

SUMMARY OF Ph.D. DISSERTATION

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Title A Study on Efficient Switching System and Media Access Control Scheme for Multimedia Communication in Ultra High Speed Photonic Networks		
Abstract <p>In the progress of photonic network technology, the demand to realize high speed, large capacity, and high efficient network for multimedia communication such as video streaming and teleconferencing is increasing. Some multimedia applications require multicasting that is point to multipoint communication and to support multicast communication is one of very important issues for realizing multimedia communication In this dissertation, we propose techniques for realizing ultra high speed photonic network for multimedia communications. We propose multicast photonic ATM switch and packet switch for backbone network and multicast packet transmission scheme for MAN/LAN.</p> <p>Chapter 1 summarizes the background of this dissertation. And the purpose of this paper is clarified.</p> <p>Chapter 2 focuses on multicast photonic ATM switch. Broadcast-and-select photonic ATM switch is known as a suitable configuration for multicast switching. However, it has problem that it requires large number of wavelengths since it allocates individual wavelengths to each input port. In order to reduce the number of wavelengths, we propose a broadcast-and-select photonic ATM switch with tunable wavelength converter, input buffer, and optical bit-rate up converter. From computer-simulated results, we show that the proposed model can reduce the number of wavelengths without causing the degradation of the cell loss probability.</p> <p>Chapter 3 focuses on multicast photonic packet switch with MPLS. We propose a multicast photonic packet switch with partially shared buffer for MPLS in IP networks. The proposed model can forward multicast packets effectively without using wavelength converters by allocating star coupler to each port. From computer-simulated results, we show that the proposed model, under multicast traffic environment, drastically improves the performance of mean system delay and the packet loss probability compared with the conventional model.</p> <p>Chapter 4 focuses on multicast transmission scheme for MAN/LAN. We propose a preferential transmission system of multicast packet using preallocation scheme in combination with wavelength monitoring scheme to RingO network. Since the feature of our scheme is to allocate a dedicated a timeslot to each node for multicast packet transmission, our scheme can send multicast packets preferentially and simultaneously and it can reduce the mean packet delay and variation of the packet transmission delay. From computer-simulated results, we show that the proposed scheme can reduce the mean packet delay, variation of the packet transmission delay and mean packet delay for each destination node and improve packet throughput.</p> <p>Finally, Chapter 5 concludes this dissertation.</p>		