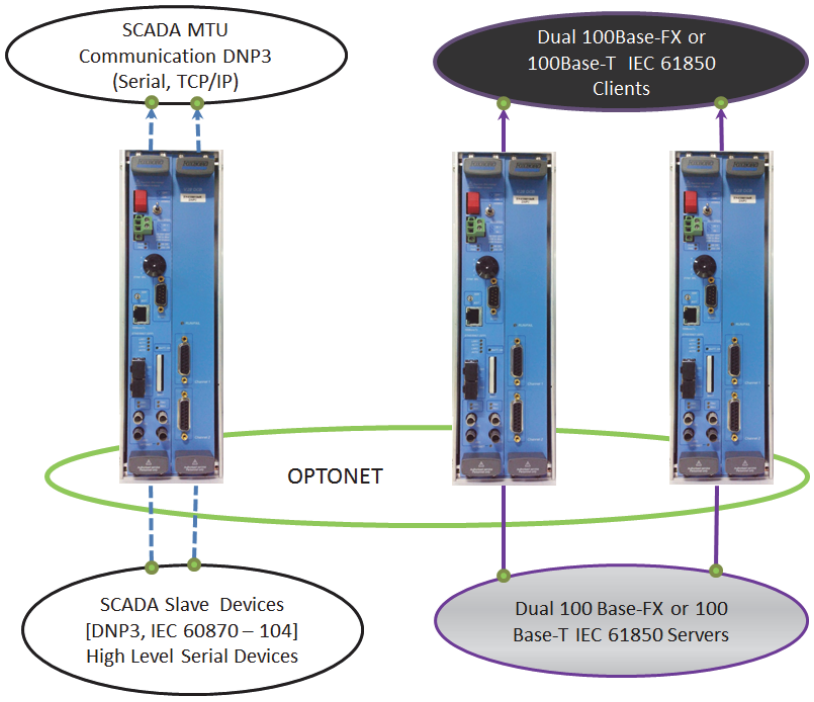
Foxboro Process Automation System

Product Specifications

Foxboro by Schneider Electric

PSS 31S-2M14

Foxboro SCD6000 IEC 61850 Gateway



OVERVIEW

The SCD6000 is an embedded computing and networking platform that serves as a distributed Station Computing Device (SCD).

The Foxboro SCD6000 IEC 61850 Gateway is a configuration of the SCD6000 product. It provides an easy introduction path to the IEC 61850 field device, reducing the impact on a SCADA control center that is already installed and uses the DNP3 protocol.

As part of the overall SCD6000 product line, the Foxboro SCD6000 IEC 61850 Gateway Edition 1 has advanced data integration, time synchronization, and programming capabilities. Its primary Slave interfaces are provided with the DNP3 Slave (TCP/IP and Serial) and IEC 61850 Client.

The SCD6000 IEC 61850 Gateway uses these protocols to communicate and integrate with multiple remote Master control centers.

The SCD6000 IEC 61850 Gateway inherits the IEC 61850 Gateway functionality of the compact SCD5200 and provides a more dynamic RAM for a higher concentration of IEC 61850 IEDs.

Each SCD6000 rack-mounted card file can support Power, CPU Serial, and Ethernet Communication ports.

The architecture provides continuous support for OptoNet and includes additional support for the high speed internet protocols that are needed to integrate IEC 61850 Station LANs. The OptoNet is transparent to the user and provides the user programming environment access to any I/O or communications information on any node at any time. IEC 61850 Station LANs can be introduced into any node on either of the Dual SFP based Ethernet ports.

The SCD6000 can be password protected on any TCP/IP or Serial port to restrict end user access. Passwords can be assigned for individual users and common roles such as Maintain, Browse, and Superuser.

Up to 63 SCD6000s can be interconnected on the OptoNet ring. Backward compatibility of the OptoNet is maintained with the Foxboro Remote Terminal Unit RTU50. This allows you to include a mix of older RTU50/SCD5200 nodes with the newer SCD6000 nodes.

The SCD6000 IEC 61850 Gateway includes both IEC 61850 Client and Server services and data structures. These data structures are created by importing a standard .SCD file format and are included with the configuration file. Either the IEC 61850 Client or Server or both may be configured for use on any node.

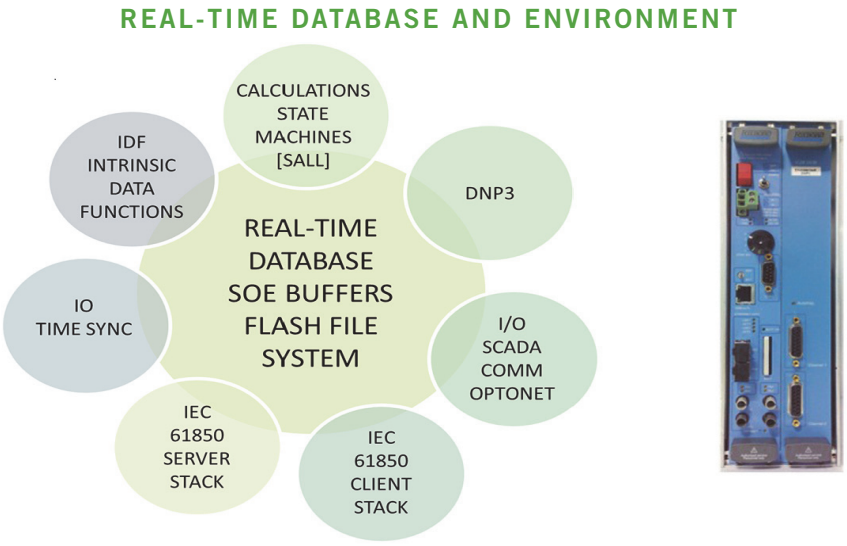


Figure 1. Real-Time Database and Environment

Figure 1 shows the SCD6000 IEC 61850 Gateway environment, which consists of a central real-time database that is kept up to date by a variety of independent processes. These processes are supported by the embedded operating system executive.

- Intrinsic Data Functions (IDF) – Event driven pre-configured functionality is very fast and often used for implicit conversions of IO information.
- Calculations – You can program up to 3 calculation tasks. Each task is written as a State Machine or a Procedural Logic using the dedicated State and Logic Language [SALL].
- OptoNet – The OptoNet interface provides most of the functionality. It supports the transparent transmission of the real-time database from node to node.
- IEC 61850 Client – A separate process is maintained to allow the IEC 61850 Client services to operate.
- IEC 61850 Server – A separate process is maintained to allow the IEC61850 Edition 1 Server services to operate.
- IO Time Sync – A real time clock (82C54) is used to synchronize the IO time syncing using electrobus interface.

The real-time database accepts incoming data and records changes in any of the change-driven protocol with a time-based comparison. The real-time database is supported by a flash-based file system.

A set of diagnostic interfaces is provided to allow both remote and local diagnostic tools to establish a connection with the unit at any time. The on-board flash file workspace allows for multiple files to be downloaded and used as current, past, or potential future running configurations. The diagnostic interface allows the SCD6000 to be reset remotely and re-started with a new or test configuration.

FILE FORMATS

Multi-Slot Cardfile Formats

The SCD6000 IEC 61850 Gateway does not support Communication and IO modules. We recommend these card files for the SCD6000 IEC 61850 Gateway:

- 2 x 5 slot file
- 3 x 3 slot file

Single-Slot Cardfile Format

With the advent of the IEC 61850 Server or Client, the SCD6000 can act as a data-concentrator with all external interaction occurring on the dual Ethernet ports. The single slot card file is most appropriate in these cases.

FILE POWER SUPPLY

In smaller file formats (up to 5 I/O modules), the COPE's integral 40W wide input voltage supply powers the system.

Optional Power Supply (SY-0399131/SY-0399131R)

A standalone power supply module is required to power the I/O modules and provide the field supply in the 10 I/O module file format.

These power supplies operate from 19.2 to 148 VDC.

CPU OPTONET AND ETHERNET (COPE AND COE) MAIN PROCESSOR MODULE

The SCD6000 COPE/COE module provides access to its battery from the front panel. Therefore, you can replace the battery without removing the SCD6000 module from the cabinet. An LED indicator on the front panel provides the status of the battery.

The SCD6000 COPE board has an industrial processor with an Electrobus Interface and includes:

- 1 serial port (configurable RS232/RS485)
- 256 KB of non-volatile static RAM
- 256 MB DDR3 SDRAM
- 64 MB internal flash
- Dual 100 Mbps fixed SFP ports to support either 100 Base-FX or 10/100 Base-T
- On-board real-time clock
- 40 W regulated wide input VDC power supply
- Single OptoNet node (2 optical ports)

The SCD6000 CPU module supports:

- Rotary Switch hardware available on the front panel labelled as Zone Sel has four selectable zone positions.The four zone positions are available to the RTU interfaces like SALL, IDF and other protocols linked to the zone positions.
- OptoNet

  High-speed optical redundant token passing local area network
- Dedicated RJ45 Ethernet diagnostic port for the Foxboro Remote Terminal Viewer (RTV)
- COM2 port RS-232/RS-485 supported protocols and features
  - DNP3 Master (SAv2 and SAv5)
  - DNP3 Slave (SAv2 and SAv5)
  - Modbus Master
  - Modbus Slave
  - GPS Clock
  - User configurable serial interface
  - Diagnostic server and router
  - Terminal server
  - IEC101 Master
  - Event Logger
- Ethernet supported protocols
  - DNP3 Master on TCP/IP (SAv2 and SAv5)
  - DNP3 Slave on TCP/IP (SAv2 and SAv5)
  - DNP3 Master on UDP (SAv2 and SAv5)
  - DNP3 Slave on UDP (SAv2 and SAv5)
  - IEC 60870-5-104 Slave
  - DNV GL Certified IEC61850 Edition 1 Server and Client
  - DNVL GL Certified IEC61850 Edition 1 Goose Publisher and Subscriber
  - Modbus/TCP Master
  - Diagnostic Utility over TCP/IP
- User authentication features
  - Password-based authentication for RTV connectivity
  - Three user privilege levels: Superuser, Maintenance, and Browse
  - Log of 500 most recent user activities in .CSV format for audit trails
  - Encrypted communication with RTV if the user authentication feature is enabled
  - System Use Notification message
  - Ethernet supported slave protocols communication restricted to the configured Trusted hosts

CPU (COPE/COE)

Part Number	Description
SY-60399001R	SCD6000 CPU OptoNet Power Supply Ethernet (COPE) Module (RoHS)
SY-60399002R	SCD6000 CPU OptoNet Ethernet (COE) Module (RoHS)

I/O FILES

Part Number	Description
SY-2003092	2x5 I/O slot file (RoHS)
SY-2003104	One I/O slot card file (RoHS)
SY-2003107	3x3 I/O slot file (RoHS)

POWER SUPPLY

Part Number	Description
SY-0399131	Wide Input Range Power Supply Module (required for 2003098)
SY-0399131R	Wide Input Range Power Supply Module (required for 2003098) (RoHS)

CONFIGURATION DETAILS

No. of Points	Number of Events/Seconds
30,000	120

DNP3 PERFORMANCE CHARACTERISTICS

Table 1. TCP/IP and UDP

DNP3		CPU IDLE %	Startup time (m:s)	RAM Usage (MB)	CPU IDLE %	Startup time(m:s)	RAM Usage (MB)
		TCP/IP			UDP		
Without secured authentication	Slave	65	3:20	136	62	2:49	135
	Master	72	1:52	137	57	1:43	139

Table 1. TCP/IP and UDP (Continued)

DNP3		CPU IDLE %	Startup time (m:s)	RAM Usage (MB)	CPU IDLE %	Startup time(m:s)	RAM Usage (MB)
With SAv2 secured authentication	Slave	65	3:24	136	62	2:53	136
	Master	71	1.54	138	58	1:48	139
With SAv5 secured authentication	Slave	65	3:23	137	62	2:53	136
	Master	71	1.56	138	58	1:48	139

Table 2. Optical DCB and COM2

DNP3		CPU IDLE %	Startup time (m:s)	RAM Usage (MB)	CPU IDLE %	Startup time (m:s)	RAM Usage (MB)
		Optical DCB			**COM2**		
Without sauthentication	Slave	62	2:44	137	56	2:52	136
	Master	83	1:54	138	75	2:05	137
With SAv2 authentication	Slave	63	3:00	138	56	2:56	136
	Master	81	2:00	138	71	2:10	138
With SAv5 authentication	Slave	63	3:03	138	56	2:56	136
	Master	81	2:02	138	71	2:10	138

IEC 61850 PERFORMANCE CHARACTERISTICS

Table 3. IEC 61850 Server

S No.	No. of Logical Nodes	Data Attributes	CPU Idle %	Startup Time (in Seconds)	RAM Usage (in MB)
1	10	1414	64-72	63	141.5
2	25	3047	61-67	64	145.4
3	50	8173	52-57	66	155.2
4	75	13577	45-50	69	166.3
5	100	15065	43-47	70	169.7
6	150	17384	34-42	72	174.7

Table 4. IEC 61850 Client

S No.	No. of Logical Nodes	Data Attributes	CPU Idle %	Startup Time (in Seconds)	RAM Usage (in MB)
1	10	1406	90-93	58	136.5
	10 (With DNP3 Slave)	1409	87-91	60	136.9
2	25	3036	89-92	59	140.7
	25 (With DNP3 Slave)	3042	85-90	67	140.3
3	50	4355	86-90	60	142.8
	50 (With DNP3 Slave)	5121	81-86	69	144.7
4	75	7745	85-88	63	150.0
	75 (With DNP3 Slave)	10448	69-72	80	155.5
5	100	8941	84-87	65	152.5
	100 (With DNP3 Slave)	11936	67-71	82	158.4
6	120	10401	83-86	67	155.6
	120 (With DNP3 Slave)	14169	65-70	92	163.2
7	140	13015	80-82	69	161.5
	140 (With DNP3 Slave)	20148	58-65	108	176.4

Table 5. IEC 61850 Server and Client

S No.	No. of IEDs	Data Attributes	CPU Idle %	Startup Time (in Seconds)	RAM Usage (in MB)
1	2	518	84-87	60	139
2	5	1295	83-85	61	141
3	10	2590	81-84	61	144
4	16	4144	78-81	62	148
5	50	12950	65-71	70	169
6	100	25900	55-60	81	199

ASSOCIATED PRODUCT SPECIFICATION SHEETS

Part Number	Description
PSS 31H-8K2	SCD6000 CPU OptoNet Power Supply Ethernet (COPE) Module / SCD6000 CPU OptoNet Ethernet (COE) Module
PSS 31H-8K3	SCD6000 Wide Range Input Power Supply Module
PSS 31H-8K3R	SCD6000 Wide Range Input Power Supply Module (RoHS)

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