

# **IEEE Communications Magazine**

## **Feature Topic**

# **Optical Control Plane for Grid Networks: Opportunities, Challenges and the Vision**

## **Scope**

Grid-based applications are the hallmark of 21st century E-science. Developed by collaborative, virtual communities, they form a new generation of applications that combine scientific instruments, distributed data archives, sensors, and computing resources to solve complex scientific problems. In the growing E-science community, there are on-going research efforts aimed at exploiting the vast bandwidth of fiber optic networks to interconnect such resources and enable a number of high-performance applications. Central to this development are the research activities carried out in the area of Optical Control Plane with results promising to extend the concept of application-driven networking into the optical arena.

Support of Grid computing and high-performance applications by the optical control plane emerged from a few converging trends. Just as the wide spread deployment of the advanced fiber network infrastructure has led to low cost high-capacity optical connections, the continued increase on demand of computational power by the emerging e-science applications is being enabled thru resource sharing over this very same infrastructure. The growing complexity of scientific problems is driving the need for increasing number of scientists from diverse disciplines and locations to (net)work together in order to achieve breakthrough results. As a consequence, active Grid research community has begun to consider the network to be as vital and critical as CPU and storage. Awareness of the network as a prime Grid resource has led to specific challenges involving interactions between the optical control plane, Grid middleware, and applications. In addition, Grid applications offer unique and challenging demands on the network infrastructure, e.g. determinism, shared data spaces, large transfer of data, latency requirements, and are easier or only achievable through dedicated optical paths (wavelengths). To meet these challenges, the optical networking community, in conjunction with the Grid community, has to rethink intelligent optical control planes for future Grid computing.

This special issue invites researchers in networking and E-science to present issues and opportunities for tomorrow's intelligent optical networks as driven by high-demand Grid applications. We invite the research community to present the most recent advances in intelligent optical control planes for future Grid computing, to discuss the most exciting research topics and development of testbeds and applications, and to share the most exciting experiences and their optical control plane strategies in the context of Grid Network and Applications. The authors are invited to pioneer the development of a common research and experimental framework for future optical control plane. Specific goals of this special issue will be to identify optical control plane requirements based on newly developed high-

demand E-science Grid applications. The idea is to raise the awareness of new developments in the area of optical control planes and Grid infrastructure, in addressing current research activities in this exciting area, and depicting visionary scenarios of the future Grid computing using optical network technologies.

Selected research topics for Optical Control Plane for Grid Networks in form of focused tutorial and survey contributions as well as research papers will include, but are not limited to, the following topics:

1. Architectural framework for optical control plane in Grid Networks; Current test-beds and visionary architectures;
2. Optical control plane as it relates to signaling, provisioning and recovery with special emphasis on interactions with applications;
3. Optical resource discovery, advanced resource reservation and interaction with other Grid resources (CPU, Storage)
4. Optical control plane for inter-domain Grid networking
5. OGSA integration and WEB services in the context of Optical Control Plane

## **Schedule**

Manuscripts due: June 20, 2005

Acceptance notification: Oct 20, 2005

Final revised manuscripts due: Nov 30, 2005

Manuscripts to publisher: Dec 30, 2005

Tentative Issue of the Feature Topic: March 2006

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