ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 9, September 2016

Improving Congestion Control over Stateless Wireless Adhoc Network Systems

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ABSTRACT: The SWAN architecture is designed to handle both real-time UDP traffic, and best effort UDP and TCP traffic without the need for the introduction and management of per-flow state information in the network. SWAN supports per-hop and end-to-end control algorithms that primarily rely on the efficient operation of TCP/IP protocols. In particular, SWAN uses local rate control for best-effort traffic, and sender-based admission control for real-time UDP traffic. Explicit congestion notification (ECN) is used to dynamically regulate admitted real-time sessions in the face of network dynamics brought on by mobility or traffic overload conditions. this paper proposes an extension to SWAN model with a scheduling module and rate control improvement.

KEYWORDS: Congestion control, SWAN, TCP/UDP, Wireless adhoc networks, Manets.

I. INTRODUCTION

SWAN adopts engineering techniques that attempt to set the admission threshold rate at mobile nodes to operate under the saturation level of the wireless channel based on insights from our earlier work on service differentiation support for wireless LANs . To our knowledge, there has been little or no prior work on provisioning service differentiation in mobile ad hoc networks using stateless approaches.

we take a practical approach that assumes a best effort MAC and propose a simple, distributed, and stateless network model called SWAN that uses feedback based control mechanisms to support real-time services and service differentiation in mobile ad hoc networks. SWAN uses local rate control for UDP and TCP best-effort traffic, and sender based admission control for UDP real-time traffic. Explicit congestion notification (ECN) is used to dynamically regulate admitted real-time sessions in the face of network dynamics brought on by node mobility and traffic overload conditions. An important contribution of our work is that intermediate nodes do not keep any per flow or aggregate state information in SWAN wireless networks.

SWAN adapts the well-known AIMD rate control mechanism to address some of these challenges. AIMD algorithms are widely used by a number of transport protocols. For example, the TCP congestion control mechanism uses AIMD window-based control, while WTC Puses AIMD rate control. In, AIMD control is applied to real-time UDP traffic. TCP and WTC Puse AIMD control to improve the performance of TCP traffic. In contrast, SWAN uses AIMD rate control to improve the performance of real-time UDP traffic. TCP attempts to avoid network congestion collapse by using packet loss as feedback[7].

II. LITERATURE SURVEY

Congestion control concerns controlling traffic entry into a telecommunications network, so as to avoid congestive collapse by attempting to avoid oversubscription of any of the processing or link capabilities of the intermediate nodes and networks and taking resource reducing steps, such as reducing the rate of sending packets. It should not be confused with flow control, which prevents the sender from overwhelming the receiver.

Magula, P.: Service Differentiation in Mobile Ad hoc Networks Information Sciences and Technologies Bulletin of the ACM Slovakia, Vol. 3, No. 2 (2011) 87-90

Mobile Ad hoc Network (MANET), a collection of nodesthat form a multi-hop wireless network, is emerging as an important technology in the present and near future. MANETs are being used in a variety of applications from

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emergency rescue to sensor networks. With the expansion of real-time applications for this type of networks, the need for quality of service (QoS) support has become essential.

This paper deals with current QoS models for MANETs. We will propose a modification of Stateless Wireless Ad hoc Networks model (SWAN) in order to improve QoS performance and will provide our simulation results.

Hayder Natiq Jasem, Zuriati Ahmad Zukarnain, Mohamed Othman, and Shamala Subramaniam "The New AIMD Congestion Control Algorithm", 2009

Congestion control is one of the fundamental issues in computer networks. Without proper congestion control mechanisms there is the possibility of inefficient utilization of resources, ultimately leading to network collapse. Hence congestion control is an effort to adapt the performance of a network to changes in the traffic load without adversely affecting users perceived utilities. AIMD (Additive Increase Multiplicative Decrease) is the best algorithm among the set of liner algorithms because it reflects good efficiency as well as good fairness.

Our control model is based on the assumption of the original AIMDalgorithm; we show that both efficiency and fairness of AIMD can be improved. We call our approach is New AIMD. We present experimental results with TCP that match the expectation of our theoretical analysis.

G.-S. Ahn, A.T. Campbell, A. Veres, and L.-H. Sun, "SWAN: Service Differentiation in Stateless Wireless Ad Hoc Networks," work-in-progress, Sept. 2002.

We propose SWAN, a stateless network model which uses distributed control algorithms to deliver service differentiation in mobile wireless ad hoc networks in a simple, scalable and robust manner. The proposed architecture is designed to handle both real time UDP traffic, and best effort UDP and TCP traffic without the need for the introduction and management of per-flow state information in the network. SWAN supports per-hop and end-to-end control algorithms that primarily rely on the efficient operation of TCP/IP protocols. In particular, SWAN uses local rate control for best-effort traffic, and sender-based admission control for real-time UDP traffic.

Explicit congestion notification (ECN) is used to dynamically regulate admitted real-time sessions in the face of network dynamics brought on by mobility or traffic overload conditions. SWAN does not require the support of a QOS-capable MAC to deliver service differentiation. Rather, real-time services are built using existing best effort wireless MAC technology. Simulation, analysis, and results from an experimental wireless testbed show that real-time applications experience low and stable delays under various multihop, traffic, and mobility conditions.

S. Marwaha et al.: Challenges and Recent Advances in QoS Provisioning, Signaling, Routing and MAC protocols for MANETs. In: Proc. of Telecommunication Networks and Applications Conference, (2008).

Mobile Ad hoc Networks (MANET), whichcomprise of mobile nodes connected wirelessly, are emerging as a very important technology for future generation of wireless mobile and ubiquitous computing. MANETs are being used in numerous application domains from emergency rescue and relief to wireless sensor networks. To support real-time communications (such as audio and video) over MANETs, new Quality of Service (QoS) provisioning mechanisms need to be developed.

III. EXISTING SYSTEM

The QoS model described in this paper is called Stateless Wireless Adhoc Network (SWAN) model. It is a distributed network QoS with stateless approach using rate control for UDP and TCP best-effort traffic based on AIMD (Additive Increase Multiplicative Decrease) [7]. Like DEQA model, it also uses ECN (Explicit Congestion Notification) to regulate real-time traffic in order to react dynamically to topology changes.

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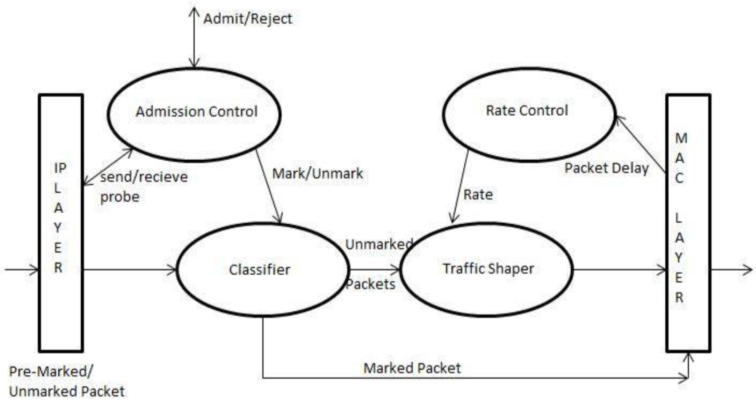

Fig.1describes the architecture of SWAN model.

The two main functional block of SWAN model are Classifier and Traffic Shaper which both operate between IP and MAC layer. The role of Classifier is to distinguish real-time traffic that should not go through Shaper. The traffic shaper in this model is represented by simple Leaky bucket shaper which is used to shape best-effort traffic based on the information from Rate Controller in order to delay best-effort packet and thus provide more bandwidth to real-time traffic.

Admission Controller is a block located at source node. Its function is to send a probe request toward the destination node to estimate resources availability. Based on this information, Admission Control module decides whether admit or reject the request. The advantage of SWAN is that all nodes regulate best-effort traffic independently and each source node uses admission control for real-time sessions.

The fact that SWAN is a stateless model and thus it does not require maintaining information at network nodes makes it very scalable and robust QoS model solution for MANETs. The lack of reservation and signalization mechanism means that this QoS model is not suitable for hard QoS provisioning but it was not the design goal of this model.

IV. PROPOSED SYSTEM

As stated above, SWAN model is suitable for dynamic MANET topologies. It provides soft QoS in a scalable and robust manner by means of distributed network approach with traffic rate control. We consider the ability of the model to differentiate only between two types of traffic as adraw back. Typically, there is a need to provide service differentiation in amore precise way than only real-time traffic and best-effort traffic. In many scenarios, real-time traffic needs to be differentiated according to various parameters, e.g. priority. Therefore, this paper proposes an extension to SWAN model with a scheduling module and rate control improvement. The architecture of our proposal is illustrated in the Figure2.

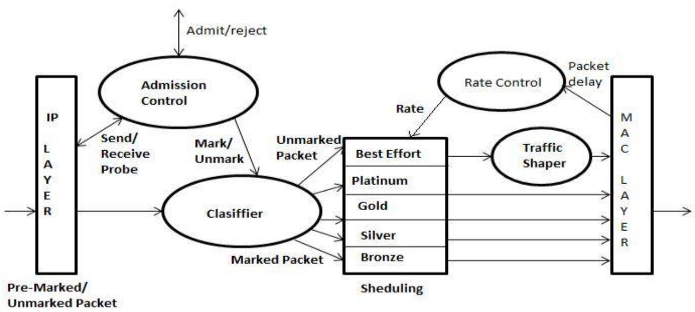

Fig.2 Proposed Extension of SWAN model.

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The scheduling module has been added to the former SWAN model, between Classifier and MAC. Then, the functionality of SWAN model has been modified in the following manner. If Admission Controller admits the request, Classifier differentiates packets according to their marking to five classes: Platinum, Gold, Silver, Bronze, and Best-effort. Then, packets are queue din respective queues and wait for the transmission. There is a special queue for best-effort traffic which can be shaped by traffic shaper, based on the information from rate controller, in a similar way like in the former SWAN model, Architecture of the system given in the below fig 3.

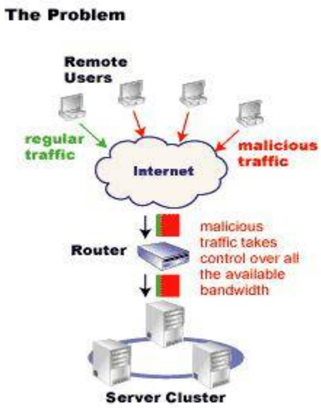

Fig.3: System Architecture

Data will be transmitted between source and destination through central device called routers. The router is attached to both source and destination.

V. SYSTEM SPECIFICATION AND SYSTEM REQUIREMENTS

Software Requirements:

1. Operating System: Microsoft Windows 98 or more.
2. JDK 1.7 or Java Net Beans.

Hardware Requirements:

1. Processor : PENTIUM IV 2.6 GHz or More.
2. RAM : 512 MB DD RAM
3. Monitor : 15” colour
4. Hard disk : 20 GB

VI. METHODOLOGY

Implementation is the stage of the project when the theoretical design is turned out into a working system.

The implementation stage involves careful planning, investigation of the existing system and it’s constraints on implementation, designing, designing of methods to achieve change over and evaluation of change over methods. State Diagram for Congestion Control over SWAN is as given below.

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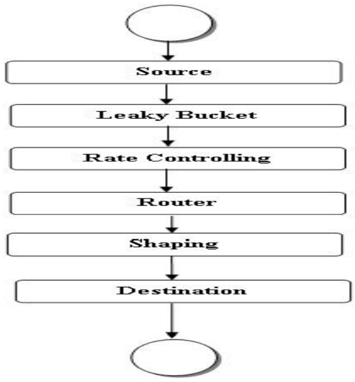


Fig.3 State Diagram for Congestion Control over SWAN

Algorithm/Technique used

A .Leaky Bucket Algorithm

B. AIMD rate control algorithm

Algorithm Description

A .LEAKY BUCKET ALGORITHM

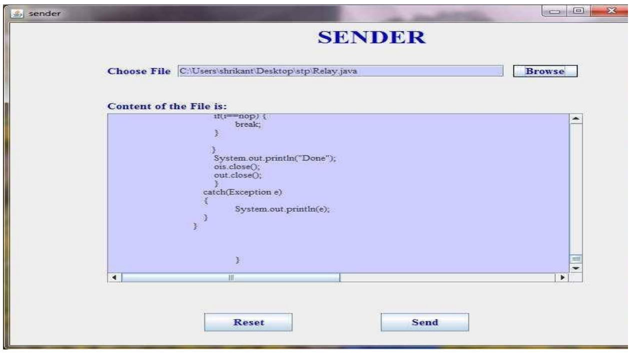
The "leaky bucket" algorithm is key to defining the meaning of conformance. The leaky bucket analogy refers to a bucket with a hole in the bottom that causes it to"leak" at a certain rate corresponding to a traffic cell rate parameter the "depth" of the bucket corresponds to a tolerance parameter each cell arrival creates a "cup" of fluid flow" poured" into one or more buckets for use in conformance checking. The Cell Loss Priority (CLP)bit in the ATM cell header determines which bucket(s) the cell arrival fluid pours into. In the algorithm, a cell counter represents the bucket. This counter is incremented by one for each incoming cell.

B. AIMD RATE CONTROL ALGORITHM

The SWAN AIMD rate control algorithm is shown in Fig. Every T seconds, each mobile host increases its transmission Rate gradually (additive increase With increment Rate of (Kbps) until the packet delays become excessive. The rate controller detects excessive delays when one or more packets have greater delays than the threshold delay d sec. As soon as the rate controller detects excessive delays.

VI.**RESULTS**

In the Sender side, sender is selected valid text file from the directory and content of that is displayed on the provided text area in the window. then, selected file will be transferred to Router machine which is in the form of packets. In the sender module any algorithms are not acceptable.



Snapshot 1:Sender Side Window

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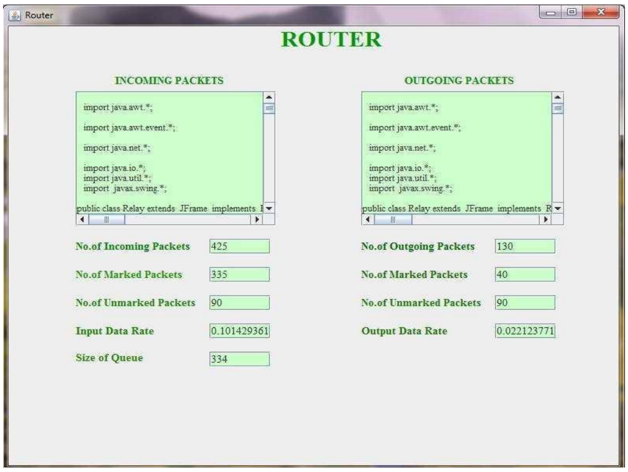
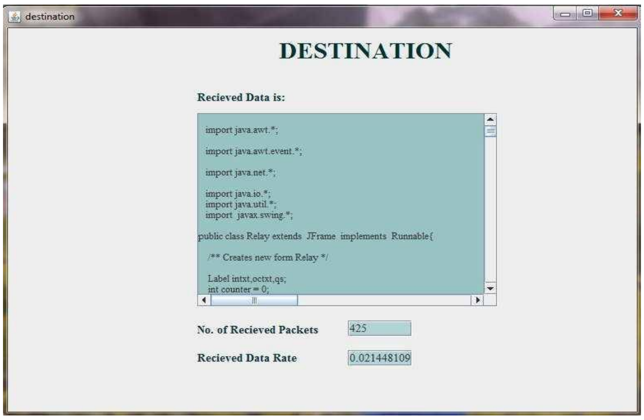
In the Router side, two algorithms are implemented first one is Additive Increase and Multiplicative Decrease which is for data rate control. Second is Leaky Bucket algorithm which is for network shaping and constant output rate if input rate is variation. Content of the file will be displayed when receiving and sending. The packets are transferred to Destination machine from the Router side.



Snap shot 2: Shows the Packet receiving and transferring in router

In Destination side, algorithms are not acceptable. Destination only receives the packets from the Relay machine and simply determines incoming packet rate



Snap shot 3 : Shows the packets received at Destination side

VII.CONCLUSIONAND FUTURESCOPE

An important benefit of SWAN is that it is independent of the underlying MAC layer, and can be potentially suited to a class of physical/data link wireless standards. As part of the future work would like to conducts emulations for more realistic scenarios with many wireless nodes and we would also like to explore queuing models based analysis for queue dynamics.

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REFERENCES

[1] Hayder Natiq Jasem, Zuriati Ahmad Zukarnain, Mohamed Othman, and Shamala Subramaniam "The New AIMD Congestion Control Algorithm",2009
[2] Dr.M.Zawodniok "WirelessAdhocandSensorNetworks", 2008
[3] Jagannathan Sarangapani, "Wireless Ad hoc and Sensor Networks: Protocols, Performance, and Control", CRC Press, 2007.
[4] D. Bansaland H. Balakrishnan, "TCP-Friendly Congestion Control for Real-Time Streaming Applications,"Technical Report, MIT-LCS-TR-806, MIT Laboratory for Computer Science, May2008.
[5] L. Koukhi, S. Cherkaout, "Intelligent Solution for Congestion Control in Wireless Adhoc Networks", 2009
[6] WanGang Zeng, "Improving TCP Performance over Wireless Networks", Communication Networks Laboratoryhttp://www.ensc.sfu.ca/research/cnlSimonFraserUniversity,2010
[7] G.-S. Ahn, A.T. Campbell, A. Veres, and L.-H. Sun, "SWAN: Service Differentiation in Stateless WirelessAdHocNetworks,"InternetDraft,work-in-progress,Sept.2002.
[8] S. Marwaha et al.: Challenges and Recent Advances in QoS Provisioning, Signaling, Routing and MAC protocols for MANETs. In: Proc. of Telecommunication Networks and Applications Conference, (2008).
[9] Magula, P.: Service Differentiation in Mobile Ad hoc Networks Information Sciences and Technologies Bulletin of the ACM Slovakia, Vol. 3, No. 2 (2011) 87-90
[10] B. Tavli, W. Henzelman: Mobile ad hoc networks – energyefficient real time data communications. Springer, (2006), ISBN-10 1-4020-4632-4.
[11] P. Mohapatra et al.: QoS in Mobile Ad Hoc Networks IEEE Wireless Communication. (2003).
[12] K. Nahrstedt: An Integrated Mobile Ad-hoc QoS Framework [Online; accessed February 20th, 2011].

BIOGRAPHY

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