

ADVANTECH

Enabling an Intelligent Planet

PATERO
QUANTUM SECURE COMMUNICATION



Encrypting Modern Manufacturing Data with Quantum Private Networks

Solving modern manufacturing cybersecurity challenges with Advantech rugged devices and CryptoQoR quantum private networking from Patero

As modern manufacturing transitions from traditional data collection and transmission to the cloud, IT and systems security teams must proactively address complex challenges from increased vulnerability to cyberattacks. When it comes to sending highly sensitive additive manufacturing files (AMF) to the production line, transmitting industrial IoT data to cloud-based SCADA systems, or using manufacturing execution systems (MES) to control processes remotely, it is imperative that manufacturers de-risk increasingly digitized operations.

Manufacturers face two key challenges:

- 1. The vulnerability of cyber attack surfaces,** as sensitive data is transferred between factories and data centers over the Internet. Strengthening Internet-exposed endpoints to make them harder to detect reduces this risk.
- 2. Current asymmetric encryption is becoming obsolete,** with the National Institute of Standards and Technology (NIST) publishing new standards for post-quantum encryption. Upgrading to these standards protects against decryption of stolen data by state actors in the future.

Regardless of co-located, on-premises, or cloud data centers, attackers can infiltrate manufacturing operations, disrupting processes and costing manufacturers trillions.

According to Express VPN, the global cost of cybercrimes is expected reach \$9.5 trillion in 2024, with that number expected to rise to \$10.5 trillion in 2025.¹ Furthermore, a recent survey by Statista revealed that industry leaders identify cyber-attacks as one of the most significant

threats to their overall business operations.

Safeguarding Data from the Factory to the Cloud

Secure data channels are essential throughout the manufacturing sector, particularly where Internet-exposed network endpoints connect the factory to the cloud. Setting up and maintaining edge-to-anything security infrastructure can be challenging as OT and IT personnel must carefully adjust firewalls and ensure data flows to cloud SCADA, historian, AI/ML, MES, and an array of applications. Network connections to and from edge AI, machine learning (ML), and remote SCADA systems are especially vulnerable, making them prone to errors and costly to secure and maintain.

The U.S. Government is driving a national encryption upgrade from today's classic asymmetric (e.g. RSA, TLS) to post-quantum encryption. Why? Classic asymmetric encryption will only continue to become less cyber secure in the future, especially with the onset of quantum computers. Today, state actors are already stealing encrypted data streams from across the Internet to try and decrypt them later ("steal now, decrypt later").

Cyber-attacks currently put trade secrets, business intelligence, and emerging technologies at the highest risk. Companies with long production cycles and significant R&D must take immediate, vigilant action to protect these assets. So, if your sensitive manufacturing or corporate data is being moved across the Internet today, the "bad guys" will likely have it in the future without protecting it with future-safe encryption.

The good news is that NIST released a new standard for post-quantum cryptography in August 2024. Advantech and Patero have adopted this new future-safe encryption standard.

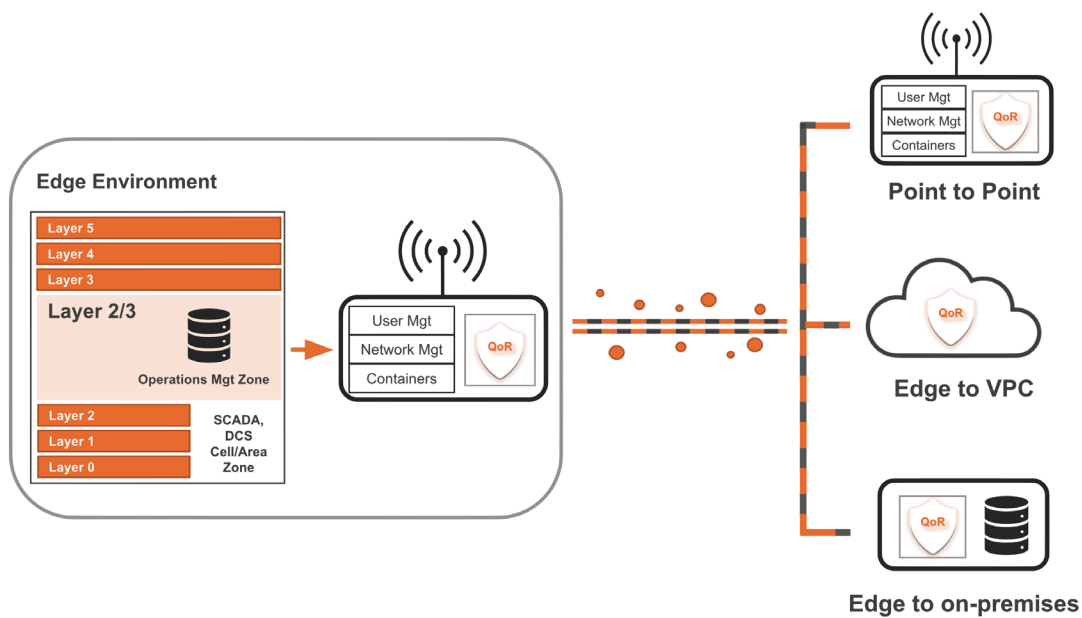
How to Secure Manufacturing Data with Quantum Private Networks

Advantech rugged devices pre-loaded with Patero's crypto module, CryptoQoR, transform Advantech-powered networks into Quantum Private Networks (QPN). An Advantech QPN secures data-in-transit from the manufacturing edge to anything with built-in hybrid PQC. Classic and NIST standardized PQC key encapsulation methods are hybridized to create "double-encrypted" data channels. The solution's zero trust network deployment model ensures

exposed network endpoints drop untrusted connection requests and cloak the exposed attack surface from discovery by cyber attackers.

Benefits

- 1. Simple Setup:** Single outbound port with no need for OT/IT configuration.
- 2. Plug-and-Play:** Automatically connects, authenticates, and sets secure, hybrid-PQC encrypted sessions.
- 3. Cost Savings:** Reduces the need for on-site systems integrators, saving both time and money.
- 4. Lower Administrative Load:** Minimizes ongoing network administration for OT/IT and CSO staff.



PATERO
QUANTUM SECURE COMMUNICATION

QoR is a software-based cryptography technology that secures communications and data in transit against current and future quantum-based attacks. Hardware-agnostic and deployable on both new and existing assets, QoR supports a range of topologies, including point-to-point, multipoint-to-cloud, and multipoint-to-on-premises communication.

Zero Touch Deployment

Deploying edge computing devices typically requires the involvement of System Integrators, OT/IT resources, truck rolls, and the configuration of often expensive firewall systems. Advantech devices pre-configured with Patero CryptoQoR require only power and a network connection. On boot, the devices call the service provider quantum-safe virtual cloud gateway through the enterprise firewall and auto-establishes a secure data channel without requiring OT/IT configuration.

Segmented Cloud Industrial Operations Network

Network segmentation increases security posture and reduces attack vectors. Whether an application is used in energy, health, communications, or heavy manufacturing industries, network segmentation with secure remote access is the optimal operational solution. Advantech Quantum Private Networks ensures network nodes can only communicate with authorized and authenticated data resources. Segmenting manufacturing production, financial, and operations networks prevents inadvertent (or intentional) access to segmented resources by and from unauthorized endpoints.

Quantum-Safe Secure Remote Access

For most cases, the implementation and management of configurations, updates, or patches on OT/IT systems are handled on-site by expensive vendor or SI support personnel, or by limited enterprise OT/IT resources. On-premises access consumes precious resources, burdens corporate personnel hosting vendors/SIs, and unnecessarily exposes enterprise network resources to possible error or infiltration.

Enterprise-level security and edge intelligence with Advantech's quantum private networking by Patero provides best-in-class computer solutions. The solution is available with Ubuntu, Debian, and is certified for RHEL9 operating systems.

Advantech Patero-Integrated Devices:

UNO-148 – Fanless DIN Rail Controller

- RHEL-Certified
- 11th gen Intel® Core™ i processor
- Modular design for flexible configuration
- Features TSN support for time-synchronized applications

[Learn More](#)



ECU-150 NXP i.MX8M-based high-performance IoT gateway

UNO-410 and **UNO-430** EXP Ruggedized, C1D2-certified systems

MIC-711 and **MIC-733** NVIDIA Jetson Orin Nano AI Systems

UNO-137 and **UNO-2271G-V2** Scalable Intel embedded systems and Edge IoT Gateways

Want to learn more?

Browse all Advantech industrial IoT edge gateway solutions on our website [here](#), or scan the QR code



Citations

1. Express VPN. (2023). "The true cost of cyber attacks in 2024 and beyond" <https://www.expressvpn.com/blog/the-true-cost-of-cyber-attacks-in-2024-and-beyond/>



At Patero, we understand the complexities of cybersecurity in today's world. We work closely with our clients to provide customized solutions that meet their unique needs. Our team of experts has years of experience in the field, and we are committed to delivering the highest level of service and support to our clients. Visit www.patero.io for more information.

Advantech Corporation Industrial IoT Group

Call Center: 1-888-576-9668
Tech Support/RMA: 1-877-451-6868
Web: www.Advantech.com

Cincinnati, OH Office
4445 Lake Forest Drive, Ste. 200
Cincinnati, OH 45242 USA
Toll Free Tel: 1-800-800-6889
Tel: 1-513-742-8895
Fax: 1-513-742-8892

Ottawa, IL Office
707 East Dayton Road
Ottawa, IL 61350 USA
Tel: 1-815-433-5100
Fax: 1-815-433-5109

Milpitas, CA Office
380 Fairview Way
Milpitas, CA 95035-3062 USA
Toll Free Tel: 1-800-800-6889
Tel: 1-408-519-3891
Fax: 1-408-519-3888

ADVANTECH

Enabling an Intelligent Planet