# Adapting Existing Computer Networks to a Quantum-Based Internet Future

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## ABSTRACT

Researchers at the University of California, Davis have developed an approach for integrating quantum computers into the existing internet backbone.

## FULL DESCRIPTION

Quantum computing offers the potential for faster and more secure communications, as well as applications ranging from personalized health to lower-cost financial transactions. Realizing its full potential, however, requires overcoming multiple challenges. Even more complex is the prospect of a quantum computing-based internet backbone. Some recent progress implies small-scale implementations of quantum networks can be achieved within the medium term. On a larger scale, viable network controls, management, and operation protocols for quantum networks are still in development. Furthermore, historical trends suggest that successful transitions in networking technologies will occur more seamlessly when upgrades to new technologies focus on transitional interoperability.

Researchers at the University of California Davis have developed a networking procedure to enable the transfer of quantum data, alongside "classical" data, on existing infrastructure. This method involves "wrapping" classical data around a payload of quantum data – an approach known as Quantum Wrapper Networking (QWN). The technology enables current data receiving systems to process quantum data using today's networking platforms. QWN technology offers the architecture, protocols, algorithms, and methods that can control and manage quantum networks with full interoperability and backward compatibility with existing classical computing networks.

## APPLICATIONS

- Secure and higher-speed transfers of quantum data using current computer networks

## FEATURES/BENEFITS

- Establishes the architecture, algorithms, and protocols needed for quantum internet service
- Full backwards compatibility with existing "classical" networking infrastructure
- Provides for error detection and performance monitoring of quantum computers and networks

## PATENT STATUS

| Country | Type | Number | Dated | Case |
|---|---|---|---|---|
| United States Of America | Published Application | 20230385683 | 11/30/2023 | 2021-607 |
| Patent Cooperation Treaty | Published Application | WO 2022/094268 | 05/05/2022 | 2021-607 |

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## INVENTORS

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## OTHER INFORMATION

### KEYWORDS

Internet networking, quantum computing, network architecture, data protocols

### CATEGORIZED AS

- **Optics and Photonics**
  - All Optics and Photonics
- **Communications**
  - Internet
  - Networking
  - Optical
  - Wireless
- **Computer**
  - Other
  - Software
- **Security and Defense**
  - Cyber security

- **Engineering**
  - Other

**RELATED CASES**

2021-607-0

## ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Higher-Speed and More Energy-Efficient Signal Processing Platform for Neural Networks
- Crystal Orientation Optimized Optical Frequency Shifter
- Hyperspectral Compressive Imaging
- Multi-Wavelength, Nanophotonic, Neural Computing System
- Athermal Nanophotonic Lasers
- Ultra-High Resolution Multi-Platform Heterodyne Optical Imaging
- Multi-Wavelength, Laser Array
- Optical Interposers for Embedded Photonics Integration
- Ultrahigh-Bandwidth Low-Latency Reconfigurable Memory Interconnects by Wavelength Routing
- Development of a CMOS-Compatible, Nano-photonic, Laser
- Energy Efficient and Scalable Reconfigurable All-to-All Switching Architecture
- Compressive High-Speed Optical Transceiver
- All-Optical Regenerators
- Tensorized Optical Neural Network Architecture
- Silicon Based Chirped Grating Emitter for Uniform Power Emission
- Energy-Efficient All-Optical Nanophotonic Computing
- 3D Photonic and Electronic Neuromorphic Artificial Intelligence

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