Differentiated Contention window scheme for IEEE 802.11 Wireless Networks

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Introduction

A new contention window scheme is proposed to incorporate the application dependency. In default scheme the contention window change is similar for all applications, it is not application dependent.

The basic idea of the proposed mechanism is that the change in contention window size is different for Real time applications and data traffic applications. The proposed mechanism improves the quality in terms of delay, jitter, and loss. The performance of the new scheme is also discussed with simulation results.

Methods

Default scheme:

For default increment scheme:
Contention window is getting doubled every time.
i.e, CW = 2*CW
If CW > CWmax,
then CW = CWmax
For default decrement scheme:
Contention window is resetting to its minimum.
CW = Cwmin

proposed scheme:

Increment formula is:
For Real time applications(UDP):
CW = CW++; (modified formula)
If CW > CWmax
CW = CWmax
For Data traffic(TCP):
CW = CW * 2; (default formula)
If CW > CWmax
CW = CWmax
Decrement formula is:
For Real time applications(UDP):
CW = CWmin; (default formula)
For Data traffic(TCP):
CW = CW-- ; (modified formula).
If CW < Cwmin
CW = Cwmin

Always CWmin <= CW <= Cwmax

Below figure illustrates the growth of the contention window as the number of transmissions

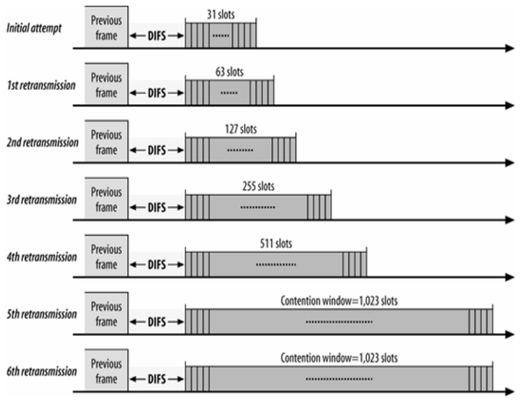


Figure 1: Contention Window in IEEE 802.11Std.

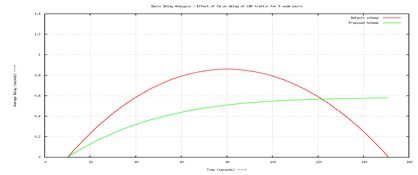
Results

In proposed scheme :

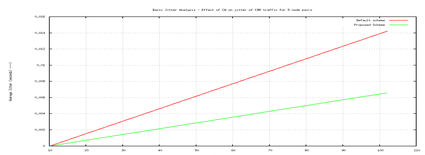
Delay is decreased.
Jitter is decreased.
Loss is decreased.
Throughput is decreased.

Below graphs show the comparison between defaults, proposed schemes of QoS parameters for 5 node pairs.

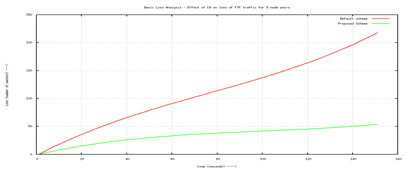
Delay comparison between defaults, proposed schemes



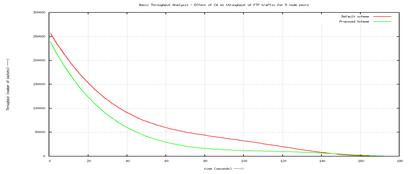
Jitter comparison between defaults, proposed schemes



Loss comparison between defaults, proposed schemes



Throughput comparison between defaults, proposed schemes



Conclusions

The proposed differentiated scheme for Contention Window mechanism reduces the average delay, average jitter for CBR traffic and it reduces the loss, and throughput for FTP traffic.

Bibliography

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2. 802.11 Wireless Networks -The Definitive Guide – by By Matthew Gast