

Family of Gateway Servers

Flexible OPC Client/Server Connectivity Options for Distributed Energy Control Systems

Highlights

Employs OPC Technology

Rapid Application Development

Complete Data Aggregation

Fast Data Transmission

Robust System Architecture

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Introduction

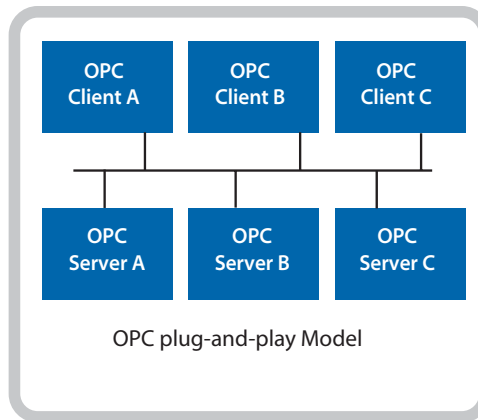
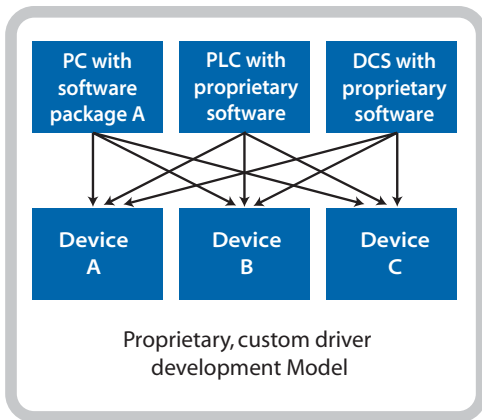
The Encorp Intelligence Family of Gateway Servers is a powerful collection of data servers built on industry standard communication specifications. The critical mission of power generation requires a number of speciality functions such as OEM engine electronic data monitoring, alarm notification, data logging, and interactive graphical screens. Raw site data for these and other purposes pass through various data filters and processing algorithms and are displayed on remote client programs such as the Virtual Maintenance Monitor™ and the Virtual Power Plant™.

From a single interface, it is possible to configure, monitor, control, and dispatch multiple remote distributed energy resources. These robust OPC Servers form the backbone of the Encorp Support Energy Management Center and are available as custom engineered solutions to our clients.

Whether your system is a single generator set used for occasional emergency backup or a multi generator co-generation peak-shaving powerplant, the Encorp Intelligence Family of Gateway Servers can provide multiple levels of information management.

1. Field Management

Modern field devices contain huge amounts of digital data. These devices are constantly collecting data on (among other parameters) power availability, power quantity, power quality, configuration parameters, engine status, and device status. This information needs to be delivered to the user, in a reliable, consistent manner.



Source: The OPC Foundation

Figure 1 In the absence of a defined standard, proprietary hardware and software drive up development and maintenance costs. The OPC plug-and-play model enables rapid project application development and simpler maintainability

2. Process Management

Depending on the objectives and complexity of a specific distributed energy system, the use of OPC technology makes it possible to monitor and control energy processes from electronic data. Aggregated data from site devices are made available and auto-configured OPC tags display the data as objects on Custom Graphical Overview Screens within the Virtual Maintenance Monitor. This makes complex remote process management not only possible but feasible and easy to manage.

3. Business Management

Information collected and logged becomes valuable intelligence. Managing the financial aspects of a distributed energy system is the bottom line for managers. OPC's consistency across client applications allows for easier integration between process and business management systems. Reporting tools easily read OPC data and are able to display it graphically for quick and intuitive analysis.

OPC Technology

OPC stands for Object Linking and Embedding for Process Control and since 1996 has been the standard client/server specification developed by leading automation and hardware suppliers working in cooperation with Microsoft. This standard is managed by the OPC Foundation, a non-profit organization comprised of over 290 members from around the globe, including major providers of instrumentation, control, and process control

systems. The OPC standard allows for rapid software and application development, designed to eliminate proprietary schemes, reduce development time and ensure functionality and performance (Figure 1).

In order to promote software inter-operability, OPC defined a standard object set, methods, and interfaces all based on Microsoft's OLE COM (component object model) and DCOM (distributed component object model) technologies.

Common standard interfaces exist for different applications within the OPC standard facilitating interoperability between software components. OPC specifications have been created to address various needs in terms of data exchange within the industrial automation marketplace. This framework for software development forms a foundation of support for legacy applications and upward migration as development progresses.

The Encorp Intelligence Family of Gateway Servers adheres to this standard and uses a collection of internally developed and third party tools to engineer fast, innovative, and robust solutions.

The OPC standard provides numerous advantages over previous methods of process control. Client devices only have to interface with a single device - an OPC server - in order to get data from any device. The benefits to users are many:

- Rapid application development
- Plug-and-play integration
- Ease of connectivity and Inter-operability of custom applications
- Reduced troubleshooting and maintenance costs
- Synchronous and asynchronous device writes (not possible before OPC)

Data Architecture

The Encorp Intelligence Family of Gateway Servers reside on the Communications Processor Module (CPM), an industrial grade computer designed to provide a local interface to all site metering and control devices. These site devices consist of Encorp Power *Gold Box* controls, PLCs, OEM Engine Electronic Controls, continuous emission monitors, and SCADA systems or ISO interfaces (Figure 2). OPC Servers have been engineered for many other site control and monitoring devices. The above listing represents a only few examples.

As a distributed energy site operates, the various site devices pass data to (and may receive data from) a communication gateway. The design of The Encorp Intelligence Family of Gateway Servers allows this data to be aggregated intelligently and fed to the Virtual Maintenance Monitor or alarm devices such as pagers and/or e-mail clients.

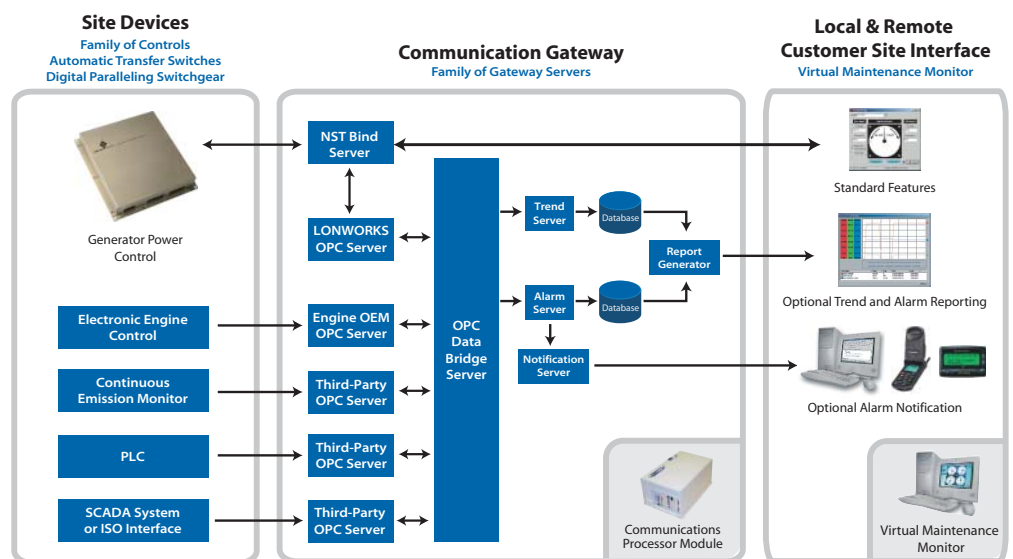
Gateway Servers

NST Bind - Configuration/Server Software

The NST Binding Tool software pulls double duty as both a configuration tool and as a data server. As a server, NST Bind functions as the primary interface between Encorp Power Generator Power Control products and custom OPC client applications. NST Bind is installed on a CPM equipped with a LONTALK adapter, which in turn is connected to the LONWORKS network.

NST Bind constantly gathers data from GPC's and other LONWORKS devices over the LONWORKS network and makes this data available to Encorp's other software programs and/or the LONWORKS OPC Server.

Within the digital environment of the Generator Power Control are over a hundred software objects and over a



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Figure 2 Data Architecture of The Encorp Intelligence Family of Gateway Servers - When installed with a Communications Processor Module acting as a gateway, the VMM may run locally or from multiple remote locations with all features present.

thousand variables representing data points. This data is organized into binding sets in the NST Bind software and served to client interfaces through the LONWORKS OPC Server.

LONWORKS OPC Server

The LONWORKS OPC Server (Figure 3) acts as a data protocol translator for the NST Bind/Server and OPC client applications. This intelligent server uses an initial configuration utility to discover and display all LONWORKS devices on the network and their tags.

Generally, the LONWORKS OPC Server works in the background providing data access between site devices and OPC client software or an OPC Data Bridge Server. The LONWORKS OPC Server also has the ability to modify variables read from or written to a device according to Gain and Offset configuration values. Other intelligent features include the ability to define tag limits and enable simulation polling for offline testing of OPC client applications.

Third-Party OPC Servers

Third-Party OPC Servers provide an interface to a wide range of industrial devices and systems. Third-Party OPC Servers provide device connectivity through the use of plug-in communications drivers. Adding a new OPC Server is simply a matter of plugging in a new driver. This

allows energy managers to interface with and control anything from emission control monitors to building SCADA systems to separate PLCs. Encorp routinely incorporates communication drivers from a long list of available drivers. Listed below are several examples:

- Modbus Slave
- Modbus RTU
- Siemens S5 (3964R)
- PLCDirect ECOM
- DIRECT-NET

Example features of these drivers include:

- Supports OPC 1.0 and 2.0 Data Access Specifications
- Uses a multi-threaded design for optimum performance
- Supports up to 16 concurrent serial port and PC card configurations
- Ability for full time on-line operation that allows on-the-fly changes
- CSV file import and export of Server Tags for easy configuration on large projects

DDE features include:

- FastDDE support
- Advanced DDE Support
- CF-TEXT Supports all DDE aware applications
- XL-TABLE Supports Excel Array Data
 - NetDDE Supports shared network access to device data

OEM Engine Electronics Server

The OEM Engine Electronics Server provides an OPC interface to the various OEM engine electronics interfaces. The OEM Engine Electronics Server provides a means to remotely control and monitor single or multiple gensets at a common site. This server gives system operators the ability to monitor all key engine and generator parameters on a real-time basis. The right most screen in Figure 3 shows multiple engine gages which are being fed data from an OEM Engine Electronics

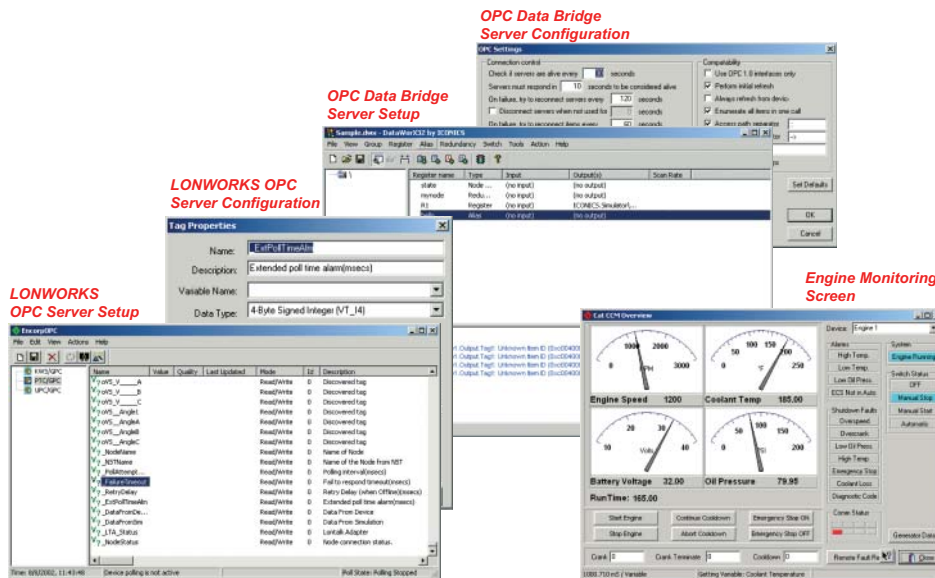


Figure 3 The Family of Gateway Servers are powerful data servers for connecting local sites to remote Dispatch Work Stations.

Server. The data is then fed to the VMM server which configures and organizes the remote connection to the VMM client. Various levels of VMM interface access are defined by the VMM server. While a site administrator has access to all configuration screens within the VMM, an operator will only have access to certain screens and has no ability to change critical parameters.

OPC Data Bridge Server

An OPC Data Bridge Server is useful in situations where there are hundreds of data points all converging into one or two CPM's and the need for efficient handling of data traffic is paramount. A big advantage to using an OPC Data Bridge Server is its ability to aggregate both Encorp and third party OPC server fed data. It can also add a layer of intelligence by manipulating data using an expression editor to build custom mathematical expressions.

Some of the advantages of deploying a Data Bridge Server are:

1. Direct Routing of Device Data to Another OPC Device

In certain circumstances, it is useful to allow a site device to feed data directly to another site device (Figure 4). For instance, a SCADA System may be providing data that is fed into an OPC Server and aggregated with other data for providing information and feedback. The same SCADA System interface might also need information from a Continuous Emission Monitor in order to regulate processes and maintain operational logs.

2. Direct Scaling

The OPC Data Bridge Server supports direct scaling of link item data. Scaling allows raw data to be converted to engineering units for OPC client applications. The OPC Data Bridge Server provides a number of unique scaling features, such as linear and square root formula scaling. Managers also specify the range of the raw data input and the engineering range of the scaled value. In some cases, the raw data input received may exceed the range set for the raw data. If this occurs, the engineering value can be forced outside of the range desired. To prevent this, the OPC Data Bridge Server allows for clamping the scaled value to the engineering ranges. In most cases, it is always assumed that a scaled value results in a floating point number. The OPC Data Bridge Server doesn't make this assumption and allows scaled engineering value to be any valid OPC data type. This allows scaling a 16-bit integer value to a 32-bit integer value.

3. Data Aggregation

Another benefit of the OPC Data Bridge Server is its OPC Data Aggregation feature. Connect any number of OPC clients, and it consolidates the OPC data requests automatically. This aggregation can help in reducing the load on the OPC Server itself. The OPC Data Bridge Server takes care of getting the data and then disseminating it to the appropriate client applications.

4. Standard Data Interface

A standard data interface decreases development time by providing for consistent remote client configurations and helps insure greater reliability.

Encorp Product Architecture

The Family of Gateway Servers are part of a comprehensive family of products designed to implement real-time, distributed energy-focused solutions for a wide range of applications (Figure 5).

The Encorp Product Architecture begins with the Generator Power Control, an analog/digital microprocessor-based device designed to fully control single and multiple generator sets and act as a master control node or serve meter/monitoring functions. Site

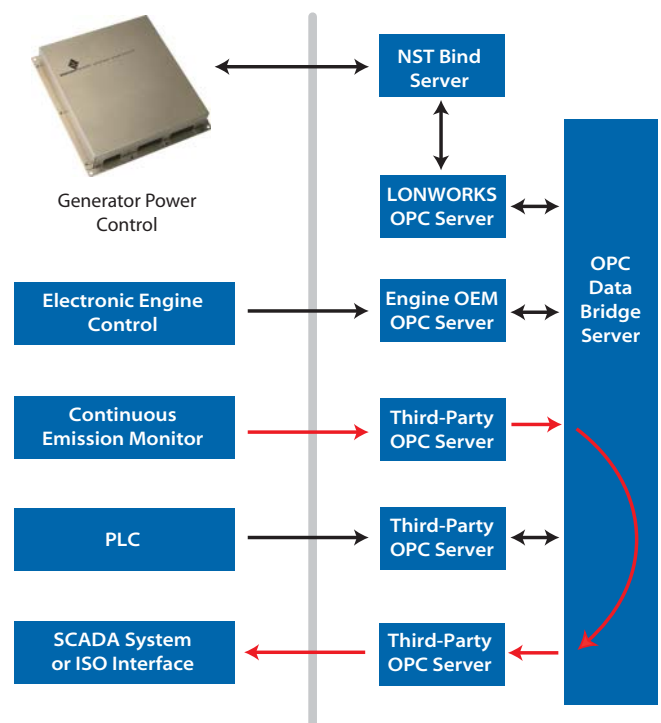


Figure 4 Data Bridge Server Direct Device Routing

devices can also include third-party controls and monitors that allow for OPC data integration.

The Encorp Intelligence Family of Gateway Servers extends the product architecture by interfacing with site devices and aggregating data into common collection points and either processing the data and returning it to other site devices or passing it on to OLE and OPC client components.

The Communications Processor Module (CPM) is an on-site, industrial computer acting as the communication gateway for local and remote operators. OPC data servers run on the CPM, providing all services described in this datasheet.

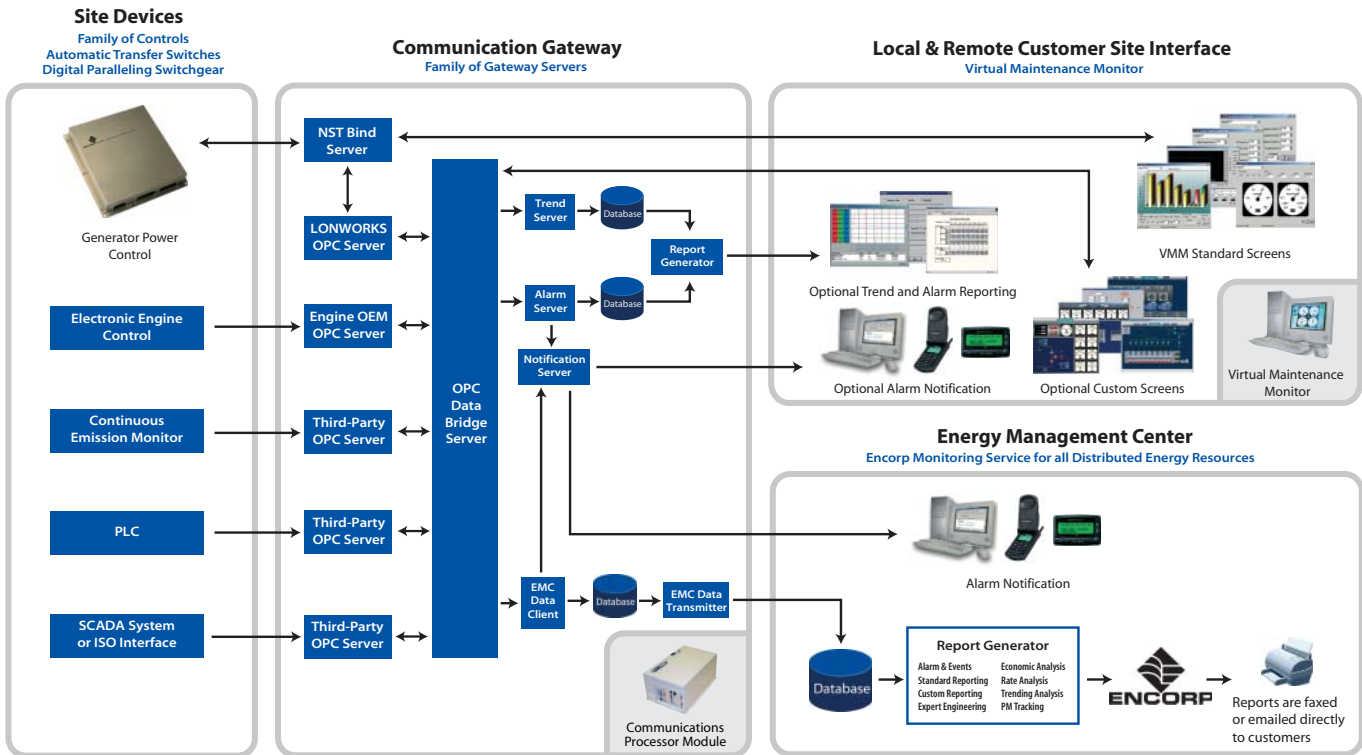
Remote users connect to the CPM via TCP/IP (Transmission Control Protocol/Internet Protocol) through a dialup, LAN (Local Area Network) or VPN (Virtual Private Network). The CPM may also use its onboard modem to send alarms as needed.

OLE (Object Linking & Embedding) and OPC (OLE for Process Control) client components reside on remote Dispatch Workstation computers and interface with the CPM receiving served data from the site devices and issuing commands back to the site. The Virtual Maintenance Monitor provides the core technology for remote site interface and integrates seamlessly with three optional components:

- Custom Graphical Screens
- Alarm Notification and Event Logger
- Data Logging and Trending Analysis

The Energy Management Center collects operational data at close intervals from on-site CPM's that automatically transmit at regular, preprogramming intervals. The data is stored in a database and organized, analyzed, and formatted. It is then periodically sent to clients via e-mail or fax. Energy quality and usage patterns can easily be tracked and analyzed in order to optimize power usage.

Family of Gateway Servers - Product Architecture



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Figure 5 Encorp Product Architecture including Site Devices, Family of Gateway Servers, Virtual Maintenance Monitor and the Energy Management Center.

