

Optical Interconnects for Cloud Computing Data Centers: Recent Advances and Future Challenges

Friday, 23 March 2018 11:20 (30 minutes)

Internet traffic has been increasing exponentially over the last few years due to the emergence of new end user applications which are based on cloud computing infrastructure. These applications run on the servers deployed in the data centers and require huge network bandwidths. The data centers are getting more and more importance in our lives because the cloud computing has shifted computation and storage away from desktops to large scale datacenters. Traditional cloud computing data centers architecture is based on a hierarchical design and comprises several layers of electrical switches at the edge and the core. There are significant challenges to meet the growing performance requirements with current data center architectures. For example, high power consumption, high traffic locality, support of higher data rates, scalability, latency and network oversubscription. Effective optical interconnect is a fundamental requisite to realize Internet-scale data centers due to the capabilities and benefits of optical devices. An optical interconnection system can meet the above mentioned challenges due to the properties of optical components. Basic fundamental elements in optical networks are optical switches, optical transceivers and optical fibers. Optical switches are power efficient and consume less power than electrical switches. Optical interconnects can provide high capacity links to meet requirements for traffic locality and higher bit rates by using optical fibers and optical transceivers. This paper presents a brief overview on optical interconnects for data centers. Furthermore, the paper provides a qualitative categorization and comparison of the proposed schemes based on their main features. Moreover, various types of optical switches and optical switching techniques that can be considered in designing an optical interconnection system for data center networks are presented. In the end, future research direction, challenges and opportunities of optical interconnect for data centers are discussed.

Primary author: Dr IMRAN, Muhammad (National Centre for Physics)

Co-author: Mr HALEEM, Saqib (National Centre for Physics, Islamabad, Pakistan)

Presenter: Dr IMRAN, Muhammad (National Centre for Physics)

Session Classification: Networking, Security, Infrastructure & Operation Session

Track Classification: Networking, Security, Infrastructure & Operations