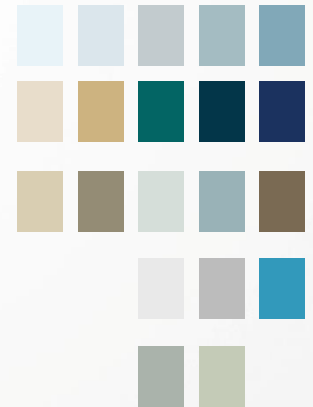


ITU WS on QKD protocols, security & certification

Operator's role on QKDN deployment and Standardization/certification

Dong-Hi SIM



Build Quantum Network with Communication Infra Expertise

Develop new Network Design Principles to accommodate Quantum technologies

Evolution

Field Trial & Testbed for Quantum Tech

Pilot Projects for Quantum Communication in live network

- To protect Critical Infrastructure
- Trusted Nodes and Key Management
- Quantum Randomness

Network Management & Control

Modular Building Blocks and Standardized interfaces

- Centralized Control for QKD Network
- Simultaneous management for OTN & QKD Network with Software Defined Network concept

Network Architecture & Design

Interoperability for Carrier-grade

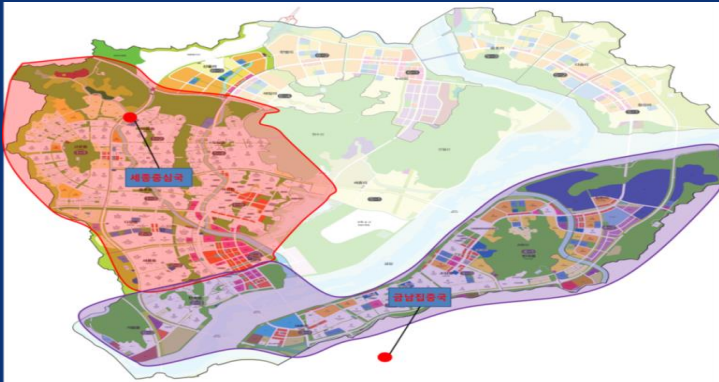
- SDN extension to have interoperable QKD with other operators
- Interoperability between Operator

QKD Commercial Case: Telecommunication Providers

SKT: World-first LTE Backhaul Protection with QKD

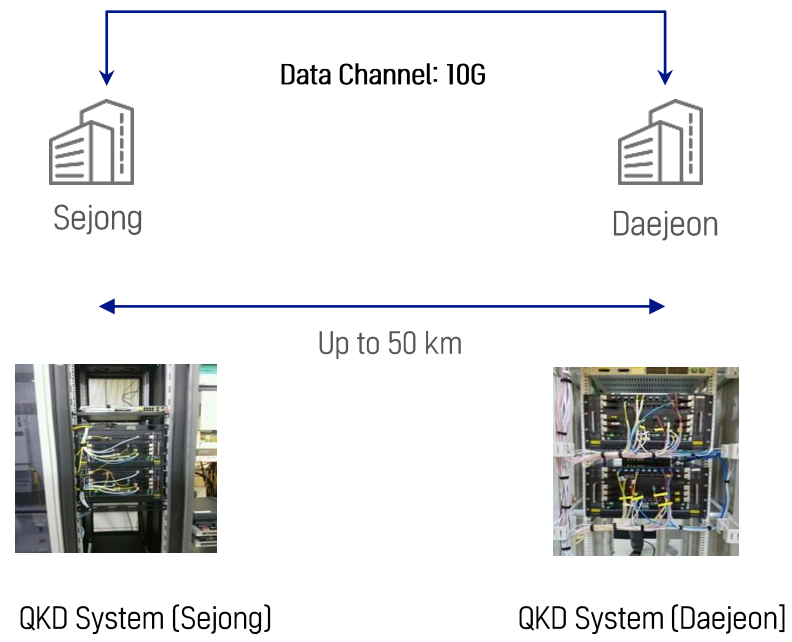


World-First (June '16)
LTE backhaul Protection with QKD



Configuration of QKD Network in Sejong

QKD-implemented



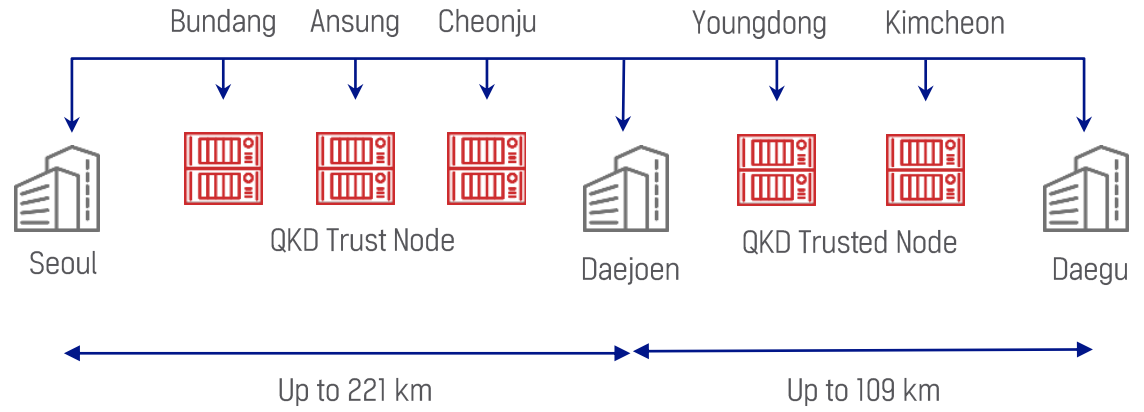
QKD Commercial Case: Telecommunication Providers

SKT: World-first 5G Backbone Protection with QKD

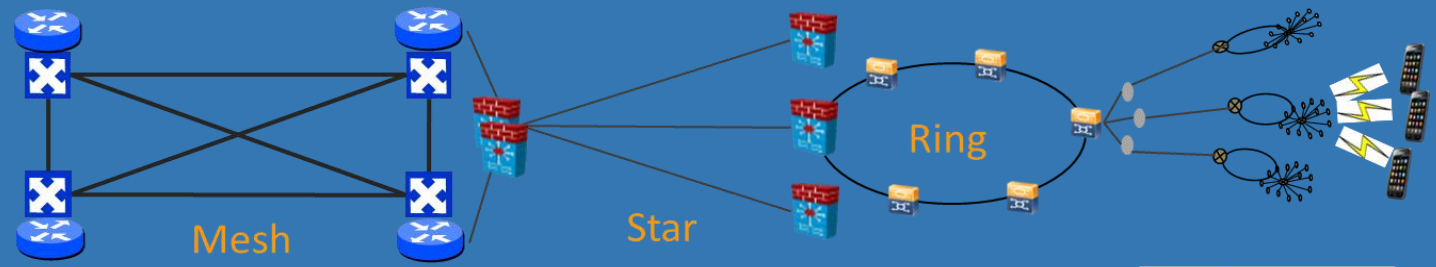
5G backbone protection with QKD (Feb '19)



QKD Network (Seoul-Daejeon-Daegu)



Different QKD Network Topologies

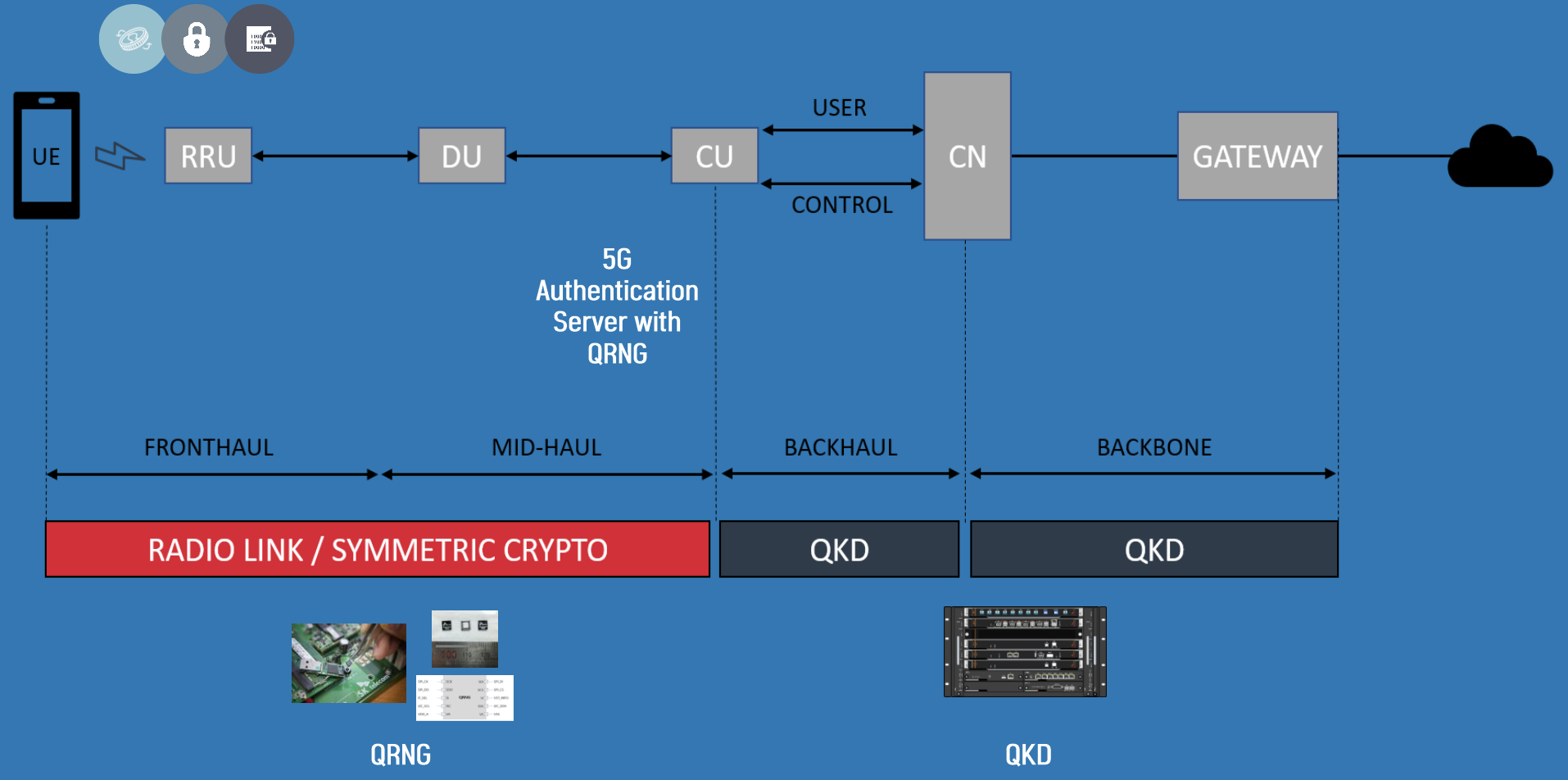


Quantum Key Distribution

5G standard security & QRNG

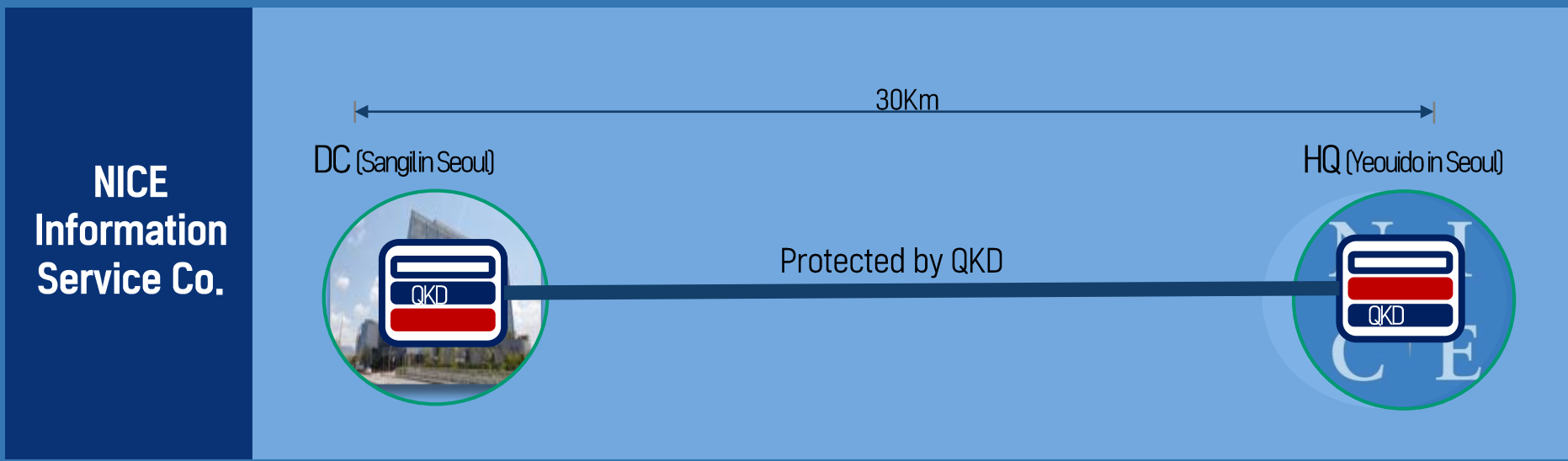
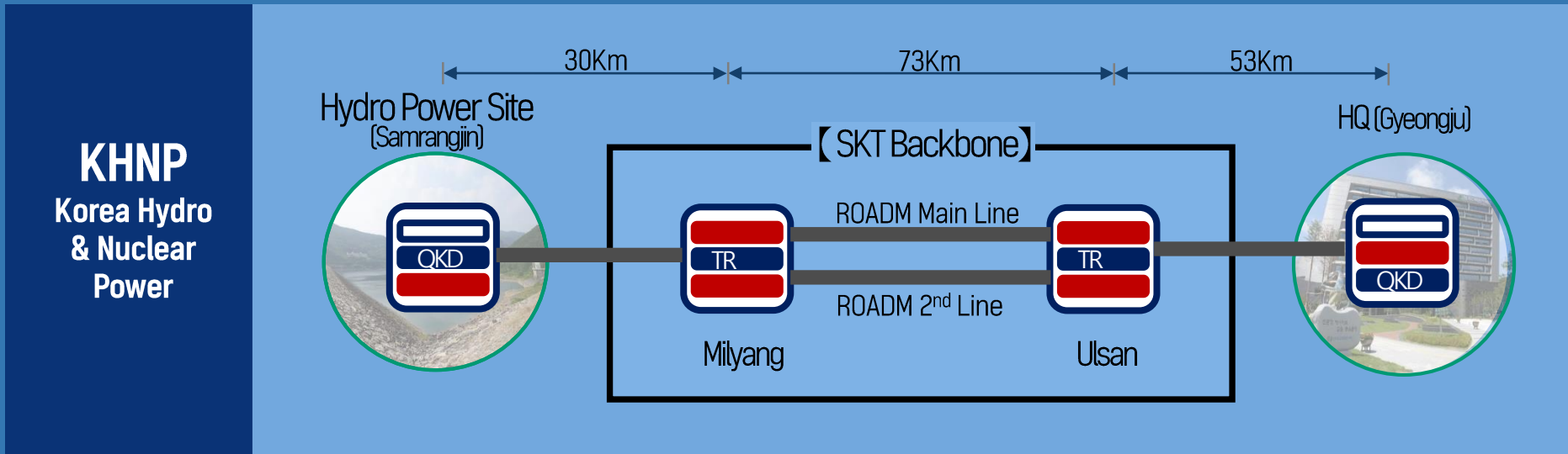
QKD Deployment for 5G

High-level 5G Network Configuration with QKD/QRNG



QKD Commercial Case: Various Vertical Sectors

Power & Financial Sector



Government-funded Projects to develop QKD Use Cases Public Sector [New-Deal]



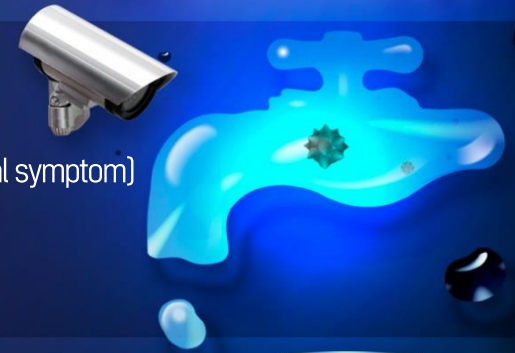
Disease Data Platform

Disease-related (COVID, Influenza, etc.) Private Data Protection



Water Business

CCTV Data Protection
(Water purification plant abnormal symptom)



Daejeon

Administrative Network Data Protection
(Customer Information)



Government-funded Projects to develop QKD Use Cases

Integrated Operation of e-Gov System Secured by QKD

The National Convergence Network Project

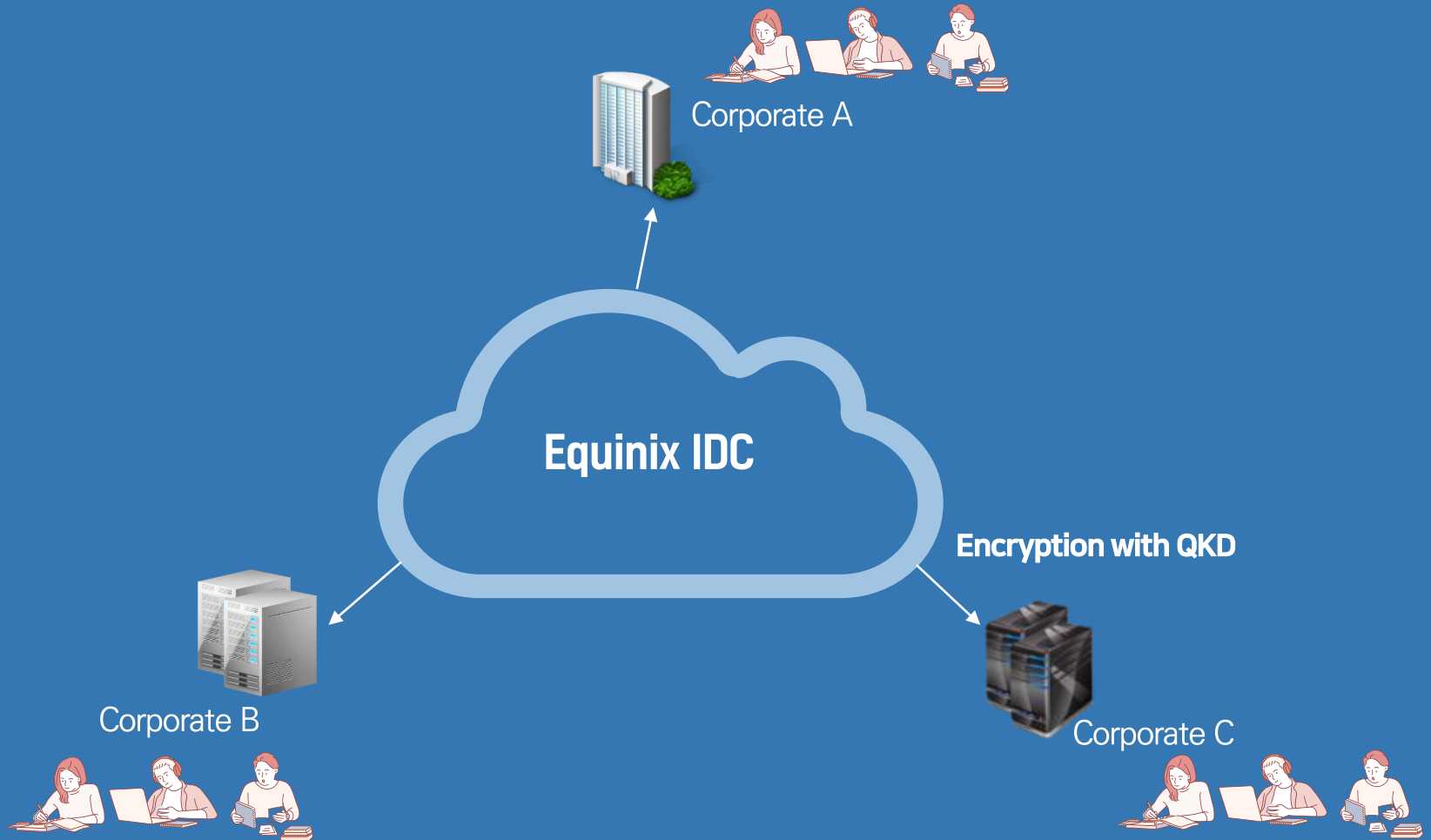
SK Broadband and IDQ selected for the construction of the first nation-wide QKD network in Korea

-  2000 kilometers
-  48 government organizations
-  Security, stability & efficiency

[QKD & KMS Network]



QKD Use Case: IDC with QKD MoU with Equinix



Abstraction for Interoperability

Centralized Control for QKD

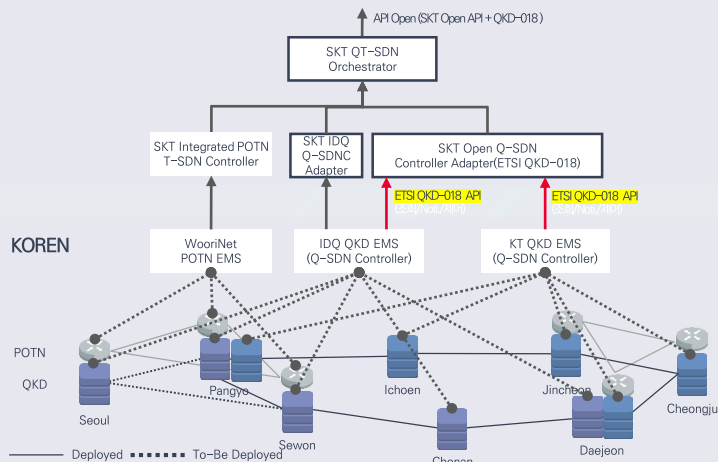
SDN paradigm adopted based on ETSI QKD-018



Achievement

- Interoperability between different QKD Systems
- Q-SDN Controller based on ETSI QKD-018 standards

Centralized Control for different vendors of QKD



Plan

- Interoperability for different KMS vendors with Q-SDN
- SDN Orchestration Upgrade to control/manage different KMS vendors and different QKD vendors

SKT SDN Orchestration for QKD and OTN ETSI Standards Approved

Proposed and Contributed by SKT

2021. 1215

Separate QKD Network with OTN

SDN is already adopted for the existing OTN & QKD is overlaid

Adopt design principle of Software-Defined Network Architecture to control both networks

Each network has each SDN-Controller

SDN Orchestrator is adopted to control both QKD and OTN networks through SDN-Controller & to orchestrate the operations between them

QKD Commercial Case: Integration with Encryption

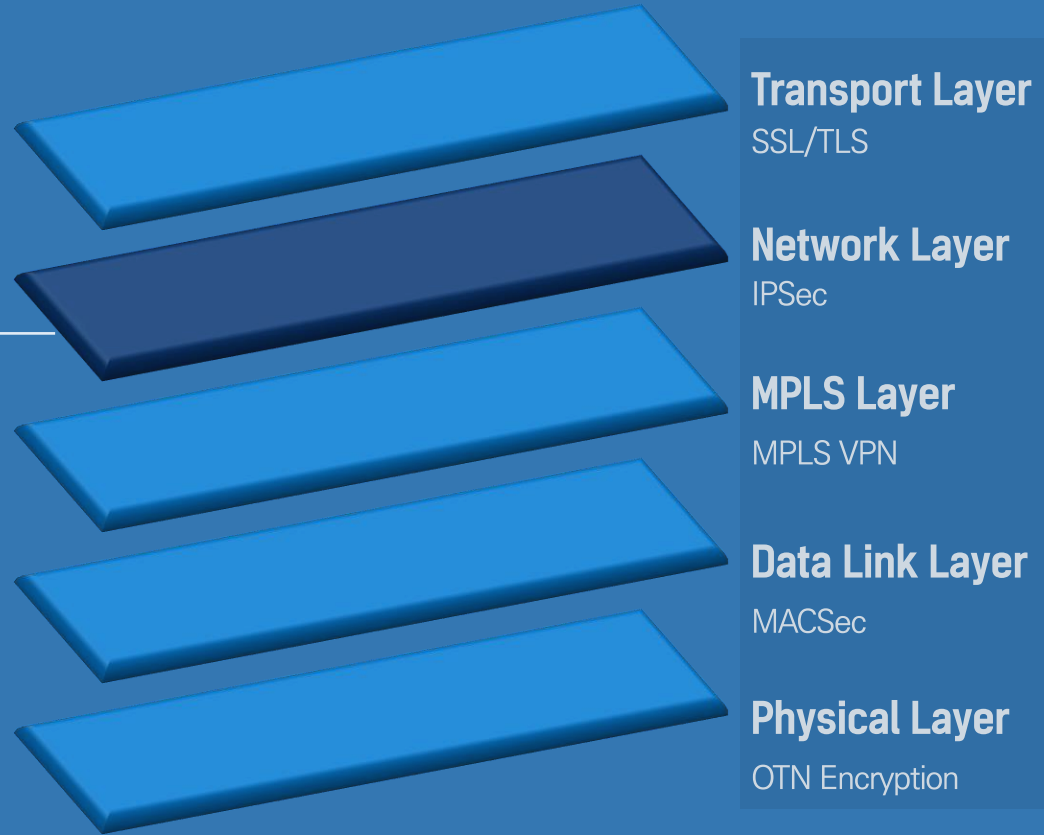
Integrating QKD with existing Encryption Solutions

Network Encryption Upgrade with QKD

- QKD key can be supplied to different layers for long-term confidentiality

Fortinet-IDQ-SKT Integration

IPSec with QKD keys
REST-based API



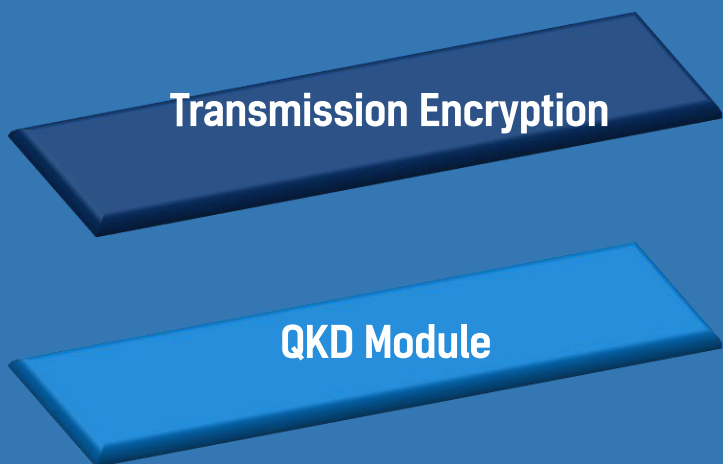
Integrating QKD with existing Encryption Solutions



Korea 1st QKD-based Transmission Encryption equipment certified



KCMVP certified QKD-based Transmission Encryption Equipment

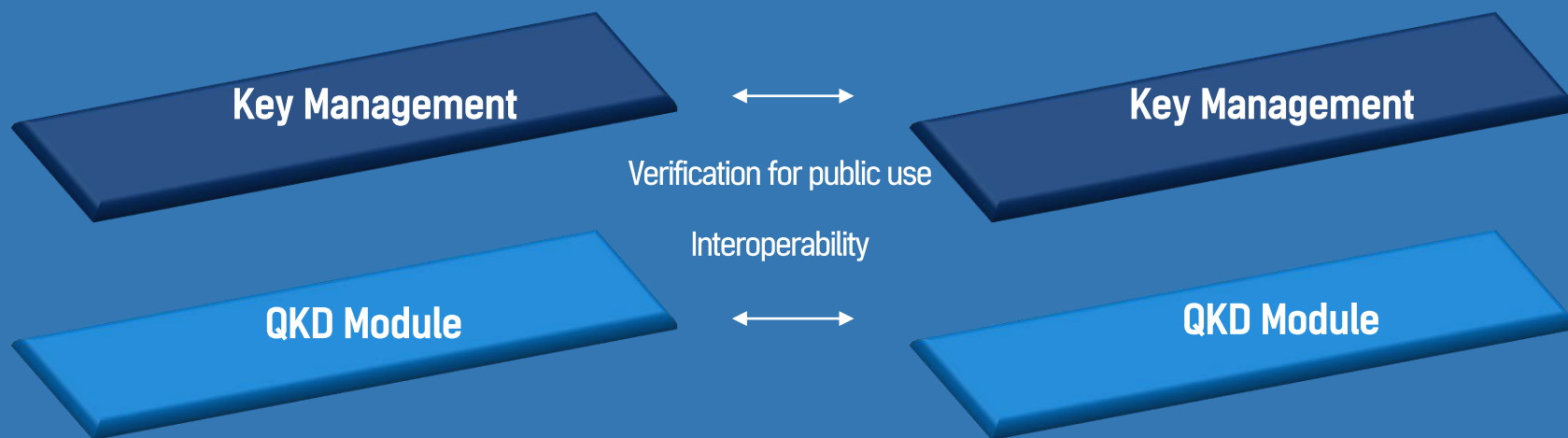


T-Crypto Module (100G/10G)

When this module mounted on a next-generation optical communication equipment (POTN), the module generates an encryption key can only be decrypted by the transmitter and receiver to protect the data

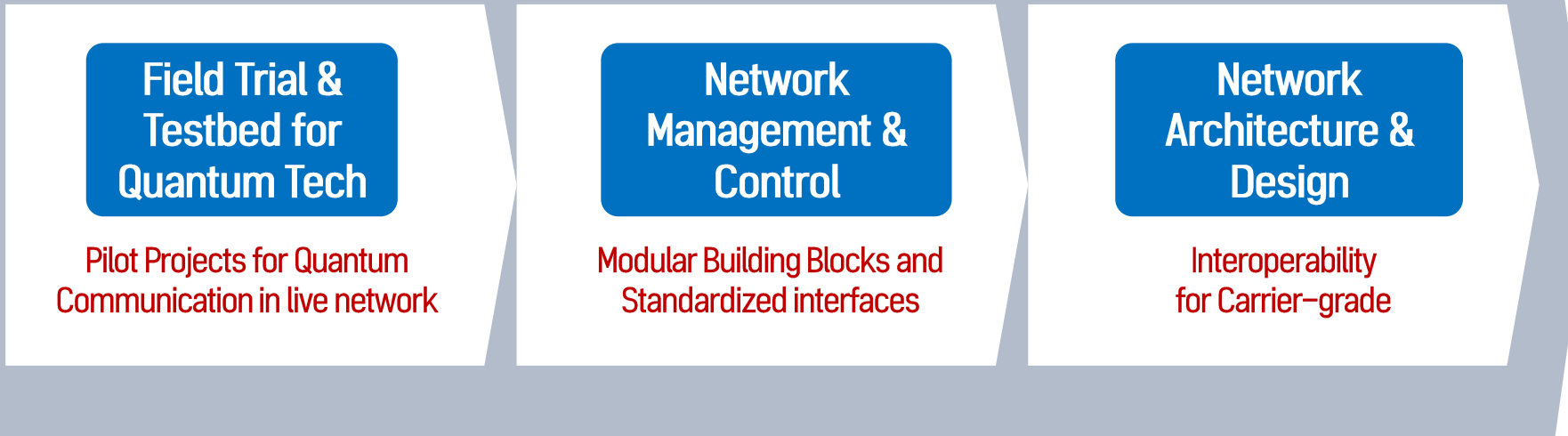
QKD & Quantum Key Management Security Requirements

Currently discussing QKD and Quantum Key Management Security Requirements with interested parties for QKD certification



Build Quantum Network with Communication Infra Expertise

Evolution



[Develop new Network Design Principles to accommodate Quantum Technologies]