Title	GMPLSに向けたサイクル・リジット型トラヒックのQoS制御
Author(s)	齋，真一朗
Citation	
Issue Date	2005-03
Type	Thesis or Dissertation
Text version	author
URL	http://hdl.handle.net/10119/1935
Rights	
Description	Supervisor:日比野 靖，情報科学研究科，修士

A QoS control scheme for Cycle Rigid Traffic toward GMPLS

Shinichiro SAI (310040)

School of Information Science,
Japan Advanced Institute of Science and Technology

February 10, 2004

Keywords: GMPLS, Packet Switching, Circuit Switching, Cycle Riget Traffic, QoS control.

Abstract

A forwarding and QoS control scheme that shows the advantage of photonics networks is proposed. This scheme guarantees completely communication quality for the cycle rigid traffic and achieves high circuit utilization. The author evaluates a transfer system with proposed scheme by computer simulation. The system displays sufficiently QoS guarantee.

The board band traffic, such as a video stream, varies both transmission cycle time and transmission data volume, for instance, when a dynamic scene change occurs. Additionally, such traffic requires real time transmission. The author call this Cycle Rigid Traffic.

QoS control in the proposed method is, the first, normalization of the cycle rigid traffic, the second, priority control for packet transfer, the third, introduction of CAC(connection admission control).

CAC is applied first. The bandwidth manager in the core network has a policy for bandwidth allocation and calculates share for the service classes. The switching node schedules packets according to the priority of services class.

1 Introduction

Photonics networks, composed of lambda switches and optical fibers with WDM (wave length multiplexing), require efficient transfer scheme that shows the advantage of themselves.

Basically, a photonics network is a circuit switching network, such as lambda switching. On the other hand, conventional IP (internet protocol) network is a packet switching network.

GMPLS (generalized multiple protocol label switching) is a concept to integrate packet switching network, MPLS (multiple protocol label switching) network, and circuit switching network, photonics network, extending the concept of label in MPLS. The label in MPLS corresponds to a lambda in photonics network. However, there is no efficient allocation scheme between virtual paths in MPLS and a physical path, a lambda, in photinics network.

The characteristics of rVBR (real time Variable Bit Rate) traffic is considered, and coexistence of rVBR and best effort traffic achieves both QoS guarantee and high circuit utilization. A policy and two QoS control mechanisms, normalization of Cycle Rigid Traffic, CAC (Connection Admission Control) and packet scheduling, are introduced.

The proposed scheme exhibits complete QoS guarantee for three service classes.

2 Standardization of Cycle Riget Traffic and QoS control mechanism

Cycle Riget Traffic is change traffic. Represented change traffic is a dynamic scene communication. The dynamic scene communication generates periodic data. Moreover, it is necessary to keep to this cycle severely. For instance, it explains the case where the compression method like MPEG is adopted here. MPEG periodically generates the transmission data. In addition, the transmission volume of data changes periodically. Moreover,The audio signal of the high quality should severely keep to the cycle. As an effect, The introduction of traffic class can unitedly treat traffic.

However, Only in the introduction of the concept named Cycle Riget Traffic, it is difficult to keep to the transmission interval severely. because, The dynamic scene application mutually sets frame rate and the initial frame interval. Therefore, the transmission cycle and the change cycle of volume of data are variously. The case that overlaps when various traffic at such a cycle is gathered, and transmitted the change of the transmission volume of data, and is not installed in the band is frequently caused.

We thought about this solution for the problem. The bandwidth management server at the core network entrance presents the transmission cycle and the change cycle in the application as a today's special beforehand.The application makes it forward at the transmission cycle and the change cycle according to the today's special. This proposal will deprive of the degree of freedom of the application. However, the service quality of the application can be easily filled if it sees from the allocation switching at the entrance of the core network.

For instance, the transmission cycle and the change cycle think about the case only kinds. Here, two or more flow is moved during the fixed time. As a result, the transmission cycle of a lot of flow can be severely kept to.

The QoS control mechanism has the packet priority control and CAC. The priority control of the packet does the priority control based on the priority level. As a result, it guarantee the quality at the packet level. There are three service classes, the EF(Expedited Forwarding class, the VF(Varivable Forwarding) class, and the BF(BestEffort) class. Priority is given beforehand. Priority is given to the permitted virtual curcit. Moreover, to defend QoS of a top priority class surely, preemptive model is adopted. It is the maximum late only at one packet time if processing is not interrupted when the packet of the EF class arrives when VF and the

BF class are processing it. With this, the communication quality of the EF class cannot be severely defended.

Here, the feature that frame interval is regulay here is made the best use of. As for it, the delay only at one frame cycle is admitted. As a result, because the frame generated at a certain time only has to arrive by the next transmission cycle, the communication is severely guaranteed.

We have achieved CAC. Because the forwarding quality in the core network cannot be guaranteed only by the packet priority control. It thinks about the case where traffic is thrown more than bandwidth on the network designed beforehand. It is assumed that the class is separated and the queue control was executed. However, the packet overflows from the queue as a result. The packet delay and the packet loss are caused.

This CAC is achieved with the bandwidth management server set up at the entrance of the core network. The bandwidth management server judge whether the demaand bandwidth has exceeded the limitaion value. The connection is permitted to the connection if it exceeds it. No permission is notified when the connection is not permission. This mechanism always works within the range to maintain the communication quality to traffic in the core network.

3 Simulation

To confirm the effectiveness of the proposal method in this research, the performance was evaluated by the simulation. The evaluation item of the simulation is the next. QoS at connected level compares the class of each service in which connected permission is done with lost-call rates of the number of ports. QoS of the packet frame flattens the packet forward in a virtual line where connected permission is done. If the priority schedule concerning the packet was completed, the maximum is evaluated.

4 Conclusion

And, it is so. The class of done the EF and each VF controls CAC at connected level. It was shown to be able to control according to the Youketske tolerance, and to keep steady in the faction. At the packet level, each each service class does the packet priority control and Priemption. The maximum arrived at the frame of EF and the VF class by this effect at one frame time or less. It is meant that this is a high communication quality. If it is an image of NTSC whose frame interval is about 33ms, the service class can reproduce in the EF class synchronizing with complete. In addition, it was shown for neither EF nor the VF class to be influenced completely when best effort type Torahicc was made to exist together to EF and the VF class and to be forwarded. As a result, the line use rate is raised by having set the service class. Moreover, this can offer the demanded service quality.