

A distributed measurement method exploiting path overlapping in large scale network systems

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Abstract. We propose a distributed method for measuring the quality (in terms of latency, loss rate, available bandwidth, etc.) of end-to-end paths in large scale network systems. Our method relies on the observation that the IP level routing paths between end hosts in IP networks often overlap with each other. The main idea is that neighboring measurement agents exchange the route information to detect overlapping paths and adjust the measurement frequency of each path, and share the measurement results of overlapping paths to enhance measurement accuracy and reduce measurement overhead. Our method requires neither a central controller, nor complete topology knowledge of the IP network at each measurement agent. Simulation results show that the relative error in the measurement results of our method can be decreased by half when the measurement metric is latency, and 65% when the measurement metric is available bandwidth, compared with the existing methods. We also confirm that our fundamental idea of exchanging measurement results contributes more to the enhancement of measurement accuracy than increasing measurement frequency.