



EFFICIENT BANDWIDTH MANAGEMENT MECHANISM FOR VIRTUAL NETWORKS

Padmapriya.M¹, Venkatachalam.K²

PG scholar¹, Professor Head of the Department²

**Department of Electronics and Communication Engineering, Velalar
College of Engineering and Technology, Erode-12.**

Mail id: priyamoorthi49@gmail.com¹, venki@gmail.com²

ABSTRACT

A virtual network is a computer network that consist of virtual network links between the computing devices. In this type, there is no physical connection. In recent years, most internet service providers (ISPs) have come across and one of the important problem that is how to manage and efficiently utilize the bandwidth in the field of virtual networks (VNs). The proposed a bandwidth allocation mechanism which will helpful to the individual users to utilize the maximum of the allowed bandwidth for them. Design and simulation of the proposed method is done in network simulator 2 (NS-2).

In this paper, experimentally analyse and appraise the micro level behaviour of different standard protocols which are installed in Windows, Linux and Android kernel under virtual network environment. The micro level analysis of standard protocols gives a stronger platform that adopts individual users.

Key words: Bandwidth Management, Throughput, Goodput, Sending rate

INTRODUCTION

VNET (Virtual Network) is a virtual protocol, which control multiple physical network protocols. When opened with an IP address, VNET decides if the host can be arrived directly on one of its physical networks. The major intention of using virtual network is to authorize a data centre or service provider network to supply the exactly suitable and efficient structure of the network for the applications it hosts – and to alter that structure as conditions warrant, using software rather than requiring physical changes in connections to hardware.

Bandwidth management is to perform the controlling and measuring communications between the network links, to avoid network congestion and poor performance. Bandwidth management is generally measured by bits per second.

EXISTING METHOD

The main concept in virtual network resource allocation mechanism. To explain our bandwidth allocation mechanism, we have the definition of a virtual network environment.

The proposed method is dynamic bandwidth allocation mechanism, and it is called as Reconfigurable Bandwidth Allocation Mechanism (RBAM). The system model for RBAM

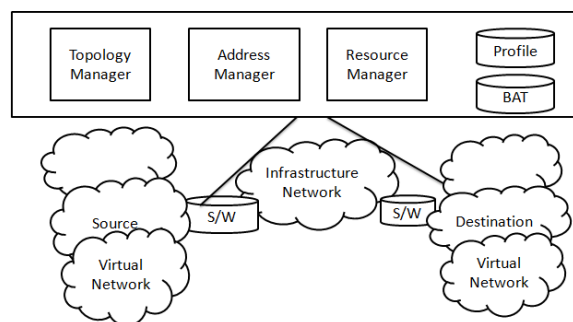


Figure 1 Reconfigurable Bandwidth Allocation Mechanism

The main component of our system model is the Virtual Network Controller. This Virtual Network Controller operates in a centralized architecture.

The Virtual Network Controller uses a profile about virtual network information. The profile information is made up of a virtual network type of service, QoS and resource information. The controller uses this information to generate the virtual network. In addition, this profile information can be obtained in cooperation with the external server. Virtual Network Controller consists of three components: Topology Manager, Address Manager and Resource Manager.

Topology Manager discovers the topology of the Infrastructure Network. It manages the physical topology of the network. Based on the identified topology, it provides a virtual node and virtual links to the virtual network. To discover the topology, it uses a specific Neighbour Discovery Protocol.

Address Manager assigns an address in accordance with the policies of the controller to identify the physical topology in the Topology Manager.

Resource Manager periodically collects resource information. It can recognize congestion or overload in the substrate links. It collects information used by the virtual

network bandwidth. It manages the information using the Bandwidth Allocation Table (BAT). When the user requests to create new virtual network, resource manager checks the bandwidth allocation table. If there are available resources, it allocates bandwidths to new virtual network. If resources are unavailable, it checks the priority of the requested service. Only requests having a higher priority is allocated bandwidth.

The resource manager manages the entire bandwidth, the available bandwidth, and the used bandwidth per virtual network with BAT. In our algorithm, we reserve the shared bandwidth. This shared bandwidth is used to prevent the traffic congestion momentarily on the virtual network.

The shared bandwidth value in this paper is set to 30% of the total bandwidth. We describe our bandwidth allocation algorithm in Reconfigurable Bandwidth Allocation Mechanism.

Reconfigurable Bandwidth Allocation Mechanism

Algorithm Basic Bandwidth Allocation Algorithm for RBAM

- 1: Receive virtual network creation request message
- 2: Check service priority and requested bandwidth(bw)
- 3: if (available bw – requested bw) > shared bw
- 4: goto step 6
- 5: else goto step 9
- 6: if (requested bw < available bw)
- 7: accept; update BAT
- 8: else
- 9: if (service priority == urgent)
- 10: compute requested withdrwa bw
- 11: restore available bw
- 12: perform bw withdraw algorithm
- 13: goto step 6
- 14: else
- 15: reject or best effort service
- 16: endif

In our Algorithm, it checks priority of the virtual network creation request. If no available bandwidth, it performs bandwidth withdraw algorithm. In this paper, we

assume that our simple algorithm withdraws bandwidth from a virtual network using high bandwidth.

PROBLEM DESCRIPTION

Common causes of congestion:

- Large downloads or uploads, such as computer updates, system backups, or sending large files across the connection
- Staff or guests overusing the connection for personal use (which can also lead to excess data charges).
- Cloud services such as Office365, which can cause large amounts of usage as they back up files to off-site servers.
- Not enough available bandwidth due to new staff, more resource-intensive software, or large projects that can impact the amount of bandwidth a business uses during day-to-day operations.

PROPOSED METHOD

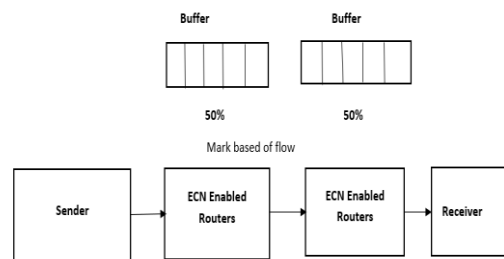


Figure 2 Mark-based packet flow

In existing method, if flag is received sender will reduce the sending rate by
 $Cwnd = cwnd / 2$

In proposed method, router mark the packets based on number of packets stored in a particular flow. Based on the marking, sender will reduce the sending rate by

$$cwnd = cwnd - (cwnd * (flowmark / 10))$$

This will not blindly reduce the sending rate by half. In order to increment the throughput, it will flow binary search increment mechanism upto 5 RTTS or untill reaching half of its maximum window.

$$cwnd = cwnd + (cwnd * (flowmark / 10))$$

SOFTWARE DESCRIPTION

A Network Simulator is a section of software or hardware that identify the manner of a network, without an original network being present. NS2 is an open-source event-driven simulator designed particularly for research in computer communication networks. NS2 have two key languages: C++ and Object-oriented Tool Command Language (OTcl). While the C++ describes the internal mechanism (i.e., a back-end) of the simulation objects, the OTcl sets up simulation by capturing and configuring the objects as well as arranging discrete events (i.e., a front-end). The C++ and the OTcl are attached together using TclCL. Simulators frequently come with support for the well-known protocols in use today, such as WLAN, Wi-Max, UDP, and TCP.

RESULT

From the graph (figure 4), the average throughput increases to 99.56%, average goodput increases to 99%, packet drop degrades to 96.99% and end to end delay decreases to 63.86%, when the environment changes from sparse to dense condition.

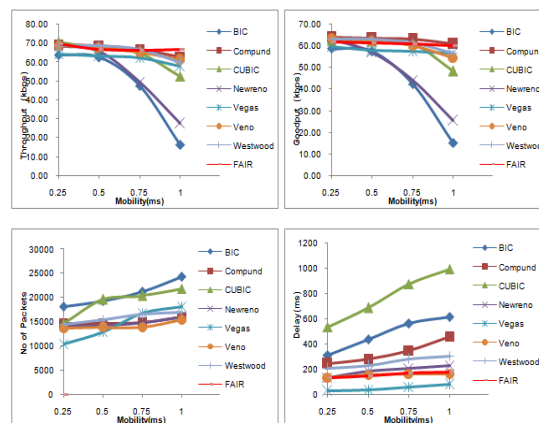


Figure 3 No of nodes vs. Parameters for outdoor environment

From the graph (figure 4), the average throughput increases to 27.91%, average goodput increases to 27%, packet drop degrades to 32.68% and end to end delay decreases to 36.21%, when the environment changes from sparse to dense condition.

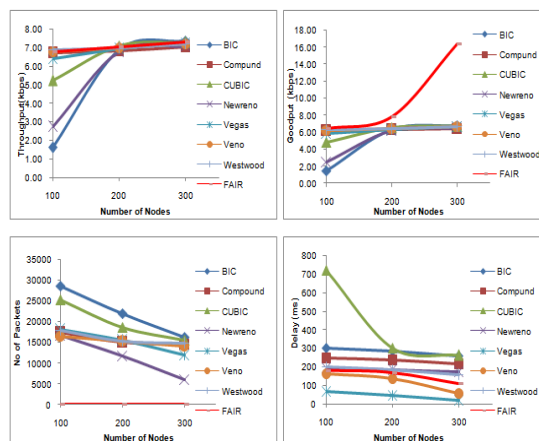


Figure 4 No of nodes vs. Parameters for indoor environment

The existing methods utilizes very low amount of Bandwidth because there are no flow monitor algorithms for each individual user. In the existing method, there is no monitoring of the buffer level and the flow rate of individual users. This will reduce the sending rate which possibly decrease the bandwidth utilization.

CONCLUSION

In existing the reconfigurable bandwidth allocation mechanisms are compared with each other. From the simulation analysis, the existing methods lacks in bandwidth utilization. Even it has very high allocated bandwidth, it uses very low level. This happens because the network has no knowledge about the individual user utilization rate.

In proposed method, a cross layer mechanism (MAC layer and Transport layer) to manage the allocated bandwidth of individual users in Virtual Networks is proposed and experimentally compared with standardized protocols which installed in Windows, Linux and Android kernels. The simulation is done in Network Simulator-2 (NS-2) and the standard parameters like throughput, goodput, packet loss and end to end delay are analysed.

REFERENCE

- Zhiyuan shao , Kai Zhand and Hai Jin “Improving fairness of network bandwidth allocation for virtual machines in cloud environment” IEEE International Black Sea Conference on Communications and Networking (BlackSeaCom) ,2016.
- Swarnalatha Madantha , Tram Truong-Huu and Mohan Gurusamy “ Adaptive Bandwidth Allocation for Virtual Network Embedding in Optical Data Center Networks” IEEE 41st Conference on Local Computer Networks (LCN) ,2016.

- Hak Suh Kim, YoungMin Kim , Youn-Seo Jeong and Sang –Ho Lee “Efficient reconfigurable bandwidth allocation mechanism for virtual network” Information and Communication Technology Convergence (ICTC), International Conference 2016.
- Tiamlin Huang , Chao Rong , Yazhe Tang and Chenchen Hu “VirtualRack: Bandwidth-aware virtual network allocation for multi-tenant datacenters” IEEE International Conference on Communications (ICC), 2014