



[Observations](#) - February 22, 2010

The (good and bad) future of the Internet

By Michael Moyer

SAN DIEGO—"We know even now that we are at some fundamental limits of what the Internet can handle," warned University of California, San Diego processor [kc claffy](#) [*sic capitalization*] at the beginning of her talk at the [American Association for the Advancement of Science meeting](#) in San Diego. "We have one big expectation—being able to innovate," she said. "And it is unclear whether we will be able to do that."

claffy's warnings are based on the observation that the Internet's infrastructure is, for the most part, hidden. In the U.S. there are on the order of one hundred Internet service providers that control the fiber lines and the routers that direct traffic throughout the network. Each of these ISPs has agreements with the others to exchange traffic. In essence, these agreements say *if you move my bits, I'll move yours*. However, all these agreements are not just independent and unregulated, they're secret.

Proprietary corporate information. This makes it impossible to understand how traffic will get redirected when, say, one path fails. It makes it impossible to understand just how strong the overall system is when something goes wrong. It makes it impossible to map the overall structure of the Internet (something intensely frustrating to claffy, whose job it is to [map the overall structure of the Internet](#)). And it also makes it difficult to predict how the Internet will grow.

One thing is for sure, though: The Internet will continue to grow. We just don't know if the current system for addressing content on the Internet will be able to accommodate this growth. Every location on the Internet—every web site, every user—has associated with it a specific address, called an Internet Protocol (IP) address. The current addressing system—called IPv4—has about four billion possible addresses. [The Internet is expected to outgrow this batch of addresses](#) in about two years. For decades researchers have been working on the next generation of addresses—the IPv6 system—which has approximately enough addresses to last until the heat death of the universe. But IPv6 and IPv4 are not compatible, so anyone working with a new IPv6 address would not be able to access Web sites using old IPv4 addresses. "Everyone would have to switch at the same time—Google, Verizon, everyone" claffy told me after her presentation. Yet a massive instantaneous global switchover of the Internet's entire addressing system is, in short, unlikely.

Irwin Jacobs, the CEO and co-founder of Qualcomm, also spoke regarding the spread of the wireless Internet. He started out with some figures that underscored the estimates of the Internet's rapid growth. According to Google, he said, half of all Internet connections today come from mobile devices, and the mobile web adoption and growth rates today are eight times what wireline-based adaptation was ten years ago. According to one estimate by Ericsson, the number of wirelessly connected devices worldwide will rise from an estimated 4.6 billion today to 50 billion by 2020. This would be around seven devices for every man, woman and child on the planet. (Jacobs later clarified that he thought these numbers were "ambitious.")

One well-publicized challenge of mobile 3G networks is dealing with the ever-increasing amounts of video coming through the system. "Video to phones accounts for half the bits now," he said. One option to reduce strain on 3G networks is expanding the portion of the wireless spectrum used to distribute content. An example of how this could work is [FLO TV](#), a service from Qualcomm that uses the old UHF channel 55 to broadcast over 20 channels to wireless devices. The system is now in place in 68 metropolitan areas, he said.

Whatever happens going forward, the Federal Communications Commission's upcoming [Broadband Access Plan](#), expected in two weeks, [will surely shape the landscape of the Internet over the years to come](#). Let's hope it can cope with the growth.

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