

FEATURE

Q&A: Ethernet's creator describes its past, future

By Matt Hamblen

Senior Editor, Computerworld

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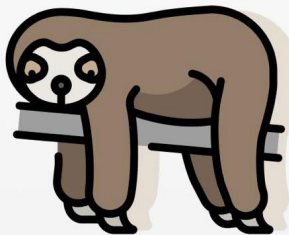
Robert M. "Bob" Metcalfe invented the local-area networking standard he called Ethernet on May 22, 1973, at the Xerox Palo Alto Research Center. Ethernet originally meant a shared media LAN. It is greatly changed today, but the name still sticks for a set of networking protocols that have become ubiquitous during the past 30 years. Metcalfe went on to co-found 3Com Corp. in 1979, then became a publisher and pundit in the 1990s, serving as CEO of *InfoWorld*, where he also wrote a column. He recently became a venture capitalist and is in his third year as a general partner at Polaris Venture Partners in Waltham, Mass. He spoke with *Computerworld* about Ethernet as a venture model and where the technology is headed.

Why celebrate the 30th anniversary of Ethernet? The world needs some good news. We're in an economic funk and a war funk and a terrorism funk, and there are still some things out there working. And one of them is Ethernet, and it's 30 years old and going strong. On May 22, we're having a celebration at PARC, and that's the very date of the anniversary of a memo I wrote describing it. The focus of that celebration is what is working with Ethernet ... and how it sets a model for other activities in our economy moving forward and what is likely to happen to Ethernet in the future.

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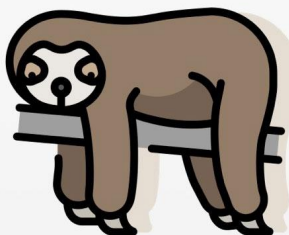


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OK, since you mention it, what is working today with Ethernet? Here it is 2003, it's certainly not the thing I invented in 1973, and a lot of people have gotten involved, so I'm not claiming credit for Ethernet. But it's my good fortune that the word *Ethernet* has been chosen. Occasionally, I even hear 802.11 wireless even referred to as wireless Ethernet. So, what is Ethernet today? It's quite a bit different than the CSMA/CD [Carrier Sense Multiple Access/Collision Detection] thing that Dave Boggs and I built in '74 and so forth. The packet format has persevered, so you might call that the Ethernet. Ethernet's collisions, which were the source of such controversy in the '80s, seem to have disappeared. There hasn't been one reported recently. [Laughs.]



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I claim that what the word *Ethernet* actually refers to now is a business model. Of course, there is a physical set of networks there, and you can argue about to what extent it is what was originally Ethernet, but we still call it Ethernet. But there is a business model as well, which you can contrast with the old vertically integrated model of IBM, or contrast with the Cisco/Microsoft/AOL monopolies, or contrast even with the Linux business model. In the Ethernet business model, the model begins with a de jure standard hard-fought in standards organizations, which was the IEEE in Ethernet's case, and then it leads to implementations of the standard which are owned by their developers, not given away free like the open-source model. And there's fierce competition, and yet there's a market ethic that the competing products will be interoperable. And there's rapid evolution of the standard after this fierce competition, and once again in the standards body, and then a high value placed on backwards compatibility to preserve the installed base. So, that's a business model, and that's what we are really celebrating above the networks. It's a business model and a set of ideas we should admire and maybe employ more frequently in the future.

It's a model that relies on a solid standards body, right? It does, and it's a brutal process and ugly, like making sausage or passing laws in a state legislature. But it's worthwhile. With Ethernet, it was the IEEE, and that's where the 802 committee started.

Back in 1973, would you have ever imagined that technology could be so political? No, and what followed between 1979 and '82 was a period of disenchantment on my part as I watched how the world works, as I watched corrupted professors and mean, tough lobbyists. But ... also at the core of it there were actual debates about how many standards do you need. And we learned that one standard is too few and a million is too many.

Where is Ethernet headed? It's already gone places never intended, and they're working on 40Gbit/sec., and we started at 2.94Mbit/sec., which we thought was dazzlingly fast. And it's also being used in applications like metro access and 802.11 wireless. In the future, 10Gbit, 40Gbit and 100Gbit Ethernet are going to make Fibre Channel unnecessary, and it will fall just the way FDDI [Fiber Distributed Data Interface] fell. Cellular telephone is under attack by 802.11. ... Third, Sonet, which is the telco Level 1 and 2, is slowly being replaced by higher-speed and cheaper Ethernet. All those may or may not fall to Ethernet.

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We're already at 10Gbit Ethernet, but it's being adopted slowly because the price is too high for most. How often have I heard that story? The adoption of 10Mbit/sec. was slow because the price was too high. AppleTalk at 250Kbit/sec. was a lot cheaper, and 10Meg had a steep hill to climb. Prices come down, and performance goes up.

Will we see wireless backbones in a substantial way in, say, 15 years? Sure, in the 50-to-100-GHz bands being opened up by the FCC.

In 10 years, will we have 40 Gigabit Ethernet everywhere? Here we are today at 10Gbit/sec. Ethernet being used in some places, which is a factor of 3,000 times where we were 30 years ago, if my math is correct. That's a factor of 10 times the speed each 10 years, so we're at 10Gig now, so in 10 years we'll be at 10Tbit/sec., if my math is correct. Yes, it will be commonplace in 10 years! And cheap, too! [Laughs.]

Do you really think that will happen? Isn't there a physical limit? There is that speed of light thing. [Laughs.]

Would a venture capitalist like you invest in that, or is that a stupid notion? It's not stupid, but it's highly speculative. And you do raise the point that there are eventually limits. Even Gordon Moore, the author of Moore's Law, said eventually all exponentials end, and he's a smart guy. Of course, his exponential hasn't ended for 35 years. So, one or two things will crap out: Either the laws of physics will impinge, or the requirement for bandwidth will flatten out. That is, people would stop thinking of all those things to do with all that bandwidth.

Actually, I've written about what will be the driving requirement for bandwidth over 10 years, and that's video, the video Internet. Not only will the Internet go to more places and homes and businesses and mobile devices ... but the driving force for a long time will be upgrading all of that to carry video so we can have videoconferencing, video-telephone, video-merchandising, video-we-can't-imagine, video-everything.

How did you come up with the name *Ethernet*? The luminiferous ether was once theorized to pervade all of space and was passive and omnipresent, a medium for the propagation of electromagnetic waves and particularly carrying light from the sun to the earth. That was the 1800s, and around 1900, thanks to Michaelson, Morley and Einstein, et al., the ether was determined not to exist. So in 1973, while searching for a word to describe the medium that would be everywhere, that would be passive and would serve as a medium for the propagation of electromagnetic waves into particular data packets, we took that word that had fallen into disuse and called it the ether network.

Matt Hamblen is a multi-media journalist covering mobile, networking and smart city tech. He previously was a senior editor at Computerworld.

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