CSE322 Project Proposal
HRED

An Active Queue Management Algorithm for TCP Congestion Control

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Reference

HRED, An Active Queue Management Algorithm for TCP Congestion Control

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Abstract

- Random Early Detection (RED) is an AQM strategy that keeps history of queue dynamics by estimating an average queue size parameter ***avg*** and drops packets when this average exceeds preset thresholds.
- An enhancement to the drop probability calculation to increase the performance of RED is proposed here.
- The proposal suggests a nonlinear adjustment for the drop rate at the midpoint between the minimum and maximum thresholds.
- Hence, the term Half-Way RED or simply, HRED.

Proposed Algorithm

Preset min_{th}, max_{th}, max_p, w_q

Set $avg = 0$, $midpoint = min_{th} + (max_{th} - min_{th})/2$

For every packet arrival update avg (Eq.1)

IF ($avg \geq min_{th}$ && $avg < midpoint$) THEN

Calculate p_b(Eq. 2)

Calculate p_a(Eq. 3)

Drop arriving packets with probability p_a

ELSE IF ($avg = midpoint$) THEN

p_a=0.5

ELSE IF ($avg \geq midpoint$ && $avg < max_{th}$) THEN

Update p_a(Eq. 3)

ELSE IF ($avg \geq max_{th}$) THEN

p_a=1.0

$$avg = (1 - w_q) * avg + w_q * q \quad (1)$$

$$p_b = max_p \left(\frac{avg - min_{th}}{min_{th} - max_{th}}\right) \quad (2)$$

$$p_a = p_b \left(\frac{1}{1 - count * p_b}\right) \quad (3)$$

Where is:

avg : Average queue size.

w_q : A weight parameter, $0 \leq w_q \leq 1$.

q: The current queue sizes.

p_b: Immediately marking probability.

max_p: Maximum value of p_b.

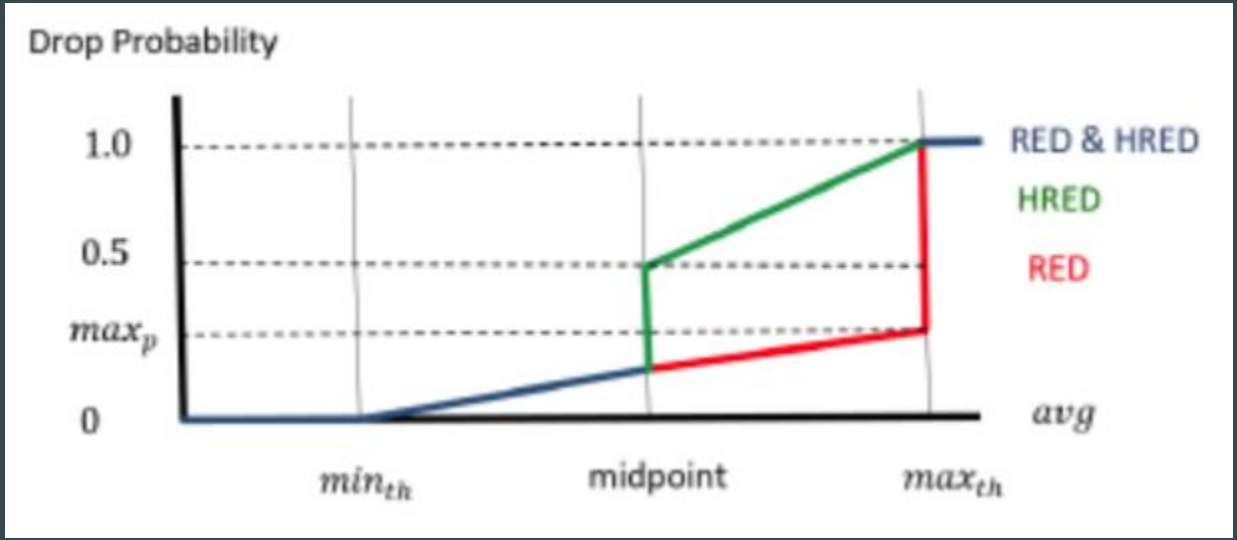
min_{th}: Minimum threshold.

max_{th}: Maximum threshold.

p_a: Accumulative probability.

$count$: number of undraped packets since the last dropped one.

Expected Result



Expected Scenario

- The throughput will be increased to higher level comparing to the original RED.
- The link utilization of TD will also be higher than that of Gentle-RED.
- The drop rate will be less oscillated than the original RED.