

**SIEMENS***Ingenuity for life***OPC UA**

## The integrating factor

[siemens.com/S7-1200](https://www.siemens.com/S7-1200)

### Author

Pamela Angelica Pacheco Tellez  
Marketing manager  
SIMATIC S7-1200  
Siemens AG, Nuremberg  
Germany



**The vision of a self-controlling, self-optimizing, self-organizing factory has now become a fixed part of the industrial and automation worlds. Networked, intelligent systems, which control processes autonomously, are technically no longer dreams of the future. But even in the details, Industrie 4.0 and the Industrial Internet of Things (IIoT) are opening up new applications for optimizing processes. However, this requires machines and systems to be easily integrated into a common data environment.**

One application that requires such integration is data-based Condition Monitoring, which allows maintenance activities to be matched to actual needs and better scheduled. The networking of data also facilitates new approaches to process optimization, such as optimizing of energy efficiency. The machines or plant sections have often already been energetically optimized. An overall view of all energy data combined with intelligent networking of the entire

operation opens up further potential for recognizing and using energy intelligently. For example by intelligent load management or chaining processes with complementary energy requirements. However, modern production facilities are not yet self-organizing, but they can be organized flexibly and controlled by new, modular line concepts, in which production stages can be combined in many different ways.

### Connectivity as the "key qualification"

In all of these cases, production data has to be provided uniformly and transparently: both horizontally – from machine to machine – as well as vertically – that is from the production to the MES/ERP levels and the cloud. The difficulty with this is often that various interfaces and protocols have to be "served". To facilitate the integration of automation systems into a standardized data and information environment, machine and plant constructors and operators need solutions which not only support con-

ventional interfaces and protocols, but also enable these interfaces to be easily adapted if required – not only for the high-end range of complex production lines or closely timed processes. Especially small units – such as conveyor systems, ventilation systems or feeding devices – form not only a large part of the machine park, but are also often crucial for optimizing the process. Energy consumption, system availability and clock rates can only be optimized if the line or plant is considered as a whole. That is why Siemens significantly expanded the connectivity of the system in its latest firmware version 4.4 for its Simatic S7-1200 controllers: The controller now supports not only widely used automation protocols such as Profinet, but also communication as an OPC UA server, secure communication via secure emails and encrypted Open User Communication (OUC) with system-supported SSL/TLS protected communication with cloud solutions such as Siemens MindSphere and higher-level systems on the MES and ERP levels. Not only all automation applications in the lower performance range benefit from simple, flexible integration into machine and even cross-plant networks, but also applications that are typically not or only slightly automated. Especially in these industries and fields of application, the modular Simatic S7-1200 has made a name for itself since its market launch. As well as industrial applications in the fields of simple open and closed loop control and the automation of pumps and ventilation systems, the controller is also especially successful in non-industrial fields, such as blueberry plantations, calf rearing and craft confectionery.

By improving connectivity, in a way Siemens is continuing a good tradition. At its market launch, the Simatic S7-1200 already offered a wide range of modules, including several communication modules. Additional modules and functions were then added one by one, such as a Siwarex module for weighing applications and the trace function added in 2013. The number of available modules has now grown to 40. As a result, not only compact solutions can be implemented in the control cabinet. Because of its modular concept, the controller can grow with the specific tasks – and thanks to the



With the new firmware 4.4, Siemens has added OPC UA to the many communication options of the Simatic S7-1200.

new interfaces – now also toward line integration and applications related to Industrie 4.0.

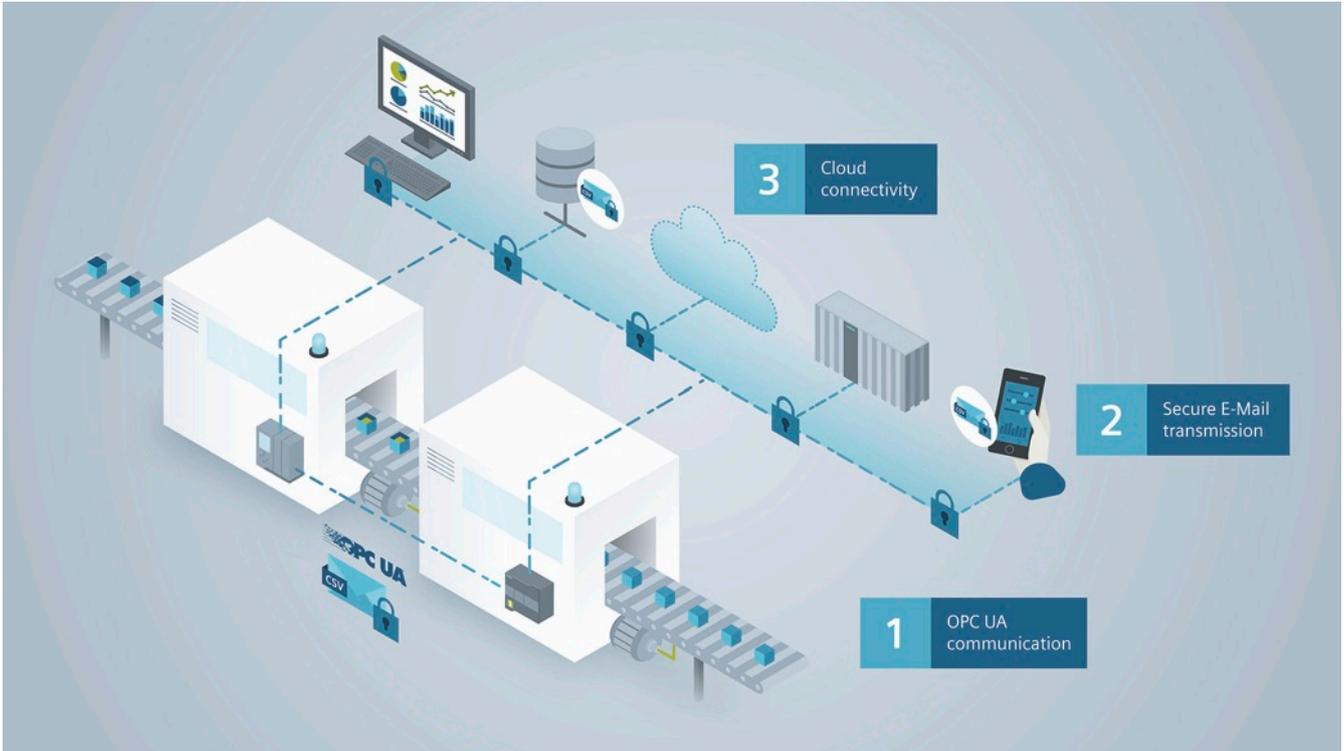
#### **Options for horizontal and vertical communication**

Open User Communication (OUC) is especially suitable both for connecting the Simatic S7-1200 to IT systems and for communicating with other controllers. OUC is based on TCP/IP and enables, for example, production data to be transferred via HTTPS or FTPS. Users can also connect TLS-based client connections to IT servers or other CPUs and optionally authenticate servers and clients by certificate. Siemens has developed a free cloud connection library for connecting the Simatic S7-1200 to cloud solutions, such as Siemens MindSphere. The connection supports encrypted data transmission from the controller to the MindSphere platform and other cloud systems via MQTT. A particular asset can easily be configured with the apps available in MindSphere and analyzed in the visual data evaluation so that potential for optimization can then be implemented.

As an OPC UA server, the Simatic S7-1200 also makes data available to a multitude of other devices and applications, which can access it through OPC UA client functionality. The Simatic S7-1200 supports client-server communication with the services for browsing CPU data, read/write for asynchronous data access, and

subscriptions for monitoring variables. The user activates the OPC UA server in the communication settings of the TIA Portal, confirms the corresponding license, and then releases specific variables for data access by means of checkboxes in the editor. Special OPC UA specifications – such as PackML and EuroMap Companion specifications for applications in the packaging or plastics industries – can be loaded easily with the Siemens OPC UA Modeling Editor (SiOME) or subsequently loaded into the firmware with the server interface editor integrated in the TIA Portal engineering tool. In the same way, users can also easily implement their own specifications and changes or enhancements to the specification without loading changed firmware in the controller.

Thanks to OPC UA, the Simatic S7-1200 can provide data for a large number of applications without having to integrate additional components into the automation. So now a data exchange with programs such as Matlab can easily be used to simulate processes, investigate process modifications, or optimize system behavior. At the same time, users can use a proven, functional and versatile controller with a large number of interfaces for sensors and actuators for the actual plant automation. In this respect, the PLC also ensures that communication functions smoothly between production and cloud.



Good connectivity is important in ensuring the standardization of data, both between individual machines as well as to higher-level systems and, if appropriate, to a cloud solution.

**Optimal basis for highly flexible and integrated applications**

Thanks to the new communication options, the Simatic S7-1200 will also make its contribution to greater transparency, efficiency and quality in the Industrial Internet of Things and shows that its functionality is still absolutely up to date even after 10 years on the market. This also includes catering for cyber security, which Siemens supports not only in the implementation in the portfolio, but also in the “Charter of Trust Initiative”.

At the same time users benefit from a proven, versatile controller solution, such as that for bottling craft beer. In this case, Simatic S7-1200 enables up to 21 different types of brew to be bottled in a single plant. As a result, the brewery’s customers can enjoy their special beers at home as if they had just been freshly drawn. But even this does not completely satisfy the master brewer. In the next few years, the company would like to achieve an almost CO2-free brewery by intelligent networking of the entire operation and the best possible protec-

tion of the environment. Another goal is to increase the speed and efficiency of filling, packaging and logistics in order to meet consumers’ changing requirements and requests in a wide range of markets. The company therefore specified Simatic as an automation component in the requirement specification, because data standardization is the basis of a digital company and can be more easily achieved with a uniform, open system.

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