Quantum Cryptography

Securing the future of a digital society

By adopting Quantum Key Distribution, organizations can **protect their communication infrastructure** from today's vast array of cyber-threats, as well as those of tomorrow. Already, hackers are using techniques such as harvest and decrypt, where data is scraped and stored today with the aim of decrypting it once they have the capability to do so through advances with supercomputers, the realisation of a **quantum computer**, or the discovery of new techniques for cryptanalysis. With QKD, any data which requires **long-term protection** is not only secure in today's IT landscape, but also **future-proofed** to remain protected in the impending **quantum age**.

Robust levels of security are required in many sectors. In **healthcare**, the technology has been applied to ensure the secure transmission of genome data in Japan. Within the **public sector** QKD is used to provide government with secure communications, in the **finance industry** to **protect banking network infrastructure** and in **aerospace** and **pharmaceuticals** to protect high-value long-life **Intellectual Property**. Equally, in the age of IoT and smart cities, the necessity for a robust, **tamper-proof** and **ultra-sensitive infrastructure** is essential to ensure day-to-day life operates without disruption both now and in the future.

Toshiba is the world leader in high-speed quantum cryptographic systems. Based on decades of scientific research, we have taken on the challenges of this unexplored field and have pioneered the path to practical use.

Long range

Toshiba QKD enables long range deployments. Toshiba was the first to demonstrate QKD over 100 km of fibre in 2004 and have demonstrated, in lab conditions, the Twin-Field QKD protocol capable of operating over 500 km of fibre

High key rates

Toshiba QKD offers market leading secure key rates. In fact we were the first to demonstrate continuous secure key rates exceeding 1 Mb/s (in 2008) and 10 Mb/s (in 2017).

Data co-existence

Toshiba's Multiplexed QKD solution allows QKD to be operated on fibre carrying multiple 10 Gb/s or 100 Gb/s data channels, eliminating the need for dark fibre and reducing the cost of deployment.

Fully automated operation with plug & play setup

Automated start-up and system optimisation in real time, delivered through active stabilization technology, that allows the system to distribute key material continuously without any user intervention in even the most challenging operating conditions.

Easy-to-use graphical user interface

A simple web-browser-based interface provides access to both real-time and historical performance data.

Integrated key delivery interface

An integrated key delivery interface is provided for secure key delivery. This is compatible with leading encryptors, and other applications using ETSI industry standards.

Product details

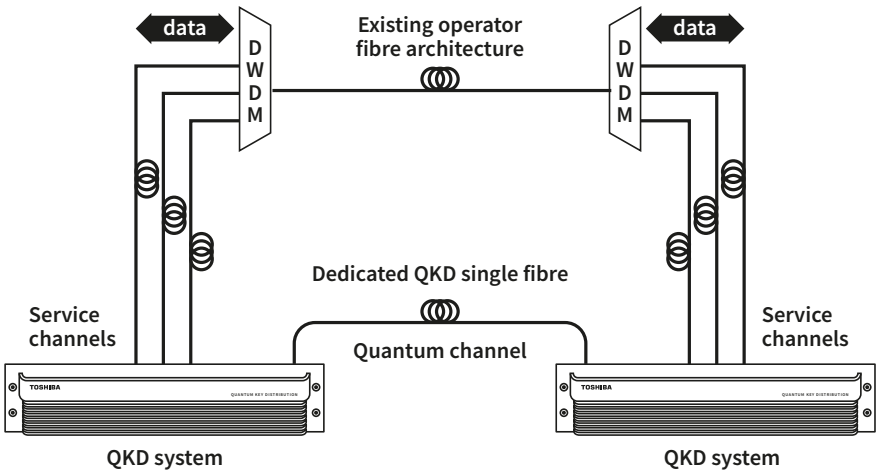
The Toshiba Flexible (LE) QKD system is **wavelength customisable** providing operators with **deployment flexibility** of the C-band quantum channel and associated quantum service channels. The LE system presents **dedicated optical quantum and service channel interfaces** to enable QKD integration into a variety of network architectures.

	Toshiba Flexible (LE) QKD system
Key Exchange Protocol	Toshiba T12 protocol (efficient BB84 protocol with decoy states and phase encoding)
Customisable Wavelengths (1529 nm – 1564 nm)	C-band customisable wavelengths for quantum information and service channels. 1 x quantum and 3x service channels required Wavelengths for quantum and service channels should be in accordance with the ITU DWDM grid Wavelengths are subject to availability, fixed during manufacture and are not changeable by the end user
Fibre Requirement	Dedicated single dark fibre required for the quantum channel Service channels can be multiplexed into existing fibre networks
Secure Key Rate	300 kb/s at 10 dB channel loss
Optical Loss Budget and launch powers	Quantum channel optical loss budget 30 dB, (ideal single mode fibre)
Detection Technology	Proprietary self-differencing semiconductor detectors
Security Parameter	Key failure probability $< 10^{-10}$, corresponding to less than once in 30,000 years
Monitoring functions	SNMP v2 & v3, GUI, CLI
Key Delivery	Integrated Key Delivery Interface to provide keys to encryptors and other applications supporting ETSI GS QKD 014 industry standard key delivery API
Standards	**CE:** EN 55032, EN 55035, EN 61000-3-2, EN 61000-3-3, EN 63000, EN IEC 62368-1, EN IEC 60825-1, EN IEC 60825-2
Dimensions	Standard 19'' rack mount (3U height)

Network Integration

The Toshiba LE QKD system easily integrates into existing multiplexing and fibre architectures.

User configurable quantum and service channel options provide further configuration flexibilty.



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