I/A Series® HARDWARE
Product Specifications

invensys Foxboro®

PSS 21H-8D2 B4

I/A Series® Intelligent SCADA Communications Line Server (CLS50)

The I/A Series® Communications Line Server (CLS50) is a fault-tolerant communications multiplexer which connects Intelligent SCADA Master Station front-end processors (FEPs) with remote field devices such as Remote Terminal Units (RTUs). While standard terminal servers may often be utilized for this purpose, the I/A Series CLS50 offers the following additional benefits:

- System-wide, high accuracy time synchronization (communication media dependent)
- Hot standby redundant units
- Automatic failover on channel-by-channel basis
- Physical line failover switching
- Dual Ethernet interface for Master Station LAN connectivity
- Sophisticated diagnostic and configuration utilities
- Embedded GPS time interface for master time synchronization
- Multiple SCADA protocol support (including legacy bit-orientated protocol support)
- Various communication interfaces (V.28, V.23 modem, fiber optic).

The I/A Series CLS50 is specifically designed for time critical and high availability SCADA communication requirements. To facilitate setup and maintenance, the Communications Line Server also provides integrated diagnostic and configuration capabilities with Intelligent SCADA Master Station and I/A Series Remote Terminal Units.

FUNCTIONAL DESCRIPTION

The I/A Series CLS50 provides the connectivity between I/A Series SCADA Master Station FEPs and remote field devices. Figure 1 shows a simple I/A Series SCADA system configuration. This configuration incorporates one FEP communicating with a field device through one CLS. The CLS handles the physical and link layer communication with the remote field devices, controlling, for example, the receive/transmit and time synchronization commands, and passes communication packets back to the FEP for processing.

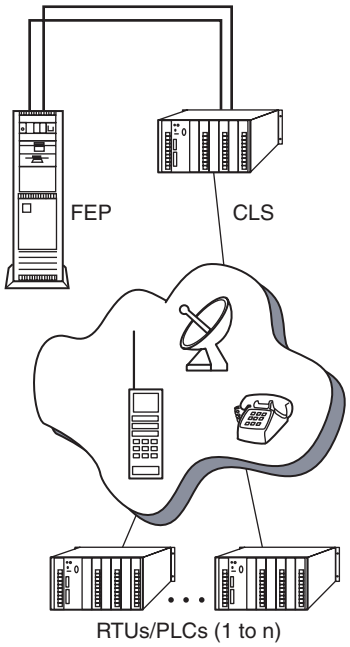

Figure 1. Simple System Configuration

The CLS provides deterministic and highly accurate time synchronization of remote devices. This level of accuracy cannot be supported using conventional UNIX-based communications hardware.

When system communication requirements necessitate multiple CLSs (as depicted in Figure 2), an OptoNet™ LAN may be connected to each unit to deliver deterministic, system-wide time synchronization.

With this configuration, time may be derived from the Intelligent SCADA Master Station or one CLS may interface to an external master time signal (as depicted in Figure 2) as provided by a GPS system.

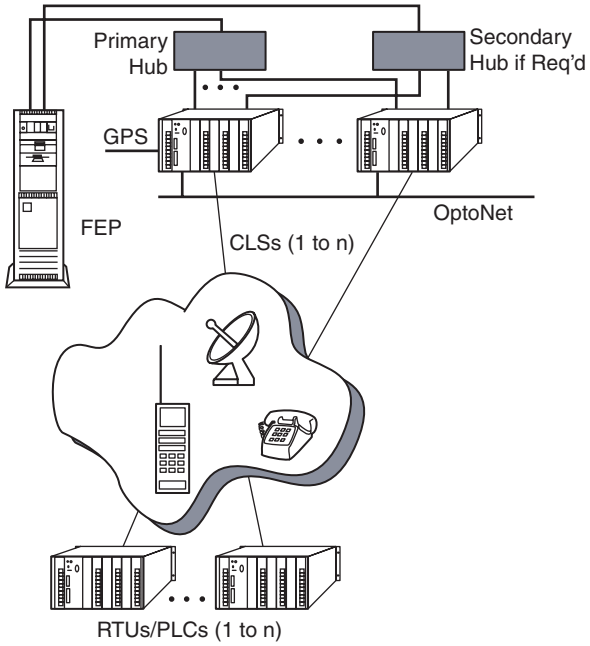

Figure 2. Extended System Configuration

HARDWARE CONFIGURATION

The I/A Series CLS50 is a 19-inch rack-mounted device with slots to support the following cards: power supply, main processor (which includes dual Dual 10BaseFL/100BaseSX Ethernet ports, dual OptoNet, and GPS interface), and up to ten dual-ported communications boards.

Two I/A Series CLS50s may be deployed to provide a hot standby arrangement. Failover is available for each dual communications board on a channel-by-channel basis.

Each dual communications board has an associated interconnection board which provides the field termination interface and the failover control circuits. A typical arrangement with failover is depicted in Figure 3.

With such a configuration, the I/A Series CLS50 delivers high availability and fast switchover in the event of failure.

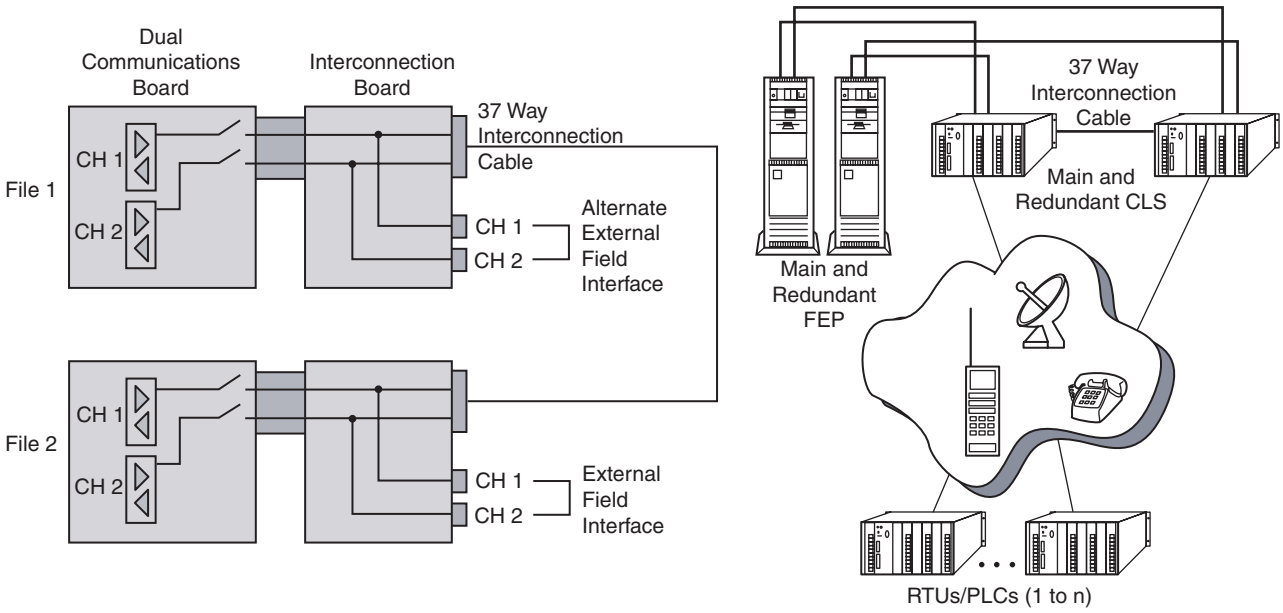

Figure 3. Failover System Configuration

HARDWARE MODULES

The basic modules which comprise the I/A Series CLS50 are illustrated in Figure 4 and Figure 5. Each module mounts into a 19-inch rack file, with an internal backplane for routing power and data between modules.

Power Supply

Power is connected via a rear IEC socket and a rear mounted slide switch. The universal power supply has an input voltage range of 90 V to 264 V ac.

Backplane

The CLS backplane utilizes a full 16-bit data transfer for interfacing between the Main Processor and Dual Communications module.

Main Processor Module

On the Main Processor board there are two serial ports, COM1 and COM2. COM1 is the maintenance port, and COM2 may be used to communicate with an accurate clock source such as a GPS receiver. COM1 and COM2 are DB9 RS-232-C ports.

The main processor module features dual 10BaseFL/100BaseSX Ethernet ports that provide a cost-effective and versatile fiber optic Ethernet interface. The optical interface maintains the high electrical isolation characteristics of the CLS. The dual communication channels can function as primary and backup paths to deliver fault-tolerant communications for critical processes. Diagnostic LEDs provide Tx and Rx indications for each fiber optic channel. The Ethernet ports support communication to Master Stations and are terminated with ST connectors.

The OptoNet subsystem of the Main Processor Module utilizes a high speed, high isolation, and noise immune optical dual ring network interface and an ARCNET (token ring) data link layer to provide peer-to-peer communications between CLS nodes. The ARCNET controller chip in the OptoNet subsystem handles all network tasks, such as token passing, message acknowledgment, and error checking. An OptoNet network may consist of between 2 and 63 nodes, no greater than 500 m apart. The maximum total network length is 5.8 km. The OptoNet board is used to communicate with other CLS files to maintain time synchronization between files.

Dual Communications Boards

Up to ten Dual Communications boards (DCBs) can be fitted. The following options are available: V.23/Bell 202 and V.28. The V.28 DCB uses an RS-232-C electrical interface. Each DCB is fitted with two channels controlled by an on-board processor. The DCB shares communications data with the main processor module via the Electrobus. Connection is made to the field via the Interconnection Board modules.

Interconnection Boards

Up to ten Interconnection Board modules can be fitted into the rear of the CLS. One board connects onto the rear of each DCB. Two options are available, V.28 and V.23/Bell 202. The V.28 boards terminate to the field via DB25 D connectors, one for each DCB channel. The V.23 Interconnection Board terminates to the field via screw terminals. The purpose of the Interconnection Board is to connect from the DCB to the field and to control failover of the DCB signals from one file to another (via a DB37 D connector). Therefore, up to ten cables can connect the two files.

Line Modules

V.28 (RS-232) signals can be converted for optical transmission by using line modules which are plugged into the DB25 connectors on the Interconnection Boards.

CONFIGURATION AND MAINTENANCE

The I/A Series CLS50 is configured and maintained via a laptop or personal computer using a simple menu-based package featuring configuration, data entry, and editing with full validity checking and on-line Help.

Configuration and diagnostic tools are consistent with I/A Series Remote Terminal Units, thereby providing a consistent, cost-effective, and easy-to-use interface for configuration and maintenance.

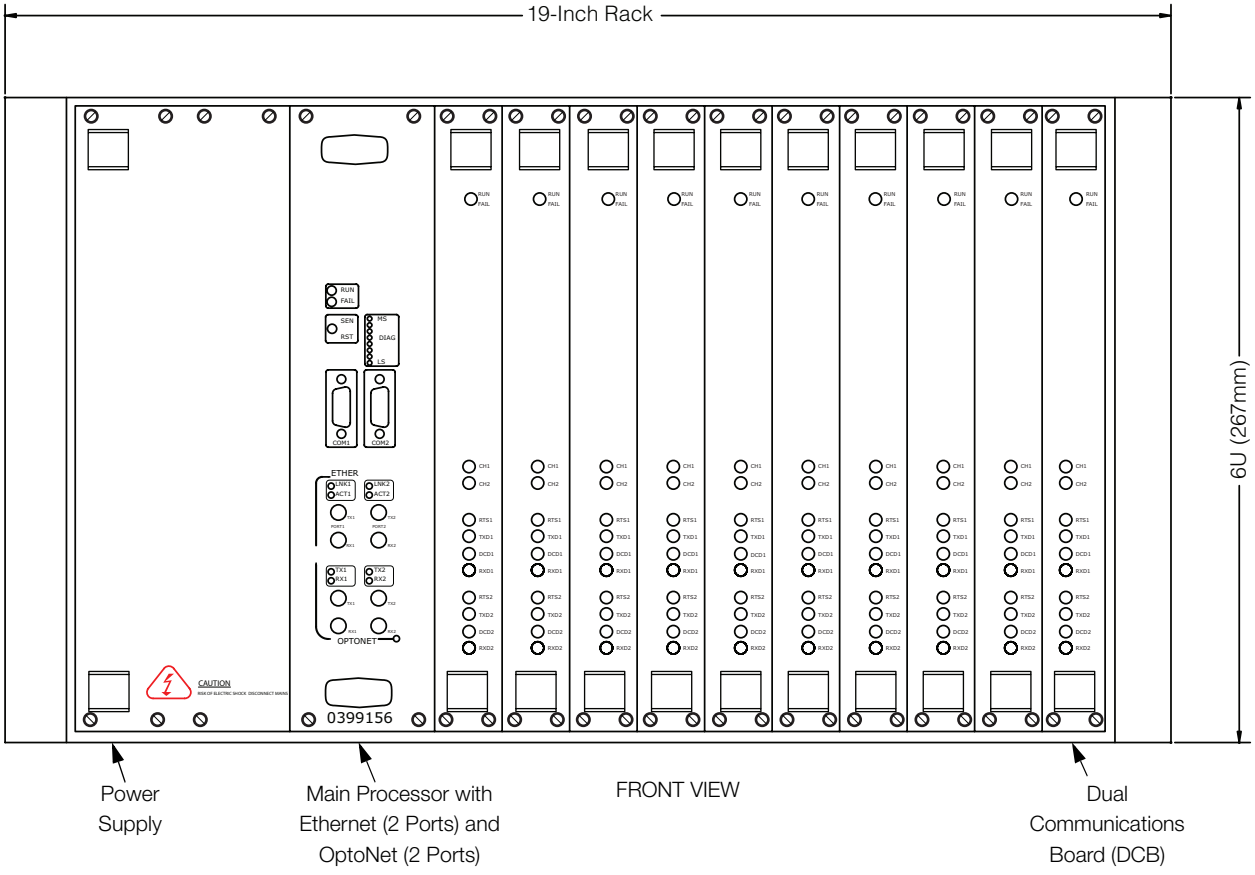

Figure 4. Communications Line Server Front View

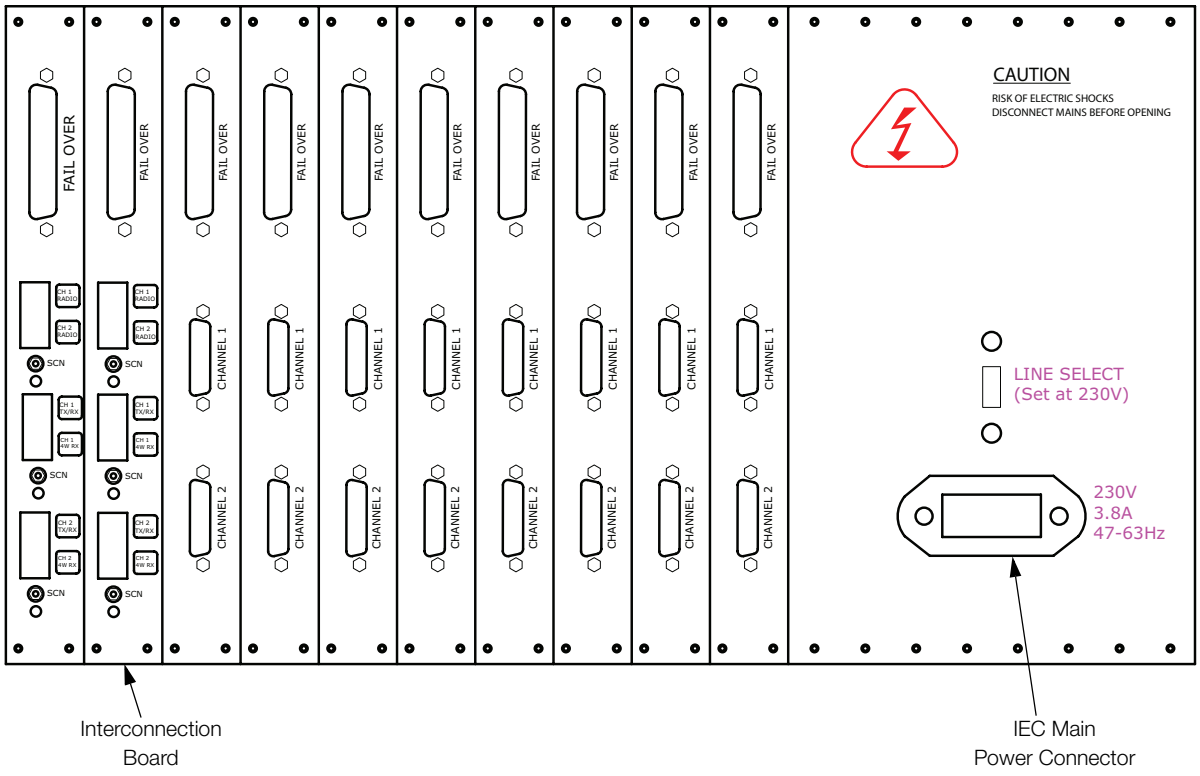

Figure 5. Communications Line Server Rear View

FUNCTIONAL SPECIFICATIONS

Power (230 V Selected)

INPUT VOLTAGE RANGE
90 to 264 V ac

POWER RATING
240 V ac

FREQUENCY RANGE
47 to 63 Hz

INPUT SURGE CURRENT
25 A (peak)

EARTH LEAKAGE
2.9 mA (60 Hz)

MTBF
>50,000 hours to MIL-HDBK-217F

Main Processor Module

PROCESSOR
AMD SC520 (32-bit Am5x86 core, integrated with chipset and peripherals)

OPERATING SYSTEM
AMX386® Operating System

BIOS
Invensys®/Foxboro® protected mode

MEMORY SYSTEM
16 MB SDRAM
8 MB flash file storage
128 KB non-volatile RAM
512 KB flash BIOS

SERIAL PORTS
DB9 male sockets wired per TIA/EIA-574 (DTE)

BACKUP TIME
Real-time clock and non-volatile RAM are maintained during power outage via a user-replaceable lithium battery. The battery lasts 1 year in storage and 7 years in use.

ETHERNET

INTERFACE

TRANSMIT POWER
-12 dBm

RECEIVE LEVEL
-27 dBm at bit error rate of 10^{-9}

RANGE
2000 m for 10BaseFL
300 m for 100BaseSX

PORTS
Dual 10BaseFL/100BaseSX Ethernet ports

OPTICAL CABLE
Glass fiber, multi-mode, 820 nm wavelength, dual 50/125 or 62.5/125 µm, ST connectors

INDICATORS
2 LEDs per port indicating Tx and Rx status (link, activity)

NOTE

AT- MC115XL from Allied Telesyn is the preferred media converter, which converts optical signals to copper Ethernet.

V.23/Bell 202 Dual Communications Board

NUMBER OF CHANNELS
Two

CONTROLLER
Zilog 85230

INTERFACE
CCITT V.23/Bell 202 modem software selectable

RTS TIMEOUT
Carrier disabled after 10 seconds

DATA RATE
150 to 1200 bits per second

LINE TERMINATION
600 ohms or high impedance, link selectable 2-wire or 4-wire, link selectable

ISOLATION
2 kV ac rms using V.23 Interconnection Board

MAXIMUM TRANSMIT LEVEL
0 dBm into 600 Ohms

MINIMUM RECEIVE LEVEL
-43 dBm

TERMINATION
Screw terminals via V.23 interconnection board

LEDS
Tx, Rx, RTS, CD, and channel on-line

RADIO INTERFACE
Form A contact, operating time 2 ms, release time 1 ms, minimum switching capability 1A, 30V dc, contact resistance 0.1 ohms

V.28 Dual Communications Board

NUMBER OF CHANNELS
Two

CONTROLLER
Zilog 85230

INTERFACE
V.28/V.24

RTS TIMEOUT
10 second timeout, link selectable

OPERATING MODES
Synchronous/Asynchronous

DATA RATE
300 to 9600 dual channel up to 64000 single channel only

EXTERNAL FIELD POWER
±12 V at 250 mA fused is provided to power external field interface module

TERMINATIONS
DB25 Female (DTE)

LEDS
Tx, Rx, RTS, CD, and channel on-line

FUNCTIONAL SPECIFICATIONS OptoNet

Configuration
ARCNET optical ring arrangement

Ports
Two ports each containing a transmit channel and a receive channel support a dual ring ARCNET configuration

Maximum Length Between Nodes
500 meters

Maximum Size of OptoNet Network Ring

UP TO 12 NODES
5800 meters

PHYSICAL SPECIFICATIONS

Physical Size
483 mm x 267 mm x 250 mm

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature

STANDARD
0°C to 60°C (32°F to 140°F)

EXTENDED(1)
-20°C to +70°C (-4°F to 158°F)

Humidity
10 to 95% (noncondensing)

Vibration
5 to 50 Hz 0.05 mm peak-to-peak
50 to 100 Hz 0.25 mm peak-to-peak

Safety
EN60950

Telecommunications

AUSTRALIA
ACA TS006 for V.23 on non-switched 2 W/4 W leased lines

EUROPEAN
ETSI-TBR 15 for 2 W leased line
ETSI-TBR 17 for 4 W leased line

(1) Extended temperature range modules are available on request.

ORDERING INFORMATION

Part Number	Description
SY-2003109	Communications Line Server File Assembly
SY-0399159	Communication Line Server Power Supply Module (90 V - 264 V ac)
SY-0399156	Communications Line Server Combined CPU/Ethernet/OptoNet Module
SY-0399101	Communications Line Server DCB (V.23 DNP)
SY-0399102	Communications Line Server DCB (V.28 DNP)
SY-0399103	Communications Line Server DCB (V.23 Conitel/C300)
SY-0399104	Communications Line Server DCB (V.28 Conitel/C300)
SY-0399105	Communications Line Server DCB (V.28 IEC.101)
SY-1025100	Glass to DB25 Female Converter
SY-1025101	Plastic to DB25 Female Converter
SY-1025104	Glass to DB25 Male Converter
SY-1025105	Plastic to DB25 Male Converter
SY-1025110	Communications Line Server Blanking Plate
SY-1014578	Communications Line Server Cable Interconnect 400 mm
1051002[(a)]	Optical Cable Assembly Multimode ST to ST L[(a)] Meters cable

(a) Length as per cable schedule

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