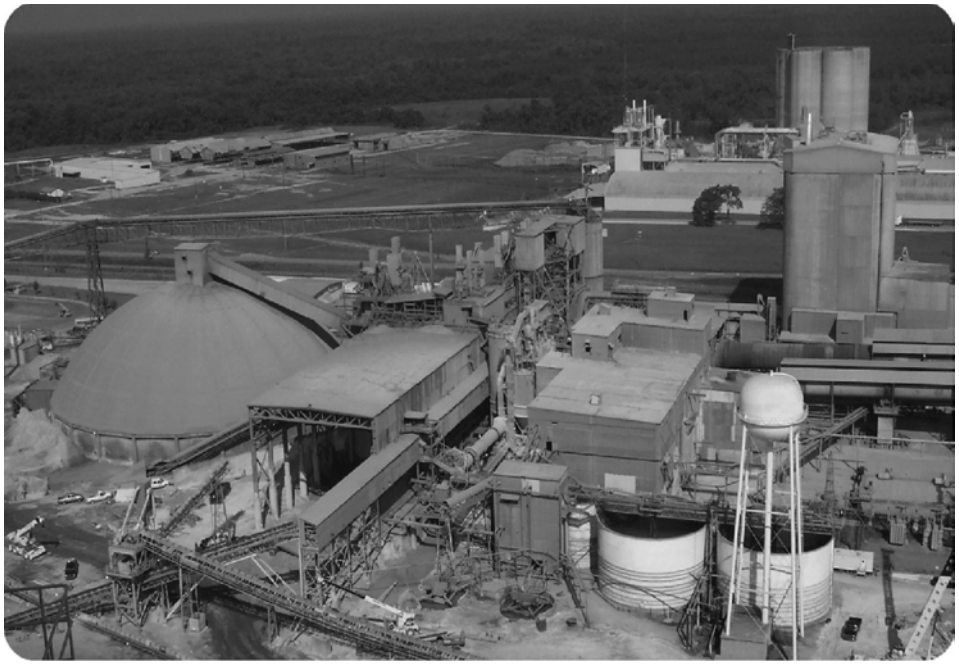
User Manual

Original Instructions

Allen-Bradley

Bulletin 857/865 Protection Systems IEC 61850 Interface Configuration Instructions

Catalog Numbers 857, 865



Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

Reproduction of the contents of this manual, in whole or in part, without written permission of Rockwell Automation, Inc., is prohibited

Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

	**WARNING:** Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
	**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.

	**SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
	**BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
	**ARC FLASH HAZARD:** Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

This manual presents the steps for configuring IEC 61850 communication in Bulletin 857 and 865 protection relays. This document begins with the factory default configuration status and ends with the substation system configuration.

Configuration tool programs are provided by Rockwell Automation.

Configuration Tool	Description
SetPointPS	A relay setting tool. You can obtain this program by using the links within the Rockwell Automation web pages that are associated with the Bulletin 857 and 865 products. See the publication 857-PM001 for details on the use of the SetPointPS programming and configuration software tool.
SCD Editor (1)	A tool program that is designed for creating and editing SCD files for building IEC 61850 communication network configurations.
Simple Tester (1)	A tool that can be used verify data that is sent and received to the Bulletin 857 or 865.

(1) Available by special request. Contact your local Rockwell Automation distributor.

All listed tool programs can be run on a personal computer with all versions of supported Microsoft Windows operating system. This guide assumes that you are familiar with the basic concepts of IEC 61850 data modeling and communication.

Abbreviations

The following abbreviations are used throughout this manual.

BRCB	Buffered Report Control Block
CID	Configured IED Description
DS	Data Set
FCDA	Functionally Constrained Data Attribute
GCB	GOOSE Control Block
GOOSE	Generic Object-Oriented Substation Events
GSE	Generic Substance Events
ICD	IED Capability Description
IED	Intelligent Electronic Device (usually a relay or controller, IEC61850 server)
IID	Instantiated IED Description
LD	Logical Device
LN	Logical Node
MAC ID	MAC Address (media access control address)
NI	Network Input
RCB	Report Control Block
SCD	Substation Configuration Description
SCL	Substation Configuration Description Language
URCB	Unbuffered Report Control Block

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
SetPointPS Configuration Software Programming Manual, publication 857-PM001	Provides information on configuring, setting up, troubleshooting, and using the SetPointPS communication software
857 Protection System for Feeder and Motor Protection Quick Start, publication 857-QS001	Provides information on mounting, wiring, and installation of the 857 relay
857 Protection System Specification Guide, publication 857-SR001	Provides specifications on protective features, measuring and monitoring, arc flash protection, and cold load pickup monitoring
857-RAA/857-RAD RTD Scanner User Manual, publication 857-UM002	Provides information on layout, wiring, installation, configurations, mounting and I/O
857-VPA3CG PROFIBUS DP Option Module, publication 857-UM003	Provides information on the PROFIBUS option modules, including installation, commissioning, dimensions, and specifications
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http // www.rockwellautomation.com/global/certification/overview.page	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at http://www.rockwellautomation.com/global/literature-library/overview.page. To request paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Configuration Process

The configuration process consists of the following high-level steps and tasks. Each step is detailed in subsequent chapters that cover each phase.

Process Overview

Before starting the configuration process, review the steps that are involved. Make the required preparations and allow sufficient time to complete tasks.

Follow these steps to configure the Bulletin 857 or 865 relay.

1. Collect the latest versions of configuration tools and test tools
   a. Install the latest version of the SetPointPS tool.

      The latest version can be loaded at www.rockwellautomation.com.
   b. Make sure that the relays to be integrated and configured are connected via an Ethernet/IP network. Or make sure that an 857-VX003 cable and a USB to Serial Converter, such as a catalog number 9300-USBS, are available.

      Depending on the configuration of the network system that you are configuring your Bulletin 857 or 865 relay for, you can require an additional software configuration tool called SCD Editor. The 61850 Simple Tester tool is used for checking the communication between configured Bulletin 857 or 865 relay. Contact your local Rockwell Automation distributor if you require any of the software tools.
2. Perform Relay initial setup by using the SetPointPS tool.

   See Relay Initial Setup on page 13.
   a. Configure the relay for the application (select active functions and active I/O, unmask events, build application logic, matrix setup).
   b. Select IEC 61850 protocol on the Ethernet port of the relay.
   c. Select IEC 61850 logical nodes to the interface data model in correspondence with active relay functions, with assignment of LN data to data sets.
   d. Configure deadband values for supervision of analog data changes in the relay.
   e. Perform preliminary configuration of GOOSE publisher with assignment of LN data to data sets used by GCB.
   f. Generate a CID or ICD file for each relay.

The file is a description of the IEC 61850 interface capabilities in SCL without known network address in the future system. And without defining the data exchange with other relays of the future system. See Generation of CID or IID File for the Relay on page 36.

IMPORTANT When applications where other third-party protocol converters or gateways are applied, the suppliers for these products can use their own software tool to perform the system configuration.

After step 2 is accomplished, the relay can be delivered to a system engineer to proceed with system installation and configuration as described in step 4.

IMPORTANT The relay is still unable to communicate in the IEC 61850 network (missing network address) and its configuration cannot be yet verified using the recommended testing tools.

Before proceeding to step 4, additional IEC 61850 parameters can be pre-configured with the SetPointPS tool as described in the tasks of step 3.

IMPORTANT To perform the configuration tasks of Step 3, the Relay engineer requires information about the relay position in the system. For example, the way the relay reports data and how fast data is exchanged with other relays.

3. Use the SetPointPS tool to perform advanced relay configuration.

   See Advanced Relay Configuration Using SetPointPS on page 27.

   a. Configure the relay network address and IED name in the IEC 61850 system.
   b. Configure the following Report Control Blocks (RBC) parameters for the BRCBs and URCBs that are used in the system.
   – Assigned data set, report identifier
   – Integrity period
   – Buffer time
   – Report trigger options
   – Option fields of reports
   c. Configure GOOSE parameters for publishing (maximum retransmission timeout and parameters of two GOOSE Control Blocks, GCB1, and GCB2).
   d. Assign data to data sets for transmitting into the network by GCB1 and GCB2.
   e. Setup GOOSE Subscriber general parameters by enabling and defining the accepted MAC ID of incoming GOOSE data messages.
   f. Map selected data from incoming GOOSE messages into Network Inputs (elements of the relay application logic).

g. Generate a CID file for the relay.

The file is a description of IEC 61850 interface capabilities of a configured network device.

After step 3 is complete, the relay is pre-configured for a specific network role in the IEC 61850 system (assigned network address, defined data flow parameters). The defined configuration can be verified using the tools that are listed in Table on page 5. The relay acts as an IEC 61850 server device and responds to IEC 61850 client requests. It must also be able to transmit GOOSE messages in accordance with the setup of GCBs and to receive GOOSE messages from the network in accordance GOOSE Subscriber setup.

This prepared configuration can require further adjustments in step 4, when the complete system is defined including all devices and when all dependencies between the devices can be verified.

4. Use the SCD Editor Tool to perform IEC 61850 system configuration building.

See IEC 61850 System Configuration Building Using SCD Editor on page 39.

IMPORTANT When applications where other third-party protocol converters or gateways are applied, the suppliers for these products can use their own software tool to perform the system configuration.

a. Start the system configuration description by creating a substation. The Communication section contains at least one Subnetwork. Optionally, more Subnetworks can be added to the system.

b. Add the time server device to the selected Subnetwork.

The device provides the source of time synchronization for the clocks of IEDs.

c. Add IEDs to the system configuration description.

d. Import the ICD (or IID) for each added relay device.

e. Assign a unique IED name to the device.

f. Place the device on the chosen Subnetwork.

An imported ICD file can be either a template ICD file that is produced in step 2 or a pre-configured ICD/IID file that is produced in step 3.

– If it is the template ICD file, several parameters values must be still set in the system configuration description.

– If it is the pre-configured ICD/IID file, several parameter values are imported into the system configuration description. Verify the values for compliance with system requirements.

g. Check / set each added IED unique network address in the chosen Subnetwork section, in accordance with the system addressing scheme.

– For an IED including GCB, check / set the network address for publishing for each GCB in accordance with the system addressing scheme.

– For an IED including RCB, check / set the RCB parameters in accordance with system requirements (they can also be left unchanged for clients to dynamically set).

– For an IED including GCB, check /set the GCB parameters in accordance with system requirements (clients cannot dynamically set).

– For an IED including Inputs (GOOSE Subscriber function), set the binding between chosen Network Inputs and published data of other IEDs. Set the binding in accordance with system requirements for horizontal communication. Verify the NI configuration that is imported from ICD file.

h. Verify the system configuration description for correctness by using the tool command.

i. After accomplishing all IED parameter setup, generate the SCD file that contains system configuration description in SCL.

Optionally generate IID files for selected IEDs.

The SCD file that is produced is then required to adjust the configuration of each Bulletin 857 and 865 relay device that is dedicated to the defined system. This configuration is done in the tasks of step 5.

5. Use the SetPointPS tool to perform IEC 61850 configuration adjustment in each system relay.

See IEC 61850 Configuration Using SetPointPS on page 53.

To configure with the SCD file, the imported SCD file (or IID file) is used to update the IEC 61850 configuration parameters of the relay. Now, the relay configuration is compliant with the system configuration.

a. Check the Enable flags of GOOSE Publishers and GOOSE Subscriber.

b. Review the signal matrices and application logic of the relay and check how GOOSE Network Inputs signals are used.

Optionally, an IID file can be generated with the SetPointPS tool to document the present configuration.

If requirements have been altered or added to the system, the configuration process can continue with another iteration. The relay configuration can be further modified with the SetPointPS tool, which results with the generation of a new IID file. This file is then used in the new run of SCD Editor as described in the tasks of Figure 6.

6. Use the SCD Editor to perform IEC 61850 system configuration revisions.

   See IEC 61850 Configuration Using the SCD Editor on page 57.

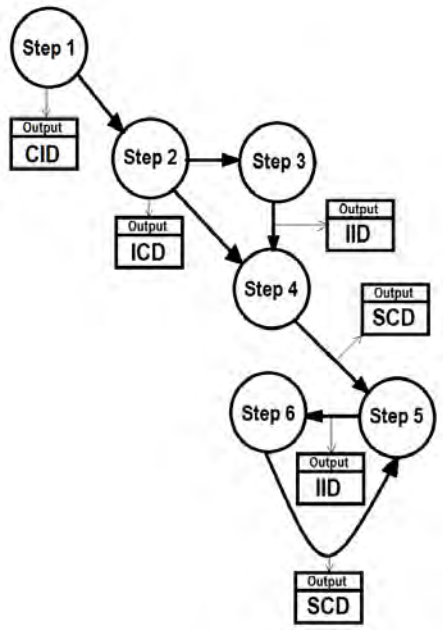
   a. Use the revised IED configuration to update the previously created system configuration description.
   b. Import the revised IID file by using IED update.
   c. Altering the parameters respectively. This operation is combined with verification of provided parameter values.

      If system requirements have been altered or added to the system, the configuration process can continue with further changes in the system configuration description. For example changed parameter values, new devices.
   d. Use the tool command to verify system configuration description.
   e. Generate the SCD file after accomplishing all IED parameter setup. The file contains the system configuration description in SCL.

      Optionally, generate of IID files for selected IEDs.
   f. Repeat step 5 to adjust the relay configurations in accordance with the present system configuration description.

      There can be several iterations of step 5 and step 6.

The following figure presents the sequence of configuration steps with possible iterations of step 5 and step 6.



IMPORTANT The CID file can be the only file that is required depending on the system configuration tool used.

The tasks of step 2...step 6 are described in detail in Chapter 2...Chapter 6.

Notes:

Relay Initial Setup

Before starting the initial setup, review the steps that are outlined in Chapter 1. Make the required preparations and allow sufficient time to complete tasks. The following procedures in this and subsequent chapters assume that you are familiar with the basic concepts of IEC 61850 data modeling and communication.

Connect to the SetPointPS Tool

The initial setup requires a connection to the Bulletin 857 or 865 Relay by using the SetPointPS software tool.(1)

1. Connect a personal computer to the Bulletin 857 or 865 Relay by using an 857-VX003 cable and initiate the SetPointPS software.

   Alternatively, connection can be made to the Bulletin 857 or 865 over an Ethernet link, if the relay contains that feature.
2. Run the SetPointPS configuration software tool and establish the connection between the relay and the software.
3. Download the complete configuration data from the relay to the SetPointPS program.

   From here, the configuration tasks can be started.
4. Enter the new parameter values.
5. Write changes to the device by the pressing the yellow Write Changes to Device button in the SetPointPS tool menu.

IMPORTANT Some parameter changes can require rebooting of the device, after which the configuration process can proceed.

Setup of the Relay Application

For each Bulletin 857 and 865 relay, there must be a list of required application functions specified in accordance with customer requirements. These functions (including protection stages, measurements and calculations, physical and logical I/O) must be activated and configured in the relay by using the SetPointPS tool.

(1) See the SetPointPS tool programming manual, publication 857-PM001, for additional details.

IMPORTANT These functions generate application events that must be enabled. The IEC61850 server interface in the relay monitors the status of application functions by collecting generated change events.

1. Check that the active stages of protection functions have enabled both start and trip on/off events.
2. Check that start and trip on/off events for programmable protection functions are enabled.
3. Check that monitored and controlled objects have defined signals, which determine their state, and that all events that are related to the four object states are enabled.
4. Check that events of physical Digital Inputs, Logical Outputs, Virtual Inputs, and Virtual Outputs are enabled.

Measurement values are periodically scanned by the IEC61850 server interface to detect value changes.

Signal matrix operations (signal transfer and signal blocking) and application logics are defined. Data is received from the network (from incoming GOOSE messages) and mapped to Network Inputs 1...64. This data together with Error status (failure of GOOSE Subscriber) can be used as input signals in the application matrices and in the application logic.

The relay application processes signals from other devices and represents them as Network Inputs. Bulletin 857 and 865 relay can also be required to transmit selected signals to the network. This part of the configuration can be left for when system requirements on horizontal communication are settled. See Chapter 5 Relay Initial Setup.

Once connected to the device with the SetPointPS configuration tool in CONFIGURATOR mode, navigate to the Communications protocol settings.

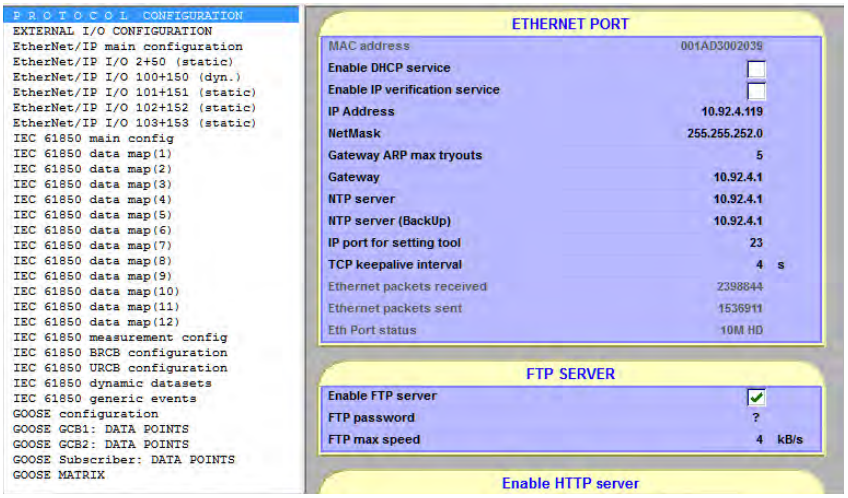
Select an IP Address

To select the IP address on the relay Ethernet port, follow these steps.

1. In PROTOCOL CONFIGURATION view, go to the ETHERNET PORT section. See Figure 1.
2. Set the Ethernet port parameters, including the IP address and subnet mask.

   Other parameters in this section can be left with default values. But only if the target values are not yet available at this step of the configuration process. For example, IP address information and NTP server address.

Figure 1 - Protocol Configuration

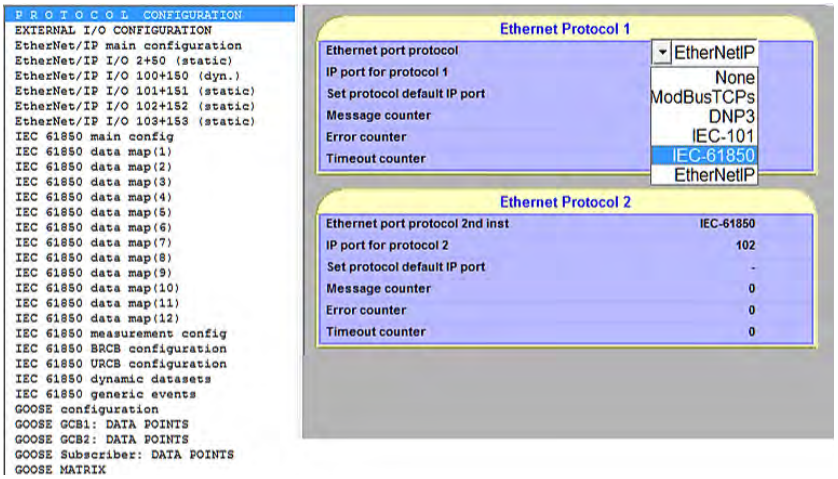


Select the IEC 61850 Protocol

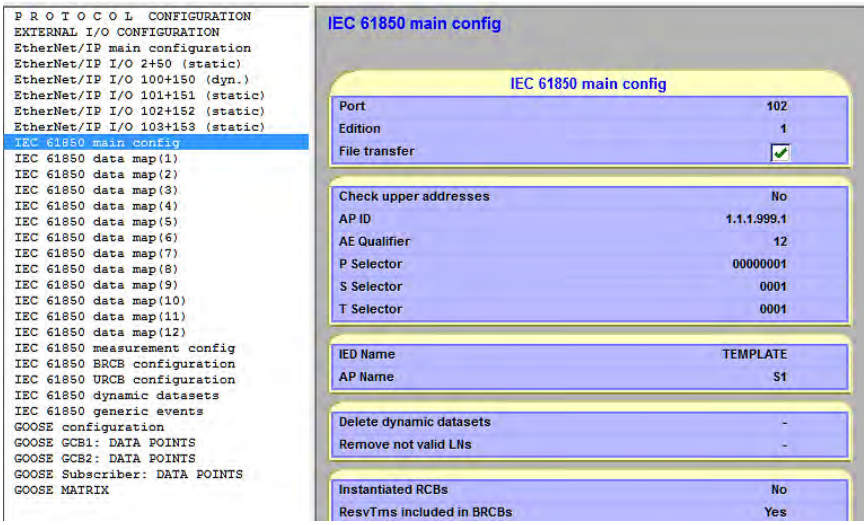
The Bulletin 857 or 865 relay supports two Ethernet protocols that run simultaneously on the same physical port. These settings are defined in Ethernet Protocol 1and 2. For each protocol, an IP (logical) port number is required. The default port numbers in the relay are 44818 for EtherNet/IP and 102 for 61850. Other protocols require an alternate port number to be set. Select at least one instance for IEC 61850. If the IEC 61850 option is not available in the pull-down list, the relay model does not support the 61850 protocol. Contact Rockwell Automation® for further details.

The IEC 61850 main config view displays additional addressing parameters of the IEC 61850 server. To set the Ethernet port and add addressing parameters, do the following steps.

1. Select the PROTOCOL CONFIGURATION view in the SetPointPS software.
2. Verify that at least one of the Ethernet port protocols is set to IEC-61850 in the ETHERNET PORT section.



The IEC 61850 main config view displays the additional addressing parameters of the IEC 61850 server, as shown in Table 1.



3. Set the addressing parameters to the values defined in Table 1.

Table 1 - Addressing Parameters

Port	The default Port number for the Main 61850 Configuration Screen is 102.
Edition	For compliance with Edition 1 of the 61850 standard, set the flag value to 1. Otherwise select Edition 2.
File Transfer	To include any Disturbance Recordings as a part of the report, select and add a check mark in the File Transfer parameter.

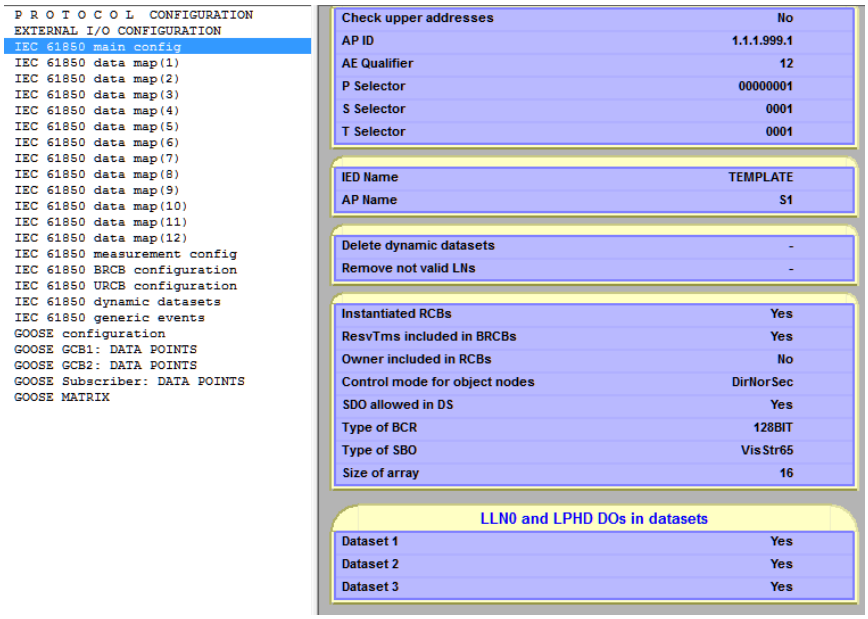
4. Use the parameters in Table 2 to define the settings of upper layers, above IP.
   - Determine, from the system requirements, whether the server interface must check these parameter values whenever there is a connection request.
   - Or, whether the parameter values can be ignored and the connection is settled only based on IP address of the request.

Table 2 - Parameters for the Upper Layer

Parameter	Value
Check upper addresses	The flag Check upper addresses is by default set to No. This parameter defines whether the following five address parameters of the protocol layers above the TCP/IP (AP ID,. . .) must be checked during the IEC 61850 connection establishment procedure. This parameter is needed only in special cases.
AP ID	Default value 1.1.1.999
AE Qualifier	Default value 12
P Selector	Default value 00000001
S Selector	Default value 0001
T Selector	Default value 0001

Table 2 - Parameters for the Upper Layer (Continued)

Parameter	Value
IED Name	Set the IED Name parameter to a unique device name in the system. This task can be deferred until it is required in Chapter 4. The IED Name parameter has a default value TEMPLATE. The default value must be changed and be unique for each relay.
AP Name	Set the Access Point Name (AP Name) to a name used to refer to the communication interface of this device in the SCL-file.
Delete dynamic data sets	The delete dynamic datasets control flag allows you to clear the definitions of the persistent dynamic data sets created by IEC 61850 clients during some previous communication sessions. The relay with factory default settings has no dynamic data sets in its configuration. If the device is reconfigured from a previous setup, the old dynamic data sets can be erased from nonvolatile memory by selecting value DELETE for this control flag.
Remove not valid LNs	The Remove not valid LNs selection can be used to remove Logical Nodes from the data maps, which are not pertinent for this relay type.
Instantiated RCBs	The Instantiated RCBs selection, when selected as No (the default), there are 8 separately defined BRCBs and 8 separately defined URCBs in the ICD file. When set to Yes, the report control blocks are instantiated from single BRCB and URCB definitions that are given in the ICD and CID file.
RsrvTms included in BRCBs	RsrvTms included in BRCBs flag informs whether the BRCB structures include an attribute ResvTms added in Edition 2 of the IEC61850 standard.



5. Set the Owner Included in RCBs to NO.

   The flag value is now set to No for compliance with Edition 1 of the standard.

6. Set the Control mode for the object nodes parameter that defines which control model is used in CSWI LNs to represent control objects of Bulletin 857 and 865 relay.

   The same control model is applied to Objects 1... 6.

   Objects 7...8 provide only status information and their control model is always set to status only. See Table 3 for the parameter value and description.

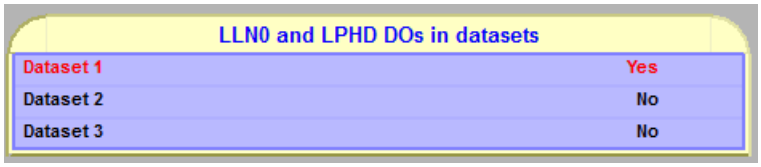
Table 3 - Control Model Parameter Values

Parameter Value	Description
DirNorSec	Direct with normal security, one-step control procedure, no activation termination message.
DirEnhSec	Direct with enhanced security. One-step control procedure, activation termination message upon completion of the procedure or time-out. Before activation termination no further control command can be executed on a given object.
SBONorSec	Select before operate with normal security, two-step control procedure, possible cancel after select, no activation termination message.
SBOEnhSec	Select before operate with enhanced security. Two-step control procedure, possible cancel after select. Activation termination message upon completion of the procedure or time-out. Before activation termination no further control command can be executed on a given object.
SDO allowed in DS	The Structured Data Objects, for example, A.phsA, are allowed in predefined datasets DS1, DS2, DS3. when set to No, The Structured Data Objects are not allowed in predefined datasets. Set to No if the client system is able to handle only complete 3-phase data types like A, PhV, PPV.
Type of BCR	Permits a selection for 32 Bits, 64 Bits, or 128- Bit length of binary counters.
Type of SBO	Provides for a selection of VisStr64 or VisStr65. This parameter can be used to select the length of visible strings.
Size of array	Sets the number of elements in the arrays that are used to transfer the harmonics
LLN0 and LPHD	The datasets can be used to include LLN0 and LPHD in predefined datasets DS1, DS2, DS3.

LLN0 and LPHD in Data Sets

In the IEC 61850 main configuration menu, there is an option to add LLN0 and LPHD to Data Sets 1, 2, and 3.

Figure 2 - LLN0 and LPHD



After this option is set, the following information is be available into the Data Sets:

- LLN0STLoc$stVal -Single Point Status information for Local / Remote state of the IED.
- VampLPHD1STPhyHealth - Single Point Status information for Self-Diagnosis of the IED.

IEC 61850 Logical Nodes to the Interface Data Model

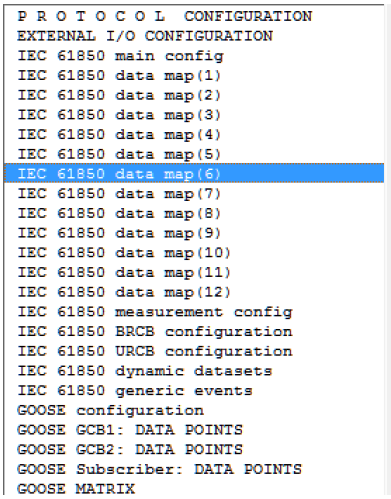
Application functions of Bulletin 857 and 865 relay, and physical and logical I/O signals, are mapped into the corresponding data models of the IEC61850 standard.

For each stage of protection function, there is a corresponding instance of logical node (P group) which includes the status of start and trip signals. Some protection-related functions can have several data that is mapped into individual LNs. For example, the events of auto-reclose function.

The Produced Relay application measurement values are represented by logical nodes (M group), with semantic based grouping. For example, phase current values for all three phases are represented by one LN with three data attribute branches. Each of the Digital Inputs, Logical Inputs, Virtual Inputs, and Virtual Outputs have its own LN (GGIO) in the IEC61850 data model.

There are up to 12 views of IEC61850 data map. You can choose which active functions of Bulletin 857 and 865 relay can have their data accessible via the IEC61850 server interface. Description column in these views gives the native function name. LN column provides the LN object name.

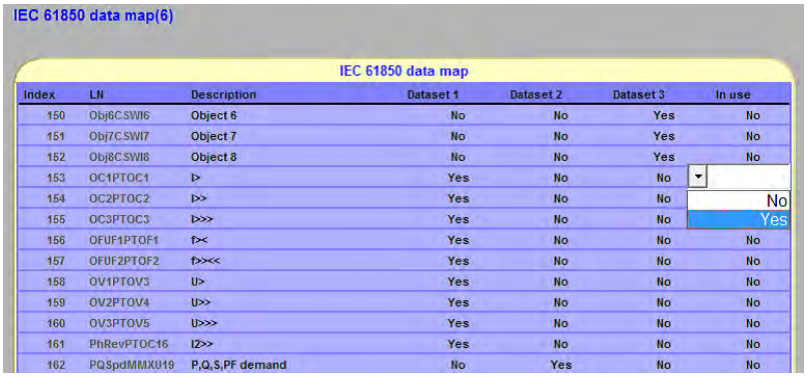
Figure 3 - 61850 Data Maps



Complete the following steps to choose the subset of active relay functions, which are important for SCADA monitoring and control.

1. Change the selection to YES in the associated Data Set, see Figure 4.
2. Set the In use column to the Yes value for an active function that has data accessible via IEC61850 server interface.
3. Set all other functions to No.

Figure 4 - Data in Use Selection



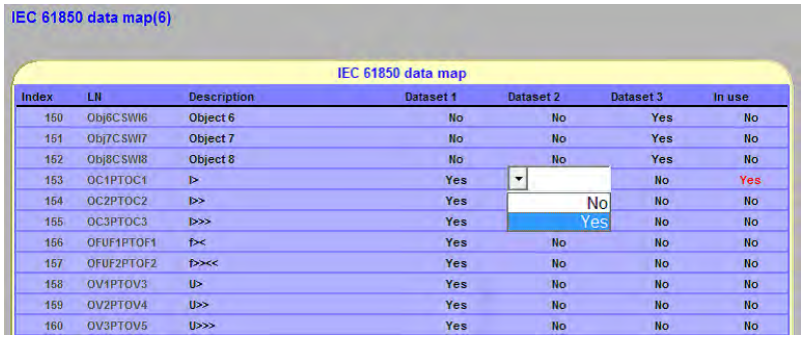
For functions with In use flag set, their data attributes can be assigned to any of the three predefined data sets (named DS1, DS2, and DS3). By such assignment these data can be reported to client systems that are using Report Control Blocks to supervise the data sets.

Assign LN Data

To assign LN data to a pre-defined data set, select the Yes value in the respective column of that data set.

Only process data of LNs is assigned to predefined data sets and are the data with ST (status) and MX (measurement) functional constraint. For example, start and trip states of protection LNs (ST) and all measured values of measurement LNs (MX). A member of the data set is a structure that is composed of process data value, quality, and time stamp attributes. Some LNs provide multiple members to the selected data set. For example, a protection LN provides two members, start and trip. Current measurement LN provides three members, currents for three phases. Any of the 3 pre-defined data sets can exclude more than 150 members.

Figure 5 - Dataset Mapping



Typically, all data is collected into one data set for the clients. One RCB is needed per client to perform data reporting.

The setup of IEC61850 data map must be carefully specified. If LNs are missing, it disables the SCADA system from seeing certain parts of the process while obsolete LNs deliver constant 0 values.

By default the pre-configured data sets are assigned to RCBs.

- DS1 is assigned to BRCB1 and URCB1
- DS2 is assigned to BRCB2 and URCB2
- DS3 is assigned to BRCB3 and URCB3.

If some data set are left empty as a result of configuring IEC61850 data map, the appropriate data set assignment in RCBs is null.

By default there is only one Logical Device in the data model of Bulletin 857 and 865 relay. All LNs are placed under this LD.

Setup of Deadband Values for Supervision of Analog Data

To monitor changes of measurements in the relay application functions, the IEC61850 interface program relies on deadband calculation.

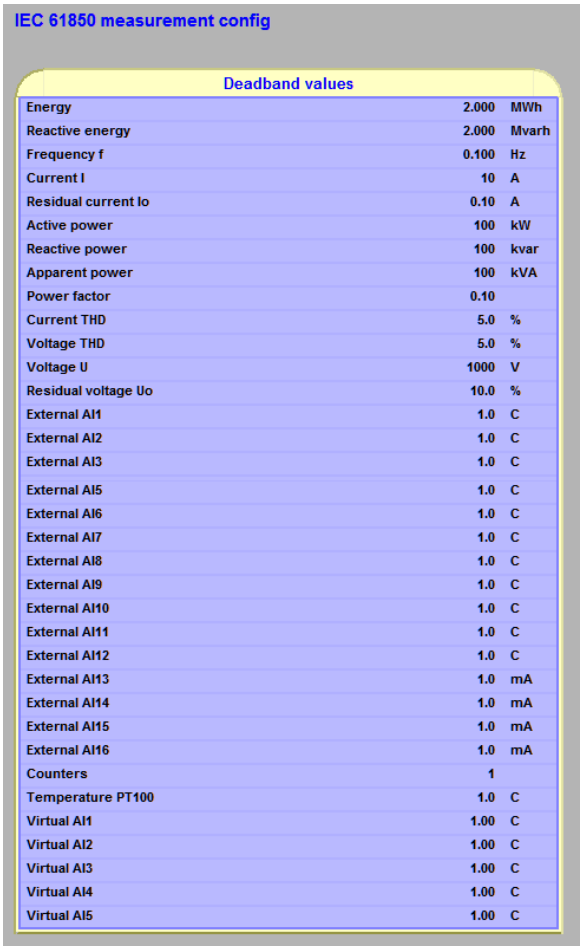
In the IEC61850 deadband configuration view, there is a deadband parameter for each measured quantity. Value 0 is interpreted as any change being of importance.

IMPORTANT Deadband parameters with values that are too small can cause unnecessary overhead in the data transfer.

The deadband calculation algorithm has two variants: absolute deadband and integrated deadband. To apply absolute deadband set the deadband integration time parameter to 0 seconds, otherwise choose the required integration time.

For example, if Current I deadband value is 5 A and Integration time is 0. The change condition is satisfied when the signal value changes of more than 5 A from the previously reported value. With setting Current I deadband value of 5 A and Integration time set to 1. The change condition is satisfied when the signal value changes. For example, more than 1 A from the previously reported value and remains such for 5 seconds.

Figure 6 - Deadband Selection



Preliminary Configuration of GOOSE

The main parameters of the GOOSE communication are available via the GOOSE configuration menu, see Figure 7).

In the Bulletin 857 and 865 Protection System, one-bit binary signals can be sent/received as GOOSE data. One device can send a maximum of two GOOSE data packets that contain 8 bits of data. The maximum number of data points that can be sent from one device is 16 bits. Goose control block 1 (GCB1) and Goose control block 2 (GCB2) are used to control the sending of these two 8-bit GOOSE data packets.

GOOSE data is multicasted to the Ethernet network. The multicast MAC ID, Application ID, and Configuration Revision are the main parameters when routing the information from one relay to the other.

The MAC ID that is used in GOOSE communication is independent from the MAC IDs of the devices in the Ethernet network. One device can receive a maximum of 64 bits of GOOSE data. This data can be used in the device internal logic and output matrix and are named as GOOSE NI1...GOOSE NI64.

Usually at this stage of the system configuration there can be limited knowledge about the data flow among different devices.

In the GOOSE configuration view (unless you have already received system parameters) set the Subscriber configuration Enable flag to Yes.

The MAC ID that is used in GOOSE communication is independent from the MAC IDs of the devices in the Ethernet network.

One device can receive a maximum of 64 bits of GOOSE data. The data can be used in the device internal logic and output matrix and are named as GOOSE NI1...GOOSE NI64. See Table 4 on page 24 for descriptions of the publisher parameters.

Figure 7 - Goose Configuration

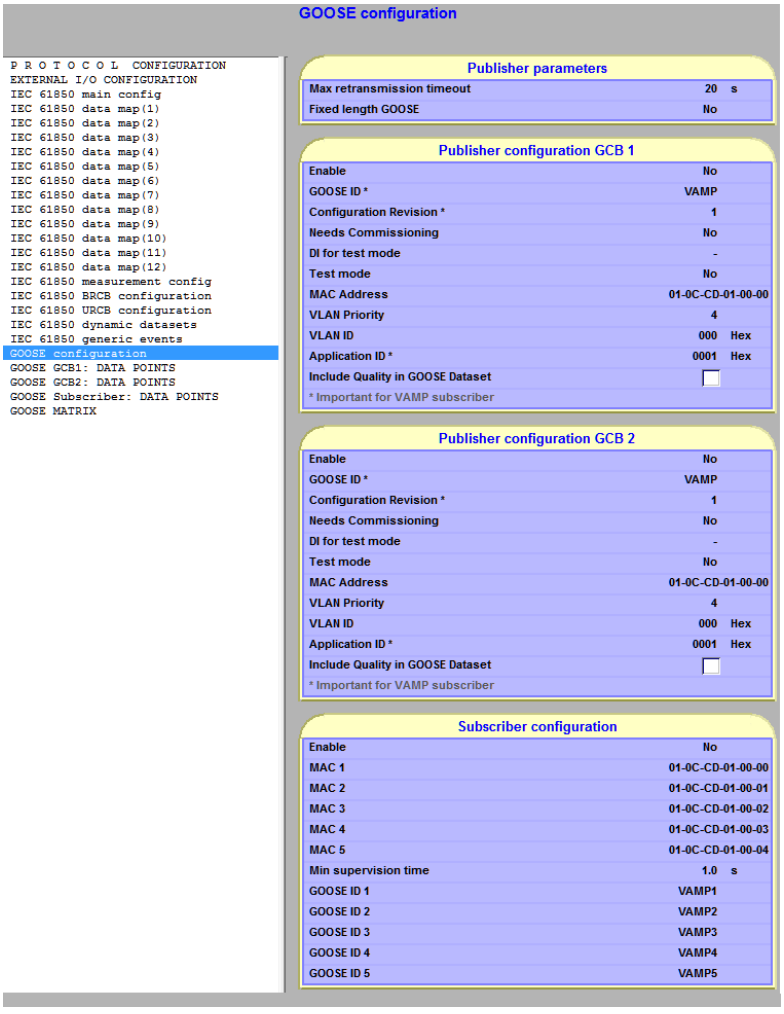


Table 4 - Goose Configuration - Publisher Parameters

Publisher Parameters	Description
Max retransmission timeout	The selection must equal the GOOSE background send cycle.
Fixed-length GOOSE	Selection of No/Yes disables or enables sending the GOOSE messages in flexible or fixed format. Edition 2 defines the Fixed-length feature.
Enable	Selection of Yes or No enables or disables the publishing of data that GCB 1 defines (data points group in 1).
The GOOSE ID	A textual string that is used to describe this GOOSE data packet. This description can be used in the receiving end to identify the correct message.
Configuration Revision	Can include a number that describes the GOOSE configuration revision. If this number is changed, then the revision number must be aligned also in the receiving end to make the connection work again.
Need Commissioning	A No/Yes flag, which can be used to indicate that a change has occurred in the configuration and a new commissioning is needed. When the Bulletin 857 or 865 devices receive a message with this flag set, the data is not delivered to the logics or matrix. But the status is shown in the subscriber view.
Test Mode	Determines the mode of operation. When selected to No, the system is running in normal operation. When set to Yes, the relay is in a Test mode. When the Bulletin 857 or 865 device receives a message with this flag set, the data is not delivered to the logics or matrix. But the status is shown in the subscriber view.
MAC Address	The GOOSE MAC ID. This MAC ID is not the same address that is used in the Ethernet system. This MAC ID must be in the range of (01-0C-CD-01-00-00…01-0C-CD-01-01-FF only and is to be used as destination address for the GOOSE message.
VLAN Priority	Selection provides a priority number, which matches any priority code that is used in the Ethernet switches to give higher priority to the GOOSE messages.
VLAN ID (hexadecimal value)	The Virtual LAN is used to deliver this GOOSE message, VLAN ID can be used to identify the correct Virtual LAN.
Application ID (hexadecimal value)	The setting is a number that is used to identify this GOOSE message source. This ID is used in the receiving end to identify the correct message. Use another Application ID in different relays, because this ID is the main identification criteria when receiving GOOSE data in the Bulletin 857 and 865 relays. Also use different Application ID for GCB1 and GCB2.

There are several selections within the Subscriber Configuration tab as shown in Table 5.

Table 5 - Subscriber Configuration Parameters

Subscriber Parameters	Description
Enable	The selection of No/Yes, disables, or enables the GOOSE subscriber (receiver) functionality.
MAC Address	Must equal the MAC destination address, which is valid for the incoming GOOSE messages
Min supervision time	Sets a minimum timeout for indicating the invalid status of GOOSE Network Inputs due to no incoming GOOSE messages. This value is the exceeded supervision time or time that is allowed to occur from the last GOOSE message, whichever is greater. The Bulletin 857 and 865 devices can receive GOOSE data only with one defined MAC Destination Address (Subscriber configuration).
The GOOSE ID 1…5	A List of GOOSE IDs that can be used to check the following: • Incoming GOOSE messages • MAC ID • Application ID • Configuration Revision

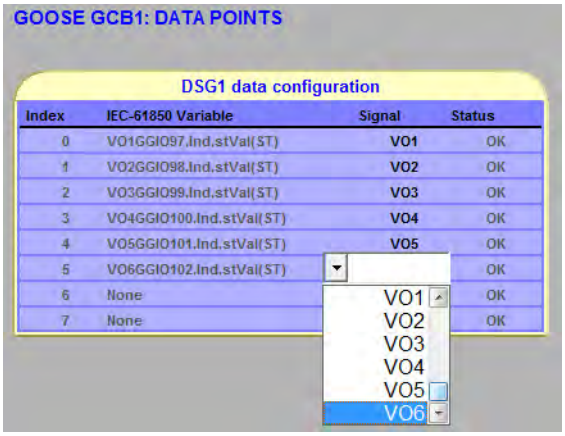
There are some special GOOSE extensions considerations that are specific to newer firmware revisions. The following are extensions in GOOSE communication that start from firmware revision 12.

- The maximums number of data points that can be sent form one device is 2 x 16 signals.
- lso analog values (IL1, IL2, IL3, UL1, UL2, UL3, Io1, IoCalc, P, Q, S, P.F) can be sent in GOOSE messages
- The IEC-61805 server checks changes of analog values with a cycle of 500 ms and are subject to deadband calculation. The minimum cycle of receiving new values of analog signals is 500 ms.
- States of objects 1...8 can be sent in GOOSE messages
- Specific bits from received bit string (that is objects status or quality) or integer can be selected as input for binary NIs.

Based on the list of active application functions, and their mapping to IEC61850 LNs, select information that the relay can transmit to the network as GOOSE Publisher, using GCB1 and GCB2 objects.

Data set DSG1 lists data that GCB1 transmits. Data set DSG2 lists data that GCB2 transmits. Each of these data sets can include up to eight members, and only binary signals from active LNs can be assigned. DSG1 and DSG2 is typically transmitted to different destinations, thus they are configured independently. In the view GOOSE GCB1: DATA POINTS the pull-down menu shoes the binary data available for assignment to the data set related to GCB1.

Figure 8 - GOOSE GCB Data Points



In a similar way, the view GOOSE GCB2: DATA POINTS allows it to configure the data set DSG2 related to GCB2.

The relay checks availability of all signals that are assigned to DSG1 and DSG2. An OK value in the Status column confirms availability. If a required signal is not available, its Status is set to Not in use, because its LN is not marked as In use in the IEC61850 data map.

After revising the IEC61850 data map, the configuration of DSG1 and DSG2 can be continued.

The setup of GOOSE Subscriber: DATA POINTS can be now left untouched.

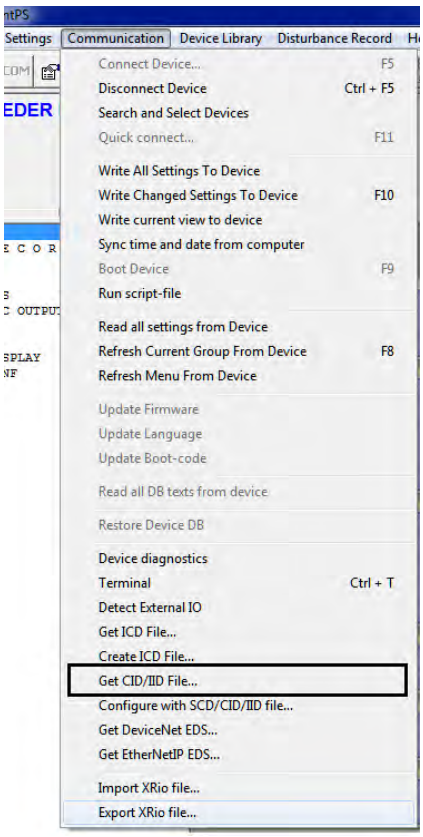
Generation of CID File for the Relay

The previous task defined the data model of the IEC61850 server in Bulletin 857 and 865 relay. The Configured IED Description CID is generated using Get CID file... command from Communication menu of the SetPointPS tool. The IEC61850 services, supported by the server in the relay, are described in the ICD file.

- LD and LNs included in the data model
- all pre-configured data sets with their names and lists of members
- Eight default BRCBs
- Eight default URCBs
- Two default GCBs.

The produced CID file is saved under a given name in the proper file directory to be used in further steps of the configuration process.

Figure 9 - Communications - Get CID/IID

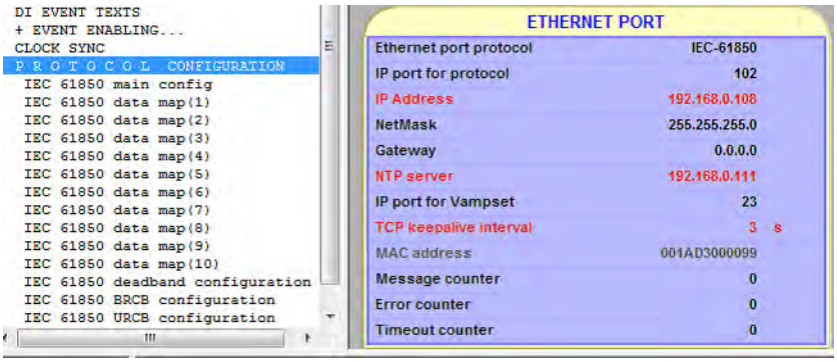


Advanced Relay Configuration Using SetPointPS

This optional continuation of Bulletin 857 and 865 relay configuration is performed if the system-related information is already available. Otherwise, omit the steps in this chapter and proceed to Chapter 4 IEC 61850 System Configuration Building Using SCD Editor.

Setup of the Relay Network Address and IED Name

In PROTOCOL CONFIGURATION view, go to the ETHERNET PORT section and do the following procedure.



1. Set the IP Address of the relay to be used in the target system.
2. Configure the NetMask address.

   The Gateway address can be discarded if the relay only communicates within the local substation network.

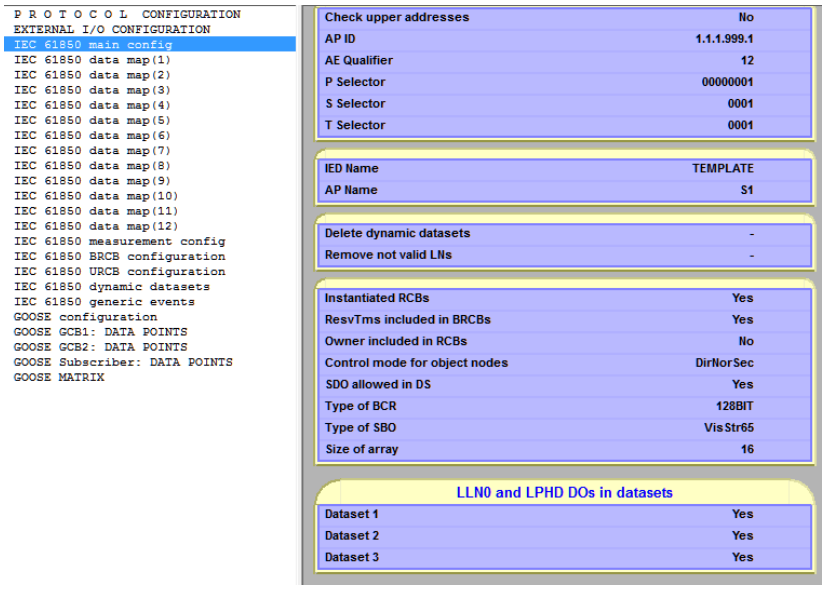
   In IEC61850 systems, all IEDs clocks are synchronized with the common time source. The NTP server parameter configures the IP address of the time server.

   For supervising the TCP connection with client devices, the relay uses keepalive messages.
3. Set the TCP keepalive interval parameter to the required number of seconds.
   It is recommended to set this parameter, as the client device can be unprepared for sending TCP keep alive messages.
4. In the IEC 61850 main config view, configure the additional addressing parameters of the IEC 61850 server.

The default port number in this standard is 102.

5. Define the settings of upper layers above IP by using the following parameter and settings.
   a. In the system requirements, determine whether the server interface must check these parameters values whenever there is a connection request. Or, whether these parameter values can be ignored and the connection is settled only based on IP address of the request.
   – If parameters values must be checked, whenever there is a connection request set the upper addresses to Yes.
   b. Set the parameter values as required in the system specification with these parameters.
   - AP ID
   - AE Qualifier
   - P Selector
   - S Selector
   - T Selector

   For default values of these parameters, see Table 2 on page 16.



   c. Change the IED Name parameter from the default value TEMPLATE. Use a unique device name in the system, for example, Bulletin 857_feeder.

   The Delete dynamic datasets control flag allows you to clear the definitions of persistent dynamic data sets created by IEC 61850 clients during previous communication sessions. The relay with factory default settings must have no dynamic data sets in its configuration. Otherwise, if the device is reconfigured from a previous setup, those old dynamic data sets can be erased from nonvolatile memory by selecting value DELETE for this control flag.

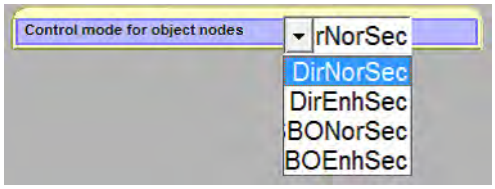
   d. Check the RsrvTms included in BRCBs flag for compliance with Edition 1 or 2 of the IEC61850 standard.

RsrvTms included in BRCBs flag informs whether BRCB structures include an attribute added in Edition 2 of the IEC61850 standard. For compliance with Edition 1 of the standard, set the flag value to No. Otherwise, leave the value Yes.

e. Check which control model is chosen in the system specification.

Control mode for object nodes parameter defines which IEC61850 control model is used in CSWI LNs that represents control objects of Bulletin 857 and 865 relay. The same control model is applied to Objects 1...6 (Objects 7...8 provide only status information and their control model is always set to status only).

f. Set the Control mode for object nodes parameter.



The possible Control modes for object nodes parameter values are listed in the following table. Direct with normal security (DirNorSec) is the simplest model, but a more advanced procedure can be required.

Control Mode	Description
DirNorSec	Direct with normal security, one-step control procedure, no activation termination message.
DirEnhSec	Direct with enhanced security. One-step control procedure, activation termination message upon completion of the procedure or time-out. Before activation termination no further control command can be executed on a given object.
SBONorSec	Select before operate with normal security, two-step control procedure, possible cancel after select, no activation termination message.
SBOEnhSec	Select before operate with enhanced security. Two-step control procedure, possible cancel after select, activation termination message upon completion of the procedure or time-out. Before activation termination no further control command can be executed on a given object.

IMPORTANT In Bulletin 857 and 865 relays, the control model for the objects cannot be changed in runtime using IEC61850 communication services.

Setup of Report Control Blocks Parameters

Configuration of Report Control Block parameters prepares RCB objects to report data to the subscribing client devices. In Bulletin 857 and 865 relays, there are 3 BRCB objects and 3 URCB objects available for clients. The main difference between BRCB and URCB is that BRCB collects and buffer data reports also during the period when there is no active subscription from a client device.

BRCBs are typically dedicated to provide data reports to such clients as SCADA systems or gateways to Network Control Centers. URCBs are typically used by such clients as additional operation workstations, test stations, devices that are temporarily connected to the network.

To configure BRCBs, go to the IEC 61850 BRCB configuration view.

1. Select the Supervised Dataset name from the pull-down menu including all predefined data sets with contents that are configured along with IEC61850 data map.

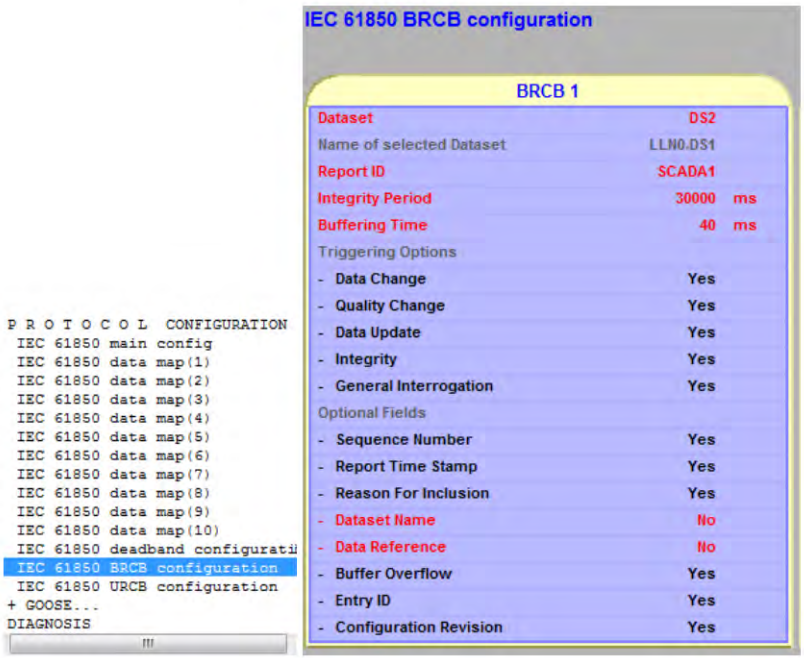
IMPORTANT In the pull-down list of the reconfigured relay, names of client created dynamic data sets can appear, if they were stored in nonvolatile memory of the relay.

   The Name of selected Dataset parameter, read-only, shows the full data set name including the LN under which the selected data set is located.

2. Configure Report ID, which is used by client to recognize the source of received reports. This value can be a text string and must be unique per client. A default value is a data reference name of RCB in the device.
3. Set the Integrity Period parameter to define the cycle that integrity reports are sent with current values of all members of the supervised data set.

   If this parameter is set to 0, integrity reports are not sent. This cycle is configured in milliseconds. A reasonable value to set is at least in the range of tens of thousands, for example 10 seconds.
4. Set the Buffering Time parameter to specify the maximum time to suspend the report transmission after the first report entry has been collected.

   This setting allows the combination of multiple entries into one report message and avoids frequent transmissions. Typically this parameter value is set to hundreds of a millisecond.



5. Set the Triggering Options parameter flags to define the reason that the relay produces data reports.

   The following list describes each option.

- Data Change – value change (for example, CB position change, trip status change, current value change).
- Quality Change – when quality attribute changes its state (for example, due to physical input failure, sensor failure).
- Data Update – when new data values on certain relay application functions are computed (for example, harmonic component values calculated cyclically).
- Integrity – with configured period.
- General Interrogation – upon the client request.

6. Set Optional Fields in RCB configuration to define the information that is included in the data report.

IMPORTANT The Buffer Overflow and Entry ID fields are only in the BRCB produced report, not by URCB.

7. To configure URCBs return to IEC 61850 URCB configuration view.
8. Repeat all steps 2...6 of this procedure.

Setup of GOOSE Publishing Parameters

Two GOOSE Control Blocks represent the supported two GOOSE Publisher functions. In GOOSE configuration view, the parameters of GCB1 and GCB2 can be set.

1. Set the Max retransmission timeout parameter by selecting the preferred parameter value from the pull-down list.

   This value defines the final cycle of transmitting GOOSE messages by GCB when no data changes occur. This cycle is called the GOOSE keep alive cycle. It is common for GCB1 and GCB2. No retransmission within this time allows GOOSE Subscribers to assume GOOSE Publisher failure.

2. Set the Enable flag to Yes.

   The Enable setting allows you to activate GCB and start GOOSE message transmission immediately after the IEC61850 interface is initialized. When set to No, GCB must be enabled in runtime by some client that is performing a write operation on this GCB attribute.

3. Set the GOOSE ID parameter, which is a text string that is used as source identifier in transmitted GOOSE messages.

   Bulletin 857 and 865 relays as GOOSE Subscribers do not use this parameter for filtering the incoming messages. However, other subscribers can require it.

   Bulletin 857 and 865 relay as GOOSE Subscriber relies on the Application ID parameter – a number that can also be used as source identifier in GOOSE messages.

4. Set the Configuration Revision parameter, which provides the version number of the data, set related to GCB.

   It must be updated after each reconfiguration of the data set contents.

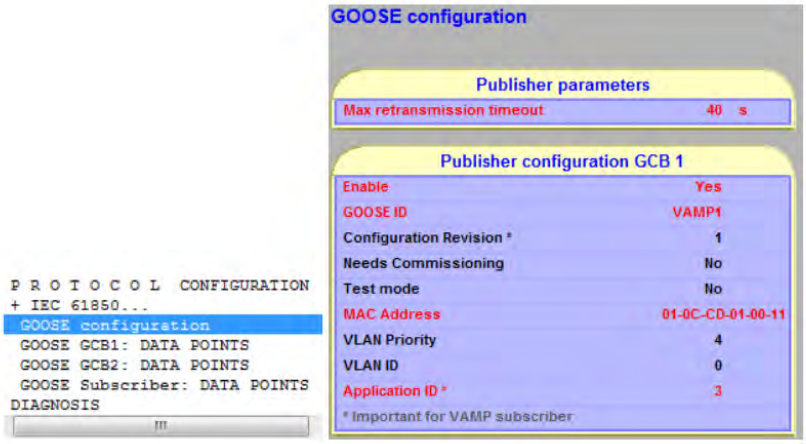
5. Set the Needs Commissioning flag.

   The flag can be set to Yes only when system tests are run and verifying the configuration. Otherwise, the value must be set to No.

6. Set the Test mode flag.

   The flag can be set to Yes only when system tests are run and verifying the configuration. Otherwise, the value must be set to No.

IMPORTANT If the Bulletin 857 and 865 relay receives a GOOSE message with one of these fields sets (steps 5…7) data values from this message update Network Inputs only. The changed values are not propagated to the application matrices and application.



7. Set All GOOSE Publishers transmitting data to Bulletin 857 and 865 relay to the same MAC ID value set in their GCB configurations. The allowed value range for this multicast MAC ID parameter is 01-0C-CD-01-00-00...01-0C-CD-01-FF-FF.

   The MAC ID parameter defines Ethernet multicast address as a destination of GCB transmitted GOOSE messages. Bulletin 857 and 865 relay as GOOSE Subscriber can accept only one such address of GOOSE messages to be processed.

8. Set the VLAN ID to the same value in GCB and in the switch ports for the relays that receive these GOOSE messages.

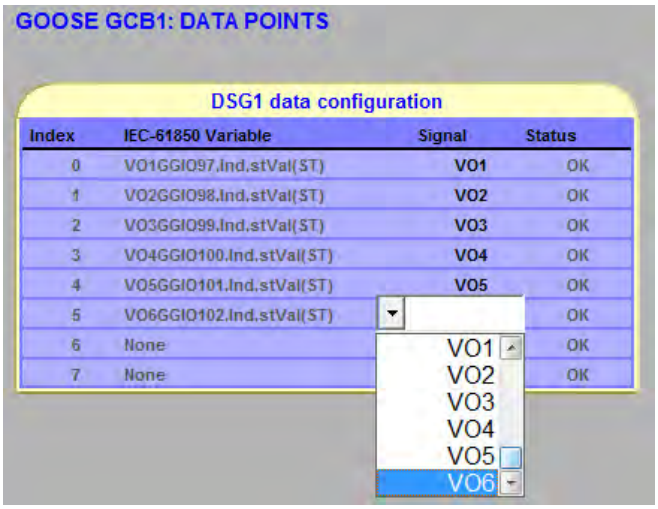
   VLAN Priority and VLAN ID parameters are set in accordance with system specification. VLAN switches allow you to build subnetworks in the system and limit the message flow.

Setup of Data Sets for GOOSE Publishers

In the view GOOSE GCB1: DATA POINTS the pull-down menu shows the binary data available for assignment to the data set related to GCB1. In a similar way, the view GOOSE GCB2: DATA POINTS allows you to configure the data set DSG2 related to GCB2.

The relay checks availability of all signals that are assigned to DSG1 and DSG2. The OK value in Status column shows confirmation. If a required signal is not available, its Status is set to Not in use. The reason is because its LN is not marked as In use in the IEC61850 data map. After revising the IEC61850 data map, the configuration of DSG1 and DSG2 can be continued.

Figure 10 - GOOSE Control Block Configuration



IMPORTANT GOOSE Publishers in Bulletin 857 and 865 relays can only transmit binary signal values (Boolean type, value only, no quality and time stamp).

Setup of GOOSE Subscriber General Parameters

If the configured relay acts in the system as GOOSE Subscriber, then go to the GOOSE configuration view, in Subscriber configuration to setup the GOOSE Subscriber.

1. Set the Enable flag to Yes.
2. Configure the destination MAC ID of the incoming GOOSE messages. Remember the Bulletin 857 and 865 relay can accept GOOSE messages with only one configured address.

   Make sure that all GOOSE Publishers providing data to this GOOSE Subscriber must use the same destination address.
3. Copy the destination address to the media access control address parameter.

IMPORTANT GOOSE Publishers delivering data to GOOSE Subscriber in Bulletin 857 and 865 relay use only one common media access control address. To distinguish the source of publisher data. properly set another GOOSE Publisher parameter, Application ID (APPID), to another publisher-specific value.

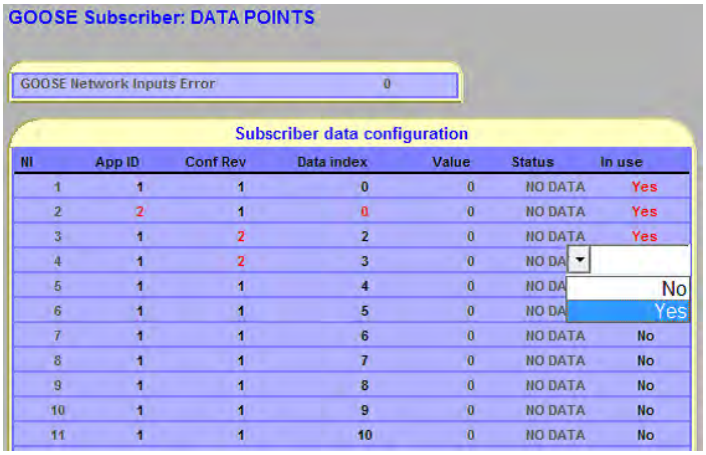
Map Data from Incoming GOOSE Messages Into Network Inputs

Bulletin 857 and 865 relays enable you to configure up to 64 Network Inputs that are named NI1...NI64. Each of NIs is binary signal that can receive its value from the incoming GOOSE messages. Network Input can provide this value to the relay application (matrices and logic). In this way, the signal transfer between different relays can be established in the IEC61850 network.

GOOSE Publishers and GOOSE Subscribers in Bulletin 857 and 865 relays can only process binary signals (Boolean type, value only, no quality and time stamp). It does not mean that other GOOSE Publishers must send only binary data in GOOSE messages. GOOSE messages can contain data of other types, but only binary data from them can be mapped to Bulletin 857 and 865 Network Inputs.

Selected Network Input to be used for providing network data to Bulletin 857 and 865 relay application must be first configured by setting its In use flag to Yes. Further configuration parameters define GOOSE message filtering to obtain the required data value for the NI. App ID parameter of NI corresponds to the Application ID parameter of GCB that transmits the GOOSE messages. Conf Rev parameter of NI corresponds to Configuration Revision parameter of GCB that is transmitting these GOOSE messages. Data index parameter represents the position of the data to be written into NI in the list of data values that are provided in the incoming GOOSE messages. The list index value is counted from 0 (and ends with 7 for messages from GOOSE Publishers in Bulletin 857 and 865 relays. The number of valid positions can be different in other relays).

Figure 11 - GOOSE Subscriber Data Configuration



IMPORTANT This configuration task is not simple and requires detailed information on already configured GCBs in other relays.

In runtime, you can use this SetPointPS view to monitor GOOSE Subscriber performance. The GOOSE Network Inputs Error tells whether there is some problem in the Subscriber configuration (if nonzero). In the NI table you can see:

- Incoming Value of NI and Status: OK (correct performance)
- OLD (if Time-to-live is exceeded for the received data)
- BAD TYPE (unmatched type – the publisher delivers other data than Boolean).

After this setup, you can define how the Network Inputs updated by GOOSE messages are used in Bulletin 857 and 865 relay application.

You can configure OUTPUT MATRIX, BLOCK MATRIX, AUTO-RECLOSING MATRIX, and OBJECT BLOCK MATRIX by specifying how GOOSE NI signals operate on other signals or functions.

You can also use GOOSE NI signals in the defined LOGIC of Bulletin 857 and 865 application. See Review / Update of Network Inputs Processing on page 54.

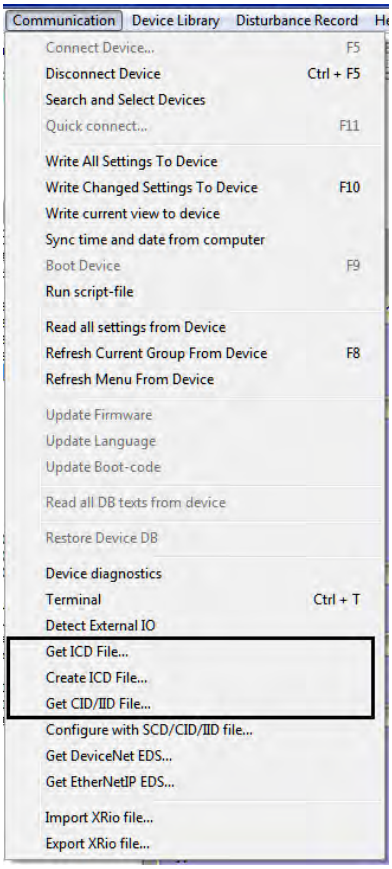
Generation of CID or IID File for the Relay

The tasks in Map Data from Incoming GOOSE Messages Into Network Inputs create an instantiated and testable configuration of the IEC61850 server in Bulletin 857 and 865 relay. Therefore, instead of generating an ICD file (IED Capability Description) it is more appropriate to generate aCID (Configured IED Description) or IID file (Instantiated IED Description).

The generation of the CID file satisfies the requirements for most systems. However, you can also generate the IID file if you wish. Use the Get CID or Get IID file... command from Communication menu of the SetPointPS tool.

The produced IID file is saved under a given name in the proper file directory to be used in the next step of the configuration process. Compared to ICD file, the IID file includes an assigned IED name, the configured network addresses in Communication section, parameters of BRCBs, URCBs, GCBs, and semi-reference information in Inputs section.

Figure 12 - Generation of IID/CID File



After Chapter 3 is completed the relay is pre-configured for a specific network role in the IEC 61850 system (assigned network address, defined data flow parameters).

The defined configuration can be verified using the listed testing tools (Bulletin 857 and 865 61850 Simple Tester). The relay acts as an IEC 61850 server device and responds to IEC 61850 client requests. The Relay can transmit GOOSE messages in accordance with the setup of GCBs and to receive GOOSE messages from the network in accordance GOOSE Subscriber setup. This prepared configuration can, however, require further adjustments in Chapter 4, when the complete system is defined including all devices and all dependencies between the devices can be verified.

Notes:

IEC 61850 System Configuration Building Using SCD Editor

You can build a new substation system configuration description or update a previously defined configuration by adding new devices or by modifying some parameters.

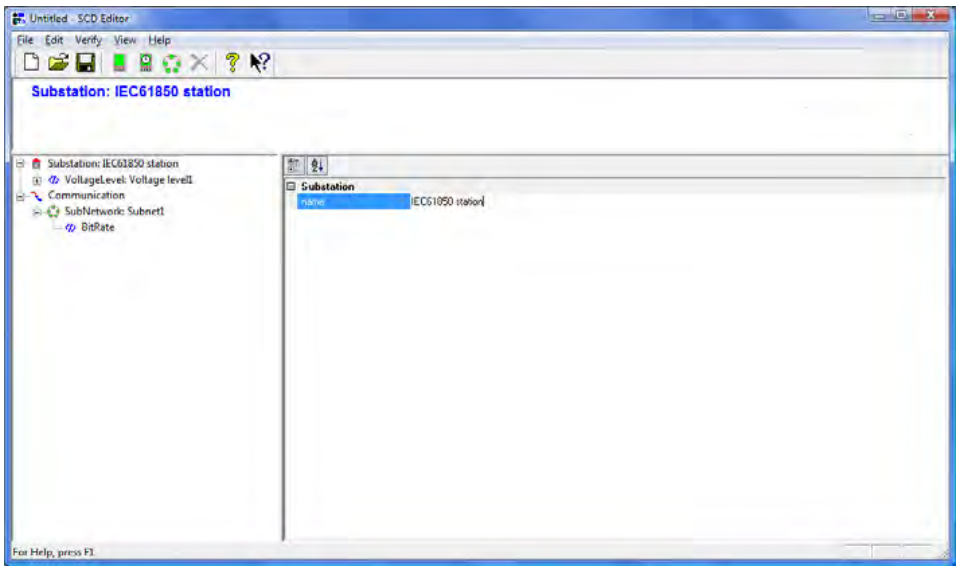
- To build s new substation system, start the tool to begin a new substation structure.
- To modify a previously defined configuration parameter, you must have an SCD file that describes the configuration. Read the SCD file into the SCD Editor by using the Open command from File menu.

While building the substation system configuration description, always save the temporary result in a file by using the Save or Save as command from the File menu.

Starting the System Configuration Description with New Substation

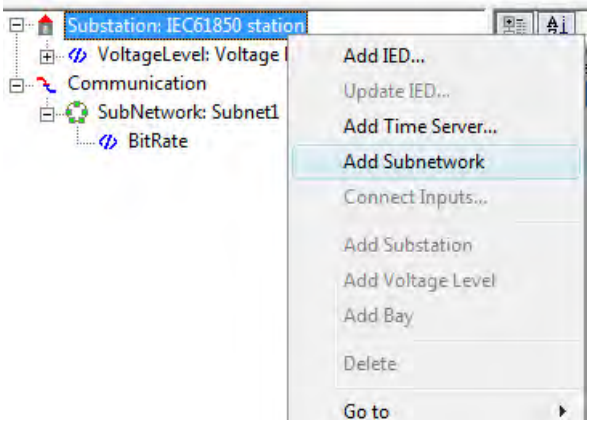
Initially, the tool creates an empty Substation structure with only one Subnetwork and without any devices. You can edit the substation name according to the received system specification.

Figure 13 - Substation System Configuration



In accordance with the system specification, you can add more subnetworks if necessary, by using Add Subnetwork command from Edit menu or from the context menu of Substation.

Figure 14 - Adding a Subnetwork

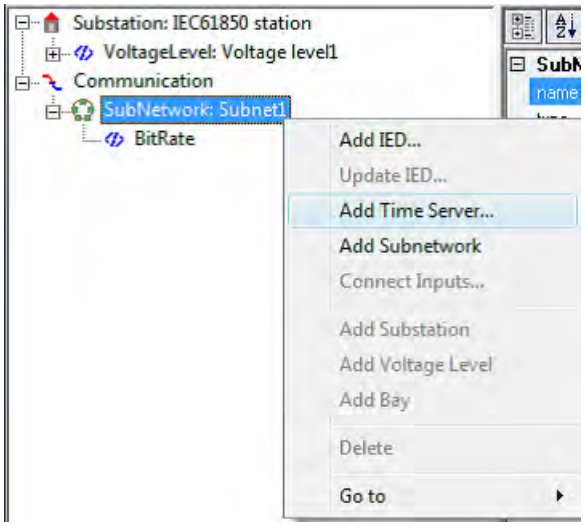


Subnetwork names can be set in accordance with system requirements. Another settable parameter of Subnetwork is Bitrate. IEC61850 requires at least 100 Mbps.

Adding the Time Server Device to the Selected Subnetwork

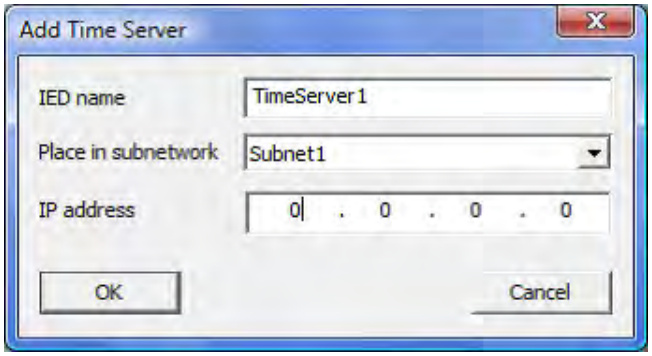
IEC61850 system requires time synchronization source for the clocks of IEDs. The source is a Time Server that supports NTP protocol. The Time Server can be added to Subnetwork by using the Add Time Server command from the context menu of selected Subnetwork.

Figure 15 - Adding the Time Server Device



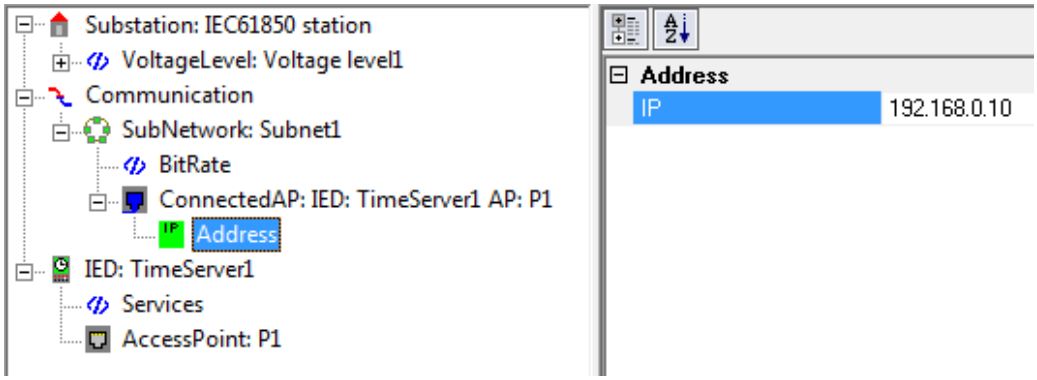
Time Server must be assigned to selected Subnetwork and must be given a unique IP address within this Subnetwork.

Figure 16 - Time Server IP Address



Added Time Server is visible in the system structure – among Substation devices and in the Communication section among Connected AP (Access Points).

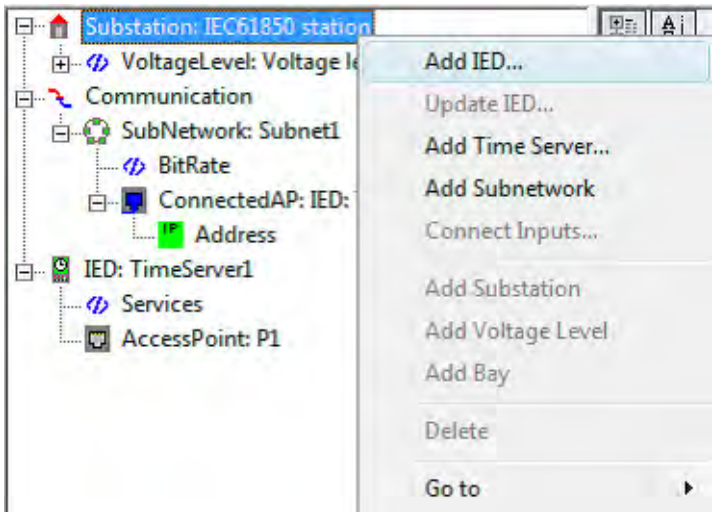
Figure 17 - Time Server IP Address Data



Adding IED to the System

To add an IED to Substation, perform the following steps.

1. From the context menu of Substation, select the Add IED command.



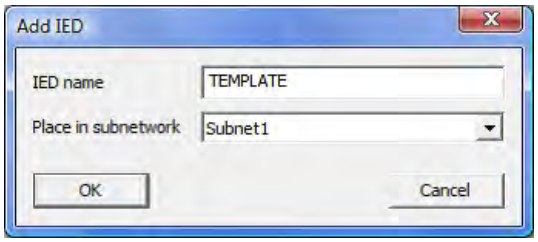
2. Select an ICD (or IID) file that describes the device.

   The SCD Editor requires you to choose an IED name for this device. The name must be unique within Substation.

3. Assign this device to one of the available Subnetworks.

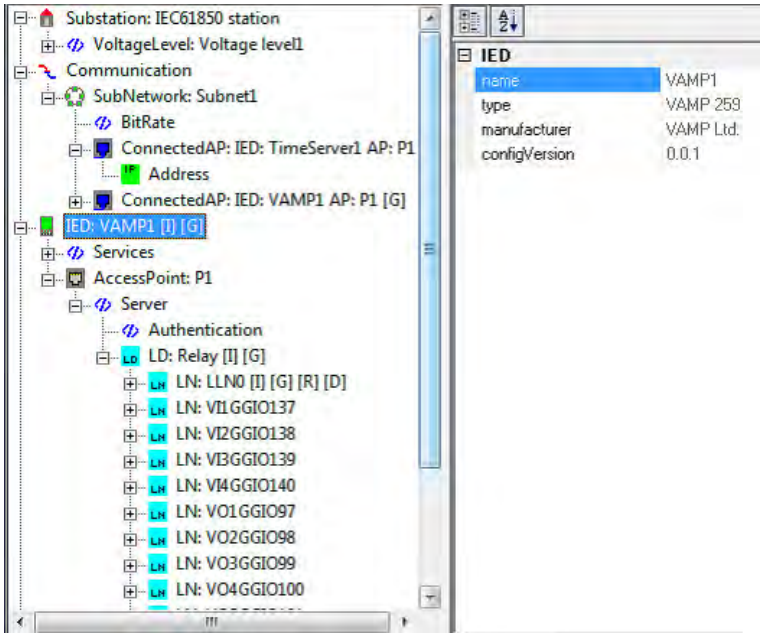
4. Change the default IED name for ICD files.

   The default, TEMPLATE, must be changed, for example to *857no1*. The SCD Editor checks whether the name is unique in the system and if not, a new name is requested.



   The added IED structure can be examined. IEDs Connected AP also appear in the Communication section, under a chosen Subnetwork.

Figure 18 - IED Structure



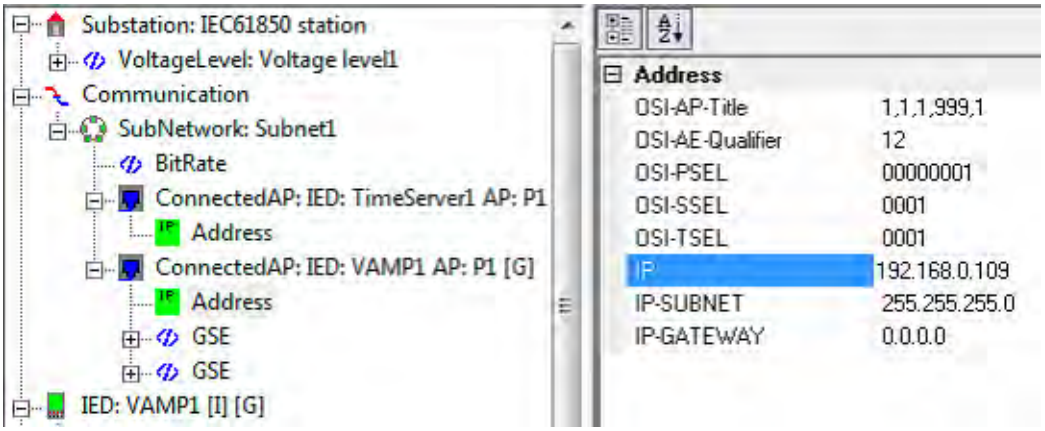
If you are importing a template ICD file, several parameters values must be set in the system configuration description.

If you are importing a pre-configured IID file, the set parameter values are imported into the system configuration description but must be verified for compliance with system requirements.

Setting IED Network Address

Each added IED must get a unique network address. This address must be checked / set in the Address parameters of the IED ConnectedAP in the chosen Subnetwork.

Figure 19 - Set IED Network Address

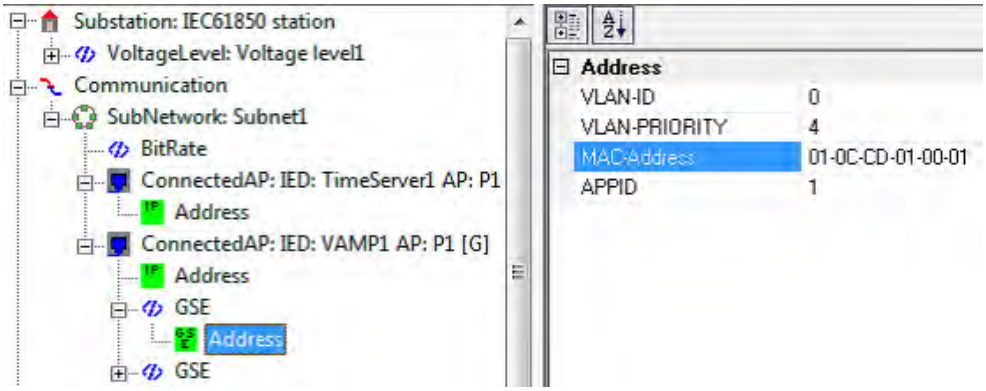


Address parameters group includes the device IP address and also upper layers settings.

Setting GCB Publishing Address

If an added IED contains GOOSE Control Blocks (GCB), their publishing addresses must be set. These Address parameters can be found in the IED ConnectedAP in the chosen Subnetwork, under the GSE branch that represents the GCB.

Figure 20 - GCB Publishing Address



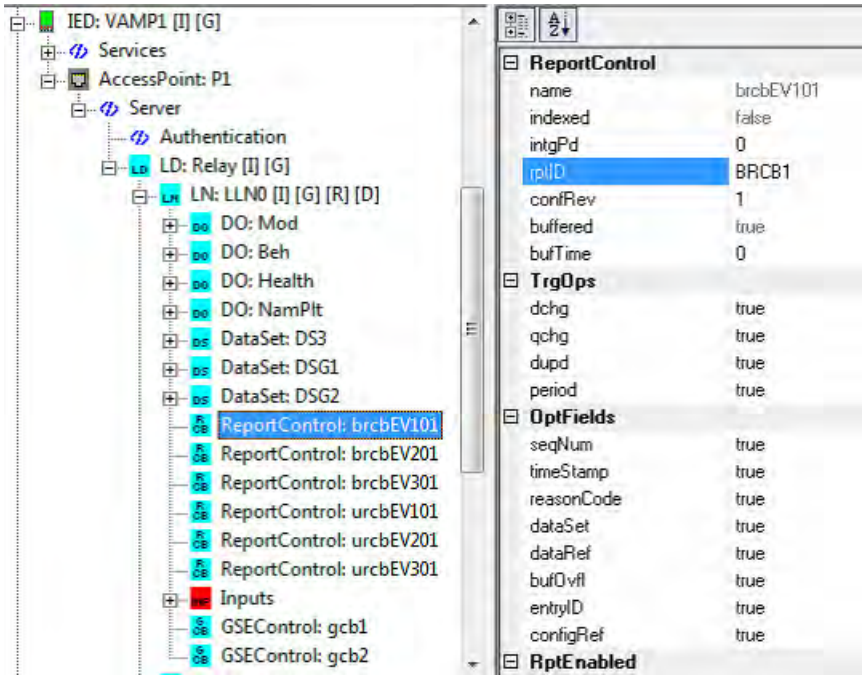
MAC ID (destination, multicast) and APPID (identifier for message filtering) are the most important parameters for GOOSE publishing. Remember that GOOSE Subscriber function in Bulletin 857 and 865 relays accepts only one value of MAC ID of incoming GOOSE messages. All GCBs in the devices use the same MAC ID value and APPID values distinguish the transmitted messages.

Check in the system specification what VLAN settings are used.

Setting RCB Parameters

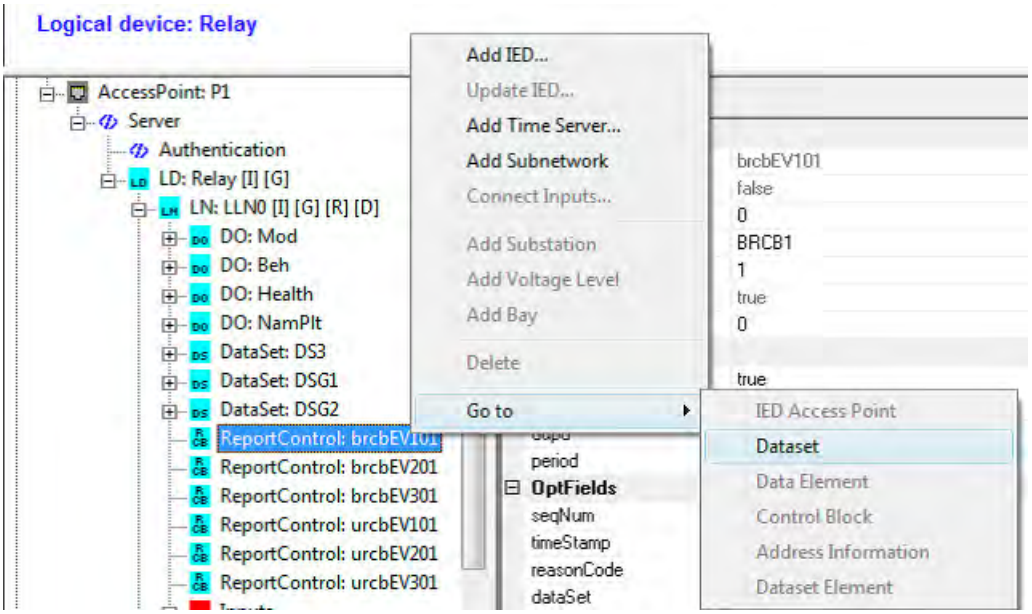
If an added IED contains Report Control Blocks (RCB), review and configure their attribute values. Browse the IED structure and locate RCBs in the LN branches marked with [R].

Figure 21 - Report Control Blocks Information



The data set assigned to a chosen RCB can be reviewed by invoking Go to ... and Dataset command from the context menu. If an RCB has no assigned data set, there is no context switch to data set description.

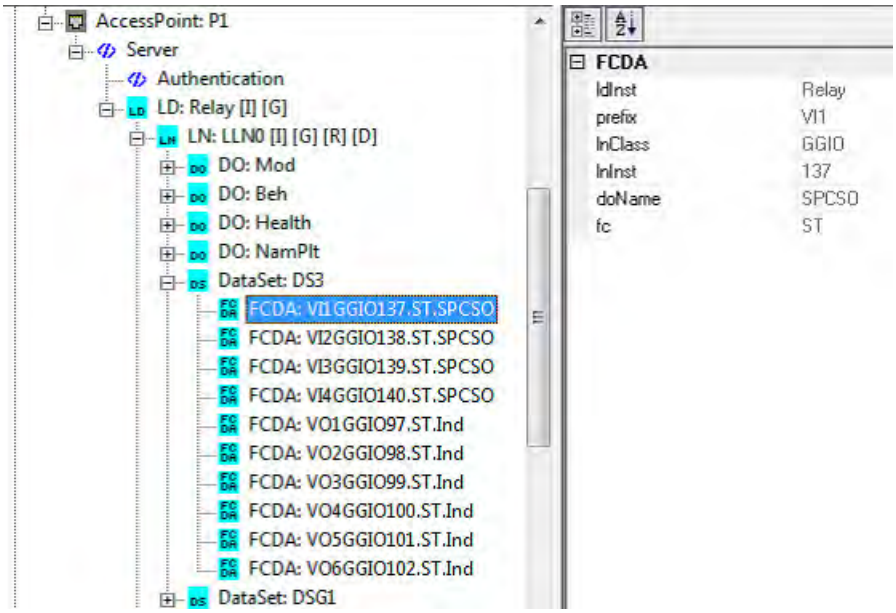
Figure 22 - Report Control Blocks Datasets



SCD Editor tool does not allow you to change the definitions of data sets. If the reviewed data set is missing data or has obsolete data, you must make the

next iteration of configuring the Relay IEC61850 data map. Use the SetPointPS tool to provide a new IID file to the SCD Editor.

Figure 23 - Functionally Constrained Data Attributes



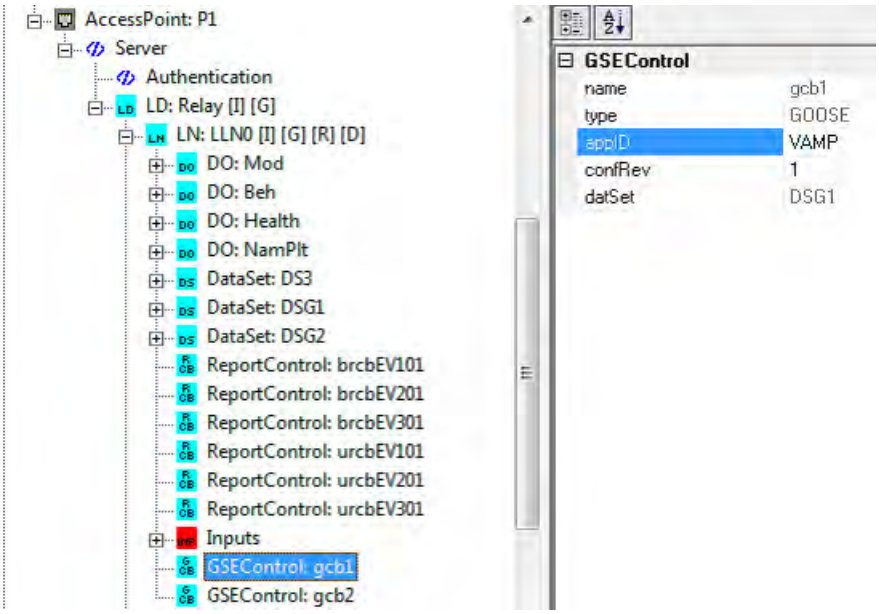
The system requirements assume that RCB parameters are not configured and are dynamically set by clients that are subscribing for reports.

Setting GCB Parameters

If an added IED contains GOOSE Control Blocks (GCB), their attribute values must be reviewed and configured. You can browse the IED structure and locate GCBs in the LLN0 branch marked with [G].

Only appID and confRev attributes of GCB can be configured with SCD Editor.

Figure 24 - Generic Substation Events Control



The data set assigned to a chosen GCB can be reviewed by invoking Go to ... and Dataset command from the context menu.

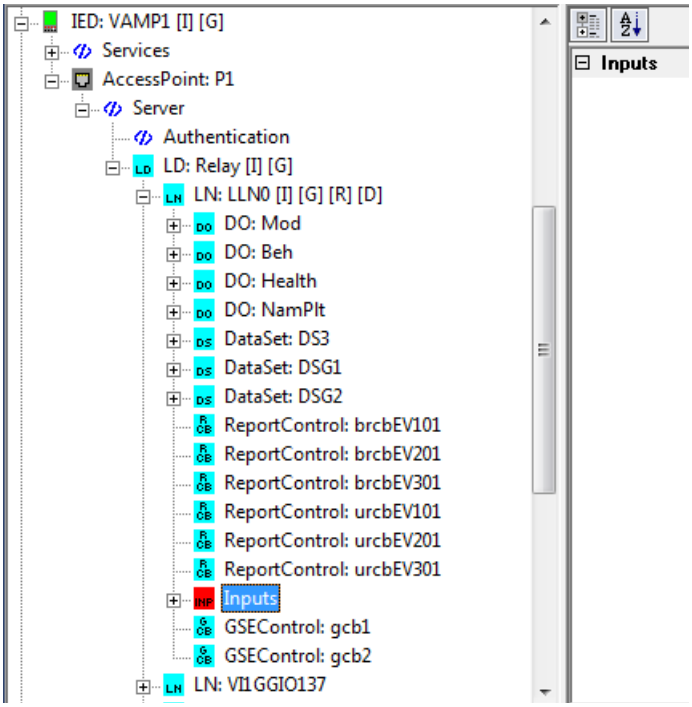
Binding between GOOSE Subscriber and GOOSE Publishers

For an IED including Inputs (GOOSE Subscriber function), the binding between chosen Network Inputs and published data of other IEDs must be set. The binding must be set in accordance with system requirements for horizontal communication.

An IED with GOOSE Subscriber function must contain a mark [I] in the LLN0 and Inputs section under LLN0 logical node.

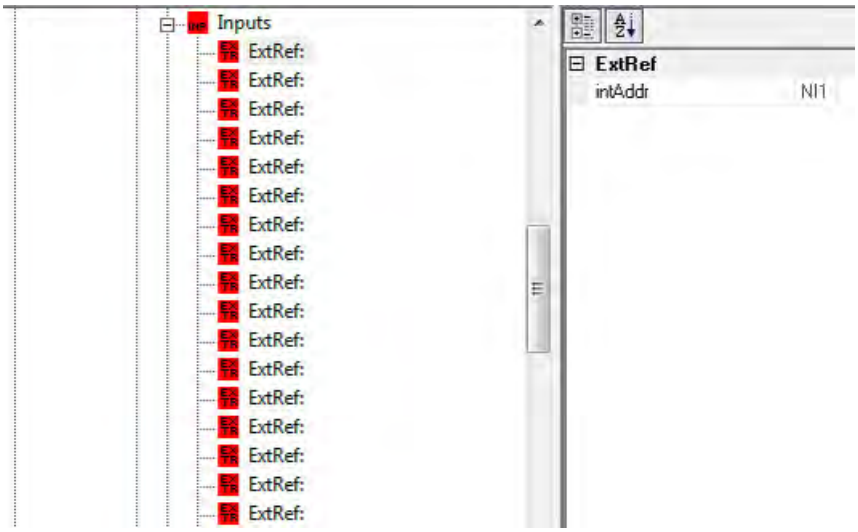
The binding between GOOSE Subscribers and GOOSE Publishers in the relays is a tedious and error prone process. Therefore, a verified specification of the required horizontal data flow must be prepared before starting this task.

Figure 25 - Generic Substation Events Control



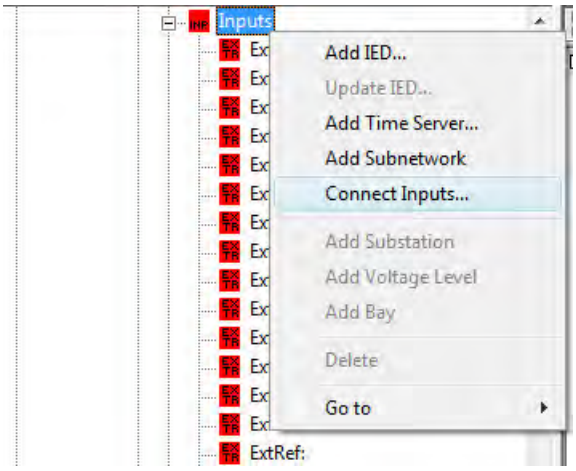
Inputs sections are initially unconfigured, with no data from other IEDs assigned as External References (ExtRef) to Network Inputs of this IED. Initially, ExtRef includes only one read-only attribute intAddr that defines to which NI this External Reference applies.

Figure 26 - IEDs Assigned External References



The binding can be configured by invoking Connect Inputs command from the context menu.

Figure 27 - External References Connect Inputs

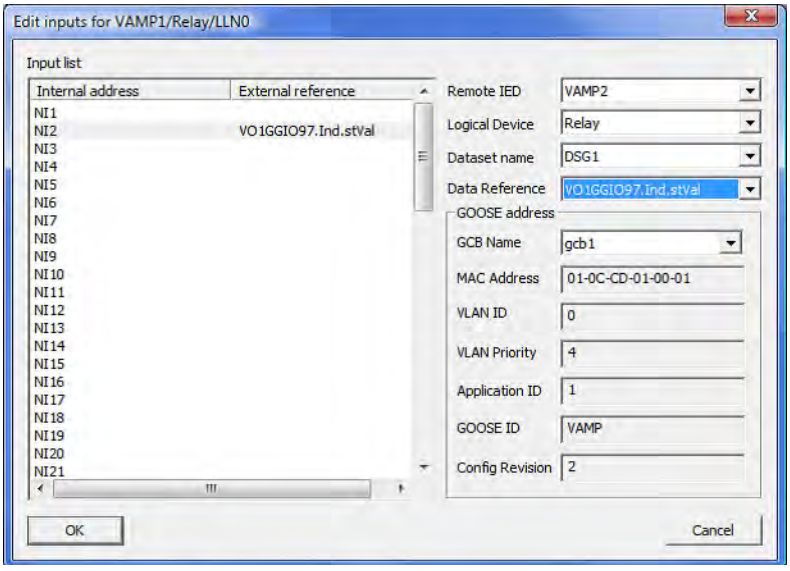


To edit the bindings between Network Inputs of the chosen IED and the other devices published GCB data perform the following steps.

1. Select a Network Input from the Input list.
2. From the Edit Inputs pull-down menus (Figure 28) choose the data to be received.
   a. Remote IED (publisher) and its LD.
   b. The Data set name.
   c. The Data reference.

   GOOSE publisher information is automatically provided in accordance with selected data. The pull-down menu includes only IEDs capable of transmitting GOOSE messages, with data belonging to data sets assigned to GCBs. The selected External reference appears next to NI. See Figure 28.

Figure 28 - Editing the Bindings between Network Inputs of the IED



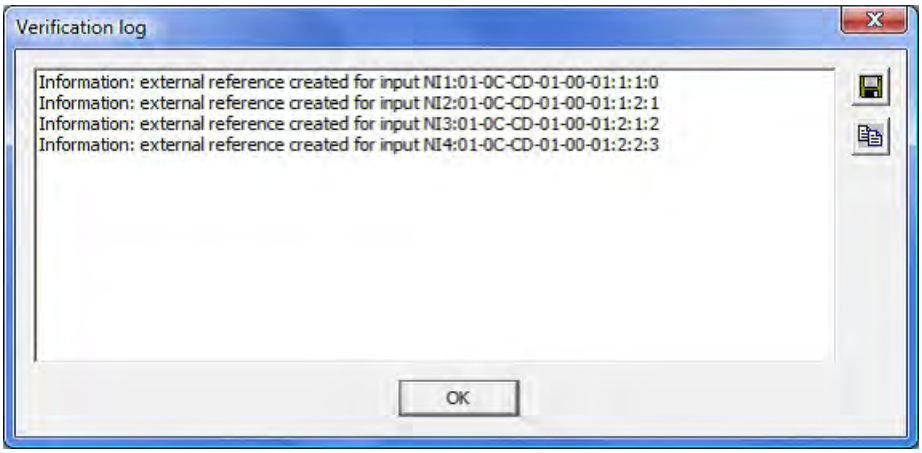
3. Click the OK button.

   The configured bindings can be reviewed by examining Inputs section. No editing of the parameter is possible on this view. To make changes in the External Reference definition, the Connect Inputs command must be executed again.

Figure 29 - Bindings between Network Inputs of the IED

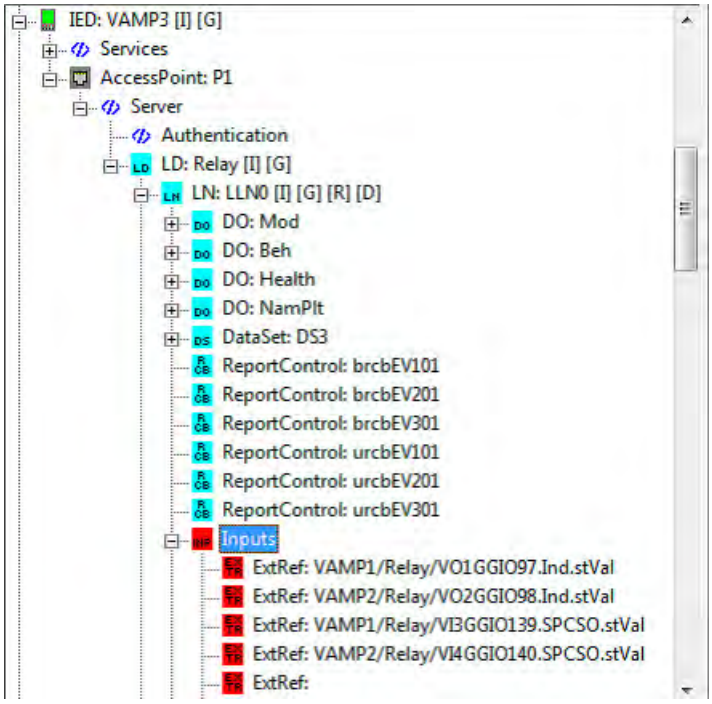
If an IED description is imported to SCD Editor by an IID file including some Network Inputs configuration, the SCD Editor verifies the GOOSE Subscriber parameters. After this verification, External Reference information is created only for the Network Inputs for which the source of incoming data can be resolved.

Figure 30 - Verification Log



The resolved External References can be reviewed by examining Inputs section of this IED. Unresolved configurations of Network Inputs are cleared.

Figure 31 - Input Bindings



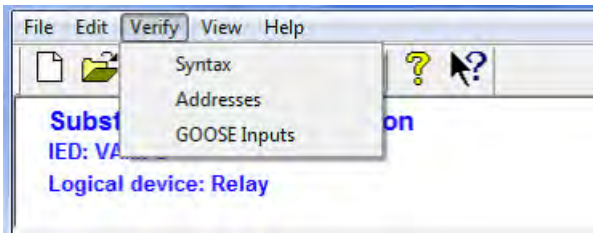
SCD Verification

The SCD Editor tool allows you to verify the created system configuration description for correctness to verify the following:

- The formal syntax of an SCD document, which is essential when using documents produced with other tools.
- The assigned network addresses.
- The configuration of GOOSE Inputs, to verify the correctness of binding GOOSE Subscribers with GOOSE Publishers .

Choose a proper command from Verify menu.

Figure 32 - SCD Verification

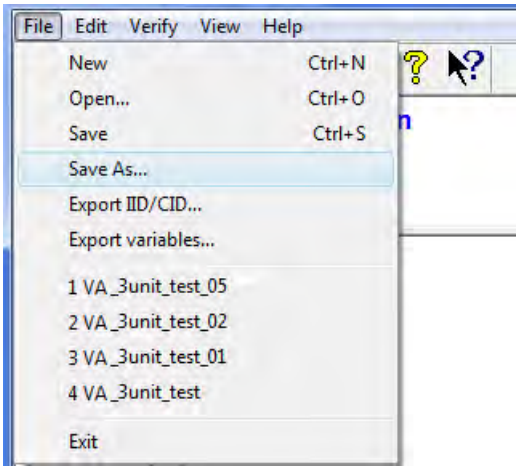


If you are finding errors, the modifications of the SCD document continue.

SCD File Generation

Upon completion (or partial completion) of defining the system configuration, save the created description in a file by using the Save or Save as command from File menu.

Figure 33 - SCD File Generation

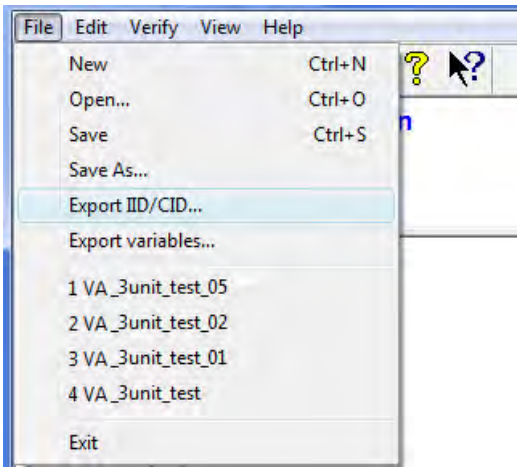


This file, with SCD extension of the name, is an SCL-based description of the IEC61850 communication system. SCD file can be then directly used to update the configuration of the relays in accordance with the system configuration. This file is also required to configure client devices.

IID File Generation

Upon completion (or partial completion) of defining the system configuration (besides SCD file, which describes the whole IEC61850 system) you can produce IID / CID files. These files are extracted parts of SCD that describe a particular device. Select Export IID/CID command from File menu.

Figure 34 - Exporting IID/CID Command



IID or CID file can also be used to update the configuration of the relay in accordance with the system description.

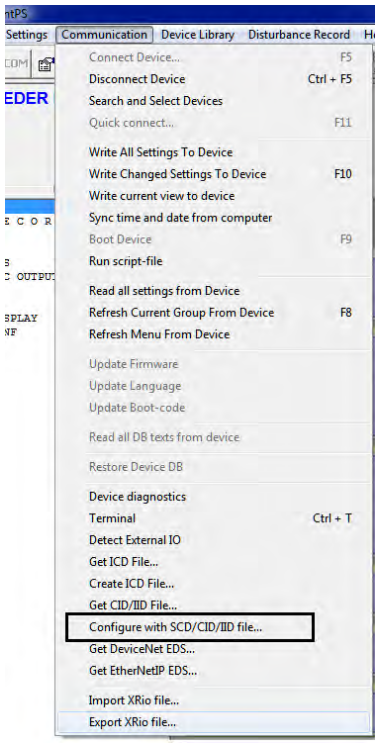
IEC 61850 Configuration Using SetPointPS

The SCD file is used to update the IEC 61850 interface parameter in Bulletin 857 and 865 relay. The SCD file is created with the SCD Editor tool, or its sections that are related to a particular device, such as the exported IID file.

Relay Configuration Update with the SCD File

To update the Relay configuration, do the following procedure.

1. Connect the SetPointPS tool to the relay, with the downloaded present configuration.
2. Select the Configure with SCD file ... command from the Communication menu of the SetPointPS tool.



3. Open the SCD file that is produced with SCD Editor.
4. Select an IED name.
5. Choose the Write Changed Settings To Device option from the Communication menu.
6. The SetPointPS tool updates the relay configuration.

If there is a problem with parsing the delivered configuration file, the SetPointPS tool displays an error message. With an SCD file that is positively verified with SCD Editor tool, an error situation does not occur.

At this point, the relay configuration is compliant with the created system configuration description.

Checking Enable Flags for GOOSE

If the configured relay is to act as the GOOSE Subscriber, verify that the GOOSE configuration view Subscriber configuration section enable flag is set to Yes. Otherwise, set this flag is set to No.

This procedure in SetPointPS has been changed to update this flag automatically when at least one NI is configured.

If the configured relay is to act as the GOOSE Publisher, its GCBs must be enabled immediately after the relay startup. Verify that the GOOSE configuration view, in the Publisher configuration GCB1 and GCB2 section, Enable flags are set to Yes. Otherwise, these flags are set to No.

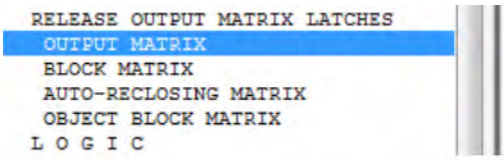
Review / Update of Network Inputs Processing

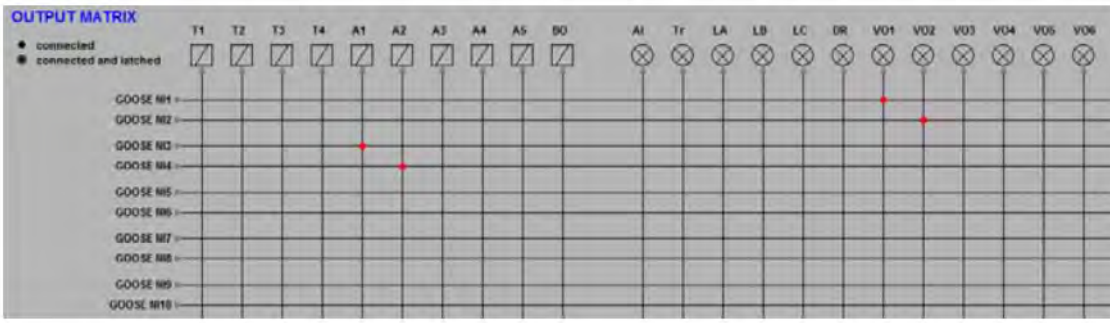
Network Inputs of GOOSE Subscriber are now configured to receive data from other devices. Now review the application configuration and check how GOOSE NI signals are processed in the matrices and in the logic.

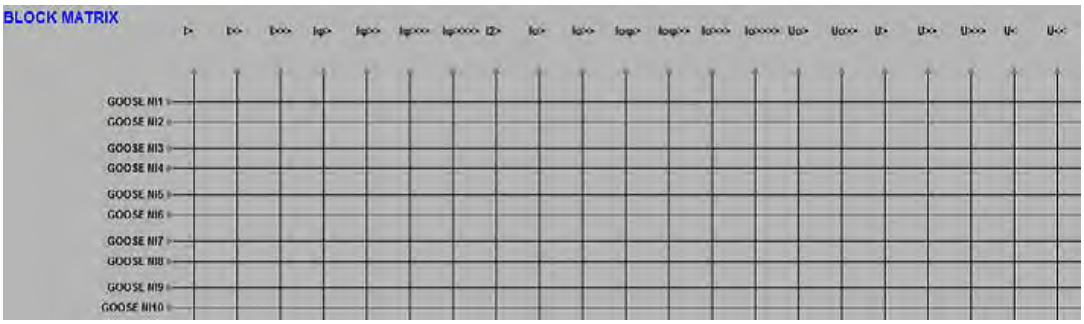
GOOSE NI signals can be used to do the following.

- Trigger relay outputs,
- Block protection functions
- Initiate auto-reclose operations,
- Block controlled objects

They can also be used in the building of application logic schemes. This task is going beyond the communication engineering and good knowledge of protection applications.







Besides GOOSE Network Inputs, there is Error status, which informs about GOOSE Subscriber failure (no data is received from the network). This signal can also be applied in matrices and in the logic to help prevent some actions that are derived from valid state of Network Inputs.

CID or IID File Generation

Optionally, a CID or IID file that documents the present relay configuration can be generated with SetPointPS. See Generation of CID or IID File for the Relay on page 36

Further Modifications

In case some requirements have been altered or added to the system, the configuration process can continue with another iteration. The relay configuration can be further modified with SetPointPS. These modifications are described in Chapter 2 (changes in IEC 61850 data map) and Chapter 3 (changes in RCBs configuration and in GOOSE configuration). Modifications result in the generation of a new IID file to be used in the new run of SCD Editor as described in Chapter 6.

Notes:

IEC 61850 Configuration Using the SCD Editor

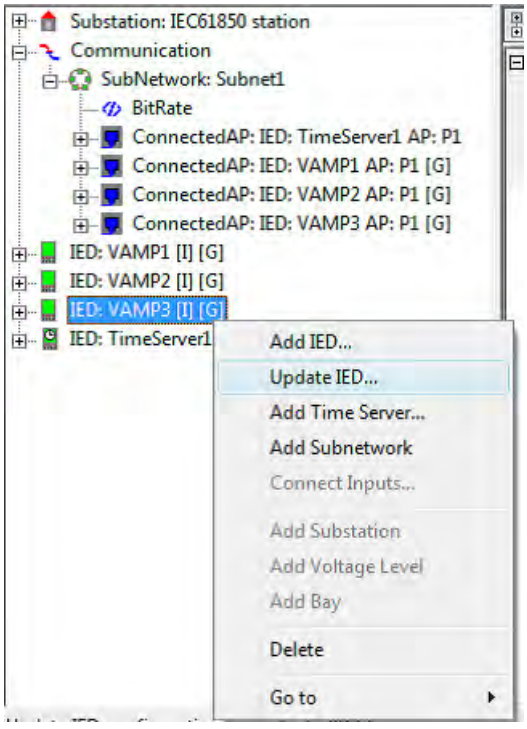
After changes are introduced into the Bulletin 857 and 865 relay configuration, the new description is available in the IID file that is generated with SetPointPS in Chapter 5. The substation system configuration description is updated accordingly.

IED Update in SCD

Start the SCD Editor tool by opening the previously saved SCD file.

1. Use File menu Open command.
2. On the displayed Substation structure, locate and select the IED with updated configuration
3. Select the Update IED command from the context menu.

Figure 35 - Figure 46 - Update IED Command



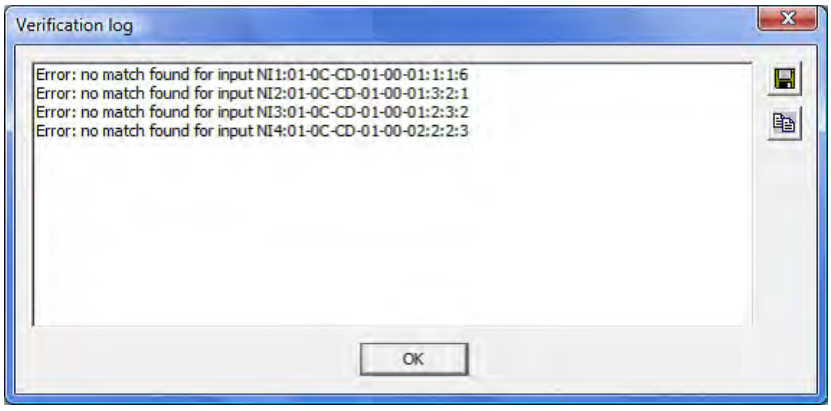
4. Select the IID file that was produced (see Chapter 5) to import it by SCD Editor.

The new configuration information replaces the former description of the IED. The tool verifies the contents of IID file and tries to resolve External References for all configured Network Inputs.

If some NIs are not properly configured in the IID file, SCD Editor displays an error message, presenting the received setup of those NIs (MAC ID, APPID, ConfRev, Data Index).

5. Save the error report into a file or copy it to the clipboard.

Figure 36 - Figure 47 - Typical Error Report



6. Network Inputs with erroneous setup have cleared External References and must be configured again using SCD Editor.

Further Modifications

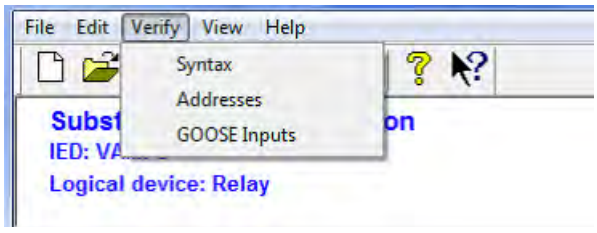
Besides the changes by updated IED configurations, some system requirements can be altered or new requirements added. The configuration process can then continue with the addition of new Subnetworks or new IED, the modification of some parameter values, or by configuring GOOSE bindings and so on. These tasks can be performed as described in Chapter 4.

SCD Verification

When all modifications of the substation system configuration description are completed, the revised SCD document is verified again.

For a complete verification, select each of the commands from the Verify menu.

Figure 37 - Figure 48 - SCD Verification



SCD File Generation

When the SCD document is completed and its verification result is positive, save the created substation system configuration.

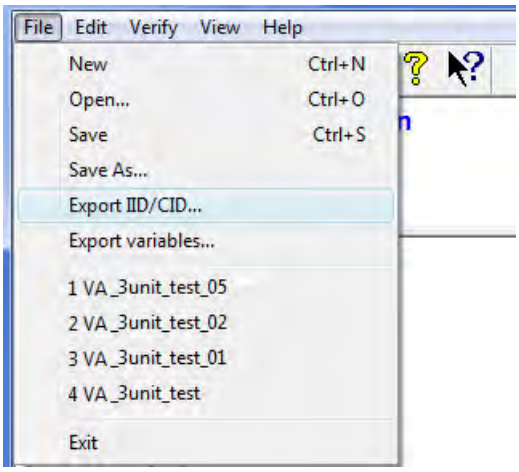
The SCD file can be used to update the configuration of the relays in accordance with the latest system configuration. This file is also required to configure the client devices that communicate with IEDs.

The Export command in File menu allows you to produce a name list of IEC61850 data objects and data sets from all IEDs included in the system. This nonstandard document, in ASCII text format, is supportive in the configuring of some client systems for data exchange with IEDs.

IID File Generation

To produce IID / CID files, which are extracted parts of SCD that describe a particular device. Select Export IID/CID command from File menu.

Figure 38 - Figure 49 - Export IID/CID



IID or CID file can also be used to update the configuration of the relay in accordance with the latest system configuration.

Adjust Configuration Revisions

With the recently produced SCD or IID files, adjust each relay configuration in accordance with the latest system configuration description. Repeat the procedure that is outlined in Chapter 5 IEC 61850 Configuration Using the SCD Editor

There can be several iterations of having to repeat Chapter 5 and Chapter 6.

Notes:

Global Logical Node List

About the Logical Nodes

This appendix shows the structure of all Logical Nodes that can be found in all Data Maps. The subset of Logical Nodes found in each device is based on the options applied. For example, LNs for Voltage Protection Functions or number of LNs for Digital Inputs.

This document uses for description of Protection Stages and Measurements, symbols and uses terminology from the IEC 61850 Standard for description of Data Objects.

IMPORTANT All Logical Nodes that are listed in this document contain Mode, Behavior, Health, and nameplateData Objects. This document does not replace any official IEC 61850 documentation.

Table 6 - Global logical nodes

Logical Node	Data Object	Description
0. AR1ftGGIO16 (AR1 final trip)	STInd	Single point status for Final Trip of Auto-Reclosing Group 1
1. AR2ftGGIO17 (AR2 final trip)	STInd	Single point status for Final Trip of Auto-Reclosing Group 2
2. AR3ftGGIO18 (AR3 final trip)	STInd	Single point status for Final Trip of Auto-Reclosing Group 3
3. AR4ftGGIO19 (AR4 final trip)	STInd	Single point status for Final Trip of Auto-Reclosing Group 4
4. AR5RREC1 (Auto-reclose) (AR)	COBlkRec	Controllable single point for enabling/disabling Auto- Reclosing
	STBlkRec	Single point status for Auto-Reclosing (enabled/disabled)
	STOp	Single point status for Auto-Reclosing (running/not running)
	STAutoRecSt	Double point status for Auto-Reclosing (Ready/In Progress/ Successful)
5. ARcftGGIO15 (AR critical final trip)	STInd	Single point status for Auto-Reclosing Critical Final Trip
6. ARcreGGIO13 (AR critical request)	STInd	Single point status for Auto-Reclosing Critical Request
7. ARftGGIO14 (AR final trip)	STInd	Single point status for Auto-Reclosing Final Trip
8. ARlocGGIO2 (AR locked)	STInd	Single point status for Auto-Reclosing Locked
9. ARre1GGIO3 (AR request 1)	STInd	Single point status for Auto-Reclosing Group 1 Request
10. ARre2GGIO4 (AR request 2)	STInd	Single point status for Auto-Reclosing Group 2 Request
11. ARre3GGIO5 (AR request 3)	STInd	Single point status for Auto-Reclosing Group 3 Request
12. ARre4GGIO6 (AR request 4)	STInd	Single point status for Auto-Reclosing Group 4 Request
13. ARre5GGIO7 (AR request 5)	STInd	Single point status for Auto-Reclosing Group 5 Request
14. ARrunGGIO1 (AR running)	STInd	Single point status for Auto-Reclosing (running/not running)
15. ARsh1GGIO8 (AR shot 1)	STInd	Single point status for Auto-Reclosing Shot 1

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
16. ARsh2GGIO9 (AR shot 2)	STInd	Single point status for Auto-Reclosing Shot 2
17. ARsh3GGIO10 (AR shot 3)	STInd	Single point status for Auto-Reclosing Shot 3
18. ARsh4GGIO11 (AR shot 4)	STInd	Single point status for Auto-Reclosing Shot 4
19. ARsh5GGIO12 (AR shot 5)	STInd	Single point status for Auto-Reclosing Shot 5
20. CBFPPIOC4 (CB failure protection) – Circuit Breaker Failure Protection (50BF)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
21. CBWA1GGIO20 (CB wear alarm 1)	STInd	Single point status for Circuit Breaker Wear Alarm 1
22. CBWA2GGIO21 (CB wear alarm 2)	STInd	Single point status for Circuit Breaker Wear Alarm 2
23. CN01GGIO103 (Counter 1)	STIntIn	Integer status for counter of State Change of Digital Input 1
24. CN02GGIO104 (Counter 2)	STIntIn	Integer status for counter of State Change of Digital Input 2
25. CN03GGIO105 (Counter 3)	STIntIn	Integer status for counter of State Change of Digital Input 3
26. CN04GGIO106 (Counter 4)	STIntIn	Integer status for counter of State Change of Digital Input 4
27. CN05GGIO107 (Counter 5)	STIntIn	Integer status for counter of State Change of Digital Input 5
28. CN06GGIO108 (Counter 6)	STIntIn	Integer status for counter of State Change of Digital Input 6
29. CN07GGIO109 (Counter 7)	STIntIn	Integer status for counter of State Change of Digital Input 7
30. CN08GGIO110 (Counter 8)	STIntIn	Integer status for counter of State Change of Digital Input 8
31. CN09GGIO111 (Counter 9)	STIntIn	Integer status for counter of State Change of Digital Input 9
32. CN10GGIO112 (Counter 10)	STIntIn	Integer status for counter of State Change of Digital Input 10
33. CN11GGIO113 (Counter 11)	STIntIn	Integer status for counter of State Change of Digital Input 11
34. CN12GGIO114 (Counter 12)	STIntIn	Integer status for counter of State Change of Digital Input 12
35. CN13GGIO115 (Counter 13)	STIntIn	Integer status for counter of State Change of Digital Input 13
36. CN14GGIO116 (Counter 14)	STIntIn	Integer status for counter of State Change of Digital Input 14
37. CN15GGIO117 (Counter 15)	STIntIn	Integer status for counter of State Change of Digital Input 15
38. CN16GGIO118 (Counter 16)	STIntIn	Integer status for counter of State Change of Digital Input 16
39. CN17GGIO119 (Counter 17)	STIntIn	Integer status for counter of State Change of Digital Input 17
40. CN18GGIO120 (Counter 18)	STIntIn	Integer status for counter of State Change of Digital Input 18
41. CN19GGIO121 (Counter 19)	STIntIn	Integer status for counter of State Change of Digital Input 19
42. CN20GGIO122 (Counter 20)	STIntIn	Integer status for counter of State Change of Digital Input 20
43. CN21GGIO123 (Counter 21)	STIntIn	Integer status for counter of State Change of Digital Input 21
44. CN22GGIO124 (Counter 22)	STIntIn	Integer status for counter of State Change of Digital Input 22
45. CN23GGIO125 (Counter 23)	STIntIn	Integer status for counter of State Change of Digital Input 23
46. CN24GGIO126 (Counter 24)	STIntIn	Integer status for counter of State Change of Digital Input 24
47. CN25GGIO127 (Counter 25)	STIntIn	Integer status for counter of State Change of Digital Input 25
48. CN26GGIO128 (Counter 26)Data Object	STIntIn	Integer status for counter of State Change of Digital Input 26
49. CN27GGIO129 (Counter 27)	STIntIn	Integer status for counter of State Change of Digital Input 27
50. CN28GGIO130 (Counter 28)	STIntIn	Integer status for counter of State Change of Digital Input 28
51. CN29GGIO131 (Counter 29)	STIntIn	Integer status for counter of State Change of Digital Input 29
52. CN30GGIO132 (Counter 30)	STIntIn	Integer status for counter of State Change of Digital Input 30
53. CN31GGIO133 (Counter 31)	STIntIn	Integer status for counter of State Change of Digital Input 31

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
54. CN32GGIO134 (Counter 32)	STIntIn	Integer status for counter of State Change of Digital Input 32
55. CTAlmGGIO22 (CT alarm)	DSTInd	Single point status for CT Alarm
56. DEF1PTOC9 (IoDir>) – Directional Earth-Fault Protection Stage 1 (67N)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPTmACrv$setCharact	Setpoint of enumerated type for Operating Curve Type (combination of Delay Curve Family and Delay Type)
	SPTmACrv$setParA	Setpoint of type floating point for Inverse Time Coef. (k)
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
57. DEF2PTOC10 (IoDir>>) – Directional Earth-Fault Protection Stage 2 (67N)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPTmACrv$setCharact	Setpoint of enumerated type for Operating Curve Type (combination of Delay Curve Family and Delay Type)
	SPTmACrv$setParA	Setpoint of type floating point for Inverse Time Coef. (k)
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
58. dfdtPFRC1 (df/dt>) – Rate of Change of Frequency Protection Stage (81R)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (Hz/s)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
59. DI01GGIO45 (Digital Input 1)	STInd	Single point status for Digital Input 1
60. DI02GGIO46 (Digital Input 2)	STInd	Single point status for Digital Input 2
61. DI03GGIO47 (Digital Input 3)	STInd	Single point status for Digital Input 3
62. DI04GGIO48 (Digital Input 4)	STInd	Single point status for Digital Input 4
63. DI05GGIO49 (Digital Input 5)	STInd	Single point status for Digital Input 5
64. DI06GGIO50 (Digital Input 6)	STInd	Single point status for Digital Input 6
65. DI07GGIO51 (Digital Input 7)	STInd	Single point status for Digital Input 7
66. DI08GGIO52 (Digital Input 8)	STInd	Single point status for Digital Input 8
67. DI09GGIO53 (Digital Input 9)	STInd	Single point status for Digital Input 9
68. DI10GGIO54 (Digital Input 10)	STInd	Single point status for Digital Input 10
69. DI11GGIO55 (Digital Input 11)	STInd	Single point status for Digital Input 11
70. DI12GGIO56 (Digital Input 12)	STInd	Single point status for Digital Input 12
71. DI13GGIO57 (Digital Input 13)	STInd	Single point status for Digital Input 13
72. DI14GGIO58 (Digital Input 14)	STInd	Single point status for Digital Input 14
73. DI15GGIO59 (Digital Input 15)	STInd	Single point status for Digital Input 15
74. DI16GGIO60 (Digital Input 16)	STInd	Single point status for Digital Input 16
75. DI17GGIO61 (Digital Input 17)	STInd	Single point status for Digital Input 17

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
76. DI18GGIO62 (Digital Input 18)	STInd	Single point status for Digital Input 18
77. DI19GGIO63 (Digital Input 19)	STInd	Single point status for Digital Input 19
78. DI20GGIO64 (Digital Input 20)	STInd	Single point status for Digital Input 20
79. DI21GGIO65 (Digital Input 21)	STInd	Single point status for Digital Input 21
80. DI22GGIO66 (Digital Input 22)	STInd	Single point status for Digital Input 22
81. DI23GGIO67 (Digital Input 23)	STInd	Single point status for Digital Input 23
82. DI24GGIO68 (Digital Input 24)	STInd	Single point status for Digital Input 24
83. DI25GGIO69 (Digital Input 25)	STInd	Single point status for Digital Input 25
84. DI26GGIO70 (Digital Input 26)	STInd	Single point status for Digital Input 26
85. DI27GGIO71 (Digital Input 27)	STInd	Single point status for Digital Input 27
86. DI28GGIO72 (Digital Input 28)	STInd	Single point status for Digital Input 28
87. DI29GGIO73 (Digital Input 29)	STInd	Single point status for Digital Input 29
88. DI30GGIO74 (Digital Input 30)	STInd	Single point status for Digital Input 30
89. DI31GGIO75 (Digital Input 31)	STInd	Single point status for Digital Input 31
90. DI32GGIO76 (Digital Input 32)	STInd	Single point status for Digital Input 32
91. DOC1PTOC12 (IDir>) – Directional Overcurrent Protection Stage 1 (67)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPTmACrv$setCharact	Setpoint of enumerated type for Operating Curve Type (combination of Delay Curve Family and Delay Type)
	SPTmACrv$setParA	Setpoint of type floating point for Inverse Time Coef. (k)
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
92. DOC2PTOC13 (IDir>>) – Directional Overcurrent Protection Stage 2 (67)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPTmACrv$setCharact	Setpoint of enumerated type for Operating Curve Type (combination of Delay Curve Family and Delay Type)
	SPTmACrv$setParA	Setpoint of type floating point for Inverse Time Coef. (k)
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
93. DOC3PTOC14 (IDir>>>) – Directional Overcurrent Protection Stage 3 (67)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
94. DOC4PTOC15 (IDir>>>>) – Directional Overcurrent Protection Stage 4 (67)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
95. EF1PTOC4 (Io>) – Earth-Fault Protection Stage 1 (50N/51N)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPTmACrv$setCharact	Setpoint of enumerated type for Operating Curve Type (combination of Delay Curve Family and Delay Type)
	SPTmACrv$setParA	Setpoint of type floating point for Inverse Time Coef. (k)
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
96. EF2PTOC5 (Io>>) – Earth-Fault Protection Stage 2 (50N/51N)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
97. EF3PTOC6 (Io>>>) – Earth-Fault Protection Stage 3 (50N/51N)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	I Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
98. EF4PTOC7 (Io>>>>) – Earth-Fault Protection Stage 4 (50N/51N)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
99. EnergyMMTR1 (Energy exported imported)	STSupWh	Integer status for Exported Energy
	STSupVArh	Integer status for Exported Reactive Energy
	STDmdWh	Integer status for Demand value of Exported Energy
	STDmdVArh	Integer status for Demand value of Exp. Reactive Energy
	CFSupW$pulsQty	Magnitude of the counted value per count for Exported Energy (1000)
	CFSupVArh$pulsQty	Magnitude of the counted value per count for Exported Reactive Energy (1000)
	CFDmdWh$pulsQty	Magnitude of the counted value per count for Demand value of Exported Energy. (1000)
	CFDmdVArh$pulsQty	Magnitude of the counted value per count for Demand value of Exported Reactive Energy (1000)
	CFSupWh$units$SIUnit	SI Unit for Exported Energy (Wh)
	CFSupVArh$units$SIUnit	SI Unit for Exported Reactive Energy (VArh)
	CFDmdWh$units$SIUnit	SI Unit for Demand value of Exported Energy (Wh)
	CFDmdVArh$units$SIUnit	SI Unit for Demand value of Exported React. Energy (VArh)
	CFSupWh$units$multiplier	Unit multiplier value for Exported Energy
	CFSupVArh$units$multiplier	Unit multiplier value for Exported Reactive Energy
	CFDmdWh$units$multiplier	Unit multiplier value for Exported Energy Demand
	CFDmdVArh$units$multiplier	Unit multiplier value for Exported Reactive Energy Demand
100.fdaMMXU9 (Frequency demand)	MXHz	Measured value for Demand value of Frequency
	CFHz$units$SIUnit	SI Unit for Demand value of Frequency (Hz)
	CFHz$units$multiplier	Unit multiplier value for Demand value of Frequency
101.fMMXU8 (Frequency)	MXHz	Measured value for Frequency
	CFHz$units$SIUnit	SI Unit for Frequency (Hz)
	CFHz$units$multiplier	Unit multiplier value for Frequency
102.Har2PTOC11 (f2>) – Magnetizing Inrush Protection (68F2)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	SPStrVal$units$SIUnit	SI Unit for Pick-up Setting (%)
	SPOpDITmms$setVal	Setpoint of type integer for Operation Delay
103.I3pdaMMXU3 (IL1, IL2, IL3 demand)	MXA$phsA	Measured value for Demand value of IL1
	MXA$phsB	Measured value for Demand value of IL2
	MXA$phsC	Measured value for Demand value of IL3
	CFA$phsA$units$SIUnit	SI Unit for Demand value of IL1 (A)
	CFA$phsB$units$SIUnit	SI Unit for Demand value of IL2 (A)
	CFA$phsC$units$SIUnit	SI Unit for Demand value of IL3 (A)
	CFA$phsA$units$multiplier	Unit multiplier value for Demand value of IL1
	CFA$phsB$units$multiplier	Unit multiplier value for Demand value of IL2
	CFA$phsC$units$multiplier	Unit multiplier value for Demand value of IL3

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
104.I3pMMXU1 (IL1, IL2, IL3)	MXA$phsA	Measured value for IL1
	MXA$phsB	Measured value for IL2
	MXA$phsC	Measured value for IL3
	CFA$phsA$units$SIUnit	SI Unit for IL1 (A)
	CFA$phsB$units$SIUnit	SI Unit for IL2 (A)
	CFA$phsC$units$SIUnit	SI Unit for IL3 (A)
	CFA$phsA$units$multiplier	Unit multiplier value for IL1
	CFA$phsB$units$multiplier	Unit multiplier value for IL2
	CFA$phsC$units$multiplier	Unit multiplier value for IL3
105.I3prMMXU2 (IL1, IL2, IL3 RMS)	MXA$phsA	Measured value for RMS value of IL1
	MXA$phsB	Measured value for RMS value of IL2
	MXA$phsC	Measured value for RMS value of IL3
	CFA$phsA$units$SIUnit	SI Unit for RMS value of IL1 (A)
	CFA$phsB$units$SIUnit	SI Unit for RMS value of IL2 (A)
	CFA$phsC$units$SIUnit	SI Unit for RMS value of IL3 (A)
	CFA$phsA$units$multiplier	Unit multiplier value for RMS value of IL1
	CFA$phsB$units$multiplier	Unit multiplier value for RMS value of IL2
	CFA$phsC$units$multiplier	Unit multiplier value for RMS value of IL3
106.IArcPIOC1 (I Arc) – Arc Overcurrent Protection Stage (50AR)	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
107.Io1ArcPIOC2 (Io1 Arc) – Arc Earth-Fault Io1 Protection Stage (50NAR)	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
108.Io1MMXU11 (Io1)	MXA$neut	Measured value for Io1
	CFA$neut$units$SIUnit	SI Unit for Io1 (A)
	CFA$neut$units$multiplier	Unit multiplier value for Io1
109.Io2ArcPIOC3 (Io2 Arc) – Arc Earth-Fault Io2 Protection Stage (50NAR)	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
110.Io2MMXU12 (Io2)	MXA$neut	Measured value for Io2
	CFA$neut$units$SIUnit	SI Unit for Io2 (A)
	CFA$neut$units$multiplier	Unit multiplier value for Io2
111.IOC1GGIO142 (Fault current of I>)	MXAnIn	Measured value for Fault Current of Overcurrent Stage 1
112.IOC2GGIO143 (Fault current of I>>)	MXAnIn	Measured value for Fault Current of Overcurrent Stage 2
113.IOC3GGIO144 (Fault current of I>>>)	MXAnIn	Measured value for Fault Current of Overcurrent Stage 3
114.IoCMMXU13 (Io calculated)	MXA$res	Measured value for Io Calculated
	CFAresunits$SIUnit	SI Unit for Io Calculated (A)
	CFAresunits$multiplier	Unit multiplier value for Io Calculated

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
115.L1fGGIO24 (Line 1 fault)	STInd	Single point status for Line 1 fault
116.L2fGGIO25 (Line 2 fault)	STInd	Single point status for Line 2 fault
117.L3fGGIO26 (Line 3 fault)	STInd	Single point status for Line 3 fault
118.LdPDIF1 (87L) (LDP) – Line Differential Protection (87L)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPLoSet$setVal	Setpoint of type integer for Pick-up Setting
	SPMinOpTmms$setVal	Setpoint of type integer for Minimum Operation Delay
119.LightSARC1 (Arc light on)	STFADet	Single point Status for Arc Light Detected
120.LO01GGIO77 (Logical output 1)	STInd	Single point status for Logic Output 1 state
121.LO02GGIO78 (Logical output 2)	STInd	Single point status for Logic Output 2 state
122.LO03GGIO79 (Logical output 3)	STInd	Single point status for Logic Output 3 state
123.LO04GGIO80 (Logical output 4)	STInd	Single point status for Logic Output 4 state
124.LO05GGIO81 (Logical output 5)	STInd	Single point status for Logic Output 5 state
125.LO06GGIO82 (Logical output 6)	STInd	Single point status for Logic Output 6 state
126.LO07GGIO83 (Logical output 7)	STInd	Single point status for Logic Output 7 state
127.LO08GGIO84 (Logical output 8)	STInd	Single point status for Logic Output 8 state
128.LO09GGIO85 (Logical output 9)	STInd	Single point status for Logic Output 9 state
129.LO10GGIO86 (Logical output 10)	STInd	Single point status for Logic Output 10 state
130.LO11GGIO87 (Logical output 11)	**STInd**	Single point status for Logic Output 11 state
131.LO12GGIO88 (Logical output 12)	STInd	Single point status for Logic Output 12 state
132.LO13GGIO89 (Logical output 13)	STInd	Single point status for Logic Output 13 state
133.LO14GGIO90 (Logical output 14)	STInd	Single point status for Logic Output 14 state
134.LO15GGIO91 (Logical output 15)	STInd	Single point status for Logic Output 15 state
135.LO16GGIO92 (Logical output 16)	STInd	Single point status for Logic Output 16 state
136.LO17GGIO93 (Logical output 17)	STInd	Single point status for Logic Output 17 state
137.LO18GGIO94 (Logical output 18)	STInd	Single point status for Logic Output 18 state
138.LO19GGIO95 (Logical output 19)	STInd	Single point status for Logic Output 19 state
139.LO20GGIO96 (Logical output 20)	STInd	Single point status for Logic Output 20 state
140.MotFStPMRI1 (Motor frequent start)	STOp	Single point status for Start Signal
	STStrInh	Single point status for Trip Signal
	SPMaxNumStr$setVal	Setpoint of type integer for Maximum Number of Starts
141.MotRnGGIO28 (Motor running)	STInd	Single point status for Motor Running
142.MotStGGIO27 (Motor starting)	STInd	Single point status for Motor Starting
143.Obj1CSWI1 (Object 1)	COPos	Controllable double point for position of Object 1
	STPos	Double point status for position of Object 1
	STBlkOpn	Single point status for Object 1 Open Blocked
	STBlkCls	Single point status for Object 1 Closed Blocked

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
144.0bj1RSYN1 (Synchrocheck object 1)	STRel	Single point status for Synchrocheck Status
	STAngInd	Single point status for Angle Difference
	STSynPrg	Single point status for Synchronizing in Progress
145.0bj2CSWI2 (Object 2)	COPos	Controllable double point for position of Object 2
	STPos	Double point status for position of Object 2
	STBlkOpn	Single point status for Object 2 Open Blocked
	STBlkCls	Single point status for Object 2 Closed Blocked
146.0bj2RSYN2 (Synchrocheck object 2)	STRel	Single point status for Synchrocheck Status
	STAngInd	Single point status for Angle Difference
	STSynPrg	Single point status for Synchronizing in Progress
147.0bj3CSWI3 (Object 3)	COPos	Controllable double point for position of Object 3
	STPos	Double point status for position of Object 3
	STBlkOpn	Single point status for Object 3 Open Blocked
	STBlkCls	Single point status for Object 3 Closed Blocked
148.0bj4CSWI4 (Object 4)	COPos	Controllable double point for position of Object 4
	STPos	Double point status for position of Object 4
	STBlkOpn	Single point status for Object 4 Open Blocked
	STBlkCls	Single point status for Object 4 Closed Blocked
149.0bj5CSWI5 (Object 5)	COPos	Controllable double point for position of Object 5
	STPos	Double point status for position of Object 5
	STBlkOpn	Single point status for Object 5 Open Blocked
	STBlkCls	Single point status for Object 5 Closed Blocked
150.0bj6CSWI6 (Object 6)	COPos	Controllable double point for position of Object 6
	STPos	Double point status for position of Object 6
	STBlkOpn	Single point status for Object 6 Open Blocked
	STBlkCls	Single point status for Object 6 Closed Blocked
151.0bj7CSWI7 (Object 7)	STPos	Double point status for position of Object 7
152.0bj8CSWI8 (Object 8)	STPos	Double point status for position of Object 8
153.0C1PTOC1 (I>) – Overcurrent Protection Stage 1 (50/51)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPTmACrv$setCharact	Setpoint of enumerated type for Operating Curve Type (combination of Delay Curve Family and Delay Type)
	SPTmACrv$setParA	Setpoint of type floating point for Inverse Time Coef. (k)
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Single point status for Start Signal

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
154.0C2PT0C2 (I>>) – Overcurrent Protection Stage 2 (50/51)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
155.0C3PT0C3 (I>>>) – Overcurrent Protection Stage 3 (50/51)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
156.0FUF1PT0F1 (f><) – Frequency Protection Stage 1 (81H/81L)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (Hz)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
157.0FUF2PT0F2 (f>><<) – Frequency Protection Stage 2 (81H/81L)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (Hz)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
158.0V1PT0V3 (U>) – Overvoltage Protection Stage 1 (59)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$Units$SIUnit	SI Unit for the Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
159.0V2PT0V4 (U>>) – Overvoltage Protection Stage 2 (59)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	SPStrVal$Units$SIUnit	SI Unit for the Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
160.0V3PT0V5 (U>>>) – Overvoltage Protection Stage 3 (59)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$Units$SIUnit	SI Unit for the Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
161.PhRevPTOC16 (I2>>) – Reversal (Incorrect) Phase Sequence Protection (47)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$Units$SIUnit	SI Unit for the Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
162.PQSpdMMXU19 (P, Q, S, PF demand)	MXTotW	Measured value for Demand value of Active Power
	MXTotVAr	Measured value for Demand value of Reactive Power
	MXTotVA	Measured value for Demand value of Apparent Power
	MXTotPF	Measured value for demand value of Power Factor
	CFTotW$units$SIUnit	SI Unit for Demand value of Active Power (W)
	CFTotVAr$units$SIUnit	SI Unit for Demand value of Reactive Power (Var)
	CFTotVA$units$SIUnit	SI Unit for Demand value of Apparent Power (VA)
	CFTotPF$units$SIUnit	SI Unit for Demand value of Power Factor (pu)
	CFTotW$units$multiplier	Unit multiplier value for Demand value of Active Power
	CFTotVAr$units$multiplier	Unit multiplier value for Demand value of Reactive Power
	CFTotVA$units$multiplier	Unit multiplier value for Demand value of Apparent Power
	CFTotPF$units$multiplier	Unit multiplier value for Demand value of Power Factor
163.PQSpfMMXU18 (P, Q, S, PF)	MXTotW	Measured value for Active Power
	MXTotVAr	Measured value for Reactive Power
	MXTotVA	Measured value for Apparent Power
	MXTotPF	Measured value for Power Factor
	CFTotW$units$SIUnit	SI Unit for Active Power (W)
	CFTotVAr$units$SIUnit	SI Unit for Reactive Power (Var)
	CFTotVA$units$SIUnit	SI Unit for Apparent Power (VA)
	CFTotPF$units$SIUnit	SI Unit for Power Factor (pu)
	CFTotW$units$multiplier	Unit multiplier value for Active Power
	CFTotVAr$units$multiplier	Unit multiplier value for Reactive Power
	CFTotVA$units$multiplier	Unit multiplier value for Apparent Power
	CFTotPF$units$multiplier	Unit multiplier value for Power Factor
164.PQSrdMMXU7 (P, Q, S, PF RMS demand)	MXTotW	Measured value for RMS Demand value of Active Power
	MXTotVAr	Measured value for RMS Demand value of Reactive Power
	MXTotVA	Measured value for RMS Demand value of Apparent Power
	CFTotW$units$SIUnit	SI Unit for RMS Demand value of Active Power (W)
	CFTotVAr$units$SIUnit	SI Unit for RMS Demand value of Reactive Power (Var)
	CFTotVA$units$SIUnit	SI Unit for RMS Demand value of Apparent Power (VA)
	CFTotW$units$multiplier	Unit multiplier value for RMS Demand value of Active Power
	CFTotVAr$units$multiplier	Unit multiplier value for RMS Demand value of Reactive Power
	CFTotVA$units$multiplier	Unit multiplier value for RMS Demand value of Apparent Power

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
165.PQSrMMXU6 (P, Q, S RMS)	MXTotW	Measured value for RMS value of Active Power
	MXTotVAr	Measured value for RMS value of Reactive Power
	MXTotVA	Measured value for RMS value of Apparent Power
	CFTotW$units$SIUnit	SI Unit for RMS value of Active Power (W)
	CFTotVAr$units$SIUnit	SI Unit for RMS value of Reactive Power (VAr)
	CFTotVA$units$SIUnit	SI Unit for RMS value of Apparent Power (VA)
	CFTotW$units$multiplier	Unit multiplier value for RMS value of Active Power
	CFTotVAr$units$multiplier	Unit multiplier value for RMS value of Reactive Power
	CFTotVA$units$multiplier	Unit multiplier value for RMS value of Apparent Power
166.PS1SGGIO29 (Programmable stage 1 start)	STInd	Single point status for Start Signal
167.PS1TGGIO37 (Programmable stage 1 trip)	STInd	Single point status for Trip Signal
168.PS2SGGIO30 (Programmable stage 2 start)	STInd	Single point status for Start Signal
169.PS2TGGIO38 (Programmable stage 2 trip)	STInd	Single point status for Trip Signal
170.PS3SGGIO31 (Programmable stage 3 start)	STInd	Single point status for Start Signal
171.PS3TGGIO39 (Programmable stage 3 trip)	STInd	Single point status for Trip Signal
172.PS4SGGIO32 (Programmable stage 4 start)	STInd	Single point status for Start Signal
173.PS4TGGIO40 (Programmable stage 4 trip)	STInd	Single point status for Trip Signal
174.PS5SGGIO33 (Programmable stage 5 start)	STInd	Single point status for Start Signal
175.PS5TGGIO41 (Programmable stage 5 trip)	STInd	Single point status for Trip Signal
176.PS6SGGIO34 (Programmable stage 6 start)	STInd	Single point status for Start Signal
177.PS6TGGIO42 (Programmable stage 6 trip)	STInd	Single point status for Trip Signal
178.PS7SGGIO35 (Programmable stage 7 start)	STInd	Single point status for Start Signal
179.PS7TGGIO43 (Programmable stage 7 trip)	STInd	Single point status for Trip Signal
180.PS8SGGIO36 (Programmable stage 8 start)	STInd	Single point status for Start Signal
181.PS8TGGIO44 (Programmable stage 8 trip)	STInd	Single point status for Trip Signal
182.ReLaGGIO141 (Release latches)	COSPCSO	Controllable single point status for Releasing Latches
183.RevP1PDOP1 (P< reverse power) – Reverse (Dir.) Power Protection Stage 1 (32)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for the Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
184.RevP2PDOP2 (P<< reverse power) – Reverse (Dir.) Power Protection Stage 2 (32)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for the Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
185.SCfyMMXU14 (Synchrocheck fy)	MXHz	Measured value for Synchrocheck Frequency 1
	CFHz$units$SIUnit	SI Unit for Synchrocheck Frequency 1 (Hz)
	CFHz$units$multiplier	Unit multiplier value for Synchrocheck Frequency 1

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
186.SCfzMMXU15 (Synchrocheck fz)	MXHz	Measured value for Synchrocheck Frequency 2
	CFHz$units$SIUnit	SI Unit for Synchrocheck Frequency 2 (Hz)
	CFHz$units$multiplier	Unit multiplier value for Synchrocheck Frequency 2
187.SCUyMMXU16 (Synchrocheck Uy)	MXPPV$phsAB	Measured value for Synchrocheck Voltage 1
	CFPPV$phsAB$units$SIUnit	SI Unit for Synchrocheck Voltage 1 (V)
	CFPPV$phsAB$units$multiplier	Unit multiplier value for Synchrocheck Voltage 1
188.SCUzMMXU17 (Synchrocheck Uz)	MXPPV$phsAB	Measured value for Synchrocheck Voltage 2
	CFPPV$phsAB$units$SIUnit	SI Unit for Synchrocheck Voltage 2 (V)
	CFPPV$phsAB$units$multiplier	Unit multiplier value for Synchrocheck Voltage 2
189.SG1GGIO135 (Setting group 1)	COSPCSO	Controllable single point status for Setting Group 1
	STSPCSO	Single point status for Setting Group 1 active
190.SG2GGIO136 (Setting group 2)	COSPCSO	Controllable single point status for Setting Group 2
	STSPCSO	Single point status for Setting Group 2 active
191.StallPMSS1 (Ist>) – Stall Protection (48)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPSetA$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFSetA$units$SIUnits	SI Unit for Pick-up Setting (pu)
	SPSetTms$setVal	Integer status setting for Operation Delay
192.THDIMHAI1 (THD IL1, IL2, IL3)	MXHz	Measured value for Frequency
	MXThdA$phsA	Measured value for Total Harmonic Distortion of IL1
	MXThdA$phsB	Measured value for Total Harmonic Distortion of IL2
	MXThdA$phsC	Measured value for Total Harmonic Distortion of IL3
	CFHz$units$SIUnit	SI Unit for Frequency (Hz)
	CFThdA$phsA$units$SIUnit	SI Unit for Total Harmonic Distortion of IL1 (pu)
	CFThdA$phsB$units$SIUnit	SI Unit for Total Harmonic Distortion of IL2 (pu)
	CFThdA$phsC$units$SIUnit	SI Unit for Total Harmonic Distortion of IL3 (pu)
	CFHz$units$multiplier	Unit multiplier value for Frequency
	CFThdA$phsA$units$multiplier	Unit multiplier value for Total Harmonic Distortion of IL1
	CFThdA$phsB$units$multiplier	Unit multiplier value for Total Harmonic Distortion of IL2
	CFThdA$phsC$units$multiplier	Unit multiplier value for Total Harmonic Distortion of IL3

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
193.THDUMHAI2 (THD Ua, Ub, Uc)	MXHz	Measured value for Frequency
	MXThdPhV$phsA	Measured value for Total Harmonic Distortion of Ua
	MXThdPhV$phsB	Measured value for Total Harmonic Distortion of Ub
	MXThdPhV$phsC	Measured value for Total Harmonic Distortion of Uc
	CFHz$units$SIUnit	SI Unit for Frequency (Hz)
	CFThdPhV$phsA$units$SIUnit	SI Unit for Total Harmonic Distortion of Ua (pu)
	CFThdPhV$phsB$units$SIUnit	SI Unit for Total Harmonic Distortion of Ub (pu)
	CFThdPhV$phsC$units$SIUnit	SI Unit for Total Harmonic Distortion of Uc (pu)
	CFHz$units$multiplier	Unit multiplier value for Frequency
	CFThdPhV$phsA$units$multiplier	Unit multiplier value for Total Harmonic Distortion of Ua
	CFThdPhV$phsB$units$multiplier	Unit multiplier value for Total Harmonic Distortion of Ub
	CFThdPhV$phsC$units$multiplier	Unit multiplier value for Total Harmonic istortion of Uc
194.TOPTTR1 (T>) – Thermal Overload Protection (49)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$setMag$units$SIUnit	SI Unit for Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
195.U3pMMXU4 (UL1, UL2, UL3)	MXPhV$phsA	Measured value for UL1
	MXPhV$phsB	Measured value for UL2
	MXPhV$phsC	Measured value for UL3
	CFPhV$phsA$units$SIUnit	SI Unit for UL1 (V)
	CFPhV$phsB$units$SIUnit	SI Unit for UL2 (V)
	CFPhV$phsC$units$SIUnit	SI Unit for UL3 (V)
	CFPhV$phsA$units$multiplier	Unit multiplier value for UL1
	CFPhV$phsB$units$multiplier	Unit multiplier value for UL2
	CFPhV$phsC$units$multiplier	Unit multiplier value for UL3
196.U3ppMMXU5 (U12, U23, U31)	MXPPV$phsAB	Measured value for U12
	MXPPV$phsBC	Measured value for U23
	MXPPV$phsCA	Measured value for U31
	CFPPV$phsAB$units$SIUnit	SI Unit for U12 (V)
	CFPPV$phsBC$units$SIUnit	SI Unit for U23 (V)
	CFPPV$phsCA$units$SIUnit	SI Unit for U31 (V)
	CFPPV$phsAB$units$multiplier	Unit multiplier value for U12
	CFPPV$phsBC$units$multiplier	Unit multiplier value for U23
	CFPPV$phsCA$units$multiplier	Unit multiplier value for U31

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
197.UCPTUC1 (I<) – Undercurrent Protection (37)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$setMag$units$SIUnit	SI Unit for Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
198.UF1PTUF1 (f<) – Underfrequency Protection Stage 1 (81L)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$setMag$units$SIUnit	SI Unit for Pick-up Setting (Hz)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
199.UF2PTUF2 (f<<) – Underfrequency Protection Stage 2 (81L)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$setMag$units$SIUnit	SI Unit for Pick-up setting (Hz)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
200.UIBCPTOC8 (I2> or I2/I1>) – Current Unbalance Protection Stage (46)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$setMag$units$SIUnit	SI Unit for Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
201.Uo1PTOV1 (Uo>) – Zero Sequence Voltage Protection Stage 1 (59N)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$setMag$units$SIUnit	SI Unit for Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
202.Uo2PTOV2 (Uo>>) – Zero Sequence Voltage Protection Stage 2 (59N)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$setMag$units$SIUnit	SI Unit for Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
203.UoMMXU10 (Uo)	MXPhV$neut	Measured value for Neutral Voltage
	CFPhV$neut$units$SIUnit	SI Unit for Neutral Voltage (V)
	CFPhV$neut$units$multiplier	Unit multiplier value for Neutral Voltage
204.UV1PTUV1 (U<) – Undervoltage Protection Stage 1 (27)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
205.UV2PTUV2 (U<<) – Undervoltage Protection Stage 2 (27)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
206.UV3PTUV3 (U<<<) – Undervoltage Protection Stage 3 (27)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	SPStrVal$units$SIUnit	SI Unit for Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
207.VI1GGIO137 (Virtual input 1)	COSPCSO	Controllable single point status for Virtual Input 1
	STSPCSO	Single point indication for Virtual Input 1
208.VI2GGIO138 (Virtual input 2)	COSPCSO	Controllable single point status for Virtual Input 2
	STSPCSO	Single point indication for Virtual Input 2
209.VI3GGIO139 (Virtual input 3)	COSPCSO	Controllable single point status for Virtual Input 3
	STSPCSO	Single point indication for Virtual Input 3
210.VI4GGIO140 (Virtual input 4)	COSPCSO	Controllable single point status for Virtual Input 4
	STSPCSO	Single point indication for Virtual Input 4
211.VO1GGIO97 (Virtual output 1)	STInd	Single point indication for Virtual Output 1
212.VO2GGIO98 (Virtual output 2)	STInd	Single point indication for Virtual Output 2
213.VO3GGIO99 (Virtual output 3)	STInd	Single point indication for Virtual Output 3
214.VO4GGIO100 (Virtual output 4)	STInd	Single point indication for Virtual Output 4
215.VO5GGIO101 (Virtual output 5)	STInd	Single point indication for Virtual Output 5
216.VO6GGIO102 (Virtual output 6)	STInd	Single point indication for Virtual Output 6
217.VTAlmGGIO23 (VT alarm)	STInd	Single point status for VT Alarm
218.XGGIO145 (Fault reactance)	MXAnIn	Measured value for Fault Reactance
219.ZD1ePDIS6 (Z1e<) – Earth-fault Distance Protection Stage 1 (21N)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
	SPX1$setMag$f	Setpoint of type floating point for X Setting Parameter
	SPRisGndRch$setMag$f	Setpoint of type floating point for R Setting Parameter
220.ZD1PDIS1 (Z1<) – Short Circuit Distance Protection Stage 1 (21)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
	SPX1$setMag$f	Setpoint of type floating point for X Setting Parameter
	SPRisPhRch$setMag$f	Setpoint of type floating point for R Setting Parameter

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
221.ZD2ePDIS7 (Z2e<) – Earth-fault Distance Protection Stage 2 (21N)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
	SPX1$setMag$f	Setpoint of type floating point for X Setting Parameter
	SPRisGndRch$setMag$f	Setpoint of type floating point for R Setting Parameter
222.ZD2PDIS2 (Z2<) – Short Circuit Distance Protection Stage 2 (21)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
	SPX1$setMag$f	Setpoint of type floating point for X Setting Parameter
	SPRisPhRch$setMag$f	Setpoint of type floating point for R Setting Parameter
223.ZD3ePDIS8 (Z3e<) – Earth-fault Distance Protection Stage 3 (21N)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
	SPX1$setMag$f	Setpoint of type floating point for X Setting Parameter
	SPRisGndRch$setMag$f	Setpoint of type floating point for R Setting Parameter
224.ZD3PDIS3 (Z3<) – Short Circuit Distance Protection Stage 3 (21)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
	SPX1$setMag$f	Setpoint of type floating point for X Setting Parameter
	SPRisPhRch$setMag$f	Setpoint of type floating point for R Setting Parameter
225.ZD4ePDIS9 (Z4e<) – Earth-fault Distance Protection Stage 4 (21N)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
	SPX1$setMag$f	Setpoint of type floating point for X Setting Parameter
	SPRisGndRch$setMag$f	Setpoint of type floating point for R Setting Parameter
226.ZD4PDIS4 (Z4<) – Short Circuit Distance Protection Stage 4 (21)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
	SPX1$setMag$f	Setpoint of type floating point for X Setting Parameter
	SPRisPhRch$setMag$f	Setpoint of type floating point for R Setting Parameter
227.ZD5ePDIS10 (Z5e<) – Earth-fault Distance Protection Stage 5 (21N)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
	SPX1$setMag$f	Setpoint of type floating point for X Setting Parameter
	SPRisGndRch$setMag$f	Setpoint of type floating point for R Setting Parameter

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
228.ZD5PDIS5 (Z5<) – Short Circuit Distance Protection Stage 5 (21)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
	SPX1$setMag$f	Setpoint of type floating point for X Setting Parameter
	SPRisPhRch$setMag$f	Setpoint of type floating point for R Setting Parameter
229.EA01GGIO164 (External AI 1)	MXAnIn	Measured value for External Analog Input 1
	CFAnIn$units$SIUnit	SI Unit for External Analog Input 1 (pu)
	CFAnIn$units$multiplier	Unit multiplier value for External Analog Input 1
230.EA02GGIO165 (External AI 2)	MXAnIn	Measured value for External Analog Input 2
	CFAnIn$units$SIUnit	SI Unit for External Analog Input 2 (pu)
	CFAnIn$units$multiplier	Unit multiplier value for External Analog Input 2
231.EA03GGIO165 (External AI 3)	MXAnIn	Measured value for External Analog Input 3
	CFAnIn$units$SIUnit	SI Unit for External Analog Input 3 (pu)
	CFAnIn$units$multiplier	Unit multiplier value for External Analog Input 3
232.EA04GGIO166 (External AI 4)	MXAnIn	Measured value for External Analog Input 4
	CFAnIn$units$SIUnit	SI Unit for External Analog Input 4 (pu)
	CFAnIn$units$multiplier	Unit multiplier value for External Analog Input 4
233.EA05GGIO167 (External AI 5)	MXAnIn	Measured value for External Analog Input 5
	CFAnIn$units$SIUnit	SI Unit for External Analog Input 5 (pu)
	CFAnIn$units$multiplier	Unit multiplier value for External Analog Input 5
234.EA06GGIO168 (External AI 6)	MXAnIn	Measured value for External Analog Input 6
	CFAnIn$units$SIUnit	SI Unit for External Analog Input 6 (pu)
	CFAnIn$units$multiplier	Unit multiplier value for External Analog Input 6
235.EA07GGIO169 (External AI 7)	MXAnIn	Measured value for External Analog Input 7
	CFAnIn$units$SIUnit	SI Unit for External Analog Input 7 (pu)
	CFAnIn$units$multiplier	Unit multiplier value for External Analog Input 7
236.EA08GGIO170 (External AI 8)	MXAnIn	Measured value for External Analog Input 8
	CFAnIn$units$SIUnit	SI Unit for External Analog Input 8 (pu)
	CFAnIn$units$multiplier	Unit multiplier value for External Analog Input 8
237.EA09GGIO171 (External AI 9)	MXAnIn	Measured value for External Analog Input 9
	CFAnIn$units$SIUnit	SI Unit for External Analog Input 9 (pu)
	CFAnIn$units$multiplier	Unit multiplier value for External Analog Input 9
238.EA10GGIO172 (External AI 10)	MXAnIn	Measured value for External Analog Input 10
	CFAnIn$units$SIUnit	SI Unit for External Analog Input 10 (pu)
	CFAnIn$units$multiplier	Unit multiplier value for External Analog Input 10
239.EA11GGIO173 (External AI 11)	MXAnIn	Measured value for External Analog Input 11
	CFAnIn$units$SIUnit	SI Unit for External Analog Input 11 (pu)
	CFAnIn$units$multiplier	Unit multiplier value for External Analog Input 11

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
240.EA12GGIO174 (External AI 12)	MXAnIn	Measured value for External Analog Input 12
	CFAnIn$units$SIUnit	SI Unit for External Analog Input 12 (pu)
	CFAnIn$units$multiplier	Unit multiplier value for External Analog Input 12
241.EA13GGIO175 (External AI 13)	MXAnIn	Measured value for External Analog Input 13
	CFAnIn$units$SIUnit	SI Unit for External Analog Input 13 (pu)
	CFAnIn$units$multiplier	Unit multiplier value for External Analog Input 13
242.EA14GGIO176 (External AI 14)	MXAnIn	Measured value for External Analog Input 14
	CFAnIn$units$SIUnit	SI Unit for External Analog Input 14 (pu)
	CFAnIn$units$multiplier	Unit multiplier value for External Analog Input 14
243.EA15GGIO177 (External AI 15)	MXAnIn	Measured value for External Analog Input 15
	CFAnIn$units$SIUnit	SI Unit for External Analog Input 15 (pu)
	CFAnIn$units$multiplier	Unit multiplier value for External Analog Input 15
244.EA16GGIO178 (External AI 16)	MXAnIn	Measured value for External Analog Input 16
	CFAnIn$units$SIUnit	SI Unit for External Analog Input 16 (pu)
	CFAnIn$units$multiplier	Unit multiplier value for External Analog Input 16
245.ED01GGIO146 (External DI 1)	STInd	Single point Indication for External Digital Input 1
246.ED02GGIO147 (External DI 2)	STInd	Single point Indication for External Digital Input 2
247.ED03GGIO148 (External DI 3)	STInd	Single point Indication for External Digital Input 3
248.ED04GGIO149 (External DI 4)	STInd	Single point Indication for External Digital Input 4
249.ED05GGIO150 (External DI 5)	STInd	Single point Indication for External Digital Input 5
250.ED06GGIO151 (External DI 6)	STInd	Single point Indication for External Digital Input 6
251.ED07GGIO152 (External DI 7)	STInd	Single point Indication for External Digital Input 7
252.ED08GGIO153 (External DI 8)	STInd	Single point Indication for External Digital Input 8
253.ED09GGIO154 (External DI 9)	STInd	Single point Indication for External Digital Input 9
254.ED10GGIO155 (External DI 10)	STInd	Single point Indication for External Digital Input 10
255.ED11GGIO156 (External DI 11)	STInd	Single point Indication for External Digital Input 11
256.ED12GGIO157 (External DI 12)	STInd	Single point Indication for External Digital Input 12
257.ED13GGIO158 (External DI 13)	STInd	Single point Indication for External Digital Input 13
258.ED14GGIO159 (External DI 14)	9STInd	Single point Indication for External Digital Input 14
259.ED15GGIO160 (External DI 15)	STInd	Single point Indication for External Digital Input 15
260.ED16GGIO161 (External DI 16)	STInd	Single point Indication for External Digital Input 16
261.ED17GGIO162 (External DI 17)	STInd	Single point Indication for External Digital Input 17
262.ED18GGIO163 (External DI 18)	STInd	Single point Indication for External Digital Input 18

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
263.HIbMHAI6 (Harmonics IL1b, IL2b, IL3b)	MXHz	Measured value for Frequency
	CFHz$units$SIUnit	SI Unit for Frequency
	CFHz$units$multiplier	Unit multiplier value for Frequency
	MXHA$phsAHar[16]	Measured values for Harmonics of Phase I'L1
	MXHA$phsBHar[16]	Measured values for Harmonics of Phase I'L2
	MXHA$phsCHar[16]	Measured values for Harmonics of Phase I'L3
	CFHA$evalTm	Time Window (0)
	CFHA$frequency	Nominal Frequency (50 Hz)
	CFHA$units$SIUnit	SI Unit for Harmonics (pu)
	CFHA$units$multiplier	Unit multiplier value for Harmonics
	CFHA$numHar	Number of Harmonics (15)
	CFHA$numCyc	Number of Cycles (1)
264.HIMHAI3 (Harmonics IL1, IL2, IL3)	MXHz	Measured value for Frequency
	CFHz$units$SIUnit	SI Unit for Frequency
	CFHz$units$multiplier	Unit multiplier value for Frequency
	MXHA$phsAHar[16]	Measured values for Harmonics of Phase IL1
	MXHA$phsBHar[16]	Measured values for Harmonics of Phase IL2
	MXHA$phsCHar[16]	Measured values for Harmonics of Phase IL3
	CFHA$evalTm	Time Window (0)
	CFHA$frequency	Nominal Frequency (50 Hz)
	CFHA$units$SIUnit	SI Unit for Harmonics (pu)
	CFHA$units$multiplier	Unit multiplier value for Harmonics
	CFHA$numHar	Number of Harmonics (15)
	CFHA$numCyc	Number of Cycles (1)
265.HUMHAI4 (Harmonics Ua, Ub, Uc)	MXHz	Measured value for Frequency
	CFHz$unit$SIUnit	SI Unit for Frequency
	CFHz$unit$multiplier	Unit multiplier value for Frequency
	MXHPhV$phsAHar[16]	Measured values for Harmonics of Phase Ua
	MXHPhV$phsBHar[16]	Measured values for Harmonics of Phase Ub
	MXHPhV$phsCHar[16]	Measured values for Harmonics of Phase Uc
	CFHA$evalTm	Time Window (0)
	CFHPhV$frequency	Nominal Frequency (50 Hz)
	CFHPhV$units$SIUnit	SI Unit for Harmonics (pu)
	CFHPhV$units$multiplier	Unit multiplier value for Harmonics
	CFHPhV$numHar	Number of Harmonics (15)
	CFHPhV$numCyc	Number of Cycles (1)

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
266.I3pbMMXU20 (IL1b, IL2b, IL3b)	MXA$phsA	Measured value for I'L1
	MXA$phsB	Measured value for I'L2
	MXA$phsC	Measured value for I'L3
	CFA$phsA$units$$SIUnit	SI Unit for I'L1 (A)
	CFA$phsB$units$$SIUnit	SI Unit for I'L2 (A)
	CFA$phsC$units$$SIUnit	SI Unit for I'L3 (A)
	CFA$phsA$units$multiplier	Unit multiplier value for I'L1
	CFA$phsB$units$multiplier	Unit multiplier value for I'L2
	CFA$phsC$units$multiplier	Unit multiplier value for I'L3
267.IL1b, IL2b, IL3b RMS (I3pbrMMXU22)	MXA$phsA	Measured value for RMS value of I'L1
	MXA$phsB	Measured value for RMS value of I'L2
	MXA$phsC	Measured value for RMS value of I'L3
	CFA$phsA$units$$SIUnit	SI Unit for RMS value of I'L1 (A)
	CFA$phsB$units$$SIUnit	SI Unit for RMS value of I'L2 (A)
	CFA$phsC$units$$SIUnit	SI Unit for RMS value of I'L3 (A)
	CFA$phsA$units$multiplier	Unit multiplier value for RMS value of I'L1
	CFA$phsB$units$multiplier	Unit multiplier value for RMS value of I'L2
	CFA$phsC$units$multiplier	Unit multiplier value for RMS value of I'L3
268.I3pDMMXU21 (IL1, IL2, IL3 Diff)	MXA$phsA	Measured value for IL1 and I'L1 Differential
	MXA$phsB	Measured value for IL2 and I'L2 Differential
	MXA$phsC	Measured value for IL3 and I'L3 Differential
	CFA$phsA$units$$SIUnit	SI Unit for IL1 and I'L1 Differential (A)
	CFA$phsB$units$$SIUnit	SI Unit for IL2 and I'L2 Differential (A)
	CFA$phsC$units$$SIUnit	SI Unit for IL3 and I'L3 Differential (A)
	CFA$phsA$units$multiplier	Unit multiplier value for IL1 and I'L1 Differential
	CFA$phsB$units$multiplier	Unit multiplier value for IL2 and I'L2 Differential
	CFA$phsC$units$multiplier	Unit multiplier value for IL3 and I'L3 Differential
269.Id1PDIF2 (3dl>) – Differential Protection Stage 1 (87)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPLoSet$setVal	Setpoint of type integer for Pick-up Setting
270.Id2PDIF3 (3dl>>) – Differential Protection Stage 2 (87)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPLoSet$setVal	Setpoint of type integer for Pick-up Setting

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
271.ILbMSQI1 (ILb symmetrics)	MXSeqA$c1	Measured value for Positive Sequence I'L
	MXSeqA$c2	Measured value for Negative Sequence I'L
	MXSeqA$c3	Measured value for Zero Sequence I'L
	CFSeqA$c1$units$SIUnit	SI Unit for Positive Sequence I'L (A)
	CFSeqA$c2$units$SIUnit	SI Unit for Negative Sequence I'L (A)
	CFSeqA$c3$units$SIUnit	SI Unit for Zero Sequence I'L (A)
	CFSeqA$c1$units$multiplier	Unit multiplier value for Positive Sequence I'L
	CFSeqA$c2$units$multiplier	Unit multiplier value for Negative Sequence I'L
	CFSeqA$c3$units$multiplier	Unit multiplier value for Zero Sequence I'L
272.ILbMSTA1 (ILb average)	MXAvAmps	Measured value for I'L Average
	MXMaxAmps	Measured value for I'L Maximum
	MXMinAmps	Measured value for I'L Minimum
	CFAvAmps$units$SIUnit	SI Unit for I'L Average (A)
	CFMaxAmps$units$SIUnit	SI Unit for I'L Maximum (A)
	CFMinAmps$units$SIUnit	SI Unit for I'L Minimum (A)
	CFAvAmps$units$multiplier	Unit multiplier value for I'L Average
	CFMaxAmps$units$multiplier	Unit multiplier value for I'L Maximum
	CFMinAmps$units$multiplier	Unit multiplier value for I'L Minimum
273.ILbrMSTA2 (ILb RMS average)	MXAvAmps	Measured value for RMS average value of I'L
	CFAvAmps$units$SIUnit	SI Unit for RMS average value of I'L
	CFAvAmps$units$multiplier	Unit multiplier value for RMS average value of I'L
274.IvPTOC20 (Iv>) – Voltage Restrained/Controlled Protection Stage (51V)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
275.OC1bPTOC18 (Ib>) – Overcurrent Protection Stage 1 for Secondary Side (50/51)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPTmACrv$setCharact	Setpoint of enumerated type for Operating Curve Type (combination of Delay Curve Family and Delay Type)
	SPTmACrv$setParA	Setpoint of type floating point for Inverse Time Coef. (k)
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
276.OC2bPTOC19 (Ib>>) – Overcurrent Protection Stage 2 for Secondary Side (50/51)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
277.OEPVPH1 (Uf>) – Volts/Hertz Overexcitation Protection Stage (24)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
278.THDIbMHAI5 (THD IL1b, IL2b, IL3b)	MXHz	Measured value for Frequency
	MXThdA$phsA	Measured value for Total Harmonic Distortion of I'L1
	MXThdA$phsB	Measured value for Total Harmonic Distortion of I'L2
	MXThdA$phsC	Measured value for Total Harmonic Distortion of I'L3
	CFHz$units$SIUnit	SI Unit for Frequency (Hz)
	CFThdA$phsA$units$SIUnit	SI Unit for Total Harmonic Distortion of I'L1 (pu)
	CFThdA$phsB$units$SIUnit	SI Unit for Total Harmonic Distortion of I'L2 (pu)
	CFThdA$phsC$units$SIUnit	SI Unit for Total Harmonic Distortion of I'L3 (pu)
	CFHz$units$multiplier	Unit multiplier value for Frequency
	CFThdA$phsA$units$multiplier	Unit multiplier value for Total Harmonic Distortion of I'L1
	CFThdA$phsB$units$multiplier	Unit multiplier value for Total Harmonic Distortion of I'L2
	CFThdA$phsC$units$multiplier	Unit multiplier value for Total Harmonic Distortion of I'L3
279.UEPDUP1 (Q<) – Under Excitation Protection Stage (40)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
280.UIBCbPTOC17 (I2b>) – Current Unb. Protection Stage for Secondary Side (46)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
281.Uof3PTOC21 (Uof3<) – Stator Earth-fault Protection Stage (64F3)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
282.UVPS1PTUV4 (U1<) – Positive Sequence Undervoltage Protection Stage 1 (27P)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
283.UVPS2PTUV5 (U1<<) – Positive Sequence Undervoltage Protection Stage 2 (27P)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
284.UX1PDUP2 (X<) – Underreactance Protection Stage 1 (21/40)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
285.UX2PDUP3 (X<<) – Underreactance Protection Stage 2 (21/40)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
286.UZ1PDIS11 (Z<) – Underimpedance Protection Stage 1 (21)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPPhStr$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
287.UZ2PDIS12 (Z<<) – Underimpedance Protection Stage 2 (21)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPPhStr$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (pu)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
288.UssQVVR1 (Voltage Sag & Swell)	DSTVarStr$stVal	Single point status for Voltage Variation in Progress
	STDipStr$stVal	Single point status for Voltage Sag (Active/Inactive)
	STSwlStr$stVal	Single point status for Voltage Swell (Active/Inactive)
	STIntrStr$stVal	Single point status for Voltage Interruption (Active/Inactive)
	STVarEnd$stVal	Single point status for Voltage Variation Ended
	MXVVa1magf	Measured value for Maximum Voltage Swell of Phase 1
	CFVVa1$units$SIUnit	SI Unit for Maximum Voltage Swell of Phase 1
	CFVVa1$units$multiplier	Unit multiplier value for Maximum Voltage Swell of Phase 1
	MXVVa2magf	Measured value for Maximum Voltage Swell of Phase 2
	CFVVa2$units$SIUnit	SI Unit for Maximum Voltage Swell of Phase 2
	CFVVa2$units$multiplier	Unit multiplier value for Maximum Voltage Swell of Phase 2
	MXVVa3magf	Measured value for Maximum Voltage Swell of Phase 3
	CFVVa3$units$SIUnit	SI Unit for Maximum Voltage Swell of Phase 3
	CFVVa3$units$multiplier	Unit multiplier value for Maximum Voltage Swell of Phase 3
	MXVVaTmmagf	Measured value for Duration of Voltage Swell
	CFVVaTm$units$SIUnit	SI Unit for Duration of Voltage Swell
	SPDipStrVal$setMag$f	Measured value for Voltage Sag Limit
	CFDipStrVal$units$SIUnit	SI Unit for Voltage Sag Limit
	CFDipStrVal$units$multiplier	Unit multiplier value for Voltage Sag Limit
	SPSwlStrVal$setMag$f	Measured value for Voltage Swell Limit
	CFSwlStrVal$units$SIUnit	SI Unit for Voltage Swell Limit
	SPSwlStrVal$units$multiplier	Unit multiplier value for Voltage Swell Limit
	SPIntrStrVal$setMag$f	Measured value for Low Limit of Voltage Interrupts
	CFIntrStrVal$units$SIUnit	SI Unit for Low Limit of Voltage Interrupts
	CFIntrStrVal$units$multiplier	Unit multiplier value for Low Limit of Voltage Interrupts
289.ARCIGGIO179 (L> inputs)	STInd1	Single point status for Arc Sensor 1
	STInd2	Single point status for Arc Sensor 2
	STInd3	Single point status for Arc BIO
290.SILbMSQI2 (ILb symmetrics struct)	MXSeqA$c1	Measured value for Positive Sequence I'L
	MXSeqA$c2	Measured value for Negative Sequence I'L
	MXSeqA$c3	Measured value for Zero Sequence IL
	CFSeqA$c1$units$SIUnit	SI Unit for Positive Sequence I'L (A)
	CFSeqA$c2$units$SIUnit	SI Unit for Negative Sequence I'L (A)
	CFSeqA$c3$units$SIUnit	SI Unit for Zero Sequence I'L (A)
	CFSeqA$c1$units$multiplier	Unit multiplier value for Positive Sequence I'L
	CFSeqA$c2$units$multiplier	Unit multiplier value for Negative Sequence I'L
	CFSeqA$c3$units$multiplier	Unit multiplier value for Zero Sequence I'L

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
291.SIpbMMXU26 (IL1b-3b)	MXA$phsA	Measured value for I'L1
	MXA$phsB	Measured value for I'L2
	MXA$phsC	Measured value for I'L3
	CFA$phsA$units$SIUnit	SI Unit for I'L1 (A)
	CFA$phsB$units$SIUnit	SI Unit for I'L2 (A)
	CFA$phsC$units$SIUnit	SI Unit for I'L3 (A)
	CFA$phsA$units$multiplier	Unit multiplier value for I'L1
	CFA$phsB$units$multiplier	Unit multiplier value for I'L2
	CFA$phsC$units$multiplier	Unit multiplier value for I'L3
292.SIpbrMMXU28 (IL1b-3b RMS)	MXA$phsA	Measured value for RMS value of I'L1
	MXA$phsB	Measured value for RMS value of I'L2
	MXA$phsC	Measured value for RMS value of I'L3
	CFA$phsA$units$SIUnit	SI Unit for RMS value of I'L1 (A)
	CFA$phsB$units$SIUnit	SI Unit for RMS value of I'L2 (A)
	CFA$phsC$units$SIUnit	SI Unit for RMS value of I'L3 (A)
	CFA$phsA$units$multiplier	Unit multiplier value for RMS value of I'L1
	CFA$phsB$units$multiplier	Unit multiplier value for RMS value of I'L2
	CFA$phsC$units$multiplier	Unit multiplier value for RMS value of I'L3
293.SIpdaMMXU25 (IL1-3 demand)	MXA$phsA	Measured value for Demand value of IL1
	MXA$phsB	Measured value for Demand value of IL2
	MXA$phsC	Measured value for Demand value of IL3
	CFA$phsA$units$SIUnit	SI Unit for Demand value of IL1 (A)
	CFA$phsB$units$SIUnit	SI Unit for Demand value of IL2 (A)
	CFA$phsC$units$SIUnit	SI Unit for Demand value of IL3 (A)
	CFA$phsA$units$multiplier	Unit multiplier value for Demand value of IL1
	CFA$phsB$units$multiplier	Unit multiplier value for Demand value of IL2
	CFA$phsC$units$multiplier	Unit multiplier value for Demand value of IL3
294.SIpDMMXU27 (IL1-3 Diff)	MXA$phsA	Measured value for IL1 and I'L1 Differential
	MXA$phsB	Measured value for IL2 and I'L2 Differential
	MXA$phsC	Measured value for IL3 and I'L3 Differential
	CFA$phsA$units$SIUnit	SI Unit for IL1 and I'L1 Differential (A)
	CFA$phsB$units$SIUnit	SI Unit for IL2 and I'L2 Differential (A)
	CFA$phsC$units$SIUnit	SI Unit for IL3 and I'L3 Differential (A)
	CFA$phsA$units$multiplier	Unit multiplier value for IL1 and I'L1 Differential
	CFA$phsB$units$multiplier	Unit multiplier value for IL2 and I'L2 Differential
	CFA$phsC$units$multiplier	Unit multiplier value for IL3 and I'L3 Differential

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
295.SIpMMXU23 (IL1-3)	MXA$phsA	Measured value for IL1
	MXA$phsB	Measured value for IL2
	MXA$phsC	Measured value for IL3
	CFA$phsA$units$SIUnit	SI Unit for IL1 (A)
	CFA$phsB$units$SIUnit	SI Unit for IL2 (A)
	CFA$phsC$units$SIUnit	SI Unit for IL3 (A)
	CFA$phsA$units$multiplier	Unit multiplier value for IL1
	CFA$phsB$units$multiplier	Unit multiplier value for IL2
	CFA$phsC$units$multiplier	Unit multiplier value for IL3
296.SIprMMXU24 (IL1-3 RMS)	MXA$phsA	Measured value for RMS value of IL1
	MXA$phsB	Measured value for RMS value of IL2
	MXA$phsC	Measured value for RMS value of IL3
	CFA$phsA$units$SIUnit	SI Unit for RMS value of IL1 (A)
	CFA$phsB$units$SIUnit	SI Unit for RMS value of IL2 (A)
	CFA$phsC$units$SIUnit	SI Unit for RMS value of IL3 (A)
	CFA$phsA$units$multiplier	Unit multiplier value for RMS value of IL1
	CFA$phsB$units$multiplier	Unit multiplier value for RMS value of IL2
	CFA$phsC$units$multiplier	Unit multiplier value for RMS value of IL3
297.STHDIbMHAI8 (THD IL1b-3b)	MXHz	Measured value for Frequency
	MXThdA$phsA	Measured value for Total Harmonic Distortion of I'L1
	MXThdA$phsB	Measured value for Total Harmonic Distortion of I'L2
	MXThdA$phsC	Measured value for Total Harmonic Distortion of I'L3
	CFHz$units$SIUnit	SI Unit for Frequency (Hz)
	CFThdA$phsA$units$SIUnit	SI Unit for Total Harmonic Distortion of I'L1 (pu)
	CFThdA$phsB$units$SIUnit	SI Unit for Total Harmonic Distortion of I'L2 (pu)
	CFThdA$phsC$units$SIUnit	SI Unit for Total Harmonic Distortion of I'L3 (pu)
	CFHz$units$multiplier	Unit multiplier value for Frequency
	CFThdA$phsA$units$multiplier	Unit multiplier value for Total Harmonic Distortion of I'L1
	CFThdA$phsB$units$multiplier	Unit multiplier value for Total Harmonic Distortion of I'L2
	CFThdA$phsC$units$multiplier	Unit multiplier value for Total Harmonic Distortion of I'L3

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
298.STHDIMHAI7 (THD IL1-3)	MXHz	Measured value for Frequency
	MXThdA$phsA	Measured value for Total Harmonic Distortion of IL1
	MXThdA$phsB	Measured value for Total Harmonic Distortion of IL2
	MXThdA$phsC	Measured value for Total Harmonic Distortion of IL3
	CFHz$units$SIUnit	SI Unit for Frequency (Hz)
	CFThdA$phsA$units$SIUnit	SI Unit for Total Harmonic Distortion of IL1 (pu)
	CFThdA$phsB$units$SIUnit	SI Unit for Total Harmonic Distortion of IL2 (pu)
	CFThdA$phsC$units$SIUnit	SI Unit for Total Harmonic Distortion of IL3 (pu)
	CFHz$units$multiplier	Unit multiplier value for Frequency
	CFThdA$phsA$units$multiplier	Unit multiplier value for Total Harmonic Distortion of IL1
	CFThdA$phsB$units$multiplier	Unit multiplier value for Total Harmonic Distortion of IL2
	CFThdA$phsC$units$multiplier	Unit multiplier value for Total Harmonic Distortion of IL3
299.STHDUMHAI9 (THD Uabc)	MXHz	Measured value for Frequency
	MXThdPhV$phsA	Measured value for Total Harmonic Distortion of Ua
	MXThdPhV$phsB	Measured value for Total Harmonic Distortion of Ub
	MXThdPhV$phsC	Measured value for Total Harmonic Distortion of Uc
	CFHz$units$SIUnit	SI Unit for Frequency (Hz)
	CFThdPhV$phsA$units$SIUnit	SI Unit for Total Harmonic Distortion of Ua (pu)
	CFThdPhV$phsB$units$SIUnit	SI Unit for Total Harmonic Distortion of Ub (pu)
	CFThdPhV$phsC$units$SIUnit	SI Unit for Total Harmonic Distortion of Uc (pu)
	CFHz$units$multiplier	Unit multiplier value for Frequency
	CFThdPhV$phsA$units$multiplier	Unit multiplier value for Total Harmonic Distortion of Ua
	CFThdPhV$phsB$units$multiplier	Unit multiplier value for Total Harmonic Distortion of Ub
	CFThdPhV$phsC$units$multiplier	Unit multiplier value for Total Harmonic Distortion of Uc
300.SUpMMXU29 (UL1-3)	MXPhV$phsA	Measured value for UL1
	MXPhV$phsB	Measured value for UL2
	MXPhV$phsC	Measured value for UL3
	CFPPV$phsAB$units$SIUnit	SI Unit for UL1 (V)
	CFPPV$phsBC$units$SIUnit	SI Unit for UL2 (V)
	CFPPV$phsCA$units$SIUnit	SI Unit for UL3 (V)
	CFPhV$phsA$units$multiplier	Unit multiplier value for UL1
	CFPhV$phsB$units$multiplier	Unit multiplier value for UL2
	CFPhV$phsC$units$multiplier	Unit multiplier value for UL3

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
301.SUppMMXU30 (U12-23-31)	MXPPV$phsAB	Measured value for U12
	MXPPV$phsBC	Measured value for U23
	MXPPV$phsCA	Measured value for U31
	CFPPV$phsAB$units$SIUnit	SI Unit for U12 (V)
	CFPPV$phsBC$units$SIUnit	SI Unit for U23 (V)
	CFPPV$phsCA$units$SIUnit	SI Unit for U31 (V)
	CFPPV$phsAB$units$multiplier	Unit multiplier value for U12
	CFPPV$phsBC$units$multiplier	Unit multiplier value for U23
	CFPPV$phsCA$units$multiplier	Unit multiplier value for U31
302.ArcM1PIOC5 (Arc master stage 1)	STOp	Single point status for Trip Signal
303.ArcM2PIOC6 (Arc master stage 2)	STOp	Single point status for Trip Signal
304.ArcM3PIOC7 (Arc master stage 3)	STOp	Single point status for Trip Signal
305.ArcM4PIOC8 (Arc master stage 4)	STOp	Single point status for Trip Signal
306.ArcM5PIOC9 (Arc master stage 5)	STOp	Single point status for Trip Signal
307.ArcM6PIOC10 (Arc master stage 6)	STOp	Single point status for Trip Signal
308.ArcM7PIOC11 (Arc master stage 7)	STOp	Single point status for Trip Signal
309.ArcM8PIOC12 (Arc master stage 8)	STOp	Single point status for Trip Signal
310.IoIO1PTEF1 (IoInt>>) – Intermittent Transient Earth-fault Protection Stage (67NT)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
311.ZoneGGIO180 (Arc master Act Zones)	STInd1	Single point status for Arc Master Zone 1
	STInd2	Single point status for Arc Master Zone 2
	STInd3	Single point status for Arc Master Zone 3
	STInd4	Single point status for Arc Master Zone 4
	STInd5	Single point status for Arc Master Zone 5
312.BiGGIO181 (Arc master Binary Inputs)	STInd1	Single point status for Arc Master Binary Input 1
	STInd2	Single point status for Arc Master Binary Input 2
	STInd3	Single point status for Arc Master Binary Input 3
313.SensGGIO182 (Arc Master Sensors)	STInd1	Single point status for Arc Master Sensor 1
	STInd2	Single point status for Arc Master Sensor 2
	STInd3	Single point status for Arc Master Sensor 3
	STInd4	Single point status for Arc Master Sensor 4
	STInd5	Single point status for Arc Master Sensor 5
	STInd6	Single point status for Arc Master Sensor 6
	STInd7	Single point status for Arc Master Sensor 7
	STInd8	Single point status for Arc Master Sensor 8
	STInd9	Single point status for Arc Master Sensor 9
	STInd10	Single point status for Arc Master Sensor 10

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
314.EvtGGIO183 (Generic events)	STInd1	Single point status for Generic Event Index 1
	STInd2	Single point status for Generic Event Index 2
	STInd3	Single point status for Generic Event Index 3
	STInd4	Single point status for Generic Event Index 4
	STInd5	Single point status for Generic Event Index 5
	STInd6	Single point status for Generic Event Index 6
	STInd7	Single point status for Generic Event Index 7
	STInd8	Single point status for Generic Event Index 8
315.I3pGGIO184 (IL1, IL2, IL3 AI)	MXAnIn1	Measured value for IL1
	MXAnIn2	Measured value for IL2
	MXAnIn3	Measured value for IL3
	CFAnIn1$units$SIUnit	SI Unit for IL1 (A)
	CFAnIn2$units$SIUnit	SI Unit for IL2 (A)
	CFAnIn3$units$SIUnit	SI Unit for IL3 (A)
	CFAnIn1$units$multiplier	Unit multiplier value for IL1
	CFAnIn2$units$multiplier	Unit multiplier value for IL2
	CFAnIn3$units$multiplier	Unit multiplier value for IL3
316.U3pGGIO185 (UL1, UL2, UL3 AI)	MXAnIn1	Measured value for UL1
	MXAnIn2	Measured value for UL2
	MXAnIn3	Measured value for UL3
	CFAnIn1$units$SIUnit	SI Unit for UL1 (V)
	CFAnIn2$units$SIUnit	SI Unit for UL2 (V)
	CFAnIn3$units$SIUnit	SI Unit for UL3 (V)
	CFAnIn1$units$multiplier	Unit multiplier value for UL1
	CFAnIn2$units$multiplier	Unit multiplier value for UL2
	CFAnIn3$units$multiplier	Unit multiplier value for UL3
317.U3ppGGIO186 (U12, U23, U31 AI)	MXAnIn1	Measured value for U12
	MXAnIn2	Measured value for U23
	MXAnIn3	Measured value for U31
	CFAnIn1$units$SIUnit	SI Unit for U12 (V)
	CFAnIn2$units$SIUnit	SI Unit for U23 (V)
	CFAnIn3$units$SIUnit	SI Unit for U31 (V)
	CFAnIn1$units$multiplier	Unit multiplier value for U12
	CFAnIn2$units$multiplier	Unit multiplier value for U23
	CFAnIn3$units$multiplier	Unit multiplier value for U31

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
318.AMSTGGIO187 (Arc Sensors Info)	STIntIn1	Integer Status for Number of Activated Light Sensor Input in I/O Unit
	STIntIn2	Integer Status for Address of Activated Light Sensor Input in I/O Unit
	STIntIn3	Integer Status for Number of Activated Current Sensor Input in I/O Unit
	STIntIn4	Integer Status for Address of Activated Channel Sensor Input in I/O Unit
	STIntIn5	Integer Status for Number of Malfunctioning Sensor Input in I/O Unit
	STIntIn6	Integer Status for Address Number of Malfunctioning Sensor Input in I/O Unit
	STIntIn7	Integer Status for Activated Sensor Input in I/O Unit
	STIntIn8	Integer Status for Address of the I/O Unit
	STIntIn9	Integer Status for Number of Activated Sensor Input in I/O Unit
	STIntIn10	Integer Status for I/O Unit Address of the Unit
	STInd1	Single point status for Light Detection of a Sensor in I/O Unit
	STInd2	Single point status for Current Detection of a Sensor in I/O Unit
	STInd3	Single point status for Malfunction/Disconnection of Sensor in I/O Unit
	STInd4	Single point status for ArcI/O Communication Link Down
	STInd5	Single point status for RS-485 Communication Link Down

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
319.SPow3MMXU31 (3 phase P, Q, S, PF)	MXW$phsA	Measured value for Active Power for Phase 1
	MXW$phsB	Measured value for Active Power for Phase 2
	MXW$phsC	Measured value for Active Power for Phase 3
	CFW$phsA$units$SIUnit	SI Unit for Active Power for Phase 1 (W)
	CFW$phsB$units$SIUnit	SI Unit for Active Power for Phase 2 (W)
	CFW$phsC$units$SIUnit	SI Unit for Active Power for Phase 3 (W)
	CFW$phsA$units$multiplier	Unit multiplier value for Active Power for Phase 1
	CFW$phsB$units$multiplier	Unit multiplier value for Active Power for Phase 2
	CFW$phsC$units$multiplier	Unit multiplier value for Active Power for Phase 3
	MXVAr$phsA	Measured value for Reactive Power for Phase 1
	MXVAr$phsB	Measured value for Reactive Power for Phase 2
	MXVAr$phsC	Measured value for Reactive Power for Phase 3
	CFVAr$phsA$units$SIUnit	SI Unit for Reactive Power for Phase 1 (VAr)
	CFVAr$phsB$units$SIUnit	SI Unit for Reactive Power for Phase 2 (VAr)
	CFVAr$phsC$units$SIUnit	SI Unit for Reactive Power for Phase 3 (VAr)
	CFVAr$phsA$units$multiplier	Unit multiplier value for Reactive Power for Phase 1
	CFVAr$phsB$units$multiplier	Unit multiplier value for Reactive Power for Phase 2
	CFVAr$phsC$units$multiplier	Unit multiplier value for Reactive Power for Phase 3
	MXVA$phsA	Measured value for Apparent Power for Phase 1
	MXVA$phsB	Measured value for Apparent Power for Phase 2
	MXVA$phsC	Measured value for Apparent Power for Phase 3
	CFVA$phsA$units$SIUnit	SI Unit for Apparent Power for Phase 1 (VA)
	CFVA$phsB$units$SIUnit	SI Unit for Apparent Power for Phase 2 (VA)
	CFVA$phsC$units$SIUnit	SI Unit for Apparent Power for Phase 3 (VA)
	CFVA$phsA$units$multiplier	Unit multiplier value for Apparent Power for Phase 1
	CFVA$phsB$units$multiplier	Unit multiplier value for Apparent Power for Phase 2
	CFVA$phsC$units$multiplier	Unit multiplier value for Apparent Power for Phase 3
	MXPF$phsA	Measured value for Power Factor for Phase 1
	MXPF$phsB	Measured value for Power Factor for Phase 2
	MXPF$phsC	Measured value for Power Factor for Phase 3
	CFPF$phsA$units$SIUnit	SI Unit for Power Factor for Phase 1 (pu)
	CFPF$phsB$units$SIUnit	SI Unit for Power Factor for Phase 2 (pu)
	CFPF$phsC$units$SIUnit	SI Unit for Power Factor for Phase 3 (pu)
	CFPF$phsA$units$multiplier	Unit multiplier value for Power Factor for Phase 1
	CFPF$phsB$units$multiplier	Unit multiplier value for Power Factor for Phase 2
	CFPF$phsC$units$multiplier	Unit multiplier value for Power Factor for Phase 3
320.AlrmGGIO188 (Line alarm status)	STInd1	Single point status for Alarm in Line 1
	STInd2	Single point status for Alarm in Line 2
	STInd3	Single point status for Alarm in Line 3

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
321.LdI1PDIF4 (LdI>) – Line Differential Protection Stage 1 (87L)	STOp1	Single point status for Trip Signal
	STOp2	Single point status for Sympathy Trip Signal
	SPLoSet$setVal	Setpoint of type integer point for Pick-up Setting
322.LdI2PDIF5 (LdI>>) – Line Differential Protection Stage 2 (87L)	STOp1	Single point status for Trip Signal
	STOp2	Single point status for Sympathy Trip Signal
	SPLoSet$setVal	Setpoint of type integer point for Pick-up Setting
323.Har5PTOC22 (If5>) – Over Excitation Protection Stage (68F5)	STStr	Single point status for Start Signal
	STOp	Single point status for Trip Signal
	SPStrVal$setMag$f	Setpoint of type floating point for Pick-up Setting
	CFStrVal$units$SIUnit	SI Unit for Pick-up Setting (%)
	SPOpDlTmms$setVal	Setpoint of type integer for Operation Delay
324.NIStGGIO189 (GOOSE NI 1-16)	STInd1	Single point status for NI 1
	STInd2	Single point status for NI 2
	STInd3	Single point status for NI 3
	STInd4	Single point status for NI 4
	STInd5	Single point status for NI 5
	STInd6	Single point status for NI 6
	STInd7	Single point status for NI 7
	STInd8	Single point status for NI 8
	STInd9	Single point status for NI 9
	STInd10	Single point status for NI 10
	STInd11	Single point status for NI 11
	STInd12	Single point status for NI 12
	STInd13	Single point status for NI 13
	STInd14	Single point status for NI 14
	STInd15	Single point status for NI 15
	STInd16	Single point status for NI 16

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
325.NIStGGIO190 (GOOSE NI 17-32)	STInd1	Single point status for NI 17
	STInd2	Single point status for NI 18
	STInd3	Single point status for NI 19
	STInd4	Single point status for NI 20
	STInd5	Single point status for NI 21
	STInd6	Single point status for NI 22
	STInd7	Single point status for NI 23
	STInd8	Single point status for NI 24
	STInd9	Single point status for NI 25
	STInd10	Single point status for NI 26
	STInd11	Single point status for NI 27
	STInd12	Single point status for NI 28
	STInd13	Single point status for NI 29
	STInd14	Single point status for NI 30
	STInd15	Single point status for NI 31
	STInd16	Single point status for NI 32
326.NIStGGIO191 (GOOSE NI 33-48)	STInd1	Single point status for NI 33
	STInd2	Single point status for NI 34
	STInd3	Single point status for NI 35
	STInd4	Single point status for NI 36
	STInd5	Single point status for NI 37
	STInd6	Single point status for NI 38
	STInd7	Single point status for NI 39
	STInd8	Single point status for NI 40
	STInd9	Single point status for NI 41
	STInd10	Single point status for NI 42
	STInd11	Single point status for NI 43
	STInd12	Single point status for NI 44
	STInd13	Single point status for NI 45
	STInd14	Single point status for NI 46
	STInd15	Single point status for NI 47
	STInd16	Single point status for NI 48

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
327.NIStGGIO192 (GOOSE NI 49-64)	STInd1	Single point status for NI 49
	STInd2	Single point status for NI 50
	STInd3	Single point status for NI 51
	STInd4	Single point status for NI 52
	STInd5	Single point status for NI 53
	STInd6	Single point status for NI 54
	STInd7	Single point status for NI 55
	STInd8	Single point status for NI 56
	STInd9	Single point status for NI 57
	STInd10	Single point status for NI 58
	STInd11	Single point status for NI 59
	STInd12	Single point status for NI 60
	STInd13	Single point status for NI 61
	STInd14	Single point status for NI 62
	STInd15	Single point status for NI 63
	STInd16	Single point status for NI 64
328.NIGrGGIO193 (GOOSE Validity Groups)	STInd1	Single point status for GOOSE Validity Group 1
	STInd2	Single point status for GOOSE Validity Group 2
	STInd3	Single point status for GOOSE Validity Group 3
	STInd4	Single point status for GOOSE Validity Group 4
	STInd5	Single point status for GOOSE Validity Group 5
	STInd6	Single point status for GOOSE Validity Group 6
	STInd7	Single point status for GOOSE Validity Group 7
	STInd8	Single point status for GOOSE Validity Group 8
	STInd9	Single point status for GOOSE Validity Group 9
	STInd10	Single point status for GOOSE Validity Group 10
	STInd11	Single point status for GOOSE Validity Group 11
	STInd12	Single point status for GOOSE Validity Group 12
	STInd13	Single point status for GOOSE Validity Group 13
	STInd14	Single point status for GOOSE Validity Group 14
	STInd15	Single point status for GOOSE Validity Group 15
	STInd16	Single point status for GOOSE Validity Group 16
329.GPubGGIO194 (GOOSE Publisher properties)	STInd1	Single point status for GCB1 Test
	STInd2	Single point status for GCB1 Needs Commissioning
	STInd3	Single point status for GCB2 Test
	STInd4	Single point status for GCB2 Needs Commissioning

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
330.FTrpGGIO195 (Final TRIP for Objects)	STInd1	Single point status for Object 1 Final Trip
	STInd2	Single point status for Object 2 Final Trip
	STInd3	Single point status for Object 3 Final Trip
	STInd4	Single point status for Object 4 Final Trip
	STInd5	Single point status for Object 5 Final Trip
	STInd6	Single point status for Object 6 Final Trip
331.DrRDRE1 (Disturbance recorder)	STRcdMade	Single point status for Record Made
	STFltNum	Integer status for Fault Number
	STMemUsed	Integer status for Memory Used in %
	CORcdTrg	Controllable single point status for Trigger Recorder
332.TmpGGIO196 (Temperature PT100)	MXAnIn	Measured value for Temperature of PT100
	CFAnIn$units$SIUnit	SI Unit for Temperature of PT100 (°C)
	CFAnIn$units$multiplier	Unit multiplier value for Temperature of PT100
333.SCRFLO1 (Incomer SC Fault Locator)	MXFltZ$cVal$mag$f	Measured value for Impedance
	MXFltZ$cVal$ang$f	Measured value for Angle
	MXFltDiskmmagf	Measured value for Distance in km
334.EFRFLO2 (Distance to Earth Fault)	MXFltZ$cVal$mag$f	Measured value for Impedance
	MXFltZ$cVal$ang$f	Measured value for Angle
	MXFltDiskmmagf	Measured value for Distance in km
335.VAIGGIO197 (GOOSE Virtual AI)	MXAnIn1	Measured value for GOOSE Analog Input 1
	MXAnIn2	Measured value for GOOSE Analog Input 2
	MXAnIn3	Measured value for GOOSE Analog Input 3
	MXAnIn4	Measured value for GOOSE Analog Input 4
	MXAnIn5	Measured value for GOOSE Analog Input 5
	CFAnIn1$units$SIUnit	SI Unit for GOOSE Analog Input 1
	CFAnIn2$units$SIUnit	SI Unit for GOOSE Analog Input 2
	CFAnIn3$units$SIUnit	SI Unit for GOOSE Analog Input 3
	CFAnIn4$units$SIUnit	SI Unit for GOOSE Analog Input 4
	CFAnIn5$units$SIUnit	SI Unit for GOOSE Analog Input 5
	CFAnIn1$units$multiplier	Unit multiplier value for GOOSE Analog Input 1
	CFAnIn2$units$multiplier	Unit multiplier value for GOOSE Analog Input 2
	CFAnIn3$units$multiplier	Unit multiplier value for GOOSE Analog Input 3
	CFAnIn4$units$multiplier	Unit multiplier value for GOOSE Analog Input 4
	CFAnIn5$units$multiplier	Unit multiplier value for GOOSE Analog Input 5

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
336.SCIGGIO198 (Current for Incomer SC)	MXAnIn1	Measured value for Current for Incomer SC before fault
	MXAnIn2	Measured value for Current for Incomer SC during fault
	MXAnIn3	Measured value for Current for Incomer SC after fault
	CFAnIn1$units$SIUnit	SI Unit for Current for Incomer SC before fault
	CFAnIn2$units$SIUnit	SI Unit for Current for Incomer SC during fault
	CFAnIn3$units$SIUnit	SI Unit for Current for Incomer SC after fault
	CFAnIn1$units$multiplier	Unit multiplier value for Current for Incomer SC before fault
	CFAnIn2$units$multiplier	Unit multiplier value for Current for Incomer SC during fault
	CFAnIn3$units$multiplier	Unit multiplier value for Current for Incomer SC after fault
337.DFLTGGIO199 (Fault distance indication)	STInd	Single point status for Fault Distance Indication
338.FLRFLO3 (Feeder Fault Locator)	MXFltZ$cVal$mag$f	Measured value for Impedance
	MXFltZ$cVal$ang$f	Measured value for Angle
	MXFltDiskmmagf	Measured value for Distance in km
339.LED2GGIO200 (LEDs for 2xx and 5x series)	STInd1	Single point status for Alarm LED (2xx Series) / LED A (5x Series)
	STInd2	Single point status for Trip LED (2xx Series) / LED B (5x Series)
	STInd3	Single point status for LED A (2xx Series) / LED C (5x Series)
	STInd4	Single point status for LED B (2xx Series) / LED D (5x Series)
	STInd5	Single point status for LED C (2xx Series) / LED E (5x Series)
340.LED5GGIO201 (LEDs for 5x series)	STInd1	Single point status for LED F (5x Series)
	STInd2	Single point status for LED G (5x Series)
	STInd3	Single point status for LED H (5x Series)
341.ResGGIO202 (Remote Reset)	COSPCSO	Controllable single point status for Remote Reset
342.Stat1GGIO1 (OC Stages Ena/Grp Info)	STIntIn1	Integer status for Overcurrent Protection Stage 1 (enabled/disabled/blocked)
	STIntIn2	Integer status for Setting Group of Overcurrent Protection Stage 1
	STIntIn3	Integer status for Overcurrent Protection Stage 2 (enabled/disabled/blocked)
	STIntIn4	Integer status for Setting Group of Overcurrent Protection Stage 2
	STIntIn5	Integer status for Overcurrent Protection Stage 3 (enabled/disabled/blocked)
	STIntIn6	Integer status for Setting Group of Overcurrent Protection Stage 3
	STIntIn7	Integer status for Current Unbalance Protection Stage 1 (enabled/disabled/blocked)
	STIntIn8	Integer status for Setting Group of Current Unbalance Protection Stage 1

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
343.Stat2GGIO1 (EF Stages Ena/Grp Info)	STIntIn1	Integer status for Earth-fault Protection Stage 1 (enabled/disabled/blocked)
	STIntIn2	Integer status for Setting Group of Earth-fault Protection Stage 1
	STIntIn3	Integer status for Earth-fault Protection Stage 2 (enabled/disabled/blocked)
	STIntIn4	Integer status for Setting Group of Earth-fault Protection Stage 2
	STIntIn5	Integer status for Earth-fault Protection Stage 3 (enabled/disabled/blocked)
	STIntIn6	Integer status for Setting Group of Earth-fault Protection Stage 3
	STIntIn7	Integer status for Earth-fault Protection Stage 4 (enabled/disabled/blocked)
	STIntIn8	Integer status for Setting Group of Earth-fault Protection Stage 4
344.Stat3GGIO1 (OCb Stages Ena/Grp Info)	STIntIn1	Integer status for Overcurrent Protection Stage 1 for Secondary Side (enabled/disabled/blocked)
	STIntIn2	Integer status for Setting Group of Overcurrent Protection Stage 1 for Secondary Side
	STIntIn3	Integer status for Overcurrent Protection Stage 2 for Secondary Side (enabled/disabled/blocked)
	STIntIn4	Integer status for Setting Group of Overcurrent Protection Stage 2 for Secondary Side
	STIntIn5	Integer status for Current Unbalance Protection Stage for Secondary Side (enabled/disabled/blocked)
	STIntIn6	Integer status for Setting Group of Current Unbalance Protection Stage for Secondary Side
345.IFLTGGIO1 (Fault currents)	MXAnIn1	Measured value for IL1 Fault Current
	MXAnIn2	Measured value for IL2 Fault Current
	MXAnIn3	Measured value for IL3 Fault Current
	MXAnIn4	Measured value for Io1 Fault Current
	MXAnIn5	Measured value for Io2 Fault Current
	MXAnIn6	Measured value for Io Calculated Fault Current
	CFAnIn1$units$SIUnit	SI Unit for IL1 Fault Current (A)
	CFAnIn2$units$SIUnit	SI Unit for IL2 Fault Current (A)
	CFAnIn3$units$SIUnit	SI Unit for IL3 Fault Current (A)
	CFAnIn4$units$SIUnit	SI Unit for Io1 Fault Current (A)
	CFAnIn5$units$SIUnit	SI Unit for Io2 Fault Current (A)
	CFAnIn6$units$SIUnit	SI Unit for Io Calculated Fault Current (A)

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
346.OCPTRC1 (OC trip)	STTr$general	Single point status for Trip Signal of any Overcurrent Protection Stage
	STTr$phsA	Single point status for Trip Signal of any Overcurrent Protection Stage in Phase 1
	STTr$phsB	Single point status for Trip Signal of any Overcurrent Protection Stage in Phase 2
	STTr$phsC	Single point status for Trip Signal of any Overcurrent Protection Stage in Phase 3
	STStr$general	Single point status for Start Signal of any Overcurrent Protection Stage
	STStr$phsA	Single point status for Start Signal of any Overcurrent Protection Stage in Phase 1
	STStr$phsB	Single point status for Start Signal of any Overcurrent Protection Stage in Phase 2
	STStr$phsC	Single point status for Start Signal of any Overcurrent Protection Stage in Phase 3
347.CBAlmGGIO1 (CB Inactivity alarms)	STAlm1	Single point status for Inactivity Alarm of Object 1
	STAlm2	Single point status for Inactivity Alarm of Object 2
	STAlm3	Single point status for Inactivity Alarm of Object 3
	STAlm4	Single point status for Inactivity Alarm of Object 4
	STAlm5	Single point status for Inactivity Alarm of Object 5
	STAlm6	Single point status for Inactivity Alarm of Object 6
348.EFPTRC2 (EF trip)	STTr$general	Single point status for Trip Signal of any Earth-fault Protection Stage
	STTr$phsA	Single point status for Trip Signal of any Earth-fault Protection Stage in Phase 1
	STTr$phsB	Single point status for Trip Signal of any Earth-fault Protection Stage in Phase 2
	STTr$phsC	Single point status for Trip Signal of any Earth-fault Protection Stage in Phase 3
	STTr$neut	Single point status for Trip Signal of any Earth-fault Protection Stage Neutral Phase
	STStr$general	Single point status for Start Signal of any Earth-fault Protection Stage
	STStr$phsA	Single point status for Start Signal of any Earth-fault Protection Stage in Phase 1
	STStr$phsB	Single point status for Start Signal of any Earth-fault Protection Stage in Phase 2
	STStr$phsC	Single point status for Start Signal of any Earth-fault Protection Stage in Phase 2
	STStr$neut	Single point status for Start Signal of any Earth-fault Protection Stage Neutral Phase
349.DrGGIO1 (Disturbance recorder)	STInd1	Single point status for Disturbance Recording Deleted
	STInd2	Single point status for Disturbance Recording Overwritten
350.CTGGIO1 (CT parameters)	SPPrimary	Setpoint of type integer for CT Primary
	CFPrimary$units$SIUnit	SI Unit for CT Primary (A)
	SPSecondary	Setpoint of type integer for CT Secondary
	CFSecondary$units$SIUnit	SI Unit for CT Secondary (A)

Table 6 - Global logical nodes (Continued)

Logical Node (Continued)	Data Object	Description
351.CTIoGGIO1 (CT Io1 parameters)	SPPrimary	Setpoint of type integer for Io1 CT Primary
	CFPrimary$units$SIUnit	SI Unit for CT Io1 Primary (A)
	SPSecondary	Setpoint of type integer for Io1 CT Secondary
	CFSecondary$units$SIUnit	SI Unit for CT Io1 Secondary (A)
352.SG3GGIO135 (Setting group 3)	COSPCSO	Controllable single point status for Setting Group 3
	STSPCSO	Single point status for Setting Group 3 active
353.SG4GGIO136 (Setting group 4)	COSPCSO	Controllable single point status for Setting Group 4
	STSPCSO	Single point status for Setting Group 4 active
354.Lnk1DnGGIO1 (Link 1 down)	STInd	Single point status for Ethernet Port 1 link down
355.Lnk2DnGGIO2 (Link 2 down)	STInd	Single point status for Ethernet Port 2 link down
356.ALLPTRC1 (Global Setpointtrip)	Opgeneral	Single point status for Global Trip

Numerics

A

C

D

E

F

G

I

L

M

N

P

R

S

T

V

Rockwell Automation Support

Use the following resources to access support information.

Technical Support Center	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	https://rockwellautomation.custhelp.com/
Local Technical Support Phone Numbers	Locate the phone number for your country.	http://www.rockwellautomation.com/global/support/get-support-now.page
Direct Dial Codes	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	http://www.rockwellautomation.com/global/support/direct-dial.page
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	http://www.rockwellautomation.com/global/literature-library/overview.page
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	http://www.rockwellautomation.com/global/support/pcdc.page

Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete the How Are We Doing? form at http://literature.rockwellautomation.com/idc/groups/literature/documents/du/ra-du002_-en-e.pdf.

Rockwell Otomasyon Ticaret A.Ş., Kar Plaza İş Merkezi E Blok Kat:6 34752 İçerenköy, İstanbul, Tel: +90 (216) 5698400

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication 857-UM004A-EN-P - March 2018