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(54) Title: SYSTEM AND METHOD FOR LONG-DISTANCE QUANTUM-CAPABLE INTERNET

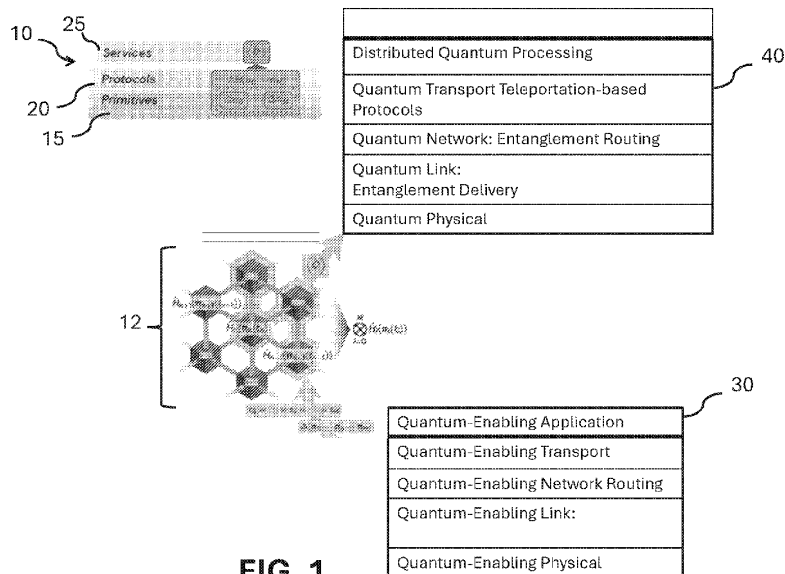


FIG. 1

(57) Abstract: A Quantum-enabled Internet (QEI) including quantum-enabling networking architectures integrating advanced communication systems with long-distance quantum communication hardware and methods of operating the same. Using a quantum-network (QN) design paradigm, there is provided a physics-centric stack-based quantum network paradigm to govern the dynamics of multiple light-matter Hamiltonians across distant nodes. This QN network facilitates a fundamental long-distance quantum network service - that of high-visibility Hong-Ou-Mandel interference of telecom quantum states generated in two independent, telecom-compatible quantum light-matter interfaces separated by a distance. The QN paradigm design can be applied to demonstrate scalable long-distance QN services in an QN infrastructure, including the transmission of polarization entanglement created by high repetition sources of entangled photons and the storage of telecom polarization entanglement using remotely located quantum memories capable of heralding

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the storage of entanglement using non-demolition measurements and quantum state tomography.