WIRELESS NETWORK TRAFFIC MONITORING AND ANALYSIS - A SURVEY

A. K. Kavitha[1], Dr. S. Mary Praveena[2]
[1]Assistant Professor, [2]Associate Professor, Department of ECE
Sri Ramakrishna Institute of Technology, Coimbatore – 10
[1]kavitha.ece@srit.org, [2]marypraveena.ece@srit.org

Abstract

The performance of the next-generation wireless networks is targeted to support various applications such as voice, data, and multimedia over networks etc. For these applications, providing quality of service is an important objective in the design of the next-generation wireless networks because of the dynamicity of the data transferred. It is important to consider the measurement and analysis of internet traffic in order to avoid the problems that could occur such as loss of data and reduced rate of transmission of the data as the data transferred is of different size, format and the protocol used for the transfer of the data varies from application to application. The main objective of this paper is to review the flexible traffic measuring and analysis tools and the various issues and techniques in provisioning QoS for wireless networks by handling the dynamicity of the data transfer characteristics with respect to some of the recent researches in subareas like network services modeling, traffic specification, packet scheduling for wireless transmission, call admission control in wireless networks and wireless channel characterization. For each sub-area, the survey is carried out and the corresponding issues and the techniques adopted for addressing the particular issues, review of major approaches and mechanisms, and the trade-offs of the approaches carried out earlier are discussed.

Keywords:
Traffic Management, Traffic analysis, Flexibility, Network Monitoring, Data transferring rate, Scheduling.

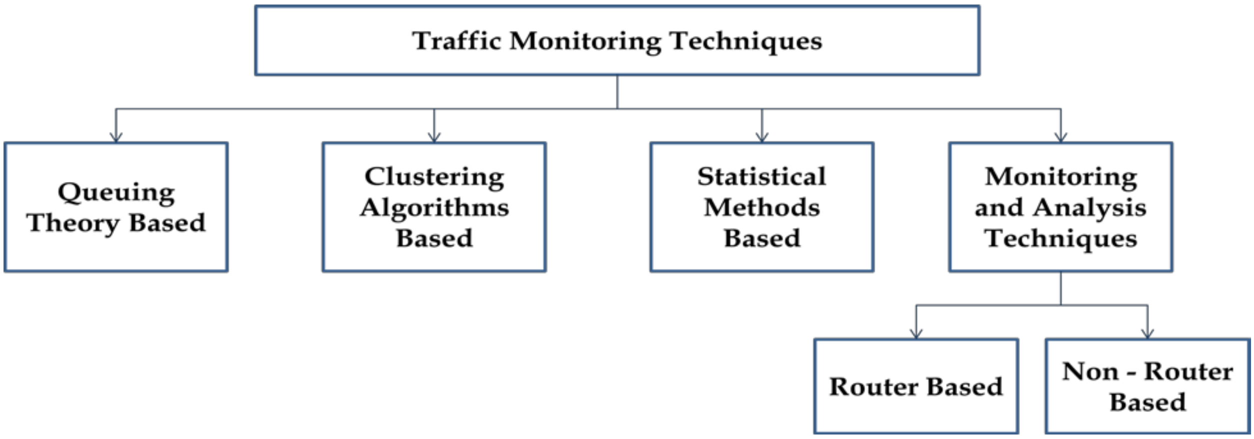
I Introduction:

In order to maintain the network system stability and availability to support various applications such as voice, data, and multimedia over networks, to fix network problems on time and to avoid network failure, to ensure the network security strength, and to make good decisions for network planning the internet traffic measurement and analysis are important. The process of network traffic measurement involves the measure of the amount and type of traffic on a particular network. This is especially important with regard to effective bandwidth management. One of the major issue in network monitoring is the speed and the performance of the data transfer which in turn ensures the better quality of service since the availability of the networks or online traffic may lead to the poor performance as it may introduce delay in data transfer. To avoid these kind of issues many tools have developed to measure and analyze the online traffic. Good traffic modeling is also a basic requirement for accurate capacity planning. This paper attempts to provide an overview of some of the widely used network traffic models, highlighting the core features of the model and traffic characteristics they capture best, the analysis methods and the techniques used for optimization.

II – Literature Survey

Classification of Monitoring and Analysis Techniques

There are various traffic monitoring techniques available based on many concepts and they are classified into four types such as Based on Queuing Theory, Based on Forecasting Algorithm, Based on Statistical Method and Monitoring Analysis Techniques[5].



Classification of Network Monitoring Techniques

Traffic management technologies in the SDN is carried out from the following aspects like traffic load balancing, QoS-guarantee scheduling, energy-saving scheduling, and traffic management for the hybrid IP/SDN. The design of a traffic scheduling algorithm to dynamically plan data forwarding paths to meet users requirements is done using the Veriflow Methodology of energy-saving scheduling, QoS-guarantee scheduling [1].

For Traffic Management and Net Neutrality in Wireless Networks, a set of regulations that limits an ISP's ability to restrict applications by requiring an open interface between network and transport layer has been developed[2].

Router based monitoring techniques have been provided for efficient and time saving system which helps to achieve reduced packet losses, lesser end to end delay and higher throughput. In the designed network there will not be any specific route to the destination node from the source node. Instead it is designed in such a way that the source node will broadcast route request about the data packets to all the nodes whenever it is in a position to send the packets. After receiving the acknowledgement from the responded node the packets will be transmitted in order for ensuring an efficient network traffic monitoring for wireless networks[5].

A history aware traffic engineering model has been developed as a techniques for obtaining traffic matrices featuring routing algorithms has been modeled by Telecommunications Laboratory of the National Technical University of Athens for Internet Traffic Engineering: History monitoring information[8].

Using Fuzzy Logic Control to Provide Intelligent Traffic Management Service for High-Speed Networks, IntelRate controller, is proposed to manage the Internet congestion in order to assure the quality of service for different service applications. The controller is designed by paying attention to the disadvantages as well as the advantages of the existing congestion control protocols. The effectiveness and superiority of the IntelRate controller, extensive experiments have been conducted in OPNET modeler [9].

A system of DNS-based solutions are proposed for providing flexible and fine-grained traffic offload control, considering UE devices supporting only a single PDN connection and UE devices supporting multiple concurrent PDN connections as an efficient solution for enhancing data traffic management in 3GPP Networks[10].

A new stochastic model characterizing the frame size sequence for MVC VBR sources has been proposed which exploits a Poisson Hidden Markov Model (HMM) representing the random frame sizes of the different MVC encoded views as a function of the random real video scene activity variations. The model was able to accurately characterize a class of MVC streams sharing similar content characteristics with the training data which is modeled for Multiview Video Traffic monitoring [11].

For Tidal Traffic, Multidimensional Markov Analysis has been carried for the understanding and implementation of traffic characteristics based dynamic radio resource management in the heterogeneous wireless networks[12].

Packet sniffer is used as a network monitoring tool[7].

III Conclusion

As the network keeps growing, the need of network monitoring and analysis tools have been increasing. The role of the administrators does not end with monitoring but if there occurs any fault in the network or failure it should be fixed on time and also responsible for avoiding the network failure because of network overload or outside threat. The network traffic information is used to meet the administrators need. For example, network utilization and network traffic characteristics can detect security vulnerabilities, the type of application that consumes more bandwidth can be used for network planning. In this paper, we categorized network traffic monitoring techniques and some popular free and commercial tools that can be used for the monitoring and analysis of the network.

References:

1. Zhaogang shu, Jiafu wan, jiaxiang lin, Shiyong Wang, Di Li, Seungmin Rho and Changcai Yang, “Traffic Engineering in Software-Defined Networking: Measurement and Management” IEEE ACCESS, Special section on green communications and networking for 5g wireless Volume 4, June 2016.
2. Lena T.Ibrahim, Rosilah Hasssan, Kamsuriah Ahmad, Asrul Nizam Asatand Halizah Omar, “Online Traffic Measurement and Analysis in Big Data: Comparative Research Review”, American Journal of Applied Sciences, 2016 13(4):420-431.DOI:10.3844/AJASSP.2016.420.431.
3. N.Brownlee, C.Mills, and G.Ruth, “Traffic flow measurement: Architecture”, RFC 2722, http://www.ietf.org/rfc/rfc2722.txt, 1999.
4. J.J. Garcia-Lunia-Aceves, Fellow IEEE and Rolando Menchacha-Mendez, “STROM: A Framework for Integrated Routing, Scheduling, and Traffic Management and in Ad Hoc Networks”, IEEE Transactions on Mobile Computing, Vol. 11, No. 18, Augusy 2012, pp:1345-1357.
5. M.Uma, G.Padmavathi, “An Efficient Network Monitoring For Wireless Networks”, International Journal of Computer Applications, Vol. 53, No. 9, September 2012, PP: 51-57.
6. Alisha Cecil, “A Summary of Network Traffic Monitoring and Analysis Techniques”, http://www.cse.wustl.edu/~jain/cse567-66/ftp/net_monitoring /index.html
7. Scott Jordan, “Traffic Management and Net Neutrrality in wireless Networks”, IEEE transactions on Network and Service Management, Vol. 8, No. 4, December 2011, PP: 297-309.
8. Paraskevi Fafali, Charalampos Patrikakis, Angelos Michalas, and Vassilios Loumos, “Internet Traffic Engineering: History monitoring information featuring routing algorithms”, Telecommunications Laboratory the National Technical University of Athens, Heroon Politechniou 9, Zographou, Greece 15773.
9. Jungang Liu, and Oliver W. W. Yang, “Using Fuzzy Logic Control to Provide Intelligent Traffic Management Service for High-Speed Networks”, IEEE Transactions on Network and Service Management, Vol. 10, no. 2, June 2013
10. Tarik Taleb, Yassine Hadjadj-Aoul, and Konstantinos Samdanis, “Efficient Solutions for Enhancing Data Traffic Management in 3GPP Networks”, IEEE Systems Journal, Vol. 9, No. 2, June 2015.
11. Lorenzo Rossi, Jacob Chakareski, Pascal Frossard, and Stefania Colonnese, A Poisson Hidden Markov Model for Multiview Video Traffic, IEEE/ACM TRANSACTIONS ON NETWORKING, VOL. 23, NO. 2, APRIL 2015.
12. WEN Juan, SHENG Min, ZHANG Yan, WANG Xijun, LI Yuzhou, “Traffic Characteristics Based Dynamic Radio Resource Management in Heterogeneous Wireless Networks” Selected Papers from IEEE/CIC ICCC2013, China Communications, January 2014.