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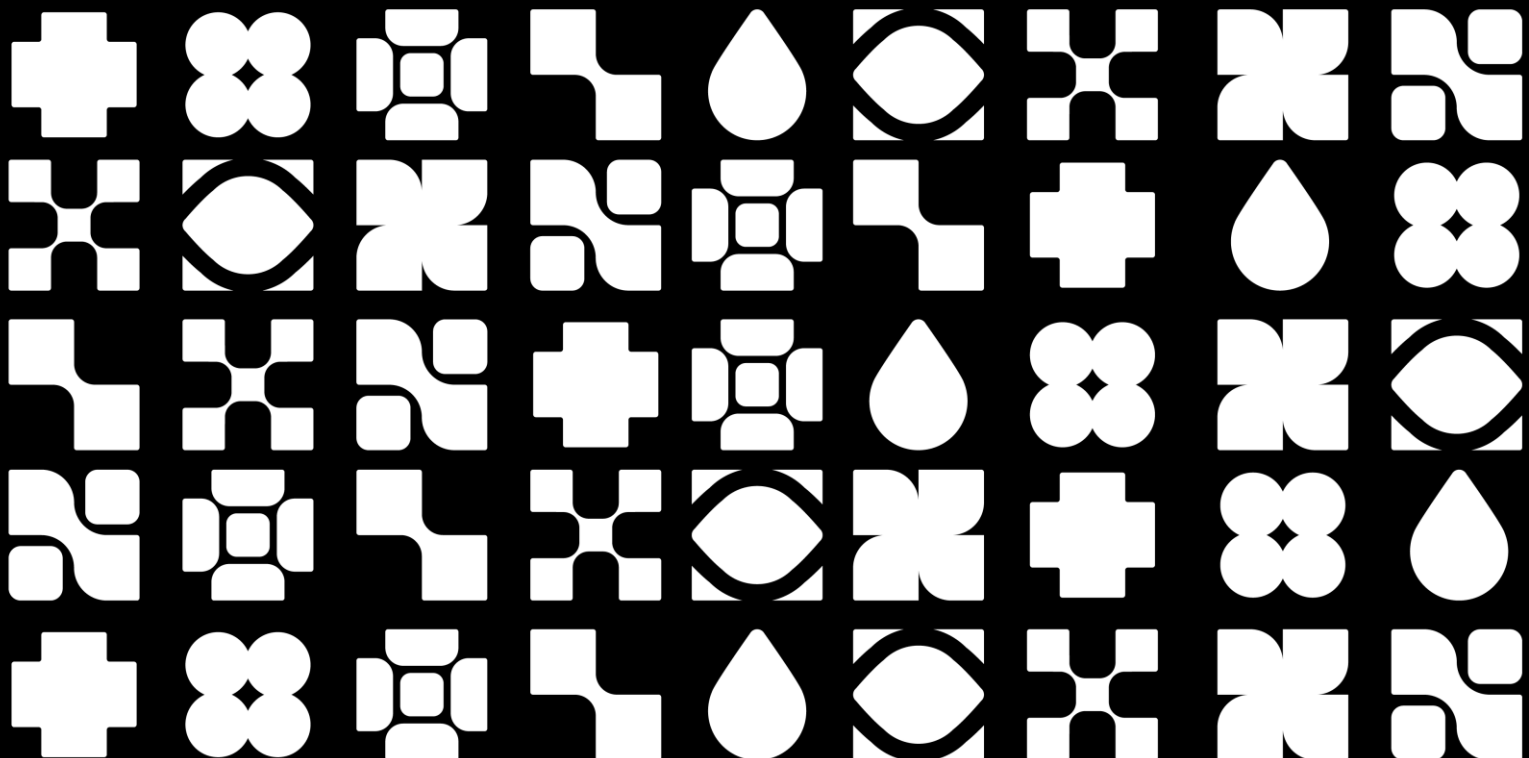
Endless ways to the future

A Multi-Use Industrial Gateway That Sits in the Goldilocks Zone

Fanless Modular Link MX93 for Retrofitting, Smart Infrastructure, HVAC, and Industrial Automation

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There are a host of reasons for making systems smarter. For example, European businesses are under pressure to report their green credentials and explain how they contribute to reducing emissions. To do this, they and their suppliers need accurate data gathered from their operations to report their environmental impact today and demonstrate improvement in the future. The industrial Internet of Things (IIoT), enabling Industry 4.0, is critical in these efforts.

In factories, data gathering is essential to provide a more granular view of operations, even from legacy equipment that's missing connectivity. Energy utility providers need to peek into homes and businesses as they generate energy behind the meter and install battery energy storage. And in the area of HVAC, there is a need to optimize energy use. Additionally, remote control and visibility into these systems makes diagnostics and predictive maintenance possible across all these cases, helping to lower costs and improve customer service.

Finally, artificial intelligence is increasingly finding a role to play. With data available for evaluation, clever machine learning algorithms can discover data dependencies or spot trends that, using other programmatic means, would be considerably more challenging. Industrial gateways are central to deploying such capabilities.

Rethinking the industrial gateway

The image that comes to mind for most industrial engineers when mentioning gateways is an x86-based industrial PC. However, not every application demands the performance of this option, nor can they justify the associated costs. At the other end of the scale are microcontroller-based IoT gateways. While cost-effective, they lack the required scalability, which limits their deployment options, and without AI accelerators, they're unable to perform intelligent data analysis at the edge.

These issues have occupied the team at SECO for some time, leading them to develop a new modular and fanless industrial PC. The Modular Link MX93 sits between the traditional performance extremes of industrial gateways and incorporates hardware AI support (Figure 1). It focuses on the needs of industrial users in diverse applications such as smart metering, HVAC, and smart gateways for automation applications and smart sensing.

At the core of the DIN-mountable Modular Link is a powerful i.MX 93 applications processor from NXP. Featuring two Arm® Cortex-A55 processors running at up to 1.7 GHz, it's paired with up to 2 GB of LPDDR4 memory and a 32 GB eMMC 5.1 mass storage device, providing plenty of performance for this class of application. Supporting edge-AI tasks is the on-chip Arm® Ethos U-65 Neural Processing Unit (NPU) whose 0.5 TOPS performance is perfect for basic inferencing or even relocating some cloud AI activities locally. At 140 × 96 × 36 mm, it's just two DIN wide and is specified for operation over the -20°C to +70°C temperature range. The gateway operates from a 12 V to 36 V power source.

Figure 1: The fanless DIN-mountable Modular Link MX93
with gigabit Ethernet, USB, and external antenna connections.

Connecting to sensors and networks

Its connectivity and interfacing options are also well-rounded. Two RJ45 gigabit Ethernet connectors are available, complemented by an optional Wi-Fi module with two external antennas (802.11 ac/a/b/g/n) and BT 5.0. And, if needed, the mini PCIe full-size card slot can be fitted with an optional LTE modem.

Two USB 2.0 Type-A connectors are also implemented, with one supporting USB-OTG. The RJ12 connector can be configured in software as an RS-232, RS-422 or RS-485 interface, while a USB Type-C connector offers access to a UART debugging interface. Finally, two digital outputs and four digital inputs are optionally available via terminal blocks.

While most gateways are operated headless, there are benefits to attaching a monitor and seeing what's going on. Supporting this is an optional mini-HDMI® connector for 1080p at 60 Hz video resolution (Figure 2).

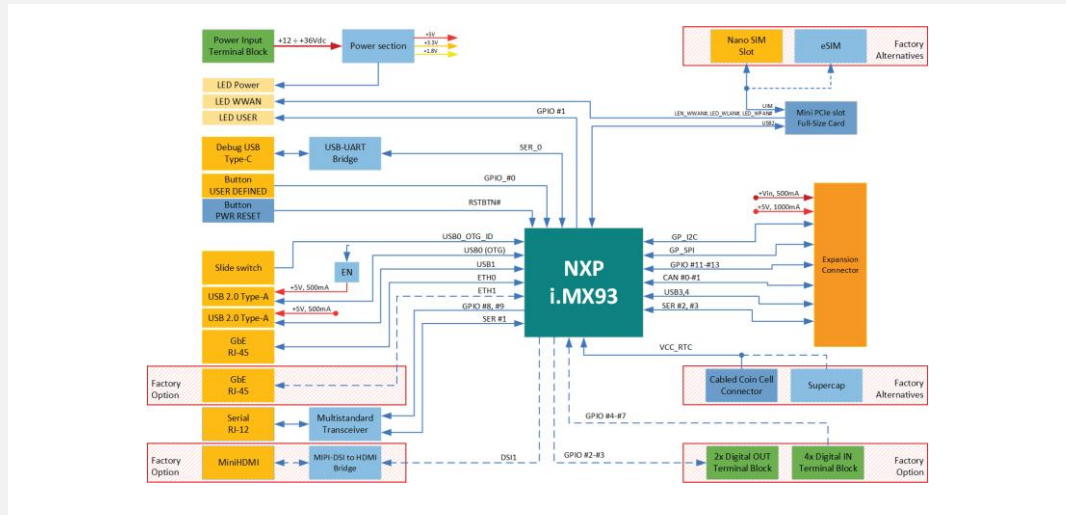# A Multi-Use Industrial Gateway That Sits in the Goldilocks Zone

Figure 2: With the NXP i.MX 93 at its core, the gateway features plenty of connectivity and I/O for interfacing with industrial, HVAC, and smart metering systems..

Thanks to the modular architecture, the system integrators can choose the optimal interfacing options for each gateway deployment they build. Three Add-On Units are currently available, with more in development, and customization to individual requirements is also possible. Attached to the expansion connector, these offer either four optoisolated serial interfaces, eight optoisolated general purpose I/Os, or a combination of both (Figure 3). This provides access to the CAN interface alongside the serial ports, supporting the protocols needed in industrial automation and building management systems (BMS).
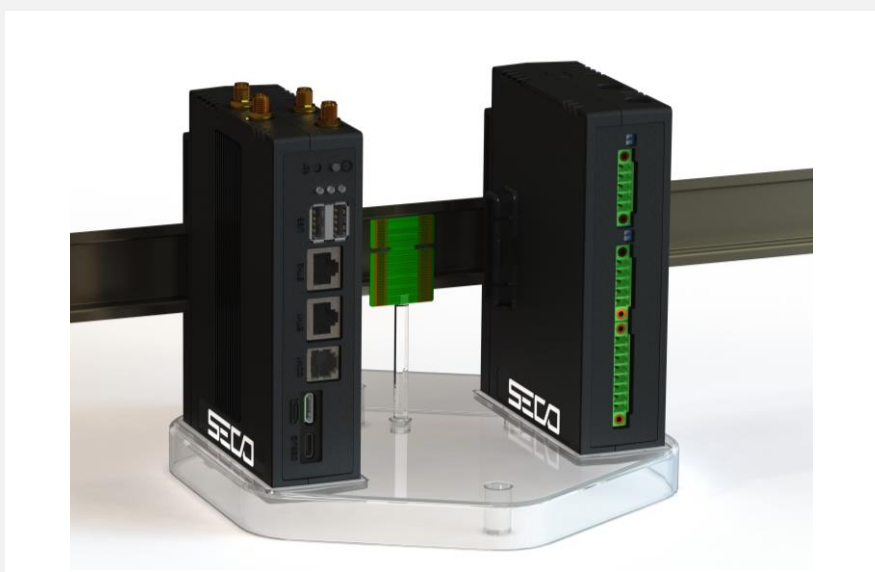

Figure 3: A range of Add-On Units with opto-isolated I/O expand the Modular Link's capabilities.

Backed up by software

With the optimal gateway hardware selected, the development team needs to configure the software to their application's needs. Each use case brings its own challenges, ranging from real-time monitoring, data analysis and control to support for application-specific communications standards such as BACnet, MQTT, and OPC-UA. Then, there are the challenges of provisioning, monitoring the status of multiple gateways, managing devices, and monetization.

Having long recognized the challenges of implementing Industry 4.0 and the upcoming transformation to Industry 5.0, SECO delivers the entire software package, from gateway to cloud, with its comprehensive Clea software suite.

Most users begin with Clea OS, an open-source Yocto Project operating system developed in-house for smart gateways with out-of-the-box security. This embedded Linux framework enables developers to build and deploy innovative IoT infrastructure without worrying about issues such as device management and how to implement secure over-the-air (OTA) updates. It implements remote access and command execution along with real-time device monitoring and status tracking. AI models can also be deployed and managed for low-latency inferencing on hardware accelerators.

Support for standard secure boot mechanisms are also included, and it will comply with cyber resiliency standards such as SBOM (software bills of materials) in the future.

Data visualization is provided by the optional telemetry platform Clea Portal (Figure 4). Its intuitive interface simplifies access to real-time data with its web-based IoT front-end. With minimal coding effort, it can be extended to meet your application's needs, while a monetization framework supports the deployment of value-added subscription services. Alternatively, it is also possible to develop a custom front-end.
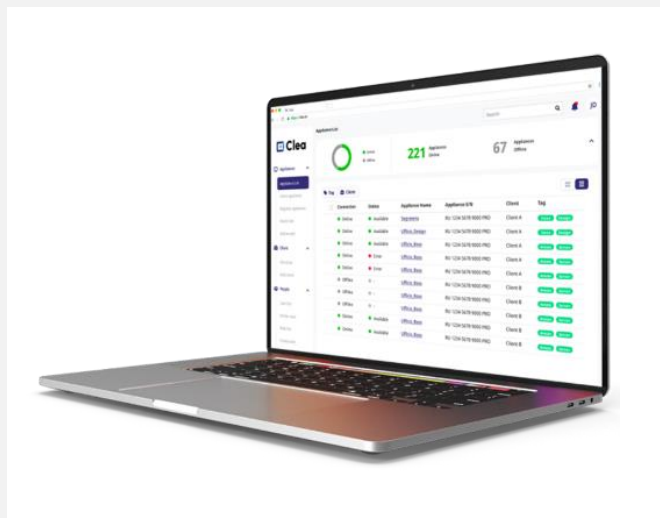
Figure 4: The industrial gateway is backed up by the comprehensive Clea software suite, which includes Clea OS and Clea Portal.

A fanless industrial gateway solution for retrofitting and new deployments

Regardless of the industry, businesses are compelled to make their systems smarter. Operational data has to be collected, and remote diagnostics implemented with a dashboard that provides clear visualization for analysis. And AI is increasingly playing a role, not just in the cloud but at the edge, supporting low-latency decisions based on data trends. The SECO Modular Link MX93 delivers a fanless industrial PC with performance that outstrips microcontroller-based alternatives that can be deployed more economically than a traditional x86 gateway.

Thanks to its modular design, the number of I/Os and serial interfaces can be scaled as required, making it suitable for retrofitting in industrial automation systems while ensuring it is equally at home in smart metering applications, HVAC, and smart buildings. When coupled with the Clea software suite, industrial engineers and system integrators have a complete package that is customizable, performant and secure.

If you'd like to learn more about the fanless Modular Link MX93, have unanswered questions, or would be interested in testing a sample device, feel free to contact the team – we'd be happy to discuss your needs and provide further information.

Learn more	Explore	Do you have an IoT project?
Modular Link MX93	Clea	Talk to us about it!

About SECO

SECO is a high-tech company that develops and manufactures cutting-edge solutions for the digitalization of industrial products and processes. SECO's hardware and software offering enables B2B companies to introduce edge computing, Internet of Things, data analytics and artificial intelligence in their businesses. SECO's technology spans across multiple fields of application: serving more than 450 customers, operating in sectors like Medical, Industrial Automation, Fitness, Vending, Transportation and many others. Enabling to accurately monitor the functioning of on-field devices, SECO solutions contribute to creating low environmental impact business models thanks to a more efficient use of resources.

For more information: http://www.seco.com/