White Paper

Highly scalable PC-based control technology from Beckhoff: Industrial PCs engineered for new applications such as the Industrial IoT

**What are the current market challenges?**

Two hot topics throughout the automation industry today are the Internet of Things (IoT) and Industrie 4.0. Their goal is to interconnect not just machines and parts of machines, but entire production lines, plants and locations as well. Server systems can be deployed to support this at the local level, but connecting locations spread around the globe inevitably involves using the Internet. Here, the easiest option is to utilize existing public cloud solutions, since specialist service providers already offer all the capabilities required to connect geographically distributed systems.

However, interconnecting machines in this fashion also exposes them to the risk of unauthorized access, and the issue of whether or not to connect an industrial control PC directly to the Internet can be contentious as a result. Systems as a whole must also continue to meet typical industry requirements, such as durability, long-term hardware and software availability and overall affordability of the solution. A frequent expectation in addition is that no modifications or changes to existing, working systems should be required, if possible.

IoT, Industrie 4.0 and industrial gateways

In situations where the previously mentioned risk of unauthorized access is considered too high, installing an IoT gateway or edge device can be a suitable solution. This can be a gateway PC, which is added to the machine or plant and runs a specially tailored software package that collects all key data from the controller IPCs. If need be, the gateway PC can pre-process this data or even analyze it in full. Conceivably, it could also just forward the raw data collected to other systems. The IoT gateway
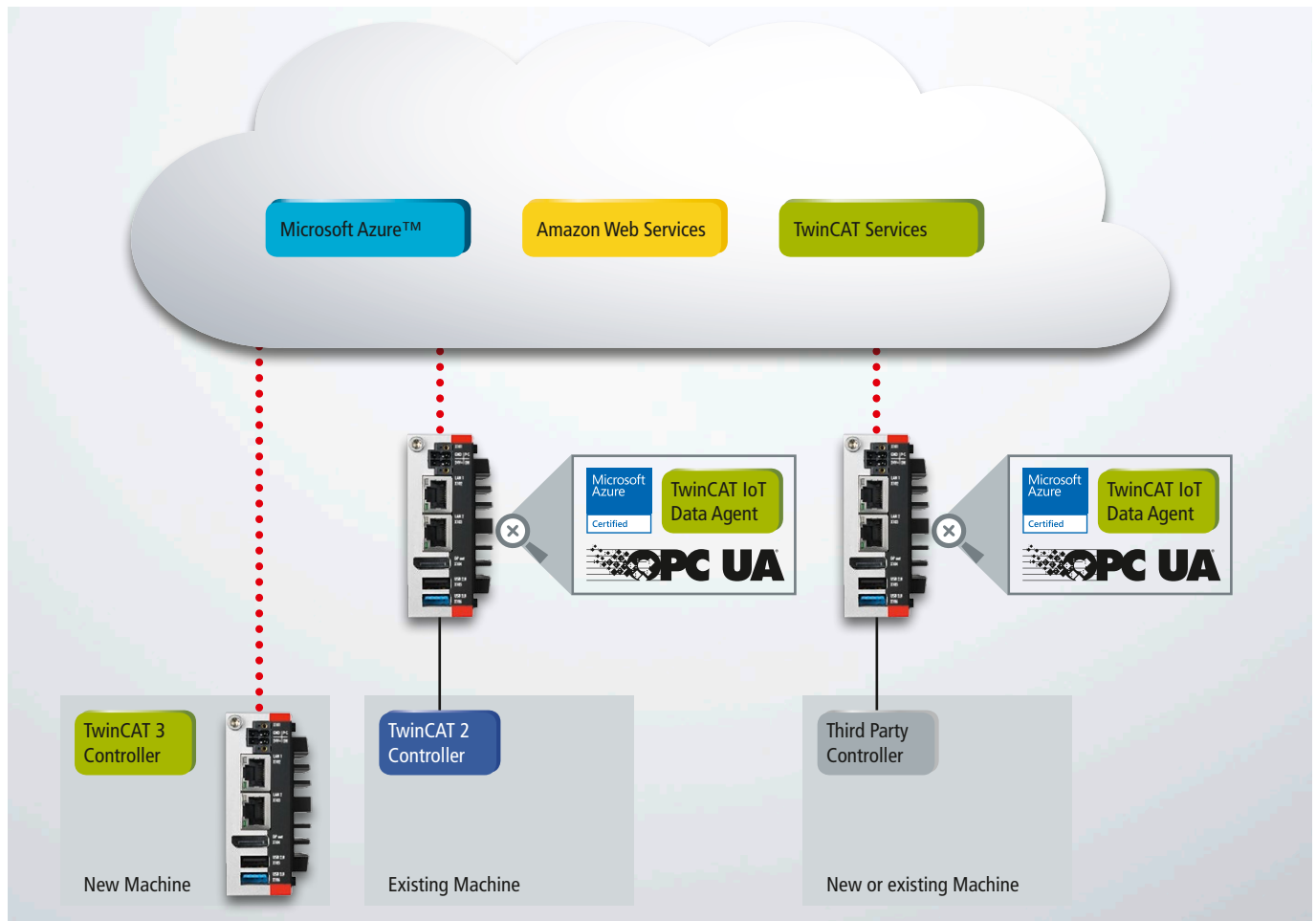
The ultra-compact IPC in the role of an IoT gateway – operating as a full-fledged machine controller, complete with PLC, HMI, IoT functionality and more (left), as an inexpensive IoT/edge device retrofitted to an existing machine (center) and as an IoT/edge device for new and existing machines in combination with third-party controllers (right).

can communicate with a public cloud using standard protocols like MQTT, AMQP, or OPC UA. The necessary privileges can be assigned in a user management dashboard; a firewall can block unauthorized access; and any network ports that are not required can be closed without restricting the functionality of connected controllers.

**Impressive processing power with Intel
in an ultra-compact design from Beckhoff:
the C6015 Industrial PC**

Specially developed and manufactured Industrial PCs (IPCs) have formed the core of PC-based control technology from Beckhoff for more than 30 years. The Beckhoff PCs in combination with the Beckhoff automation software TwinCAT

are designed to perfectly support industrial applications. They are available in a wide range of form factors and performance classes for automation solutions in any industry. Immensely scalable, the Beckhoff portfolio of IPCs is also suitable for scores of applications besides classic automation.

The most recent generation of ultra-compact C60xx IPCs occupies a special place in this portfolio. The C6015, the smallest IPC in the range, is exceptionally compact, measuring just 82 x 82 x 40 mm, yet delivers impressive performance for a device of this size, due to the latest-generation Intel Atom® E38xx and E39xx processors that power it. Capable of parallel computing on up to four CPU cores and at clock speeds up to 1.91 GHz per core, the C6015 is an ideal device
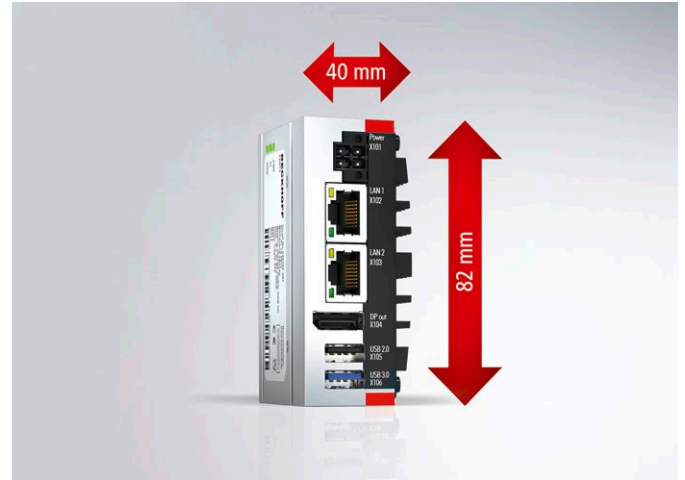
The small size, installation flexibility and high performance of the ultra-compact C6015 IPC make it an excellent choice when adding IoT capabilities to existing systems.

for midrange control applications and for use as a universal IoT gateway.

Why is the C6015 ideal as an IoT gateway or edge device?

On the one hand, the C6015 is equipped with the necessary interfaces and the considerable computing power of the Intel Atom® processors of the E38xx and E39xx series, which makes it an excellent IoT gateway and also shows the consistent pursuit of the Beckhoff strategy to always employ the latest available processor technologies from Intel in its Industrial PCs. In this case, Intel is supporting the rapid development and growing complexity of IoT infrastructures with the release of the Intel Atom® E3900 processors. The new E3900 series targets diverse IoT solutions from manufacturing machines that can 'see' through to intelligent video systems that are able to analyze data. Intel Atom® processors bring latest capabilities to the market due to a perfect balance of power, performance and security. The C6015 also provides all the standard capabilities of a regular PC, so it can easily run any software packages that may be required.

What ultimately makes the C6015 an ideal IoT gateway or edge device, though – besides the combination of high computing performance and comprehensive basic functionality – is its ultra-compact form factor and highly flexible mounting options. With TwinCAT Analytics and a preconfigured OPC UA server available as an option, Beckhoff also offers ready-made software

packages that can capture data from its own IPCs as well as from third-party equipment, and pre-process that data if required. The TwinCAT IoT software package thus helps add IoT capabilities to existing machinery configurations with little effort, without having to make changes to the IPC controller hardware or software. This means that the C6015 can be retrofitted as a fully compatible IoT gateway not just to existing machinery configurations, but even to machines during live operation.

High installation flexibility and industrial-grade design

The C6015 is a single-board IPC with a die-cast aluminum and zinc enclosure in a compact design, engineered to withstand shock, vibration and ambient temperatures as high as 55 °C in demanding industrial environments. Like all Beckhoff Industrial PCs, the C6015 is a robust product made in Germany, built to last and with long-term availability.

One standout feature of the C60xx series of Industrial PCs is its near-limitless flexibility when it comes to installation. For instance, the book-format, but wallet-sized C6015 takes up very little space when installed in a control cabinet, where it can be mounted flat against the cabinet's back wall or door, or clipped straight onto a DIN rail. In addition, it can be installed with the ports facing in any direction. This makes it easy to incorporate not just into almost any new control cabinet layout, no matter how limited the space, but also into existing control cabinet layouts. In other words, it can easily be designed into, or retrofitted to, machinery already in production. This means that

control systems can be upgraded to provide richer, enhanced functionality and thus a whole new selling proposition.

In a nutshell: What makes the C6015 so unique?

– variety of installation options that minimize space requirements and enable optimal port alignment
– optimum balance of size and computing performance
– proven Beckhoff quality, made in Germany
– part of the highly scalable Beckhoff IPC portfolio
– ideal both as a controller and as an IoT gateway

The Intel Atom® CPUs with up to four cores that power the ultra-compact C6015 Industrial PC offer excellent energy efficiency and performance to spare. To protect users' investment, Beckhoff exclusively uses processors from Intel's Embedded Line with long-term availability.

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More about the C6015 Industrial PC ▶ **www.beckhoff.com/c6015**