NAME

cc_chd - CHD Congestion Control Algorithm

DESCRIPTION

CHD enhances the HD algorithm implemented in cc_hd(4). It provides tolerance to non-congestion related packet loss and improvements to coexistence with traditional loss-based TCP flows, especially when the bottleneck link is lightly multiplexed.

Like HD, the algorithm aims to keep network queuing delays below a particular threshold (queue_threshold) and decides to reduce the congestion window (cwnd) probabilistically based on its estimate of the network queuing delay.

It differs from HD in three key aspects:

- The probability of cwnd reduction due to congestion is calculated once per round trip time instead of each time an acknowledgement is received as done by cc_hd(4).
- Packet losses that occur while the queuing delay is less than queue_threshold do not cause cwnd to be reduced.
- CHD uses a shadow window to help regain lost transmission opportunities when competing with loss-based TCP flows.

MIB Variables

The algorithm exposes the following tunable variables in the *net.inet.tcp.cc.chd* branch of the sysctl(3) MIB:

queue_threshold Queueing congestion threshold (qth) in ticks. Default is 20.

pmax Per RTT maximum backoff probability as a percentage. Default is 50.

qmin Minimum queuing delay threshold (qmin) in ticks. Default is 5.

loss_fair If 1, cwnd is adjusted using the shadow window when a congestion related loss is detected. Default is 1.

use_max If 1, the maximum RTT seen within the measurement period is used as the basic delay measurement for the algorithm, otherwise a sampled RTT measurement is used. Default is 1.

SEE ALSO

cc_cdg(4), cc_cubic(4), cc_dctcp(4), cc_hd(4), cc_htcp(4), cc_newreno(4), cc_vegas(4), h_ertt(4), mod_cc(4), tcp(4), khelp(9), mod_cc(9)

D. A. Hayes and G. Armitage, "Improved coexistence and loss tolerance for delay based TCP congestion control", *in 35th Annual IEEE Conference on Local Computer Networks*, 24-31, October 2010.

ACKNOWLEDGEMENTS

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HISTORY

The **cc_chd** congestion control module first appeared in FreeBSD 9.0.

The module was first released in 2010 by David Hayes whilst working on the NewTCP research project at Swinburne University of Technology’s Centre for Advanced Internet Architectures, Melbourne, Australia. More details are available at:

http://caia.swin.edu.au/urp/newtcp/

AUTHORS

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