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Bob Metcalfe: Ethernet's Past, Innovation's Future

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I'm not a Professor of Innovation, so I thought it'd be useful if we collect and gathered some lessons from the Ethernet history about how to innovate. I thought it'd fun – we all thought it'd be fun to sing some of our unsung heroes, because many people have invented Ethernet. And then we thought it'd be good to have a party, and we had one of those last night. Strange party wasn't it? Yes. Well I knew almost everybody there; that's strange. Usually I'm just in the corner and I don't know anybody, but this was amazing.

And then these industry briefings, because even though Ethernet is 40 years old, it is not dead. And apparently it is blooming. It is blossoming. And so there's something like $100 billion industry for us to pay attention to, and that's what we're doing today.And here's some evidence that the Ethernet, whatever Ethernet is, it is not dead. And here are some of the ways in which it is not dead. We heard from Erin Dunne earlier today that the traffic now being carried by carrier Ethernet, between carriers and their customers, now exceeds all the legacy access methods before, more than private line, more than T1, more than ISDN and frame and ATM, etc. And you saw her charts. Not only has it past all the legacy, it keeps going up, like this.

This year there'll be $70 billion worth of carrier Ethernet equipment and services sold, expected to be $100 billion by 2017. Verizon announces the simultaneous availability of 120,000 new office buildings with gigabit Ethernet fibre service under FiOS.

The MEF has today introduced – or this week introduced a new committee, the operations committee, whose purpose is to speed the provisioning and, this is the way I put it, to speed the provisioning and settlements among multicarrier networks. In other words, if you want to connect all your offices around the world, you can't do it through one carrier; you've got to go through multiple carriers. And that needs automating and speeding and MEF is taking that up. So merely having that, as Nan put, we have too much Ethernet now, it's a problem. We have to learn to manage it better.

We also heard the formation of the Cloud Ethernet Forum, a formation and its association with MEF. Well that's great news. That's one of the new challenges, one of the new killer apps of the internet's plumbing is to support cloud computing. And it's a very positive sign that a group of significant industry players have formed to pursue to sort that out, that new killer app, the cloud.

And in a previous panel we worried about whether all this networking was going to become a commodity. You remember that? Wasn't it like a problem? It was put like a problem that it would all become a commodity. It's our goal to make the internet a commodity, to make Ethernet a commodity. In 1984, when I was on the public road show, taking my company 3Com public, all the press and analysts wanted to know -were warning us that 3Com's sale of Ethernet was about to be commoditised, this was in 1984, and that basically our company was doomed because the commoditisation was just around the corner. Well they were really wrong about that. So 3Com had 5 billion in sales in 1999, a few years later.

More importantly, it was our goal to lower the cost and make it invisible. You want your networks to be cheap and invisible and we've gone a long way toward succeeding at that goal. What they also didn't notice that even though our prices for Ethernet were going down exponentially, our costs were going down

even more exponentially. So I remember gross margins at 3Com were going up during the commoditisation of the Ethernet mix in those days.

So we just heard about HP results were just announced, financial results, and the stock took a big jump up. And it was entirely because of the 14th straight quarter of robust growth in the networking division, which contains what company? What company is part of HP networking? That would be 3Com, yes. And I actually cornered Bethany Mayer and got her to actually say that to me, and I asked permission to tell you that 3Com's the most successful acquisition that HP has ever made. So I'm pushing, you know that HP are the initials of the founders, and now my company's sort of part of that. So I'm pushing to have HP renamed, HMP. No.

I'm a Professor of Innovation, and really am looking for lessons to profess. And professing innovation is a tough job, but somebody's got to do it. I guess one of the problems is everybody's doing it. Every politician in the world that travels around promoting innovation, innovation is now one of those unfortunate buzzwords, like SDN. Innovation, what is it? But let me make some observations about the innovation process.

For example, there is a short form of the story of Ethernet. It was born in the ARPANET community, supported by ARPA, a government agency, at universities, in my case MIT, Harvard and Stanford. Then Xerox PARC took over and supported it for a very long time and it blossomed. That's sort of here it got invented. And then VC stepped in to create an Ethernet and several Ethernet companies. Then the strategic partners formed up with the venture-backed start-ups, DEC, Intel, Xerox, HP, Siemens, NEC all joined in that early consortium to promote this new innovation.

And then of course there are the early adopters. I always mention the early adopters. Those are the customers who buy stuff from start-ups. And I took Ethernet to Germany and they asked me what part of Siemens I was from. And when I went to Japan, they asked me did I work at NEC. But when I was in the United States I could sell Ethernet cards to major US corporations, god bless early adopters. They helped feed the innovation process. We need to cherish them.

And then there's another observation is the role of the Ethernet brand, there is very little agreement about what the word Ethernet means. Some people think it means CSMA/CD on half-inch coax, running at 2.94 megabits per second with 8-bit addresses over a kilometre. And any departure of that spec, it's not Ethernet any more.

Obviously we don't subscribe to that here. I think Ethernet has become a brand and a brand is a promise. And what Ethernet promises and why major US corporations use the Ethernet brand is it has this model behind it, a model that seems to work. And we want to support the model and keep participating in it. And let me describe that short model. So the brand communicates a process which, at its core, has a de jure standard. So god bless the IEEE 802. Actually god should bless 802.3, not 4 and not 5, just 3.

Alright, 802. And then there's the fierce competition that I've already mentioned, which is very much a part of the Ethernet models. As soon as Ethernet was licensed to the world, 3Com bought a license in order to buy and sell, and they can sell Ethernet, but so did 100 other companies in the same week.

And then we were off to the races. And that fierce competition really can get unpleasant at times but it drives things forward and it's a part of this model. So when you have the Ethernet brand, you're expected to be snarky on panels at conferences to your competitor to the right or left.

Then there's the interoperability ethic of the Ethernet brand. It used to be that standards had conformance. What would you would do is you're write this standard and then you would get everyone to conform and then you'd build test equipment to test conformance. And what we learnt is it doesn't work because standards have too many options. So it's all too possible to be conforming and yet not interoperate with anybody else. And the Ethernet started at the very beginning with an interoperability ethic as opposed to a conformance ethic. So there were whole conferences formed called Interop. And we went there with our cable and the cable ran across the convention centre and we all tapped into it and then we bragged to our

customers how we were compatible with all the other stations on that network. That was interoperability, not conformance per se.

And another part of the brand is rapid evolution of the standard. The point was amply made, there were many versions of Ethernet. Which one are we talking about? Well some of that is diversity of application, but some of it is the unfolding of time which causes new standards to be created. So the rapid evolution of the Ethernet standard is certainly part of that brand. And yet there's this penchant for sticking with the installed base. So this law that I really like, called Metcalfe's law, says that the value of a network goes as the square of its size. So when you introduce a new technology, do you abandon the installed base? No. You invent things like auto-negotiation that make you automatically compatible with the previous generation. So backward compatibility is an ethic of this Ethernet brand.

BY Bob Metcalfe, Co-Inventor of Ethernet & UT Austin Professor of Innovation