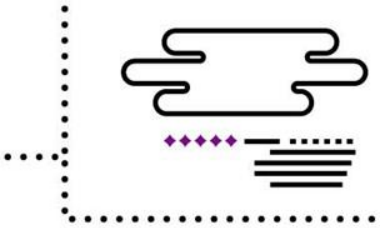


Introduction to Local Area Networks

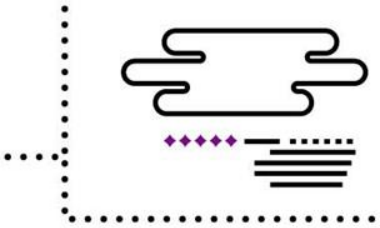
Background

Gentian Jakllari



Objectives

- What is a Local Area Network?
- What is its origin and purpose?
- What is the fundamental engineering challenge?
- What are the dominant technologies?

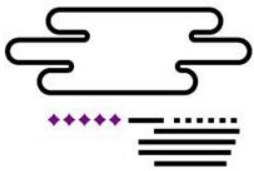


What is a Local Area Network?

Computer
network

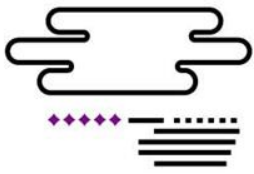
Small geographical area

- Apartment (Wi-Fi)
- Office floor/building (Wi-Fi, Ethernet)



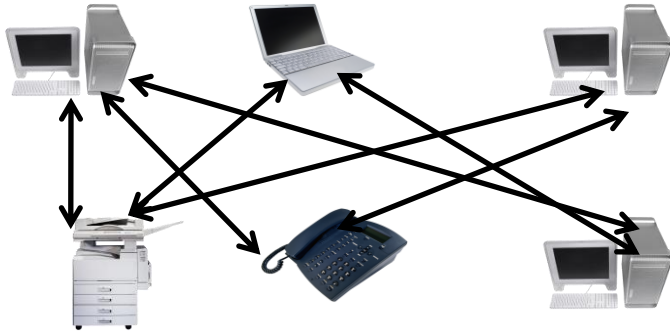
Why do they exist ?

- End 60's : computers started to proliferate in universities and research labs
 - First email sent @BBN in 1971
- Printing, storage, computing power sparse & expensive \Rightarrow needed to be shared
- **WANTED**
inexpensive & flexible system for local communication & resource sharing among computing stations



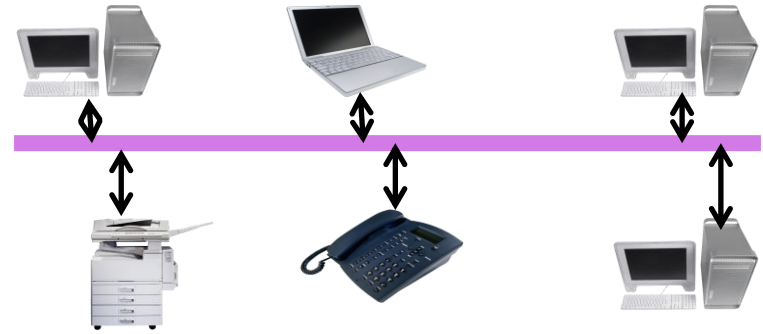
Basic Architecture

○ Straightforward solution

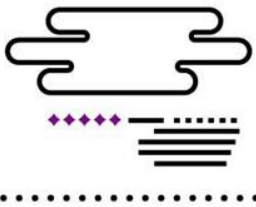


- Expensive: extensive cabling
- Inflexible: major changes every time a machine joins/leaves

○ Shared medium



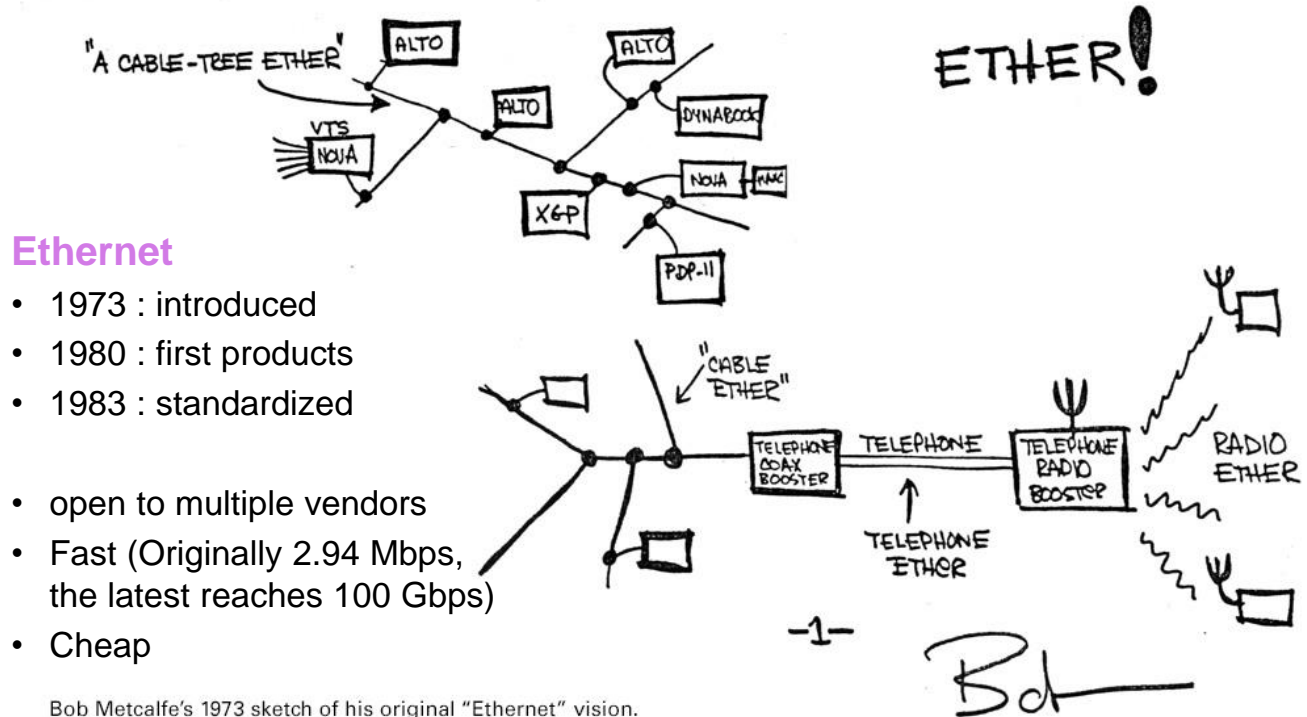
- + Minimum cabling
- + Flexible: join & leave dynamically
- Share the medium



Main scientific/engineering challenge

- Reliable message delivery over a **shared medium** where two or more machines can transmit simultaneously
- Answer: **3 layer architecture**

First (major) technologies - 1



Ethernet

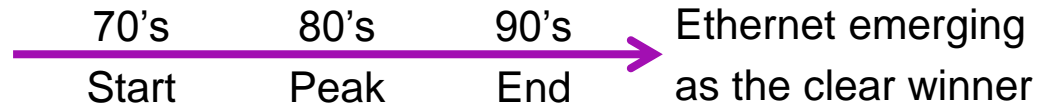
- 1973 : introduced
- 1980 : first products
- 1983 : standardized
- open to multiple vendors
- Fast (Originally 2.94 Mbps, the latest reaches 100 Gbps)
- Cheap

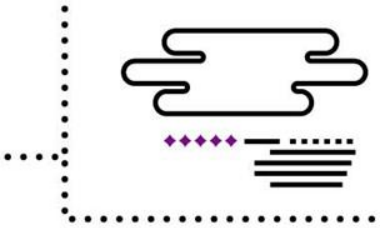
Bob Metcalfe's 1973 sketch of his original "Ethernet" vision.
Image courtesy of PARC, a Xerox company



First (major) technologies - 2

- IBM token ring
 - IBM Zurich, by Werner Bux and Hans Mülle
 - 1984 : first product
 - 1985 : standardized
 - Tightly controlled by IBM
 - 3 times as expensive as Ethernet
- ARCnet & Omninet
 - + Faster, less expensive than Ethernet in the early 80's
 - Remained proprietary until too late
- LAN Wars





To Follow...

- Week 1 : basic concepts of LANs
- Week 2 : Ethernet
the most consequential LAN technology
- Week 3 : Wi-Fi
- Week 4 : enterprise LANs
- Week 5 : advanced topics