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30 Years Ago: Networking in the 1980s Meant Ethernet vs. Token Ring

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The Ethernet networking technology was already 10 years old when PC Week was growing rapidly in the midst of the IBM PC boom.

In May 2013 it celebrated its 40th birthday, and today it remains unchallenged as the dominant networking system in the world, connecting an estimated 90 percent of all devices, from PCs to servers to switches.

A technology that co-inventors Bob Metcalfe and David Boggs developed at Xerox PARC (Palo Alto Research Center) originally to connect their computers to printers, Ethernet has become ubiquitous (http://www.eweek.com/networking/slideshows/ethernet-marks-40-years-linking-people-computers-in-a-wired-world/) throughout the $200 billion global networking industry. It's difficult now to imagine a connected world that didn't include Ethernet.

However, that wasn't always the case. In the 1980s—when consumers and businesses began using PCs in earnest—and into the 1990s, the field for LAN connectivity was wide open, setting up a clash of technologies between Ethernet—which had the backing of the likes of Digital Equipment Corp., 3Com (which was founded by Metcalfe), Intel and Xerox—and Token Ring (http://www.webopedia.com/TERM/T/token_ring_network.html) , developed by IBM and with initial support from Cisco Systems and others.

Also in the mix for a relatively short amount of time was ARCnet (http://www.webopedia.com/TERM/A/ARCnet.html) , which had some similarities to Token Ring.

But the bulk of the debate centered around Ethernet vs. Token Ring, and while Ethernet eventually won, the debate was fierce and lasted for years. While some industry observers argued that Token Ring had several technological advantages over Ethernet, eventually the latter won out, due in large part to its performance and price, common issues around which many technology debates are settled.

With Ethernet, data travels through the network inside units called frames, with each frame containing source and destination addresses. If data from multiple computers are transmitted at the same time and a collision happens, the systems wait before transmitting again.

In a Token Ring network, all devices are connected to the network, with empty data frames circulating around the ring. A computer is granted the right to transmit data. Then the data and destination are inserted into an empty frame. The destination system grabs the data, the message is removed from the frame, and the now-empty frame is sent back circulating around the ring until another system needs to send a message. This was seen by proponents as more efficient than Ethernet in handling messages and ensuring fewer "collisions" between transmitted data.

IBM was the big backer of Token Ring in the 1980s, but eventually most top-tier vendors, businesses and government agencies found their way to Ethernet.

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It wouldn't be until 1985, PC Week's second year in business, that the IEEE adopted an Ethernet standard, but a few years before that, 19 companies agreed to use an Ethernet specification, a huge break for the technology and its

backers.

Another significant change occurred when Ethernet technology moved away from being based on shared coaxial cable to telephone-grade twisted-pair copper media, which made it easier to install, more reliable and less costly. That was a key change in 10Base-T Ethernet, which not only used twisted-pair media for the first time, but also was inexpensive and hit speeds of 10M bps.

Speed and performance continued to help Ethernet to eventually push its way past Token Ring. At one point, Token Ring ran at 4M bps, though IBM officials argued that due to its greater efficiencies, it actually offered better performance than Ethernet at 10 M bps—and argument that 3Com and other Ethernet supporters disputed.

Even though early in its development Token Ring briefly got faster than Ethernet, Ethernet continued to quickly ramp up its speed, going from 10M bps to 100M bps, eventually reaching 1G bps and, now, 10G bps and 40G bps, with an eye toward 100G bps (http://www.eweek.com/networking/extreme-shows-off-40gbe-100gbe-networking-switch-modules/) . Token Ring couldn't keep up, and vendors like Cisco—which in 1998 opted out of a project to get to 100M bps—continued their migration to Ethernet. At the same time, vendors were introducing products that helped reduce collisions within Ethernet environments, which further ramped up the technology's performance and reliability.

Cost also was a factor. As the speed and performance of Ethernet rapidly improved, the cost of the technology was going down. However, the price of Token Ring equipment continued to remain high, due in large part to high royalties IBM charged vendors making Token Ring products. In a 2008 column, an adjunct professor at ITT Institute said that a Token Ring card could cost five or six times as much as an Ethernet card. "Add on the cost of more expensive cabling and MAUs, and Token Ring just priced itself out of the market," John Sheesley wrote in his column on *TechRepublic* (http://www.techrepublic.com/blog/classic-tech/does-anyone-actually-still-use-token-ring/) .

Ethernet is now the dominant LAN connectivity technology, and Token Ring is rarely seen anymore. There are still Token Ring adapters, cables and other gear that can be found for sale on such sites as NewEgg (http://www.newegg.com/Product/ProductList.aspx?Submit=ENE&DEPA=0&Order=BESTMATCH&Description=token+ring&N=-1&isNodeId=1) and CDW (http://www.cdw.com/shop/search/result.aspx?key=token+ring+cable&wclsscat=&b=&p=&searchscope=All&ctlgfilter=&sr=1) , but it would be difficult to find many instances of Token Ring installations today outside of longtime IBM environments.

"I honestly don't know of anyone still using the [Token Ring] technology, but I expect there are some out there, mainly in legacy mainframe and AS400 installations in both business and government agencies," Charles King, principal analyst with Pund-IT Research, said in an email to *eWEEK*.