

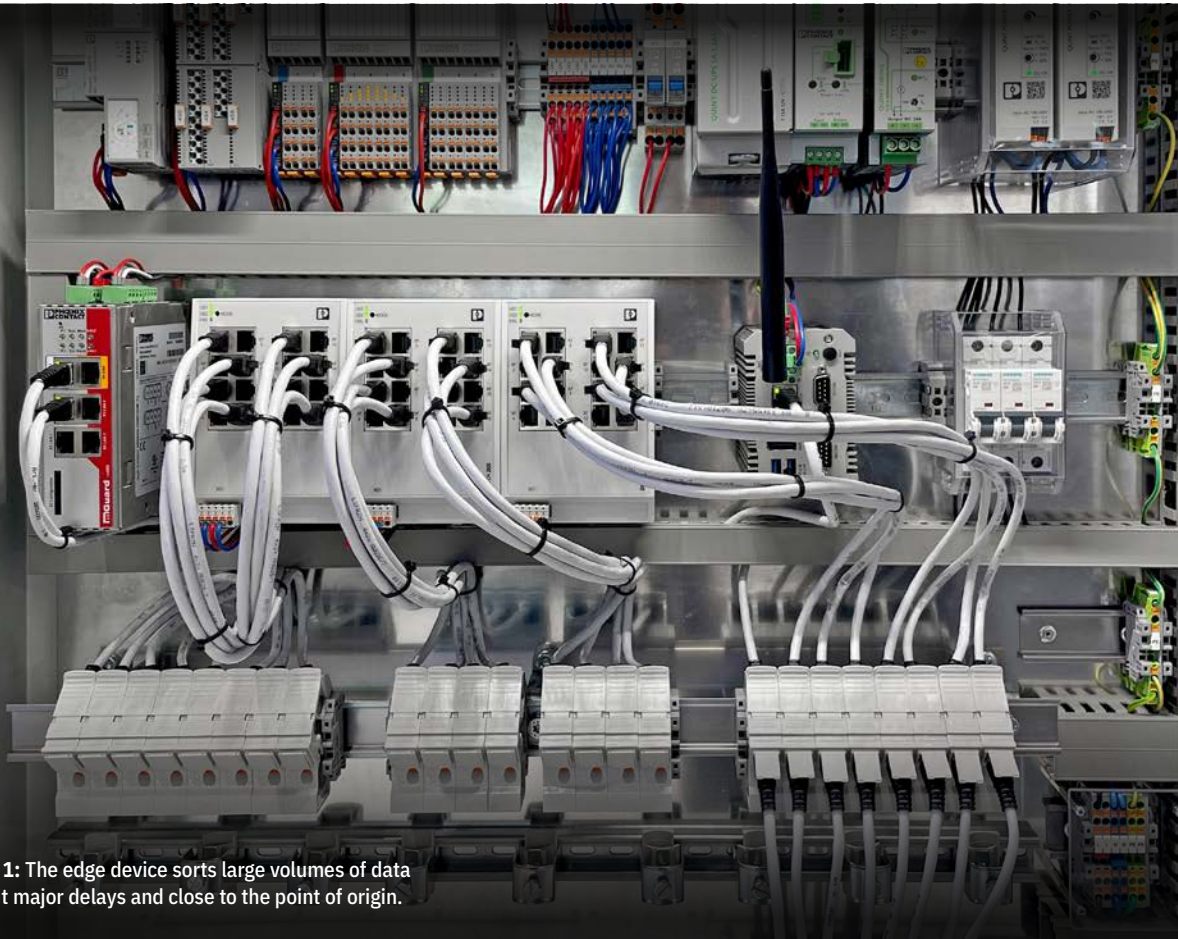


Figure 1: The edge device sorts large volumes of data without major delays and close to the point of origin.

Smart edge computing with PLCnext Technology

Foundation for optimizing the entire value chain

Learn more about

- The value of collecting data at the edge of an IIoT application
- Ensuring data security in an edge application
- How edge devices can improve reliability, efficiency, and flexibility

Introduction

The term edge computing is inextricably linked to the term cloud computing. While cloud computing – the connection of systems to the Internet – has been an important topic related to Industry 4.0 and the Industrial Internet of Things (IIoT) for years, edge computing seems to be a relatively new technology. (figure 1/lead image).

An Internet connection to link the system to a cloud is often necessary when data volumes need to be evaluated and stored. In many applications, however, the data must be collected, checked, and fed back into the process in very short cycles. When this is the case, a public cloud solution is not suitable – simply because of the latency times on the Internet. Edge computing is becoming increasingly common for these smart applications.

Modern edge devices combine the robustness of proven industrial PCs with an open automation platform. Intelligent IoT edge concepts can be built with this approach. Using edge devices to process and analyze the growing volumes of data can optimize the entire value chain (figure 2).



Figure 2: The EPC 1502 edge computer from Phoenix Contact has a large data storage system, high-performance hardware, and unconventional interfaces compared to a traditional PLC.

Easy-to-integrate box for collecting local data

Edge devices have a broad range of applications. You can find potential applications wherever data needs to be analyzed or is already being analyzed in the cloud. At the beginning of the development of every edge application, the user always asks the same question: How can the data be accumulated centrally? Many complex undertakings – such as developing autonomous vehicles, a traffic light system, or intelligent thermostats – can benefit from the power and responsiveness of an edge computer.

Above all, the edge device must be flexible. In addition, it must be capable of collecting a large amount of system data, usually provided by numerous sensors from different manufacturers. The field devices often communicate via a wide range of industry protocols. In addition, the data is often analog, which is not easily accumulated.

The tailor-made Edge Collection Box from Phoenix Contact is ideal for collecting local data. The switchgear and controlgear assembly collects digital, analog, and temperature signals via the connected sensors. The box is easy to integrate into an existing production environment. The edge device captures data in parallel so that, for example, the CE marking of the machines is not invalidated. The main component of the Data Collection Box is the EPC 1502 PLCnext Control with an IIoT framework. Energy and process data can be collected easily via the framework based on the familiar industry-standard communication protocols (figure 3). ■



Figure 3: The Data Collection Box from Phoenix Contact makes it easy to collect data in existing systems without jeopardizing the CE marking of the machines.

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Secure Data Box as a secure interface to higher-level IT systems

Once the edge device has collected and analyzed the data locally, the device can serve as an intermediate layer to the cloud. While collecting data in existing systems may already be difficult, potentially, there is an even greater task to be solved: How can the summarized data, evaluated alarms, and edge device analyses be transferred securely to the cloud?

This is where another integration-capable solution from Phoenix Contact comes in: the Secure Data Box is designed for use with the Data Collection Box switchgear and controlgear assembly. It establishes a secure interface between the production network and higher-level IT networks, external service providers, and cloud systems. The integrated FL mGuard security router includes a firewall, which blocks unauthorized access. The firewall only allows the necessary data traffic, ensuring optimum protection of the segmented network. Optionally, the EPC 1502 edge device can also be accessed directly via the mGuard Secure Cloud app. With this approach, the user receives all necessary information about remote maintenance (figure 4). ■

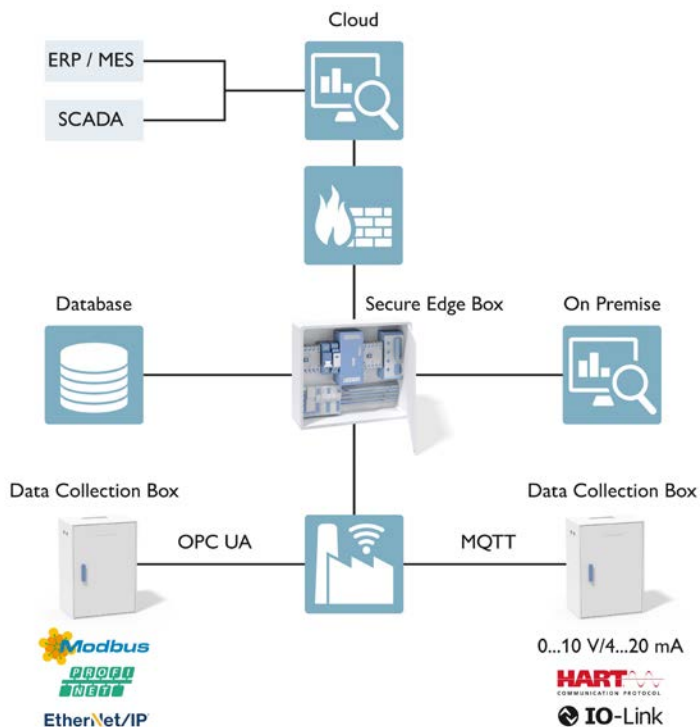


Figure 4: The Data Collection Box and Secure Edge Box can interact, so manufacturers can securely visualize data locally and send it to the cloud via a VPN tunnel.

Reliable operation of automated guided vehicle systems

Back to the application examples cited: For example, what added value would using the edge device bring to an automated guided vehicle (AGV) system? The openness of the edge device bridges the gap between classic control functions and AGV navigation. A quick connection to existing navigation solutions can be realized with a plug-and-play interface for the Robot Operating System (ROS). With support for high-level language programming, the ROS interface, and Docker software, users can also implement their own approaches directly on the edge device. The PLCnext Store includes numerous apps that enable the edge device to send firmware and application updates to all other controllers.

The device installed at the “edge” of the network provides a simple and secure entry point for remote maintenance of the entire system. The collected data can be displayed locally via dashboards. Artificial intelligence and its algorithms analyze data points to detect anomalies. This creates the basis for predictive maintenance, as the solution warns of failing drive shafts or motors at an early stage. It enables immediate repair, which in turn minimizes production downtime.

With the atypical interfaces, which a traditional control system usually does not provide, data can be forwarded directly via WLAN, which reduces the time and cost of laying cables. The large internal data storage system means that data can be stored locally over a longer period of time. Edge devices are often essential to help AGVs operate reliably, efficiently, and flexibly. ■

Numerous uses in large and small applications

Edge computing can be utilized in different ways in different individual applications. The combination of ready-to-install edge boxes can significantly simplify the implementation of large systems with considerable amounts of data that need to be collected using different protocols. Existing systems can be converted to edge computing easily with the integration-capable solutions that are installed outside the machines, meaning that they retain their CE marking. In smaller systems, the edge device must bring benefits with many supported protocols and apps for functional extension so that the user receives added value with simple installation. ■

Learn more at <https://www.phoenixcontact.com/en-us/products/edge-computing> or <https://www.plcnext-community.net/>.

Scalable solutions from a single source

In addition to a device with sufficient computing power and connectivity, system manufacturers who do not yet have an in-house solution for realizing an edge application also need the right software environment. With both hardware and software in a ready-to-install product, the EPC 1502 is tailored to the essential requirements of an edge application. Additional apps can extend the device's capabilities.

For existing systems, easy-to-use tailored solutions should generate added value from the analysis of the data without losing the CE marking during the necessary conversion. Phoenix Contact provides scalable solutions, from the high-performance VL3 UPC industrial PC and the EPC 1502 edge computer, to ready-to-install data boxes that can collect data and transfer it securely to cloud systems. Every application benefits from processing the resulting data directly at the point of origin.

About Phoenix Contact

Phoenix Contact is a global market leader based in Germany. Since 1923, Phoenix Contact has created products to connect, distribute, and control power and data flows. Our products are found in nearly all industrial settings, but we have a strong focus on the energy, infrastructure, process, factory automation, and e-mobility markets. Sustainability and responsibility guide every action we take, and we're proud to work with our customers to empower a smart and sustainable world for future generations. Our global network includes 22,000 employees in 100+ countries. Phoenix Contact USA has headquarters near Harrisburg, Pa., and employs more than 1,100 people across the U.S.

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