

NEWS RELEASE

TOSHIBA EUROPE AND SINGLE QUANTUM PARTNER TO PROVIDE EXTENDED LONG-DISTANCE QKD DEPLOYMENT CAPABILITY

QKD READY FOR PRACTICAL DEPLOYMENT OVER 300KM FIBRE LINKS



Cambridge, United Kingdom / Delft, Netherlands, 22nd April 2024: Toshiba Europe Ltd. and Single Quantum B.V. have collaborated to test and validate long-distance deployments of Quantum Key Distribution (QKD) technology. Following extended validation testing of Toshiba's QKD technology and Single Quantum's superconducting nanowire single photon detectors (SNSPDs), both companies are pleased to announce a solution that substantially extends the transmission range for QKD deployment over fibre connections, up to and beyond 300km.

QKD uses the quantum properties of light to generate quantum secure keys that are immune to decryption by both high performance conventional and quantum computers. Toshiba's QKD is deployed over fibre networks, either coexisting with conventional data transmissions on deployed 'lit' fibres, or on dedicated quantum fibres.

Toshiba's unique QKD technology can deliver quantum secure keys in a single fibre optic link at distances of up to 150km using standard integrated semiconductor devices. Achieving longer distance QKD fibre transmission is challenging due to the attenuation of the quantum signals along the fibre length, (the optical loss of the fibre link). To provide extended QKD transmission, operators typically concatenate fibre links together with trusted nodes along the fibre route which house QKD systems that relay the secret keys.

The use of multiple trusted nodes may not be practical or desirable along certain networks, such as marine fibre links, cross-border fibre optic links and terrestrial links in locations where suitable buildings cannot be found, such as in remote areas.

To address this challenge, Toshiba and Single Quantum have worked together to validate the performance of Single Quantum's revolutionary SNSPDs working with the Toshiba QKD systems. Single Quantum's SNSPDs can detect single photons very accurately and efficiently over higher optical loss fibre links, significantly extending the QKD transmission distance over a single fibre optic link.

Toshiba and Single Quantum are able to extend the range QKD transmission from 150km to distances of 300km+, with the low noise and high detection efficiency of Single Quantum's SNSPDs mitigating the challenges that come with detecting QKD signals over higher loss fibre links.

Further to extending the range of a single QKD link, the superior performance of the Toshiba QKD equipment combined with the unparalleled photon detection rate of the Single Quantum SNSPD's helps enable market leading secret key rate performance – Figure 1 shows the system performance over a wide range of optical losses along with the performance across a 300km fibre link.

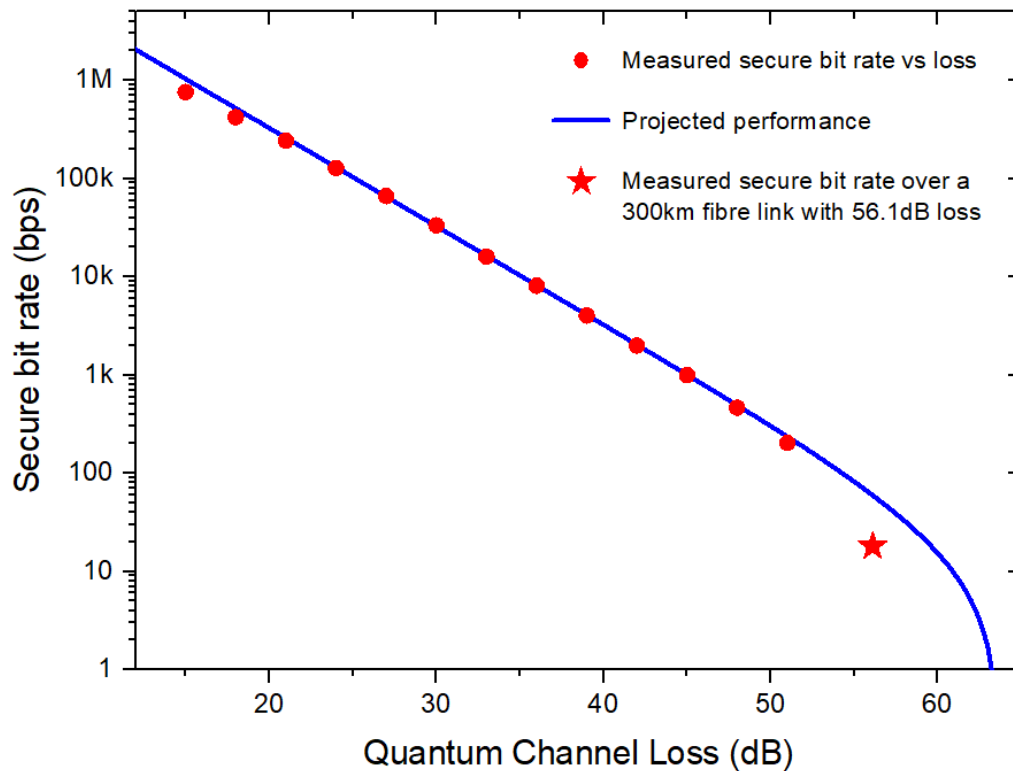


Figure 1: Toshiba and Single Quantum QKD transmission performance

In addition to validating the capability of extended range fibre QKD deployment, Toshiba and Single Quantum are providing a solution for extended long distance QKD transmission over a single fibre link by integrating Single Quantum’s SNSPDs with Toshiba’s QKD technology in a compact, stackable and rack mountable solution.

“Forward-thinking organisations are already deploying QKD on networks to protect their data from the risk posed by quantum computers,” said **Dr Andrew Shields, Head of the Toshiba Quantum Technology Division**. “As more and more people use QKD, it’s important that we’re able to implement it efficiently at scale. The ability to provide users with long-distance networks, without the need for additional infrastructure to link together different nodes, is vital for ensuring that quantum-secure communications are accessible and effective. Collaborating with Single Quantum has shown this is possible, and we look forward to continuing our work in future.”

Jessie Qin-Dregely, COO of Single Quantum, commented on the exciting results of this partnership with Toshiba, “Quantum technology has huge potential to revolutionise a wide range of sectors from security to telecommunications, through technologies such as QKD, quantum computing, and quantum networking. Yet, for each application, there are still challenges to overcome before we can fully harness the power that quantum technology has to offer. The collaboration between Toshiba and Single Quantum shows how quantum companies can work together to achieve the goal of overcoming a crucial challenge.”

For more information on Toshiba’s QKD services and quantum technology offerings, please visit: <https://www.toshiba.eu/quantum/>

To learn more about Single Quantum and superconducting nanowire single photon detectors, please visit: <https://www.singlequantum.com/>

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About Toshiba

Toshiba Corporation leads a global group of companies that combines knowledge and capabilities from almost 150 years of experience in a wide range of businesses—from energy and social infrastructure to electronic devices—with world-class capabilities in information processing, digital and AI technologies. These distinctive strengths support Toshiba in building infrastructure that everyone can enjoy, and a connected data society, and in achieving the Company’s ultimate goal, a future that realizes carbon neutrality and a circular economy. Guided by the Basic Commitment of the Toshiba Group, “Committed to People, Committed to the Future,” Toshiba contributes to society’s positive development with services and solutions that lead to a better world. The Group and its 110,000 employees worldwide secured annual sales of 3.4 trillion yen (US\$25.1 billion) in fiscal year 2022.

Find out more about Toshiba at www.global.toshiba/ww/outline/corporate.html

About Single Quantum

Founded in 2012 in Delft, the Netherlands, Single Quantum was the first European company to develop and commercialize superconducting nanowire single photon detectors. Since then, the Single Quantum Eos superconducting nanowire photon

detection system has been chosen by more than 250 academic and industrial labs all over the world. Single Quantum's mission is to make the world's fastest and most sensitive light sensors limited only by the laws of physics. Find out more about Single Quantum at <https://www.singlequantum.com/about-us/>

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