Multi-Client Quantum Key Distribution using Wavelength Division Multiplexing[1] B. WILLIAMS, University of Tennessee, R. BENNINK, D. EARL, P. EVANS, W. GRICE, T. HUMBLE, R. POOSER, Oak Ridge National Laboratory, J. SCHAAKE, University of Tennessee — Quantum Key Distribution (QKD) exploits the rules of quantum mechanics to generate and securely distribute a random sequence of bits to two spatially separated clients. Typically a QKD system can support only a single pair of clients at a time. We overcome this limitation with the design and characterization of a multi-client entangled-photon QKD system with the capacity for up to 100 clients simultaneously. The telecom-wavelength entangled photon pairs are generated in a broadband down-conversion source configured for time-bin entangled QKD. The photons are strongly correlated in energy and are emitted across a large spectrum. Using standard wavelength division multiplexing hardware, the photons can be routed to different parties on a quantum communication network, while the strong spectral correlations ensure that each client is "linked" only to the client receiving the conjugate wavelength. In this way, a single down-conversion source can support dozens of channels simultaneously.

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