Unified Automation

Case Study September 2015

OPC UA Controls Highly Flexible Sewerage Systems

SEGNO integrates OPC UA to reduce the dangers of combined wastewater discharges.

S E G N O

Background

More than half of the German population is connected to a combined sewer.
Over and over during extreme rain events, environmentally harmful wastewater discharges from interposed storage structures pollute water bodies. To reach the EU set goal of a good condition of all water bodies, local authorities and associations urgently need to take action regarding their wastewater treatment plants and sewerage systems. In the future, it will be necessary to take further efforts to effectively reduce water pollution.
There are two different approaches to optimize discharge quantities of sewerage networks. On the one hand, it is possible to structurally enhance sewerage systems, e.g. by building retention ponds or expanding pipe diameters. On the other hand, sewage streams can be dynamically controlled in real time to increase the efficiency of the existing infrastructure and to reduce environmental pollution caused by wastewater. Due to the dynamic operation of the real time control system, sewerage systems are better prepared to cope with future changes, like the effects of climate change. In principle, integrated control systems

are complicated, time consuming to install and maintain, and thus expensive. Thus, water suppliers are reluctant to establish such systems.

Challenges

Within the scope of a research project funded by the European Union, SEGNO Industrie Automation GmbH develops an intelligent RTC (real time controller) module that simplifies real time control of sewerage systems and reduces the costs for implementation. A particular challenge is that geographically distributed systems of diverse manufacturers have to be connected to the module. The module is a central control unit that has to connect to visual display software and programmable logic controllers (PLCs) of different manufacturers. A secured channel has to be used for data communication, ensuring data integrity as well as protection against unauthorized access.

Solution

The central element of SEGNO's integrated control system is the module for open/closed loop control and data recording, the ADESBA-RTC-Core. The connection to the integrated web server as well as the communication with external visual display and control systems are realized with a plug-in interface. To communicate with these devices, the industry standard OPC UA is used, which is supported by a large number of devices from different manufacturers. Data integration is much easier to achieve with OPC UA than with proprietary bus systems, because it provides meta information in addition to raw data. It is possible to configure and start up the data integration securely across network boundaries. OPC UA makes only low demands on the network infrastructure, is robust and comes with integrated security, like encryption and authorization.

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OPC UA Background

During the last years, SEGNO already gained experience with the "classic" COM/DCOM based OPC standard, but it only works on Microsoft systems. Particularly in distributed networks, DCOM configuration is again and again complicated and time consuming, and can often only be achieved using additional software. Thus, SEGNO decided to use the "new" standard OPC UA for their ADESBA-RTC module. To connect existing legacy systems, software gateways are used as UA proxy servers.
OPC UA establishes the communication via a defined TCP port, thus network boundaries with a firewall no longer cause a problem. Using the web service implementation, even communication via http proxies is possible.
Already the base technology of OPC UA contains heartbeat monitoring (KeepAlive), thus the connection is automatically monitored in both directions. The requested secure communication is an integral part of OPC UA. The connection can be signed and encrypted using X.509 certificates.

Used Products of Unified Automation

"Unified Automation's toolkit fits perfectly into the .NET world. It encapsulates OPC UA functionalities and provides an easy to use API", says Kevin Bäker (software development at SEGNO).

The OPC UA plug-in has been developed using Unified Automation's ".NET based OPC UA Client & Server SDK (Bundle)". It consists of overall three assemblies that encapsulate basic functionalities like communication establishment, message transport, and security. The server and client libraries provide a simple API that enables the user to easily and comfortably develop OPC UA applications.
To ensure the link to the "classic" OPC standard, Unified Automation's "UaGateway" is used. The high-performance wrapper and proxy allows connecting COM/DCOM clients/servers to OPC UA. Thereby, UaGateway is installed locally to the same PC on which the "classic" OPC server is running. Thus, only a simple configuration is necessary. The communication over the network works encrypted and authenticated via OPC UA. Thus, VPN tunneling or time-consuming DCOM configuration can be avoided.

About SEGNO

SEGNO Industrie Automation GmbH is a software company that focuses on industrial applications. The company's core areas are process control engineering, software development, database systems, ERP integration, as well as automation telecontrol engineering.

To secure customers' invests, the solutions are based on products of the world's leading manufacturers that are customary in the market and in line with the industry standard.

Website: www.segno.de

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About Unified Automation

As a leading supplier of OPC UA software Unified Automation provides UA-enabled products, cross-platform toolkits and development frameworks in different programming languages (ANSI C, C++, JAVA and C# .NET) and for different platforms (Windows, Linux, VxWorks, QNX, RTOS, and many embedded operating systems). The target market of OPC UA products ranges from manufacturers of embedded devices to developers of enterprise applications.
Unified Automation sees itself as technology and software provider in the field of OPC based communication. The software development kits (SDKs) form the base of OPC UA products of nearly all large and small automation vendors worldwide.

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