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The History of Ethernet

40 years Ethernet: What's next? The 400 Gigabit Fast Ethernet is realized in the short term. In the long term, experts expect the Ethernet providing a petabits / s-technology.

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There is no better model for success in data communications as the Ethernet. This technology forms the basis for access to the Internet and the transport of data over networks. Most users communicate via either an RJ-45 connector or wireless (Wi-Fi) with the world. Hardly anyone knows that the Ethernet was invented and developed in the 1970s.

The actual development of the Ethernet began when Robert Metcalfe took a job as a developer at the Xerox Corporation. Xerox was working on a prototype of a communications controller that should communicate via the so-called Ethernet medium. The data rate is then propagated the unimaginable fast speed of 3 Mbit / s (in truth there were "only" 2.94 Mbit / s). The new technology was introduced in 1976 at a computer conference to the public.

Video: http://www.youtube.com/embed/Z6E4eCYADMw

In February 1979, agreed Robert Metcalfe and Gordon Bell (DEC), the evolution of Ethernet to a quasi-standard LAN (10 Mbit / s). The DIX group consisting of DEC, Intel and Xerox, began officially in June 1979, the co. In September 1980, the DIX group published specifications for Ethernet LANs. The first standard is now known as Ethernet version first The American Standards Institute Institute of Electrical and Electronic Engineers (IEEE) took up the idea of the Ethernet, and the newly established IEEE 802.3 working group tried to develop company-specific specifications from an internationally recognized standard. In December 1982, the draft of the IEEE 802.3 group could be presented for yellow Ethernet (10Base5) as unapproved standard under the name "Carrier Sense Multiple Access with Collision Detection (CSMA / CD)." In the same month, the DIX group released the specification for Ethernet Version 2 The Ethernet Version 2 is an adaptation of the IEEE Ethernet Version 1 design.

The work on the so-called standard Cheapernet (10Base2) and began in June 1983 by the IEEE 802.3 standard Unapproved Standards Board ratified. The American researchers world that is closely linked for historical reasons, the development of Ethernet, follow the signs of the times and published in Request for Comments (RFC) under the title "Standard for the transmission of IP datagrams over Ethernet networks" the adaptation of the TCP / IP world to the new transmission medium. In the same year, work on the Ethernet on broadband (10Broad36) and the StarLAN (1Base5) specifications began. In 1985, the Ethernet standard as ISO / DIS 8802/3 standard is published worldwide. The first time the magic number of 100 manufacturing companies worldwide has been exceeded, which had received a license from Xerox to the production of Ethernet products.

In June 1985, the RFC 948 allows the support of the TCP / IP protocols on the official IEEE 802.3 networks for the first time.

Video: http://www.youtube.com/embed/o9MbO7Fhvpg

The years between 1980 and 1990 were in the fight with the rival of Ethernet Token Ring from IBM. Let us remember the debates: "Who needs the museum Ethernet or Token Ring?" Today we know how this went out war and the Token Ring LAN was the equivalent of the Betamax video recording system.

Video: http://www.youtube.com/embed/cjiashsjjzU

1986 start some smaller companies with the transmission of Ethernet data on four-wire lines. Simultaneously, a new working group will be launched, which should examine the Ethernet to fiber optic communication lines. In 1988, Ethernet offered on twisted pair products (pre-standard) and adopted until 1991 as standard 10BaseT (Ethernet on twisted pair) after long discussions. The following year, the 10BaseF followed standard (Ethernet on fiber optics). 1992 announced the company Hewlett-Packard, and AT & T Microsystems to develop a Fast Ethernet on the basis of 100 Mbit / s on twisted pair cables. This initiative was countered by the IEEE 802.3u group and published the Fast Ethernet standard (100BaseX). At the physical level of the Ethernet standard, supports both fiber optic (100BaseFx) and twisted pair. Even the Fast Ethernet standard laid for the first time set the full-duplex transmission mode.

Through the development of multimedia applications in networks new demands were placed on the transfer rate in subsequent years. For this reason, in late 1996 has already been turned back at the speed screw and started with the definition of a new Ethernet substandard at 1000 Mbit / s (1 Gbit / s). The standardization efforts of the IEEE 802.3z group were quickly driven by the substantial interest of the market and the manufacturer, so that already existed in mid-1997, a draft standard for Gigabit Ethernet. The final 1000 Mbit / s standard for fiber optic media and twinax cables were already before the middle of 1998. The definition of the 1000BaseT standard was postponed due to time constraints in the 802.3ab working group and persecuted separately. Although the PHY, PCS, PMD and management specifications already existed since the middle of 1998, it took until the end of 1999 to the 1000BaseT standard finally saw the light of the world. Beginning of 2000 was rumored in the market, which spoke of a 10 Gbit / s Fast Ethernet. Giant strides in the 10 Gigabit Ethernet 802.3ae task force aimed towards the completion of the standard. In autumn 2001, the first 10 Gb / s Ethernet components have been published. Some years later (2010) already came the first pre-standard Ethernet products in the range of 40 and 100 Gb / s on the market. Work on the standard 802.3ba began in late 2006. This defines another two speeds for the Ethernet for two applications: 40 Gbit / s for the server connection and 100 Gbit / s for the upgrade of the core switches. The new IEEE standard 802.3ba paved the way for higher speed Ethernet in the data center sector

According to the statements of the Cisco Internet traffic grows over the next five years to four times and the number of mobile internet connections will explode by the year 2017. The figures speak for themselves ITU: This year, the number of Internet users will grow by a quarter of a billion users compared to the figures for the previous year and thus be his nearly three times as high as in 2005.

Also the bandwidth requirements of the Data Center will continue to rise. In this area we see the transition from 10G to 40G and 100G Ethernet to eventually. In the near future Gigabit Ethernet will play the role that had once held by the Fast Ethernet. Thus, every 10 years, the speed of the Ethernet, at least for the factor of 10. Even the stage is already set for the Terabit Ethernet by the year 2023. For this reason, IEEE has established a working group to develop a 400Gbps Ethernet standards to life, because only with faster transmission technologies can be satisfied, the booming demand for network bandwidth.

Video: http://www.youtube.com/embed/hlkB25F3TmE

In general, the modern networks to an annual average growth rate in terms of "bandwidth" of 58 percent. The reasons for this are driven to ever-increasing numbers of users, the falling prices and popular video-on-demand applications and social media. Networks. For this reason, IEEE capacity requirements of 1 terabit per second for 2015 and 10 terabits per second predicted by the year 2020. But the fact is that the 100G Ethernet products are only slowly available in the market, and this standard was developed when there were no iPhones and tablets. The mobile technology to set new standards in the internet and the majority of video communication over the Internet is initiated by mobile devices.

Video: http://www.youtube.com/embed/lPkyRnawkcE

The Ethernet in all areas of life

It was a long and arduous path to the Ethernet has been adopted worldwide. Meanwhile, it has advanced in many areas of life:

Ethernet in the Car: A number of car manufacturers now toying with Ethernet in the car as a replacement for the proprietary bus technologies that are used in this area so far. All the major car manufacturers will also integrate the IP protocol in the sets of wheels. Thus, the electrical systems of the car can be serviced and maintained via remote connections and problems in the car to be corrected before the driver notices this

Ethernet in the features: Ethernet devices are now used to manage and communicate the on-board systems in trains. At the speed of the transmission medium, it is no longer that trains arrive at stations unpunctual.

Ethernet in the universe: The Ethernet technology has been successfully used for years in NASA systems. This year the German company TTTech to realize a fault-tolerant Ethernet in space for the space agency.

Ethernet in military vehicles: last year built GE Fanuc first time in a tank a Gigabit Ethernet switch. This Ethernet upgrade is part of the long-term plan of the U.S. Army to equip all troops with fast communication.

Ethernet in unmanned aircraft: Even when unmanned aircraft (also called drones) Gigabit Ethernet is high on the list of military technologies. By standardizing the communication equipment to the future development and reduced costs for unmanned aircraft systems interoperability can be improved.

Ethernet at Sea: The U.S. Navy signed a long-term contract to upgrade the missile on naval ships with Boeing. Basis of this Agreement is to establish Gigabit Ethernet on the ships. It is the naval Gigabit Ethernet Data Multiplex System (GEDMS) expanded by a 100 Mbit / s fiber-optic backbone to a redundant 1 Gb / s Ethernet.

Ethernet in the ice: The National Science Foundation is building a Gigabit Ethernet network backbone at McMurdo station in Antarctica, and plans to provide the polar researchers at the South Pole a secure high-speed network, and thus the requirements of voice, video and perform data communication.

Conclusion

The Ethernet speed has increased over the past 40 years of 3 Mbit / s to 100 Gb / s dramatically. In the coming decades, the basic principles outlined by Bob Metcalfe, the Ethernet will certainly not fundamentally change. For this reason, the Ethernet is also to break the terabit barrier easily and still continue the success story.