PROCEEDINGS OF COIN' 2005

The Fourth International Conference on Optical Internet

COIN
International Conference on Optical Internet

Date

May 29 to June 2, 2005

Site

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Chongqing, China

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Foreword

Dear COIN2005 Attendees:

Welcome to Chongqing University of Posts and Telecommunications and the Fourth International Conference on Optical Internet – COIN2005! We hope that you will enjoy both the excellent technical content and recreational parts of the meeting. COIN, which is held annually in the Asian Pacific region, will provide an international forum to present and discuss significant progress in research, development, and application of emerging optical technologies for Internet fields.

In COIN2005 a total 121 papers are to be presented in both oral and postal sessions that will stimulate active discussions among the participants.

The Plenary Session of the conference begins with three excellent invited Plenary Talks.

Following the Plenary Session, COIN2005 will continue with many exciting contributed technical talks. The main technical program consists of 121 Regular Oral, and 4 invited papers arranged in four technical sessions. The Technical Program Committee, co-chaired by Prof. Keping Long and Prof. K. Kitayama has done an excellent job arranging this program.

The International Workshop on Optical Burst Switching (OBS) and Optical Packet Switching (OPS) will be held at the same conference site on Sunday, May 29, 2005.

Finally, we are very happy to acknowledge all of the kind supports and contributions from many individuals who spent their time and resources to make the COIN2005 a great success. We also acknowledge the financial contributions of many foundations, and all attendees for technical contributions without whose support, this conference could not be held. On behalf of the Organizing Committee, we hope you enjoy both technical parts of COIN2005 and beautiful mountain city, Chongqing.

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The organizer and the committee of the conference owe a lot thanks to the authors and/or attendees who have presented their technical and financial support to the Conference, all else technical and/or financial contributions from the societies and companies without which the Conference cannot be held on due and with such a success.

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The Proceedings of The Fourth International Conference on the Optical Internet (COIN2005)

The Optical Burst Switching Testbed Based on Wavelength Selective Optical Switches (Invited Paper)

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***Abstract*—In this paper, we present the demonstration system of optical burst switching (OBS) with three edge routers and one core-node. A new kind of wavelength selective switches was developed for this system and its characteristics are depicted. The implementation of Just-in-Time (JIT) protocol is described and the performance is analyzed. We also report the experimental results on File Transfer Protocol (FTP) and Video-on-Demand (VOD) services.**

***Index Terms*—Optical Burst Switching (OBS), Wavelength Selective Optical Switch, Just-in-Time (JIT) Protocol**

I. INTRODUCTION

As IP-oriented data services grow exponentially, fast optical switching has become an important issue. To date, many studies of optical packet switching have been carried out [1, 2], yet some technical obstacles remain to be overcome. Around 2000, optical burst switching (OBS) was proposed with its advantages and feasibility for practical applications [3, 4]. Since then, significant progress has been made [5, 6]. However, some of key technologies still need further developing, including the development of suitable switching devices and the implementation of feasible control protocol, etc.

II. SYSTEM CONFIGURATION

The layout of our experimental optical burst switching (OBS) system is shown in Fig. 1. It consists of one core node and three edge nodes. The core router comprises an optical wavelength selective switch (WSS) and related optical burst switching (OBS) control card. The optical burst switching (OBS) control cards are used to communicate with the optical burst switching (OBS) cards in the edge routers. The optical burst switching (OBS) card in each edge router is equipped with three pairs of transceivers (Tx/Rx) for data channels with bit rate of 1.25 Gb/s at wavelengths of 1551.32nm, 1552.12nm, and 1552.93nm respectively, and one pair of receiver/transmitter (Rx/Tx) for control channel with bit rate of 155Mb/s at wavelengths of 1310nm.

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Our experimental system employs a generalized reference model of layered optical burst switching (OBS) network as shown in Fig. 1, which is based on International Telecommunication Union- Telecommunication Standardization Sector (ITU-T) G.805. There are three layers, namely the access layer, optical burst switching (OBS) layer and physical layer. Optical burst switching (OBS) networks are

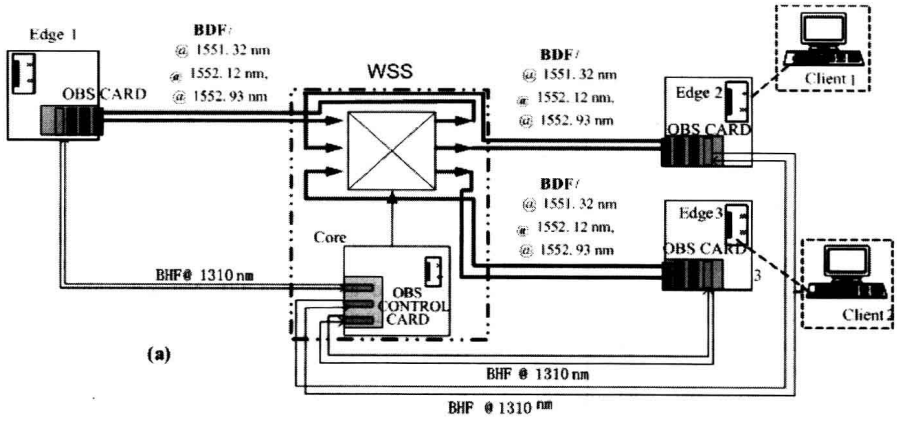


Fig.1 The architecture of optical burst switching system

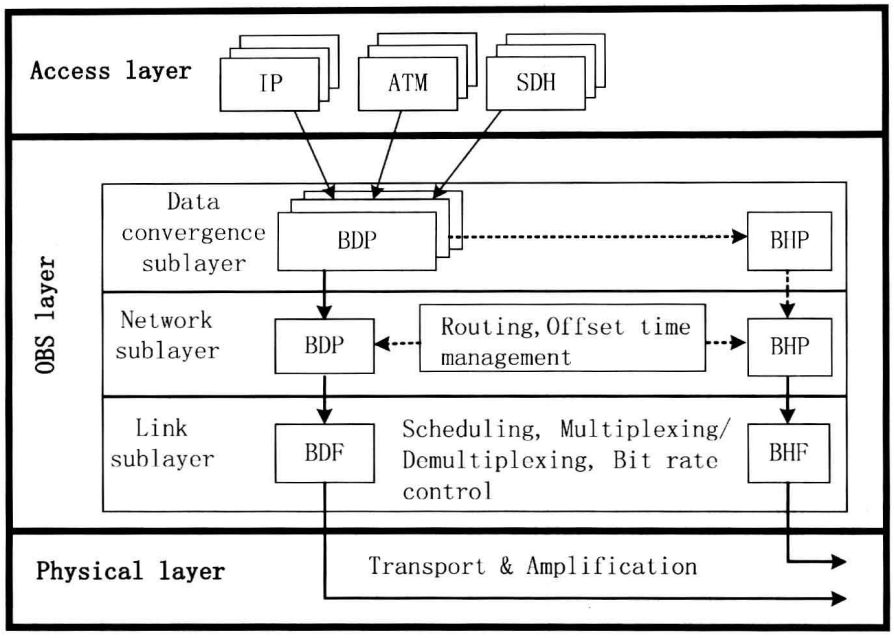


Fig. 2 The reference model of OBS layered network

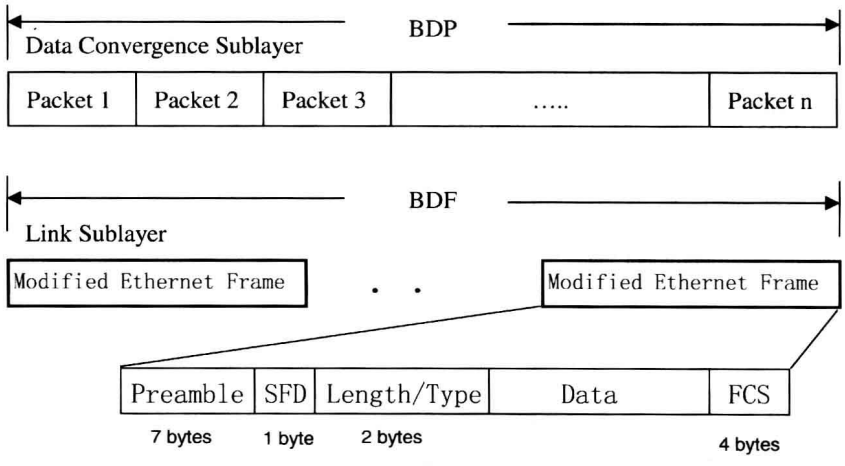
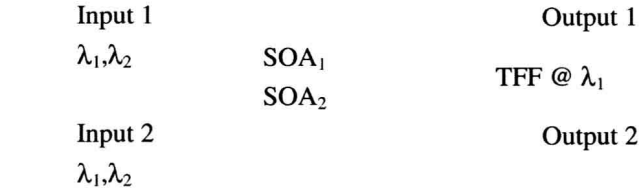
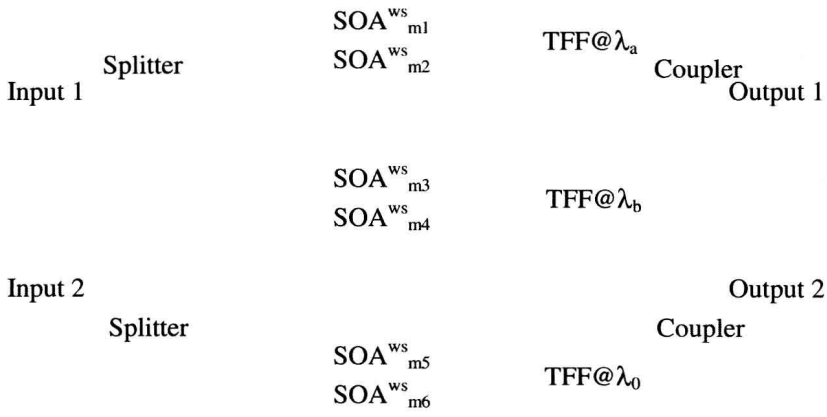


Fig. 3 The architecture of BDF

designed to be able to support various services. The access layer includes the services such as Internet Protocol(IP), Asychronous Transfer Mode(ATM) and Synchronous Digital Hierarchy (SDH), etc. The optical burst switching (OBS) layer is classfied into three sublayers, i.e., data convergence sublayer, network sublayer and link sublayer. Data convergence sublayer has the functions of the upper layer service adaption (such as data rate adaption), data classification, data convergence and data shaping. It also assemblies or disassemblies burst data packets (BDPs) and generates related burst header packets (BHPs). The assembly method used in our system is the time-based assembling [7]. Network sublayer performs the routing function and the management of offset time. Media access control is fulfilled in the link sublayer via wavelength and bandwidth resource assignment, scheduling of incoming BDPs, multiplexing/demultiplexing of different wavelengths



（a）wavelength selective switch element (dual wavelengths)



（b）wavelength selective switch module (triple wavelengths)

Fig.4 The structure of the 2×2 wavelength selective switch element (a) and module (b)

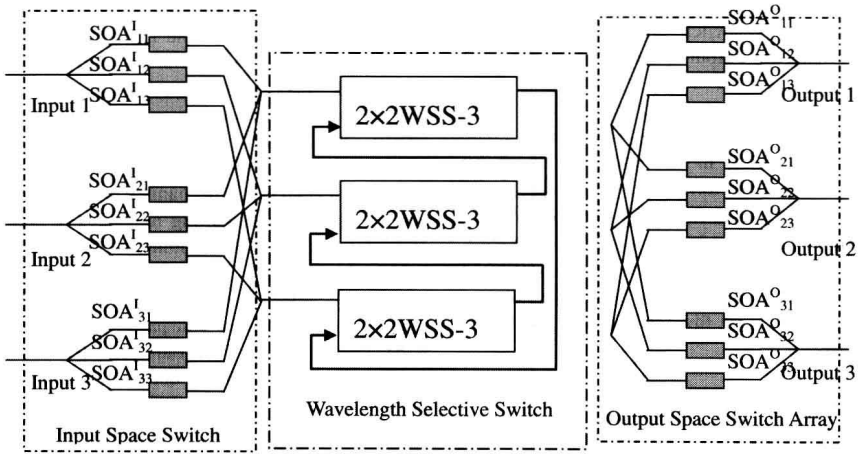


Fig.5 The architecture of 3×3 wavelength selective switch (triple wavelengths)

and bit rate control. In our system, LAUC (latest available unscheduled channel) scheduling algorithm for control channels and FF (fix searching order/first fit) scheduling algorithm for data channels are used [7]. The link sublayer also

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