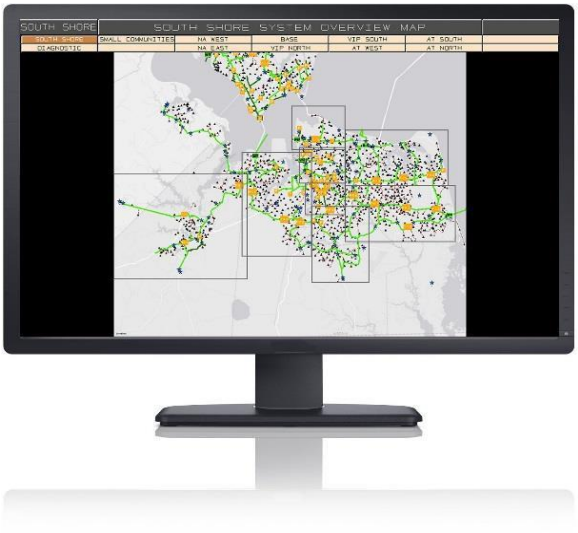
Ovation™ SCADA Communication Server

Features

- Effective management of remote units controlling mission-critical processes
- Interoperability with various remote terminal units
- Unified information through the Ovation database for efficient SCADA data management
- Optional dual redundant configuration for additional system security
- Seamless integration with new or existing Ovation systems
- Continuous monitoring of equipment and communication links
- Supports both serial and Ethernet interfaces



Introduction

As the world's population grows, so does the demand for more power, cleaner water, and less waste. Producing these everyday necessities calls for mission-critical processes that require constant, accurate control. Quality, conservation, regulatory control, and deregulation are just some of the factors forcing changes in the way these vital processes are managed.

To help customers deal with these issues, Emerson presents the Ovation™ Supervisory Control and Data Acquisition (SCADA) communication server. Important information from SCADA remote terminal units is readily available to the control system and desktops of supervisors and managers — enabling them to make faster, more effective decisions.

Coupled with the powerful Ovation system, the Ovation SCADA communication server brings process automation of mission-critical processes to a new level.

Remote Monitoring and Control

SCADA systems are typically comprised of two basic components: a remote terminal unit (RTU) and a client terminal unit. The Ovation SCADA communication server operates as the client terminal unit, providing central monitoring and control for the SCADA system.

Functions of the Ovation SCADA communication server include:

- Seamlessly passes value and status information to and from the Ovation database
- Configures and monitors RTUs
- Sends control commands to the RTUs
- Receives and reports data, messages, and alarms from RTUs
- Manages the status of communication links to RTUs
- Retries failed equipment
- Continually monitors failed equipment and communication links to put the failed piece back into operation
- Implements sophisticated polling algorithms using scan groups, priorities, and multiple scan rates
- Quickly changes polling algorithms
- Accepts unsolicited messages

Hardware Requirements

The Ovation SCADA communication server is based on an Ovation Windows-based platform, which can be integrated with an existing or new Ovation network. An optional keyboard and monitor make configuration and link administration quick and easy. For smaller systems, the Ovation SCADA communication server can be combined with other drop functions such as operator or engineer software. However, for most applications, it is recommended to implement the server software on an independent hardware platform.

Two mounting options are available. Rack-mounted systems are ideal for relay rooms or placement in environmentally harsh locations in NEMA-type cabinets. Desktop systems are perfect for control rooms, supervisor offices, or employee workspaces.

Software Configuration

Three major software components comprise the Ovation SCADA communication server. Each component plays a key role in ensuring constant and accurate control and monitoring of a SCADA system. And like any Ovation server, the SCADA communication server is easily configured using Ovation engineering tools.

Ovation Real-Time Data Interface

As the main interface to the Ovation database, the real-time interface moves process data between the Ovation network and the RTUs. In addition, a separate time-tagged data processor is used when the SCADA RTU/protocol provides timed-tagged data.

Redundancy Interface

A redundant interface provides a failsafe redundant connection to the Ovation network.

Polling Engine

The polling engine ensures communication between the RTU device and the Ovation SCADA communication server. The polling engine interfaces through multiple drivers as required to support RTU protocols.

Communications

Ovation's open architecture also extends to the SCADA communications server. The use of standard communication protocols, media, and open programming tools allows easy placement of a SCADA communication server on new and existing Ovation systems.

The server has the flexibility to operate over a variety of media such as leased lines, dial-up telephones, microwaves, licensed and unlicensed radios, spread spectrum packet radio, public switched networks, or satellites. Management of multiple media paths is automatic, allowing field data to be acquired from any one location, including backup communication channels and multiple sources. Communicating to primary and backup paths on different media provides additional system security.

The Ovation SCADA communication server interfaces with RTUs through multiple serial and Ethernet ports using routers, terminal servers, A/B switches, modems, and so forth. Up to 32 simultaneous channels of any type can be interfaced with the server, including backup channels. Multiple protocols are available from any one SCADA communication server. Refer to the SCADA Communication Server Specifications table for information on supported protocols.

Data Collection, Transmittal, and Storage

Efficient data management is vital to the success of SCADA communications. All process variables, data values, status, and diagnostic information used in SCADA communications are stored in the Ovation database and available to other Ovation drops (such as operator, engineer, historian, report server, workstations, and so forth). Process data is sent to RTUs based on control calculations or operator commands. Status changes of SCADA variables are then communicated throughout the Ovation system, allowing quick adjustments to the operating conditions before a problem occurs.

Polling algorithms are used to ensure communication between the RTU device and the Ovation SCADA communication server. The server supports multiple polling algorithms based on the number and type of connected RTUs. These algorithms include periodic, on-demand, spontaneous, and by-exception polls. Demand scans for faster process variable scanning rates can also be implemented to quickly display, respond to, or control SCADA information. Since the SCADA communication server is directly connected to the Ovation network, historical SCADA process data can be collected by the Ovation historian for online storage, offline archiving, sorting, data analysis, and generating reports.

Redundancy and Link Failures

Emergencies require rapid recovery to ensure the continual flow of vital remote data to the control system. The Ovation SCADA communication server incorporates various optional redundancy and failover schemes to keep processes running. Dual redundancy allows one Ovation SCADA communication server to perform as the primary server, while a second server is a backup. Whenever failure of the primary server is detected, data shadowing and diagnostic monitoring are automatically initiated, thereby allowing the backup server to assume full SCADA communication responsibility.

The Ovation SCADA communication server can quickly detect and respond to failure modes, including line failures, time-outs, data retransmit, incomplete data, and busy signals. Failure of communication links between the RTU and the communication server is monitored and reported to the Ovation database as an alarm. When a failure is detected after a specified number of retries, the server alarms the failure connects to an alternative communication link (if available), and attempts to re-establish communication to the primary link. The failed channel is continuously monitored and returned to service upon recovery. An initialization scan ensures the initial proper operation of the recovered link, while a confidence scan is run periodically to verify continuous smooth link operation. The number of recovery attempts from communication failures is pre-determined by the operator. If an alternative link is not available, all process variables associated with that link will be reported as “timed out” until link operation resumes.

Remote Terminal Units

The Ovation SCADA communications server supports various RTUs and Programmable Logic Controllers (PLCs) at remote locations. These devices handle process I/O and application logic to monitor and control local processes. They also handle communications to one or more central monitoring facilities (client/server configuration) and possibly to other remote locations (peer-to-peer). Ovation technology supports a variety of RTUs, such as those from Emerson, Motorola, Kingfisher, and Control Microsystems, as well as PLCs that can provide RTU services, such as Allen-Bradley and Modicon. Remote configuration and programming may be available depending on the RTU/PLC, protocol, and network combination specified. Emerson will interface to existing RTUs over an existing network or work with the customer to upgrade both.

Specifications

SCADA Communication Server Specifications	
Hardware Platform	Windows
Standard Communication Protocols	• Allen-Bradley CSP/PCCC Client • Allen-Bradley DF1 Client • Allen-Bradley EIP/PCCC Client • Building Automation Controls network (BACnet)/BACnet Server • DNP3 Client/DNP3 Server • DNP3 Server • EIP Explicit Client (Allen-Bradley EIP/Native) • EIP Explicit Server • EIP Implicit I/O Client • EIP Implicit I/O Server • GE Ethernet Global Data (EGD) • GE Mark GSM Client • GE Mark IV Client • Inter-Control Center Communications Protocol (ICCP) Client/ICCP Server/ICCP Bidirectional • IEC 61850 MMS Client • IEC 60870-5-101 Controlling/ IEC 60870-5-101 Controlled • IEC 60870-5-103 Controlling/ IEC 60870-5-103 Controlled • IEC 60870-5-104 Controlling/ IEC 60870-5-104 Controlled

SCADA Communication Server Specifications	
	• LoggerNet PC Client • Modbus Client/Modbus Server • Motorola ACE IP Gateway Client • Openness, Productivity, and Connectivity Unified Architecture (OPC UA) Client/ OPC UA Server • Optomux Client • Siemens S7 • Turbine Control Interface Client • Winteligence Server
Communication Media	Leased lines, dial-up telephones, microwave, licensed and unlicensed radio, spread spectrum packet radio, public switched networks, satellites, cellular, Ethernet (LAN and WLAN)
Redundancy Scheme	Primary and backup; supports dual redundant configuration
Number of Simultaneous Communication Channels	Up to 32 per server

ControlWave® Integration

Emerson's ControlWave® product line has been integrated into the 2.x series of the Ovation SCADA platform to provide seamless supervisory control and data acquisition. Real-time data is exchanged between the Ovation control system and the ControlWave RTUs through a configurable polling mechanism built into the Ovation SCADA communication server. Time-stamped historical data and alarm data are also captured for storage in the Ovation Historian. The Ovation SCADA communication server acts as a gateway to the ControlWave products through Ethernet or serial communications. Configuration of the ControlWave RTUs/PLCs is performed through native tools, such as the ControlWave designer and OpenBSI utilities.

Summary

The power of the Ovation control system can now be connected to the SCADA process, maximizing plant effectiveness and increasing productivity, while reducing operating costs. Data from SCADA operations can also be shared across organizational boundaries from remote terminal units to plant operators, supervisors, and management. Quick, reliable control can make the difference between a rapid recovery from an emergency and loss of production, time, and more.