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## Two-Year Study Finds Fast Changing Web Architectures

A [two-year study](#) by Arbor Networks and the University of Michigan captured and analyzed 264 exabytes of network traffic. The study found annual Internet traffic growth of 45%, which (considering Arbor did not include virtual private networks, IPTV, and much private network traffic) tends to confirm our estimates of 50%-60% annual growth. It also corroborates our multi-year focus on Web video and the increasing importance of content delivery networks (CDNs) and other non-traditional network infrastructure companies like Google.

The Arbor study dubs these major new Web infrastructure players “Hyper Giants.” It shows that in 2007 both Google and Comcast were outside the top ten Internet Service Providers by traffic volume. (The report technically measures “ASN transit groups,” or large network entities with an “autonomous system number.” We’ll call them ISPs.) But by 2009, Google had vaulted to number three and Comcast to number six among global ISPs. Google’s rise was fueled in major part by its absorption of the Web’s largest video distributor, YouTube. Comcast’s Net presence grew as it built its own nationwide core network instead of relying on third-party providers.

“The Internet is at an inflection point,” concludes Arbor. Content delivery networks like Akamai and Limelight, which cache content closer to network end-points for faster delivery and more robust service, are now responsible for 10% of Internet traffic. Google, Arbor says, makes up around 6% of global traffic, meaning it is an even larger portion of U.S. traffic. We have estimated that YouTube generates around 7% of U.S. traffic, which is consistent with this finding.

Arbor also confirmed another of our predictions: that peer-to-peer (P2P) would decline significantly in overall importance and as a percentage of traffic. Indeed, between 2007 and 2009 direct delivery of video and audio content via the Web (e.g., HTTP and Flash video) grew dramatically, jumping to 52% of all Net traffic from 42%. Meanwhile, P2P as a percentage of Net traffic, though still substantial, declined faster than any other application.

### Policy Implications

The Arbor report shows “increasingly blurred lines between content, consumer ISP, transit, CDN, etc.” What is a content provider? Service provider? A backbone network? An application accelerating edge-caching network? The categories are overlapping and ever-changing. Companies play in multiple spaces and integrate many of these functions into their proliferating, interconnected infrastructures. No wonder we call it “the cloud.”

The FCC’s drive to impose rigid “net neutrality” regulations does not fit this fast-changing ecosystem, which is in a constant state of growth and flux. Arbor concludes these “[c]hanges mean significant new commercial, security, and engineering challenges.” The technologies, architectures, and business models of the vast Net are not fixed or amenable to impositions from a central authority like the FCC.

Net neutrality and Net reality are very different. Or as Arbor says, “This is just the beginning . . .”

– Bret Swanson

Top ten global ISPs by traffic volume

rank	2007	2009
1	Level 3	Level 3
2	Global Crossing	Global Crossing
3	AT&T	Google
4	Sprint	*
5	NTT	*
6	Cogent	Comcast
7	Verizon	*
8	TeliaSonera	*
9	Savvis	*
10	AboveNet	*

\* intentionally omitted / Source: Atlas Observatory

