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An efficient switching system for real time traffic – a proposal of synchronous label switching –

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Abstract

This paper presents a novel switching scheme, synchronous label switching, based on synchronous transfer under the time division multiplexing combining with label switching technology. The proposed switching scheme can guarantee QoS for real time traffic and improve circuit utilization. Traffic is classified according to required QoS and scheduled for forwarding. Forwarding packets are transferred on synchronous frames. Therefore, the required QoS is guaranteed. The mechanisms of proposed scheme are described and performance evaluation on simulation experiments is presented.

1   Introduction

The author proposes a novel switching scheme, synchronous label switching, based on synchronous transfer under the time division multiplexing combining with label switching technology. This scheme well-suites real time traffic, and achieves high circuit utilization.

In recent years, real time traffic like video steaming rapidly increases. All communication traffic will be integrated into asynchronous packet transmission in the near future. The packet switching is efficient compared with circuit switching for various traffic. However, it is difficult to guarantee QoS for time sensitive traffic. On the other hand, the circuit switching

using synchronous transfer on the time division multiplexing circuits can guarantee QoS for all kind of traffic, while circuit utilization is low. Therefore, it is said that the circuit switching is not efficient and expensive.

2   Labeled synchronous transfer system

In labeled synchronous transfer system, variable-length packet is forwarded in transfer frame. This transfer frame is composed of 8 SDH/SONET frame. This transfer frame is divided by 64 byte time slot, and administrated per each time slot. The number of time slot is depend on speed of the line. The time slot at the head of each transfer frame used signalling only. It is out of band signalling. Even if congestion is occur, control packet is certainly sent.

The path forwarding real time trafic is determined by central administrant node and bandwidth of all nodes in route is reserved. Then packet is forwarding on static toute. At this time, if there are no needed bandwidth or it is not possible to satisfy thir reqest, it's request is deny. Best effort traffic's forwarding path is preliminarily decided, it route is used statically. If best effort traffic need additional bandwidth, administrant node allocation additional path. If it path have no use, release it.

Forwarded data is divided into three by required QoS, MVA (Maximum Value Allocation) guarantee the maximum bit ratio, AVA (Average Value Allocation) guarantee the average bit ratio, and BEA (Best Effort Allocation) doesn't guarantee QoS. Packet required higher QoS allocated the time slot by priority schedulling, forwarded preferentially. If there are free space, best effort packet is allocated. And if reschedulling the packet before frame is forwarded.

This proposaled system is assumed implement to the backbone network of STM-1/OC-3 or more.

3   Simulation for verifying

Assume a physical line of STM-1/OC-3, simulate, and evaluate the proposaled system. The traffic throught this system is divided into two, real time traffic required QoS guarantee like MPEG stream, and best effort traffic

doesn's need QoS guarantee. Put up performance this proposaled system first, describe about nfluence mutually given and the quality guarantee of which extent possible when traffic of two or more service classes exists together.

4   Conclusion

Since roposaled system do queuing, priority schedulling, and reschedulling, it is not possible to guarantee QoS completely. But in simulation, MVA traffic's QoS is guaranteed enought. This is because of frame transfer, priority schedulling, and reschedulling is done. AVA traffic's QoS also guaranteed if MVA traffic's ratio is not too big. On the othe hand, best effort trafic's delay is increase in consequence of traffic required QoS guarantee.