Leuze electronic

the sensor people

SMART
SENSOR
BUSINESS

OPC UA MICROSOFT AZURE CLOUD

White Paper

OPC FOUNDATION MEMBER

Microsoft Azure

Leuze electronic

the sensor people

White Paper

LEUZE ELECTRONIC COOPERATES WITH MICROSOFT

Leuze electronic and Microsoft jointly develop a sensor solution with I4.0 capability which is based on the BCL 300i bar code reader and transfers the data directly to the Azure Cloud and back to the sensor.

IS A COMMUNICATION INTERFACE ALREADY INDUSTRY 4.0?

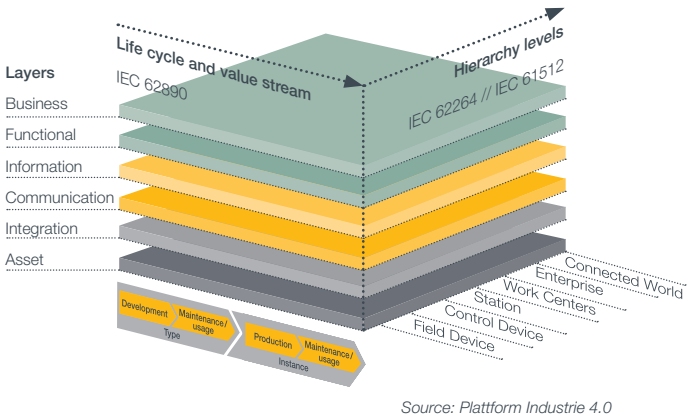
An intelligent and standardized data interface is the prerequisite for high data transparency and thus, the basis for Industry 4.0. The interface alone is not enough, however, to be able to realize Industry 4.0 systems. The RAMI 4.0 reference architecture model of the Industry 4.0 platform provides a representation for industry.

Depicted in the RAMI model are the properties of Industry 4.0 components in three different dimensions: in one direction, the product life cycle is described – here, product data such as production data, data sheets, configuration data, etc., is collected. In the next dimension, a hierarchy is recorded. This is, in principle, similar to the familiar automation pyramid, expanded with the Product item below the Field level and the Connected World item above the Company level. Described in the third dimension is the IT representation.

Industry 4.0 components must be describable using the RAMI 4.0 model. This means that a sensor (field device) must be able to communicate across all IT levels if it is to be used as an Industry 4.0 component. This is something not possible for a sensor with a classic fieldbus interface, since these interfaces communicate exclusively with the control, but do not pass any data to the upper IT levels.

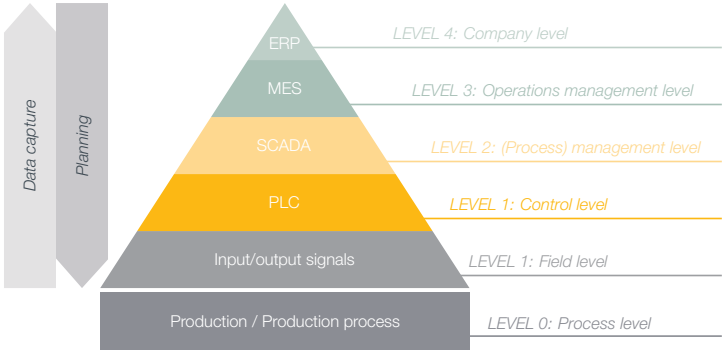
OPC UA AS FUTURE STANDARD IN M2M COMMUNICATION

Unlike classic fieldbus interfaces, an interface that is expanded with the OPC UA communication model can transport data to higher IT levels of the RAMI model. OPC stands for “Open Platform Communications” and is a set of standards for industrial communication. This standard was developed between 1994 and 1996 under the name “OKE for Process Control” with the goal of exchanging process data of actuators and sensors from various manufacturers with



Source: Plattform Industrie 4.0

The reference architecture model of the Industry 4.0 (RAMI 4.0)



The standard automation pyramid

SCADA and HMI systems. OPC is based on the Microsoft technologies OLE, COM and DCOM. The UA in OPC UA stands for “Unified Architecture” and represents a significant further development of OPC. Unlike the original UPC technology, OPC UA is a cross-platform implementation and, as a result, is no longer restricted to Windows platforms. Among other places, it can also be used in embedded systems and, thus, implemented in sensors. Furthermore, the OPC UA communication model can be operated next to the classic protocols, such as Profinet or Ethercat, over all Ethernet-based fieldbus interfaces.

OPC UA includes a security implementation that consists of authentication, authorization, encryption and data integrity with signatures. Unlike the communication methods typically used in industrial environments, OPC UA thereby allows for secure communication. From the field level of the automation pyramid, OPC UA can communicate via two different mechanisms: either via client/server communication or via a publisher process. With client/server communication, an OPC UA server is integrated in the data source, e.g., a sensor that can deliver data to a data recipient. With the publisher process, a UPC UA publisher is integrated in the data source. This can then make its data available to various data recipients. If there is more than one data source (sensor) in the system, the data recipient can decide which data it would like to receive from which publisher. Thus, the recipient does not always need to accept the data from all publishers. Using this process, communication from m data sources to n data recipients is thereby possible. Moreover, a data cloud can retrieve interesting data directly from the data source. Communication in the opposite direction – from the cloud to the sensor – will also be possible in the future. As per the requirements for Industry 4.0 compatible communication, OPC UA can thus virtually “tunnel through” the layers of the automation pyramid and transport data to the higher levels of the RAMI model. Standardized communication of sensors and actuators from various manufacturers directly with a cloud-based ERP system is thereby made possible. Thanks to the secure communication, even the exchange of data between different systems via public channels is conceivable. Because Industry 4.0 and IIoT stand for the exchange of data between capturing and operating units across all system borders, OPC UA is an important part of Industry 4.0. With the properties mentioned above, it is – from our perspective – one of the most important candidates for a future standard in machine-to-machine communication (M2M).

THE MICROSOFT AZURE CLOUD

The provision of data by components via OPC UA communication alone is not enough for an Industry 4.0 application. Additional mechanisms are needed for data acquisition from the cloud. Data transfer from a sensor to the cloud is referred to as telemetry. To realize telemetry data without additional components, such as an Industry 4.0 gateway, Leuze electronic and Microsoft began a collaboration, the first results of which both companies will be presenting together at SPS/IPC/Drives 2016 in Nuremberg: sensor data from the BLC 348i bar code reader from Leuze electronic is transmitted via the OPC UA Publish/Subscriber Communication Model (PSCM) to the Azure IoT Hub from the Microsoft company. Transmitted by the bar code reader to the Microsoft Azure Cloud via the Advanced Message Queuing Protocol (AMQP) of the OPC UA interface are both process data and metadata as well as code type or the number of readings. This data is recorded there by the IoT hub and made available to the Azure Cloud Services for analysis and visualization.

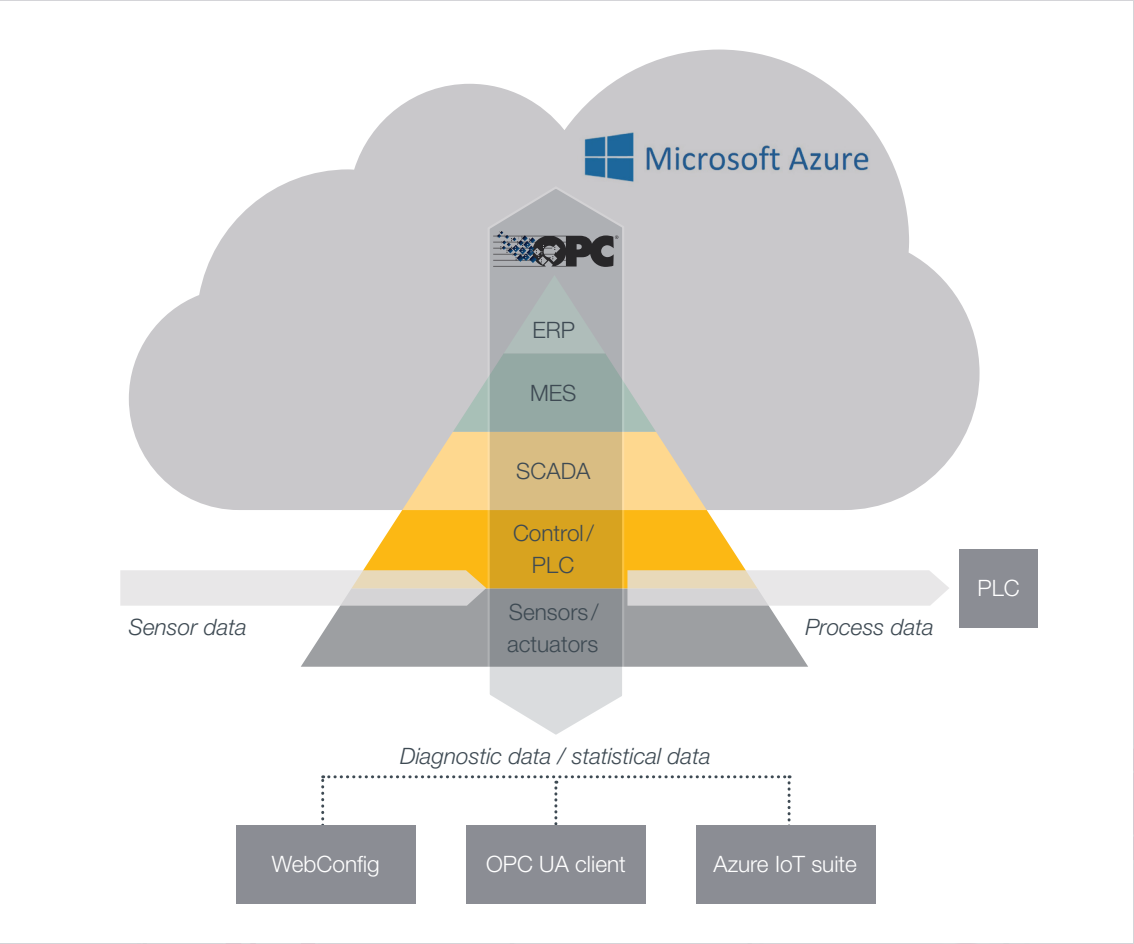
COOPERATION BETWEEN LEUZE ELECTRONIC AND MICROSOFT

With the Azure Cloud, Microsoft is one of the leading suppliers of cloud services. The Azure Cloud makes a number of cloud applications available to the user. These services can be hyperscaled and can be called up globally by the user. Microsoft is currently offering the possibility of relay/broker communication for embedded devices for the first time. This feature has now been integrated in the BCL 348i bar code reader from Leuze electronic. With this communication, an embedded device can be controlled from the Azure Cloud and is referred to as a command/control function. Using the BCL 348i bar code reader as an example, Leuze electronic will present how a device can be addressed from the cloud on the lowest RAMI level without the need for another gateway. It will be clearly shown how the reading gate of a bar code reader from Leuze electronic can be controlled from anywhere in the world by any mobile device via the Azure Cloud.

In the context of big data, another application case is of much greater importance. The sensor data recorded by the IoT hub can be analyzed by the powerful analysis tools of the cloud according to predetermined criteria and trigger events in the Industry 4.0 total system. At SPS/IPC/Drives in

Nuremberg, Leuze electronic will, as an example, be showing an evaluation of erroneous readings in the Azure Cloud which, in addition to a graphical presentation, also results in a message being sent to the user: building 7A, booth 230.

By establishing cooperations, application-oriented use cases and the development of innovative Industry-4.0-capable solutions and products, Leuze electronic is a driver for Industry 4.0 and views this as an opportunity for new business models.



"Tunnel through" the layers of the automation pyramid via the OPC UA protocol