Note on Bandwidth Estimation

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March 27, 2013

1 Target

We need to way to determine the available bandwidth between two hosts with in our action network.

2 Solution

2.1 Existing Approaches

There are some traditional ways to do bandwidth estimation:

1. Passive Estimation
   Based on the statistics data from previous traffic. This is not quite useful in out data center networks

2. Active Estimation : Package Pair
   Send two package through the link we want to test, waiting for the echo. Estimate the available bandwidth by examination on the difference of the gaps between the first bits of the sent packages and the echos.

3. IGI Algorithm
   The IGI algorithm sends a sequence of packet trains with increasing initial packet gap. We monitor the difference between the average output gap and the input gap for each train and use the first train for which the two are equal. This point is called turning point. At this point, we use the IGI formula to compute the competing bandwidth. The available bandwidth is obtained by subtracting the estimated competing traffic bandwidth from an estimate of the bottleneck link bandwidth.

2.2 Drawbacks

Drawbacks of the aforementioned techniques:
They all requires sending multiple packets through a period of time, and its accuracy is largely affected by the variation of the competing traffic. The statistics nature of this algorithm make a real-time estimation very hard to achieve.

2.3 Proposed Solution

Bandwidth estimation based on network resource allocation scheduler and an variant factor α.

3 Reference

Estimating Available Bandwidth Using Packet Pair Probing, Ningning Hu, Peter Steenkiste September 9, 2002 CMU-CS-02-166

Evaluation and Characterization of Available Bandwidth Probing Techniques, Ningning Hu, Student Member, IEEE, and Peter Steenkiste, Senior Member, IEEE