

SS3: Optical Networking for Data Centers

■ Call for Papers

Data Centers today are hosting cloud computing, big-data processing, social networking, video streaming and other Internet applications, and are experiencing continuous and rapid growth in network traffic. With increasing number of applications that generate huge amounts of traffic, Data Center networks are looking towards growing in a massive scale. A modern Data Center consists of thousands of servers and large Data Centers with hundreds of thousands of servers are becoming common. According to a recent study, the annual global Data Center traffic is estimated to reach several zetta-bytes by the end of 2016. Further, the traffic generated within Data Centers and between Data Centers is expected to grow significantly. This drives the need for high performance network technologies and architectures for intra- and inter- Data Center networks. Another challenge in current electrical-packet-switching Data Center networks is that they consume 10-20 percent of the total power of Data Centers, and this is expected to increase in the near future. The current Data Center networks which are mainly built from commodity Ethernet switches can no longer remain attractive. Optical networking is a promising solution to address the above challenges due to their attractive features such as high bandwidth, low power consumption, high reliability, and low cabling complexity. While optical circuit-switching paths are good for routing large flows, due to slow optical switch reconfiguration, traditional electrical packet-switching is preferred for short and latency-sensitive flows. Hybrid optical-electrical Data Center networks wherein electrical and optical network elements co-exist, could be a cost-effective intermediate solution when compared to the all-optical Data Center networks.

Optical networks based on optical packet switching, wavelength division multiplexing (WDM) optical circuit switching, and optical orthogonal frequency division multiplexing (OFDM) technologies have become potential candidates for intra- and inter- Data Center networks. Unique features and capabilities of Data Centers such as virtualization & virtual machine (VM) migration and that of optical networks such as reconfiguration and optical bypass pose several new challenges in intra- and inter-Data Center optical networks. Such challenges require new solutions different from that for the current all-electrical packet switching Data Center networks. For example, traffic engineering problem requires intelligent ways of distributing traffic onto optical paths and electrical packet-switched paths. The problem of virtual Data Center (VDC) network embedding, wherein a tenant requests a certain number of VMs and bandwidth between VMs in addition to the computing and server resources, would need to consider placement of VMs and its impact on traffic load on optical and electrical networks. Similarly, energy efficiency problem requires intelligent policies to choose appropriate electrical and optical networking elements. Key challenges in inter-Data Center optical networking include traffic engineering, anycast/multicast routing, network virtualization, planning, configuration, monitoring, survivability, and software defined networking control.

The aim of this special session is to provide a comprehensive global forum for researchers to exchange ideas and present results of ongoing research in the state-of-the-art areas of intra- and inter- Data Center optical Networks. The scope of the special session includes the following and other related topics.

- Optical network architectures for Data Centers
- Traffic engineering in optical, hybrid optical-electrical Data Centers
- Traffic-aware VM placement in optical, hybrid optical-electrical Data Centers
- Energy efficiency in optical, hybrid optical-electrical Data Centers
- VDC embedding in optical, hybrid optical-electrical Data Centers
- Traffic engineering in inter-Data Center optical networks
- Anycast/Manycast routing in inter-Data Center optical networks
- Survivability in inter-Data Center optical networks
- Network virtualization and planning
- Service level agreements
- Software defined networking control
- Testbed and experimental study

■ Important dates

Paper Submission: July 3, 2014 (Extended)

Notification of Acceptance: August 1, 2014

Final Paper: August 15, 2014

Submit online at [EDAS website](#) »

■ Session organizer

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