SIR-A

Feeder Protection and recloser Control



IEC61850 PROTOCOL MANUAL

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1. IEC 61850 PROTOCOL

The IEC 61850 standard defines a framework for substation communications networks and systems. The standard consists of several parts ranging from the requirements on substation automation systems to the details of a communication protocol.

The IEC 61850 standard specifies an expandable data model and services for substation automation. The standard does not specify any protection or control functions, but specifies how the functions expose their information to a communication network.

SIR-A IED has been designed around IEC 61850. This means that the functionality of the IED is represented in a data model in accordance with the standard and the IEDs support a range of the services provided by the standard.

- Process data: monitoring of status information, measurements
- Application data: protection activations, tripping, fault recordings
- Control commands
- Self-supervision messages
- Fast horizontal communication between devices

This section describes the implementation of IEC 61850 protocol in SIR-A relay. Services will be available using the Ethernet port through its default IP (192.168.200.121)

GOOSE fast messages is not a Client-Server communication like TCP/IP but a Multicast communication that sends messages directly to the Link Layer using MAC directions as destination directions for publishing the GOOSE.

1.1 Data model

Server IEDs have all the information of all their events, measures, parameters and services, organized in a hierachical structure with device's functional units as main ones.

The main level of the structure is the name of the IED, by default SIR-A.

Down the IED there are Logical Nodes that represent the functional units of the IED (Protection, Control and measure units, status of external elements like circuit breaker, etc.)

Inside Logical Nodes there are Data objects that compose a functional unit, and inside each Data object, there are Data attributes that give complete information about this Data object.

As example, the ground overcurrent protection unit is represented in SIR-A according IEC 61850 as the logical node PIOC, with the prefix F50G and the instance 1: F50GPIOC1

In the Logical Node, the starting of the unit is represented by its Data Object, *Str*, with a list of Data Attributes that give information about the starting:

A single logical device is used for all SIR-A models. The ICD file is common for all the models and the complete set of features will be shown. Only the ones that belong to the relay model will operate.

1.1.1. Common Data Classes (CDC)

SPS

Single point status (SPS)					
DATA ATTRIBUTE					
Data Attribute Name	**Type**	**FC**	**TrgOp**	**Value / Value Range**	**M/O/C**
STATUS					
stVal	BOOLEAN	ST	dchg	True / False	M
q	Quality	ST	qchg		M
t	Time Stamp	ST			M

INS

Integer Status (INS)					
DATA ATTRIBUTE					
Data Attribute Name	**Type**	**FC**	**TrgOp**	**Value / Value Range**	**M/O/C**
STATUS					
stVal	INT32	ST	dchg. dupd		M
q	Quality	ST	qchg		M
t	Time Stamp	ST			M

ENS

Enumerated Status (ENS)					
DATA ATTRIBUTE					
Data Attribute Name	**Type**	**FC**	**TrgOp**	**Value / Value Range**	**M/O/C**
STATUS					
stVal	ENUMERATED	ST	dchg. dupd		M
q	Quality	ST	qchg		M
t	Time Stamp	ST			M

ACT

Protection activation information (ACT)					
DATA ATTRIBUTE					
Data Attribute Name	**Type**	**FC**	**TrgOp**	**Value / Value Range**	**M/O/C**
STATUS					
general	BOOLEAN	ST	dchg		M
phsA	BOOLEAN	ST	dchg		O
phsB	BOOLEAN	ST	dchg		O
phsC	BOOLEAN	ST	dchg		O
neutr	BOOLEAN	ST	dchg		O
q	Quality	ST	qchg		M
t	Time Stamp	ST			M

ACD

Directional protection activation information (ACD)					
DATA ATTRIBUTE					
Data Attribute Name	**Type**	**FC**	**TrgOp**	**Value / Value Range**	**M/O/C**
STATUS					
general	BOOLEAN	ST	dchg		M
dirGeneral	ENUMERATED	ST	dchg	Unknown | forward | backward | both	M
phsA	BOOLEAN	ST	dchg		GC_2_1
dirPhsA	ENUMERATED	ST	dchg	Unknown | forward | backward	GC_2_1
phsB	BOOLEAN	ST	dchg		GC_2_2
dirPhsB	ENUMERATED	ST	dchg	Unknown | forward | backward	GC_2_2
phsC	BOOLEAN	ST	dchg		GC_2_3
dirPhsC	ENUMERATED	ST	dchg	Unknown | forward | backward	GC_2_3
Neutr	BOOLEAN	ST	dchg		GC_2_4
dirNeutr	ENUMERATED	ST	dchg	Unknown | forward | backward	GC_2_4
q	Quality	ST	qchg		M
t	Time Stamp	ST			M

BCR

Binary counter reading (BCR)					
DATA ATTRIBUTE					
Data Attribute Name	**Type**	**FC**	**TrgOp**	**Value / Value Range**	**M/O/C**
STATUS					
actVal	INT64	ST	dchg		M
q	Quality	ST	qchg		M
t	Time Stamp	ST			M
CONFIGURATION					
plusQty	FLOAT32	CF	Dchg		M

MV

Measured value (MV)					
DATA ATTRIBUTE					
Data Attribute Name	**Type**	**FC**	**TrgOp**	**Value / Value Range**	**M/O/C**
MEASURED					
mag	Analogue Value	MX	dchg. dupd		M
q	Quality	ST	qchg		M
t	Time Stamp	ST			M

CMV

Complex measured value (CMV)					
DATA ATTRIBUTE					
Data Attribute Name	**Type**	**FC**	**TrgOp**	**Value / Value Range**	**M/O/C**
MEASURED					
cVal	Vector	MX	dchg. dupd		M
q	Quality	ST	qchg		M
t	Time Stamp	ST			M

*Note: Vector type definition

Attribute Name	Attribute Type	Value / Value Range	M/O/C
mag	Analogue Value (FLOAT 32)		M
Ang	Analogue Value (FLOAT 32)		O

WYE

Phase to ground/neutral related measured values of a three-phase system (WYE)					
DATA ATTRIBUTE					
Data Attribute Name	**Type**	**FC**	**TrgOp**	**Value / Value Range**	**M/O/C**
SubDataObject					
phsA	CMV				GC_1
phsB	CMV				GC_1
phsC	CMV				GC_1
Net	CMV				GC_1
Res	CMV				GC_1

DEL

Phase to phase related measured values of a three-phase system (DEL)					
DATA ATTRIBUTE					
Data Attribute Name	**Type**	**FC**	**TrgOp**	**Value / Value Range**	**M/O/C**
SubDataObject					
phsAB	CMV				GC_1
phsBC	CMV				GC_1
phsCA	CMV				GC_1

SPC

Controllable single point (SPC)					
DATA ATTRIBUTE					
Data Attribute Name	**Type**	**FC**	**TrgOp**	**Value / Value Range**	**M/O/C**
MEASURED					
cVal	BOOLEAN	ST	Dchg	FALSE | TRUE	AC_ST
q	Quality	ST	qchg		AC_ST
t	Time Stamp	ST			AC_ST

DPC

Controllable double point (DPC)					
DATA ATTRIBUTE					
Data Attribute Name	**Type**	**FC**	**TrgOp**	**Value / Value Range**	**M/O/C**
STATUS					
stVal	CODED ENUM	ST	Dchg		M
q	Quality	ST	qchg		M
t	Time Stamp	ST			M
CONFIGURATION					
CtlModel	CtlModel	CF	Dchg		M

INC

Controllable integer status (INC)					
DATA ATTRIBUTE					
Data Attribute Name	**Type**	**FC**	**TrgOp**	**Value / Value Range**	**M/O/C**
STATUS					
stVal	INT32	ST	Dchg		M
q	Quality	ST	qchg		M
t	Time Stamp	ST			M
CONFIGURATION					
CtlModel	CtlModel	CF	Dchg		M

LPL

Logical node name plate (LPL)					
DATA ATTRIBUTE					
Data Attribute Name	**Type**	**FC**	**TrgOp**	**Value / Value Range**	**M/O/C**
CONFIGURATION					
vendor	VISIBLE STRING255	DC			M
swRev	VISIBLE STRING255	DC			M
ConfigRev	VISIBLE STRING255	DC			AC_LN0_M

1.1.2. System Logical Nodes. LN Group: L

The following tables list possible attributes in Logical Node (LN) by LN gropus. Logical nodes not found in this description are not supported.

LN: Logical node zero. Name: LLN0

LLN0 - Logical node zero			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
	LLN0		LLN0
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Health	stVal	ENS	Health
Mod	stVal	ENS	Mode
CF			
Mod	ctlModel	ENS	Mode
DC			
NamPlt	configRev	LPL	Name Plate
NamPlt	swRev	LPL	Name Plate
NamPlt	vendor	LPL	Name Plate
EX			
NamPlt	ldNs	LPL	IEC 61850-7-4:2010

1.1.3. Logical nodes for protection functions: P Group

LN: Directional overpower. Name: PDOP

32 – Directional overpower			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F32	PDOP	1 / 2 / 3 / 4	F32PDOP1 / F32PDOP2 / F32PDOP3 / F32PDOP4
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	general	ACD	Start
Str	phsA	ACD	Start
Str	phsB	ACD	Start
Str	phsC	ACD	Start
Op	general	ACT	Operate
Op	phsA	ACT	Operate
Op	phsB	ACT	Operate
Op	phsC	ACT	Operate

LN: Rate of change of frequency. Name: PFRC

81R-1 / 81R-2 – Rate of change of frequency (ROCOF)			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F81R	PTOF	1 / 2	F81RPTOF1 / F81RPTOF2
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	general	ACD	Start
Op	general	ACT	Operate

LN: Harmonic restraint. Name: PHAR

SHB – Second harmonic blocking			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
FSHB	PHAR	1	FSHBPHAR1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	general	ACD	Start
Str	phsA	ACD	Start
Str	phsB	ACD	Start
Str	phsC	ACD	Start

LN: Instantaneous Overcurrent. Name: PIOC

50-1 / 50-2 – Instantaneous phase overcurrent			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F50P	PIOC	1 / 2	F50PPIOC1 / F50PPIOC2
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	general	ACD	Start
Str	phsA	ACD	Start
Str	phsB	ACD	Start
Str	phsC	ACD	Start
Op	general	ACT	Operate
Op	phsA	ACT	Operate
Op	phsB	ACT	Operate
Op	phsC	ACT	Operate

50G – Instantaneous measured neutral overcurrent			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F50G	PIOC	1	F50GPIOC1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	general	ACD	Start
Op	general	ACT	Operate

50N – Instantaneous measured neutral overcurrent			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F50N	PIOC	1	F50NPIOC1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	general	ACD	Start
Op	general	ACT	Operate

46BC – Broken conductor detection			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F46BC	PIOC	1	F46BCPIOC1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	general	ACD	Start
Op	general	ACT	Operate

SOTF – Switch On To Fault			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
FSOTF	PIOC	1	FSOTFPIOC1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	general	ACD	Start
Str	phsA	ACD	Start
Str	phsB	ACD	Start
Str	phsC	ACD	Start
Op	general	ACT	Operate
Op	phsA	ACT	Operate
Op	phsB	ACT	Operate
Op	phsC	ACT	Operate

LN: Phase angle measuring. Name: PPAM

78 – Out of step (vector shift)			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F78	PPAM	1	F78PPAM1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	general	ACD	Start
Op	general	ACT	Operate

LN: Time Overcurrent. Name: PTOC

67-1 / 67-2 / 67-3 / 67-4 – Inverse time directional phase overcurrent			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F67P	PTOC	1 / 2 / 3 / 4	F67PPTOC1 / F67PPTOC2 / F67PPTOC3 / F67PPTOC4
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	dirGeneral	ACD	Start
Str	general	ACD	Start
Str	dirPhsA	ACD	Start
Str	phsA	ACD	Start
Str	dirPhsB	ACD	Start
Str	phsB	ACD	Start
Str	dirPhsC	ACD	Start
Str	phsC	ACD	Start
Op	general	ACT	Operate
Op	phsA	ACT	Operate
Op	phsB	ACT	Operate
Op	phsC	ACT	Operate

67G-1 / 67G-2 – Inverse time directional measured neutral overcurrent			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F67G	PTOC	1 / 2	F67GPTOC1 / F67GPTOC2
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	dirGeneral	ACD	Start
Str	general	ACD	Start
Op	general	ACT	Operate

67N-1 / 67N-2 – Inverse time directional calculated overcurrent			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F67N	PTOC	1 / 2	F67NPTOC1 / F67NPTOC2
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	dirGeneral	ACD	Start
Str	general	ACD	Start
Op	general	ACT	Operate

67GI – Inverse time directional isolated measured neutral overcurrent			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F67GA	PTOC	1	F67GAPTOC1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	general	ACD	Start
Str	dirGeneral	ACD	Start
Op	general	ACT	Operate

67NI – Inverse time directional isolated calculated neutral overcurrent			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F67NA	PTOC	1	F67NAPTOC1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	general	ACD	Start
Str	dirGeneral	ACD	Start
Op	general	ACT	Operate

46 – Phase balance current protection			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F46	PTOC	1	F46PTOC1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	general	ACD	Start
Op	general	ACT	Operate

LN: Time Overfrequency. Name: PTOF

81-1 / 81-2 / 81-3 / 81-4 / 81-5 / 81-6 – Overfrequency			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F81	PTOF	1 / 2 / 3 / 4 / 5 / 6	F81PTOF1 / F81PTOF2 / F81PTOF3 / F81PTOF4 / F81PTOF5 / F81PTOF6
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	general	ACD	Start
Op	general	ACT	Operate

LN: Time Overvoltage. Name: PTOV

59-1 / 59-2 - Instantaneous phase overvoltage			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F59	PTOV	1 / 2	F59PTOV1 / F59PTOV2
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Op	general	ACT	Operate
Op	phsA	ACT	Operate
Op	phsB	ACT	Operate
Op	phsC	ACT	Operate
Str	general	ACD	Start
Str	phsA	ACD	Start
Str	phsB	ACD	Start
Str	phsC	ACD	Start

59N-1 / 59N-2 – Instantaneous calculated neutral overvoltage			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F59N	PTOV	1 / 2	F59NPTOV1 / F59NPTOV2
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Op	general	ACT	Operate
Str	general	ACD	Start

59L– Instantaneous Line Overvoltage			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F59L	PTOV	1	F59LPTOV1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Op	general	ACT	Operate
Op	phsA	ACT	Operate
Op	phsB	ACT	Operate
Op	phsC	ACT	Operate
Str	general	ACD	Start
Str	phsA	ACD	Start
Str	phsB	ACD	Start
Str	phsC	ACD	Start

59NL – Instantaneous calculated neutral overvoltage (Line)			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F59NL	PTOV	1	F59NLPTOV1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Op	general	ACT	Operate
Str	general	ACD	Start

47– Phase balance			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F47	PTOV	1	F47PTOV1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Op	general	ACT	Operate
Str	general	ACD	Start

47L - Line phase balance			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F47L	PTOV	1	F47LPTOV1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Op	general	ACT	Operate
Str	general	ACD	Start

LN: Protection trip conditioning. Name: PTRC

General Trips Status			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
GEN	PTRC	1	GENPTRC1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Op	general	ACT	Operate
Tr	general	ACT	Trip
Tr	phsA	ACT	Trip
Tr	phsB	ACT	Trip
Tr	phsC	ACT	Trip
Tr	neut	ACT	Trip
Str	general	ACD	Start
Str	phsA	ACD	Start

Str	phsB	ACD	Start
Str	phsC	ACD	Start
Str	neut	ACD	Start

LN: Thermal overload. Name: PTTR

49 - Thermal Overload			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F49	PTTR	1	F49PTTR1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
AlmThm	stVal	SPS	Thermal Alarm
Op	general	ACT	Operate
MEASURED AND METERED VALUES			
TmpRl	mag	MV	Relation between temperature and maximum temperature

LN: Undercurrent. Name: PTUC

37 - Instantaneous phase undercurrent			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F37P	PTUC	1	F37PPTUC1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	general	ACD	Start
Str	phsA	ACD	Start
Str	phsB	ACD	Start
Str	phsC	ACD	Start
Op	general	ACT	Operate
Op	phsA	ACT	Operate
Op	phsB	ACT	Operate
Op	phsC	ACT	Operate

LN: Undervoltage. Name: PTUV

27-1 / 27-2 – Instantaneous phase undervoltage			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F27P	PTUV	1 / 2	F27PPTUV1 / F27PPTUV2
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	general	ACD	Start
Str	phsA	ACD	Start
Str	phsB	ACD	Start
Str	phsC	ACD	Start
Op	general	ACT	Operate
Op	phsA	ACT	Operate
Op	phsB	ACT	Operate
Op	phsC	ACT	Operate

27V1 – Instantaneous positive sequence undervoltage			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F27V1	PTUV	1	F27V1PTUV1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	general	ACD	Start
Op	general	ACT	Operate

27L – Instantaneous line undervoltage			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F27L	PTUV	1	F27LPTUV1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	general	ACD	Start

Str	phsA	ACD	Start
Str	phsB	ACD	Start
Str	phsC	ACD	Start
Op	general	ACT	Operate
Op	phsA	ACT	Operate
Op	phsB	ACT	Operate
Op	phsC	ACT	Operate

27V1L – Instantaneous positive sequence undervoltage			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F27V1L	PTUV	1	F27V1LPTUV1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	general	ACD	Start
Op	general	ACT	Operate

1.1.4. Logical nodes for generic references: G Group

LN: Generic process I/O. Name: GGIO

Alarms & LED's			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
ALM	GGIO	1	ALMGGIO1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Ind1	stVal	SPS	General Indication – Alarm 01
Ind2	stVal	SPS	General Indication – Alarm 02
Ind3	stVal	SPS	General Indication – Alarm 03
Ind4	stVal	SPS	General Indication – Alarm 04
Ind5	stVal	SPS	General Indication – Alarm 05
Ind6	stVal	SPS	General Indication – Alarm 06
Ind7	stVal	SPS	General Indication – Alarm 07
Ind8	stVal	SPS	General Indication – Alarm 08
Ind9	stVal	SPS	General Indication – Alarm 09

Ind10	stVal	SPS	General Indication – Alarm 10
Ind11	stVal	SPS	General Indication – Alarm 11
Ind12	stVal	SPS	General Indication – Alarm 12
Ind13	stVal	SPS	General Indication – Alarm 13
Ind14	stVal	SPS	General Indication – Alarm 14
Ind15	stVal	SPS	General Indication – Alarm 15
Ind16	stVal	SPS	General Indication – Alarm 16
Ind17	stVal	SPS	General Indication – Alarm 17
Ind18	stVal	SPS	General Indication – Alarm 18
Ind19	stVal	SPS	General Indication – Alarm 19
Ind20	stVal	SPS	General Indication – Alarm 20
Ind21	stVal	SPS	General Indication – Alarm 21
Ind22	stVal	SPS	General Indication – Alarm 22
Ind23	stVal	SPS	General Indication – Alarm 23
Ind24	stVal	SPS	General Indication – Alarm 24
Ind25	stVal	SPS	General Indication – Alarm 25
Ind26	stVal	SPS	General Indication – Alarm 26
Ind27	stVal	SPS	General Indication – Alarm 27
Ind28	stVal	SPS	General Indication – Alarm 28
Ind29	stVal	SPS	General Indication – Alarm 29
Ind30	stVal	SPS	General Indication – Alarm 30
Ind31	stVal	SPS	General Indication – Alarm 31
Ind32	stVal	SPS	General Indication – Alarm 32

SCM			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
FSCM	GGIO	1	FSCMGGIO1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Ind1	stVal	SPS	General Indication – Standby
Ind2	stVal	SPS	General Indication – Wait to open
Ind3	stVal	SPS	General Indication – Lockout
Ind4	stVal	SPS	General Indication – Wait to 79
Ind5	stVal	SPS	General Indication – Reset Time

SZM			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
FSZM	GGIO	1	FSZMGGIO1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Ind1	stVal	SPS	General Indication – Standby
Ind2	stVal	SPS	General Indication – Wait to open
Ind3	stVal	SPS	General Indication – Wait to reclose
Ind4	stVal	SPS	General Indication – Reset Time
Ind5	stVal	SPS	General Indication – Open
Ind6	stVal	SPS	General Indication – Lockout

Commands				
PREFIX	**LOGICAL NODE**		**INSTANCE**	**VALUE**
CMD	GGIO		1	CMDGGIO1
DATA OBJECTS				
Data Object Name	**Sub DO Name**	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION				
Beh	stVal		ENS	Behavior
ISCSO1	stVal		INC	Integer status controllable status output
CF				
ISCSO1	ctlModel		INC	Integer status controllable status output (direct with normal security)
CO				
ISCSO1	Oper	Check	INC	Integer status controllable status output
ISCSO1	Oper	T	INC	Integer status controllable status output
ISCSO1	Oper	Test	INC	Integer status controllable status output
ISCSO1	Oper	ctlNum	INC	Integer status controllable status output
ISCSO1	Oper	ctlVal	INC	Integer status controllable status output
ISCSO1	Oper	origin	INC	Integer status controllable status output

Control - Operation (ctVal)	
1	Open Breaker
2	Close Breaker
3	79 Block
4	79 Unblock
5	Local Control
6	Remote Control
7	Reset
9	Thermal I. Reset

General Information			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
GEN	GGIO	1	GENGGIO1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Alm1	stVal	SPS	General Single Alarm – Event Error
Ind1	stVal	SPS	General Indication – Ready
Ind2	stVal	SPS	General Indication – Set Date & Time
Ind3	stVal	SPS	General Indication – SER Deleted
Ind4	stVal	SPS	General Indication – Settings Changed
Ind5	stVal	SPS	General Indication – Configuration Changed
Ind6	stVal	SPS	General Indication – LDP Erased
Ind7	stVal	SPS	General Indication – New DFR
Ind8	stVal	SPS	General Indication – Trip Block Active
Ind9	stVal	SPS	General Indication – Settings Group 1
Ind10	stVal	SPS	General Indication – Settings Group 2
Ind11	stVal	SPS	General Indication – Settings Group 3
Ind12	stVal	SPS	General Indication – Settings Group 4
Ind13	stVal	SPS	General Indication – Settings Group 5
Ind14	stVal	SPS	General Indication – Settings Group 6
Loc	stVal	SPS	Local control behavior
Wrn1	stVal	SPS	General Single Warning – Wrong Password
Wrn2	stVal	SPS	General Single Warning – Wrong Access

GOOSE			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
GOOSE	GGIO	1	GOSSEGGIO1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Alm1	stVal	SPS	General Single Alarm – Goose input 1
Alm2	stVal	SPS	General Single Alarm – Goose input 2
Alm3	stVal	SPS	General Single Alarm – Goose input 3
Alm4	stVal	SPS	General Single Alarm – Goose input 4
Alm5	stVal	SPS	General Single Alarm – Goose input 5
Alm6	stVal	SPS	General Single Alarm – Goose input 6
Alm7	stVal	SPS	General Single Alarm – Goose input 7
Alm8	stVal	SPS	General Single Alarm – Goose input 8
Alm9	stVal	SPS	General Single Alarm – Goose input 9
Alm10	stVal	SPS	General Single Alarm – Goose input 10
Alm11	stVal	SPS	General Single Alarm – Goose input 11
Alm12	stVal	SPS	General Single Alarm – Goose input 12
Alm13	stVal	SPS	General Single Alarm – Goose input 13
Alm14	stVal	SPS	General Single Alarm – Goose input 14
Alm15	stVal	SPS	General Single Alarm – Goose input 15
Alm16	stVal	SPS	General Single Alarm – Goose input 16
Ind1	stVal	SPS	General Indication – Goose output 1
Ind2	stVal	SPS	General Indication – Goose output 2
Ind3	stVal	SPS	General Indication – Goose output 3
Ind4	stVal	SPS	General Indication – Goose output 4

INPUTS			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
INP	GGIO	1	INPGGIO1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Ind1	stVal	SPS	General Indication – Input 1
Ind2	stVal	SPS	General Indication – Input 2
Ind3	stVal	SPS	General Indication – Input 3
Ind4	stVal	SPS	General Indication – Input 4
Ind5	stVal	SPS	General Indication – Input 5
Ind6	stVal	SPS	General Indication – Input 6
Ind7	stVal	SPS	General Indication – Input 7
Ind8	stVal	SPS	General Indication – Input 8
Ind9	stVal	SPS	General Indication – Input 9
Ind10	stVal	SPS	General Indication – Input 10
Ind11	stVal	SPS	General Indication – Input 11
Ind12	stVal	SPS	General Indication – Input 12
Ind13	stVal	SPS	General Indication – Input 13
Ind14	stVal	SPS	General Indication – Input 14
Ind15	stVal	SPS	General Indication – Input 15
Ind16	stVal	SPS	General Indication – Input 16
Ind17	stVal	SPS	General Indication – Input 17
Ind18	stVal	SPS	General Indication – Input 18
Ind19	stVal	SPS	General Indication – Input 19
Ind20	stVal	SPS	General Indication – Input 20
Ind21	stVal	SPS	General Indication – Input 21
Ind22	stVal	SPS	General Indication – Input 22
Ind23	stVal	SPS	General Indication – Input 23
Ind24	stVal	SPS	General Indication – Input 24
Ind25	stVal	SPS	General Indication – Input 25
Ind26	stVal	SPS	General Indication – Input 26
Ind27	stVal	SPS	General Indication – Input 27
Ind28	stVal	SPS	General Indication – Input 28
Ind29	stVal	SPS	General Indication – Input 29
Ind30	stVal	SPS	General Indication – Input 30
Ind31	stVal	SPS	General Indication – Input 31
Ind32	stVal	SPS	General Indication – Input 32

Measurements			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
MSR	GGIO	1	MSRGGIO1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Alm1	stVal	SPS	General Single Alarm – Measurement Error
Alm2	stVal	SPS	General Single Alarm – Line Frequency Blocked
Alm3	stVal	SPS	General Single Alarm – Busbar Frequency Blocked
Ind1	stVal	SPS	General Indication – Setting = 50Hz (True) / 60Hz (False)
Ind2	stVal	SPS	General Indication – VA Zero Crossing
Ind3	stVal	SPS	General Indication – VB Zero Crossing
Ind4	stVal	SPS	General Indication – VC Zero Crossing
Ind5	stVal	SPS	General Indication – VLA Zero Crossing
Ind6	stVal	SPS	General Indication – VLB Zero Crossing
Ind7	stVal	SPS	General Indication – VLC Zero Crossing

Harmonic Measurements			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
BAR2H	GGIO	1	BAR2HGGIO1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
AnIn1	mag	MV	Analogue Input – Phase A second harmonic measurement
AnIn2	mag	MV	Analogue Input – Phase B second harmonic measurement
AnIn3	mag	MV	Analogue Input – Phase C second harmonic measurement

OUTPUTS			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
OUT	GGIO	1	OUTGGIO1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Ind1	stVal	SPS	General Indication – Output 1
Ind2	stVal	SPS	General Indication – Output 2
Ind3	stVal	SPS	General Indication – Output 3
Ind4	stVal	SPS	General Indication – Output 4
Ind5	stVal	SPS	General Indication – Output 5
Ind6	stVal	SPS	General Indication – Output 6
Ind7	stVal	SPS	General Indication – Output 7
Ind8	stVal	SPS	General Indication – Output 8
Ind9	stVal	SPS	General Indication – Output 9
Ind10	stVal	SPS	General Indication – Output 10
Ind11	stVal	SPS	General Indication – Output 11
Ind12	stVal	SPS	General Indication – Output 12
Ind13	stVal	SPS	General Indication – Output 13
Ind14	stVal	SPS	General Indication – Output 14
Ind15	stVal	SPS	General Indication – Output 15
Ind16	stVal	SPS	General Indication – Output 16
Ind17	stVal	SPS	General Indication – Output 17
Ind18	stVal	SPS	General Indication – Output 18
Ind19	stVal	SPS	General Indication – Output 19
Ind20	stVal	SPS	General Indication – Output 20
Ind21	stVal	SPS	General Indication – Output 21
Ind22	stVal	SPS	General Indication – Output 22
Ind23	stVal	SPS	General Indication – Output 23
Ind24	stVal	SPS	General Indication – Output 24
Ind25	stVal	SPS	General Indication – Output 25
Ind26	stVal	SPS	General Indication – Output 26
Ind27	stVal	SPS	General Indication – Output 27
Ind28	stVal	SPS	General Indication – Output 28
Ind29	stVal	SPS	General Indication – Output 29
Ind30	stVal	SPS	General Indication – Output 30
Ind31	stVal	SPS	General Indication – Output 31
Ind32	stVal	SPS	General Indication – Output 32

Programmable Logic Control			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
PGC	GGIO	1	PGCGGIO1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Ind1	stVal	SPS	General Indication – Open Breaker
Ind2	stVal	SPS	General Indication – Close Breaker
Ind3	stVal	SPS	General Indication – 79 Block
Ind4	stVal	SPS	General Indication – 79 Unblock
Ind5	stVal	SPS	General Indication – Local Control
Ind6	stVal	SPS	General Indication – Remote Control
Ind7	stVal	SPS	General Indication – 52a
Ind8	stVal	SPS	General Indication – 52b
Ind9	stVal	SPS	General Indication – Settings Group 1
Ind10	stVal	SPS	General Indication – Settings Group 2
Ind11	stVal	SPS	General Indication – Settings Group 3
Ind12	stVal	SPS	General Indication – SZM Start
Ind13	stVal	SPS	General Indication – 79 Hot Line Tag
Ind14	stVal	SPS	General Indication – 79 Enable
Ind15	stVal	SPS	General Indication – 79N1 Start
Ind16	stVal	SPS	General Indication – 79N2 Start
Ind17	stVal	SPS	General Indication – 79N3 Start
Ind18	stVal	SPS	General Indication – 79N4 Start
Ind19	stVal	SPS	General Indication – DFR Start
Ind20	stVal	SPS	General Indication – 50BF Start
Ind21	stVal	SPS	General Indication – SOTF Start
Ind22	stVal	SPS	General Indication – Reset TI
Ind23	stVal	SPS	General Indication – 74TCS Continuity A
Ind24	stVal	SPS	General Indication – 74TCS Continuity B
Ind25	stVal	SPS	General Indication – Neutral Block
Ind26	stVal	SPS	General Indication – Phase Block
Ind27	stVal	SPS	General Indication – External Trip
Ind28	stVal	SPS	General Indication – PGC 1
Ind29	stVal	SPS	General Indication – PGC 2
Ind30	stVal	SPS	General Indication – PGC 3
Ind31	stVal	SPS	General Indication – PGC 4
Ind32	stVal	SPS	General Indication – PGC 5

Self-Diagnosis			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
SELF	GGIO	1	SELFGGIO1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Alm1	stVal	SPS	General Single Alarm – Model error
Alm2	stVal	SPS	General Single Alarm – HW error
Alm3	stVal	SPS	General Single Alarm – COM error
Alm4	stVal	SPS	General Single Alarm – Settings default
Alm5	stVal	SPS	General Single Alarm – Settings error
Alm6	stVal	SPS	General Single Alarm – Config default
Alm7	stVal	SPS	General Single Alarm – Config error
Ind1	stVal	SPS	General Indication – Test mode

60CTS - Phase CT Supervision			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F60CTS	GGIO	1	F60CTSGGIO1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Alm1	stVal	SPS	General Single Alarm – 60CTS Trip
Ind1	stVal	SPS	General Indication – 60CTS Pickup

60VTS - Phase VT supervision			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F60VTS	GGIO	1	F60VTSGGIO1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Alm1	stVal	SPS	General Single Alarm – 60VTS Trip
Alm2	stVal	SPS	General Single Alarm – 60VTS Trip Phase A
Alm3	stVal	SPS	General Single Alarm – 60VTS Trip Phase B
Alm4	stVal	SPS	General Single Alarm – 60VTS Trip Phase C
Ind1	stVal	SPS	General Indication – 60VTS Pickup

1.1.5. Logical nodes for protection related functions: R Group

LN: Breaker failure. Name: RBRF

50BF – Circuit Breaker opening failure			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F50BF	RBRF	1	F50BFRBRF1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
Str	general	ACD	Start
OpEx	general	ACT	Breaker failure trip

LN: Autoreclosing. Name: RREC

79 – AC Reclosing device			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F79	RREC	1	F79RREC1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
AutoRecSt	stVal	ENS	Auto reclosing status (RREC*)
RecCyc	stVal	INS	Actual reclose cycle (number between 1 and UseCyc) (RREC**)
OpCls	general	ACT	Operation ”close switch” issued to close the XCBR

(RREC*) Automaton for reclosing device has the following states:

Standby – 1 (Ready)

Reclose time – 2 (In progress)

IS 52 Open? – 4

Hold time - 8

Closing Time – 16

Reset Time – 32

Lockout – 64

Safe Time - 128

(RREC**) This number is updated after the reclosing attempt (Closing Time). For the first reclosing attempt, before the closing time, the value will be 0.

LN: Autoreclosing. Name: RSYN

25 – Synchronism check			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F25	RSYN	1	F25RSYN1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
AngInd	stVal	SPS	Angle difference indicator
HzInd	stVal	SPS	Frequency difference indicator
Rel	stVal	SPS	Release
Vind	stVal	SPS	Voltage difference indicator

1.1.6. Logical nodes for supervision and monitoring: S Group

LN: Monitoring and diagnostics for arcs. Name: SARC

AFD – Arc Flash Detector			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
FAFD	SARC	1 / 2 / 3 / 4	FAFDSARC1 / FAFDSARC2 / FAFDSARC3 / FAFDSARC4
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
FADet	stVal	SPS	Fault arc detected
FACntRs	stVal	INC	Fault arc counter – not available
CONTROLS			
FACntRs	ctlModel	INC	Fault arc counter – not available

LN: Circuit breaker supervision. Name: SCBR

74TCS & 52 – Circuit breaker Supervision			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F74TCS	SCBR	1	F74TCSSCBR1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
ColAlm	stVal	SPS	Coil Alarm
ColOpn	stVal	SPS	Open Command of trip coil
OpCntAlm	stVal	SPS	Number of operations has exceeded the alarm level for number of operations

1.1.7. Logical nodes for switchgear: X Group

LN: Circuit breaker. Name: XCBR

52 – Circuit Breaker Monitoring			
PREFIX	**LOGICAL NODE**	**INSTANCE**	**VALUE**
F52	XCBR	1	F52XCBR1
DATA OBJECTS			
Data Object Name	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION			
Beh	stVal	ENS	Behavior
BlkCls	stVal	SPC	Block closing
BlkOpn	stVal	SPC	Block opening
Loc	stVal	SPS	Local control behavior
OpCnt	stVal	INS	Operation counter
Pos	stVal	DPC	Switch position (1-Open / 2-Closed)
CONTROLS			
BlkCls	ctlModel	SPC	Block closing (*)
BlkOpn	ctlModel	SPC	Block opening (*)
Pos	ctlModel	DPC	Switch position (*)
MEASURED ANS METERED VALUES			
SumSwARs	pulsQty	BCR	Sum of switches amperes (k(A^2)), resettable.

On the communication protocol despite units are indicated as A^2 the quantity is expressed in k(A^2).

(*) Note: Only status control is permitted.

1.1.8. Logical nodes for metering and measurement: M Group

LN: Measurement. Name: MMXU

Measurements on the Bar				
PREFIX	**LOGICAL NODE**		**INSTANCE**	**VALUE**
BAR	MMXU		1	BARMMXU1
DATA OBJECTS				
Data Object Name	**Sub DO Name**	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION				
Beh	stVal		ENS	Behavior
MEASURED ANS METERED VALUES				
A	neut	cVal	WYE	Phase currents (IL 1, IL 2, IL 3)
A	phsA	cVal	WYE	Phase currents (IL 1, IL 2, IL 3)
A	phsB	cVal	WYE	Phase currents (IL 1, IL 2, IL 3)
A	phsC	cVal	WYE	Phase currents (IL 1, IL 2, IL 3)
Hz		mag	MV	Frequency
MaxAPhs		mag	MV	Maximum magnitude of current of the 3 phases. Max(Ia,Ib,Ic)
MaxPhVPhs		mag	MV	Maximum magnitude of phase to reference voltage of the 3 phases. Max(PhVa, PhVb, PhVc)
PNV	neut	cVal	WYE	Phase to neutral voltage
PNV	phsA	cVal	WYE	Phase to neutral voltage
PNV	phsB	cVal	WYE	Phase to neutral voltage
PNV	phsC	cVal	WYE	Phase to neutral voltage
PPV	phsAB	cVal	DEL	Phase to phase voltages (VL1, VL2, VL3)
PPV	phsBC	cVal	DEL	Phase to phase voltages (VL1, VL2, VL3)
PPV	phsCA	cVal	DEL	Phase to phase voltages (VL1, VL2, VL3)
TotVA		mag	MV	Total apparent power (total S)
TotVAr		mag	MV	Total reactive power (total Q)
TotW		mag	MV	Total active power (total P)
VA	phsA	cVal	WYE	Phase apparent power (S)
VA	phsB	cVal	WYE	Phase apparent power (S)
VA	phsC	cVal	WYE	Phase apparent power (S)
VAr	phsA	cVal	WYE	Phase reactive power (Q)
VAr	phsB	cVal	WYE	Phase reactive power (Q)
VAr	phsC	cVal	WYE	Phase reactive power (Q)
W	phsA	cVal	WYE	Phase active power (P)
W	phsB	cVal	WYE	Phase active power (P)
W	phsC	cVal	WYE	Phase active power (P)

Measurements on the Line				
PREFIX	**LOGICAL NODE**		**INSTANCE**	**VALUE**
LINE	MMXU		1	LINEMMXU1
DATA OBJECTS				
Data Object Name	**Sub DO Name**	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION				
Beh	stVal		ENS	Behavior
MEASURED ANS METERED VALUES				
Hz		mag	MV	Frequency
PNV	neut	cVal	WYE	Phase to neutral voltage
PNV	phsA	cVal	WYE	Phase to neutral voltage
PNV	phsB	cVal	WYE	Phase to neutral voltage
PNV	phsC	cVal	WYE	Phase to neutral voltage
MaxPhVPhs		mag	MV	Maximum magnitude of phase to reference voltage of the 3 phases. Max (PhVa, PhVb, PhVc)

LN: Sequence and imbalance. Name: MSQI

Measurements on the Bar				
PREFIX	**LOGICAL NODE**		**INSTANCE**	**VALUE**
BAR	MSQI		1	BARMSQI1
DATA OBJECTS				
Data Object Name	**Sub DO Name**	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION				
Beh	stVal		ENS	Behavior
MEASURED ANS METERED VALUES				
SeqA	c1	cVal	CMV	Positive, negative and zero sequence current – Positive
SeqA	c2	cVal	CMV	Positive, negative and zero sequence current – Negative
SeqA	c3	cVal	CMV	Positive, negative and zero sequence current – Zero
SeqA		seqT	MX	Dir-quad-zero
SeqV	c1	cVal	CMV	Positive, negative and zero sequence voltage – Positive
SeqV	c2	cVal	CMV	Positive, negative and zero sequence voltage – Negative
SeqV	c3	cVal	CMV	Positive, negative and zero sequence voltage – Zero
SeqV		seqT	MX	Dir-quad-zero

Measurements on the Bar				
PREFIX	**LOGICAL NODE**		**INSTANCE**	**VALUE**
LINE	MSQI		1	LINEMSQI1
DATA OBJECTS				
Data Object Name	**Sub DO Name**	**Attribute Name**	**Common Data Class**	**Data Object Description**
STATUS INFORMATION				
Beh	stVal		ENS	Behavior
MEASURED ANS METERED VALUES				
SeqV	c1	cVal	CMV	Positive, negative and zero sequence voltage – Positive
SeqV	c2	cVal	CMV	Positive, negative and zero sequence voltage – Negative
SeqV	c3	cVal	CMV	Positive, negative and zero sequence voltage – Zero
SeqV		seqT	MX	Dir-quad-zero

1.2. Services

Following services according IEC 61850 are provided:

1.2.1. DATASETS

A Dataset is a grouping of information from the data model of the IED. These groupings can be used by other services for the sending of information (GOOSE, RCB, BRC).
The definition of Datasets must be made in a the **.ICD** file (IED Capability Description) which is provided with the device.

By default, the only Dataset configured on the ICD is the one belonging to Gooses.

1.2.2. GOOSE CONTROL BLOCKS

Goose service allows the Multicast sending (to multiple devices) of the existing information in a Dataset. Goose message is an Ethernet message that is continuously cast to the Ethernet and every device can analyze it.

The publication of GOOSE messages can be configured from the SICom software, and the GOOSE message subscriptions from the EasyConnect software.

GOOSE Publication

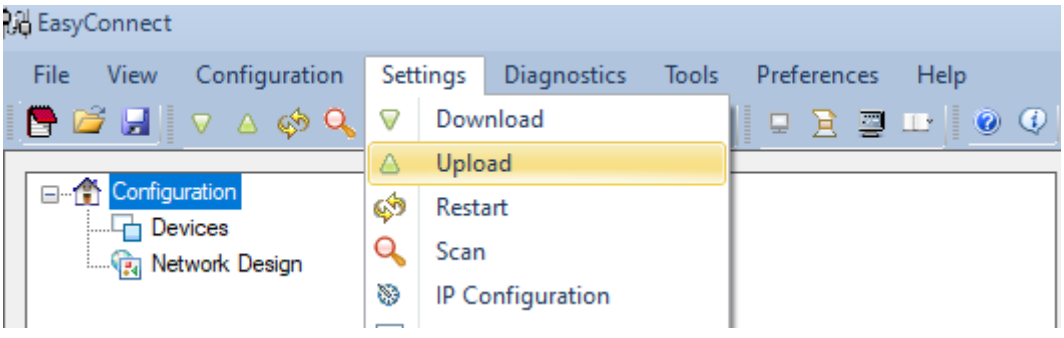
From SICOM software, connect the relay and open the Configuration Menu. Select goose output from the left navigation panel. From there it can be configured the logic for each goose output.

GOOSE Subscription

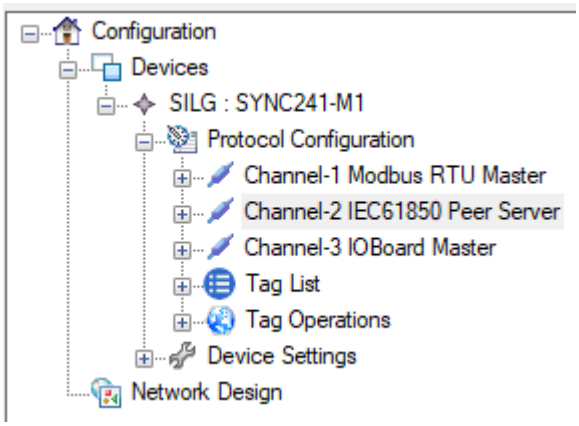
NOTE: To subscribe to another IED's gooses, it is necessary to have the publisher IED's ".icd" file.

From EasyConnect software, connect the relay by the IEC61850 port. For Goose subscription configuration follow the next steps:

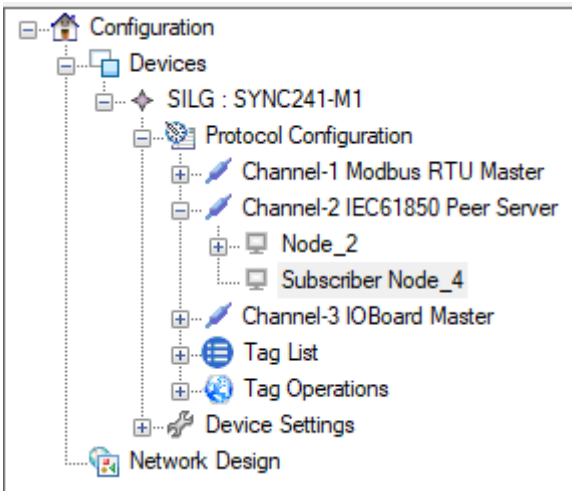
1- Upload the configuration from the relay



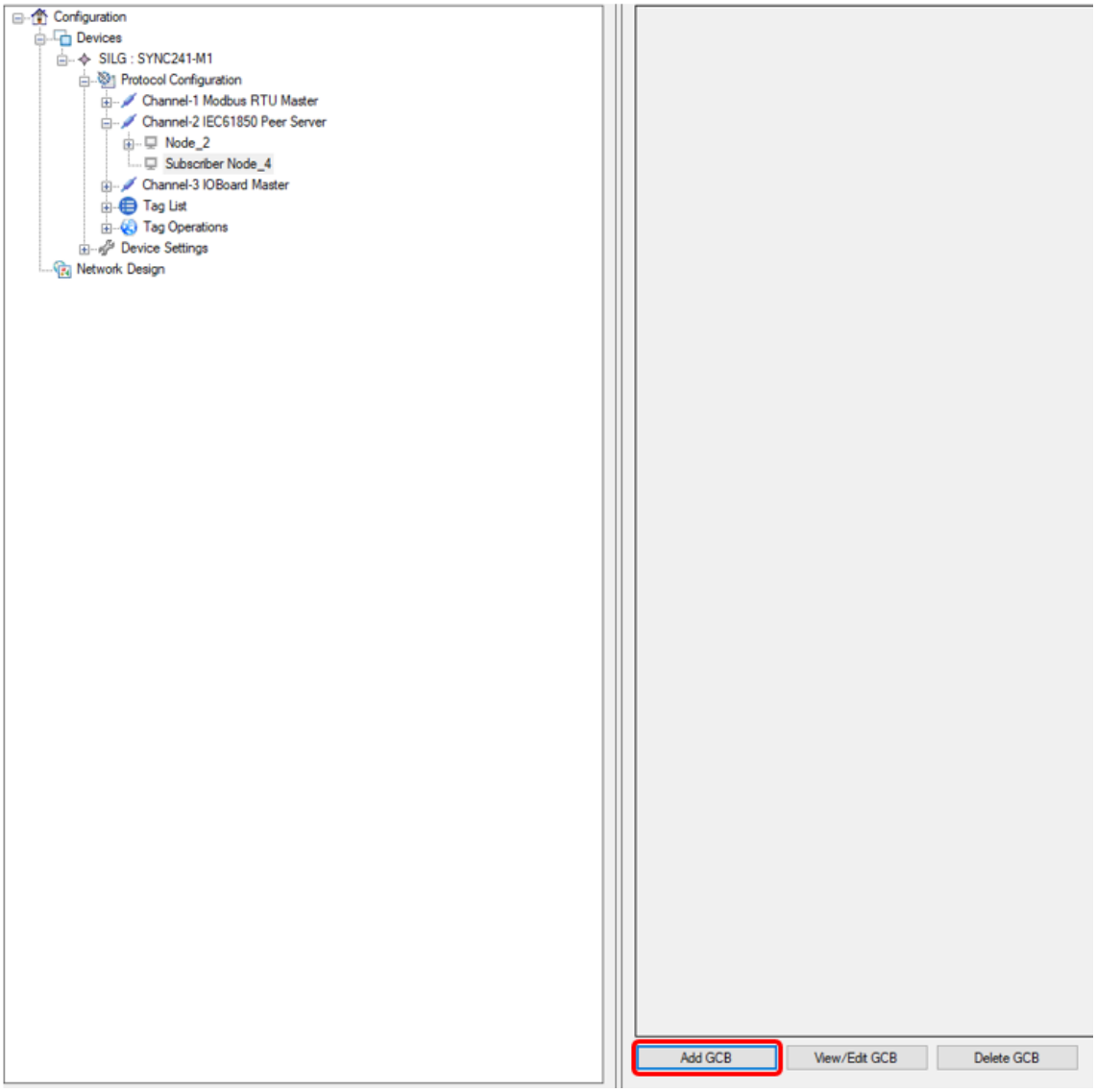
2- Select “Channel-2 IEC61850 Peer Server” and right click it.



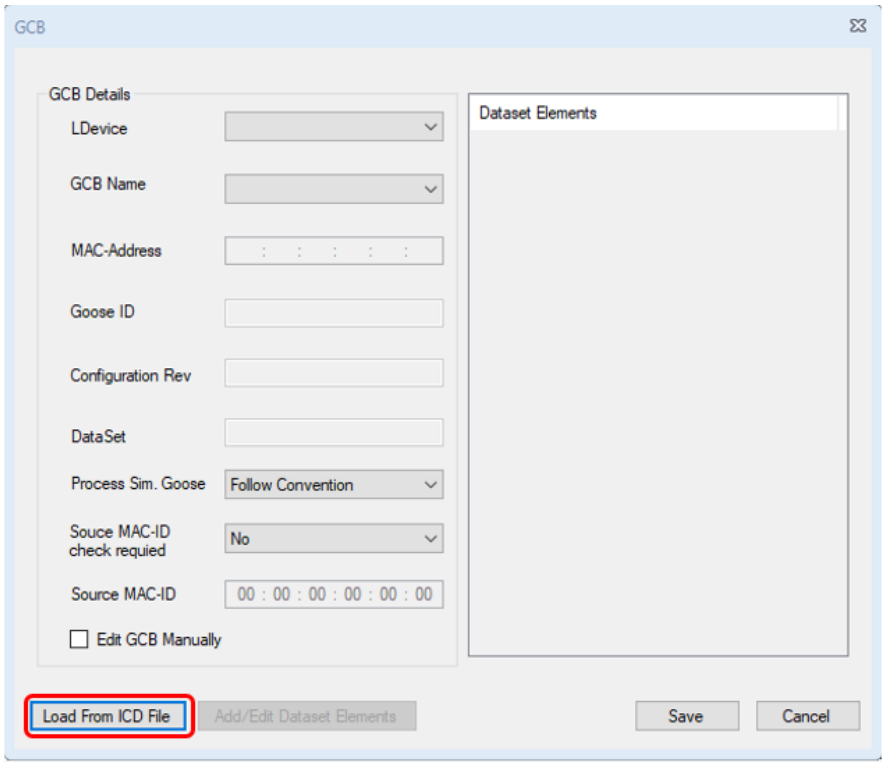
3- Select “GOOSE Subscriber” . If it does not allow to select it, it is already added. Expand “Channel-2 IEC61850 Peer Server” and click on “Suscriber Node”



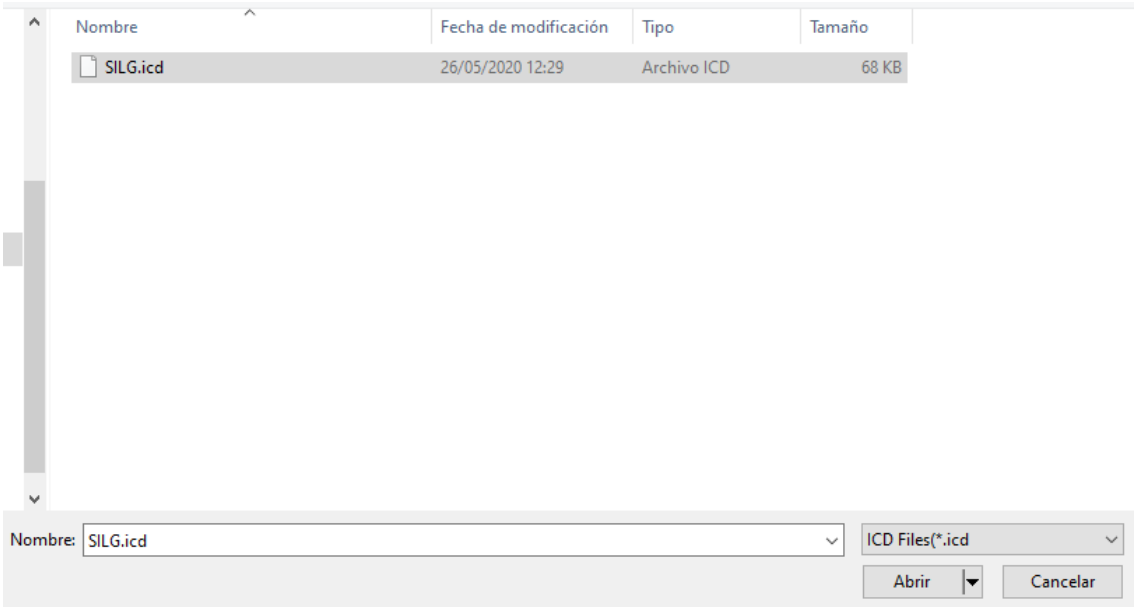
4- Click on “Add GCB”



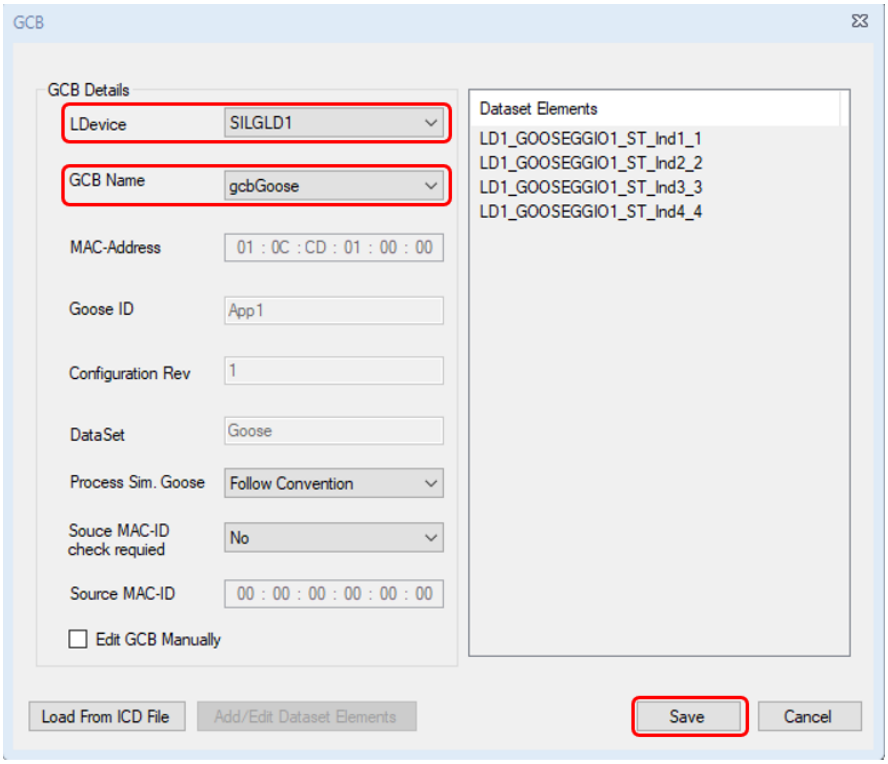
5- Click on “Load From ICD File”.



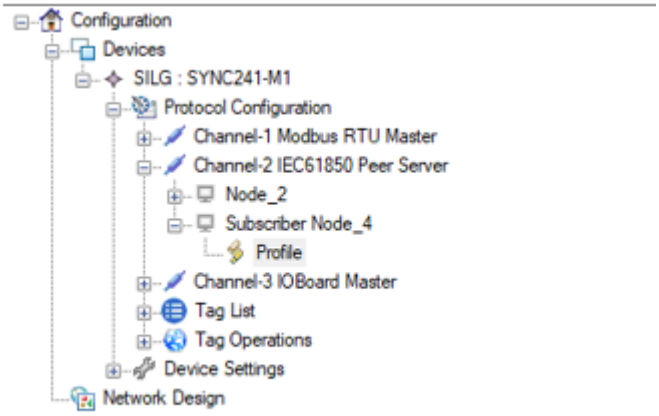
6- Search and open the .icd file of the publisher IED to which you wish to subscribe.



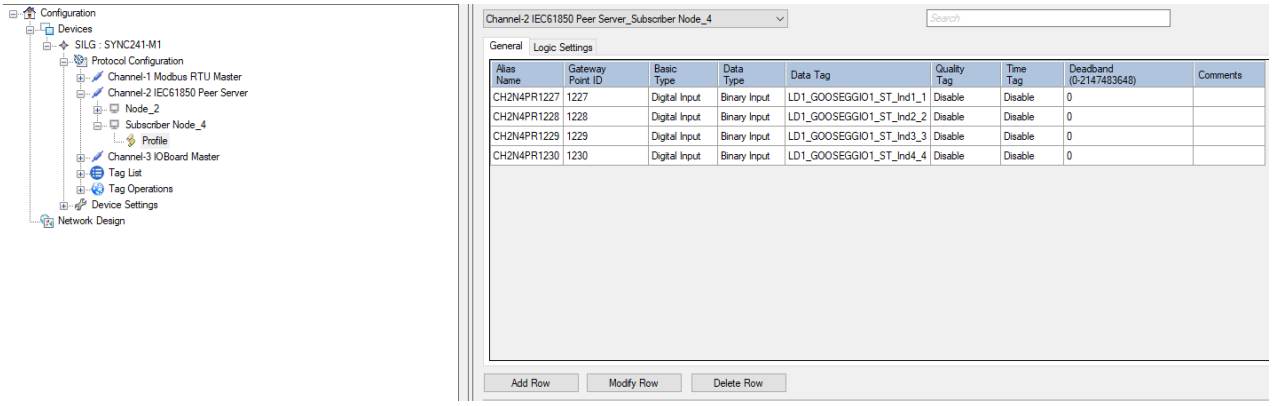
7- Select the Logical Device ("LDevice") and the Goose Control Block Name ("GCB Name") of the Goose you wish to subscribe to, and click "Save". It will automatically detect the names, MAC and number of goose outputs of the publishing device.



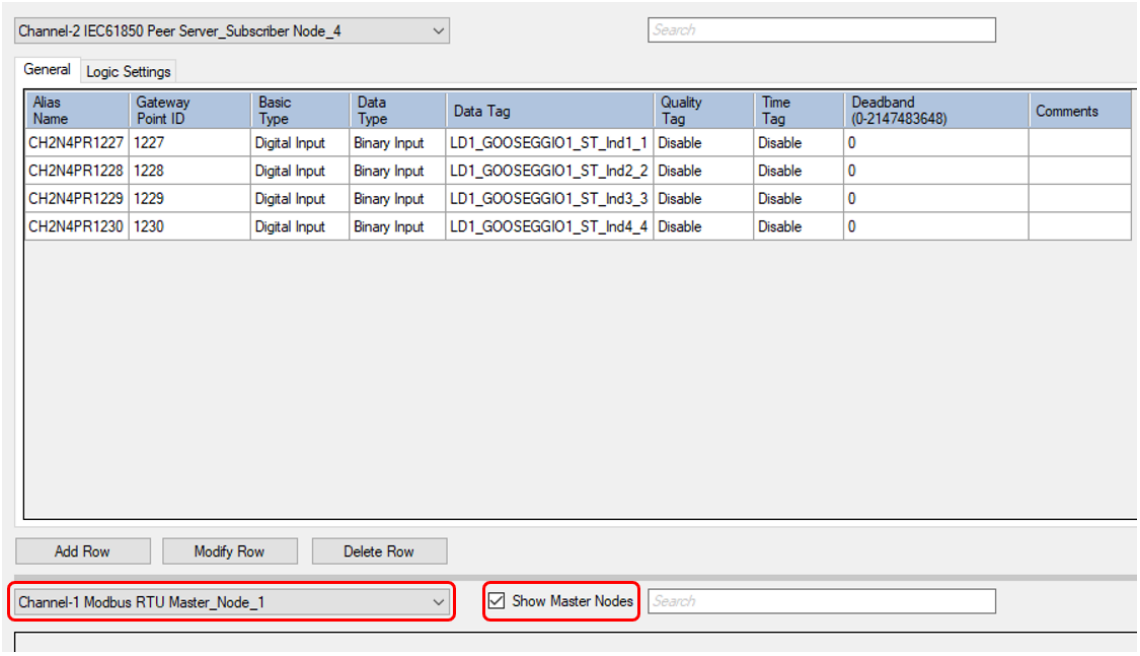
8- Expand “Subscriber Node_4" in the "Channel-2 IEC61850 Peer Server" and click on “Profile”.



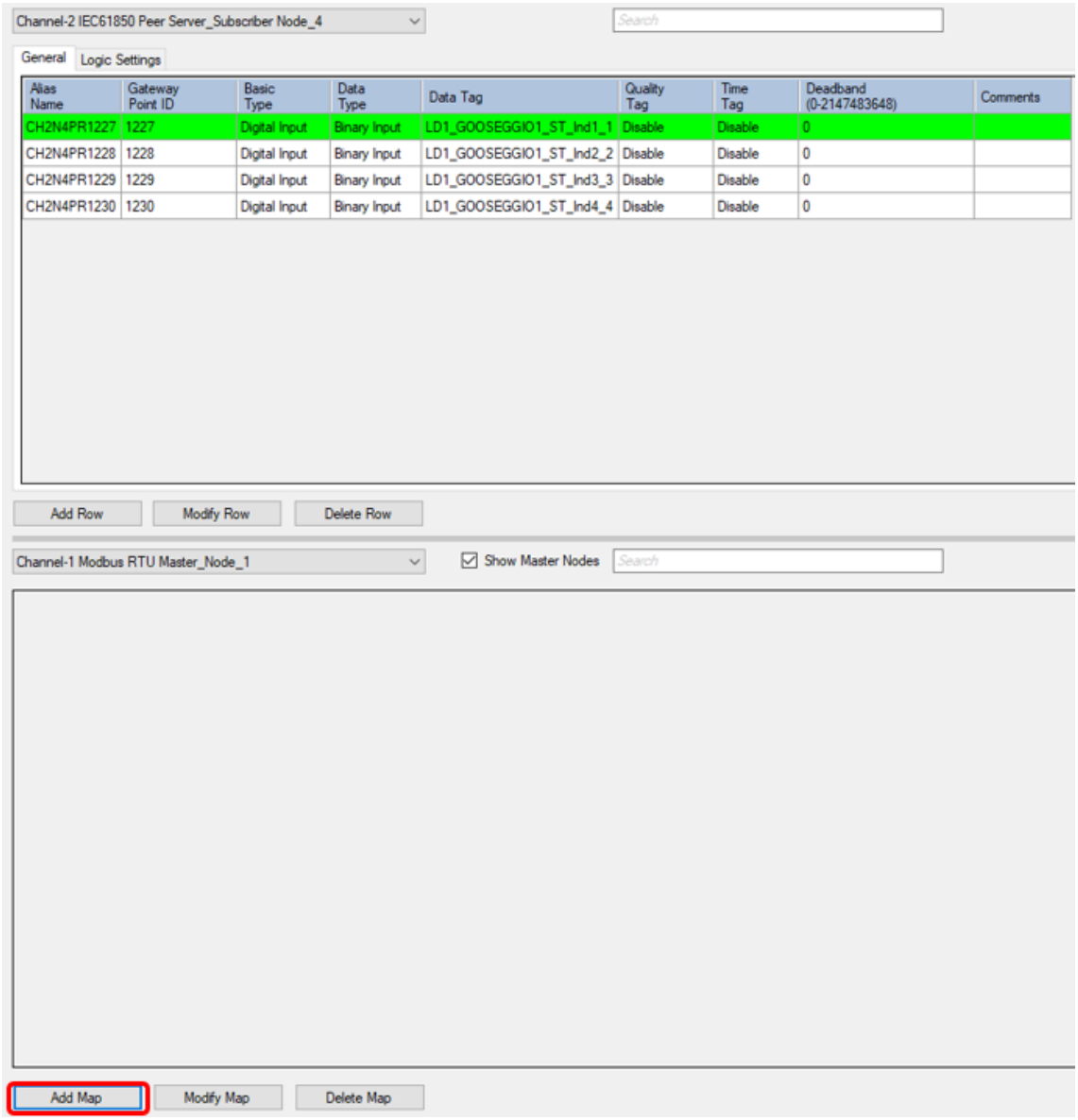
9- Check the signals that have been read from the Goose Control Block selected in the step 7.



10- Check the "Show Master Nodes" check box and select "Channel-1 Mosbus RTU Master".



11- Select a Point from the Profile and click on Add Map.

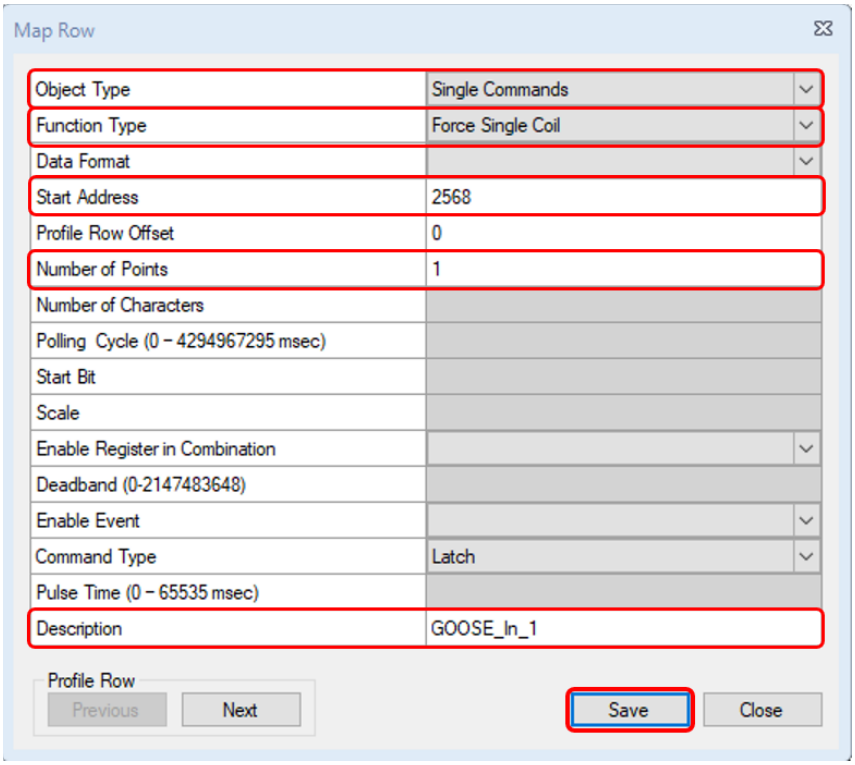


12- Select:

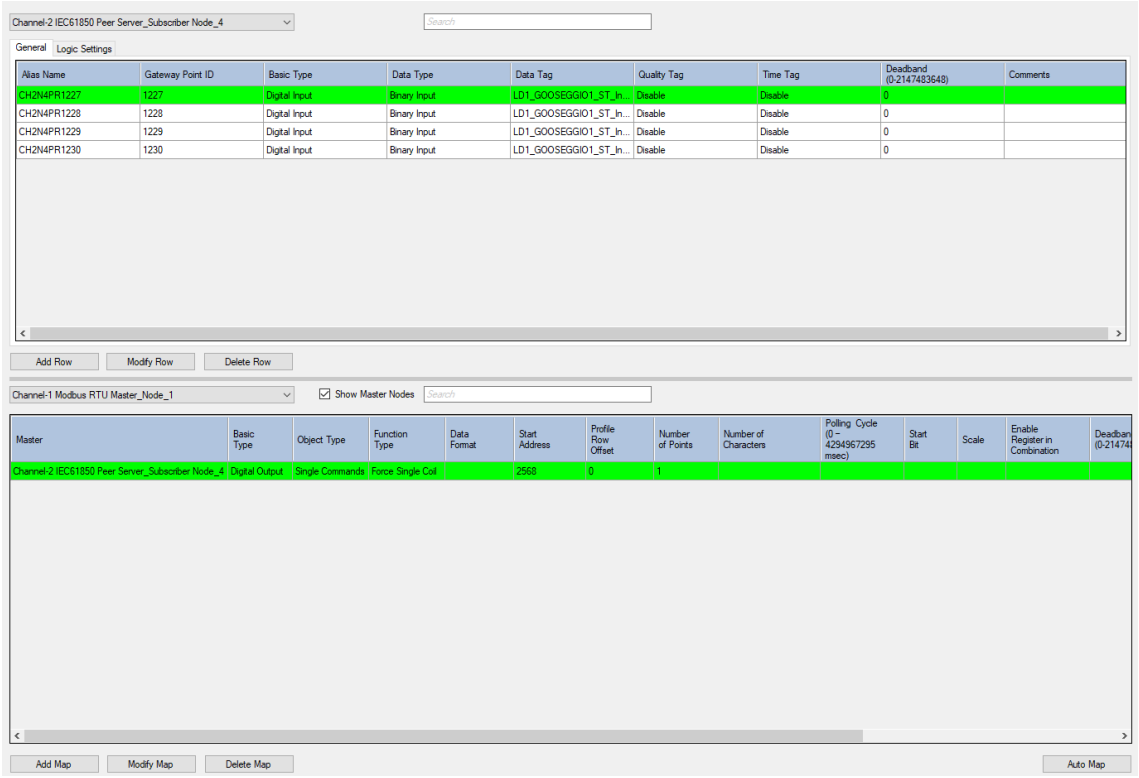
- Object Type -> Single Commands
- Function Type -> Force Single Coil
- Start Address -> View Addresses in “GOOSE In” Table
- Number of Points -> 1
- Description -> Optional Description

And click on "Save".

Descripción	GOOSE_In Address
GOOSE_In_1	2568
GOOSE_In_2	2569
GOOSE_In_3	2570
GOOSE_In_4	2571
GOOSE_In_5	2572
GOOSE_In_6	2573
GOOSE_In_7	2574
GOOSE_In_8	2575
GOOSE_In_9	2576
GOOSE_In_10	2577
GOOSE_In_11	2578
GOOSE_In_12	2579
GOOSE_In_13	2580
GOOSE_In_14	2581
GOOSE_In_15	2582
GOOSE_In_16	2583



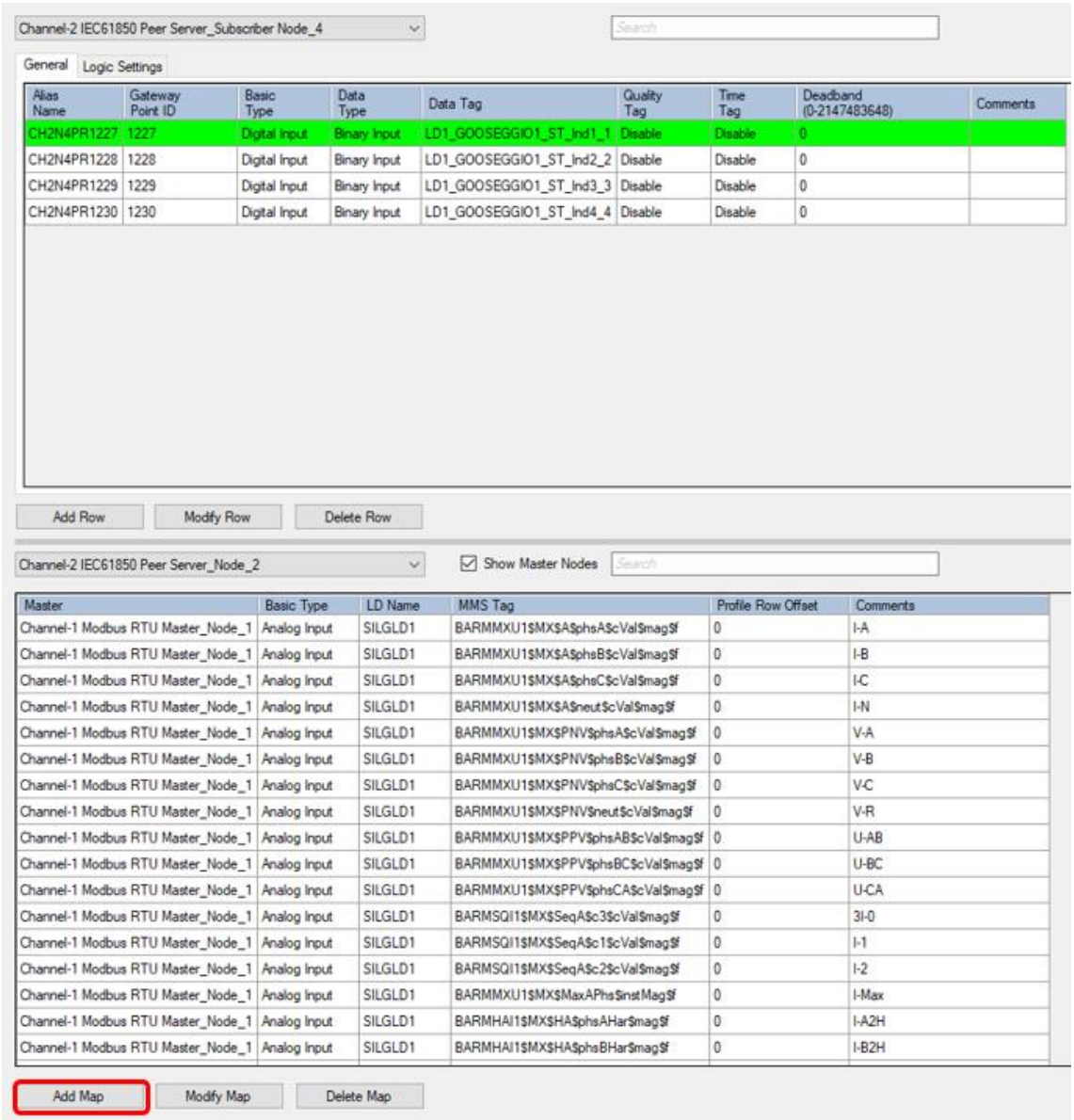
13- Check the Mapping of the selected point of the Profile, clicking on it.



14- Select "Channel-2 IEC61850 Peer Server" in the drop-down menu next to the Check Box "Show Master Nodes"



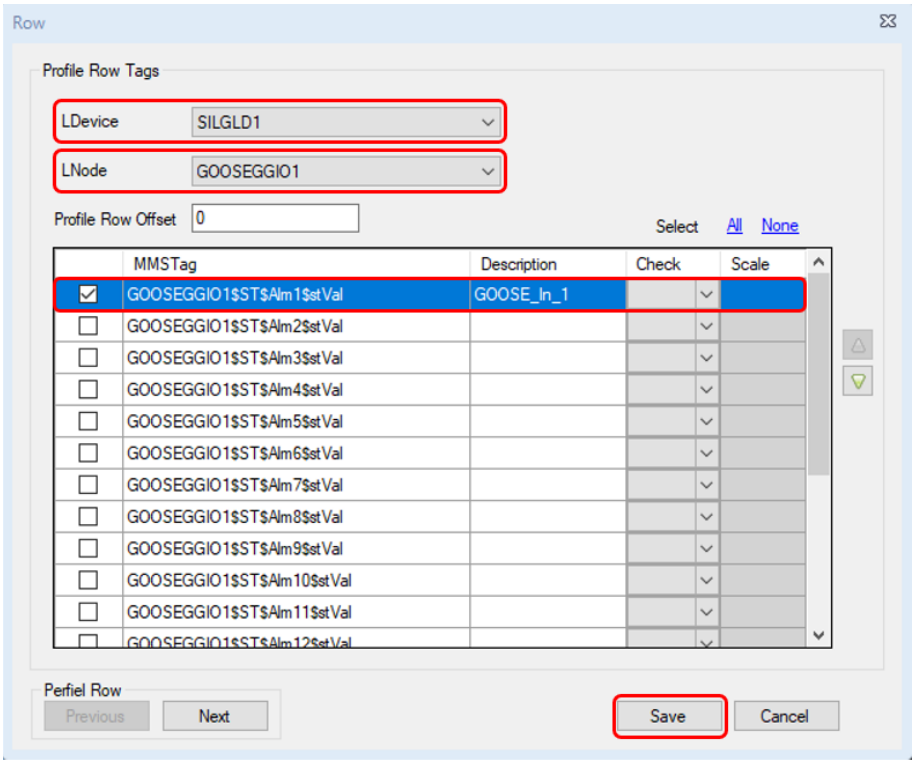
15- Select the same Point from the Profile selected in step 11, and click Add Map



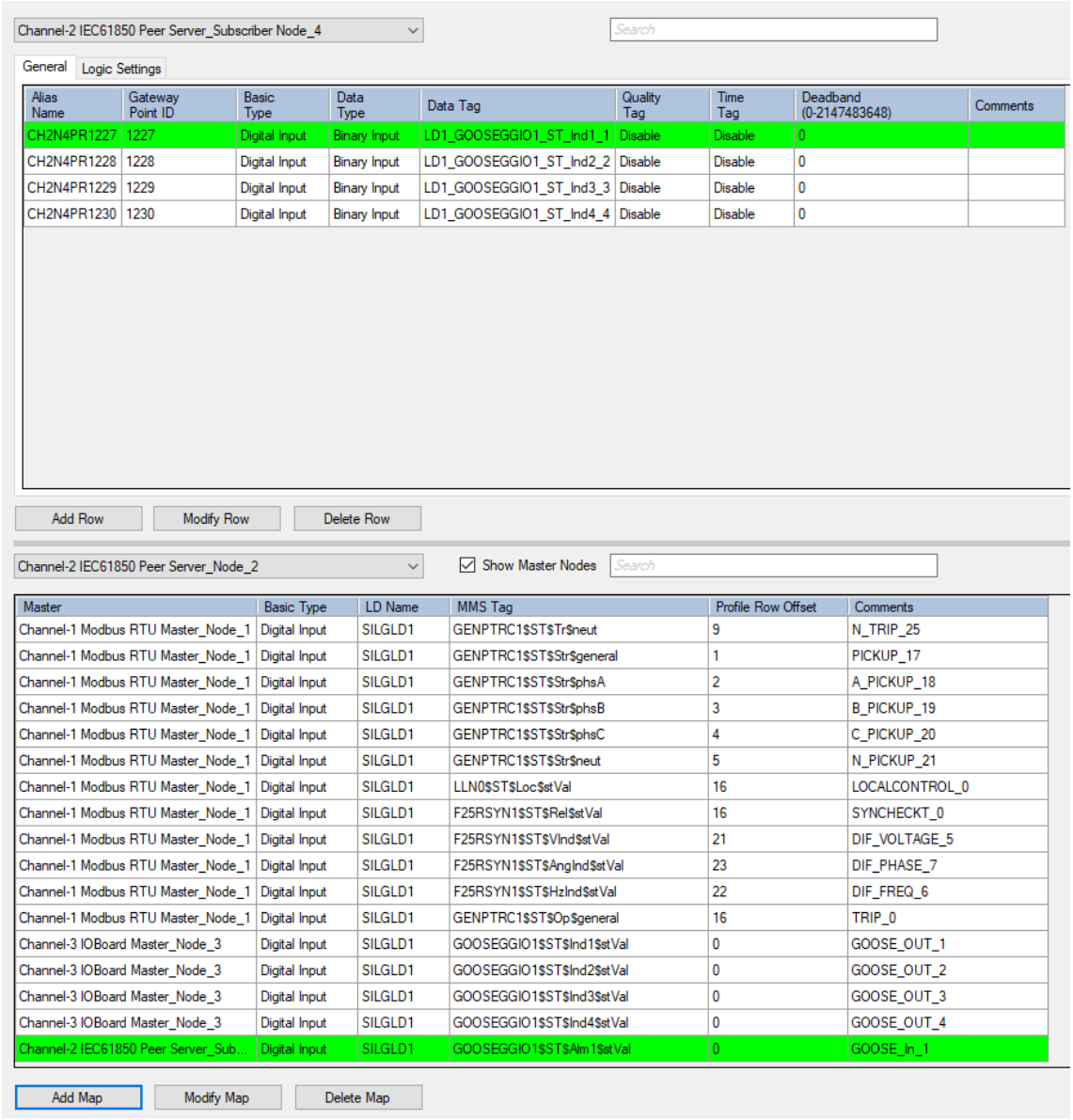
16- Select de :
- Logical Device (LDevice) -> subscriber Logical Device
- Logical Node (LNode) -> GOOSEGGIO1

NOTE: To maintain a correlation between the Address configured in step 12 and the alarm number inside the GOOSEGGIO1 Logical Node, select the Check Box of the alarm number corresponding to the previously configured GOOSE number, i.e. if the address of GOOSE_In_1 has been configured, select the Alarm_1 (Alm1) Check Box.

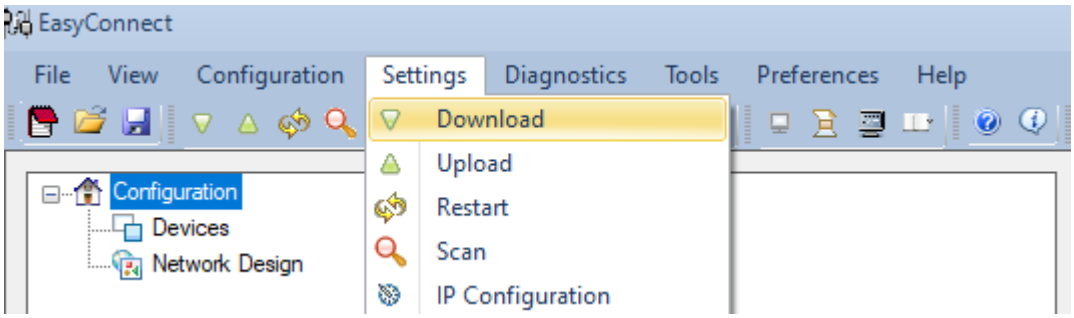
Add the description with the name of the configured GOOSE and click on "Save".



17- Check the Mapping of the selected point of the Profile, clicking on it.



18- Repeat steps 11 to 17 for adding more Goose Subscriptions.
19- Save the configuration.
20- Download the configuration to the relay.



21- Finally, restar the relay.



Bizkaia Technology Park

Building, 604

Derio, 48160 Bizkaia SPAIN

T. +34 94 471 14 09

fanox@fanox.com

www.fanox.com