

CSC2231 – Internet Systems and Services

Paper Review – End-to-End Effects of Internet Path Selection

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Using various traces of round-trip time and loss rates between Internet hosts, Savage et al. investigate whether choice routing path has a significant impact on end-to-end performance. They do this by building a graph in which vertices represent end hosts and edges represent paths. Note that each edge represents a path between two end hosts and not a hop. After removing the path between two vertices, A and B, the authors perform shortest path calculations on the remaining graph to determine the shortest possible alternate path from A to B.

I'll admit that I'm not 100% sure whether this is a correct description, since the methodology seems a bit strange to me. From what I understand, this methodology implies that the alternate paths will go through other Internet hosts. As such, their results are only relevant to P2P topologies and not Internet routing in general. In fact, the authors admit that they have no information about the Internet's internal topology. If this is the case, then the authors have investigated the benefits of overlay routing and not Internet path selection – unless I have misunderstood something.

Their results show that end-to-end connections can experience (roughly from Figure 4) a 25 to 50KBps increase in bandwidth by routing through alternate paths. This reflects one of the theoretical motivations for developing overlay networks – that higher bandwidth can potentially be available through a peer along the Internet's edge, rather than through the Internet core.

The authors also mention that 30% to 50% of the alternate paths yield a shorter round trip time. Although this appears to be true, the graph that is provided (Figure. 1) is remarkably similar to a Gaussian CDF with a mean of 0. The alternate paths that *are* different (whether shorter or longer RTTs) appear to be (roughly) normally distributed on either side of the mean. In other words, it appears that there is no clear statistical benefit from choosing an alternate path in terms of shorter RTTs.

Regardless, the study was interesting and (if my understanding of their methodology is correct) there are some interesting results relevant to overlay routing.