Random Early Detection (RED)

15-744 Computer Networks

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September 24, 2010

Why We Need it?

• We learned TCP congestion control last week!
  – Sent, ACKed, congestion window, AIMD, etc.

• Issues
  – TCP needs to create losses to find the available bandwidth of the connection.
  – Who’s the best to detect congestion and resolve it?
  – Full queue of a gateway significantly increases the average delay.
  – Congestion avoidance by Gateway!

Key Design Concepts of RED (1/2)

• How to know?
  – Average queue sizes
  – Effect of a low-pass filter
  – Busty traffic vs persistent traffic

• How to let them know?
  – Drop a packet or Mark a packet probabilistically.
  – Dropping requires end hosts to follow the TCP rule
  – Marking requires end hosts to understand the special bits

Key Design Concepts of RED (2/2)

• Avoid global synchronization
  – Prevents underutilization

• Fairness
  – More share of the bandwidth, more likely to be dropped

• Randomly drop or mark a packet with prob p!
Discussion

• Based on other literature and Class Discussion Pages

• Dropping or Marking a packet?
  – Understandable in the TCP context, may not be in other protocols or to ignorant users.
  – In ATM network, if one cell is dropped, then all the others are useless.

• Queue?
  – Largely rely on FIFO
  – How to determine optimum average queue size for max throughput and min delay for various configurations?
  – Scheduling or multi-level queue?