Impregnable Cryptographic Solutions for the Ages

Phio TX™ from Quantum Xchange brings immediate crypto-diversification and quantum-resistant capabilities to the Engage BlackDoor encryptor suite.

The Problem

Advances in computing and mathematics continue to push the boundaries of how best to secure data in motion. Yes, quantum computers may one day break encryption. So might stochastic magnetic tunnel junction machines or some other yet-to-be-discovered innovation.

Next-generation computing power isn't needed to break encryption. It's successfully happening right here and now. Many factors contribute to encryption weaknesses and create vulnerabilities ready for exploitation by cybercriminals or state-sponsored actors:

- Human risk factors including poor implementation or programming errors

- Weak entropy sources leading to certificate collisions

- Software bugs

- A single trusted user responsible for keys

- Reliance on public key encryption (PKE) – where key generation and key delivery travel down the same transmission tunnel with the data, allowing an attacker to compromise a single weak link to retrieve all the secret information.

- Lack of key rotation of pre-shared keys

Future-forward organizations recognize these common occurrences introduce undo risk into their environments. They also understand the Information Age of Computing will soon give way to the Quantum Age, and with that the need to replace legacy encryption with quantum-resistant algorithms.

Changing encryption is hard, disruptive, and resource intensive. It can require modifying or replacing libraries, validation tools, hardware, operating systems, application code, device protocols, and user/administrative procedures – on every network node. This leads to disruptions, downtime, and lost productivity.

The Solution

To get a leg up on the paradigm shift and combat everyday crypto vulnerabilities there's Phio Trusted Xchange (TX) from Quantum Xchange. The crypto-diverse and crypto-agile key delivery platform integrates seamlessly with the BlackDoor encryption system to offer a resilient approach and to extend your crypto investment into the future with very little lift or outlay, and with no network interruptions or downtime.

Key Generation
Phio TX supports a mix of asymmetric and symmetric encryption, all NIST-backed Post-Quantum Cryptography (PQC) candidate algorithms, entropy from Quantum Random Number Generators (QRNG), and Quantum Key Distribution (QKD) if desired. The crypto-agile infrastructure allows users to easily upgrade defenses as the threat landscape evolves.

Key Delivery
Phio TX sends a second quantum-safe symmetric key, out-of-band, down a separate quantum-protected transmission tunnel and mesh network. In doing so, it bypasses the inherent vulnerabilities of PKE – where key generation and key delivery travel down the same transmission tunnel with the data and where an attacker needs only to compromise a single link to retrieve all the secret information.

Key Management
Phio TX is auditable, featuring a user dashboard that provides security administrators a real-time view into where keys are traveling, what type of keys are being transmitted, volume of keys, and their transmission

frequency for improved performance and data-security optimization.

Phio TX is available in a variety of deployment options, i.e., physical appliance, in the cloud, and as an edge device, to meet all budgetary and business requirements.

## ENGAGE BLACK'S BLACKDOOR ETHERNET ENCRYPTOR ADVANTAGES

✓ **ETSI protocol** support

✓ **FIPS approved** symmetric encryption AES algorithm used by U.S. Government organizations to protect sensitive information

✓ **Point-to-point** or multipoint architecture

✓ **Encrypt voice**, video, and data at gigabit speeds

✓ **Fully automatic** key management, one-minute to 42-day rekey interval without interruption

✓ **Hardware Random** Number Generator

✓ **Low latency** (< 1ms)

✓ **Encrypt at** the link, network or transport layer and then tunneled, bridged, or routed to the destination network

✓ **Can provide** payload only encryption for MPLS data packets, maintaining the MPLS labels but encrypting the data

✓ **Supports Quantum** Key Distribution (QKD)

Why Use Engage Black BlackDoor Encryptors with Phio TX from Quantum Xchange?

Key advantages and features include:

• Extend the life of your Engage Black ethernet encryptors by making BlackDoor keys immediately quantum-safe.

• Multilayered, crypto-diverse approach to secure key transfer protected by PQC and/or QKD in a FIPS 140-2 validated implementation.

• Avoid brute-force, side-channel, and SSL/harvesting attacks with out-of-band, quantum-safe key delivery. With Phio TX, keys are used as a key-encrypting-key (KEK) for impenetrable protection.

• Shore up risks and vulnerabilities of modern-day PKE. No data loss even if KEK is stolen — the attacker must still figure out when, where, and how it was used.

• Dramatically improve key entropy with quantum-enhanced options i.e., PQC, QKD, QRNG or combination.

• Multipath key routing, fault-tolerant and load-balanced point-to-multipoint key transmissions. Supports key transmission IPv4 or IPv6 network — copper, fiber, 4G, 5G, satellite, etc.

• Future-proof and crypto-agile key distribution system. Enables users to quickly change to any NIST-backed PQC and provides an onramp to maximum-level QKD security if desired with no distance limitations.

• Improves QKD by removing its reliance on fiber and making point-to-multipoint intelligent key routing and delivery possible.

How it Works – Simple Overlay that Effortlessly Plugs into Engage BlackDoor Encryptors
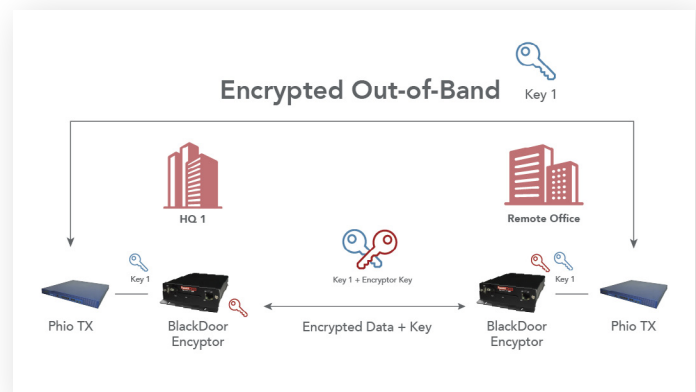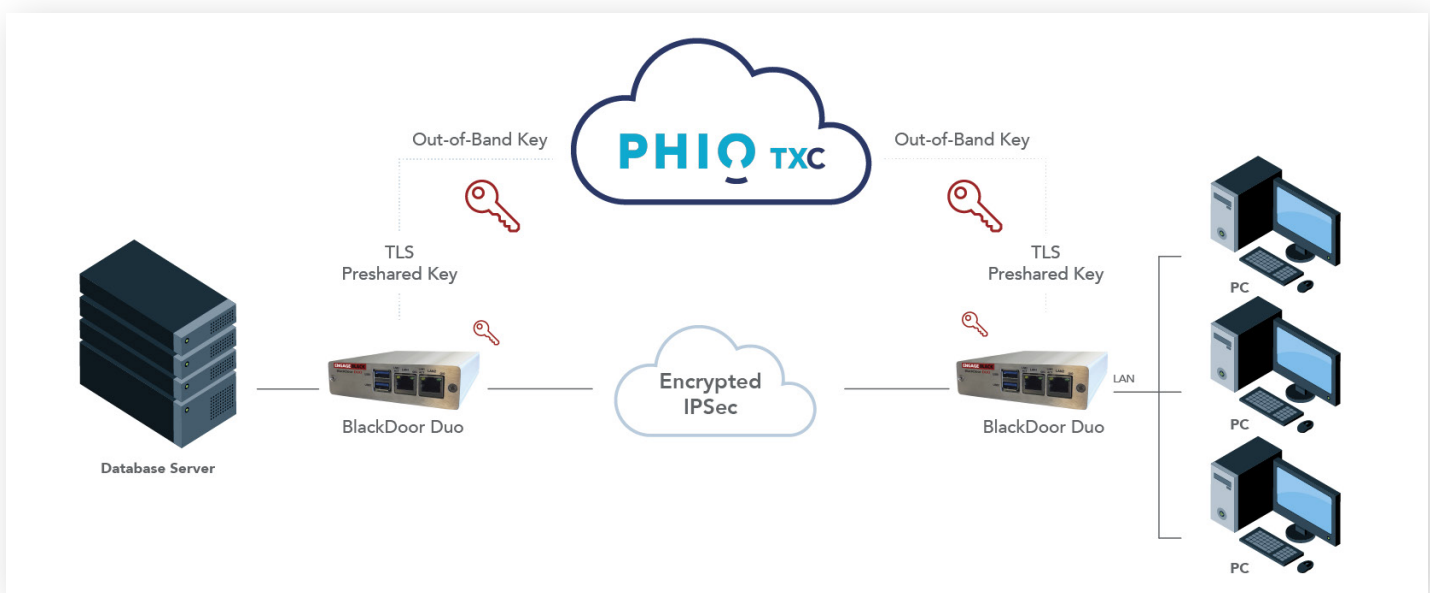
Key distribution over cloud infrastructure using Phio TX cloud deployment (Phio TX-C).

Remove Single Points of Failure in Your Crypto Infrastructure with Instant Quantum-Safe Key Delivery

Are you ready to simultaneously solve for present-day crypto vulnerabilities; combat popular attack vectors like man-in-the-middle, brute force, and harvesting attacks; and be post quantum, NIST-standard ready easily and affordably?

Contact Quantum Xchange to learn more about Phio TX at info@quantumxc.com.
To learn more about the BlackDoor advantages contact Engage Black at info@engageblack.com.