



“Why Would We EVER Need Anything Faster?”

By Steven S. Ross ■ *Editor-in-Chief*

W e're well into our fourth decade of bandwidth growth and denial. At Rensselaer Polytechnic Institute, where I received my BS in physics in 1969, I used the early ARPANET, the direct ancestor to the Internet. I could only send data. E-mail would not be invented until 1971. By the time I received my MS in journalism at Columbia University in 1970, I had gotten used to the old teletype machine, which delivered news at 110 baud. That's about two words a second.

Why would we EVER need anything faster? After all, that's about the speed a human can read text aloud, so the teletype was fast enough to bring news to radio announcers.

By the late 1970s I was using a dedicated appliance – a portable keyboard, thermal printer and 300 baud modem all in one small case, the CDI MiniTerm. Three times the speed! Connected to EIES, the Electronic Information Exchange System at New Jersey Institute of Technology, 30 of us with this crude equipment hammered out a toxic facilities siting law for the state of New Jersey. I was EIES account holder 69.

Six words a second is about the speed a human can read and absorb information silently. It was also about as fast as the thermal printer built into the terminal could print, too.

Why would we EVER need anything faster? By the late 1970s, I was an adjunct at Columbia, teaching the use of NEXIS for article searches and Dow Jones News Retrieval for finding business data. At home, Dow Jones came to me via my cable TV hookup, still at 300 baud but sent into a Kaypro “portable” computer the size of a sewing machine. There was nothing like it on campus until 1978 – I had to bring my students over to New Jersey to use it.

Why would I EVER need anything faster? After all, I had mastered the text-

based user-hostile interfaces of the CP/M operating system (even DOS was easier to use) and of the Dow Jones data retrieval system. So had 80 others in Bergen County, New Jersey – one of the nation's richest counties. With so few customers, the cable company stopped the experiment.

In 1983, I agreed to teach a technical writing course for the IEEE. I was living in Hawaii and had traded up to an IBM PC. My students were scattered from Paris to Guam. Each received an exercise book, printed on paper, in the mail. But students submitted their writing assignments on line, and discussed them in a CompuServe forum. Occasionally, a student would send a diagram, usually laboriously created out of type... but sometimes drawn and mailed. One student had access to a \$5,000 scanner (\$15,000 in today's dollars) and used FTP to get the file to me – email could only send text.

Why would we EVER need anything faster? When I got back from Hawaii in 1984, I took over a small educational software company, CCM. Our biggest client was IBM.

We had 1200 baud and 2400 baud modems, but almost every day, we sent a floppy disk with new code from our office on Staten Island to IBM in Boca Raton – via FedEx, because IBM did not trust the security of e-mail from outside the company. It was too expensive for IBM to set up a VPN – a virtual private network – to securely link our sites at the time, because we were an external contractor.

Why would we EVER need that versatility? I began teaching full-time at Columbia in 1985. By 1988, the Internet's national backbone bandwidth was 1.5 Mbps – about the speed of DSL to a single household today. It carried the entire nation's Internet traffic. At Columbia had installed the first NEXIS operation in the world where journalists, rather than librar-

ians, did their own searches. We received Associated Press and Bloomberg text at up to 9600 baud – not through the telephone lines, but by FM sideband to loop antennas stuck on classroom windows. Traffic quickly grew on the AP national wire to fill the new capacity.

Why would we EVER need anything faster? The World Wide Web was invented at CERN on the French-Swiss border two years later. The first graphic Web browser, Mosaic, appeared in 1993.

We never looked back. But we can look ahead. We're not sure what will produce the need for more bandwidth... but we know there will NEVER likely be a time when the growth stops.

As Michael Dell of Dell Computer points out in this issue, YouTube today creates more Internet traffic than did the entire Internet in 2000.

Yet today's business plans barely take this inexorable growth in traffic – and thus bandwidth need – into account. Part of the reason is, of course, the dot-com bubble of the late 1990's. But that bubble burst because it projected traffic growth rates way beyond the historical norm of about 50 percent a year, and because little effort was made to bring the bandwidth into users' homes. The fiber was laid between cities, but not in the first mile.

Do your customers, investors, and government officials understand all that? Do they understand the need for fiber all the way to users? Probably not. So hand them the detailed yet readable FTTH Primer in this issue. It's sponsored by the FTTH Council, which is making extra copies available as well. **BBP**

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