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DWDM-RAM: an architecture for data intensive services enabled by next generation dynamic optical networks

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Abstract
An architecture is proposed for data-intensive services enabled by next generation dynamic optical networks. The architecture supports new data communication services that allow for coordinating extremely large sets of distributed data. The architecture allows for novel features including algorithms for optimizing and scheduling data transfers, methods for allocating and scheduling network resources, and an intelligent middleware platform that is capable of interfacing application level services to the underlying optical technologies. The significance of the architecture is twofold: 1) it encapsulates "optical network resources" into a service framework to support dynamically provisioned and advance scheduled data-intensive transport services, and 2) it establishes a generalized enabling framework for intelligent services and applications over next generation networks, not necessarily optical end-to-end. DWDM-RAM is an implementation version of the architecture, which is conceptual as well as experimental. This architecture has been implemented in prototype on OMNInet, which is an advanced experimental metro area optical testbed that is based on novel architecture, protocols, control plane services (optical dynamic intelligent network-ODIN), and advanced photonic components. This paper presents the concepts behind the DWDM-RAM architecture and its design. The paper also describes an application scenario using the architecture's data transfer service and network resource services over the agile OMNInet testbed.

Index Terms
Inspec

Controlled Indexing
data communication   middleware   optical fibre networks   protocols   resource allocation   telecommunication services   wavelength division multiplexing

Non-controlled Indexing
DWDM-RAM   advanced photonic component   control plane service   data communication service   data intensive service   intelligent middleware platform   metro area optical testbed   next generation dynamic optical network   optical dynamic intelligent network

Author Keywords
Not Available

Medical Subject Heading (MeSH Terms)
Not Available

PACS Codes
Not Available

DOE Thesaurus Terms
Not Available

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