An adaptive transmission control considerable available bandwidth

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This paper present new adaptive transmission control method which provides reduce propagation delay and less traffic congestion at routers considering the available band width of outgoing transmission lines.

It give a effective the this method, an adaptive transmission control to available band width, for conform by simulation program.

It's perpus how make packet generate without make congestion on transmissin lines, but how do to congestion avoidance method. It is clear from Traffic Theory which only solution of congestion avoidance is stopped generate packet on sender. To packet generate control, it is importnce to traffic measureing mechanism detect to increase traffic on transmission lines as fast as.

Provide method has basical two mechanism as following

- Traffic measuring mechanism.

  To grasp of traffic on a long-term, value of average queue length Lq_{avg} presume from value of queue length Lq at output port of router exist on transmission lines. The average queue length Lq_{avg} feedback to all segment connected to router by broadcast, possible outgoing to output port.

- Packet generate control mechanism which adapt to available sending rate.

  It controled packet generate adapt available sending rate λ, after ρ and available sending rateλ compute by average queue length Lq_{avg} feedbacked from router.

The traffic mesureing mechanism was demand on most of importance detection increase traffic as fast as. To it hold back effect burst traffic and short-term increases in

the queue length thatfrom transient congestion do not resutl in a significant increase in the average queue size.

Thus,

$$Lq_{avg}(t) = (1-w)Lq_{arg}(t-1) + wLq_{obs}(t) \tag{1}$$

w : $(weight)$ is effect responce to queue length and convergent to target value. It's exist trade-off, as follow, if w were case of small value, it's give lettle effect for average queue lengthLq_{avg}, but can not follow up flucture of traffic in short-term,the other side, if were case of big value, it's catch flucture of traffic in short-term, but Lq_{avg} can not converge to target value. The value of weight$w$ was decide by simulation program's result which to confirm of responce and convergement.

In addition, it's effect by measure interval time, to it not pass over traffic various. The case of short measure interval time, it following up traffic various in short term, but it increase overhead of measuring. the other side, if case of measure interval time is long, it is litte effect in short term, but it overlooked most of impotrance traffic various. It's exist trade off too.

The measure interval time was a half propagetion delay of traffic lines from $Nyquist$ interval. It is occur to can not detect traffic various, if measure interval time longger than $Nyquist$ interval.

It must consider beedback to sender presumed average queue length Lq_{avg}, but small effect becauce of presume average queue length Lq_{avg} is effective on long term, it is less than feedback time.

The other is packet generate control mechanism which compute ρ and available band width, which controled to packet generate sending value $lambda_c$, by average queue length Lq_{avg} from traffic measure mechanism. This system assume to $M/M/1$ queuing model, then relations between busy rate ρ to average queue length Lq_{avg} is as follow equation.

$$Lq_{avg} = \frac{\rho^2}{1-\rho} \tag{2}$$

To solve by busy rate ρ, we get following result,

$$\rho = \frac{-Lq_{avg} + \sqrt{Lq^2 + Lq}}{2} \tag{3}$$

It,s establish available busy rate ρ_{max}, since the busy rate ρ step by step to 1, then avarage queue length Lq_{avg} is ∞.

The leading line busy rate ρ calculate to subtract itselt traffic from maximum available λ_{max}, since multiply the line servece rate μ by line busy rate ρ is include itself traffic.

The packet generate control mechanism is adjust packet generate rate λ_c. This mechanism is most of importance at increased traffic, in the other word, at available band width is decreased. At the available packet generate rate λ_c for decreased, if it ware not controled packet generate, conditions a change for the worse by genereted traffic made to itself. Therfore, individual packet's propagetion delay time is increase it, mechanism

control is hards. On the other hand, case of at traffic on lines is decrease, then problem is only effective used to band width, it not effect increase of packet's propagation delay.

It confirmed reduce individual packet's propagation delay time which show effective of this propose method which result of simulation program by proposed method.