

Toward a Quantum Internet – Online Event  
by SGIInnovate and Centre for Quantum Technologies

QKD commercial perspectives

# Are You Ready For Quantum Safe Communications?

## TOSHIBA

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# Cyber Threats in Data Communication & Storage



## Communication Hacking

Steal encrypted data and decrypt it IMMEDIATELY by quantum computer

## Data Harvesting

Steal and store encrypted data FIRST, then decrypt data LATER when technically capable by supercomputer or quantum computer

**How to deal with those threats?**



# Quantum Safe Solutions

Two solutions are emerging.

## Quantum Key Distribution (QKD)

- Quantum physics based – completely safe
- Only proven solution today
- Remain effective throughout quantum computing era

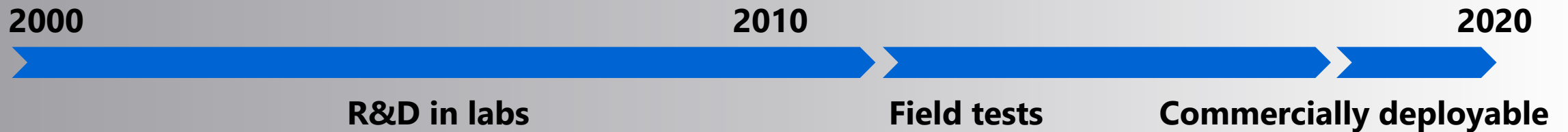
## Post Quantum Cryptography (PQC)

- Math based – relatively safe
- Evolution of current computational cryptography
- Several candidates being evaluated, a few to be certified by NIST in 2024
- Need to evolve as quantum computers evolve

**QKD is ready for commercialization**

# QKD Advancements

QKD technologies have advanced as;



Toshiba QKD technologies on the courses of;



## QKD deploying globally

# QKD Commercial Market

## QKD systems and services now commercially available

### **Terrestrial fibre QKD systems** from several vendors

- ID Quantique of Swiss & QuantumCTek of China for years
- A few start-ups of US, UK and others these days
- Toshiba in next quarter
- Current TAM of high tens of millions \$, according to a market research firm, IQT of US
  - Source: Inside Quantum Technology, Quantum Key Distribution, July 2020

### **Terrestrial fibre QKD services** from Quantum Xchange of US

**Satellite and terrestrial free space QKD services  
on the way to next few years**

## Market evolution ahead



# Introducing Toshiba QKD Systems

<https://www.toshiba.co.jp/qkd/en/index.htm>

Industry  
leading  
performances

Advanced  
feature

International  
standard API

Limited  
availability  
by region

high key rate, long range

multiplexing

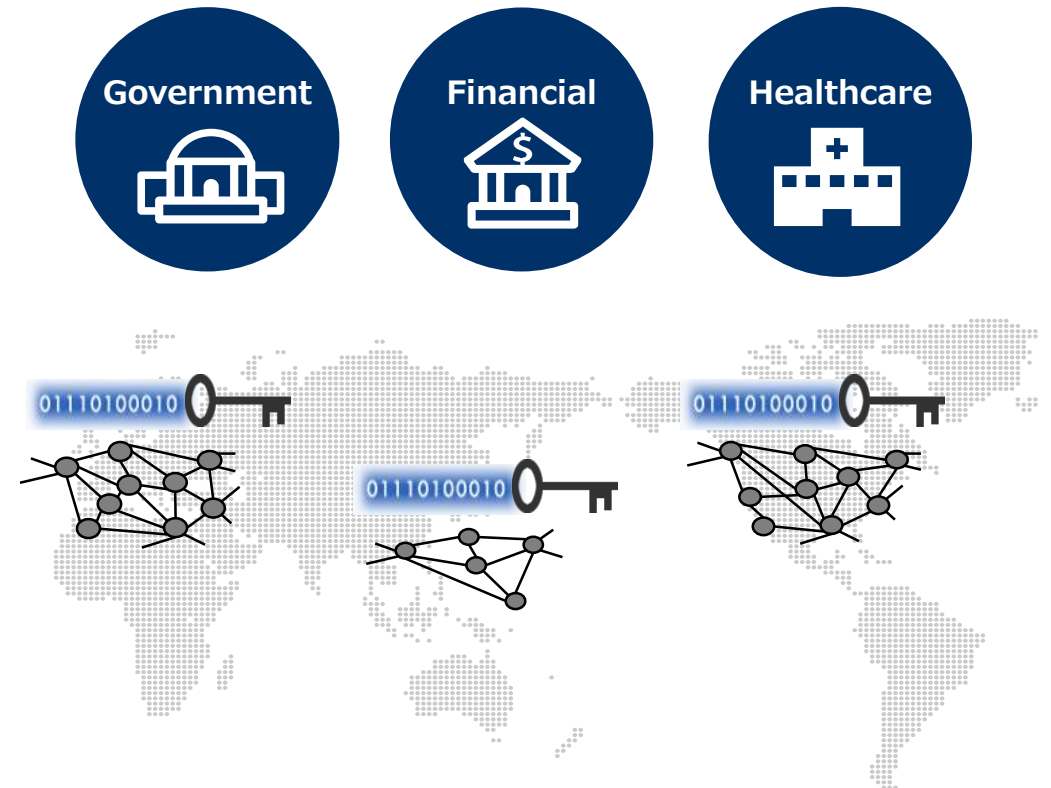
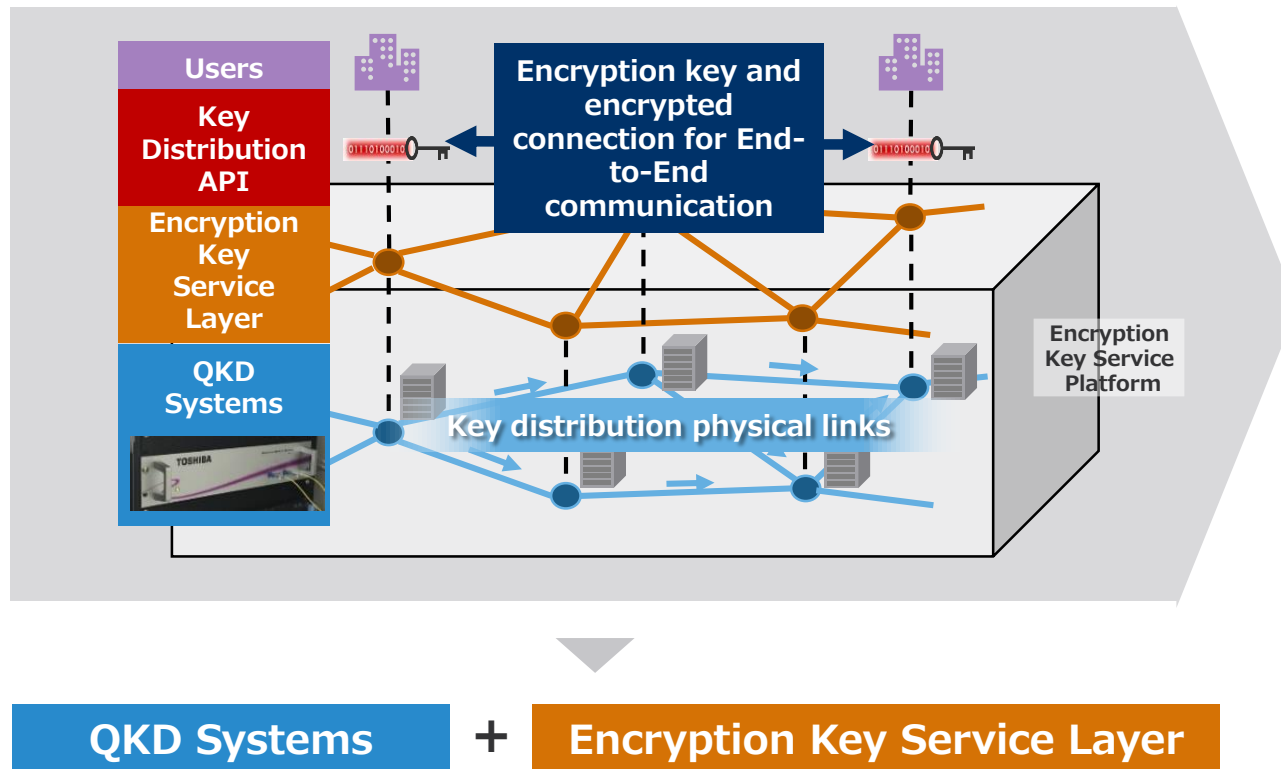
	Long Distance System	Multiplexed System
Key Rate (Typical)	300 kb/s @ 10 dB loss	40 kb/s @ 10 dB loss
Range (using ideal SM fibre)	Up to 120 km	Up to 70 km
Fibre Requirement	Two Fibers	One or Two Fibers
Multiplexing compatibility	-	Option to multiplex data in C-band
Key Exchange Protocol	Efficient BB84 protocol with decoy states and phase encoding	
Security Parameter	Key failure probability $< 10^{-10}$	
Detection Technology	Proprietary self-differencing semiconductor detectors	
Dimensions	Standard 19" rack mount, height = 3U	



Visit Toshiba QKD website for details

# Toshiba QKD Service – Future Release

## QKD service platform by Toshiba for regional QKD service providers



**On call for regional service partners**



# Toshiba QKD in Singapore and APAC

## Ongoing advancements:

### **Collaborate with SpeQtral of Singapore**

- To help governments and enterprises learn, consider, plan and deploy quantum safe cryptographic solutions in SE Asia
- To work for global seamless solutions in combination of terrestrial and satellite QKD technologies, systems and services

### **Lead Japan government and industry to develop next phase of quantum communication technologies and solutions**

- Aiming at deploying world's first wide-range and large-scale quantum cryptography communication networks

### **In talks with communication service providers in APAC for QKD system solutions and services**

**We, Toshiba, can help you protect your valuable data.**

# QKD Future Technologies & Solutions

To advance toward global scale social deployments, governments and industries should collaborate on

1

**Quantum  
Communications  
Link Technologies**

2

**Trusted Node  
Technologies**

3

**Quantum Relay  
Technologies**

4

**Wide-Area Network  
Construction and  
Operation  
Technologies**

**A Vibrant Ecosystem to Promote Collaborations between  
Governments, Research Institutes and Commercial Organizations**



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Thank you

