Smarter Systems, Safer Cities

AAEON Scales NVR Deployment with the MIX-Q670D1

Introduction

A company with a rich history of providing public infrastructure electronics such as security camera and intercom networks sought an advanced computing platform to be deployed as the foundation of a new series of network video recorders (NVRs) it was developing.

The client's broad objective was to create a mission-critical tool for recording, retaining, and reviewing video evidence in a professional surveillance environment, a tall task considering the client's products are often in settings ranging from public spaces served by law enforcement agencies such as transport hubs, city centers, and tourist areas with high foot traffic all the way to more local safety systems for hospitals and commercial buildings.

Project Needs

Because of the versatile nature of the end product, scalability was key, particularly where camera support was concerned. The customer required support for a large number of cameras due to the broad coverage area of each NVR unit, while also being capable of receiving high-bandwidth IP camera streams without a significant reduction in data flow.

With such a substantial volume of video data being received from multiple cameras, the second key need was adequate local storage for its long-term retention. Given the sensitivity of the data collected, enhanced security features were also seen as a significant advantage.

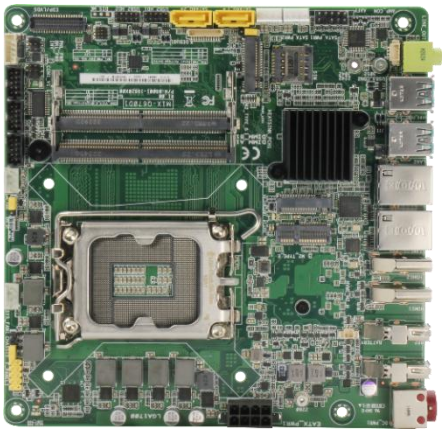
On the same note, the client requested a product with substantial processing power, able to undertake simultaneous decoding and processing of multiple video streams. As is the case with the majority of NVR applications, on-system display was needed in order to allow personnel to monitor the areas covered by its cameras, as well as for the purpose of reviewing incident data retrieved stored on the NVR.

One final point that was raised during the client's discussions with the AAEON team was making sure the product selected would be both compact enough to fit in their mountable chassis and resilient enough to handle deployment in a range of locations often exposed to unstable or inconsistent power supplies.

At this stage, the client became confident that AAEON was the most suitable partner, thanks to its reputation for flexible customization and responsive technical support throughout every phase of development.

Flexibility as the Key to Addressing Project Needs

Addressing the practical considerations of the project at first, the AAEON team ascertained that the most suitable form factor would a Mini-ITX motherboard, which would provide an excellent balance of expandability, onboard interfaces, and high-performance processing on a modest 170mm x 170mm form factor.



Given the technical needs of the project, particularly with respect to handling high volumes of data and subsequent storage needs, the AAEON team recommended the MIX-Q670D1, a Mini-ITX motherboard equipped with the Intel® Core™ i7 processor 14700.

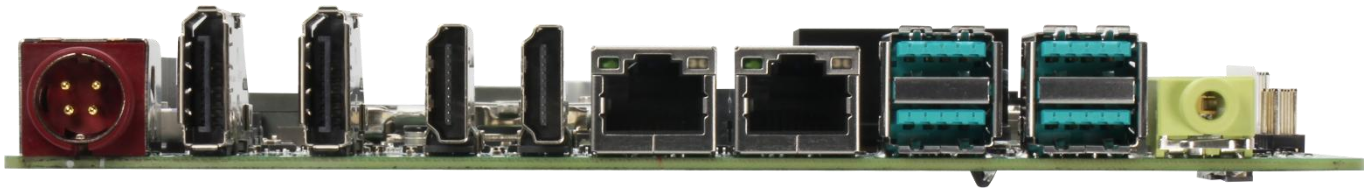
Hardware Monitoring Paired with High-Performance 14th Gen Intel Processing

The first reason for the choice was the board's capacity to host such an advanced CPU while ensuring stability during operation. The key to this was twofold, with the first being the presence of both CPU and system fan connectors to give the client a modular platform around which to design the NVR's enclosure for maximum heat dissipation.

Secondly, the MIX-Q670D1 was equipped with hardware monitoring capabilities, meaning the temperature of both the CPU and system were continuously monitored, preventing thermal throttling, overheating, and allowing the system to operate over long periods while executing high-load tasks like video decoding and recording while staying within safe internal temperature thresholds.

The choice of processor was also application-focused, with the Intel® Core™ i7 processor 14700 offering a number of on-chip technologies, such as Intel® Clear Video HD Technology and Intel® Quick Sync Video. The former provided a suite of image decode and processing technologies built into the integrated processor graphics for the purpose of improving video playback, while the latter matched the client's need for low latency by expediting the conversion of video data for transmission to portable media players and storage modules.

Flexible Ethernet Interfaces for Modular Camera Support



The MIX-Q670D1's dual GbE LAN ports were critical to supporting the multiple IP cameras required to collect video data. To achieve this, each LAN port was connected to an 8-port internal PoE switch module integrated into the NVR system chassis, which in turn routed video stream data from their connected cameras to the MIX-Q670D1 for processing, analysis, and storage.

This architecture allowed the NVR to remain relatively compact and self-contained, whereas installing a motherboard equipped with the same number of onboard PoE ports would mean substantially increasing the size of the chassis housing it, while also standardizing the number of cameras supported, limiting the customer's options to develop multiple SKUs depending on the needs of different end users.

Three Dedicated Storage Drives

A key reason the MIX-Q670D1 was chosen for the project was its exceptional storage options relative to its size. Equipped with two 2.5" SATA drives and an M.2 2280 M-Key slot supporting a four-lane PCIe interface for NVMe, the MIX-Q670D1 provided substantial options for local data storage and long-term retention.

The AAEON team also supplied the client with a RAID driver, allowing for more flexible allocation of storage resources. One option was for the client to install two 22TB HDDs with an 8TB NVMe module for a total of 52TB of storage. However, their emphasis on the need for long-term, stable data retention made mirroring by configuring RAID 1 with the two SATA HDDs, ensuring data integrity could be maintained even in the event of a drive failing the more appropriate setup.

A byproduct of configuring RAID 1 was the halving of available storage to 22TB across the two drives, however this was a sacrifice the client felt necessary due to both the reliability it offered and data retention being mission-critical to the application.

AAEON's Flexible Customization

To meet the standard of reliability required by NVR systems deployed in different settings, the AAEON team demonstrated the flexible customization capabilities that make up a core part of AAEON's value proposition.

As the MIX-Q670D1 has a 12V DC power input as its default, the client was concerned the board would not be able to survive the harsh power environments typical of surveillance installations. To counteract this, AAEON added a poly-switch to the board's power input circuit, acting as a resettable overcurrent protection (OCP) device to protect the application against failure caused by momentary shorts or overcurrent conditions.

Project Success

By using AAEON's MIX-Q670D1 as the engine through which video data was collected, processed, and stored, the client was able to expand its line of NVR devices, with deployment primarily focused on transport hubs, city centers, and tourist areas.

The flexibility of the board's Ethernet configuration paired with the client's integrated PoE switch module allowed them to offer a reliable smart city product able to support up to 16 cameras per unit along with high-volume data storage with drive failure protection.

In addition to the technical specifications of the MIX-Q670D1 being an excellent fit for the client's NVR device, the service provided by the AAEON team was ultimately the deciding factor in the success of the project. This extended beyond the flexible customization undertaken to install a poly-switch to the board's power input circuit, but also to intangible factors such as the customer-centric attention to detail of AAEON's sales team, electrical engineers, quality engineers, and product managers, all of whom were deeply invested in making sure the customer's project was successful from initial proof of concept all the way to deployment and mass production.

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.