http://community.comsoc.org/blogs/alanweissberger/bob-metcalfes-closing-keynote-ethernet-innovation-summit-may-23-2013-chm-mt-vi

Bob Metcalfe's Closing Keynote at Ethernet Innovation Summit - May 23, 2013, CHM in Mt View, CA

Sun, 05/26/2013

Bob Metcalfe's keynote wrapped up the 2 day, information packed **Ethernet Innovation Summit**, organized by NetEvents.org. It can be viewed at:

http://www.netevents.org.uk/celebrating-40-years-of-ethernet-innovation-closing-keynote

Here are **Professor Metcalfe's main points**, which summarized this excellent event:

-A key lesson learned from the early development of Ethernet (at XEROX PARC) was how to innovate.

-In 2012, Carrier Ethernet (CE) data traffic eclipsed the sum of ALL legacy wire-line traffic, including T1 private lines! And CE traffic continues to increase rapidly.

-$70B CE equipment and services is estimated to be $70B in 2013; growing to over $100B by 2017 (Source: Vertical Systems Group)

-Verizon just announced it will be extending its fiber optic network to 120K new office buildings. That will facilitate a lot more **fiber based Carrier Ethernet** services to business customers.

-The **MEF Services Operations** committee was announced. It will seek to provide guidelines to manage operations for mutli-carrier Ethernet networks. The results will hopefully be more consistent contracts and clarification of different CE providers' capabilities and a standardized ordering process that takes into account national regulatory factors as well as the greater diversity of CE services.

-Formation of the **Cloud Ethernet Forum** was announced as well as its relationship with the MEF. The new Forum will address the specific issues of scaling and applying suitable Ethernet services to meet the stringent demands of delivering cloud services. http://online.wsj.com/article/PR-CO-20130523-912875.html

NOTE: This new Cloud Ethernet Forum should NOT be confused with the MEF's spec on **CE Delivery of Private Cloud Services.**

http://metroethernetforum.org/PDF_Documents/Cloud/MEF_Carrier_Ethernet_for_Delivery_of_Private_Cloud_Services_20120031.pdf

-"Our goal (at Xerox and 3Com) was to make Ethernet a commodity. And it's been happening- in both silicon and boxes," Metcalfe said.

-Interoperability ethic of Ethernet brand helped make it successful. It's possible to conform to a standard, but not interoperate, because of different vendor equipment implementing different

options in the standard. Interoperability "plug fests" for all versions of Ethernet went a long way to establish this ethic and thereby increase Ethernet's market size.

-Rapid evolution of the Ethernet standard (IEEE 802.3), while maintaining backward compatibility was very important to Ethernet's success. Different speed versions of Ethernet could be sorted out and determined by an auto-negotiation capability used at start-up time (before the information transfer phase).

-The reason Ethernet first ran at 2.94M b/sec (i.e. the version developed in 1973-74) was because there wasn't room on the network interface card for a clock circuit, so he and co-inventor Dave Boggs derived the Ethernet clock signal from the system clock on the backplane (used to connect printed circuit boards). It turned out to be 2.94M b/sec.

-The next version of Ethernet (designed in 1978-79 by Ron Crane), ran at 10M b/sec and was the basis for the so called DIX (DEC, Intel, Xerox) specification published on September 30, 1980: "The Ethernet, A Local Area Network. Data Link Layer and Physical Layer Specifications." Later that year, the spec was submitted to IEEE 802* as the proposed single standard for LANs.

*Note: From 1980-1982, the IEEE 802 committee had not yet been divided into working groups. The first IEEE 802.3 Ethernet standard - 10BASE5 (10 Mb/sec, Baseband transmission, 500m without repeaters) - was published in 1983.

-Panelists and Metcalfe observed that U.S. government and Corporate research is not what it used to be (it's greatly decreased in the past few years). That's not good for the innovation process.

During the **Q & A part of this closing session**, the audience was captivated by Bob's war stories – like being told the commoditization of Ethernet would doom 3Com. In fact, the higher volumes of Ethernet products sold by 3Com enabled the company to survive and thrive. "3Com is most successful acquisition HP ever made," Metcalfe said to applause from the audience.

Metcalfe told the now famous Ron Crane "ceiling tile" story -at least his version of it. (The author has heard Crane's version). He then acknowledged Crane's foresight by telling the "lightniing strikes" story. Crane insisted on designing lightning protection into 3Com's Ethernet NIC for the IBM PC, which was neither in the IEEE 802.3 Ethernet standard, 3Com's design spec, nor was it requested by 3COM's customers. 3Com then sold 1,000 cards to a New York City bank which hedged its bets by buying 1,000 cards from a different Ethernet NIC vendor. Lightning struck the NYC building, the 3Com cards continued to work, while the competitor cards were fried by the power surge. 3Com sold another 1,000 cards to the bank immediately thereafter, as a result of the built-in lightning surge protection.

Note: There is also a 1993 "kite flying" story that measured RF interference from nearby radio stations for the version of 100 M b/sec Ethernet that used telephone grade unshielded twisted pairs (UTP-3). Ron insisted that such interference was an issue, even though "IEEE 802.3 Fast Ethernet" was not intended for outdoor deployments. But that is a story for another time, or maybe never.

"Why did 3Com win in the LAN wars of the mid to late 1980s?" this author asked. Metcalfe responded, "We had a time machine. Our Ethernet team at Xerox PARC went into the future and then came back. As a result, we knew what the future would look like. Others, like as Ralph Ungermann (co-founder of Ungermann-Bass) worked on Ethernet concentrators for dumb (ASYNC ASCII) terminals but at 3COM we designed Ethernet cards for PCs cause we knew there would soon be PCs on everyone's desks."

And why would Ethernet keep getting faster and used more widely in so many different ways? Metcalfe's philosophy was: "Build it, and they [the network configurations and applications] will come." Today, we have Ethernet dominating the: workgroup (wired) LAN, campus LAN, Data Center switching, enterprise networks, access to IP-VPNs, Carrier Ethernet and other market segments. You can't argue with success and ubiquity!

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References:

http://www.netevents.org.uk/ethernet-innovation-summit

http://www.netevents.org.uk/celebrating-40-years-of-ethernet-innovation-closing-keynote

http://www.eweek.com/innovation/ethernet-invention-revealed-the-origins-of-innovation/

http://www.eweek.com/networking/slideshows/ethernet-marks-40-years-linking-people-computers-in-a-wired-world/

http://www.theregister.co.uk/2013/05/22/metcalfe_on_moocs/

http://scriptpirates.com/topic/1024-as-ethernet-turns-40-some-seek-to-take-it-to-the-cloud-ethernet/

Videos of the 2 day event: All video content can be found at the following URL's :

http://www.netevents.org.uk/celebrating-40-years-of-ethernet-innovation-day-2-introduction

http://www.netevents.org.uk/celebrating-40-years-of-ethernet-innovation-session-5

http://www.netevents.org.uk/celebrating-40-years-of-ethernet-innovation-session-6

http://www.netevents.org.uk/celebrating-40-years-of-ethernet-innovation-session-7

http://www.netevents.org.uk/celebrating-40-years-of-ethernet-innovation-session-8

http://www.netevents.org.uk/celebrating-40-years-of-ethernet-innovation-session-9

http://www.netevents.org.uk/celebrating-40-years-of-ethernet-innovation-closing-keynote