



Scale, Monitor, Maintain

The MIX-ASLD1 as a Gateway to Operational Expansion

Overview

A company with a network of self-service laundromats primarily located in high-density population centers wanted to expand its operations to include locations outside of major cities.

Given the minimal on-site staffing required to operate their facilities, the company reasoned that by opening a large number of smaller facilities in often-neglected markets across a wider geographical area, they would not only reach a broader customer base, but differentiate and consolidate the company's brand across regions.

To help them achieve this, they knew they would need a way to monitor and maintain each premises, and the equipment therein, from a central hub. To develop an application capable of this, they turned to AAEON.

Key Requirements for Scaling the Business



While the customer's business model benefited from low staff overhead costs, they raised a number of potential logistical problems that could arise if all bases weren't covered. For example, the customer explained that they wanted to be able to remotely monitor and log the status of each washing machine at each facility.

Specifically, they wanted a way to check machine temperature, the presence of water leaks, and general machine health metrics.

Because their new facilities would be spread out across a larger area, the customer also wanted the IoT Gateway to be capable of issuing alerts and logs to a central control hub, transmitting data on machine usage, lifecycles, and common faults.

Most importantly, the customer wanted to eliminate the need for personnel to be physically on-site to actively maintain the machines, such as performing updates or troubleshooting technical issues. This was a vital prerequisite, as the logistics involved in sending personnel to remote facilities to fix common problems risked the expansion becoming a liability, with increased staff costs compounded by lost revenue during machine downtime. Because of this, the company requested that the application provide a way for operators to start or stop machines, reset systems, or respond to sensor alerts without being physically on-site.

Following discussions regarding the proposed application's primary functions, the AAEON team provided the customer with a number of embedded platforms capable of powering the application.



Upon review, the customer felt that a product from AAEON's Mini-ITX motherboard range, the [MIX-ASLD1](#), would be the most suitable option. For practical reasons, the board was secured in custom housing, providing access to the necessary interfaces for its role as an IoT Gateway while protecting it from dust ingress and

environmental damage. The choice was ultimately a wise one, with a number of the MIX-ASLD1's key attributes cementing it as the right platform as the application was deployed.

Flexible Sensor Support

Sporting a programmable 8-bit digital I/O, an SMBus/I2C header, and multiple USB pin headers, the [MIX-ASLD1](#) was well-equipped to host the variety of sensors the application needed. Its digital input pins could be configured to support different types of sensors, such as those required to monitor internal washing machine temperatures. Other such peripherals included float switches to detect water leaks and mechanical switches, used to monitor each machine's door open/close status.

Meanwhile, an I2C header was a broader, more versatile tool offered by the board, allowing the customer to install multi-sensor modules to monitor other parameters within the facility, such as temperature and humidity, to ensure washing machines could safely and efficiently operate.

Machine and Device Control

The use of the MIX-ASLD1's digital input pins for sensor connectivity was mirrored by its digital output pins where device control was concerned. These were used to drive relays connected to washers and dryers so the IoT Gateway could control start/stop operations.



A secondary benefit was that in the event a fault was detected by sensors, the board was able to trigger alerts or machine-specific commands. These bidirectional I/O capabilities allowed the [MIX-ASLD1](#) to effectively respond to changes in washing machine operational status.

Remote Troubleshooting

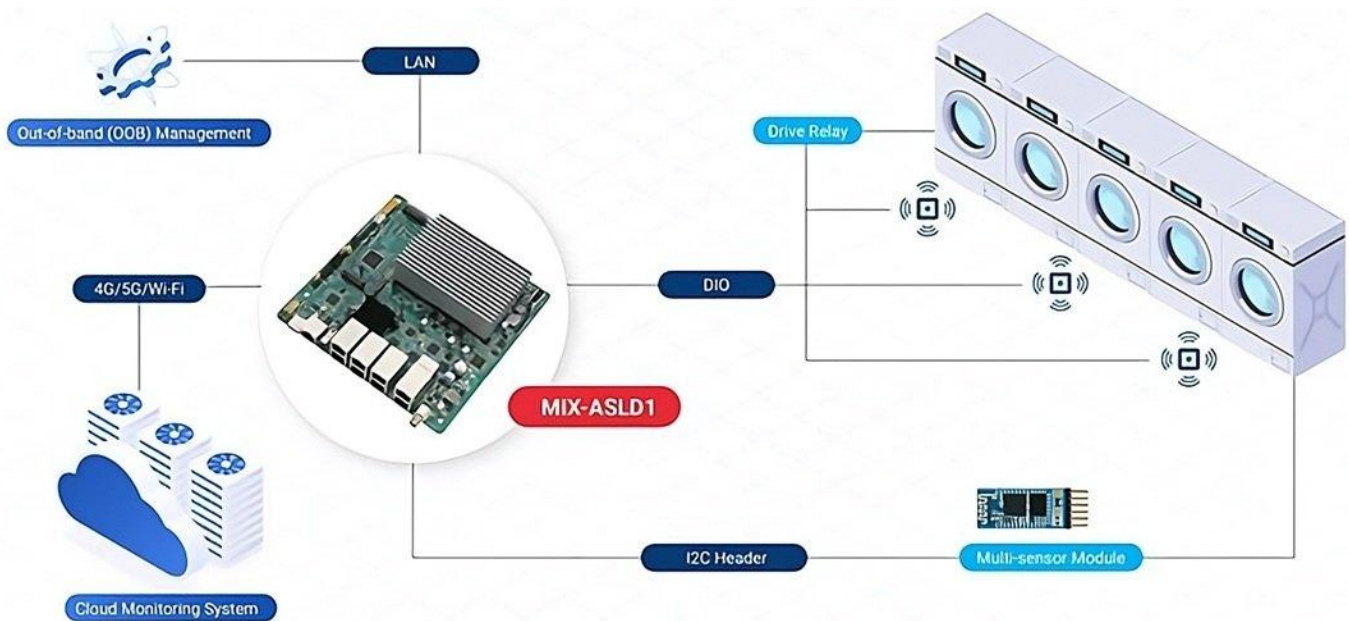
Arguably the most important factor in the customer's choice of the [MIX-ASLD1](#) was that it allowed the customer to remotely manage the IoT Gateways from a central, cloud-based platform.

To do this, the customer leveraged the out-of-band (OOB) management support offered by the Intel® Ethernet Controller I210-AT chip used by one of the board's seven LAN ports. This function reduced the logistical complexity of machine maintenance, with operators able to recover, troubleshoot, and update firmware remotely.

Bidirectional Edge-to-Cloud Communication

Remote maintenance was not the only benefit of the MIX-ASLD1's extensive LAN port lineup. Using the remaining ports, the IoT Gateway could securely transmit sensor data and logs to the customer's cloud monitoring system. Meanwhile, the board could also rely on wireless connectivity via 5G or Wi-Fi expansion modules hosted by its M.2 B- and E-Key slots respectively, with data being protected in transit by the MIX-ASLD1's integrated TPM 2.0 chip.

Application Architecture



Project Outcomes & Added Value

With the [MIX-ASLD1](#) as a central fixture of their IoT Gateway setup, the company was able to expand operations into new markets without any major setbacks. Given its versatile I/O, the [MIX-ASLD1](#) proved to be the ideal solution to resolve the pain points the company anticipated would arise during the project.

In addition to the overall success of the application, the board provided a number of further incidental benefits. The first of these was the ease with which Gateways could be deployed at new facilities. Given that the board was equipped with all of the necessary features to interface with a variety of commercial and industrial machines, the company did not need to replace or change their standard equipment, reducing the time it took to set up and have new facilities operational.

The second key benefit came from the scalability of the application. Thanks to the board's support for both wired networking and wireless expansion modules, the IoT Gateway powered by the [MIX-ASLD1](#) could effectively be deployed anywhere and still be able to communicate with the company's cloud management system.



This factor, along with the OOB management capabilities offered by AAEON's platform, will be instrumental in future-proofing the system, allowing operators to perform firmware updates remotely and maintain a fleet of IoT Gateways from a centralized location without on-site visits.

About AAEON

Established in 1992, AAEON is one of the leading designers and manufacturers of industrial IoT and AI Edge solutions. With continual innovation as a core value, AAEON provides reliable, high-quality computing platforms including industrial motherboards and systems, rugged tablets, embedded AI Edge systems, uCPE network appliances, and LoRaWAN/WWAN solutions. AAEON also provides industry-leading experience and knowledge to provide OEM/ODM services worldwide. AAEON works closely with premier chip designers to deliver stable, reliable platforms. For an introduction to AAEON's expansive line of products and services, visit www.aaeon.com.



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