Scientists to cut the 'key' to an unhackable 5G network

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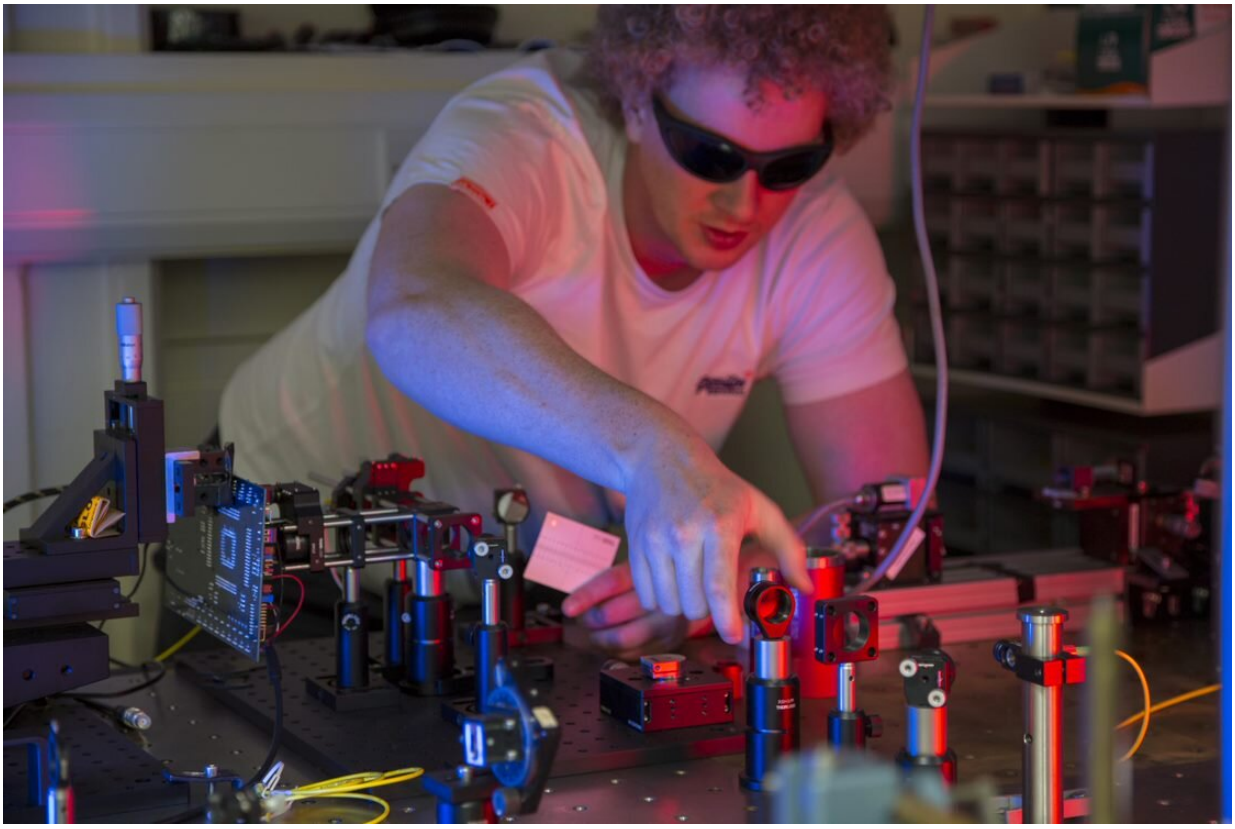

Credit: Heriot-Watt University

Scientists from Heriot-Watt University have secured six-figure funding from Innovate-UK on a project led by BT to develop practical quantum key distribution (QKD) transmitter and receiver modules for short range

terrestrial applications.

The technology will form a central component in a world-first trial of end-to-end quantum-secured communications for 5G and connected cars.

Heriot-Watt's work will support BT and its other project partners to harness fixed fibre and free-space networks, and quantum-enhanced security chips in mobile devices for the first time, providing an ultra-secure link between connected 5G towers and mobile devices. The ambition is to create the world's most secure fixed-mobile communications link.

QKD is an un-hackable, cutting edge technique for sharing encryption 'keys' between locations using a stream of encoded single photons (quantum bits). The project, called AIRQKD, combines BT's globally leading expertise in building quantum-secure networks using QKD with new techniques for applying quantum security to mobile devices.

The Heriot-Watt team brings essential expertise of practical QKD by leading the design, testing, and construction of the QKD transmitter and receiver prototypes. The team will also support other project partners developing novel single-photon source and detector technologies for the commercial products.

The trial, which will run for 36 months, will see the development of a wide range of quantum-secured scenarios in which the security of data transfer is especially important.

Dr. Ross Donaldson from Heriot-Watt University explains: "Our focus is on how to create a core to this system that will still operate in very tough conditions. Up to now, most quantum communication research has concentrated on the integrity of long-range signals, but this is about

delivering a constant service at short distances through the broad range of weather conditions which can cause connection issues.

"As our connected world becomes increasingly complex, the security of systems must keep pace with technological developments. Automated vehicles in the future will have their own connected systems with software updates being supplied from a central source. It is essential that these updates are sent securely without the risk of hacking or malicious tampering. Quantum-enabled technology provides a greater level of reassurance to manufacturers.

"Industry collaborations of this type are a demonstration of the value of university research when addressing challenges in a real-world context. This is an example of an academic paper being translated into direct benefit to industry as well as increasing security for the wider public."

Prof. Andrew Lord, BT's head of optical network research, said: "We are thrilled to have brought together leading UK partners from industry and academia in the AIRQKD project. Heriot-Watt University bring unique skills and with their expertise we will demonstrate a fully integrated Free Space Optics plus Quantum Key Distribution field trial. This will provide the essential security needed for future 5G applications such as autonomous vehicles."

Other applications for the research will include connected cars, mass manufacturing and Internet of Things devices.

The full trial is funded with £7.7M by the Quantum Technologies Challenge, led by UK Research and Innovation. AIRQKD is an Innovate UK funded project involving the following partners: BT, Lexden Technologies, OLC, Duality, Bristol University, Fraunhofer Centre for Applied Photonics, Strathclyde University, Warwick University Manufacturing Group, Bay Photonics, Heriot-Watt University, Angoka,

ArQit, Nu Quantum, National Physical Laboratory, CSA Catapult, Edinburgh University.

Provided by Heriot-Watt University