


Trustworthy Node Relay



*Extending
interoperable
quantum
communications
over long
distances*

Existing quantum links are theoretically limited in range to about 100 miles, but in practice this distance is much less. This project addresses two impediments to the widespread implementation of quantum communications technology: limitations on the maximum link range and non-interoperable implementations. The team is developing and demonstrating a three-node network, extending quantum communications by building and deploying trusted relay nodes located in physically secured locations. This project applies the latest research in post-quantum cryptography to develop novel key-switching methods in order to securely join many quantum links into a far-reaching network. These methods will then be demonstrated on quantum hardware security modules to refine and assess their performance on real-world hardware. This work enables vendor-agnostic, widespread, and interoperable quantum communication systems. Following successful testing, the systems will be integrated in a final field demonstration.

KEY TAKEAWAYS

- Demonstrates interoperability of different quantum communication systems for plug-and-play installations
 - Brings security benefits of quantum communications to long-range network links
 - Creates a dedicated software translation layer to generate master quantum keys shared between multiple trusted node links
- 

OUTCOME

By developing and implementing a systems-level approach to interoperable trusted relay nodes, this project brings the security assurances of quantum communication systems to long distances. Nationwide deployment of quantum technologies will require interoperable systems from multiple vendors. This project allows system operators to plug-and-play a quantum device without regard for the underlying physics of the deployed quantum technologies.

PARTICIPANTS

ROLE



Design, develop, and deploy interoperable quantum communication systems with low facility support requirements, suitable for use in electric power substations.



Field demonstration partner; participates in joint demonstrations of quantum communication systems to show seamless interoperability of heterogeneous systems.

CONTACT INFORMATION

Initial Leads:

Carol Hawk
Program Manager

Raymond Newell
Principal Investigator
Los Alamos National Laboratory
505-695-4370
raymond@lanl.gov

Current Contact as of February 2020:

Akhlesh Kaushiva
Senior Technical Systems and Cybersecurity Advisor
Department of Energy (DOE)
Office of Cybersecurity, Energy Security, and Emergency Response (CESER)
202-287-6062
Akhlesh.Kaushiva@hq.doe.gov

Period of Performance: October 2017 – March 2021

Total Award Value: \$1,500,000
DOE Share: \$1,500,000
Cost Share: \$0

CYBERSECURITY FOR ENERGY DELIVERY SYSTEMS (CEDS)

CEDS projects are funded through DOE CESER, which aims to enhance the reliability and resilience of the nation's energy infrastructure by reducing the risk of energy disruptions due to cyberattacks.

Website: <https://www.energy.gov/ceser>

Date Written: June 2021