Packet Loss in Wireless Networks

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Abstract

It is well known fact that packet loss is big problem in networks, in this paper we analyze the importance and cause of packet loss in networks, this packet loss caused by buffer overflow in intermediate network nodes. Packet loss causes performance degradation. The buffer overflow is controlled by setting a threshold value which is equal to the buffer size of the node. If the threshold limit is reached, rate of flow of packets is reduced to reduce packet loss. The Overflow of link is controlled by setting a threshold value which is equal to the link capacity between the nodes. If the threshold limit is reached, packet loss is decreased by reducing the rate of flow of packets. The simulation results show that packet loss in link and buffer is reduced significantly after introducing threshold mechanism. We illustrate out approach with examples.

Keywords: Packet loss, Wireless networks, Link capacity, IEEE 802.11

1. Introduction

Understanding the packet loss process in wireless networks and providing accurate solution to describe it are of great importance for the design and performance of network applications. Packet loss is one of the important criteria which need to be controlled to achieve the required performance of wireless networks. If packet loss is not controlled then will be a decrease in the performance of wireless networks. If the packet loss is not controlled then will be a decrease in the performance of wireless networks. The reasons for the packet loss in wireless networks should be. Packet loss is one of the important criteria which need to be controlled to achieve the required performance of wireless networks. If packet loss is not controlled then will be a decrease in the performance of wireless networks. If the packet loss is not controlled then will be a decrease in the performance of wireless networks. The reasons for the packet loss in wireless networks should be identified first and then only, it can be reduced. Packet loss may occur in the buffer of a node, if the size of the buffer becomes less than the flow of packets into the buffer. Packet loss occurs in the wireless link between two nodes, if the link capacity becomes less than the rate of flow of packets.

Wireless network refers to any type of computer network that is not connected by cables of any kind. Such as Environment sensing, Health care, Manufacturing industry and Transport industry. The loss of packet in the buffer and the wireless link can be reduced by sending the threshold limit and if it is reached then the rate of flow of packets should be reduced. The threshold set for the buffer is the buffer size. The packets are made to flow between nodes until the threshold limit is reached. The threshold limit is reached or not can be identified by continuously comparing the threshold value with the amount of packets accumulated in the buffer. The packet flow is continued until the threshold limit is less than or equal to the amount of packets in the buffer. When the packets in the buffer exceed the threshold limit then the flow is slowed down. The packet loss due to buffer overflows is reduced to a large extent after introducing threshold when compared the scenario of packet loss due to buffer overflow before introducing threshold.

2. Analysis on Packet Loss in Wireless Network

An alternative of way of characterizing the packet loss process is to distinguish explicit factors that contribute to packet loss in networks. Buffer overflow due to congestion in routers in the major cause of packet losses, such as buffer overflows A Packet loss in buffer due to buffer overflow buffer overflow occurs due to the shortage of space in the buffer to store the packets which leads to packet loss. If the flow of packets is greater than the size of the buffer then there is a packet loss. The amount of packet loss is taken into account and the transmission of packet continues. Since there is no threshold mechanism for buffer size.

2.1 Packet loss in link due to link capacity overflow

The Link capacity overflow occurs when the rate of flow of packets is higher than the link capacity. There will be packet loss when there is a link capacity overflow. Rate of flow of packets while passing through the wireless link between the nodes are calculated. The link capacity in the wireless link

depends upon the signal strength available. The link capacity varies with the variation in the received signal strength of a node. The link capacity can be calculated as

Link capacity =Link utilization + Available link space

The link utilization is the part of the link being utilized by the node during packet transmission. Available link space or free link space is the part of the link which is empty or not being utilized by the node during transmission of packet. Packet loss will continue to occur if the link utilization or the rate flow of packets exceeds the link capacity making link space unavailable. Since there is no threshold mechanism for link to control packet loss, the packet loss increases.

3. Proposed Work

A reducing packet loss in buffer due to buffer overflow
The packet loss in buffer due to buffer over flow can be reduced by introducing the threshold mechanism. The threshold value set for reducing packet loss in buffer is Buf-threshold. The maximum size of the buffer(Buf-max) is assigned as the Buf-threshold. When the number of packets in the buffer(Buf-used) exceeds the threshold them slow down the flow packets, thus reduces the packet loss.

3.1 Algorithm: Reducing packet loss in buffer due to buffer overflow.

1) Set maximum buffer size(Buf-max) to 20 packets

2) Set Buf-threshold to Buf-max

3) Measure the number of packets in the buffer (Buf-used)

4) If(Buf-threshold> Buf-used)

  Store the packets in the buffer and continue the transmission of packt

else

slow down the transmission of packet

end if

After packets transmitted to the destination node, the size of the Buf-used increases according to the accumulation Of packets in it. Each time when packet flow occurs, the buf-used of the destination node is compared with the Buf-Threshold. The flow of packets continues until the increasing Buf-used is less than the Buf-threshold. If Buf-used exceeds Buf-threshold, then slow down the transmission of packets and measure the packet loss. The packet loss will be highly reduced when compared to the existing system approach.

3.2. Reducing packet loss link due to link capacity Overflow

The packet loss in the wireless link is reduced by applying threshold value set for reducing packet loss in link is Link-threshold. The maximum capacity of the link(Link-max) is assigned to the Link-threshold. Link utilization is the measure of number of packets flow through link (Link-used).

3.3. Algorithm

Reducing packet loss in link due to link capacity overflow

1) Measure the received signal strength
2) Set the maximum link capacity (linkp-max) based on the received signal strength
   (for example the signal strength form-12 dbBM to -92 dBm is set to link capacity of 1 kbps (link-max))
3) Therefore higher the signal strength then higher the link-max
4) Set the link-threshold to link-max
5) Measure the link utilization (link-used)
6) If link-threshold>link-used
   Continue the transmission of packet else slow down the transmission of packet
   End if
7) Go to step1

If the signal strength is zero then the wireless link between the nodes is unavailable. Since the link is not present between the nodes. Transmission of packets between then is not possible. It is assumed that if the signal strength varies from 1 to 5 then value of Link-max varies from 1kbps to 5 kbps. If Link-used exceeds the Link-threshold then slow down the transmission of packets to reduce packet loss.

## 4. Performance Analysis of packet issues in Wireless Networks Node

Packet Loss in buffer due to buffer overflow
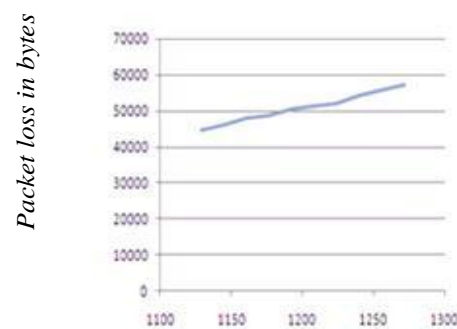
Time in milliseconds
Packet loss due to buffer overflow

Fig1: shows the packet loss due to the buffer overflow without the threshold mechanism. It reveals that the packet loss increases when the simulation time increases.

4.1 Reducing packet loss in buffer due to buffer overflow
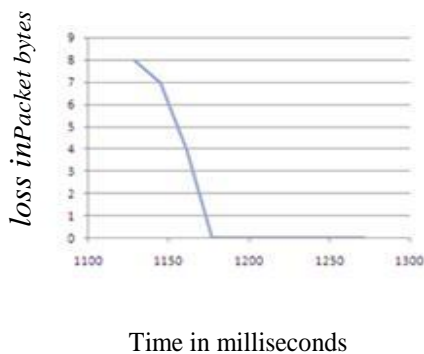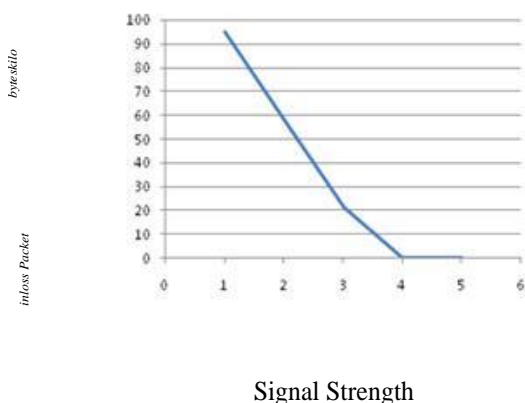

Time in milliseconds
Fig.2 Reducing Packet loss in buffer.

Fig: 2 Shows the packet loss due to the buffer overflow with threshold mechanism. It reveals that the packet loss decreases when the simulation time increases.
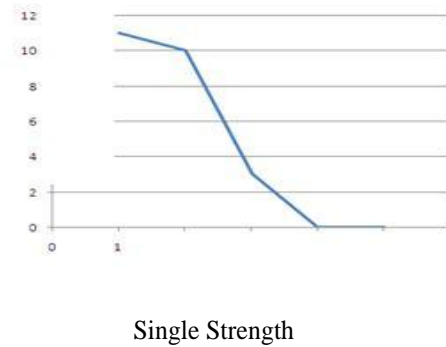
4.2 Packet loss in link due to capacity overflows

Packet loss due to link capacity overflows without the threshold mechanism. It reveals that the packet loss increases rapidly with the decrease in signal strength.

Signal Strength

Fig3: Packet losses due to link capacity overflow

4.3 Reducing loss in link due to link capacity overflow

Single Strength

Fig:4 Reducing packet loss in link

Fig: 4 Shows that packet loss due to link capacity overflow with threshold mechanism.. it reveals that he packet loss decreases with the increase in signal strength.

Conclusion

This paper describes the analysis of packet loss in wireless networks in node and links using a threshold mechanism that reduces the packet loss in the buffer and the link of wireless network. The packet loss in the buffer of a node is due to the overflow of buffer. The packet loss in the link between the nodes is due to the over flow of link capacity.

10. References

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