PhD Dissertation Announcement

RECONFIGURABLE OPTICAL NETWORKS AND MULTI-PHOTON QUANTUM CRYPTOGRAPHY

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Abstract:

Internet traffic keeps increasing in the past years and it is dominated by various multimedia applications with different requirements. Due to the explosion of information, traditional network architecture cannot meet the requirement of the traffic trends. Dense Wavelength Division Multiplexing (DWDM) technology has greatly increased the bandwidth of the optical network by merging hundreds of wavelengths into a single fiber. However, the traditional topology of the network restricts the development of advanced network technologies. Software-Defined Optical Networking (SDON), inspired by Software-Defined Networking (SDN), is a promising solution for the problem. In this dissertation, self-resilient reconfigurable optical network is proposed to support multiple switching modes in SDON. A reliable retransmission model is analyzed in the proposed network.

Besides, network security becomes more and more important in information transmission. Classical cryptography is based on the complexity of computation. With the increasing power of supercomputers and the development of quantum computers, classical cryptography is becoming more and more vulnerable. Compared to classical cryptography, quantum cryptography is based on the law of physics, and in the only means with provable security. This dissertation is the first to analyze the impact of noise as well as practical attenuated laser sources on multi-photon quantum cryptography protocols. The results provide insights in developing practical quantum cryptography hardware systems.