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DWDM-RAM: a data intensive Grid service architecture enabled by dynamic optical networks

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Abstract

Next generation applications and architectures (for example, Grids) are driving radical changes in the nature of traffic, service models, technology, and cost, creating opportunities for an advanced communications infrastructure to tackle next generation data services. To take advantage of these trends and opportunities, research communities are creating new architectures, such as the Open Grid Service Architecture (OGSA), which are being implemented in new prototype advanced infrastructures. The DWDM-RAM project, funded by DARPA, is actively addressing the challenges of next generation applications. DWDM-RAM is an architecture for data-intensive services enabled by next generation dynamic optical networks. It develops and demonstrates a novel architecture for new data communication services, within the OGSA context, that allows for managing extremely large sets of distributed data. Novel features move network services beyond notions of the network as a managed resource, for example, by including capabilities for dynamic on-demand provisioning and advance scheduling. DWDM-RAM encapsulates optical network resources (Lambdas, lightpaths) into a Grid service and integrates their management within the Open Grid Service Architecture. Migration to emerging standards such as WS-Resource Framework (WS-RF) should be straightforward. In initial applications, DWDM-RAM targets specific data-intensive services such as rapid, massive data transfers used by large scale eScience applications, including: high-energy physics, geophysics, life science, bioinformatics, genomics, medical morphometry, tomography, microscopy imaging, astronomical and astrophysical imaging, complex modeling, and visualization.

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