1J-06 Relationship between DiffServ and Demand Inquiring Service

Chih-Chang Hsu, Kustarto Widoyo, Terumasa Aoki, Hiroshi Yasuda
Research Center for Advanced Science and Technology
The University of Tokyo

1. Introduction

Since the current Internet provides *best-effort service* only, most of users and applications have to share the limited network resources together. Although traffic is processed as quickly as possible, the actual delivery or the timeliness of data is still not under guarantee. Many models or mechanisms, intended to solve such kinds of problems, have been proposed by IETF. Among them, differentiated services model, integrated services/RSVP model, MPLS, traffic engineering and constraint-based routing [1] are notable models

Another salient characteristic of today's Internet is that the needs of running communication on end-to-end system. Because network only acts as a media for storing and forwarding the packets, it does not provide its real conditions to users or applications. That means, network just likes a "black box" form the view of users and applications. To improve such a poor condition, we proposed Demand Inquiring Service (DIS) [2]. It belongs to a network service that bridges the core of network and users or applications.

We do not intend to substitute DIS for those existed service models or mechanisms. Instead, we do believe that DIS should be implemented to cooperate with other methods or protocols, for providing better services to users or applications. In this manuscript, we present the relationship between DIS and DiffServ.

2. Demand Inquiring Service

DIS is a network service that has an aim to provide a mechanism for users or applications to request their specific demands to network at any time and conditions. Moreover, by receiving such kinds of network services, users or applications can get detailed information about their network conditions, and even advice concerning their requests from network they use. DIS uses active network technology to implement its services. Users or applications send their requests to DIS server, which is located in an active node, via DIS client. Active node is a piece of equipment, like router or switch, which owns not only the capability of storing and forwarding the packet, but also the capability of computing.

A request from users or applications can be formed in a sequence of parameters or a source program. This request is allocated in the packet, which we called DIS packet. When active node recognizes the DIS packet, it sends the packet to DIS server. DIS server records the ID of the request owner and analyzes the request. After compiling and analyzing the request, DIS server sends the execution result (advice) of the request to its relative user or application. With such kinds of services, users or applications can get special treatment for their requests; network can also obtain detailed information about what requests users or applications really want, and then it can optimize its resources utilization.

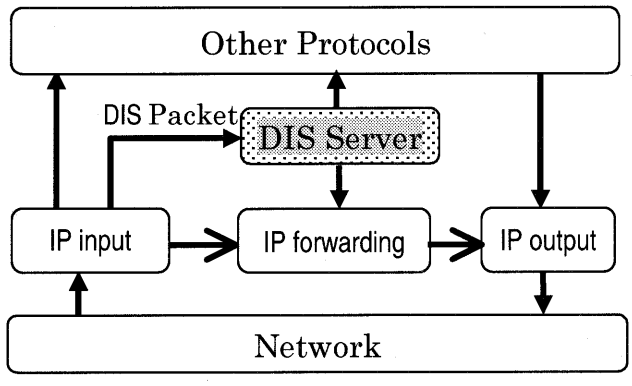

Figure 1. The location of DIS server in network node.

3. Differentiated Service

Differentiated Service (DiffServ) is a set of methods, which allow network service providers to offer different kinds of network quality-of-services to different users. The premise of DiffServ network is that routers within the core of the network handle packets in different traffic streams by forwarding them using different per-hop behaviors (PHBs). DiffServ uses six bits of the IPv4 or IPv6 header to convey the DiffServ Code Point (DSCP), which is encoded in the DS field. Each DS node must use to select the PHB, which is to be experienced by each packet it forwards.

In order for a customer to receive differentiated services from its Internet Services Provider (ISP), it must have a service level agreement (SLA) with its ISP. An SLA basically specifies the service classes supported and the amount of traffic allowed in each class. An SLA

can be static or dynamic. Static SLAs are negotiated on a regular basis. Users with dynamic SLAs must use a signaling protocol to request services on demand [3].

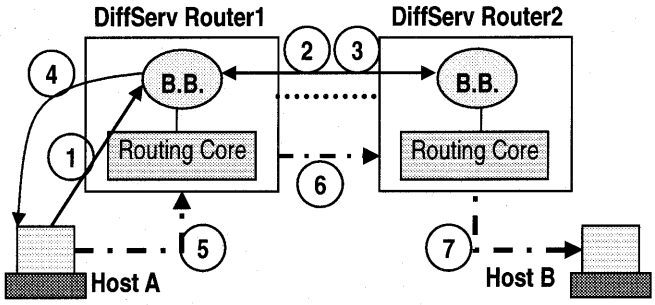

Figure 2. DiffServ with dynamic SLA.

As the delivery process of DiffServ with a dynamic SLA shown in figure 2, host A wants to send data to host D. Host A has a dynamic SLA with DiffServ Router1 domain. At first, host A sends out a resource request message to its local BB (Bandwidth Broker), which makes an admission control decision in this domain. If the request is accepted, BB in Router1 sends out the same request to BB in Router2, then the following steps was shown as Figure. If the request is denied by either BB in Router1 or BB in Router2, an error message is sent back to host A, then the signaling process is terminated.

4. The Relationship

As mentioned above, if a dynamic SLA between a customer and its ISP, a customer needs to use some signaling protocol to request resources on demand from his ISP. Therefore, a potential problem, which may cause a customer to waste lot of time in requesting the resource, will possible be found in the signaling phase of DiffServ process, while ISP can not grant the request. Another issue related to BB in Diffserv model is that the actual protocols for inter-BB communications, for BB to edge router communication are not specified yet.

In order to provide better network services than that done by DiffServ network alone and solve the above problems. In this section, a new service architecture, which is the combination of DIS and DiffServ network, is presented as shown in Figure 3. Because of a salient characteristic of good communication implemented in its client-server model, DIS is chosen to be one of main components in this new architecture to improve the lack of communication between hosts and Routers in the original DiffServ model. By communicating with BB and monitoring a set of DiffServ routers, DIS server can keep the conditions of its network domain under perfect control. Furthermore, by exchanging the data with adjacent DIS servers periodically, DIS server can also acquire the whole conditions of network. Hence, DIS server will have powerful ability to provide good services for its clients.

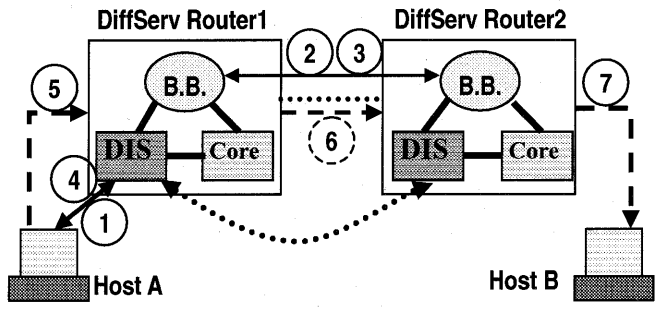

Figure 3. The combination of DIS and DiffServ

DIS can be used for solving the potential problem, which we described before, by giving its clients action advice or providing them detailed network information, such as bandwidth utilization, resource allocation, and even transmission behavior prediction. The network architecture consists of two main benefits:(1) Improving the communication between users or applications and network to achieve end-to-end QoS;(2) Complementing the communication between inter-BB to account traffic more accurately and utilize the network resources.

Functions Supported	DIS	DiffServ	DIS+DiffServ
Bandwidth Broker	X	O	O
User/Application Control	O	X	O
Active-ness	O	X	O

List A: The comparison of DIS and DiffServ

5. Conclusion

We presented the new network service architecture for improving end-to-end QoS, in which DIS, an active network model, and DiffServ are used together to meet the needs of large ISPs who manage the transit networks of the Internet, and the needs of users and applications.

References

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[3] Xipeng Xiao and Lionel M.Ni, Internet QoS: A Big Picture, *IEEE Network* Vol.13, No.2, 1999.