

Singapore charts new growth path, seizes opportunities in deep tech

Quantum technologies have the ability to create unbreakable codes. Blockchain technologies ensure authenticity and transparency in record keeping. They are critical to Singapore's \$25 billion research plans for the next five years to create new economic opportunities for the nation in a post-Covid-19 world. The Straits Times looks into the potential uses of quantum technology and blockchain.



Quantum computing

The quest to build an unhackable quantum Internet

Irene Tham
Tech Editor

Quantum computers have the ability to break encryption codes in seconds, putting the Internet at risk of being hacked. Enter quantum cryptography, which uses the quantum properties

of light particles to create an unbreakable cryptographic algorithm to secure satellite or fibre broadband communications.

There are plans to blanket the whole of Singapore with such secure links, either over the existing fibre broadband network or by using satellites.

Associate Professor Alexander Ling, principal investigator at the

Centre for Quantum Technologies (CQT) at the National University of Singapore, told *The Straits Times*: "In the next year or so, we're about to kick off a program...

...to build a national quantum network."

The most immediate application is securing data centre traffic, he said.

As a global data hub, Singapore

is home to the data centres of many tech giants, including Google, Facebook, Amazon Web Service, Microsoft and IBM, as well as data centre specialists like Equinix and Digital Realty.

The Republic also accounts for the largest supply of data centres in the Asia-Pacific region, followed by Hong Kong, Australia (Sydney) and Japan (Tokyo).

Separately, CQT is working with Singapore-based ST Engineering to develop unbreakable encryption codes.

"We hope to build up our fibre-based quantum cryptography system in the next five years," said Prof Ling.

"We may be able to have the world's first national network which is secure from point to point," he added, noting that Sin-

gapore's smallness is an advantage in this case.

Fibre broadband has reached all corners of the island, with 98 per cent of the 1.37 million households here already connected.

Securing it requires just hardware installation along the entire network.

This approach, however, secures only domestic Internet traffic.

Satellites are needed to apply quantum cryptography to secure global Internet data exchanges, as satellite signals can travel greater distances.

An international team led by CQT has started work on this front.

The centre is behind the world's first nanosatellite, dubbed SpooQy-1, which aims to prove that quantum signals can be cre-



HOPES FOR SECURE NATIONAL NETWORK

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ASSOCIATE PROFESSOR ALEXANDER LING, principal investigator at the Centre for Quantum Technologies, which is working with ST Engineering to develop encryption codes that are unbreakable.



Above: SpooQy-1 co-founder Robert Bedington holding a partially assembled SpooQy-1 satellite. The world's first nanosatellite, it aims to prove that quantum signals can be created in tiny spaces.

Left: A technician at work in one of Google's data centres here. Singapore accounts for the largest supply of data centres in the Asia-Pacific region. PHOTOS: CENTRE FOR QUANTUM TECHNOLOGIES AT NUS, GOOGLE

ated in tiny spaces.

SpooQy-1 is the size of a shoebox and weighs just 2.6 kg.

It was launched in April last year and remains in orbit 400km above the earth, controlled from ground stations in Singapore and Switzerland.

It has not, however, sent its quantum signals to earth.

Researchers at CQT are working with researchers in Britain on the next version of SpooQy that will allow it to send signals from space to earth.

Some of the work is done at SpooQy, a venture-funded start-up spun off from CQT to commercialise space-based quantum communication systems.

Slated for launch in 2022, the new nanosatellite could weigh about 25kg to 30kg, said Prof

Ling.

It will still be lighter than China's Micius, a satellite weighing 600kg.

Micius is the world's first satellite to beam secure quantum signals to ground receivers.

But large satellites are expensive to launch and may add to space trash.

Quantum communications are one of the key focus areas of the National Research Foundation under its \$25 billion research plans from next year to 2025.

Last week, Deputy Prime Minister Heng Swee Keat said that one-third of the \$25 billion in funding will go towards basic research, including quantum communication systems.

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