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Hybrid Passive and Active Surveillance Approach with Interchangeable Filters and a Time Window Mechanism for Performance Monitoring

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Abstract- According to Bonald and Feuillet (2011), the management of network resources has taken on a new urgency with the highly interactive nature of modern computing and the increasing interdependence of networked applications. As a result, the monitoring of network behavior has become an integral part of management. It is critical that applications are armed with tools that can facilitate the estimation of performance and allow the selection of suitable encoding schemes, buffering sizes, and adaptation features. This paper examines the importance to assess the requirements for monitoring the network performance within a wireless environment for the processing and presentation of the statistical outcome of surveillance information. In comparison to the probing technique, which is based on the distance separating data packets, the two monitoring schemes lead to considerable traffic within the network. The proposed method will use a straightforward statistical analysis to determine variations in the network characteristics used a hybrid passive and active surveillance approach with interchangeable filters and a time window mechanism.

Keywords- Buffer Size, Surveillance Information, Interchangeable Filters, Time Window Mechanism

I. INTRODUCTION

Pallavi S. et al (2014) has concluded in their paper, buffering of burst at the contending nodes is a good option which increases the throughput and reduces the average delay. Finally, they showed the buffering in conjunction with deflection of bursts will provide very effective solution. Perkins, Hughes, and Owen (2012) opine that various Internet-supported applications have been introduced in the recent past. Most of them are interactive as they collect and use data on a real-time basis. For this reason, there has been diversification in the utilization of the Internet and the development of new application requirements. Correspondingly, there has been a tremendous growth in cellular as well as mobile communication frameworks (Holt, 2008). Consequently, the natural progression is to integrate the two to provide access to information from anywhere at any time. However, both infrared and wireless LANs are distance limited and hence this vision might be too farfetched but by employing technologies such as Frequency Hopping Spread Spectrum (FHSS) or Direct Sequence Spread Spectrum (DSSS) then the problem might be dealt with. FHSS and DSSS are used in radio signal transmission but if the same technology could be used in infrared and wireless transmission then the solution to internet access everywhere could be found soon. Wireless and infrared signals are often affected by reflections, noise and other environmental factors but FHSS is negligibly affected by environmental factors and hence might be the best solution. Ideally, the approach will ensure the simultaneous and unlimited access to the Internet from various networks and support the web's capacity to match user and application requirements to the characteristics of the system. Surveillance in wired and wireless networks is well explained by video wireless mesh networks. Different agencies use these networks since they are effective and affordable. The video wireless mesh is highly used in municipalities, enterprises and safety agencies since it can support voice and data applications under different paths. Such data on WAN and LAN hops is supported making is highly used wireless surveillance network. Installation on the other hand is easy since no fixed infrastructure is needed in installation. It is of profound importance to assess the requirements for monitoring the network performance within a wireless environment to recommend a flexible framework for the processing and presentation of the statistical outcome of surveillance information and allow the configuration of applications and the selection of networks. The question arises whether the active or passive monitoring approaches can be used and this has to be analyzed.

II. MONITORING APPROACHES

Studies on network monitoring tools and techniques group monitoring schemes into passive and active surveillance (Markl & Huhn, 2009). Active surveillance works by inserting probing traffic into the affected system for the purpose of extracting information regarding network attributes such as bottlenecks, the available bandwidth, and cyclical delays (IEEE, 2009).

Packet-pair or back-to-back probing is a useful technique for detecting bottleneck bandwidth. The approach is a measure of the time and space separating two arriving data packets (Markl & Huhn, 2009). The TCP is a standard method for measuring the available bandwidth by simulating the transfer of bulk data (Markl & Huhn, 2009). Treno makes use of the echo packets of the ICMP with congestion and flow control in modeling the TCP-based bulk data transmission, and it is from the transfer that the available bandwidth is derived (Markl & Huhn, 2009).

In comparison to the probing technique, which is based on the distance separating data packets, the two monitoring schemes

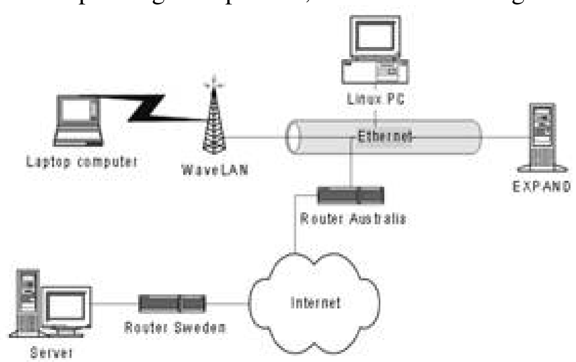

Figure 1: Test Bed

However, the data flows in applications compete with traffic control for the network resources. For this reason, active probing cannot be quantified in scarce resource situations (Nelson & Rebelo, 2009). Similarly, the delays related to obtaining results can be significant and render the approach inappropriate for use with QoS managers (Nelson & Rebelo, 2009).

Fortunately, passive schemes overcome the drawbacks of active approaches related to delay and overheads. They monitor systems to track the present network status as opposed to the introduction of surveillance traffic (George, Xia & Squillante, 2012). SPAND, a monitoring scheme, is based on the tenets of passive monitoring. It provides implements for the sharing of performance results among the host networks to enhance accuracy (George et. al., 2012). It operates via a centralized server where the applications relay

lead to considerable traffic within the network. It is important to note that both approaches measure the mean bandwidth over a given time. Bandwidth may also vary instantaneously during the measurement period (Nelson & Rebelo, 2009). The benefit of bottleneck bandwidth in the surveillance of network performance is that its value remains fixed as long as the routing path is continuous. However, the drawback is that the bottleneck value, although stable, is not an accurate reflection of the actual load and, as a result, it can be an over-optimistic measure (Marshall, 2010). Also, the metric does not take into account the degradation of throughput that may be as a result of the load of the server's CPU (Marshall, 2010). Consequently, the available bandwidth is more practical to applications than the bottleneck type that has a range of uses such as routing, selecting a network, and collecting background information for the statistical estimation of bandwidth. Active monitoring offers an accurate approach for the determination of the network characteristics.

the measured parameters. The premise of the approach is that the hosts from a given region can use a similar route to access a remote host, and this enables them to share information (George et. al., 2012). Further, it assumes that the performance of the network is stable and generates a reasonable result for a given time. The last assumption is valid in the context of fixed Internet situations. However, as shown in figure 1, it is invalid in the wireless Internet scenarios (Markl & Huhn, 2009). A wireless network's performance depends on a range of factors such as the current load, multipath fading, the transmitted power, and interference. In turn, such factors are subject to the geographical location of the host. Consequently, the sharing of results from measurements by hosts may contribute to unreliable estimates.

Clearly, neither passive nor active monitoring can be used directly in the control of wireless Internet. On the contrary, it is conceivable to develop a hybrid approach that employs passive monitoring in the wired segments and the active surveillance of the unwired parts as well as a windowing mechanism for accounting for instantaneous fluctuations (Marshall, 2010). The hybrid scheme offers a universal tool for measuring performance for the rapidly growing wireless network environments. As shown in figure 2, the treatment of the wireless and wired segments is independent. The passive scheme employs EXPAND, an expanded SPAND server, to support active monitoring within a fixed network component.

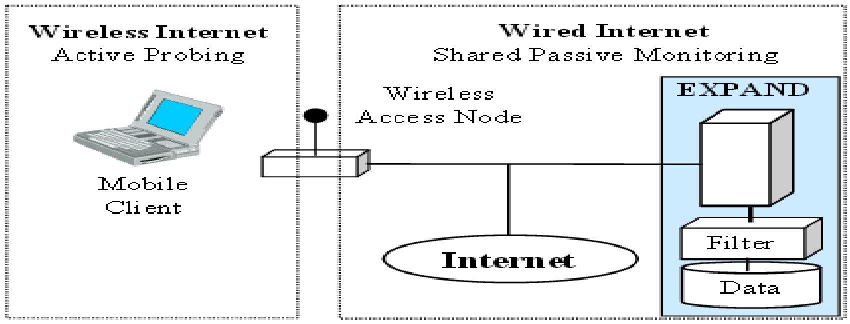

Figure 2: The Hybrid Approach

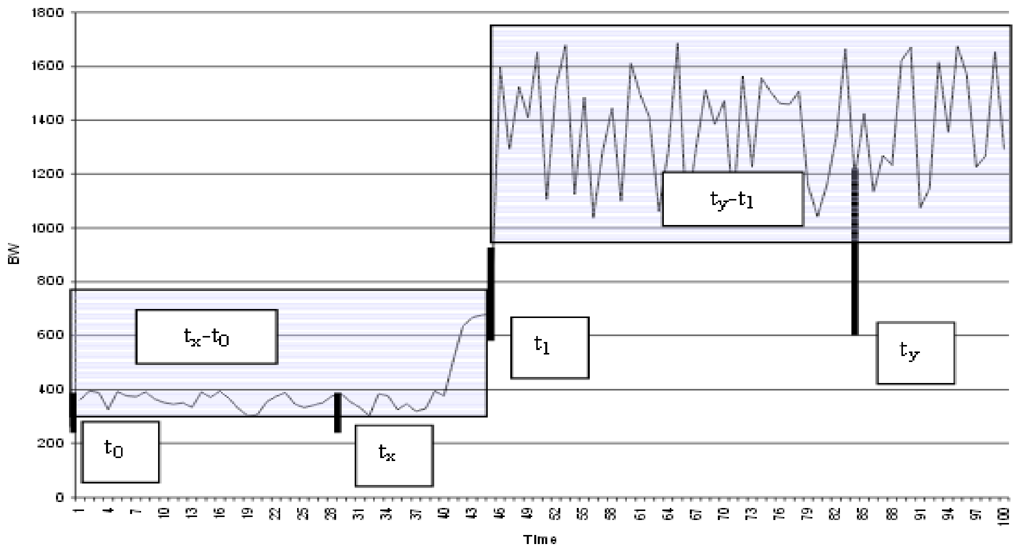

Figure 3: Data Regions of the Dynamic Window

The proposed method will use a straightforward statistical analysis to determine variations in the network characteristics. Schematically, the mechanism is as indicated in figure 3.

At a time t, where t is equivalent to tx and 0 < tx<t1, the data to be calculated will be between t0 and tx. It implies that, on the detection of a step change, the data set to be analyzed will be between t1 and ty whereas that which is between t1 and t0 will be disregarded (Nelson &Rebelo, 2009). The mechanism for the detection of a step change involves calculating the standard deviation of the mean value of normalized data. The parameter will indicate the measurements' variability and reveal a step change. Normalization is critical to the quantification of variability in measurements. The threshold value (δ) is defined and compared with the aggregate standard deviation to detect any change as shown in figure 4. A step change is detected when the following mathematical statement is true:

$$\delta \leq \frac{\frac{1}{n-1}\sum_{i=1}^{n}\left(x_i-\bar{x}\right)^2}{\frac{1}{n}\sum_{i=1}^{n}x_i} \qquad \textbf{(1)}$$

Where δ = sample standard deviation
$\sum$ = sum of...

$\bar{x}$ = sample mean
n = number of scores in sample
Figure 4: Detection of a Step Change

In the formula above, n will be the size of the data whose standard deviation will be calculated, xi are the values in the data where $xi = x1, x2, \ldots xn,$ and $\bar{x}$ is the mean of the data. A data of 50 items (n) with a mean value ($\bar{x}$) of 30, and $\sum(x-\bar{x})^2$ (which is the sum of the difference between every value of the data and the mean) of 178, and total sum of the values $\sum x$ of 251 will have a standard deviation of

$$\frac{\frac{1}{50-1}\times 178}{\frac{1}{50}\times 251} = \frac{3.6326}{5.02} = 0.7236$$

When the value of the δ is less than or equivalent to 0.7236 there will be a detection of step change in the data.

IV. Conclusion

It has been discussed neither passive nor active monitoring can be used directly in the control of wireless Internet. On the contrary, it is conceivable to develop a hybrid approach that employs passive monitoring in the wired segments and the active surveillance of the unwired parts as well as a windowing mechanism for accounting for instantaneous fluctuations (Marshall, 2010). Compared to instantaneous measurements, the dynamic windowing mechanism presents a consistent and reliable approach to determining the state of a given network as well as extracting suitable regions.The mechanism for the detection of a step change involves calculating the standard deviation of the mean value of normalized data. A step change is detected and shown above. The hybrid scheme offers a universal tool for measuring performance for the rapidly growing wireless network environments.

The wireless networks have been used in the field of surveillance when compared to the wired networks. The availability and reliability of these networks has increased the number of the wireless networks in the world.

References

[1] Bonald, T., & Feuillet, M. "Network performance analysis". London, UK: ISTE **2011**.

[2] George, D. K., et al "Exact-order asymptotic analysis for closed queuing networks" Journal of Applied Probability, 49(2), **2012, 503-520.**

[3] Holt, A. "Network performance analysis: Using the J programming language" London, UK: Springer **2008**

[4] Markl, C., & Huhn, O. (Eds.). "Evaluation of prioritization in performance models of DTP Systems" IEEE Conference on Commerce and Enterprise Computing CEC'09: Vienna, Austria: IEEE. **2009**

[5] Marshall, P. "Quantitative analysis of cognitive radio and network performance" Norwood, MA: Artech House. **2010**

[6] Nelson, P., & Rebelo, P. "Network performance". New York, NY: Taylor & Francis. **2009.**

[7] Perkins, D. D et al Proceedings of IEEE International Conference on Communications COC'12: Factors affecting the performance of ad hoc networks. Lafayette, LA: IEEE, **2012**.

[8] Pallavi S and M. Lakshmi, "Estimation Of Burst Length in OBS Networks" Indian Journal of Computer Science and Engineering (IJCSE). Vol.5, Issue-2, **2014,** pp.**78-84**. e-ISSN:0976-5166 p-ISSN:2231-3850.

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