International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 1 Issue 8, October - 2012

Dispensing Definite Frequency Schemes For MIMO Systems

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ABSTRACT

One of the Emerging technologies according to the present generation is wired and wireless data applications due to their extensive usage. For this purpose ,considerable efforts have focused on the design of multi input and multi output systems .To achieve system stability and to get fast response from the system without having loss of packets, new flow control schemes based on self-tuning proportional integrative plus derivative (SPID) controller and distributed self-tuning proportional plus integrative (SPI) controller. To achieve high scalability systems, SPID and SPI controllers are placed at the source nodes to regulate the transmission rates. As a result, group node makes sure that the buffer occupancy stabilizes and never overflows the buffer capacity.

KEYWORDS: Self-tuning proportional integrative plus derivative (SPID), FCP (Forward control packet), BCP(Backward Control Packet)

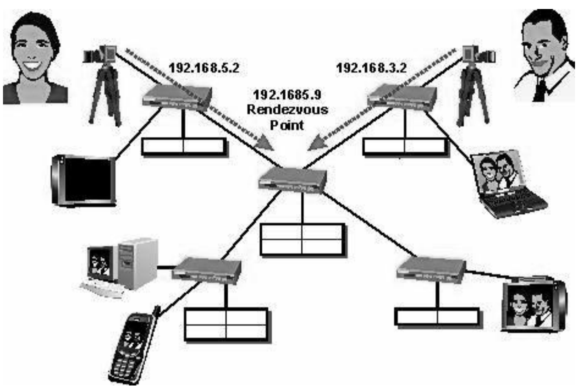
I. INTRODUCTION

The advancements in multi-input–multi-output (MIMO) systems and networking technologies introduced a revolution recently, which promises significant impact in our lives. Especially with ever-increasing multicast data applications, wireless and wired multicast (multipoint-to-multipoint) transmission has considerable effect on many applications such as teleconferencing and information dissemination services. Multicast improves the efficiency of multipoint data distribution from multiple senders to a set of receivers. Unfortunately, the widely used multicast transport protocols, which are layered on top of IP multicast, can cause congestion or even congestion collapse if adequate flow control is not provided. Flow control thus plays an important role in the traffic management of multicast communications.

A lot of approaches use queue schemes to solve congestion control problems. Queue schemes in routers make sure that the buffer occupancy stabilizes and never overflows the buffer capacity. Our schemes are based on the explicit rate schemes in the senders. These are active and effective methods to adjust the sending rates, and reduce the packets loss. The major difficulty in designing multicast flow control protocols arises from the long and heterogeneous RTTs involved in the closed-loop control.

II. SYSTEM ANALYSIS

Several multicast flow approaches have been proposed recently. One class of them adopts a simple hop-by-hop feedback mechanism, in which the feedback, i.e., backward control packets (BCPs), from downstream nodes are initially gathered at branch points, and then are transmitted upward by a single hop upon receipt of a forward control packet (FCP). This kind of manipulation can be carried out on the basis of the tree structure in a multicast transmission. These schemes then introduce another problem of slow transient response due to the feedback from “long” paths. Such delayed congestion feedback can cause excessive queue buildup/packet loss at bottleneck links.

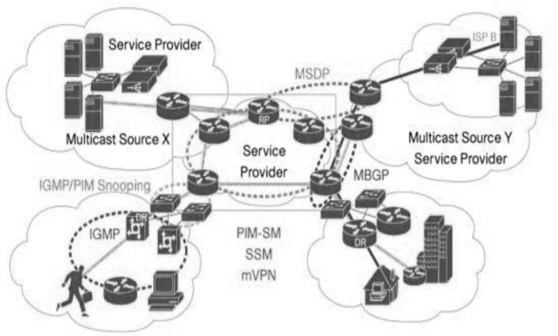


III .MODULE DESCRIPTION

3.1. Multicast Network Configuration Module:

The multicast network is a connection-oriented one, which is composed of sources and destination nodes. Multicast connection and every sampling period, the multicast source issues and transmits a FCP to the downstream nodes (the branch node and destination nodes), and a BCP is constructed by each downstream node and sent back to the source. After the multicast source receives the BCPs from the downstream nodes, it will take appropriate action to adjust its transmitting rates of multicast traffic based on the computed value of the SPID controller. After receiving the data packets coming from the branch point, the receivers construct BCPs and send them back to the branch point.

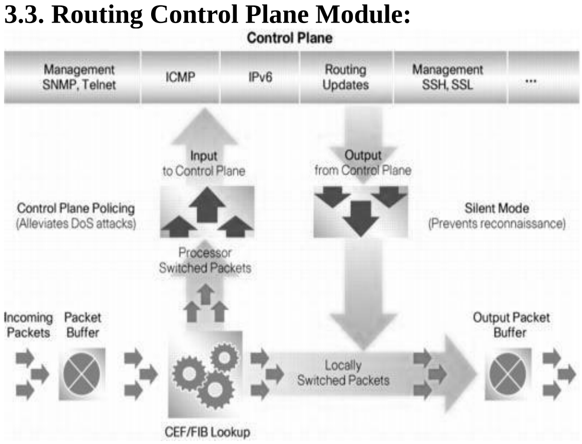
3.2. Multicast control Module:



Multicast is a well-established bandwidth-conserving technology that reduces traffic by allowing a host to send packets to a subset of all hosts as a group transmission instead of having to send packets to every single user. IP Multicast delivers application source traffic to multiple receivers without burdening the source or the receivers while using a minimum of network bandwidth and enabling easily scalable and economical distributed applications. Multicast packets are replicated in the network at the point where paths diverge by Cisco routers enabled with Protocol Independent Multicast (PIM) and other supporting multicast protocols, resulting in the most efficient delivery of data to thousands and even millions of business or consumer users.

First-in first-out (FIFO) queue to multiplex all flows traveling through the outgoing link. Assume that congestion never happens at the router connected with the sources; hence, these two can be consolidated into one node, which is true in most cases in real networks.

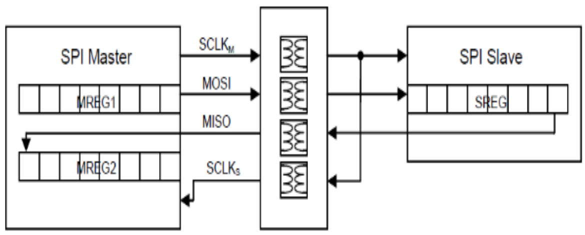
3.3. Routing Control Plane Module:



We process the nodes that have small differences of time delay and sending rate together. Then we unify the time delay and sending rate. Since the situation of every node in each group (about 20 receivers) is similar, we only choose one node from each group as a representative. We assume that the link delay is dominant compared to the other delays, such as processing delays and queuing delay, the multicast source sends data packets at 0 ms and the another multicast source starts to send data packets at 1000 ms in the simulation time; then the joining of second one enhances the network dynamic behavior, and also demonstrates the efficiency of the SPID and SPI schemes. In simulation 2 (see Fig), there are more receivers and longer delay than in model 1, and we set appropriate parameters to enable system stability.

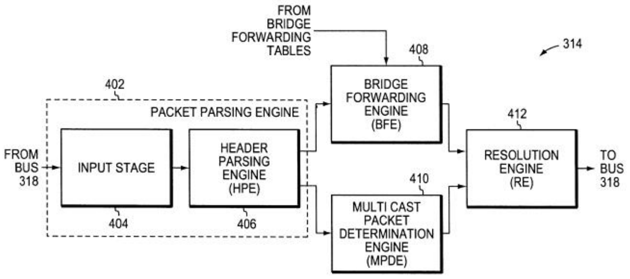
3.4. SPID and SPI controllers Module:

Standard implementations of SPI use the clock signal, SCLKM, generated by the Master device to control all movement of data on the bus. Data moves between the Master and Slave as if they were two interconnected shift registers. The Master and Slave present data to the bus on one phase of the clock and read the data into their shift register on the opposite phase. This system works fine as long as the round trip propagation delay through the bus is less than half of the clock period, because the data must be back to the master by the next clock edge, half a clock period later.



The control parameters of the SPID and SPI controllers can be designed to ensure the stability of the control loop in terms of buffer occupancy and adjust automatically, depending on the network load. This subsequently means that the schemes provide the least packet loss in steady state. Relevant pseudo codes for implementation have been developed, and the paper shows how the two controllers could be designed to adjust the rates of data service. Simulations have been carried out with wireless and wired multipoint-to-multipoint multicast models

3.5. Forward control packet (FCP) Module:



Forward control packet (FCP). This kind of manipulation can be carried out on the basis of the tree structure in a multicast transmission. The main merit of these methods lies in the simplicity of the hop-by-hop mechanism.

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IV.ALGORITHMS USED

4.1. Distributed ER allocation algorithm.

In this algorithm, flow controllers regulate the source rate at a multicast tree, which accounts for the buffer occupancies of all destination nodes. The proposed control scheme uses a distributed self-tuning proportional integrative plus derivative (SPID) controller or uses a distributed self-tuning proportional plus integrative (SPI) controller. The control parameters can be designed to ensure the stability of the control loop in terms of source rate. We further show how the control mechanism can be used to design a controller to support multipoint-to-multipoint multicast transmission based on ER feedback. System stability criterion is derived in the presence of destination nodes with heterogeneous RTTs.

4.2. SPID and SPI Algorithms

Each branch point of the multicast tree replicates each data packet and FCP from its upstream node to all its downstream branches. The downstream nodes return their congestion information via BCPs to the parents through the backward direction once they receive FCPs. Assume that congestion never happens at the router connected with the sources; hence, these two can be consolidated into one node, which is true in most cases in real networks. The major difficulty in designing multicast flow control protocols arises from the long and heterogeneous RTTs involved in the closed-loop control.

V. CONCLUSIONS

A limitation on the frequency schemes is that if the network has a larger transfer delay, then the effect of the control schemes becomes weak. A possible reason is that a larger delay makes the response time too long, which is not good for an applicable network. Our further research along this line of study would investigate TCP-friendly related issues in multicast congestion control.

ACKNOWLEDGMENTS

The heading of the Acknowledgment section and the References section must not be numbered.

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