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Routing based on Receiver Feedback with Resource Reservation in Real Time Communication

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Abstract— In our method routing is based on resource reservation and also depending upon the feedback from receiver. [2] The receiver may experience loss of quality in the streaming media due to some jamming in a router. If the receiver is disconnected or if some domain is congested then by using feedback message we can identify where the problem has occurred. We can thus stop resource wastage. Also we focus on the resource reservation technique in Core router. If more than one core router has available resources then boundary router selects the core router on the basis of first fit mechanism so that more number of connections should be possible between different sources to receiver via that router in parallel and also it will take less time.

Keywords— Boundary router, ingress node, egress node, feedback message, domain, Diffserv, RSVP

I. INTRODUCTION

Real time communication (e.g. video streaming) is very much important in today's life. This is also necessary for live video streaming (e.g. cricket/ football match). User sends the request to source for that video. If the network is okay then streaming is started. If congestion happens in any domain then it can be identified by our approach. Here we discuss the real time communication method with resource reservation by enhancing Diffserv. Resource reservation is important so that we can easily transmit the data over the network. Also we have to maintain the network depending upon the receiver's feedback, as done in RSVP [2]. If feedback message does not arrive from receiver then we can find out the problematic area and control the data sending from source. Here we first discuss how routing will be possible if only one domain is present in between source and receiver and then we shall discuss the scenario when more than one domain are present.

II. SINGLE DOMAIN SCENARIO

A. Router Selection In A Domain

In this approach there are two types of router are available in each domain [1], [5]. One is Boundary router and another is Core Router. Boundary router receives data packets from source via ISP (internet service provider). In boundary router all data packets are waiting in queue.

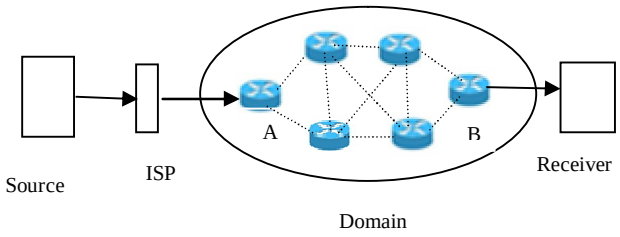

Fig. 1 A, B are boundary router in a domain. In between A & B 4 core router are present. Path are created between A to B by first fit method.

Boundary router has an information table where it can store the information about the path and also the resources. Boundary router always is in soft state, i.e. it can update its information table time to time depending up on the resource used and packet passing rate etc. [5]. But core router does not store information. It just forward the data packets. INITIATION message is sent by from Boundary router and goes to each core router. We use first fit allocation technique in this process. In first fit algorithm the boundary router keeps a list of available core routers.

INITIATION message scans along the list for the first available core router that is large enough to satisfy the request. If the resource of the chosen core router is significantly larger than the required, then that router is selected to create path. In this fashion the whole path is created in every domain. The extra resource remaining after the allocation would be used for another transmission. We would not use best fit or worst fit algorithm because these will take more time for comparing. In our first fit approach the extra resource would be usable. So there would be minimal chance of resource wastage and also this approach will take less time.

B. Receiver Feedback

This approach is totally depending upon the receiver feedback [3]. Here we consider the domain which is nearest to receiver. User first sends request to source. If all are okay then INITIATION message selects the path in the domain and sends it to receiver. Receiver then sends feedback message to boundary router. Boundary router has the information about the path selected by INITIATION message. Boundary router always is in soft state. After creating the path source sends data packets via boundary router. Receiver will send feedback message periodically after the transmission is started. If feedback message doesn't come within a specified period then it would be assumed the receiver has disconnected or the feedback message has been jammed at any intermediate router.

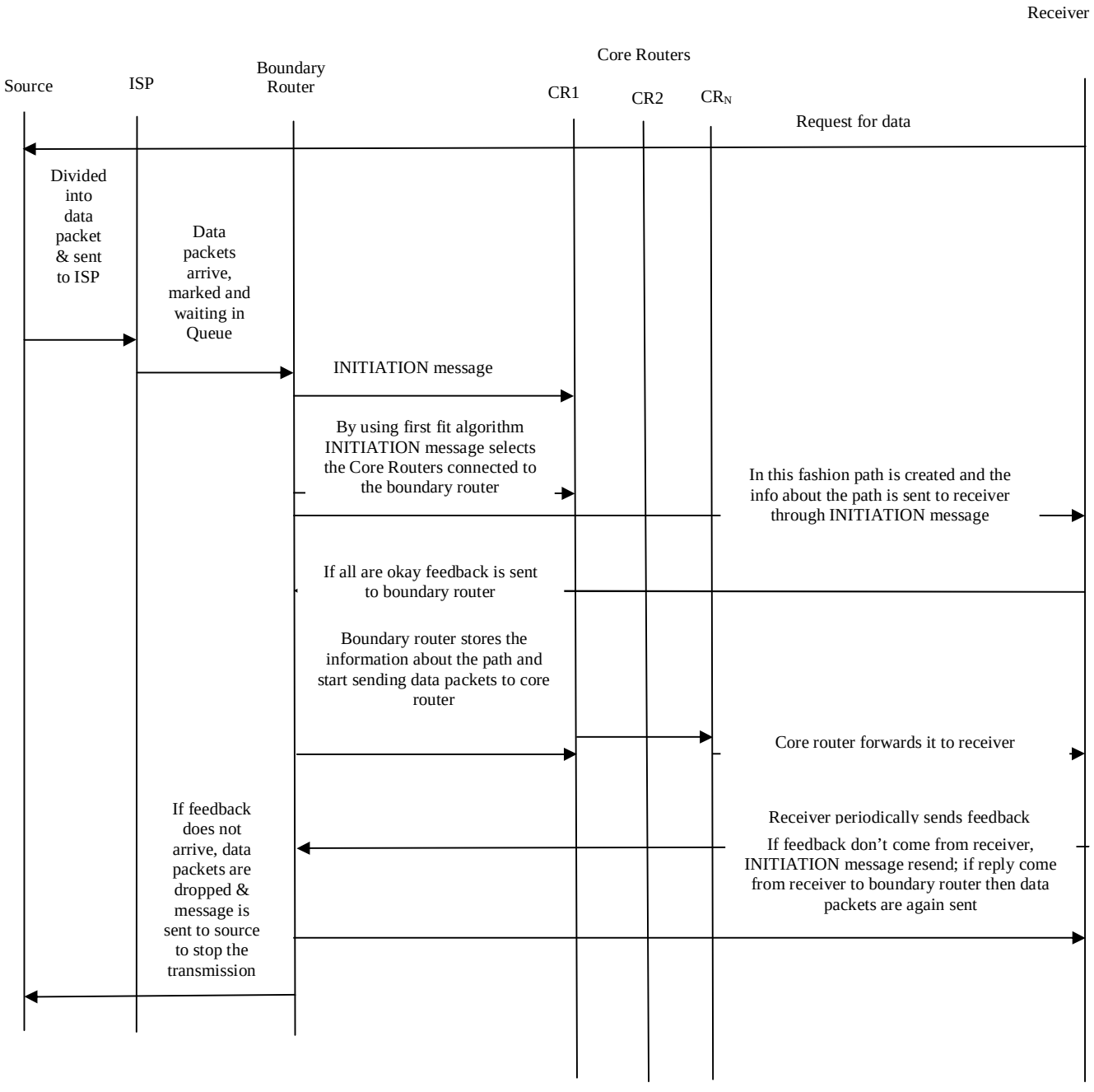

Fig. 2 Sequence Diagram of single domain approach

III. IF MORE THAN ONE DOMAIN PRESENT IN BETWEEN SOURCE AND RECEIVER

In real world more than one domain are present in between source and receiver. Now we discuss how routing will be done based on receiver feedback with resource reservation in real time.

If some domain is congested then by using feedback message we can identify where the problem occurred. Here we discuss about feedback message. If feedback message does not arrive from a domain, we can easily identify the problematic area. Now, we discuss about our process.

A. Proposed Method

1. Receiver sends request to source.
2. Data are divided into data packets and sent to the Boundary router (ingress node) of the near most domain via ISP (Internet Service Provider) and wait in a queue.
3. Boundary router (Ingress node) of the first domain will send INITIATION message to the core router connected with it in that domain.
4. INITIATION message selects the path in first fit approach and reserves the resources. INITIATION message scans list of available core routers. The INITIATION message will contain the resource requirement and thus can be used for selecting routers. The near most core router, which has available resources, will be selected. Extra resources of that router will be usable for another transmission.
5. In this fashion resource reserved path is created in a domain.
6. Then in the same manner path will be created in the other domains.
7. When the total path is created from source to receiver, receiver will send a feedback message to the boundary (ingress node) router of the first domain.
8. After this routing will be started from the source.
9. Boundary router has information table. It keeps the record of transmission, how much data are passing, how much resources are reserved etc. Boundary router is in soft state. That is, it updates its information table from time to time. Core routers do not store anything. They only pass the data packets.
10. During transmission, Receiver will send feedback message to the boundary router of its near most domain after a certain time interval. Then that feedback message reaches the boundary router of the previous domain. In this fashion it reaches the first domain.
11. If the feedback arrives then only transmission continues, otherwise boundary router again sends INITIATION message to check.
12. If reply does not arrive from the receiver then boundary router drops the packets which are waiting in the queue.
13. If no feedback arrives from the Receiver for a specified time, it will mean
    Either, (A) the receiver has disconnected
    Or, (B) there is a router problem somewhere in the domain.

In order to determine the actual cause, the ingress router will send a test message to the egress router. The egress router, on receipt of this test message, sends an acknowledgment to the ingress router.

If the acknowledgement arrives at the ingress router, it will mean that the ingress-to-egress connectivity is okay and the receiver has disconnected. Then the sender will be informed to stop transmitting media to that particular receiver.

If acknowledgment does not arrive within a specified time, the ingress router will understand that there is connectivity or router issue within the domain. Then it will look for an alternate route.

IV. GRAPHICAL REPRESENTATION

User first sends request source for particular video/ audio file etc. Data are divided into data packets. Then

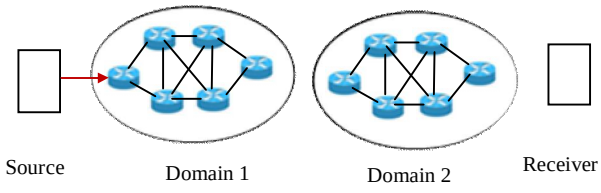

Fig. 3 sender sends data packets to boundary router via ISP

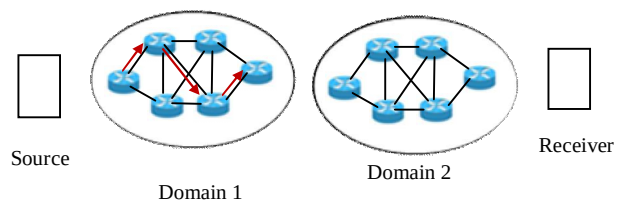

Fig. 4 Boundary router create resource reserved path by using INITIATION message

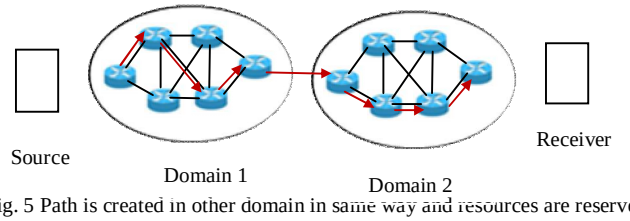

Fig. 5 Path is created in other domain in same way and resources are reserved

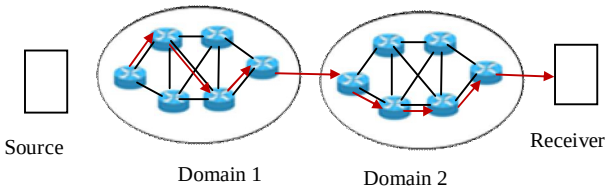

Fig. 6: Path information goes to Receiver

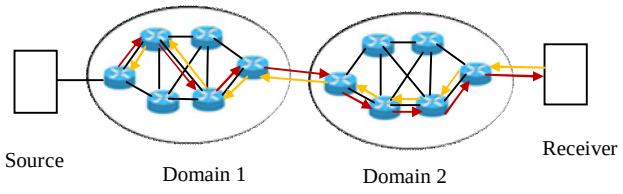

Fig. 7 Receiver gives a feedback to the boundary router

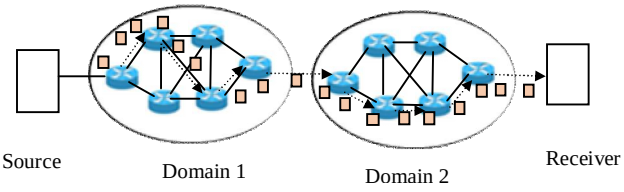

Fig. 8 Routing start and data packet goes to receiver via reserved path

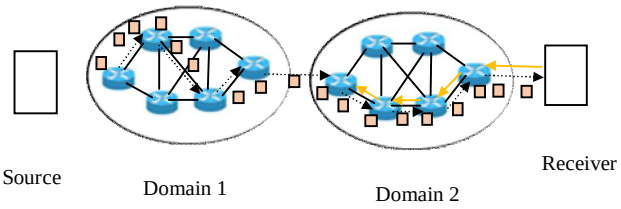

Fig. 9: after a certain time interval receiver sends feedback message to nearly boundary router

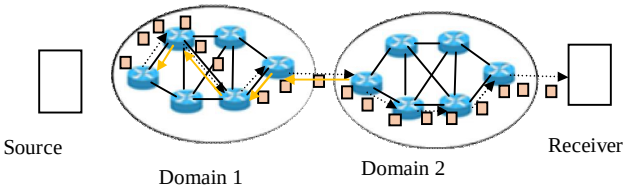

Fig. 10: Similarly feedback come to the previous domain & routing continues

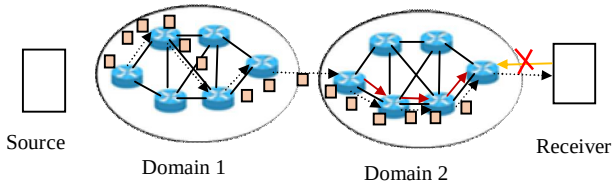

Fig. 11. If receiver don't send feedback then nearly boundary router send INITIATION message again

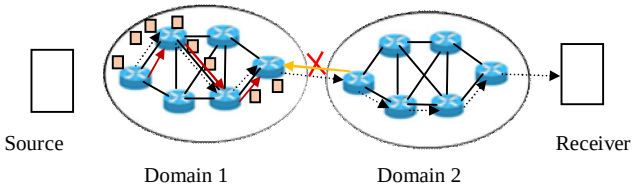

Fig. 12: Problematic domain will be identify if feedback does not arrive from any domain

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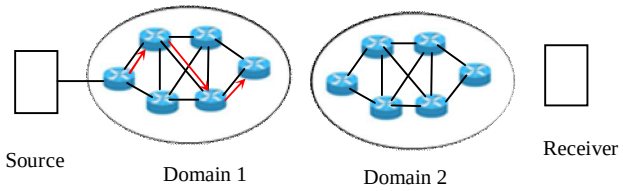

Fig. 13: Ingress node send test message to egress node to check ingress-to-egress node connectivity in a domain

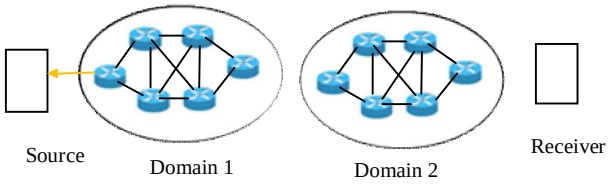

Fig. 14: If feedback doesn't come, boundary router drops packet and sends a message to source to stop transmission

V. CONCLUSIONS

The boundary routers will maintain soft state as in diffserv. Additionally, when the ingress router of one domain will choose another domain, it will use first fit logic to find out which router has adequate resources to fulfill the traffic requirement.
An initiation message will be sent by the sender via border router to choose the proper route. The receiver, upon receiving the initiation message, will issue confirmation message back to the sender.
Moreover, like rsvp, periodic refresh messages will be issued by the receiver to indicate that it is still connected.
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