

APPLYING GENERALIZED AIMD TO OPTICAL BURST SWITCHED NETWORKS

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Abstract. Many new network applications require a stable, transparent, well-defined and understood communications network. In this paper, we first consider and analyze the simple arrangement of adding caching nodes at the edge of the an Optical Burst Switched (OBS). The caching scheme is then used to make the case for the addition of congestion control to OBS networks using General AIMD to manage the throughput at the network's core nodes. It was found that loss could be reduced in the core by almost 72% by applying General AIMD congestion control to the OBS network with a congestion threshold, while keeping end-to-end delay within 5% of traditional OBS implementations.

Keywords. Optical burst switching, OBS, GAIMD, flow control.

1 Introduction

Optical Burst Switching (OBS) has been proposed as a form of next generation All Optical Network (AON). OBS is a hybrid form of packet and circuit switching. From packet switching, OBS borrows the idea of packetized bundles of data transmitted over short-lived dynamic connections between nodes. From circuit switching, OBS borrows the concept of an out-of-band control packet that reserves various network switching resources ahead of time in order to prepare for the transmission of a data burst[20]. This hybridization attempts to solve two difficult problems. Optical Burst Switching improves the bandwidth utilization of optical circuit switched networks when transmitting bursty traffic through the burst aggregation process. Secondly, there is currently no way to easily buffer data in the core of an optical network except through the use of fibre delay lines (FDL). FDLs are simply long loops (hundreds or thousands of metres) of fibre optical cable that have a predetermined propagation delay. Since there is no easy way to buffer data, Optical Burst Switching is able to operate without the need for any buffering in the core of the network.

The two types of network nodes in OBS networks are *Edge Nodes* and *Core Nodes*. The *Edge Nodes*, as their name implies, sit at the boundary between the OBS network and any other "feeder" networks. The OBS *Edge Nodes* aggregate hundreds or thousands of incoming data packets into a bundle (or burst) of data. When the aggregated data is ready for transmission,