Abstract
To avoid the expensive and slow optical-electrical-optical (OEO) conversion, optical networks generally employ the all-optical buffer consisting of a number of Fiber Delay Lines (FDLs) to resolve the traffic contention within the optical domain. The optical FDL buffers differ significantly from conventional electronic RAM buffers that can provide any variable length of delay. In this paper we present how to optimally schedule traffic in a batch at the presence of FDL buffers. 

Need For Speed
Internet traffic doubles every 12 months. Prevaling deployment of optical fiber.

Wavelength Division Multiplexing (WDM)
Is a technology which multiplexes multiple optical carrier signals on a single optical fiber by using different wavelengths (colors) of laser light to carry different signals.

100 Gbps per wavelength. 1000 wavelengths per fiber.

Optical fiber as point to point link.

Electronic back bone.

Optical routers are based on the optical switching techniques and they provide services at the optical speed.

Optical Burst Switching (OBS) Concept
The control signals can be processed electronically, and allow the timely setup of an optical light path to switch the soon-to-arrive data, thereby eliminating the need for OEO conversion.

Optical Burst Switching (OBS) Bandwidth Reservation
A processing delay is needed to process Control Packet and reconfigure switch. A Control Packet is sent out, preceding the Data Burst for an offset-time to compensate the processing delay.

Our Study: A. Batch Scheduling
The number of incoming data wavelengths and the number of simultaneously arriving bursts (and OBS control packets) can be very large.

Thus, batch scheduling processes proposed to consider handling multiple OBS control packets simultaneously taking advantage of the strong correlations among the bursts requests to schedule them in a batch, instead of individually making the resources reservation for each burst.

Why Batch Scheduling is Important?
A) OBS Scheduling without Batch: first come, first scheduled
B) OBS with Batch Scheduling

Experiment Results
The performance gain in burst loss rate is at the expense of slightly increasing average end-to-end delay in the network.

There is a tradeoff between increasing δ and improving network loss performance.

With high traffic, which is the case in backbone, even a very small δ, batch scheduling can still achieve significant improvement.

Higher traffic enable Batch Scheduling to obtain knowledge of multiple burst reservation requests.

The performance of the proposed algorithms is evaluated and compared with OBS networks employing the well-known LAUC-VF algorithm without FDLs [2].

References

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