Providing QoS for Anycasting over Optical Burst Switched Grid Networks

Balagangadhar G. Bathula and Jaafar M.H. Elmirghani

School of Electronic and Electrical Engineering,
University of Leeds, Leeds LS2 9JT
{b.bathula,j.m.h.elmirghani}@leeds.ac.uk

Abstract. This paper presents a mathematical framework to provide Quality of Service (QoS) for Grid Applications over optical networks. These QoS parameters include, resource availability, reliability, propagation delay, and quality of transmission (QoT). These multiple services are needed to ensure the successful completion of a Grid job. With the help of link-state information available at each Network Element (NE), the bursts are scheduled to its next link. This de-centralized way of routing helps to provide optimal QoS and hence decreases the loss of Grid jobs due to multiple constraints.

Keywords: WDM, QoS, GoOBS, Anycasting.

1 Introduction

The enormous bandwidth capability of the optical networks, helps the network user community to realize many distributed applications like Grid. These emerging interactive applications require a user-controlled network infrastructure [1]. This leads many researchers to investigate control plane architectures for optical networks. A comprehensive review of the optical control plane for the Grid community can be found in [2]. QoS policies implemented in IP network do not work in the optical network, as the store-and-forward model does not exist [3]. We thus see the need for an intelligent control plane in the optical network, which can provide the required QoS for Grid applications.

With the advent of many new switching techniques, researchers were able to tap the huge bandwidth capacity of the fiber. Fast and dynamic connection establishments using Optical Burst Switched (OBS) networks have been achieved at much lower switching costs. The Open Grid Forum (OGF) is a community that aims to develop standards, protocols and solutions to support OBS-based Grid networks [1]. A general layered Grid architecture and the role of OBS network is discussed in [4]. Delivering a Grid application effectively involves many parameters such as, design of efficient control plane architectures, algorithms for routing, providing QoS and resilience guarantees.

Anycast can be defined as a variation on unicast, with the destination not known in a-priori [5,6]. Anycasting is similar to deflection routing, except for the

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