

## A graph-theoretic study of the flattening internet as topology

Mohammad Z Masoud, Xiaojun Hei, Wenqing Cheng

Networks (ICON), 2013 19th IEEE International Conference on IEEE

**Abstract:** The Internet topology at the autonomous system (AS) level has been under heavy investigation in recent years. Previous studies have shown that the Internet AS topology exhibits a power-law node degree distribution and a small-world structure. With the proliferation of peering links and IXPs between ASes, the traditional hierarchical Internet has been more flattened. In this paper, we conducted a graph-theoretic study of the Internet AS topology and applied the centrality metrics (including betweenness and closeness) to quantify the AS core. To this end, we implemented a progressive node deletion algorithm to eliminate high-rank AS nodes from the AS topology in order to study whether the AS topology maintains as a tiering graph. To evaluate the proposed algorithm, we constructed the Internet AS topology based BGP dumps harvested from 50 route servers. Our results show a strong trend quantitatively that the Internet AS topology has become much more flattened. The Internet is more resilient to node and link failures and is difficult to be torn down. This AS topology evolution trend may result in significant traffic shifting and potentially reshaping the global telecom industry.