

Point of Disconnect: Internet Traffic and the U.S. Communications Infrastructure

By Michael Kleeman

Description:

Kleeman explores the disconnect between traditional internet architecture and consumer demand as internet infrastructure struggles to keep up with increasing multimedia and mobile internet-based traffic.

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Policy Brief:

We have reached a point of disconnect between the traditional voice, internet and broadcast video network architectures and the needs of today's customers. This disconnect is driven largely by emerging multimedia and multimodal internet-based traffic and our infrastructures and their underlying economics are struggling to catch up. There is, or should be, little debate about the importance to all sectors of the economy of our communications infrastructure keeping pace. Accordingly, seeking a better understanding — and even a rough consensus — about the sources and nature of this disconnect is important in identifying solutions.

The internet was initially designed to help transfer files from one computer to another and for simple messaging. People used little bandwidth at home because it was largely unavailable. People used a little more at work. Delay was acceptable because one or two seconds of jitter, delay, or latency has virtually no impact on how a consumer experiences an email or file transfer. And, the infrastructure we have — and the economic arrangements underlying that infrastructure — were more than capable of handling this sort of demand. Then the demand started growing. It is easy to see why. One example: the most popular YouTube video download as of July 2007 was “Evolution of Dance”, a six minute video added in 2006, which had over 52 million downloads. This one video generated traffic roughly equivalent to a month of data network traffic in 2000.

YouTube currently serves over 100 million videos per day and thousands are added each hour to the online library. But “more traffic” only tells part of the story. There have also been changes in the types of traffic and the quality of service (QoS) that this traffic requires, and where the traffic is originating and going to — each contributing to the disconnect.

These changes in user demand have resulted in corresponding changes in network requirements. Contrasting this customer driven demand for service with voice provides a good comparison. Voice traffic was virtually all point-to-point and utilized a dedicated network resource for its duration which no other users could access, and all calls used the same protocol (which was 64,000 bits/second without any compression to reduce the capacity required — about the speed of a basic dialup connection). Contrast this with the internet. The internet is a packet-based network, where multiple traffic streams share the connection, and if one user uses increased network capacity it can degrade the quality of the service for other users.

These dynamics lead to a situation where the current and projected requirements for communications services have outgrown the architecture, traffic management and economic requirements of today's networks. All these complications in network design and construction will require the development and adoption of new techniques and technologies.