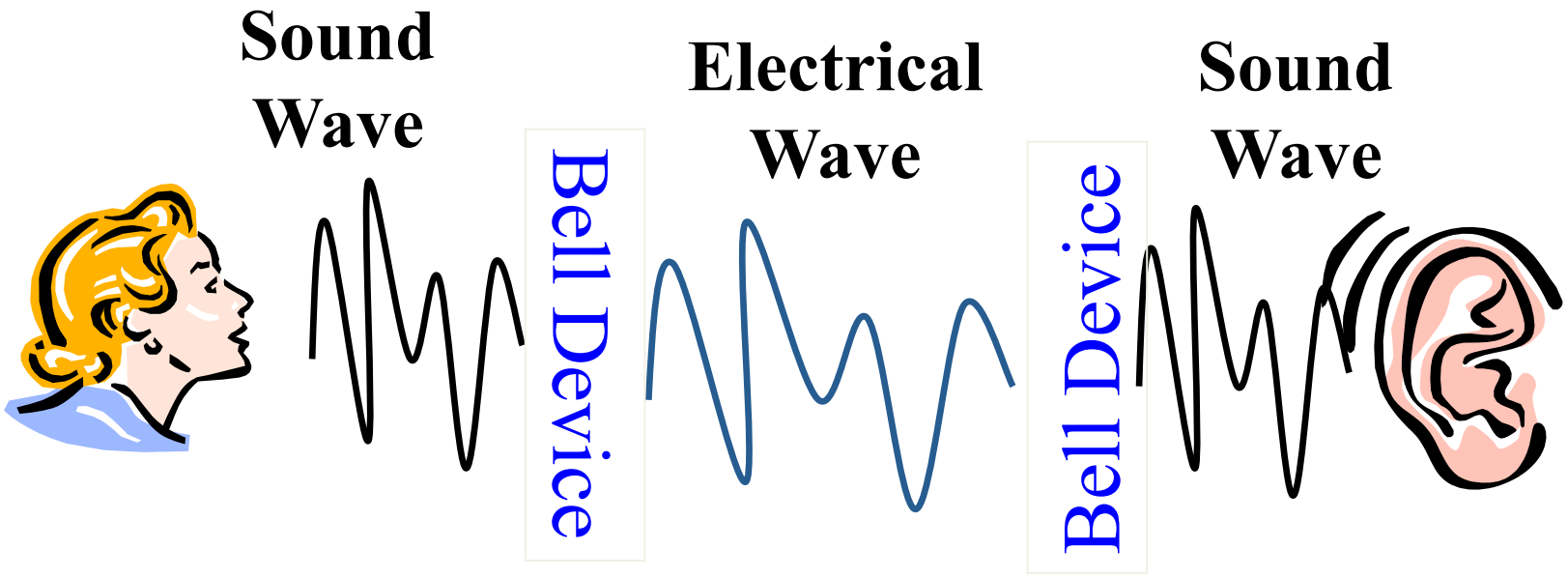
Overview of the History of the Telecommunications Industry

COMPTEL

Back to basics …what did Bell invent?



The First Interconnection Dispute

- 1878 Western Union begins developing exchanges using a patented telephone developed by Thomas Edison.
- Western Union refuses to install telegraph lines to premises with a Bell telephone. Bell and WU sue each other.
  - Western Union withdraws from telephone for 17 years.
  - Bell agrees to stay out of the telegraph business.

Local Competition – First Try (1894-1907)

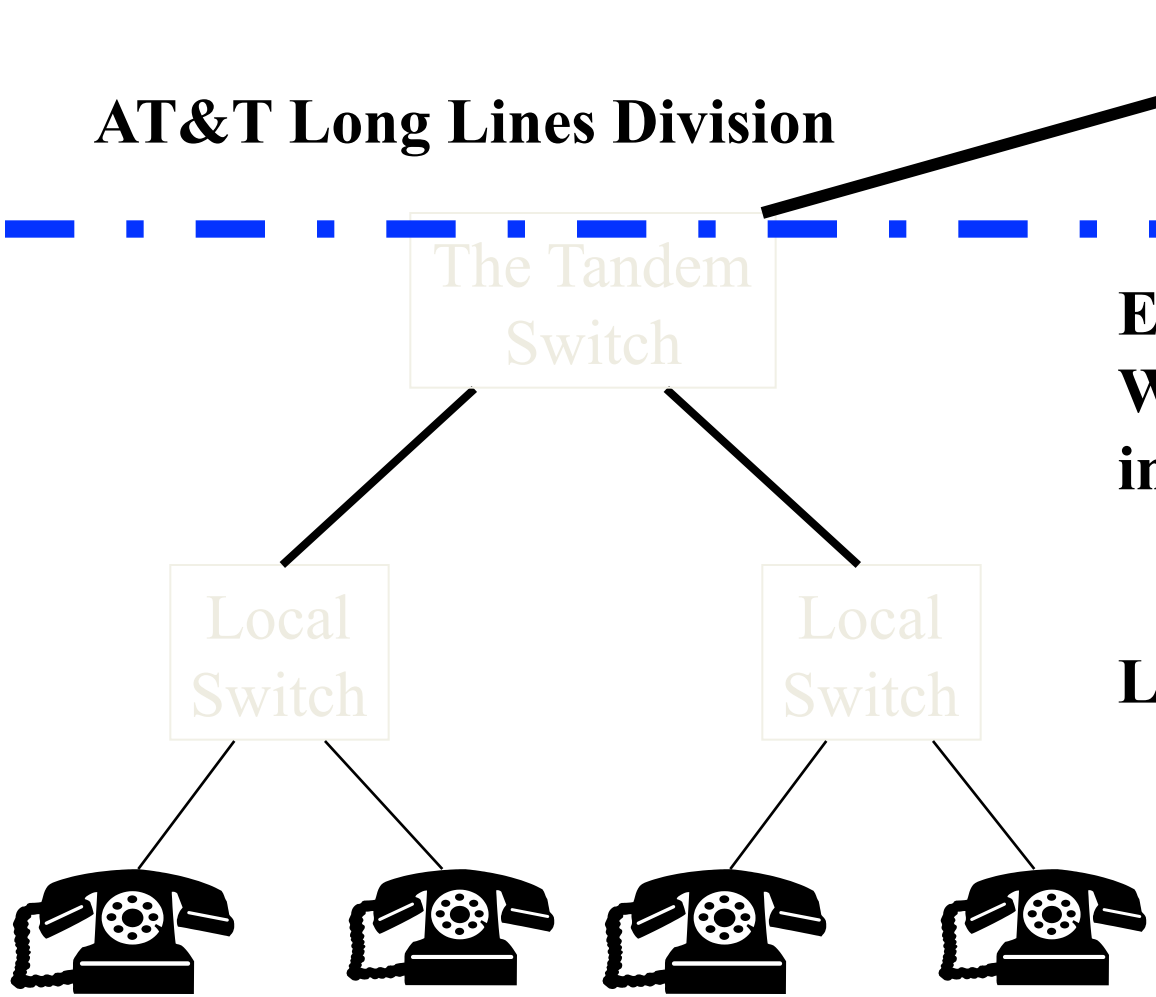
- Bell patents expire – the patent on the telephone was the basis for the first monopoly.
- Independent (i.e., not Bell) Companies form in rural areas.
- Competition develops in cities with multiple networks.

Outcome: Settle with DOJ

1913 Kingsbury Commitment

- Sell Western Union
- Allow interconnection
- Quit buying independents

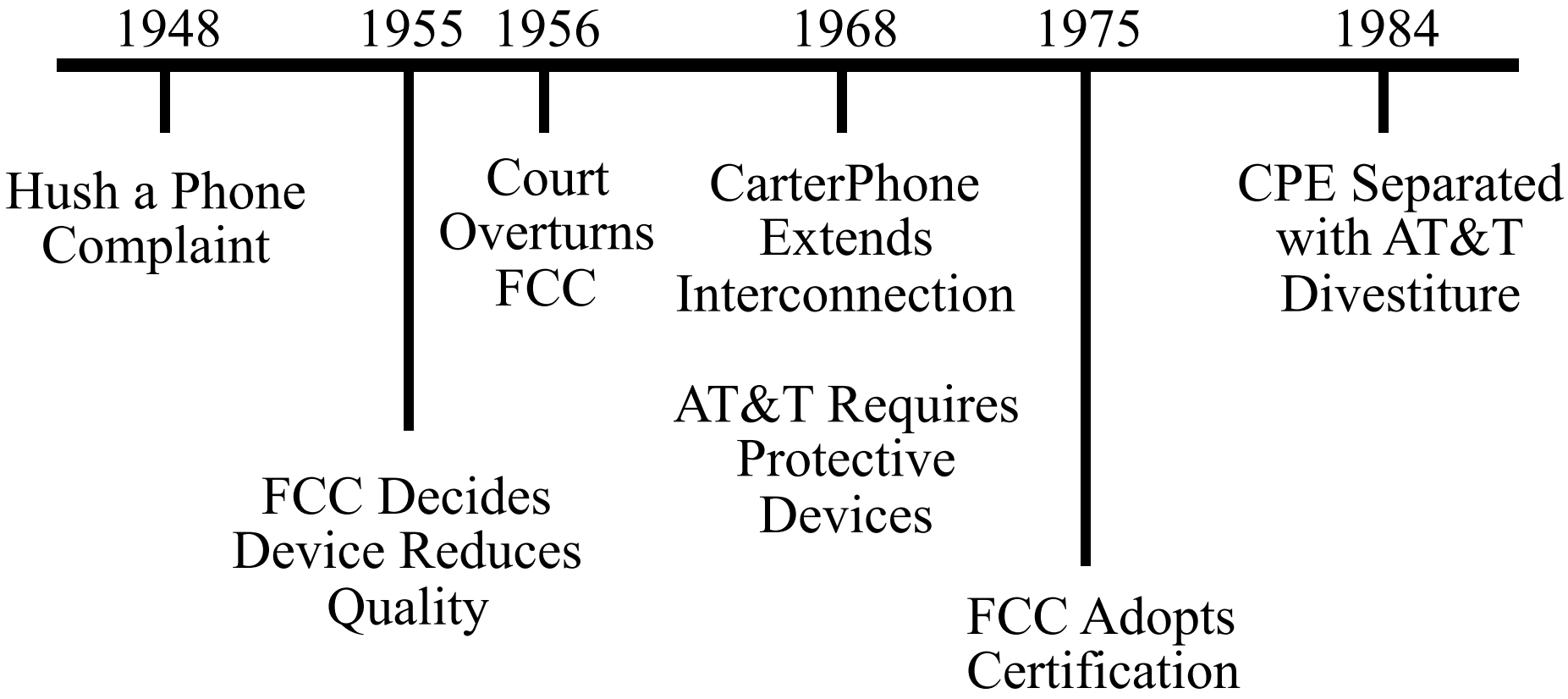
A Stable Monopoly:(1913-1950)



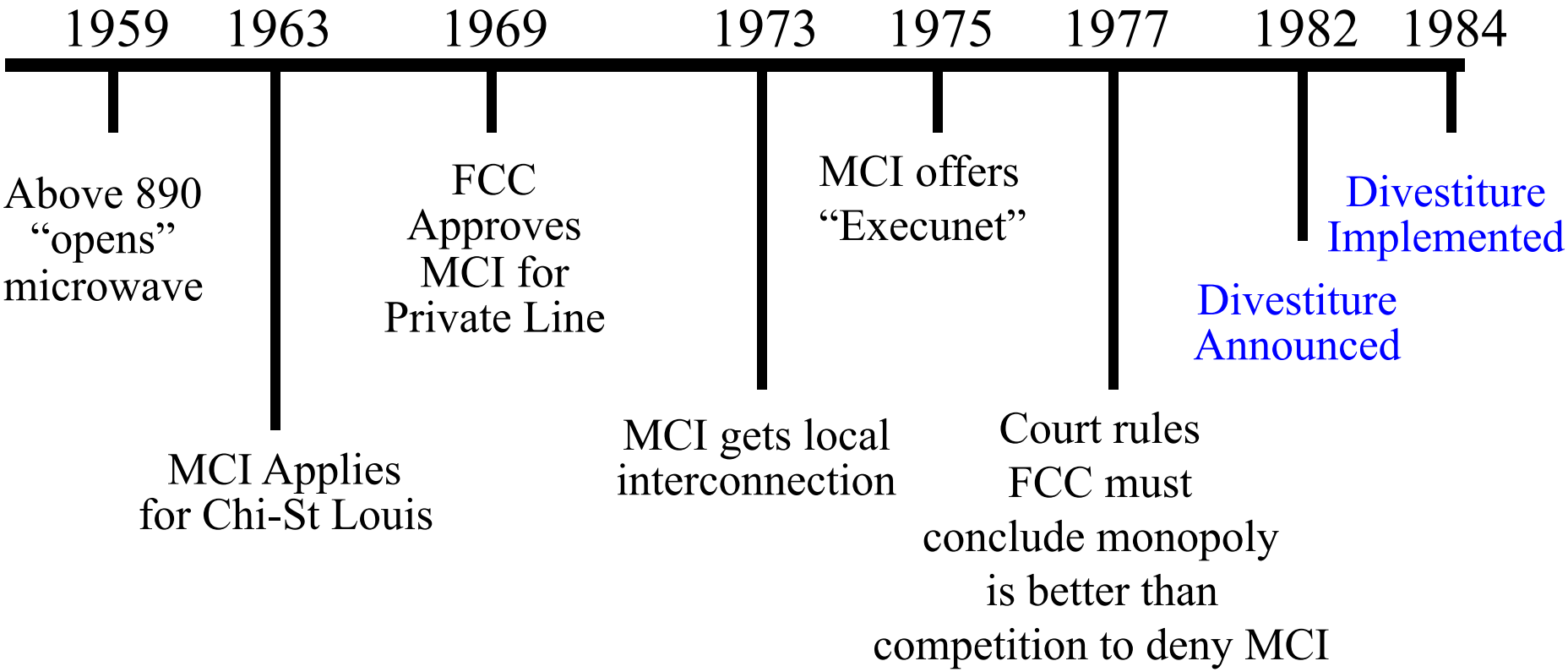
Everything built by Western Electric and invented by Bell Labs.

Local Bell Company

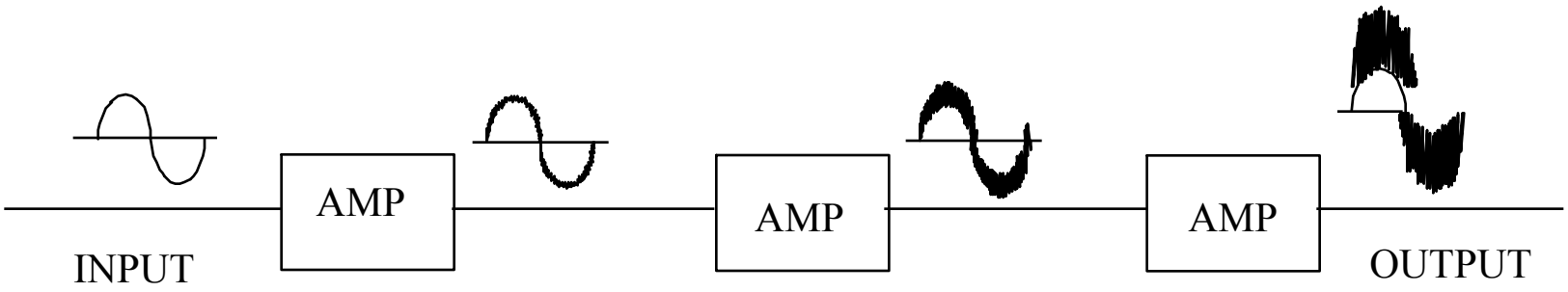
Timeline of Customer Equipment (CPE) Competition



Timeline of Long Distance Competition



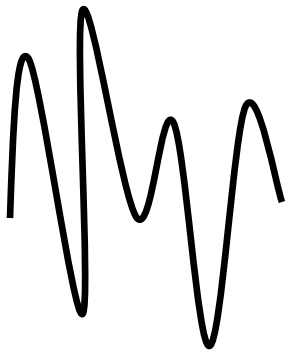
Analog Transmission Limited by Noise

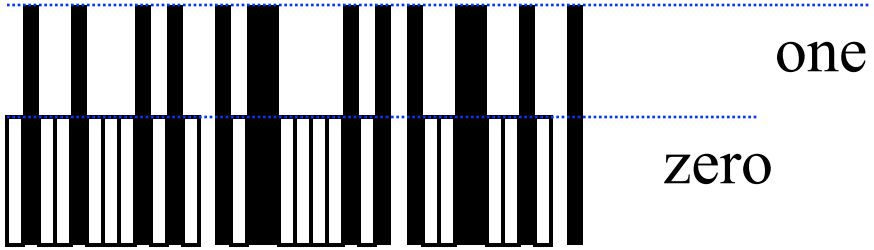


Analog Amplification: Noise Accumulates

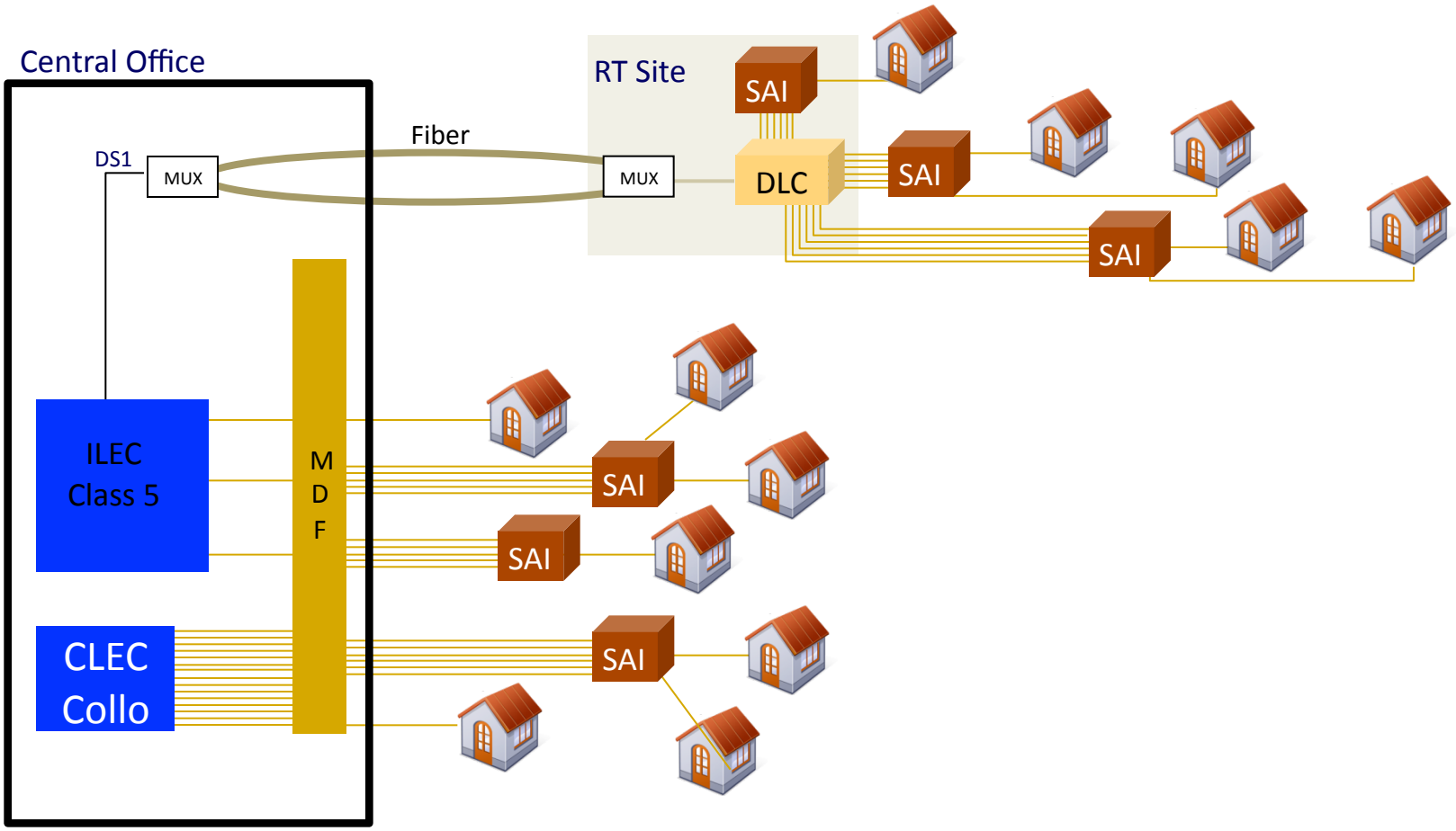
Analog to Digital Conversion

Original Signal





Telecom Architecture



Lots of great CO based copper … it must be protected!

History of Copper Cable

- Substantial portion of copper cable installed under **"rate of return"** regulation paid for by ratepayers.
- Most ILECs have depreciated the value of their copper cable but have not reduced their rates.
- **New entrants are privately funded** since 1996 with no beginning customer base or revenue stream.
- ILECs have the revenues from existing customers to fund new fiber deployment and preservation of copper. (80% market share)

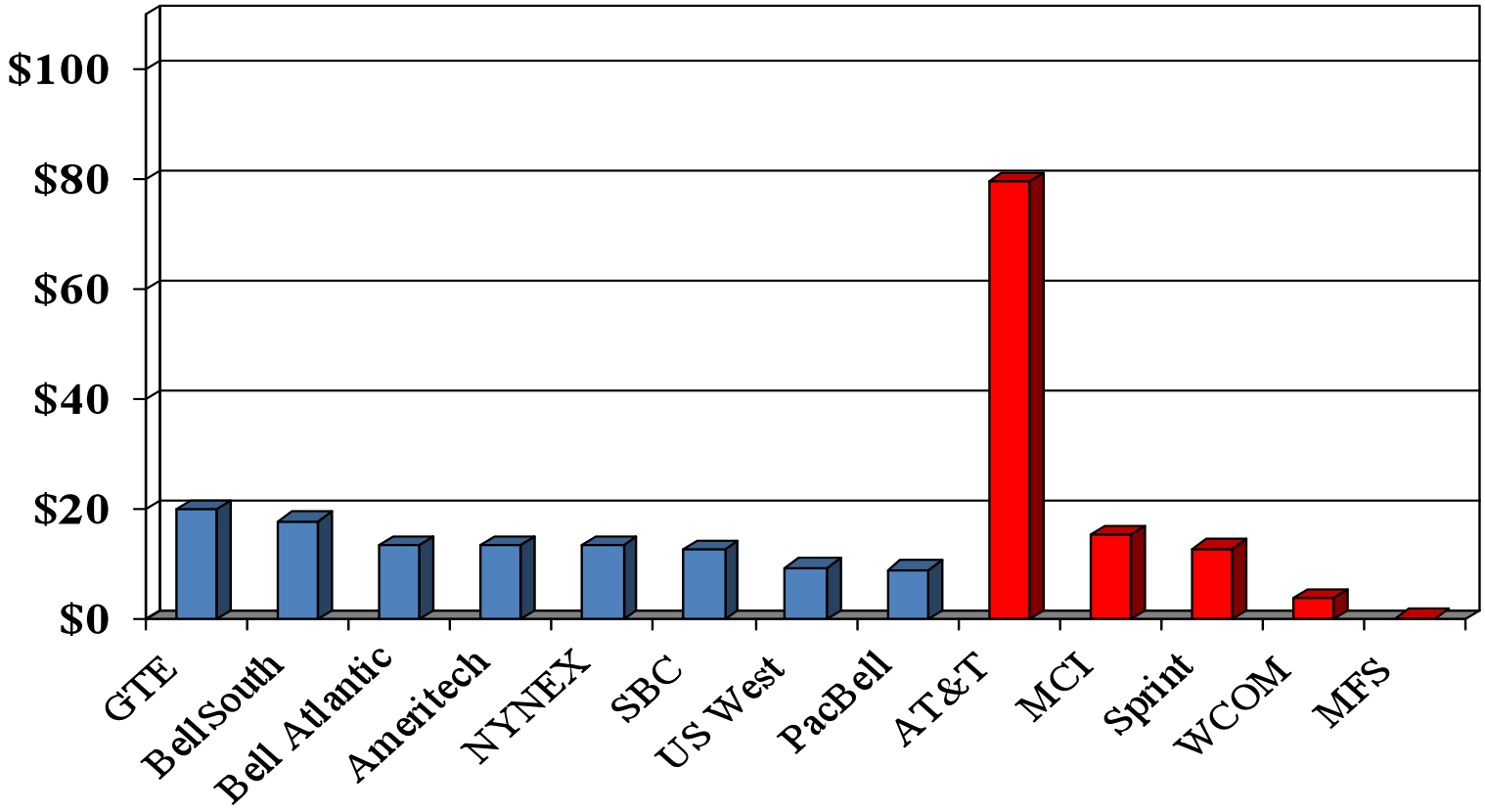
The Pressures for Grand Bargain – 1996 ACT

- **CLECs** want to offer traditional switched **local services**
- **RBOCs** want to offer **long distance service**.
- **RBOCs** concerned that **"universal service"** obligations are a perpetual disadvantage.
- **Long Distance Carriers (IXCs)** fear the power of RBOC pre-divestiture problems and want **access reform**.

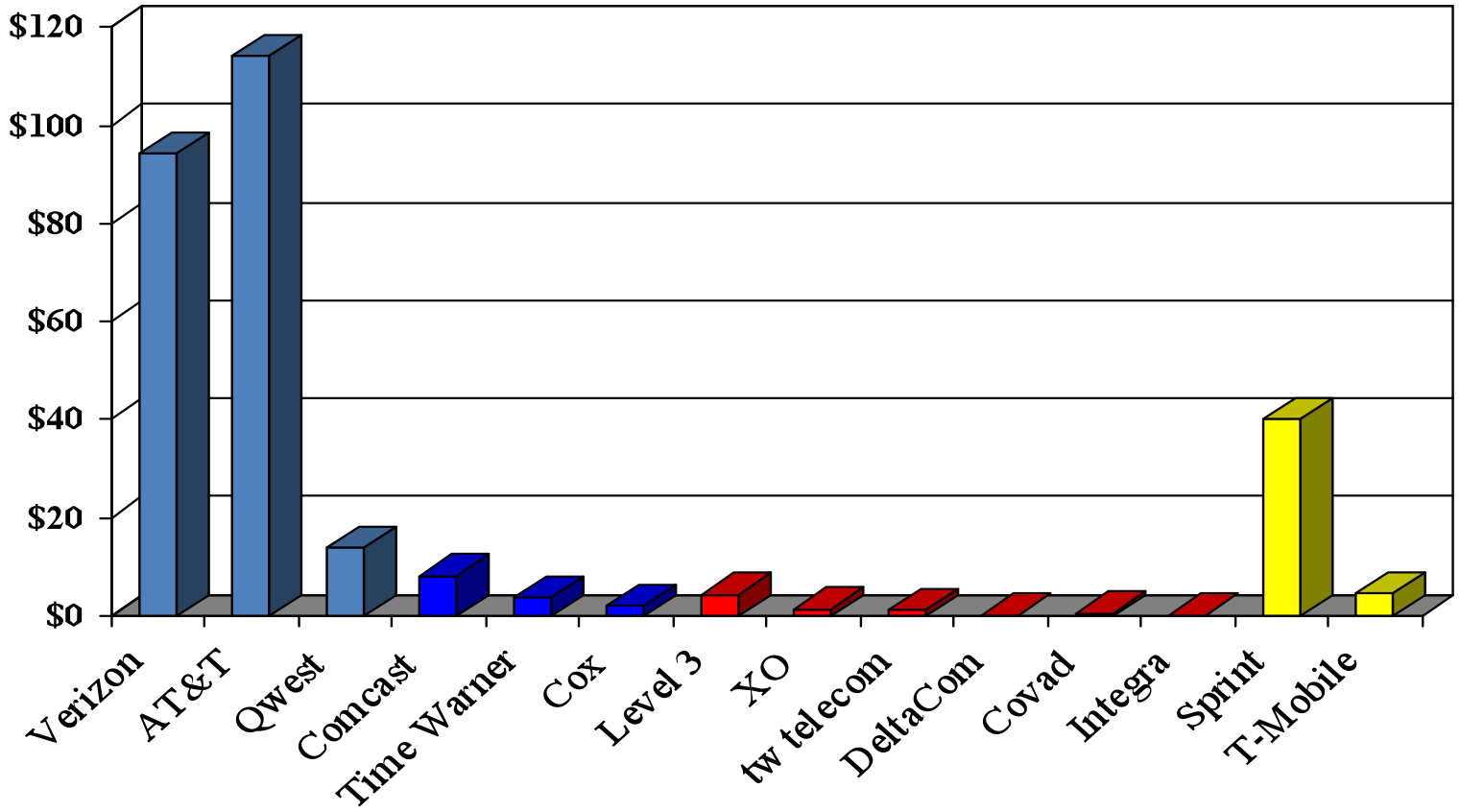
Local Entry Strategies

- **Resale** of the incumbent local telephone companies service. (Avoided Cost Discount)
- **Lease** of the incumbent local companies network. (Cost-Based Rates)
  - UNE-Loop
  - UNE-Platform
- **Build** your own network and then interconnect with ILECs for exchange of traffic.
- **Offer** Internet services and new applications

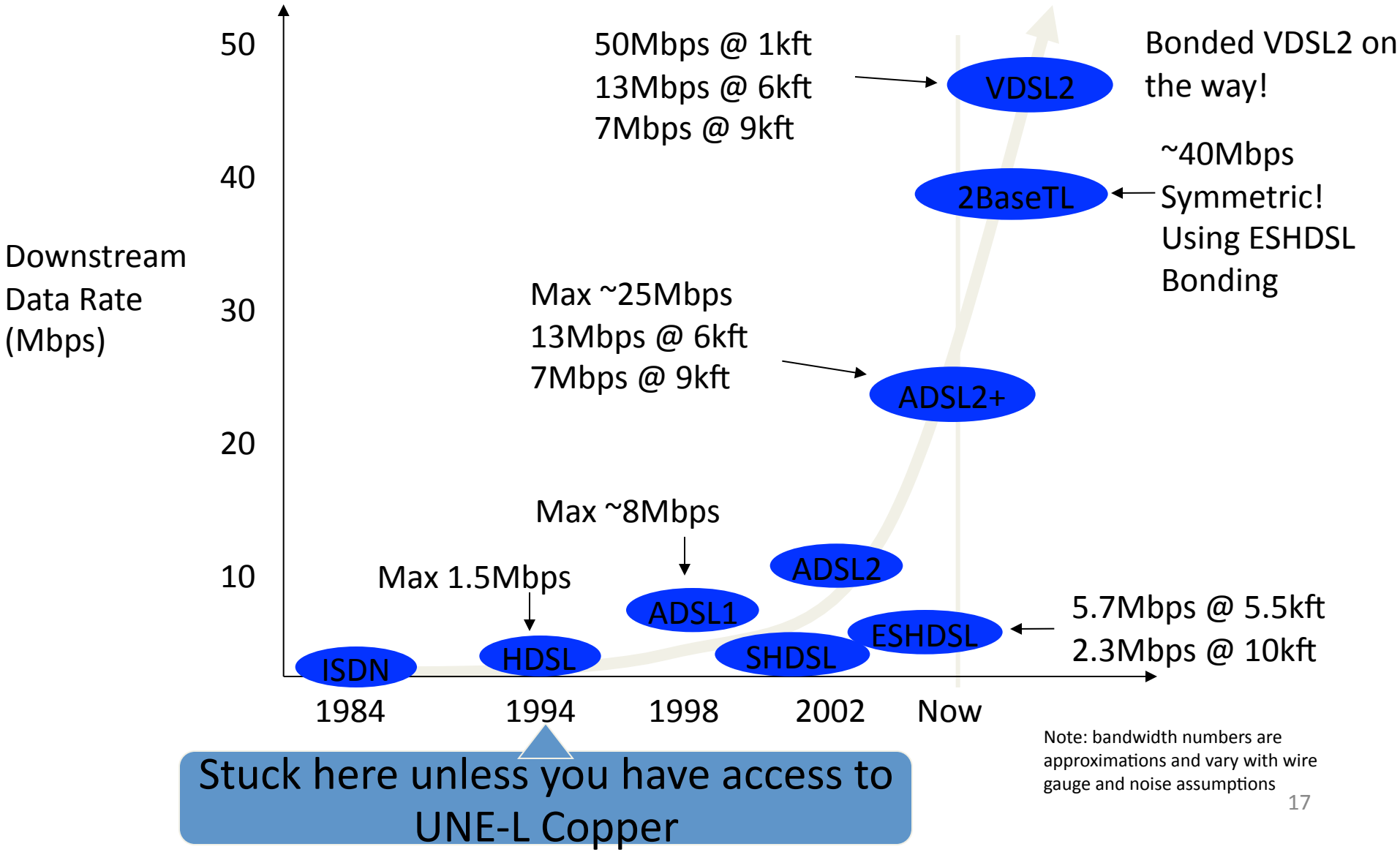
Revenues ($ Billions - Year End 1995)



Revenues ($ Billions - Year End 2007)
Traditional Wireline/Cable/Wireless



A history of bandwidth



Note: bandwidth numbers are approximations and vary with wire gauge and noise assumptions

Copper Innovation Continues … but

- **Copper loop plant** is a national treasure and generally available anywhere **today**.
- **DSL innovation** has connected tens of millions of consumers and businesses to the internet … an absolute necessity today for broadband availability.
- **Bandwidth speeds via copper** have already exceeded what many thought was possible and this innovation continues today with speeds up to **1 Gbps per customer*.**
- **Copper applications now include video and Ethernet** at lower costs than fiber. It is critical to preserve copper to take advantage of opportunities created by these new technology advances.
- **Access to copper is not guaranteed**. Incumbents are retiring a record number of copper loops and transport which directly affect CLECs and their customers.

*John M. Cioffi, Sumanth Jagannathan, Mehdi Mohseni, and George Ginis, Stanford University and ASSIA, Inc.,"CuPON: The Copper Alternative to PON 100 Gb/s DSL Networks," IEEE Communications Magazine, June 2007

The IP Network Layers