



Understanding Cloud Network Performance

Todd Arnold

Columbia Univ/West Point

Date: Dec 3rd, 2020

Time: 15:00 – 16:00

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Abstract:

Internet flattening has so fundamentally altered the structure of the Internet that the preponderance of Internet traffic is generated and transmitted by a decreasing number of networks, transpires on private connections, does not cross the traditional Internet hierarchy, and is not visible to the public Internet. The large cloud providers are major drivers of Internet flattening by deploying some of the Internet's largest global networks. As the tactics for users to access content shifts dramatically in favor of a flattened Internet and consolidation onto major cloud provider infrastructure, we need to understand the progress of Internet flattening and its affect on user perceived performance. We present the first comprehensive study of cloud provider networks versus the public Internet, and propose a new metric, hierarchy-free reachability, that reflects network interconnectivity to measure Internet flattening's progress. We show that the major cloud providers are more interconnected than virtually every other network, and can reach at least 76% of networks without using the traditional Internet hierarchy.

Bio:

Todd Arnold is research scientist at the Army Cyber Institute and an Assistant Professor in the Department of Electrical Engineering and Computer Science at West Point. His research focuses on Internet routing, specifically improving the performance and reliability of networking protocols and architectures. His recent work investigates how the Internet structure and user performance is impacted by the cloud providers. He has 20 years experience in network engineering and both offensive and defensive cyberspace operations. He received his PhD from Columbia University, and Todd was instrumental in the establishment and design of the Army Cyber branch and is the recipient of the Army CIO's Excellence Award for Innovation in 2010 as well as the 2014 U.S. Military Academy at West Point's Clark K. Ray Award for Excellence in Computer Science Education.

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