Message

Procedure

This table covers the steps necessary to read the assembly 102 or 103 with an explicit message:

Step	Action
1	In the **Controller Organizer**, open the **Controller Tags** and select the **Edit Tags** tab.
2	Create the following tags: • `Read_status` (type: MESSAGE) • `Start_read_status` (type: BOOL), in order to manage the message block • `Status_table` (type: array of INT), the length depends on the assembly (10 for the assembly 102, 100 for the assembly 103) 
3	In the **Controller Organizer** → **MainRoutine**, create a new rung.

Step	Action
4	Insert a message block **MSG** (available in the **Input/Output** tab):  Configure the message element: ● **Message Type**: CIP Generic ● **Service Type**: Get Attribute Single ● **Service Code**: e ● **Class**: 4 ● **Instance**: 102 or 103 ● **Attribute**: 3

Step	Action
5	Select the **Communication** tab and configure the communication path using the browser: 
6	Click **OK**.
7	Save and download the application to the PLC.
8	When the download is complete, a prompt displays to place the PLC in Run Mode.
9	Click **Controller Organizer** → **Controller Tags** and select the **Monitor Tags** tab: 

Step	Action
10	Use the `Start_read_status` bit to manage the message block. **Result:** The assembly data are returned in the `Status_table array`.

Reading/Writing Request with the Modbus Object

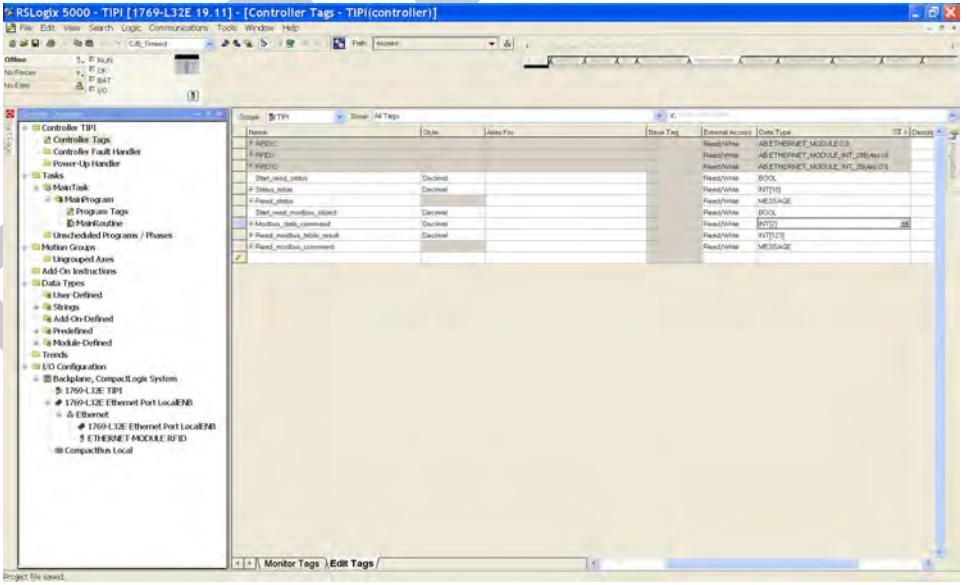
Introduction

These Modbus explicit commands must be used to manage the tag and the Smart Antenna memory zones *(see page 48)*.

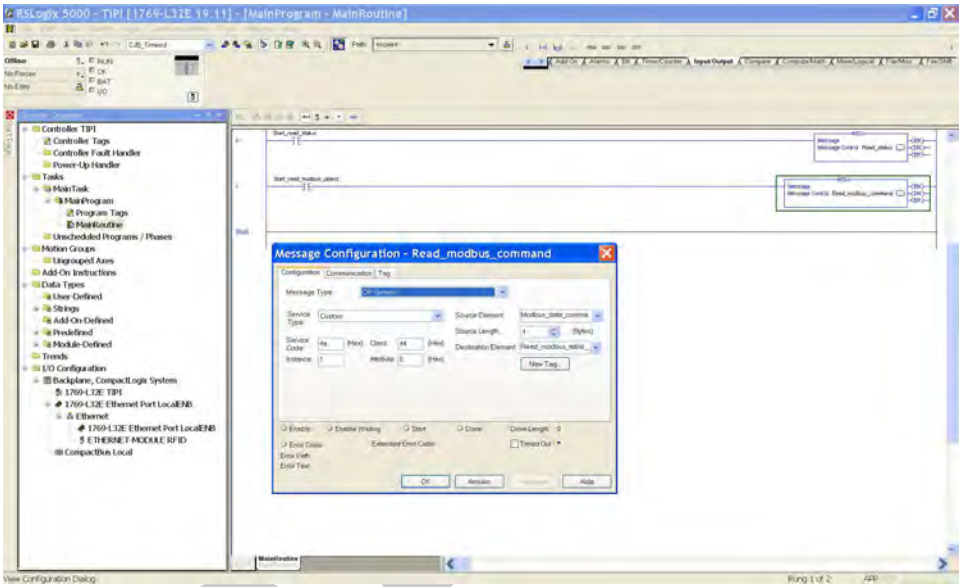
Reading Request with the Modbus Object and an Explicit Message

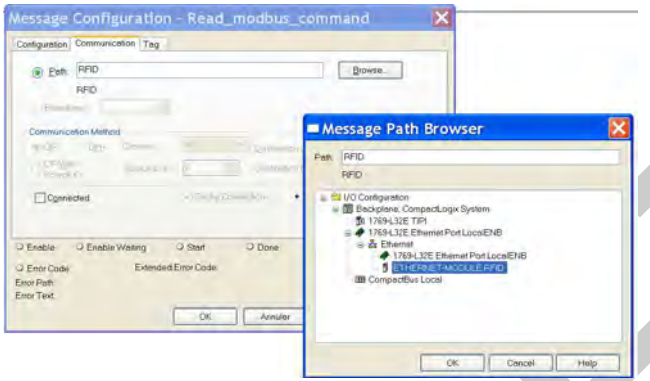
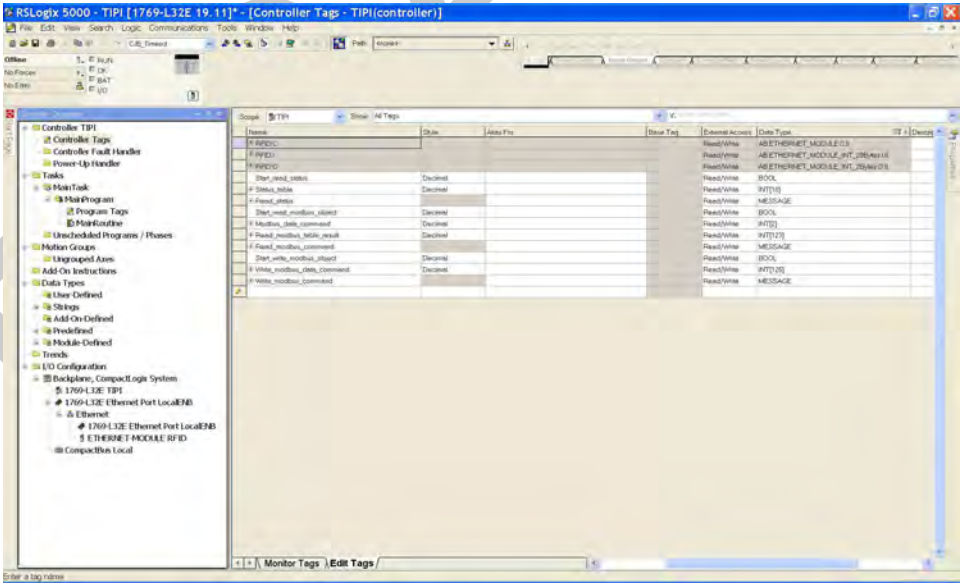
This table explains how to use the Modbus object *(see page 67)* for reading with an explicit message:

Step	Action
1	In the **Controller Organizer**, open the **Controller Tags** and select the **Edit Tags** tab.

2	Create the needed tags:
	● `Read_modbus_command` (type: MESSAGE)
	● `Start_read_modbus_object` (type: BOOL), in order to manage the message block
	● `Modbus_data_command` (type: array of 2 INT), data of the read Modbus command:
	  ● First word: starting address
	  ● Second word: quantity of registers to read
	● `Read_modbus_table_result` (type: array of INT), the length depends on the quantity of the register to read (123 words maximum)
	 

3	In the **Controller Organizer** → **MainRoutine**, create a new rung.

Step	Action
4	Insert a message block **MSG** (available in the **Input/Output** tab):  Configure the message element: ● **Message Type**: CIP Generic ● **Service Type**: Custom ● **Service Code**: 4e ● **Class**: 44 ● **Instance**: 1 ● **Attribute**: 0

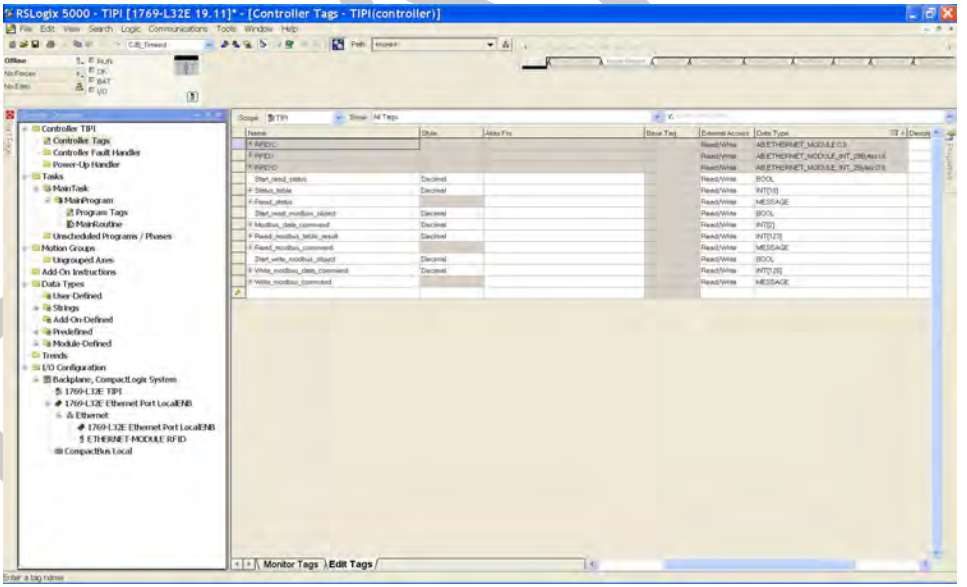
Step	Action
5	Select the **Communication** tab and configure the communication path using the browser: 
6	Click **OK**.
7	Save and download the application to the PLC.
8	When the download is complete, a prompt displays to place the PLC in Run Mode.
9	Click **Controller Organizer** → **Controller Tags** and select the **Monitor Tags** tab: 

Step	Action
10	Use the `Start_read_status` bit to manage the message block. **Result:** The result of the reading request is retuned in the `Read_modbus_table_result` array.

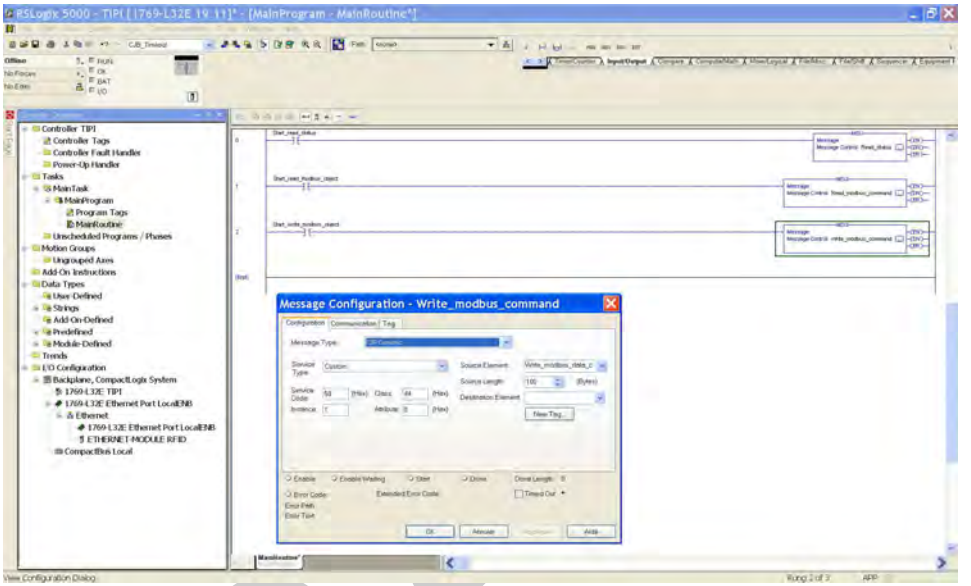
Writing Request with the Modbus Object and an Explicit Message

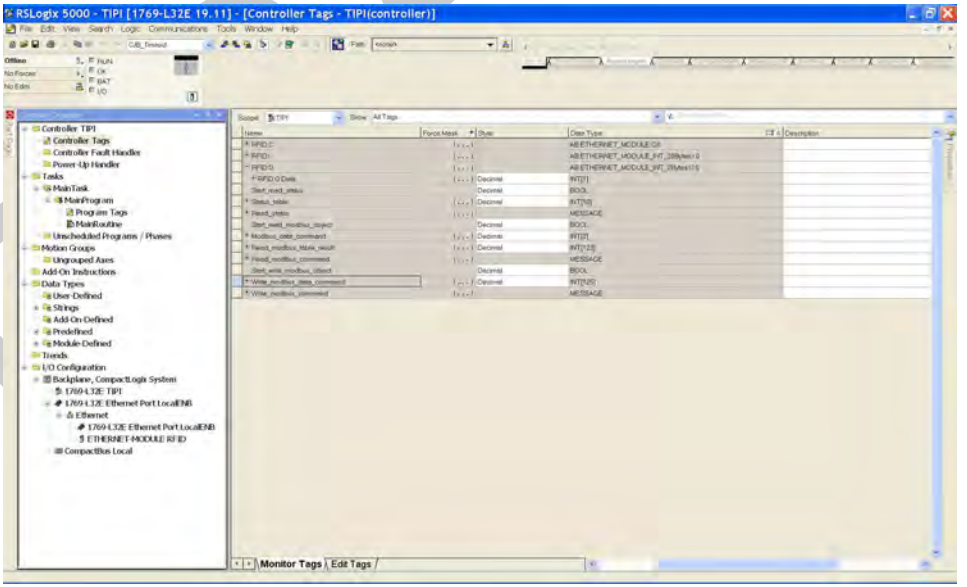
This table explains how to use the Modbus object *(see page 67)* for writing with an explicit message:

Step	Action
1	In the **Controller Organizer**, open the **Controller Tags** and select the **Edit Tags** tab.

2	Create the needed tags:
	• `Write_modbus_command` (type: MESSAGE)
	• `Start_write_modbus_object` (type: BOOL), in order to manage the message block
	• `Write_Modbus_data_command` (type: array of N INT), data of the write Modbus command (the length depends on the quantity of the register to write):
	  • First word: starting address
	  • Second word: quantity of registers to write
	  • Third...N word: data to write
	 

3	In the **Controller Organizer** → **MainRoutine**, create a new rung.

Step	Action
4	Insert a message block **MSG** (available in the **Input/Output** tab):  Configure the message element: ● **Message Type**: CIP Generic ● **Service Type**: Custom ● **Service Code**: 50 ● **Class**: 44 ● **Instance**: 1 ● **Attribute**: 0

Step	Action
5	Select the **Communication** tab and configure the communication path using the browser: 
6	Click **OK**.
7	Save and download the application to the PLC.
8	When the download is complete, a prompt displays to place the PLC in Run Mode.
9	Click **Controller Organizer** → **Controller Tags** and select the **Monitor Tags** tab: 

Step	Action
10	Place the data to write in the `Write_modbus_data_command` array. Use the `Start_write_modbus_object` bit to manage the message block.

Chapter 6
Modbus TCP/IP Communications Support

Introduction

This chapter describes how a Smart Antenna can be accessed from other devices on a Modbus TCP/IP fieldbus network.

What Is in This Chapter?

This chapter contains the following topics:

Modbus Commands Supported by the Smart Antenna

Introduction

Modbus is the protocol used by Modicon PLCs. Modbus defines the message structure that the PLCs understand and use, regardless of network type. The Modbus protocol describes the process that a controller uses to access another device, how that device responds, and how detected errors are reported.

The Smart Antenna is a server on a Modbus TCP system.

It can be connected to any system with Modbus TCP clients, including these:

- PLC (function blocks or I/O scanner)
- HMI
- SCADA
- Computer

The Unit ID of the Smart Antenna on Modbus TCP is fixed to 1, the Smart Antenna is addressed by its IP address.

Modbus Message Data Frame

Modbus messages are embedded within the frame or packet structure of the network in use. A Modbus over TCP/IP network uses both the Ethernet II and IEEE 802.3 data formats. For communications with the Smart Antenna, Modbus messages can be embedded in either frame type. Ethernet II is the default data format.

Modbus Message Structure

The Modbus protocol uses a 16-bit word. A Modbus message begins with a header. A Modbus message uses a Modbus function code *(see page 102)* as the first byte.

Following is a description of the structure of a Modbus message header:

Invoke Identifier	Protocol Type	Command Length	Destination ID	Modbus Message
two-byte field that associates a request with a response	two-byte field value for Modbus is always 0	two-byte field value is the size of the rest of the message	one-byte	n-byte field first byte is the Modbus function code

List of Supported Commands

The table lists the Modbus commands that the Smart Antenna supports:

Modbus Function Code	Subfunction or Subindex	Command
03h	-	Read n words ($1 \leq n \leq 123$)
06h	-	Write one word
08h	16h	Get/clear Ethernet statistics *(see page 103)*

Modbus Function Code	Subfunction or Subindex	Command
0Bh	-	Read event counters
10h	-	Write n words (1 ≤ n ≤ 123)
2Bh	0Eh	ID

Ethernet Statistics

Ethernet statistics comprise status information and errors related to data transmissions to and from the Smart Antenna over the Ethernet LAN.

Ethernet statistics are held in a buffer until the **get Ethernet statistics** command is issued, and the statistics are retrieved.

The **clear Ethernet statistics** command clears all of the statistics currently held in the buffer *except the MAC address and the IP address*.

When issuing a command, it is necessary to include a diagnostic control word that contains the following required information:

Diagnostic Control Byte	Description	
MSB: bits 15...8	Data selection code:	
	01h	Basic network diagnostics *(see page 103)*
	02h	Ethernet port diagnostics *(see page 104)*
	03h	Modbus TCP/Port 502 diagnostics *(see page 105)*
LSB: bits 7...0	Port selection code	
	01...FFh	The logical number of the port

Basic Network Diagnostics

Basic network diagnostic data can be accessed at the following Modbus register addresses, relative to the initial address offset value:

Address: Offset +	Description
0–1	basic network diagnostic validity
2	communication global status
3	supported communication services
4	status of communication services
5–6	IP address
7–8	subnet mask
9–10	default gateway
11–13	MAC address
14–16	Ethernet frame format capability/configuration/operational

Address: Offset +	Description
17–18	Ethernet receive frames OK
19–20	Ethernet transmit frames OK
21	number of open client connections
22	number of open server connections
23–24	number of Modbus exception responses
25–26	number of Modbus messages sent
27–28	number of Modbus messages received
29–36	device name
37–38	IP assignment mode capability/operational

Ethernet Port Diagnostics

Ethernet port diagnostic data can be accessed at the following Modbus register addresses, relative to the initial address offset value:

Address: Offset +	Description
0	port diagnostics data validity
1	logical/physical port number
2	Ethernet control capability
3	link speed capability
4	Ethernet control configuration
5	link speed configuration
6	Ethernet control operational
7	link speed operational
8–10	port MAC address
11–12	media counters data validity
13–14	number of frames transmitted OK
15–16	number of frames received OK
17–18	number of Ethernet collisions
19–20	detected carrier sense errors
21–22	number of Ethernet excessive collisions
23–24	detected CRC errors
25–26	detected FCS errors
27–28	detected alignment errors
29–30	number of detected internal MAC Tx errors
31–32	late collisions

Address: Offset +	Description
33–34	detected internal MAC Rx errors
35–36	multiple collisions
37–38	single collisions
39–40	deferred transmissions
41–42	frames too long
43–44	frames too short
45–46	detected SQE test error(s)
47	interface counters diagnostic validity
48–49	number of octets received
50–51	number of unicast packets received
52–53	number of non-unicast packets received
54–55	number of inbound packets discard
56–57	number of detected inbound packet errors
58–59	number of unknown inbound packets
60–61	number of octets sent
62–63	number of unicast packets sent
64–65	number of non-unicast packets sent
66–67	number of outbound packets discarded
68–69	number of detected outbound packet errors

Modbus TCP/Port 502 Diagnostics

Modbus TCP/Port 502 diagnostic data can be accessed at the following Modbus register addresses, relative to the initial address offset value:

Address: Offset +	Description
0–1	Modbus TCP/port 502 diagnostic data validity
2	port 502 status
3	number of open connections
4–5	number of Modbus messages sent
6–7	number of Modbus messages received
8	number of Modbus open client connections
9	number of Modbus open server connections
10	maximum number of connections
11	maximum number of client connections
12	maximum number of server connections

Address: Offset +	Description	
13–14	number of Modbus exception responses	
15	number of open priority connections	
16	maximum number of priority connections	
17	number of entries in unauthorized table	
18–19	remote IP address 1	Table entry 1
20	number of attempts to open unauthorized connection 1	
...		
111–112	remote IP address 32	Table entry 32
113	number of attempts to open unauthorized connection 32	

Modbus Requests Description

Read N Words

This function is used to read objects (word, word string).

Read request:

Slave no.	Function code	Address of 1st word		Number of words		Check
01h	3h	Hi	Lo	Hi	Lo	
1 byte	1 byte	2 bytes		2 bytes		2 bytes (RTU mode)

- Slave no.: 01h
- Function code: 3h
- Address of first word: Corresponds to the address of the first word to be read in the tag or the Smart Antenna (depending on the address)
- Number of words: $1 \leq N \leq 123$

Response:

Slave no.	Function code	Number of bytes read	Value of 1st word		Value of last word		Check
01h	3h or 4h		Hi	Lo	Hi	Lo	
1 byte	1 byte	1 byte	2 bytes		2 bytes		2 bytes (RTU mode)

- Slave no.: 01h
- Function code: Same as read request
- Number of bytes read: 2 to 246
- Value of the words read: 0000h to FFFFh
- If there is no tag present, the Smart Antenna sends a detected error report (Error messages *(see page 109)*).

Write One Word

Write request:

Slave no.	Function code	Address of word		Word Value		Check
01h	6h	Hi	Lo	Hi	Lo	
1 byte	1 byte	2 bytes		2 bytes		2 bytes (RTU mode)

- Slave no.: 01h
- Function code: 6h
- Address of word: Same addressing field as for the read request
- Word values: 0000h to FFFFh

Response:

Slave no.	Function code	Address of word		Word Value		Check
01h	6h	Hi	Lo	Hi	Lo	
1 byte	1 byte	2 bytes		2 bytes		2 bytes (RTU mode)

The response is an echo of the request, indicating that the value contained in the request has been taken into account by the Smart Antenna.

Write N Words

Write request:

Slave no.	Function code	Address of 1st word		Number of words		Number of bytes	Value of 1st word		Value of last word		Check
01h	10h	Hi	Lo	Hi	Lo		Hi	Lo	Hi	Lo	
1 byte	1 byte	2 bytes		2 bytes		1 byte	2 bytes		2 bytes		2 bytes (RTU mode)

- Slave no.: 01h
- Function code: 10h

- Number of words: 1 ≤ N ≤ 123
- Number of bytes: Twice the number of words
- Word values: 0000h to FFFFh

Response:

Slave no.	Function code	Address of 1st word written		Number of words written		Check
01h	10h	Hi	Lo	Hi	Lo	
⌣	⌣	⌣		⌣		⌣
1 byte	1 byte	2 bytes		2 bytes		2 bytes (RTU mode)

- Slave no.: 01h
- Function code: Same as request
- Address of first word written: Same as request
- Number of words written: Same as request

Identification Request

Function 2Bh: This function is used to identify the Smart Antenna.

Read request:

Slave no.	Function code	MEI *	Read Device ID code	Object ID
01h	2Bh	0Eh	01h, 02h, 03h	00h

* : MEI = Modbus Encapsulated Interface

Response:

Index	Object Name & Description	Description	Data Type
0 (0000h)	Manufacturer name	TELEMECANIQUE	ASCII string
1 (0001h)	Product code		
2 (0002h)	Version number	Vx.y (for example: V3.6)	

Detected Error Messages

When an anomaly in the message (or during its execution) is detected by the Smart Antenna to which it is addressed, the Smart Antenna sends back a detected error message to the master system.

Syntax:

Slave no.	Function code	Detected error code	Check
⌣	⌣	⌣	⌣
1 byte	1 byte	1 byte	2 bytes (RTU mode)

- Slave no.: 01h
- Function code: Same as the function code and most significant bit of the byte set at 1

Examples:

- Function code of the detected error message after a read request:
  83h = (80 + 03) or 84h = (80 + 04)
- Function code of the detected error message after a write request:
  90h = (80 + 10)

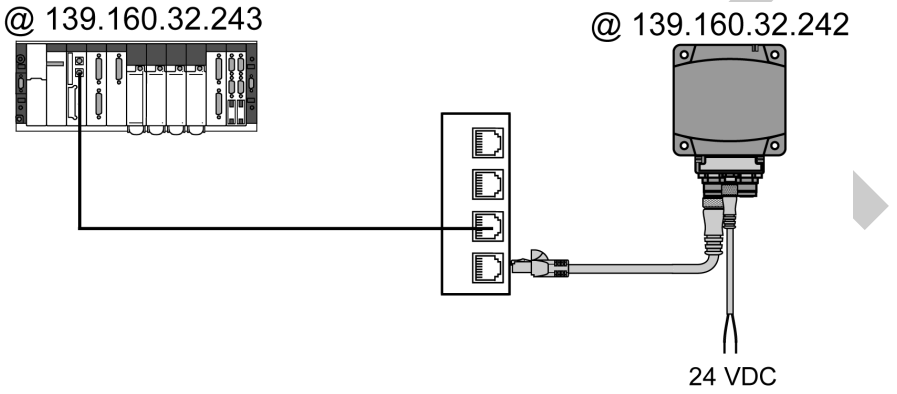
Detected error code:

- 1h: Unknown function code or incorrect request format
- 2h: Incorrect address or prohibited zone or protected zone or address outside the tag memory zone
- 3h: Incorrect data too much or not enough data in the frame, or quantity = 0, or data incompatible
- 4h: Execution detected error (in read or write mode, or tag missing)

Modbus Application Example

Application Example

A Smart Antenna and a Premium PLC are connected to a Modbus TCP/IP network.

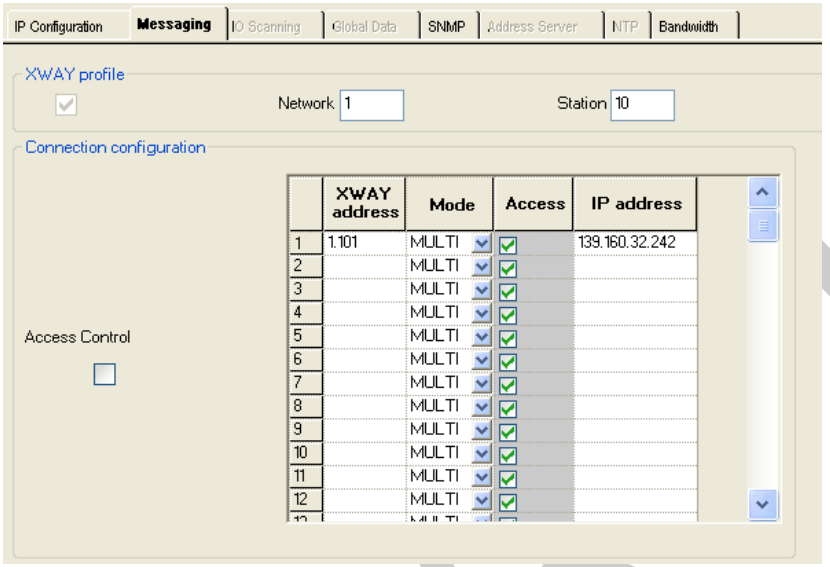


PLC Configuration with Unity Pro XL

To enable communication between these 2 devices, the PLC hardware configuration must be entered, giving:

- An XWAY address for the Smart Antenna
- The IP address of the Smart Antenna

The figure illustrates the configuration in Unity Pro:

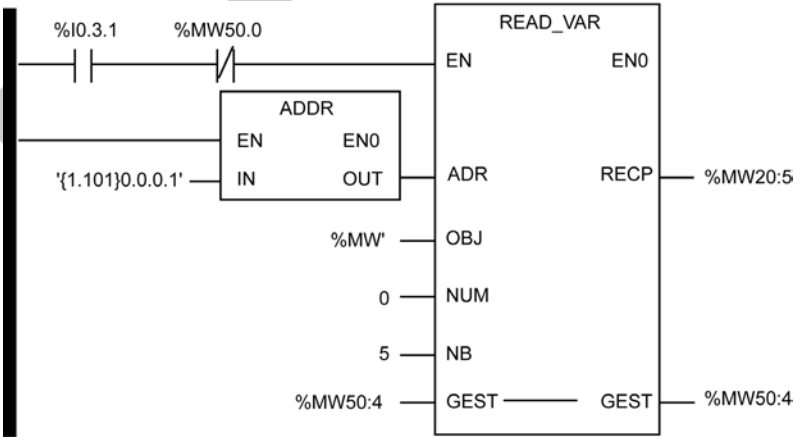


Example of Program in Unity Pro

Program example: Read 5 words in the tag starting at word %MW0 of the tag.

NOTE: The Modbus address of the Smart Antenna is 1 (fixed address).

LADDER programming



Structured Text programming

```
if % I0.3.1 and not Management_buffer[0].0 then
    READ_VAR (adr := ADDR('(1.101)0.0.0.1)'),
          OBJ := '%MW',
          NUM := 0,
          NB := 5,
          GEST := Management_buffer,
          RECP => Reception_buffer);
end_if;
```

Reception_buffer	ARRAY[0..4] OF INT
Reception_buffer[0]	INT
Reception_buffer[1]	INT
Reception_buffer[2]	INT
Reception_buffer[3]	INT
Reception_buffer[4]	INT

Management_buffer	ARRAY[0..3] OF INT
Management_buffer[0]	INT
Management_buffer[1]	INT
Management_buffer[2]	INT
Management_buffer[3]	INT

NOTE: The ADDR function is structured: **'(***XWAY address***)***Rack***.***Module***.***Channel***.***Modbus address***)'**.

Chapter 7
Web Server

Aim of This Chapter

This chapter describes the Smart Antenna web server.

What Is in This Chapter?

This chapter contains the following topics:

Web Server Access

Introduction

To access the Smart Antenna web server, you need:

- Microsoft Windows XP or 7,
- Microsoft Internet Explorer version ≥ 8 or Mozilla Firefox version ≥ 19,
- Java Runtime environment version ≥ 7.

Before you begin, be sure that both your PC and the Smart Antenna are configured with IP addresses that are located in the same subnet (or, alternatively, are connected via a routing mechanism).

Accessing the Smart Antenna Embedded Web Server

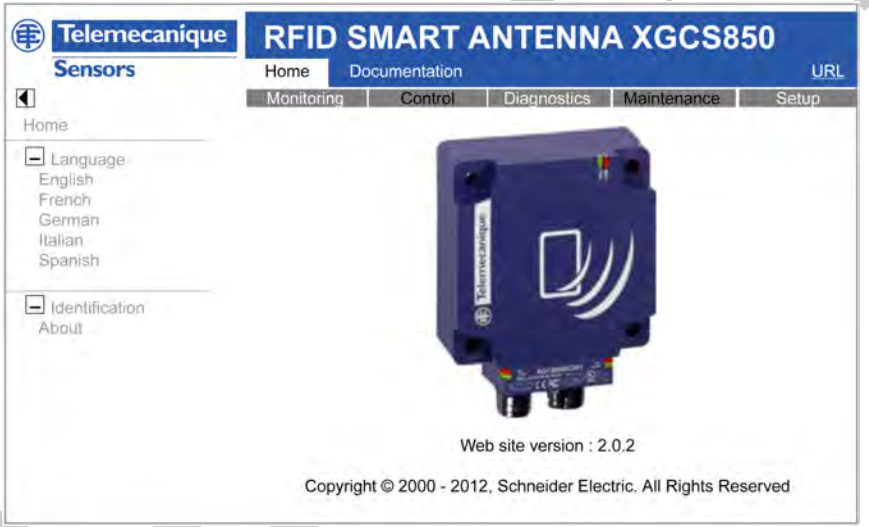
The procedure describes how to access the embedded web server:

Step	Action
1	Connect the Smart Antenna to a PC.
2	Open a web browser.
3	Enter the Smart Antenna factory setting address: http://192.168.0.10 in the address line of the browser and hit **Enter** on your keyboard.
4	A dialog box opens and prompts you for a user name and password. 

Step	Action
5	Enter the factory default settings for **User name** and **Password**: ● **User name** = USER ● **Password** = USER **NOTE:** If you previously changed the password, you must instead enter the new password in this dialog box.
6	Click **OK**. The web server home page is displayed.

Home Page Description

The graphic shows the Smart Antenna web server **Home** page:



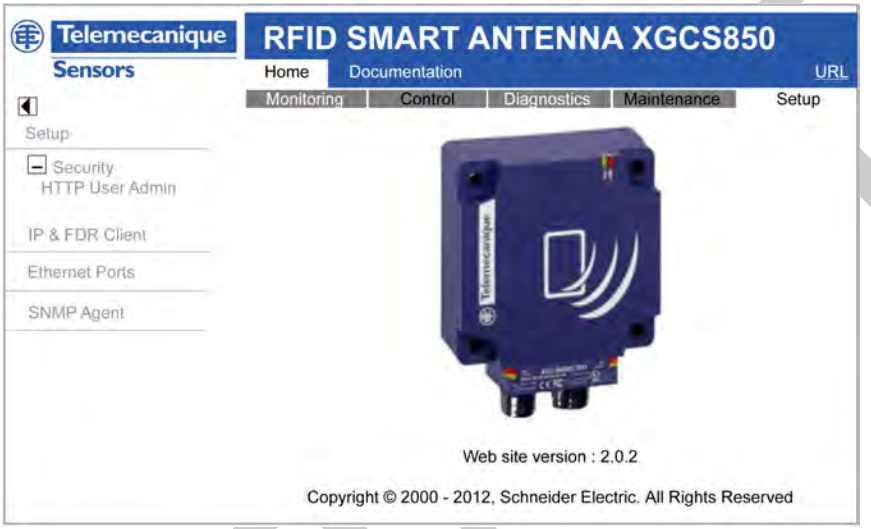
The **Home** page gives access to the following web service pages:

- **Setup** *(see page 118)*
- **Diagnostics** *(see page 128)*
- **Monitoring** *(see page 128)*
- **Documentation** *(see page 123)*

Setup Pages

Setup Home Page

The **Setup** home page looks like this:

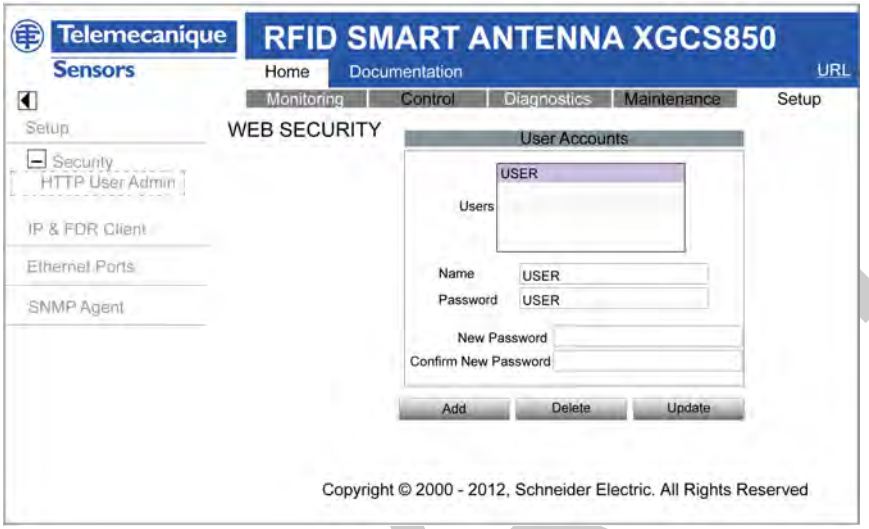


From the **Setup** home page, you can access to the following pages:

- **WEB SECURITY** *(see page 119)*, to configure user accounts and passwords,
- **IP & FDR CONFIGURATION** *(see page 41)*, to configure the Smart Antenna IP address,
- **ETHERNET PORTS CONFIGURATION** *(see page 120)*, to configure the 2 ports of the Smart Antenna,
- **SNMP AGENT CONFIGURATION** *(see page 120)*, to configure the SNMP agent.

User Accounts Configuration

The **WEB SECURITY** *(see page 119)* page looks like this:

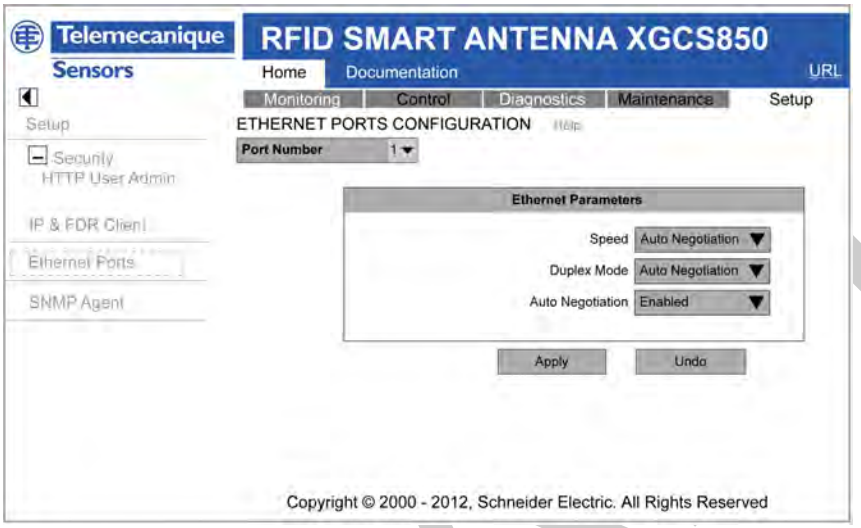


The procedure shows how to modify a user account:

Step	Action
1	In the **Users** list, select the account to modify.
2	Fill the fields **Name** and **Password**.
3	Enter the new password in the fields **New Password** and **Confirm New Password**.
4	Click **Update** to confirm the new settings.

Ethernet Ports Configuration

The **ETHERNET PORTS CONFIGURATION** page looks like this:



The procedure shows how to configure Ethernet ports:

Step	Action
1	Select the **Port Number** to configure (1 or 2).
2	Select the **Auto Negotiation** mode (enabled or disabled).

3	Configure the following parameters if the **Auto Negotiation** is disabled:
	● Speed
	  ● 10 Mbit/s
	  ● 100 Mbit/s
	● Duplex Mode
	  ● Half-duplex
	  ● Full-duplex

4	Click **Apply** to confirm the new settings.

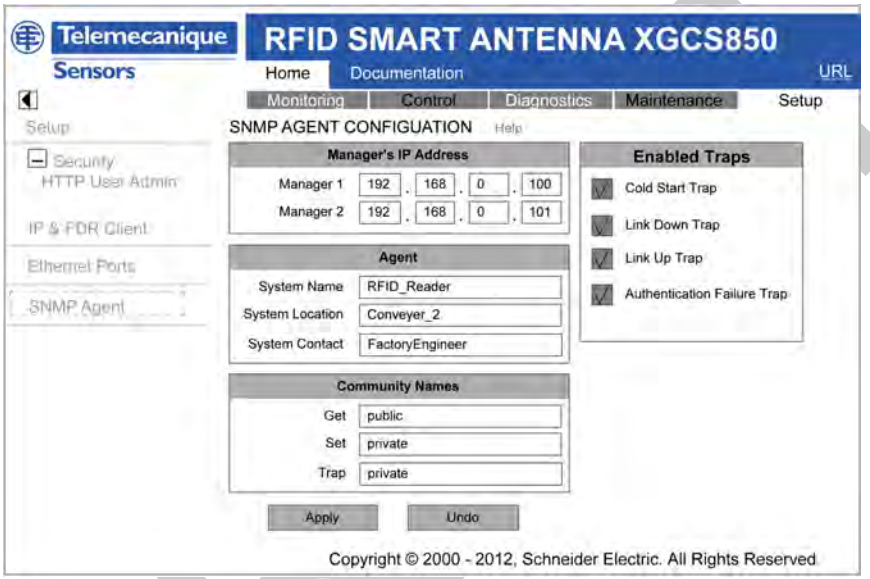
SNMP Agent Configuration

The Smart Antenna includes an SNMP agent that can connect to and communicate with an SNMP manager through the UDP transport protocol over ports 161 and 162.

The SNMP service includes:

- automatic discovery and identification of the Smart Antenna by an SNMP manager over an Ethernet network,
- authentication checking by the Smart Antenna of any SNMP manager that sends requests to it,
- management of event (or trap) reporting by the Smart Antenna, including the identification of 2 SNMP managers authorized to receive reports.

The **SNMP AGENT CONFIGURATION** page looks like this:



The table describes the SNMP agent parameters:

Area	Parameters	Description
Manager's IP Address	Manager 1	IP addresses of the SNMP administrators. The Smart Antenna allows a maximum of 2 administrators. These addresses are used for transmitting events (trap).
	Manager 2	
Agent	System Name	Indicate the name of the Smart Antenna.
	System Location	Indicate the physical location of the Smart Antenna.
	System Contact	Indicate the person to contact for management of the Smart Antenna
Community Names	Get	Define a password for the Set, Get, and Trap service families. **NOTE:** The maximum password length is 16 printable ASCII characters.
	Set	
	Trap	

Area	Parameters	Description
Enabled Traps	Cold Start Trap	The event is sent when the Smart Antenna is powered up.
	Link Down Trap	One of the communication links of the agent has turned off.
	Link Up Trap	One of the communication links of the agent has turned on.
	Authentication Failure Trap	The agent received a request from an unauthorized manager.

The table describes the SNMP agent configuration:

Step	Action
1	In the **Manager's IP Address** section, enter these values: ● **Manager 1**: The IP address of the first SNMP manager. ● **Manager 2**: The IP address of the second SNMP manager.
2	The following **Agent** fields are read-only ASCII strings: ● **System Name**: This user-defined string describes the Smart Antenna. ● **System Location**: This string describes the location of the Smart Antenna. ● **System Contact**: This string identifies the contact person for the Smart Antenna. **NOTE:** These case-sensitive strings have a maximum length of 32 characters.
3	In the **Community Names** section, enter passwords for **Get**, **Set**, and **Trap**. (They can be empty.) **NOTE:** The maximum password length is 16 printable ASCII characters. The default setting for **Get** is `public` and `private` for **Set**, and **Trap**.
4	In the **Enabled Traps** section, select one or more of the following traps to enable SNMP agent reporting of that trap; de-select a trap to disable reporting: ● **Cold Start Trap**: The agent is reinitializing and its configuration may be altered. ● **Link Down Trap**: One of the communication links of the agent has turned off. ● **Link Up Trap**: One of the communication links of the agent turned on. ● **Authentication Failure Trap**: The agent received a request from an unauthorized manager.
5	Click one of the following: ● **Apply**: Save your edits. ● **Undo**: Clear the page without saving your edits.

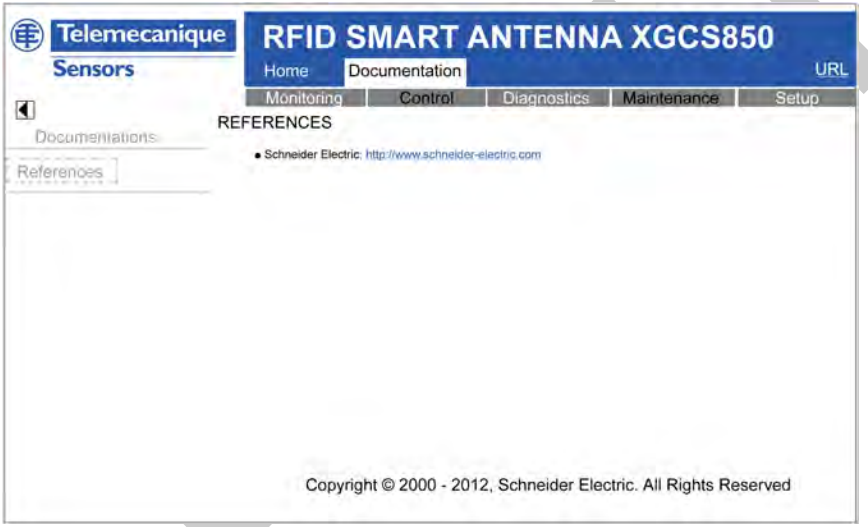
Documentation Web Page

Introduction

The **Documentation** page of the embedded web server allows downloading the EDS file of the Smart Antenna.

Description

The graphic shows the Smart Antenna web server **Documentation** page:



Click the EDS file to download it.

Chapter 8
Diagnostics

Aim of This Chapter

This chapter describes how to diagnose a detected issue using the LEDs on the Smart Antenna or by accessing the web server.

What Is in This Chapter?

This chapter contains the following topics:

Smart Antenna Diagnostic LEDs

Introduction

The 6 two-tone LEDs display all the operating states of the Smart Antenna:

LEDs Description

The table describes the LEDs state:

LED	Name	LED State	Description	Smart Antenna State
1	TAG	Solid green	Tag presence	A tag is detected, dialog ok
		1 flash	No tag detected	Waiting for a tag
		Red flashes	RFID detected error	Errors detected in the dialog with the tag
2	COM	Green flashes	Requests received from a client	Ok
		Red flashes	Detected error in requests received from a client	Detected error code returned to the client (no tag / bad parameters,...)

LED	Name	LED State	Description	Smart Antenna State
3	NS (Network Status)	Steady off	Not powered or no IP address	Waiting for IP address setting (fixed or DHCP).
		Flashing green	No connections	No CIP connection established, and an exclusive owner connection with a client has not timed out.
		Solid green	Connected	At least one CIP connection is established, and an exclusive owner connection with client has not timed out.
		Flashing red	Connection timeout	An exclusive owner connection with client has timed out.
		Solid red	Duplicate IP	The Smart Antenna has detected that its IP address is already in use.
		Flashing green/red	Self-test	The Smart Antenna is performing its power-on self test.
4 5	Link Activity (port 1 and 2)	Solid green	Ethernet link present at 100 Mbit/s	Ok
		Flashing green	Traffic at 100 Mbit/s	Ok
		Solid yellow	Ethernet link present at 10 Mbit/s	Ok
		Flashing yellow	Traffic at 100 Mbit/s	Ok
6	MS (Ethernet module status)	Solid green	The Ethernet module of the Smart Antenna is operational	Ok
		Flashing green	Standby	The Smart Antenna is waiting for network configuration.
		Flashing red	Minor detected fault	The Smart Antenna has detected a recoverable minor fault. **NOTE:** An incorrect or inconsistent configuration is considered as a minor detected fault.
		Steady red	Major detected fault	The Smart Antenna has detected a non-recoverable major fault on its Ethernet module.
		Flashing green/red	Self-test	The Smart Antenna is performing its power-on self test.

Diagnostic Web Pages

Diagnostic Home Page

The **Diagnostic** home page looks like this:

Links on the left display and access embedded web pages for the selected function:

Link		Corresponding Embedded Web Page
Ethernet Statistics	Global	Ethernet TCP/IP Statistics *(see page 129)*
	Port	Ethernet Port Statistics *(see page 130)*
Modbus Statistics	TCP Port	Modbus TCP Port Statistics *(see page 131)*
	TCP Port Connections	Modbus TCP Messaging Statistics *(see page 132)*
SNMP Statistics		SNMP Statistics *(see page 133)*
Diagnostic Log		Diagnostic Log *(see page 134)*
Reader Diagnostics		Reader Diagnostics *(see page 135)*

Ethernet TCP/IP Statistics Page

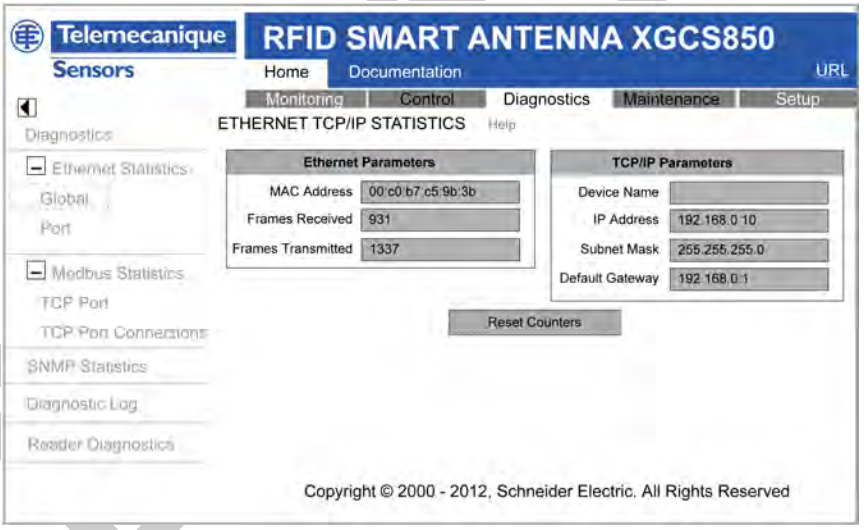
Description

On the left side of the page, under **Ethernet Statistics**, select **Global** to open the Ethernet TCP/IP Statistics page.

Use the Ethernet TCP/IP Statistics page to:

- Display the following information about the Smart Antenna:
  - device name,
  - MAC address,
  - IP addressing parameters *(see page 40)*,
  - the number of Ethernet frames successfully received by both Ethernet ports on the module,
  - the number of Ethernet frames successfully transmitted by both Ethernet ports on the module.
- Click the **Reset Counters** button to reset the **Frames Received** and **Frames Transmitted** counting statistics to 0.

The counting statistics on this page are automatically refreshed:



Ethernet Port Statistics Page

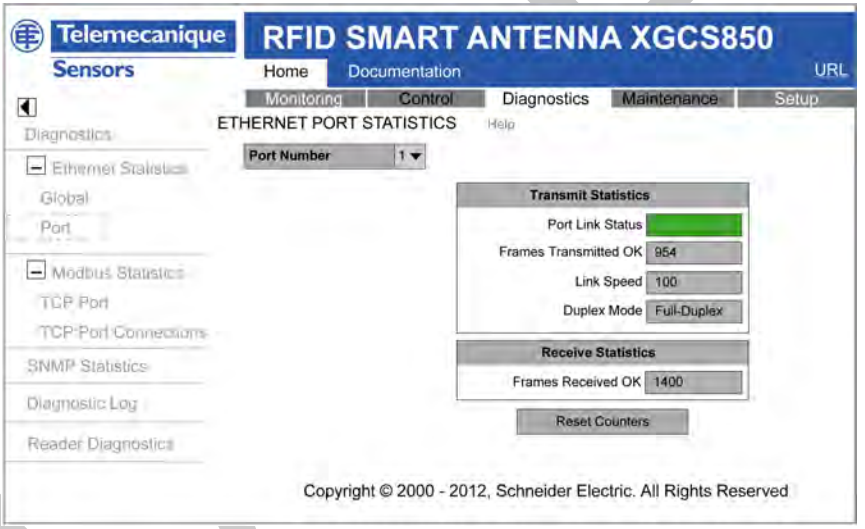
Description

On the left side of the page, under **Ethernet Statistics**, select **Port** to open the Ethernet Port Statistics page.

Use the Ethernet Port Statistics page to:

- Display statistical information related to:
  - transmitted frames,
  - received frames,
  - late collisions.
- Reset all counting statistics by clicking the **Reset Counters** button.

The counting statistics on this page are automatically refreshed:



The **Ethernet Port Statistics** page displays these data fields:

- **Port Number**: Select a port to display its statistics: 1 or 2.
- **Transmit Statistics**
  - **Frames Transmitted OK**: A count of frames successfully transmitted.
  - **Duplex Mode**: A display of the current duplex mode (full/half).
  - **Link Speed**: Displays the current link speed in Mbit/s (10 or 100).
- **Receive Statistics**
  - **Frames Received OK**: A count of frames successfully received.

Modbus TCP Port Statistics Page

Description

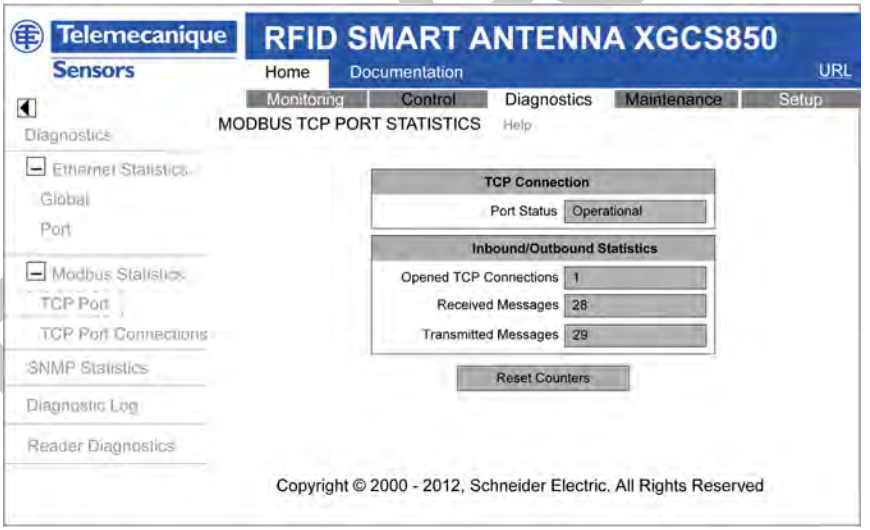
On the left side of the page, under **Modbus Statistics**, select **TCP Port** to open the **Modbus TCP Port Statistics** page.

The **Modbus TCP Port Statistics** page displays data describing the usage of the embedded Modbus TCP port (port 502).

Use the **Modbus TCP Port Statistics** page to:

- display these data:
  - **Port Status** (operational or idle),
  - a count of each of the following statistics since these counters were last reset (by either a power cycle or the **Reset Counters** button):
    - **Opened TCP Connections**
    - **Received Messages**
    - **Transmitted Messages**
- access the **Reset Counters** button, which you can click to clear the counting statistics listed above.

The statistics on this page are automatically updated:



Modbus TCP Messaging Statistics Page

Description

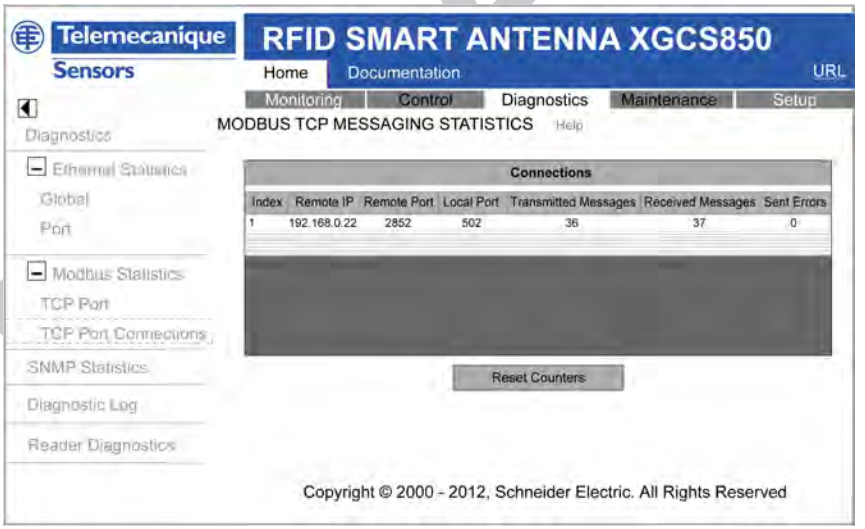
On the left side of the page, under **Modbus Statistics**, select **TCP Port Connections** to open the Modbus TCP Messaging Statistics page.

The Modbus TCP Messaging Statistics page displays data describing the usage of the embedded Modbus TCP Messaging.

Use the **Modbus TCP Messaging Statistics** page to:

- display these data:
  - **Index**: the index number,
  - **Remote IP**: the IP address of the remote connection,
  - **Remote Port**: the port number of the remote connection,
  - **Local Port**: the port number of the local connection,
  - **Transmitted Messages**: the number of transmitted messages,
  - **Transmitted Messages**: the number of received messages,
  - **Sent Errors**: the number of detected sent errors.
- access the **Reset Counters** button, which you can click to clear the counting statistics listed above.

The statistics on this page are automatically updated:



SNMP Statistics Page

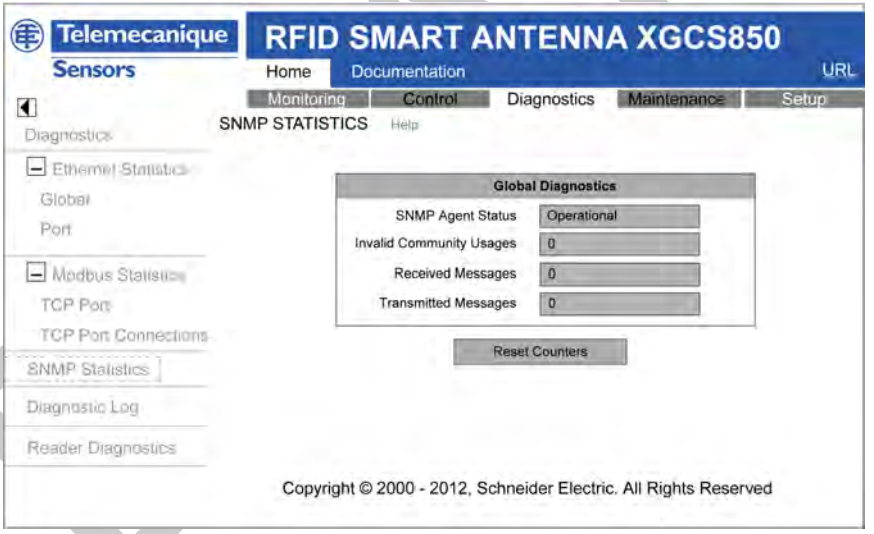
Description

On the left side of the page, select **SNMP Statistics** to open the SNMP Statistics page.

Use the SNMP Statistics page to:

- display the following data describing the Smart Antenna embedded SNMP agent:
  - **SNMP Agent Status:** operational or idle,
  - **Bad Community Usages:** a count of requests sent to the Smart Antenna containing an invalid community name, indicating the requesting device may be unauthorized to make such a request,
  - **Received Messages:** a count of the number of SNMP requests received by the Smart Antenna,
  - **Transmitted Messages:** a count of the number of SNMP responses sent by the Smart Antenna,
- reset the 3 counting statistics, above, by clicking the **Reset Counters** button.

The SNMP Statistics page looks like this:



Diagnostic Log Page

Description

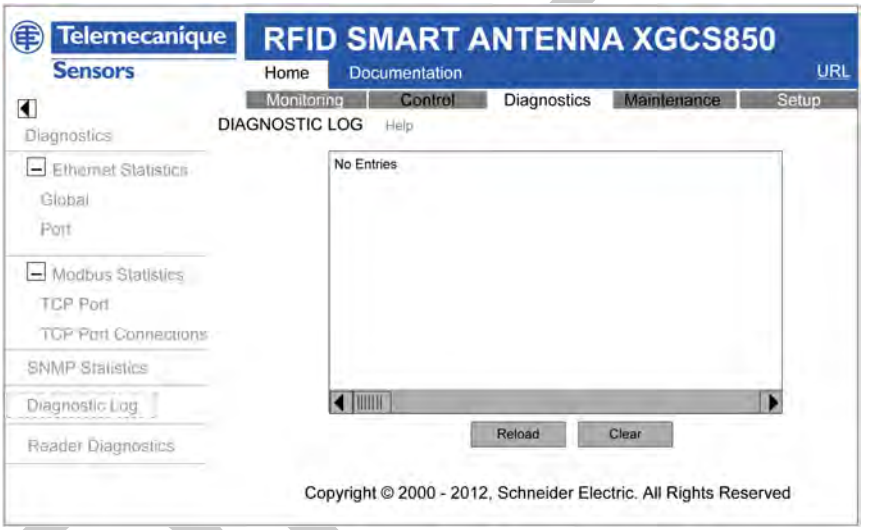
On the left side of the page, select **Diagnostic Log** to open the **Diagnostic Log** page.

The **Diagnostic Log** page reports information that is collected during Smart Antenna operations.

In the **Diagnostic Log** page, you can click the:

- **Reload** button to update the display. This page is not automatically updated, so you can more easily read its static contents.
- **Clear** button to clear the log. Deleting the log removes its content from flash memory.

The **Diagnostic Log** page looks like this:

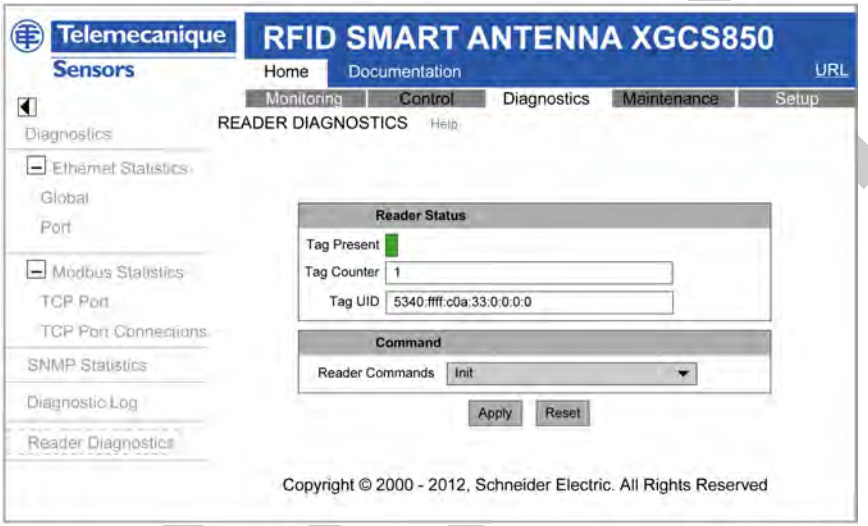


Reader Diagnostics Page

Description

On the left side of the page, select **Reader Diagnostics** to open the **Reader Diagnostics** page.

The **Reader Diagnostics** page looks like this:



The table describes the **Reader Diagnostics** page:

Area	Parameter	Description
Reader Status	Tag Present	Green if a tag is present.
	Tag Counter	Number of detected tags.
	Tag UID	UID of the last detected tag.
Command	Reader Commands	Choice of the command to execute *(see page 51)*: • Init • Reset • Sleep • Execution
	Apply	Execute the selected command.
	Reset	Reset the tag counter.

Chapter 9
FAQs

FAQ

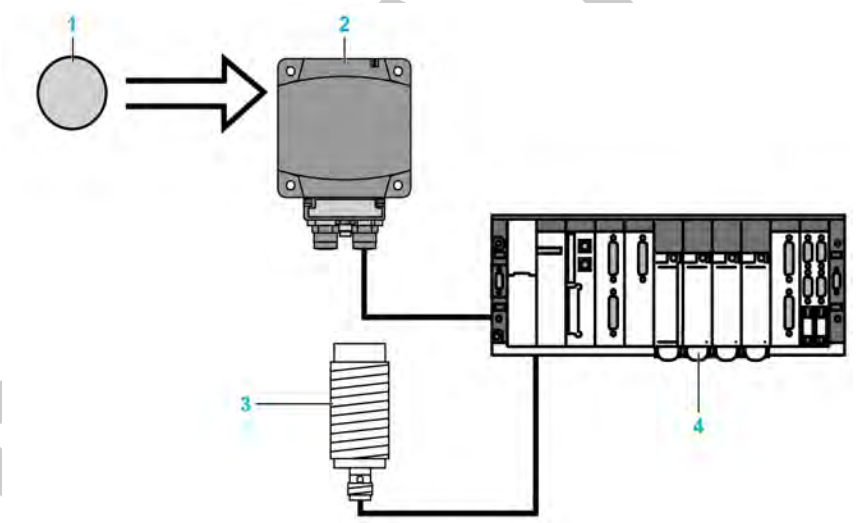
Detected Errors During Tag Reading/Writing

How to avoid making errors in reading/writing a tag

To avoid making errors in reading/writing a tag, it is necessary to check the tag presence between making the request.

1: Use a sensor:

Synchronize the Read/Write requests with a sensor that indicates the presence of the tag to the control system:



1 Tag
2 Smart Antenna
3 Tag presence sensor
4 PLC

In case of processing detected errors (such as incorrect positioning of the tag or a transmission detected error), provide for repetition of the request before switching to the "Fallback" mode (abandoning of the request and generation of an alarm).

2: Read the STATUS word of the Smart Antenna:

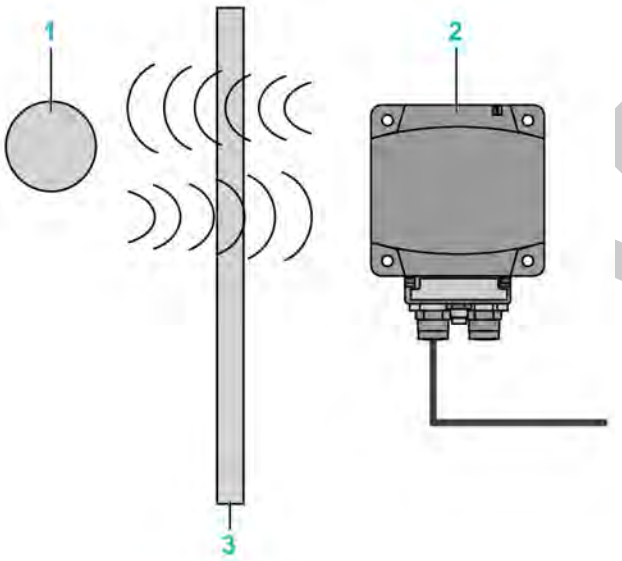
Before initiating a tag Read/Write request, ensure that the tag is present using a request to read the Smart Antenna STATUS word (bit 0 of the word STATUS = 1 if the tag is present).

Protecting the Smart Antenna

How to protect the Smart Antenna against shock

To protect the system against shock, you can:

- Embed the Smart Antenna in metal *(see page 36)*
- Embed the tag in metal *(see page 36)*
- Protect the Smart Antenna by making use of its capability to work through non-metallic materials according to the diagram shown below:



1 Tag
2 Smart Antenna
3 Non-metallic screen

NOTE: Thermal protection

Avoid exposing the tags to radiating heat sources, such as infrared dryers.

Maximum Cable Length

What is the maximum connection cable length of the Smart Antenna?

100 m *(328 ft)* between each Smart Antenna.

Line Terminator

How to insert the line terminator?

A line terminator is not necessary on Ethernet network.

COM Detected Error

How to process the communication interruptions between the PLC and the Smart Antenna?

There is a permanent risk of communication detected error in the reading or writing of a tag (disturbances, EMC, tag in the dialog zone limit...).

It is necessary to integrate the risk management into the PLC program:

- Process the detected error codes of the Smart Antenna (request for reading / writing is rejected since no tag is detected in front of the Smart Antenna,...)
- Process the "Time-Out" when the Smart Antenna does not respond, such as "the message is not included following a disturbance".
- In the case of detected error, repeat the request (up to 3 times) before exiting and issuing a PLC alarm.

Tag Write Number

How many times can it be written in the tags?

The maximum number of writing depends on the tag storage temperature: the higher the temperature is, the more this limit decreases.

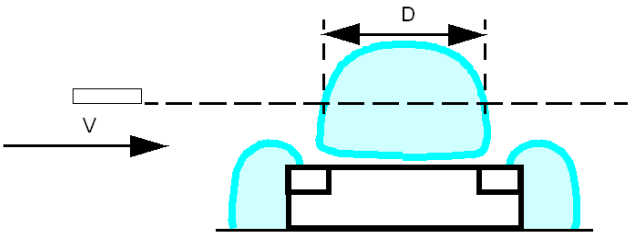
The Smart Antenna tags are provided for at most 100,000 tags per data bit in the defined storage temperature range.

If the tag is permanently at a temperature less than 30°C /*86°F* (the most frequent case), the maximum number of typical writings is **2.5 million**.

NOTE: For application where frequent writing is required, select a tag with a Feram memory (10^{10} write cycles).

Readable Data of a Moving Tag

What amount of data can be exchanged in a moving tag?



When the tag is not stopped during its movement in front of the Smart Antenna, it is necessary to:

Step	Action
1	Determine the speed **V** of the tag.
2	Determine the number of word to exchange.
4	Refer to the maximum speed in the tag characteristics *(see page 25)*.

NOTICE
UNINTENDED EQUIPMENT OPERATION Do not make a writing request when the tag exits the detection zone of the Smart Antenna (Sensing Zone *(see page 35)*). **Failure to follow these instructions can result in equipment damage.**

NOTE: This may generate a tag-writing error or incorrect data writing.

Using third-party Tags

What is the dialog distance between a Smart Antenna and a tag purchased at a third-party supplier?

There is no normalization of the reading distances. Each tag with its own characteristics cannot allow a dialog distance.

It is imperative to test a sample to determine the proper dialog distance.

Compatibility of Smart Antenna with other 13.56 MHz Tags

Is my 13.56 MHz tag compatible with the Smart Antenna?

Send a sample to your Schneider agency to verify its compatibility.

Precautions against EMC Perturbations

What are the precautions to be taken regarding EMC?

To avoid EMC perturbations, it is necessary:

- Make sure that the Smart Antenna is at least 30 cm *(11.81 in)* from an EMC source (motor, solenoid valve, and so on).
- Use the intended cables (conceived to protect against EMC perturbations).

Metal Influence

What is the influence of metal on the Smart Antenna/tag reading distances?

The presence of metal near an RFID tag affects the reading distances.

Some tags in the Smart Antenna range are designed to attenuate this phenomenon (XGHB44•••• and XGHB221346). Other references cannot be attached directly on a metallic support.

Glossary

0-9

100Base-TX

An adaptation of the IEEE 802.3u (Ethernet) standard, the 100Base-T standard uses 2 twisted-pair wiring with a maximum segment length of 100 m *(328 ft)* and terminates with an RJ45 connector. A 100Base-T network is a baseband network capable of transmitting data at a maximum speed of 100 Mbit/s. "Fast Ethernet" is another name for 100Base-T because it is 10 times faster than 10Base-T.

10Base-T

An adaptation of the IEEE 802.3 (Ethernet) standard, the 10Base-T standard uses twisted-pair wiring with a maximum segment length of 100 m *(328 ft)* and terminates with an RJ45 connector. A 10Base-T network is a baseband network capable of transmitting data at a maximum speed of 10 Mbit/s.

802.3 frame

A frame format, specified in the IEEE 802.3 (Ethernet) standard, in which the header specifies the data packet length.

B

BootP

BootP (bootstrap protocol) is an UDP/IP protocol that allows an Internet node to obtain its IP parameters based on its MAC address.

C

configuration

The arrangement and interconnection of hardware components within a system and the hardware and software selections that determine the operating characteristics of the system.

CRC

cyclic redundancy check. Messages that implement this detected error checking mechanism have a CRC field that is calculated by the transmitter according to the message content. Receiving nodes recalculate the field. Disagreement in the 2 codes indicates a difference between the transmitted message and the one received.

D

DHCP

dynamic host configuration protocol. A TCP/IP protocol that allows a server to assign an IP address based on a device name (host name) to a network node.

E

EDS

electronic data sheet. The EDS is a standardized ASCII file that contains information about a network device communications functionality and the contents of its object dictionary. The EDS also defines device-specific and manufacturer-specific objects.

EEPROM

Electrically Erasable Programmable Read-Only Memory. EEPROM is a nonvolatile memory.

EMC

electromagnetic compatibility. Devices that meet EMC requirements can operate within a system expected electromagnetic limits without interruption.

Ethernet

A LAN wiring and signaling specification used to connect devices within a defined area, for example, a building. Ethernet uses a bus or a star topology to connect different nodes on a network.

Ethernet II

A frame format in which the header specifies the packet type, Ethernet II is the default frame format for NIM communications.

EtherNet/IP

EtherNet/IP (the Ethernet Industrial Protocol) is especially suited to factory applications in which there is a need to control, configure, and monitor events within an industrial system. The ODVA-specified protocol runs CIP (the Common Industrial Protocol) on top of standard Internet protocols, like TCP/IP and UDP. It is an open local (communications) network that enables the interconnectivity of all levels of manufacturing operations from the office plant to the sensors and actuators on its floor.

F

FeRAM

Ferroelectric Random Access Memory. FeRAM is a nonvolatile memory offering faster write performance and greater number of writing cycles.

flash memory

Flash memory is nonvolatile memory that can be overwritten. It is stored on a special EEPROM that can be erased and reprogrammed.

function block

A function block performs a specific automation function, such as speed control. A function block comprises configuration data and a set of operating parameters.

function code

A function code is an instruction set commanding 1 or more slave devices at specified addresses to perform a type of action, for example, read a set of data registers and respond with the content.

H

HMI

human-machine interface. An operator interface, usually graphical, for industrial equipment.

HTTP

hypertext transfer protocol. The protocol that a web server and a client browser use to communicate with one another.

I

IEC

International Electrotechnical Commission Carrier. Founded in 1884 to focus on advancing the theory and practice of electrical, electronics, and computer engineering, and computer science. EN 61131-2 is the specification that deals with industrial automation equipment.

IEEE

Institute of Electrical and Electronics Engineers, Inc. The international standards and conformity assessment body for all fields of electrotechnology, including electricity and electronics.

IP

Internet Protocol. That part of the TCP/IP protocol family that tracks the Internet addresses of nodes, routes outgoing messages, and recognizes incoming messages.

IP rating

Ingress Protection rating according to IEC 60529.

L

LAN

local area network. A short-distance data communications network.

LSB

least significant bit, least significant byte. The part of a number, address, or field that is written as the rightmost single value in conventional hexadecimal or binary notation.

M

MAC address

media access control address. A 48-bit number, unique on a network, that is programmed into each network card or device when it is manufactured.

master/slave model

The direction of control in a network that implements the master/slave model is from the master to the slave devices.

Modbus

Modbus is an application layer messaging protocol. Modbus provides client and server communications between devices connected on different types of buses or networks. Modbus offers many services specified by function codes.

MSB

most significant bit, most significant byte. The part of a number, address, or field that is written as the leftmost single value in conventional hexadecimal or binary notation.

P

PELV

protective extra low voltage.

PLC

programmable logic controller. The PLC is the brain of an industrial manufacturing process. It automates a process as opposed to relay control systems. PLCs are computers suited to survive the harsh conditions of the industrial environment.

R

RFID

radio frequency identification. RFID is a term used for radio frequency identification systems. These frequencies range between 50 kHz and 2.5 GHz. The most widely used is 13.56 MHz.

Rx

reception.

S

SCADA

supervisory control and data acquisition. Typically accomplished in industrial settings with microcomputers.

Smart Antenna

RFID reader incorporating all the RFID and network functions in the same device.

subnet

A part of a network that shares a network address with the other parts of a network. A subnet may be physically and/or logically independent of the rest of the network. A part of an Internet address called a subnet number, which is ignored in IP routing, distinguishes the subnet.

T

TCP

transmission control protocol. A connection-oriented transport layer protocol that provides full-duplex data transmission. TCP is part of the TCP/IP suite of protocols.

Tx

transmission.

U

UDP

user datagram protocol. A connectionless mode protocol in which messages are delivered in a datagram to a destination computer. The UDP protocol is typically bundled with the Internet protocol (UPD/IP).

UID

Unique ID. Identification number of the tag. Each tag has a different UID.

Index