



Quantum networking, the “spooky” connectivity of the future.

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What does quantum’s “unhackable” power mean for connectivity and security?

Much of what was the stuff of science fiction in the past is becoming reality. Ubiquitous mobility with networked devices, artificial intelligence -- and the intriguing but difficult to understand quantum network technology that NEC is tracking for its customers.

National Portfolio Manager at NEC Australia Pankit Mehta explained that quantum networking is an emerging technology.

It’s associated with quantum computing, cryptography and sensor technologies, he said.

Quantum networking as of today is in its early stages of development. It is based on quantum physics, which is the science of the subatomic world, one that can be difficult to understand. “Spooky” in fact, as certain phenomena appear to be at odds with classical physics.

To be clear, quantum networking is not yet established commercially, unlike other connectivity technologies commonly used in government and by enterprises.

However, quantum networking does hold out the intriguing promise of very secure, tamper-proof connectivity, which is becoming increasingly important to certain sectors.

“Quantum networks basically entails exchanging of information; but, it’s an exchange of quantum information, with a far higher level of security through unbreakable encryption,” Mehta said.

Put simply, there’s currently no known way for threat actors to copy quantum data perfectly, making the technology unhackable in theory. This enhanced security could make quantum networks an effective answer to the never-ending scourge of ransomware.

Any attempt to intercept or eavesdrop on a quantum network disrupts the entanglement, which instantly alerts senders and receivers. This by itself makes it impossible to steal information, and holds the promise for creating ultra secure networks.



Quantum networking early adopters

This is very new tech indeed, but there are many target verticals interested in quantum networking.

These include government and defence agencies, utilities, telcos, financial institutions and other enterprises that are looking at essentially unhackable networks that use entanglement of photons.

Cisco has invested in early pure-play quantum networking company Aliro, which aims to provide solutions for quantum sensing, quantum internet, computing and communication.

Financial institutions like banks that do billions of transactions a day are also early keeping their eyes on quantum networks.

"I think for them it's mainly about security, transferring the information from one place to another. Imagine when it comes to national security, quantum networking could play a big role here," he said.

Mehta explained that for the Australian market, the healthcare sector and pharmaceuticals which transfer sensitive patient information, medical imaging and research material are looking at secure quantum networks.

Energy generators that need enhanced precision and security for monitoring and resource management is another sector, Mehta said.

Current state of play with quantum networks

Quantum networks can use existing optical fibre links. Cisco has already developed a framework that can be used to guide the first steps of planning a quantum network over existing optical infrastructure.

Currently, the first generation of quantum networks look set to be hybrid communications infrastructure. These use existing internetworking data transfer protocols such as TCP/IP for data transfer, but use entangled photons to securely distribute cryptographic keys.

Such quantum networks where digital keys cannot be intercepted or copied without disrupting the entanglement is known as Quantum Key Distribution (QKD).

In terms of physical infrastructure, quantum communication has been demonstrated over optical networks that are hundreds of kilometres long.

However, Low Earth orbit (LEO) satellite services meanwhile can extend the reach of quantum networks vastly, without the need to build large amounts of supporting terrestrial infrastructure.

While the pieces in the quantum technology puzzle are falling into place, cost will be an issue for deploying the next generation networks. In fact, existing technologies should serve customers well enough for the time being, until the cost of quantum networking comes down.

