

# SIEMENS

## SICAM RTUs

### TG800

#### Interoperability

---

Preface

---

Open Source Software

---

Introduction **1**

---

Interoperability of SICAM RTUs using  
TG800 unbalanced MASTER **2**

---

Interoperability of SICAM RTUs using  
TG800 unbalanced SLAVE **3**

---

Literature

---

**Haftungsausschluss**

Wir haben den Inhalt der Druckschrift auf Übereinstimmung mit der beschriebenen Hard- und Software geprüft. Dennoch können Abweichungen nicht ausgeschlossen werden, so dass wir für die vollständige Übereinstimmung keine Gewähr übernehmen. Die Angaben in diesem Handbuch werden regelmäßig überprüft, und notwendige Korrekturen sind in den nachfolgenden Auflagen enthalten. Für Verbesserungsvorschläge sind wir dankbar.

Technische Änderungen bleiben vorbehalten.

Document Label: SICRTUs-HBIntopTG800-ENG\_2.02  
Ausgabedatum: 23.08.2016

**Copyright**

Copyright © Siemens AG 2016  
Weitergabe und Vervielfältigung dieser Unterlage, Verwertung und Mitteilung ihres Inhalts ist nicht gestattet, soweit nicht ausdrücklich zugestanden. Zuwiderhandlungen verpflichten zu Schadenersatz. Alle Rechte vorbehalten, insbesondere für den Fall der Patenterteilung oder GM-Eintragung.

# Preface

**This document is applicable to the following product(s):**

- SICAM RTUs

**Purpose of this manual**

This manual describes the interoperability of SICAM RTUs using protocol element according to L&G TG800 and essentially contains

- Interoperability TG800

**Target Group**

The document you are reading right now is addressed to users, who are in charge of the following tasks:

- Sales engineering and technical clarification
- Conceptual activities, as for example design and configuration



# Open Source Software

This product contains, among other things, Open Source Software developed by third parties. The Open Source Software used in this product and the license agreements concerning this software can be found in the Readme\_OSS. These Open Source Software files are protected by copyright.

Your compliance with those license conditions will entitle you to use the Open Source Software as foreseen in the relevant license. In the event of conflicts between Siemens license conditions and the Open Source Software license conditions, the Open Source Software conditions shall prevail with respect to the Open Source Software portions of the software. The Open Source Software is licensed royalty-free.

Insofar as the applicable Open Source Software License Conditions provide for it you can order the source code of the Open Source Software from your Siemens sales contact - against payment of the shipping and handling charges - for a period of at least 3 years since purchase of the Product.

We are liable for this product including the Open Source Software contained in it pursuant to the license conditions applicable to the Product. Any liability for the Open Source Software beyond the program flow intended for this product is explicitly excluded. Furthermore any liability for defects resulting from modifications to the Open Source Software by you or third parties is excluded. We do not provide any technical support for this Product if it has been modified.



# Table of Contents

<b>1.</b>	<b>Introduction.....</b>	<b>9</b>
1.1.	Area of Application .....	10
1.2.	General Information.....	10
<b>2.</b>	<b>Interoperability of SICAM RTUs using TG800 unbalanced MASTER.....</b>	<b>11</b>
2.1.	Network Configurations .....	12
2.2.	Physical layer.....	13
2.2.1.	Transmission Speed (common for both directions).....	13
2.2.2.	Transmission Mode .....	13
2.3.	Link Layer .....	14
2.3.1.	Message Format .....	14
2.3.2.	Link Transmission Procedure.....	14
2.3.3.	Frame Length.....	14
2.3.4.	Address field of the Link .....	14
2.4.	Application Layer.....	15
2.4.1.	Process Information in Monitor Direction.....	15
2.4.2.	System Information in Monitor Direction.....	15
2.4.2.1.	System Indications .....	15
2.4.3.	Parameters in Monitor Direction.....	16
2.4.4.	Process Information in Control Direction .....	16
2.4.5.	System Information in Control Direction .....	16
2.4.6.	Parameter in Control Direction.....	17
<b>3.</b>	<b>Interoperability of SICAM RTUs using TG800 unbalanced SLAVE.....</b>	<b>19</b>
3.1.	Network Configurations .....	20
3.2.	Physical layer.....	21
3.2.1.	Transmission Speed (common for both directions).....	21
3.2.2.	Transmission Mode .....	21
3.3.	Link Layer .....	22
3.3.1.	Message Format .....	22
3.3.2.	Link Transmission Procedure.....	22
3.3.3.	Frame Length.....	22
3.3.4.	Address field of the Link .....	22
3.4.	Application Layer.....	23
3.4.1.	Process Information in Monitor Direction.....	23
3.4.2.	System Information in Monitor Direction.....	23
3.4.2.1.	System Indications .....	24
3.4.3.	Parameters in Monitor Direction.....	24
3.4.4.	Process Information in Control Direction .....	24
3.4.5.	System Information in Control Direction .....	25

3.4.6. Parameter in Control Direction..... 25



# 1. Introduction

## Contents

1.1.	Area of Application .....	10
1.2.	General Information.....	10

## 1.1. Area of Application

In this documentation, all definitions are described that are necessary for communication between automation units as per L&G TG800 and between automation units or automation units and control room process computer systems as per L&G TG800.

## 1.2. General Information

Syntax:

The symbols you will find hereafter in the 1<sup>st</sup> column of the lists have the following meaning:

£ implemented by SICAM RTUs

n/i not implemented by SICAM RTUs

T subset selected for the defined project (empty check box to be replaced with this symbol)

∩ mandatory

~~strike through~~ the text descriptions of parameters which are not applicable to this companion standard

**Definition:**

**MASTER / SLAVE** Protocol elements for communication from/to 3rd party system using L&G TG800 with multipoint configuration for the link between the SICAM RTUs and 3rd party systems that support these parameters.

System elements for multipoint master (MASTER):

SM-2551/TG8MA0  
SM-0551/TG8MA0

System elements for multipoint slave (SLAVE):

SM-2551/TG8SA0  
SM-0551/TG8SA0  
CP-6010/TG8ST0  
CP-3410/TG8ST0  
CP-3411/TG8ST0  
CP-8000/TG8ST0

## 2. Interoperability of SICAM RTUs using TG800 unbalanced MASTER

### Contents

2.1.	Network Configurations .....	12
2.2.	Physical layer .....	13
2.3.	Link Layer .....	14
2.4.	Application Layer .....	15

## 2.1. Network Configurations

	Configuration	Remark
£	Point-to-Point 1)	Multipoint-Partyline with one Slave
n/i	Multiple Point-to-Point	
£	Multipoint-Partyline 1)	
n/i	Multipoint-Star	
n/i	Data Concentrator	
n/i	Multipoint-Ring	
n/i	Dial in	
n/i	Dial out	
n/i	Modem Bank	
£	Radio spontaneous mode	only for commands and setpoints (projectspecific implementation with realization)

1) The TG800-Master protocol only supports the **polling mode** (= call up mode) in "**leased line**" mode (like IEC 60870-5-101 unbalanced mode).

## 2.2. Physical layer

### 2.2.1. Transmission Speed (common for both directions)

	Speed	Remark		Speed	Remark
£	50 bit/s		£	600 bit/s	
£	75 bit/s		£	1200 bit/s	
£	110 bit/s		£	1800 bit/s	
£	134 bit/s		£	2400 bit/s	
£	150 bit/s		£	4800 bit/s	
£	200 bit/s		£	9600 bit/s	
£	300 bit/s		n/i	19200 bit/s	

### 2.2.2. Transmission Mode

	Prozedure	Remark
∩	Asynchron	
n/i	Synchron	

## 2.3. Link Layer

### 2.3.1. Message Format

	Prozedure	Remark
n	IEC standard TC57 for class format FT 1.2	
n	Long block (variable length), short block, single character	
n	1 start bit, 8 data bits, even parity, 1 stop bit (standard)	
n/i	1 start bit, 8 data bits, no parity, 1 stop bit (GSM Modem in RTU)	

### 2.3.2. Link Transmission Procedure

	Description	Remark
n	Unbalanced, Master (half duplex)	
n/i	Unbalanced slave	

### 2.3.3. Frame Length

	Description	Remark
n	Maximum frame length = up to 255 octets	max. frame length is configurable

### 2.3.4. Address field of the Link

	Description	Remark
n	One octet	
n/i	One octet + one octet address field extension (hierarchy)	
n/i	One octet + two octets address field extension (hierarchy)	
n/i	One octet + Com-Line number (one octet address field extension for the Com-Line number)	especially for SBB

## 2.4. Application Layer

### 2.4.1. Process Information in Monitor Direction

	Description	Remark
£	IAC <sup>1)</sup> 1: Indications (without time tag)	
£	IAC 2: Indications with time tag (SOE)	
£	IAC 3: Measurand (on event)	
£	IAC 4: Measurand with relative time from protection equipment	
£	IAC 6: Indication with relative time from protection equipment	
n/i	IAC 8: SOE indication for logging "TG709 SOE"	
£	IAC 10: Counter value called up and archived (single current)	
£	IAC 11: Counter value called up and archived (double current)	
n/i	IAC 12: Counter values after check request, before setting	
£	IAC 15: GA indications (block of indications)	
£	IAC 16: Analogue GA measurands (block of measurands)	
£	IAC 17: Digital GA measurands (block of measurands)	
n/i	IAC 166: TG800 Transfer of Disturbance Data According to VDEW/ZVEI-IEC 103	

1) IAC = German: "Information Art Character" (Information type character)

### 2.4.2. System Information in Monitor Direction

	Description	Remark
£	IAC 15: GA block with system indications	
£	IAC 1: System indications (without time tag)	
£	IAC 2: System indications with time tag	
£	IAC 18: Block of system indications	only permitted if the transmission of system indications is defined as "collective"
£	IAC 25: Own station number	message is discarded
n/i	IAC 35: Request for time from the CS	
£	IAC 158: GA request to the CS: Indications	
£	IAC 159: GA request to the CS: Measurands	
n/i	IAC 168: Restart Subsystem	
n/i	IAC 169: Subsystem Change Over	
n/i	IAC 170: TG 809 Fault Report Text Transfer to Station Module	

#### 2.4.2.1. System Indications

	Description	Remark
--	-------------	--------

£	Collective system indications (SW-address 0-7)	The 48/64 system indications are reduced to 8 collective system indications, the detailed information (IAC = 18) must be requested by the control station.
£	Detailed system indications (IAC = 18)	only possible, if collective system indications are used
£	System indications as "normal" indications with SW-address 0-47 resp. 63	

### 2.4.3. Parameters in Monitor Direction

	Description	Remark
n/i	IAC 175: Parameters	

### 2.4.4. Process Information in Control Direction

	Description	Remark
£	IAC 1: Indications in command direction (without time tag)	
£	IAC 2: Indications in command direction (with time tag)	
£	IAC 3: Measurands (on event) in command direction	
n/i	IAC 15: GA indications in command direction	
n/i	IAC 16: Analogue GA measurands in command direction	
n/i	IAC 17: Digital GA measurands in command direction	
£	IAC 128: Pulse commands	
£	IAC 129: Permanent commands	special handling with control center required
£	IAC 130: Stop permanent command	special handling with control center required
£	IAC 131: Set Point Value (VW <sup>1)</sup> )	
n/i	IAC 133: PBN Set Point Value	
£	IAC 134: PBN command	
n/i	IAC 166: TG800 Transfer of disturbance data According to VDEW/ZVEI-IEC 103	

1) VW = German: "Vorgabewert"

### 2.4.5. System Information in Control Direction

	Description	Remark
£	IAC 135: Synchronisation time	
n/i	IAC 140: Counter value freeze	
n/i	IAC 141: Counter value freeze, reset	



	Description	Remark
£	IAC 142: Counter value freeze, transmit	
£	IAC 143: Counter value freeze, reset, transmit	
n/i	IAC 144: Counter value transmit	
n/i	IAC 145: GA request: Counter value	
n/i	IAC 146: Single CV Call up before CV setting	
n/i	IAC 148: Single Counter Value from the MS during CV setting	
£	IAC 160: GA Request to slaves: Indications	
£	IAC 161: GA Request to slaves: Measurands	
£	IAC 162: GA Request: System Indication Block	
£	IAC 163: System Indication Block Acknowledgement	
£	IAC 165: Command: send own station number	
n/i	IAC 168: Restart Subsystem	
n/i	IAC 169: Subsystem Change Over	

#### 2.4.6. Parameter in Control Direction

	Description	Remark
n/i	IAC 175: Parameters	
£	IAC 175 – Type 11: Reboot Online	



### **3. Interoperability of SICAM RTUs using TG800 unbalanced SLAVE**

#### **Contents**

3.1.	Network Configurations .....	20
3.2.	Physical layer .....	21
3.3.	Link Layer .....	22
3.4.	Application Layer .....	23

### 3.1. Network Configurations

	Configuration	Remark
£	Point-to-Point 1)	Multipoint-Partyline with one Slave
n/i	Multiple Point-to-Point	
£	Multipoint-Partyline 1)	
n/i	Multipoint-Star	
n/i	Data Concentrator	
n/i	Multipoint-Ring	
n/i	Dial in	
n/i	Dial out	
n/i	Modem Bank	
£	Radio spontaneous mode	

- 1) The TG800-Slave protocol only supports the **polling mode** (= call up mode) in "**leased line**" mode (like IEC 60870-5-101 unbalanced mode).

## 3.2. Physical layer

### 3.2.1. Transmission Speed (common for both directions)

	Speed	Remark		Speed	Remark
£	50 bit/s		£	600 bit/s	
£	75 bit/s		£	1200 bit/s	
£	110 bit/s		£	1800 bit/s	
£	134 bit/s		£	2400 bit/s	
£	150 bit/s		£	4800 bit/s	
£	200 bit/s		£	9600 bit/s	
£	300 bit/s		n/i	19200 bit/s	

### 3.2.2. Transmission Mode

	Prozedure	Remark
£	Asynchron	
£	Synchron	

### 3.3. Link Layer

#### 3.3.1. Message Format

	Prozedure	Remark
n	IEC standard TC57 for class format FT 1.2	
n	Long block (variable length), short block, single character	
n	1 start bit, 8 data bits, even parity, 1 stop bit (standard)	
n/i	1 start bit, 8 data bits, no parity, 1 stop bit (GSM Modem in RTU)	

#### 3.3.2. Link Transmission Procedure

	Description	Remark
n/i	Unbalanced, Master (half duplex)	
n	Unbalanced slave	

#### 3.3.3. Frame Length

	Description	Remark
n	Maximum frame length = up to 255 octets	max. frame length is configurable

#### 3.3.4. Address field of the Link

	Description	Remark
n	One octet	
n/i	One octet + one octet address field extension (hierarchy)	
n/i	One octet + two octets address field extension (hierarchy)	
n	One octet + Com-Line number (one octet address field extension for the Com-Line number)	especially for SBB

## 3.4. Application Layer

### 3.4.1. Process Information in Monitor Direction

	Description	Remark
£	IAC <sup>1)</sup> 1: Indications (without time tag)	
£	IAC 2: Indications with time tag (SOE)	
£	IAC 3: Measurand (on event)	
n/i	IAC 4: Measurand with relative time from protection equipment	
n/i	IAC 6: Indication with relative time from protection equipment	
n/i	IAC 8: SOE indication for logging "TG709 SOE"	
£	IAC 10: Counter value called up and archived (single current)	TG800-Overflow-handling must be done at the acquisition board, no "SNI"
n/i	IAC 11: Counter value called up and archived (double current)	
n/i	IAC 12: Counter values after check request, before setting	
£	IAC 15: GA indications (block of indications)	
£	IAC 16: Analogue GA measurands (block of measurands)	
n/i	IAC 17: Digital GA measurands (block of measurands)	transmitted with IAC = 16
n/i	IAC 166: TG800 Transfer of Disturbance Data According to VDEW/ZVEI-IEC 103	

1) IAC = German: "Information Art Character" (Information type character)

### 3.4.2. System Information in Monitor Direction

	Description	Remark
£	IAC 15: GA block with system indications	
£	IAC 1: System indications (without time tag)	
£	IAC 2: System indications with time tag	
£	IAC 18: Block of system indications	only permitted if the transmission of system indications is defined as "collective"
£	IAC 25: Own station number	
n/i	IAC 35: Request for time from the CS	
£	IAC 158: GA request to the CS: Indications	
£	IAC 159: GA request to the CS: Measurands	
n/i	IAC 168: Restart Subsystem	
n/i	IAC 169: Subsystem Change Over	
n/i	IAC 170: TG 809 Fault Report Text Transfer to Station Module	

### 3.4.2.1. System Indications

	Description	Remark
£	Collective system indications (SW-address 0-7)	The 48/64 system indications are reduced to 8 collective system indications, the detailed information (IAC = 18) must be requested by the control station.
£	Detailed system indications (IAC = 18)	only possible, if collective system indications are used
£	System indications as "normal" indications with SW-address 0-47 resp. 63	

Note: Only a subset of the predefined TG800 system indications is supported.

### 3.4.3. Parameters in Monitor Direction

	Description	Remark
n/i	IAC 175: Parameters	

### 3.4.4. Process Information in Control Direction

	Description	Remark
£	IAC 1: Indications in command direction (without time tag)	
£	IAC 2: Indications in command direction (with time tag)	
£	IAC 3: Measurands (on event) in command direction	
£	IAC 15: GA indications in command direction	
£	IAC 16: Analogue GA measurands in command direction	
n/i	IAC 17: Digital GA measurands in command direction	
£	IAC 128: Pulse commands	
£	IAC 129: Permanent commands	restricted use in SICAM 1703
£	IAC 130: Stop permanent command	restricted use in SICAM 1703
£	IAC 131: Set Point Value (VW <sup>1)</sup> )	
n/i	IAC 133: PBN Set Point Value	
£	IAC 134: PBN command	attribute = 0, programm-number = 1, 2
n/i	IAC 166: TG800 Transfer of disturbance data According to VDEW/ZVEI-IEC 103	

1) VW = German: "Vorgabewert"



### 3.4.5. System Information in Control Direction

	Description	Remark
£	IAC 135: Synchronisation time	
n/i	IAC 140: Counter value freeze	
n/i	IAC 141: Counter value freeze, reset	
£	IAC 142: Counter value freeze, transmit	1)
£	IAC 143: Counter value freeze, reset, transmit	1)
n/i	IAC 144: Counter value transmit	
n/i	IAC 145: GA request: Counter value	
n/i	IAC 146: Single CV Call up before CV setting	
n/i	IAC 148: Single Counter Value from the MS during CV setting	
£	IAC 160: GA Request to slaves: Indications	
£	IAC 161: GA Request to slaves: Measurands	
£	IAC 162: GA Request: System Indication Block	
£	IAC 163: System Indication Block Acknowledgement	
£	IAC 165: Command: send own station number	
n/i	IAC 168: Restart Subsystem	
n/i	IAC 169: Subsystem Change Over	

1) Functionality must be configured at the acquisition board, function is not done in the Telegyr firmware.

### 3.4.6. Parameter in Control Direction

	Description	Remark
n/i	IAC 175: Parameters	



# Literature

SICAM RTUs . Ax 1703 Common Functions Protocol Elements	DC0-023-2
SICAM RTUs Platforms Configuration Automation Units and Automation Networks	DC0-021-2
TELEGYR 809 Specification Message structure and handshaking COMIO H1 1782 1240 b/E	
System Element Manual SM-x551/TG8SA0 LANDIS & GYR TELEGYR 800-MPT-S (unbalanced Multipoint Slave)	DC0-058-2.00
System Element Manual SM-x551/TG8MA0 LANDIS & GYR TELEGYR 800-MPT-M (unbalanced Multipoint Master)	DC0-062-2.00

