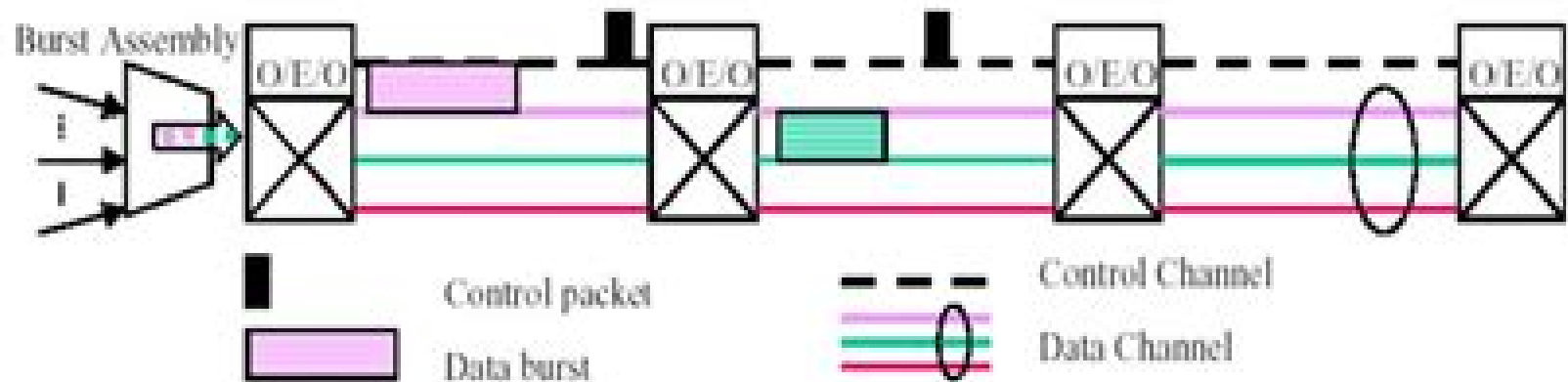# Optical Burst Switched Networks

Optical Burst Switched Networks Optical Networks

T. Venkatesh,C. Siva Ram Murthy

Optical Burst Switched Networks Optical Networks:

Optical Burst Switched Networks Jason P. Jue,Vinod M. Vokkarane,2006-06-07 Next generation high speed Internet backbone networks will be required to support a broad range of emerging applications which may not only require significant bandwidth but may also have strict quality of service QoS requirements Furthermore the traffic from such applications are expected to be highly bursty in nature For such traffic the allocation of static fixed bandwidth circuits may lead to the over provisioning of bandwidth resources in order to meet QoS requirements Optical burst switching OBS is a promising new technique which attempts to address the problem of efficiently allocating resources for bursty traffic In OBS incoming data is assembled into bursts at the edges of the network and when the burst is ready to be sent resources in the network are reserved only for the duration of the burst The reservation of resources is typically made by an out of band one way control message which precedes the burst by some offset time By reserving resources only for the duration of the burst a greater degree of utilization may be achieved in the network This book provides an overview of optical burst switching Design and research issues involved in the development of OBS networks are discussed and approaches to providing QoS in OBS networks are presented Topics include Optical burst switching node and network architectures Burst assembly Signaling protocols Contention resolution Burst scheduling Quality of service in OBS networks   Quality of Service in Optical Burst Switched Networks Kee Chaing Chua,2007 Quality of Service in Optical Burst Switched Networks is a broad review and reference for researchers and professionals of Quality of Service QoS support in Optical Burst Switching OBS networks The authors start with an overview of OBS architecture then categorize and discuss existing QoS support in OBS including relative and absolute models mechanisms for supporting multiple traffic classes edge to edge provisioning and other non mainstream mechanisms Optical networking professionals will find the literature review as an up to date coverage of topics which is both timely and helpful   *Optical Burst Switched Networks* Jason P. Jue,Vinod M. Vokkarane,2008-11-01 Next generation high speed Internet backbone networks will be required to support a broad range of emerging applications which may not only require significant bandwidth but may also have strict quality of service QoS requirements Furthermore the traffic from such applications are expected to be highly bursty in nature For such traffic the allocation of static fixed bandwidth circuits may lead to the over provisioning of bandwidth resources in order to meet QoS requirements Optical burst switching OBS is a promising new technique which attempts to address the problem of efficiently allocating resources for bursty traffic In OBS incoming data is assembled into bursts at the edges of the network and when the burst is ready to be sent resources in the network are reserved only for the duration of the burst The reservation of resources is typically made by an out of band one way control message which precedes the burst by some offset time By reserving resources only for the duration of the burst a greater degree of utilization may be achieved in the network This book provides an overview of optical burst switching Design and research issues involved in the development of OBS networks are discussed and

approaches to providing QoS in OBS networks are presented Topics include Optical burst switching node and network architectures Burst assembly Signaling protocols Contention resolution Burst scheduling Quality of service in OBS networks

An Analytical Approach to Optical Burst Switched Networks T. Venkatesh,C. Siva Ram Murthy,2010-03-16 This book presents the state of the art results on modeling and analysis of OBS networks It provides researchers with new directions for future research and helps them gain a better understanding of modeling OBS networks This book classifies all the literature on modeling and analysis of OBS networks and serves as a thought provoking material for the researchers working on the analysis of high speed networks The scope of this book however is not limited to OBS networks alone but extends to high speed communication networks with limited or no buffers *Performance Analysis of Optical Burst Switched Networks with Dynamic Simultaneous Link Possession* ,2004 Given the current state of the technology the Optical Burst Switched OBS architecture is a practical optical switching solution for the optical networks In OBS the user data is transmitted in variable size data units called bursts which travel as an optical signal along the entire route The control information for each burst is transmitted prior to its corresponding burst and it is electronically processed at each hop along the route The dynamic nature of OBS allows for network adaptability and scalability which makes it very suitable for the transmission of bursty traffic In this thesis we study and analyze the performance of OBS networks We consider the case when the bursts are large enough to simultaneously hold wavelengths on multiple links along the route Since the size of the bursts varies and the link distance between two adjacent network nodes also varies a burst may simultaneously occupy wavelengths on a variable number of links as it travels from its source to its destination As the burst propagates through the network it dynamically acquires and releases wavelengths from link to link In this thesis we propose queueing network models that feature dynamic simultaneous link possession and analyze them in order to obtain the end to end burst loss probabilities This thesis is structured into five parts In the first part we describe the Optical Burst Switch architecture and summarize its main design components In the second part we define and motivate the simultaneous link possession problem In the third part we study an OBS network where the bursts are large enough to simultaneously hold wavelengths on one or two consecutive links In the fourth part of this thesis we analytically study an OBS network with simultaneous link possession and a very large number of wavelengths per link In the fifth part we address the problem of how to analytically evaluate the performance of OBS networks when the arrival traffic is bursty **Quality of Service in Optical Burst Switched Networks** Kee Chaing Chua,Mohan Gurusamy,Yong Liu,Minh Hoang Phung,2008-11-01 Optical Burst Switching OBS offers a promising switching technique to support huge bandwidth requirements in optical backbone networks that use Wavelength Division Multiplexing This book details the quality of service QoS issue in OBS networks It examines the basic mechanisms to improve overall QoS in OBS networks as well as discusses the relative QoS differentiation among multiple service classes in OBS networks Coverage also details absolute QoS provisioning in OBS networks end to end QoS provisioning in OBS networks and some

non mainstream research issues and future research directions in OBS networks *Enabling Optical Internet with Advanced Network Technologies* Javier Aracil,Franco Callegati,2009-06-20 This book provides a broad overview of IP over WDM technologies as seen by a group of experts participating in the e Photon ONeC and BONE Networks of Excellence funded within the VIth and VIIth Research Framework Programmes FP6 and FP7 of the European Union Both Networks of Excellence are aimed at the integration of research teams active on optical networks at a pan European level with the creation of virtual centers of excellence in optical networks te nologies and services The working groups on optical core networks gathered about a 100 researchers from more than 20 universities and research institutions in Europe The multifaceted viewpoints available in this community on the current state and future evolution of large WDM networking infrastructures are reported in this book The book is organized in chapters with chapter editors listed on pp having the responsibility to collect and harmonize contributions by different search groups The whole work was made possible by the coordination efforts of Javier Aracil and Franco Callegati leaders at the time when the book writing was begun of the working groups on optical core networks and on optical burst swit ing in e Photon ONeC We are thankful to them for their efforts We hope that this manuscript will serve as a valuable reference for students and practitioners in the eld of optical networking

Providing High Throughput and Controllable Performance in Burst-switched Optical Networks Neil Barakat,2006 In this thesis I examine the problem of providing high throughput and controllable and predictable performance in OBS networks I present new analytical models which for the first time allow one to quantify precisely the effect of offsets on the performance of OBS networks I then present a new OBS signaling architecture called dual header optical burst switching DOBS which allows for precise control of offsets in every node of the network I show how DOBS signalling can reduce the complexity of core node burst schedulers from O log W to O 1 where W is the number of wavelengths in the system I also present a new scheduling algorithm that minimizes burst blocking in core nodes of a DOBS network This allows the system to support an offered load that is between 10% and 50% higher than that of a single header OBS system for a given target blocking probability By increasing the understanding of the effect of OBS offsets and by providing mechanisms by which they can be precisely controlled the contributions of this work provide OBS researchers with a powerful toolset for providing the reliable and predictable end to end performance guarantees required by next generation Internet applications and brings optical burst switching one step closer to commercial viability Optical fiber networks and in particular wavelength division multiplexing are the only technologies capable of supporting the huge bandwidth demand that has accompanied the explosive growth of the Internet Optical burst switching OBS has emerged as a very promising candidate architecture for next generation optical networks because it combines the simple optical technology of optical circuit switching with the flexibility and bandwidth efficiency of optical packet switching The most distinguishing feature of OBS is the use of a time offset between the header and payload of each burst These offsets allow for the time required to perform switching and

forwarding operations in each node and directly affect the complexity throughput performance and end to end delay of OBS systems **Optical Switching Networks** Martin Maier,2008-02-11 Optical Switching Networks describes all the major switching paradigms developed for modern optical networks discussing their operation advantages disadvantages and implementation Following a review of the evolution of optical WDM networks an overview of the future trends out The latest developments in optical access local metropolitan and wide area networks are covered including detailed technical descriptions of generalized multiprotocol label switching waveband switching photonic slot routing optical flow burst and packet switching The convergence of optical and wireless access networks is also discussed as are the IEEE 802 17 Resilient Packet Ring and IEEE 802 3ah Ethernet passive optical network standards and their WDM upgraded derivatives The feasibility challenges and potential of next generation optical networks are described in a survey of state of the art optical networking testbeds Animations showing how the key optical switching techniques work are available via the web as are lecture slides www cambridge org 9780521868006 **Quality of Service in Optical Burst Switched Networks** Kee Chaing Chua,Mohan Gurusamy,Yong Liu,Minh Hoang Phung,2007-12-24 Optical Burst Switching OBS offers a promising switching technique to support huge bandwidth requirements in optical backbone networks that use Wavelength Division Multiplexing This book details the quality of service QoS issue in OBS networks It examines the basic mechanisms to improve overall QoS in OBS networks as well as discusses the relative QoS differentiation among multiple service classes in OBS networks Coverage also details absolute QoS provisioning in OBS networks end to end QoS provisioning in OBS networks and some non mainstream research issues and future research directions in OBS networks Performance Analysis of Optical Burst Switched Networks Lisong Xu,2002 Keywords optical networks protocol design queuing theory optical burst switching performance analysis Performance Analysis of Optical Burst Switched Networks ,2002 In this dissertation we studied the performance of Optical Burst Switching OBS OBS is a promising new solution for the next generation optical Internet In the first part of the dissertation we studied a novel WDM ring network with OBS The ring consists of N nodes and each node owns a home wavelength on which it transmits its bursts The ring operates under the fixed transmitter tunable receiver FTTR scheme Control information is transmitted on a separate control channel We proposed five different burst switching access protocols We also studied the performance of these access protocols in terms of throughput packet delay throughput fairness and delay fairness under different network parameters average packet arrival rate maximum burst size and minimum burst size Finally we proposed a new offset calculation method which can significantly simplify the access protocol design and reduce the packet delay for all access protocols In the second part of the dissertation we analyzed an edge node of a WDM OBS mesh network using a new burst arrival process which is more realistic than the well known Poisson process The edge node is modeled as a closed non product form queueing network consisting of special nodes with orbiting customers Despite the rich literature in queueing network analysis this particular queueing network with orbiting

customers has not been analyzed before We developed algorithms for both the single class and multi class queueing networks The single class queueing network is solved using Marie s method In the case of no converters we obtained a closed form expression of the conditional throughput of the special node with orbiting customers The multi class queueing network is analyzed by decomposition Specifically a multiple class queueing network is decomposed into a set of two class queueing networks and each of them is then solved by Neuse and Chandy s Heuristic Aggregation Method We also developed a much faster appr **Performance Analysis of Optical Burst Switched Networks with Dynamic Simultaneous Link Possession** Tzvetelina Battestilli,2005 Keywords simultaneous possession queueing network optical networks optical burst switching performance evaluation **Current Research Progress of Optical Networks** Lin Ma,2009-04-16 Optical communication networks have played and will continue to play a prominent role in the development and deployment of communication network infrastructures New optical systems and protocols will enable next generation optical networks to meet the diverse requirements from a wide range of new applications and services Optical networks have evolved to become more flexible intelligent and reliable New optical switching architectures technologies and sophisticated control and management protocols have already enabled optical networks to be used not only in the core but also the metropolitan and access networks The widespread deployment of optical communication networks will continue to have a big impact on our future lifestyle Current Research Progress of Optical Networks is aimed to provide an overview on recent research progresses in optical networking with proposed solutions survey and tutorials on various issues and topics in optical network technologies and services **Control and Survivability Issues for Optical Burst Switched Networks** Salim Youssef Said,2005 Optical burst switching OBS is the most promising all optical architectures for the next generation Internet OBS is still being developed and several issues still need to be addressed Several studies have stressed the importance of the choice of the offset time and its criticality in influencing the burst loss phenomenon in OBS networks The main problem arises in estimating the initial delay that is compatible with the optical burst switching architecture implemented This thesis aims to provide a mechanism to calculate the offset time and to study its effect on the network performance and refining QoS levels The study is extended to networks under failure to investigate the influence of the delay factor on the restoration process especially in compensating failed network performance degradations The simulation studies validated the proposed mechanism and formed an annex that can be integrated on any OBS restoration mechanism A new QoS parameter is defined to meet service differentiation with respect to the data losses and delays *High Speed Networks and Multimedia Communications* Zoubir Mammeri,Pascal Lorenz,2004-06-17 This book constitutes the refereed proceedings of the 7th IEEE International Conference on High Speed Networking and Multimedia Communications HSNMC 2004 held in Toulouse France in June July 2004 The 101 revised full papers presented were carefully reviewed and selected from 266 submissions The papers are organized in topical sections on quality of service QoS DiffServ and performance analysis scheduling and resource

allocation MPLS routing and multicast mobile networks mobile IP 3G UMTS IEEE 802 11 networks and ad hoc networks wireless and WLAN optical networks and WDM applications and software development and security and privacy

Encyclopedia of Multimedia Technology and Networking Pagani, Margherita,2005-05-30 This encyclopedia offers a comprehensive knowledge of multimedia information technology from an economic and technological perspective Provided by publisher **Next Generation Optical Network Design and Modelling** Andrea Bianco,Fabio Neri,2013-11-11 Optical networks are leaving the labs and becoming a reality Despite the current crisis of the telecom industry our everyday life increasingly depends on communication networks for information exchange medicine education data transfer commerce and many other endeavours High capacity links are required by the large futemet traffic demand and optical networks remain one of the most promising technologies for meeting these needs WDM systems are today widely deployed thanks to low cost at extreme data rates and high reliability of optical components such as optical amplifiers and fixed tunable filters and transceivers Access and metropolitan area networks are increasingly based on optical technologies to overcome the electronic bottleneck at the network edge Traditional multi layer architectures such as the widely deployed IP ATM SDH protocol stack are increasingly based on WDM transport further efforts are sought to move at the optical layer more of the functionalities available today in higher protocol layers New components and subsystems for very high speed optical networks offer new design opportunities to network operators and designers The trends towards dynamically configurable all optical network infrastructures open up a wide range of new network engineering and design choices which must face issues such as interoperability and unified control and management *Loss-free Architectures in Optical Burst Switched Networks for a Reliable and Dynamic Optical Layer* Thomas Coutelen,2010 *Optical Switching* Georgios I. Papadimitriou,Chrisoula Papazoglou,Andreas S. Pomportsis,2007 While much has been published on the subject in individual articles this text is the first to cohesively present optical switching in a single book The three authors examine and discuss all the challenges involved in the commercialization of optical switching Readers are brought up to date with the latest advances in research as well as the technological hurdles that researchers

This book delves into Optical Burst Switched Networks Optical Networks. Optical Burst Switched Networks Optical Networks is an essential topic that must be grasped by everyone, ranging from students and scholars to the general public. The book will furnish comprehensive and in-depth insights into Optical Burst Switched Networks Optical Networks, encompassing both the fundamentals and more intricate discussions.

1. This book is structured into several chapters, namely:

   - Chapter 1: Introduction to Optical Burst Switched Networks Optical Networks
   - Chapter 2: Essential Elements of Optical Burst Switched Networks Optical Networks
   - Chapter 3: Optical Burst Switched Networks Optical Networks in Everyday Life
   - Chapter 4: Optical Burst Switched Networks Optical Networks in Specific Contexts
   - Chapter 5: Conclusion

2. In chapter 1, the author will provide an overview of Optical Burst Switched Networks Optical Networks. This chapter will explore what Optical Burst Switched Networks Optical Networks is, why Optical Burst Switched Networks Optical Networks is vital, and how to effectively learn about Optical Burst Switched Networks Optical Networks.
3. In chapter 2, the author will delve into the foundational concepts of Optical Burst Switched Networks Optical Networks. The second chapter will elucidate the essential principles that must be understood to grasp Optical Burst Switched Networks Optical Networks in its entirety.
4. In chapter 3, this book will examine the practical applications of Optical Burst Switched Networks Optical Networks in daily life. This chapter will showcase real-world examples of how Optical Burst Switched Networks Optical Networks can be effectively utilized in everyday scenarios.
5. In chapter 4, this book will scrutinize the relevance of Optical Burst Switched Networks Optical Networks in specific contexts. This chapter will explore how Optical Burst Switched Networks Optical Networks is applied in specialized fields, such as education, business, and technology.
6. In chapter 5, this book will draw a conclusion about Optical Burst Switched Networks Optical Networks. The final chapter will summarize the key points that have been discussed throughout the book.
   The book is crafted in an easy-to-understand language and is complemented by engaging illustrations. It is highly recommended for anyone seeking to gain a comprehensive understanding of Optical Burst Switched Networks Optical Networks.

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