Review by : Haris Volos
Paper : Random Early Detection Gateways for Gongestion Avoidance
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The paper presents an active queue management technique of preventing congestion in packet-switch networks called Random Early Detection (RED) gateways. RED is based on the observation that congestion can most accurately be understood at the gateway, since it can distinguish high propagation delay from high delay brought on by increasing queue lengths. Therefore, they suggest that congestion detection should be done at the gateway. Congestion is detected in the gateway by measuring the average queue length, and notification of congestion to sources is done by either dropping packets or marking them. This mechanism has some desirable properties, including not being biased against bursty traffic, and being able to avoid global synchronization, a problem where all hosts in a network are notified of congestion at the same time and simultaneously reduce their window size and output to the network. The key way that RED follows to achieve the above properties is through its randomization mechanism. When packets are marked randomly, the probability that a particular packet is marked is proportional to the bandwidth that the connection it is on is consuming.

Concerning some weak points of the paper, I think while the paper gives some good science on the parameters of the RED gateways, how to select the values of the parameters is an open engineering problem. It seems to me that the network engineer has to try a lot to tune the RED gateways under different traffic loads. Another issue is related with fairness and misbehaviour. Although RED could identify connections using a large share of the total bandwidth using the marking-probability method, it could realize the fairness only cooperated by the congestion avoidance algorithm in transport-layer. In another words, RED only could indicate the misbehaving users, but the control and avoidance work should be done in the transport-layer which is contrary to what they argue that RED could be deployed without changes in end-to-end protocols.

Active queue management and RED specifically is a very elegant way of reducing the congestion in the network since they attack the problem at the moment it appears. Moreover the fact that it can be gradually deployed without needing all the Internet routers get changed made makes the method very promising. RFC-2309 encourages the use of RED in Internet. Moreover, from some research I did I found that Cisco has routers with WRED capability, a variant of RED. All these indicate that people have considered RED in use of today's Internet.