SOLUTION BRIEF

Smart Factory

IoT

Guiding Manufacturers toward Industry 4.0 with High-performance Intel® Processors

IEI's QTS Gateway is an optimal Industry 4.0 solution that enables a wide range of private cloud platforms.

The new QTS Gateway cloud platform combines IEI's hardware design and manufacturing technology with the QNAP QTS OS designed by QNAP Systems, Inc., and integrates high-performance Intel Atom, Intel Core i, and Intel Xeon processors. An easy-to-use control interface allows IT administrators to quickly deploy powerful software applications such as Virtualization Station, Container Station, Surveillance Station, and QRM+. As a result, this control interface lowers management and production costs while accelerating your business toward Industry 4.0.

IEI Integration Corp. boasts many years of experience in the industrial computing sector and is one of the world's leading suppliers of IT devices. Over the years, IEI has promoted its own brand and provided customized ODM services. It has also provided hundreds of products and solutions and implemented relevant apps for multiple sectors, including factory automation, telecommunications, national defense, construction, public safety, intelligent transportation, and medical devices. IEI's products are being widely used in smart cities, making IEI one of the few systems integration service providers that offer comprehensive IoT (Internet of Things) solutions.

IEI founder Teddy Kuo has worked in industrial computing for twenty years and recognizes the setbacks that global manufacturers are facing, including labor shortages, scarcity of land for industrial use, and rising factory construction costs. QTS Gateway was launched in 2016 as an Industry 4.0 solution that helps businesses address these issues. Essentially, the platform enables the comprehensive use of information and communications technology to incorporate virtual systems into the production environment and boost competitiveness. Businesses can deploy the QTS Gateway platform to engage in low-volume manufacturing for a variety of products and make quick, precise adjustments to their product lines with little or zero downtime.

Intel® has been aware of the special industrial conditions that PCs may encounter and therefore promoted new processors. The processors boast a temperature range of -40 to 105 degrees Celsius, and can operate normally under extreme conditions. Product is expected to be in stock for up to fifteen years so that IEI PCs that apply the QTS Gateway system can help users focus on R&D without worrying about technical support for manufacturing equipment in the post-development phase.

Traditional industrial PCs versus QTS Gateway

	Traditional industrial PCs	QTS Gateway
Remote system visualization	No	✓ Yes
Operating system	Must be purchased separately	✓ Built-in VM application
Remote device management	Must be purchased separately	✓ Built-in QRM+ application
Data backup	Must be purchased separately	✓ Built-in Hybrid Backup Sync
myQNAP cloud management	No	✓ Yes
Video surveillance	Must be purchased separately	✓ Built-in Surveillance Station
RAID data protection	Must use a specific platform	✓ RAID 0, RAID 1
Mobile device support	No	✓ Built-in Qmanager

Solving maintenance issues for aging devices with a free, built-in virtualization platform

The QNAP QTS OS, designed by QNAP Systems, Inc., was originally intended as an operating system for network-attached storage (NAS) systems. But with the ever-improving performance of Intel processors, QNAP QTS OS could do more than data storage and became an indispensable cloud computing operating system for businesses. QNAP QTS OS was customized for industrial requirements and integrated with high-reliability, high-performance IEI industrial PCs. This has enabled QTS Gateway to become a powerful tool in both personal cloud computing and edge

computing so that businesses could tackle various issues in their efforts to upgrade from Industry 3.0 to Industry 4.0.

QTS Gateway supports multiple, powerful software applications that can lower both management and production costs. A free virtualization platform assists manufacturers in migrating production line servers that are past end of life to a virtual environment that supports older operating systems for easier maintenance. Without virtualization, businesses would continue to face a number of costly, hardware-related issues. For example, system stability tends to worsen as components approach end of life. Even if businesses are willing to purchase new industrial PCs, most newer models do not support older operating systems, leaving businesses no choice but to continue maintaining their aging devices.

With QTS Gateway's built-in virtualization platform, IT administrators can migrate an older system to a new, high-performance platform while lowering maintenance costs and improving production line stability. Furthermore, IEI industrial PCs support a comprehensive range of Intel processors (Intel Atom, Intel Core i, and Intel Xeon), all of which support Intel Virtualization Technology for Directed I/O. As needed, administrators can connect specific COM and USB ports to the virtual machine without having to change any physical connections to devices, thus ensuring the stability of existing production processes.

In addition to virtualization, QTS Gateway features rapid firmware and snapshot functions so that IT administrators can quickly update factory device firmware and perform backups of important data for multiple devices in the factory, lowering maintenance costs even further. The built-in Hybrid Backup Sync solution allows businesses to back up, recover, and sync data on remote servers or cloud backup spaces, mitigating issues that might arise due to human error or natural disasters.

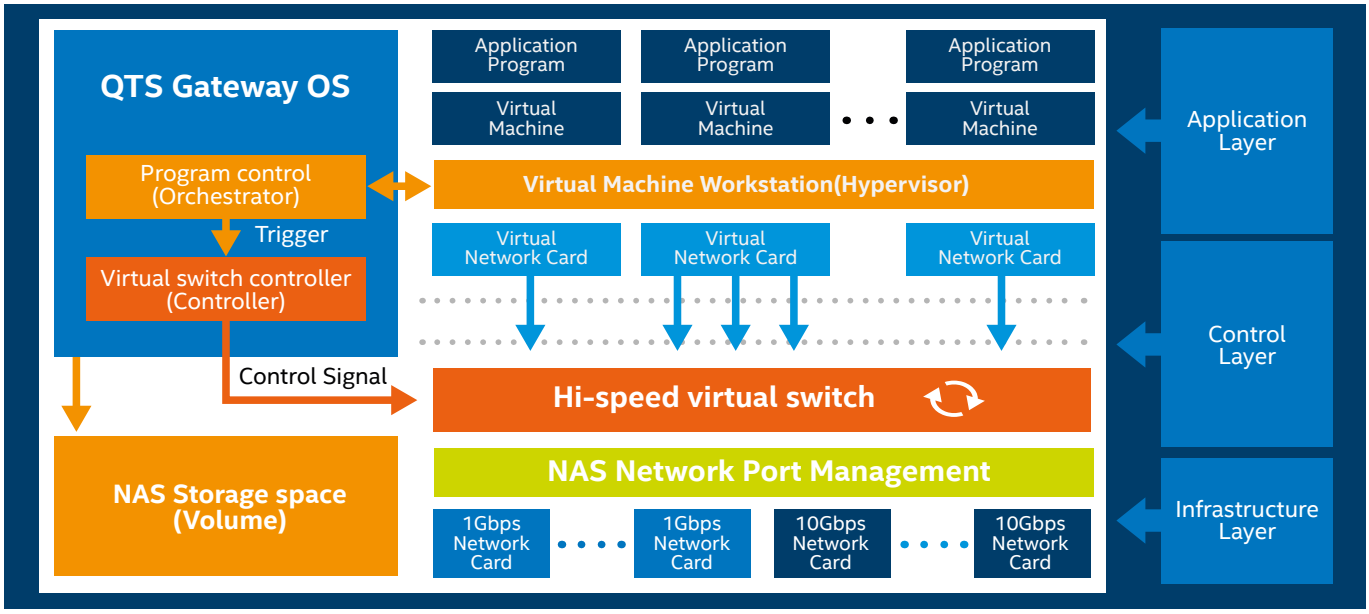

Figure 1. The QTS Gateway virtual machine, supported by Intel Virtualization Technology for Directed I/O, can connect to specific COM and USB ports without the need to change any physical connections to devices. This ensures the stability of existing production processes.

Improve application performance with Container Station

Container-based virtualization is a micro-service framework that breaks free from the traditional application service framework and allows efficient utilization of valuable computing support. Compared to traditional application development environments, which rely on communication between the base operating system and hardware devices,

container is a new virtualization technology that is free from the constraints of an operating system. During software development, only the necessary system tools, libraries, and settings are deployed to allow direct access to processors, memory, and more. Container optimizes the allocation of hardware resources while safeguarding operational efficiency. Experts regard container as an optimal method for accelerating the development of applications, making containerization a vital Industry 4.0 concept.

Different from most products with built-in Docker containers, QTS Gateway's built-in Container Station supports both LXC and Docker lightweight virtualization technologies. Project managers can tailor container specifications to suit the needs of their businesses. LXC is a Linux operating-system-level virtualization method used for the efficient management of hardware resources. Docker, an application-based virtualization concept that has swept the world in recent years, features Docker Hub, a cloud-based registry service that allows users to download thousands of applications to meet various production needs.

QTS Gateway Container Station comes with a built-in Docker Hub registry that has more than 45,000 applications to choose from, which greatly simplifies the application development process. Create a website with programming languages like PHP, Perl, and Python; build a database with MongoDB; configure an Apache Tomcat web server; or install an Ubuntu operating system to run an assortment of applications for your different business needs.

Smart surveillance station helps monitor factory operations

Industry 4.0 calls for the joint operation and integration of virtual and physical devices. The goals are to reduce waste, lower operating costs, and boost competitiveness. To achieve these goals, it is necessary to create a secure work environment for staff and ensure that business SOPs are followed in the production process. This is why businesses are investing in smart surveillance systems.

QTS Gateway's built-in Surveillance Station conforms to both ONVIF (Open Network Video Interface Forum) and PSIA

(Physical Security Interoperability Alliance) specifications. Surveillance Station is a comprehensive security solution that can be deployed in offices, factories, and warehouses. With an intuitive and easy-to-use control interface, administrators can efficiently manage multiple IP cameras for round-the-clock surveillance of important locations. This application supports real-time monitoring, recording, playback, smart recording, alarm notifications, Intelligent Video Analytics, and management functions to guarantee the security of both personnel and property. In particular, the software has a built-in electric fencing function. When the alarm recording function is activated, an alarm icon will be displayed on the real-time surveillance page as a suspicious event takes place, and the administrators just need to click on the icon to view more details.

Different from other surveillance systems on the market, Surveillance Station also features an E-map function that helps administrators visualize the layout of IP cameras so that the exact location of each camera can be quickly identified. In addition, businesses can input the floor plans of their factories to assign the locations where each IP camera is installed. When a suspicious event occurs, an IP camera icon flashes so that an administrator can quickly and accurately identify its location. The E-map feature facilitates a quick response time to suspicious events occurring on a large property.

QTS Gateway supports more than 100 brands and more than 3,000 types of cameras. A free license for up to four IP cameras allows users to enjoy the advantages of intelligent surveillance services without the additional expenditures required to purchase licenses. Administrators can even install a free app on mobile devices, such as smart phones or tablets, to view live video feed captured by their IP cameras and quickly assess the operating conditions of the production environment.

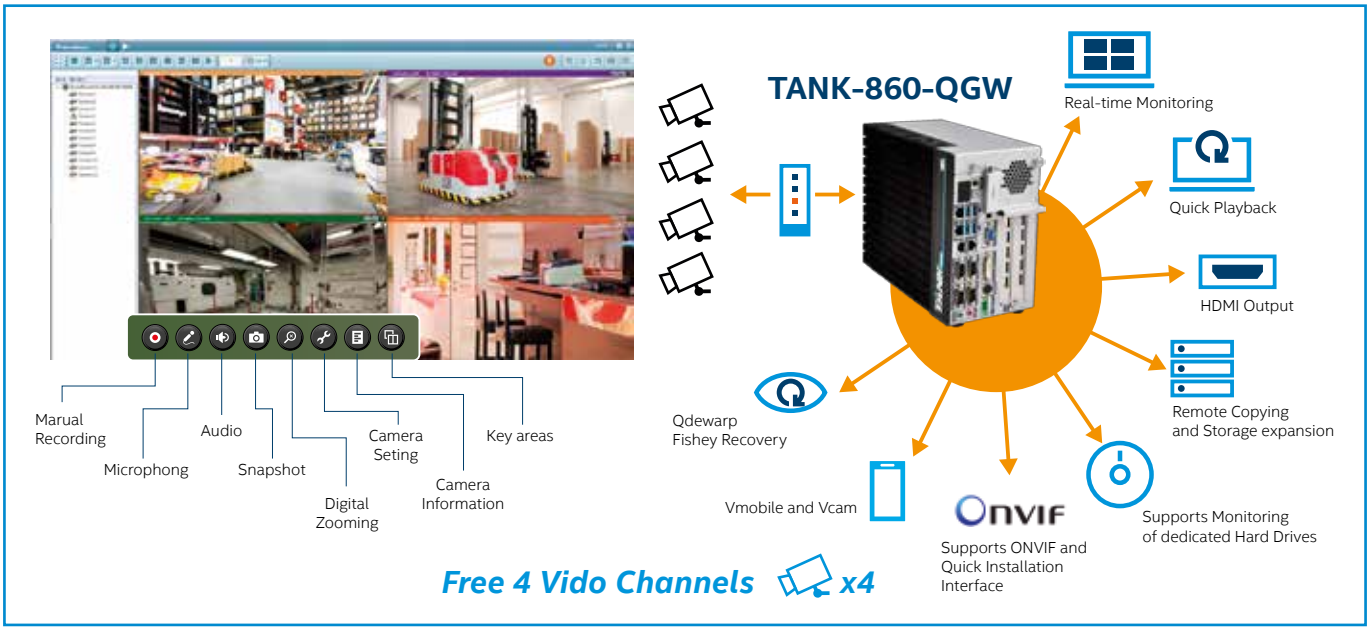

Figure 2. QTS Gateway supports more than 100 brands and more than 3,000 types of cameras. A free license for up to four IP cameras allows users to enjoy the advantages of intelligent surveillance services without the additional expenditures required to purchase licenses.

QRM+ reduces device management costs and improves administrative efficiency

Considering the many IT devices that need to be managed in a vast manufacturing base, QTS Gateway features the built-in QRM+ remote management solution for IT administrators that rely on multiple network devices for day-to-day operations. QRM+ provides a single point solution to manage all the servers, PCs, and thin clients in the network, significantly improving administrative efficiency.

In the past, administrators managed different brands of computing devices and relied on the original equipment supplier for management interface tools. But because only devices from one single brand could be managed at a time, it was necessary to switch between the different control interfaces in order to see the operational status of each device.

In comparison, QTS Gateway QRM+ enables continuous system monitoring of remote devices. By installing a lightweight remote management agent called QRMAgent onto a Windows or Linux machine, administrators can view the system status of connected devices with the QRM+ management interface. Details such as processor, memory, disk space, network, and power usage can all be monitored. QRM+ can also generate a list of IT devices so that administrators can readily monitor and track company assets and prevent the loss of important assets. In addition, QRM+ automatically checks the network status of devices so that each end-point can be monitored in real time. QRM+ is the optimal tool for remote management of IT devices.

Three advantages of QTS Gateway's flexibility – Transforming legacy machine tools into smart devices

Most manufacturers have many old CNC (computer numerical control) machine tools that function normally but cannot be upgraded. Fortunately, three built-in features of QTS Gateway can be deployed to transform CNC machines into M2M (machine-to-machine) smart devices. These features make QTS Gateway an important component for businesses wanting to realize the Industry 4.0 vision.

First, the increasingly unstable systems of aging devices can be migrated to a highly-stable QTS Gateway virtual platform that supports multiple communication protocols. This upgrades the CNC machine tool to a smart device that is capable of automated data exchange. The QTS Gateway platform also features the Hybrid Backup Sync solution so that administrators can back up, recover, and sync data, thereby ensuring that the device can cope with the impact of problems caused by human error or natural disasters.

Second, there is a solution for CNC machine tools that do not support externally connected devices: Surveillance Station can be deployed with high-definition cameras. During production, or in the event of mechanical failure, or if peripheral devices detect poor-quality material, items, or problems in the production process, audio-visual data of such events will be recorded and stored for analysis to pinpoint the problem. This will prevent the waste of raw materials and save cost. Worthy of note is how IEI is integrating Intel FPGA (field-programmable gate array) chips into several types of high-definition industrial cameras. The recognition capabilities of these cameras that IEI is developing are much stronger than most cameras on the market, and are an optimal solution for upgrading a device's recognition functionality.

Finally, QTS Gateway QRM+ provides a single interface with which administrators can monitor the operational status of different brands of IT devices. This prevents the frustration of switching through multiple management software control interfaces or the need to physically access and manage a device on site. Not only does QRM+ improve administrative efficiency, it also reports the health status of IT devices in advance. This way, administrators can fix problems early on and work to ensure round-the-clock production, significantly boosting a company's market competitiveness.

IEI launches the Mustang-200 computing accelerator for enhanced client-side computing performance

As application environments become more complex, an increasing number of businesses are integrating powerful, reasonably-priced Intel processors to implement HPC (high-performance computing) solutions capable of performing big data analytics. Traditional HPC servers, however, are used for parallel computing solutions with multiple processors and are relatively large devices that occupy lots of rack space. They are therefore better suited for back-end analysis.

In the Industry 4.0 environment, industrial PCs collect data on the front end and are equally important as servers on the back end. But without filtering the data in advance, data would be indiscriminately sent to back-end platforms, eating up bandwidth and significantly increasing server workloads. IEI's Mustang-200 computing accelerator can boost front-end performance without the additional physical space requirements.

The Mustang-200 comes with two built-in Intel Core i5 or Intel Core i7 processors, 32GB (4 x 8GB) of memory, and two 512GB Intel NVMe SSDs. IT administrators can assign tasks to the Mustang-200 computing accelerator as needed, further boosting complex computing functionality and virtualization, while improving overall front-end server performance.

Each Mustang-200 computing accelerator with the PCI Express x4 slot can be installed on a front-end computing device or a server to pre-filter irrelevant information. This reduces back-end server workloads and produces quicker data analysis results. In addition, benefitting from the integration of Intel Iris Plus Graphics 650 chip in the seventh generation of Intel Core i-series processors, the IEI Mustang-200 accelerator card can provide high-definition video conversion functionality and produce 360-degree surround videos. Multiple Mustang-200 cards can be installed as needed, helping creative professionals to streamline workflows and accelerate processes.

Intelligent manufacturing is becoming global trend. A business that does not achieve Industry 4.0 status early on will be unable to maintain a leading position in the global marketplace. IEI's QTS Gateway, which integrates hardware and software, along with the Mustang-200 computing accelerator, which enhances computing performance, further guarantee the reliability and stability of IEI products while meeting a variety of needs for both personal cloud computing and edge computing. The Mustang-200 is an optimal solution for businesses geared towards Industry 4.0.

About IEI Integration Corp.

IEI is a top global supplier of industrial PCs that accelerates the development of the Internet of Things (IoT). QTS Gateway integrates high-performance Intel processors and provides solutions for businesses aspiring to upgrade from Industry 3.0 to Industry 4.0.

To learn more about IEI Integration Corp., please visit the website: www.ieiworld.com

To find the right solution for your business,

please contact Intel or visit the website for more information: www.intel.com/content/www/us/en/internet-of-things/overview

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