

Enhancing Performance of Cloud Computing Data Center Networks by Hybrid Switching Architecture

Abstract:

Cloud computing services have driven a new design of data center networks. Hybrid switching architecture is one of the promising solutions since it makes better tradeoff between the network performance and technical feasibility. However, as the existing hybrid networks only deploy one-hop optical circuit switching (OCS) in the top layer, the flexibility and scalability is limited. To address this problem, a distributed OCS model is proposed. To reduce the high blocking ratio, the WDM and SDM technologies are introduced to increase the connectivity of the optical network. Moreover a multi-wavelength optical switch based on microring resonators is designed to enable the fast switching. Based on this model, the multi-rooted tree based hybrid architecture with deep integration of optical connection is constructed. A new way to solve the mixed traffic scheduling problem is also provided by delivering the small flows and large flows through the different networks. The simulation results indicate that the multi-rooted tree based hybrid architecture achieves better performance under various traffic patterns. It also introduces less control overhead compared with the existing traffic scheduling.