

The LAN turns 30 - But Will it Reach 40?

Lamont Wood
(Computerworld)

ARCnet idea came to an engineer while he was eating a meatball sandwich

LAN technology recently passed a milestone -- it has been around for 30 years, some of them tumultuous. But while the LAN seems ubiquitous now, there are those who think its future may be more troubled than its past.

"Comparing the present environment to our original vision, the temptation is huge to say that we foresaw all this," said Bob Metcalfe, one of the inventors of Ethernet (by far the best-selling LAN protocol) and now a general partner at Polaris Venture Partners in Waltham, Mass. "But I will resist and say, 'Duh, wow, look what happened.'"

Ethernet, he explained, was developed as part of a project at Xerox Corp.'s Palo Alto Research Center (PARC) in the early 1970s that pioneered the idea of desktop personal computers connected to one another and to laser printers. The original network speed was just under 3Mbit/sec., gated by the processor of the Alto computer that PARC developed for the project, he added.

Metcalfe recalled that about 100 nodes were operational by the time a groundbreaking technical paper that he co-wrote describing Ethernet appeared in the July 1976 "Communications of the ACM."

First commercial LAN

But that's where the story gets tumultuous, because the 30-year milestone doesn't refer to the birth of Ethernet but to the first commercial installation of a LAN, which took place in December 1977 at Chase Manhattan Bank in New York. And it was not an Ethernet, but a network called ARC (Attached Resource Computer or, generically, ARCnet) from now-defunct Datapoint Corp. in San Antonio.

“ARCnet was a beautiful thing.
Bob Metcalfe, co-inventor of Ethernet

"It was impressive in that it was something that people were not even thinking about doing," said analyst Amy Wohl, head of Wohl Associates Inc. in Merion Station, Pa., recalling her first glimpse of an ARCnet at Datapoint headquarters shortly after the 1977 announcement. "Previously, you needed a dedicated line to get a networking connection, and it was expensive and hard to implement."

Harry Pyle, then at Datapoint and now a principal software design engineer at Microsoft Corp., recalled that Datapoint sold desktop machines running multiple data-entry terminals. Supporting additional terminals required bigger machines, and he recalled eating a meatball sandwich at an Italian restaurant when a field engineer said his customer wanted more terminals immediately -- leading to a train of thought that sparked the development of ARCnet.

"With multiple machines supporting maybe 10 dumb tubes each, all tied to the same disk resources, you could leverage additional small computers instead of just building bigger and bigger computers," he explained. Pyle said that he recalled seeing Metcalfe's Association of Computing Machinery (ACM) article during the development of ARCnet, but assumed it was theoretical.

Original name was 'Internet'

The original internal project name was, of all things, "Internet." But that was considered too frivolous, recalled Gordon Peterson, then a Datapoint software developer and now a custom programmer in

The LAN turns 30 - But Will it Reach 40?

Lamont Wood
(Computerworld)

Dallas. "They decided they did not want to call it a network, since networks were perceived as complicated, expensive and hard to manage," he added.

"Before we finished developing ARC, we repeatedly thought that it can't be this easy -- what are we overlooking? Why has no one done this yet?" recalled Peterson. "But each time we decided that it is this easy, it will be this neat and that no one had gotten around to doing it yet."

The resulting network ran at 2.5Mbit/sec., although, as with Ethernet, faster versions appeared later. The big difference was that with ARC the nodes used a token-passing scheme to take turns transmitting, while Ethernet used collision detection to handle situations where two nodes transmitted at the same time. Using a collision-detection scheme meant that following a collision, each node would back off for a random number of milliseconds before trying again. "The programmer was pounding on tables saying he would not build randomness into his product," Pyle recalled.

Ethernet's designers considered token passing too slow and fragile, Metcalfe said. "We wanted everything to be passive and simple," he explained. "The token-passing people -- and that included IBM Token Ring -- said they were deterministic, since you knew the token would be passed around in a certain amount of time. But if you counted the processes that had to be undertaken if the token was lost, it was a lie. I know that sounds nasty, but for 10 years I had to put up with that crap from the IBM Token Ring people -- you bet I'm bitter.

"ARCnet was a beautiful thing, and the only reason it is not the standard today is that Datapoint decided not to make it an IEEE standard," Metcalfe said. He added that he contacted Datapoint to ask the company to join the Institute of Electrical and Electronics Engineers networking standardization group in 1980 and was rebuffed.

"ARCnet did not know that it was a LAN, and that was to their great regret," Wohl agreed. "When local networking became chic, people did not even think of ARCnet as being in that game, although they were. It was a perfect example of where being first did not make you the winner of the game."

"ARCnet was a formidable competitor during the 1980s, since they had a bigger installed base and being nonstandard and slower made them cheaper," Metcalfe recalled. "But our prices kept coming down and our speeds going up, and by the time there were additional sources for ARCnet, it was too late. It took into the early 1990s to say that we had defeated Token Ring, and then Ethernet was the last man standing."

“**The LAN will fade away, and everyone will be on the same WAN.**
Robert Whiteley, analyst

Metcalfe recalled that he left Xerox to establish 3Com Corp. in 1979 to serve the Ethernet market. He shipped his first Ethernet card for the minicomputer market in 1981, running at 10Mbit/sec. and costing \$5,000.

Today, by contrast, Ethernet interfaces are now so cheap (and low-power) that they are showing up in places like smoke detectors and exit signs, noted Abner Germanow, an analyst at market research firm IDC. As for speed, the bulk of ports being sold today run at 100Mbit/sec., although the excitement is in 1Gbit/sec. ports, he said. Data centers are using 10Gbit/sec. and 40Gbit/sec. ports and would like to get 100Gbit/sec. ports, Germanow added.

The LAN turns 30 - But Will it Reach 40?

Lamont Wood
(Computerworld)

Talking about terabit

"We are just at the point where you can talk about terabit connections without sounding like a whack job," Germanow noted. As for market share, Ethernet now has nearly 100% of the LAN market, he said, adding that his firm stopped tracking competitive technologies years ago. "I think Ethernet will continue to play the primary role in LAN connectivity at least through my lifetime," Germanow added.

Actually, when the Grim Reaper does come, he may be on a mission to collect the LAN itself, and that may happen not so long from now, said Robert Whiteley, an analyst at Forrester Research Inc. The LAN will become obsolete, he predicted, through a process he called de-perimeterization.

"We are already seeing 20 or 30 of the largest global firms doing it in isolation, and in five or 10 years, it may reach critical mass," he said. Companies are finding that they can skip cabling and adopt wireless networks. The next step is to give each machine a direct Internet connection, with appropriate security technology, skipping the LAN, he predicted.

"The two major barriers are performance and reliability," Whiteley noted. "Reliability is easier to overcome since the Internet is getting more reliable, and if the hardware is cheap enough, I can just get two wireless interface cards, with different carriers, and the computer will load-balance across those links. As for performance, accelerator technologies are popular now, and in the few years, they will be baked into the infrastructure or the operating systems."

He predicted that the time will eventually come when the average machine will have a wireless gigabit connection directly to the Internet. "The LAN will fade away, and everyone will be on the same WAN," he said.