

Viral Triggers: Telephony



Communicators

CB

FRS

AM/FM (Audio-casting)

Television

Telephony

SMS

IM

M2M

Imaging

Remote Controls

Positioning

RFID

Blogs

Podcasting

Fleet Communications

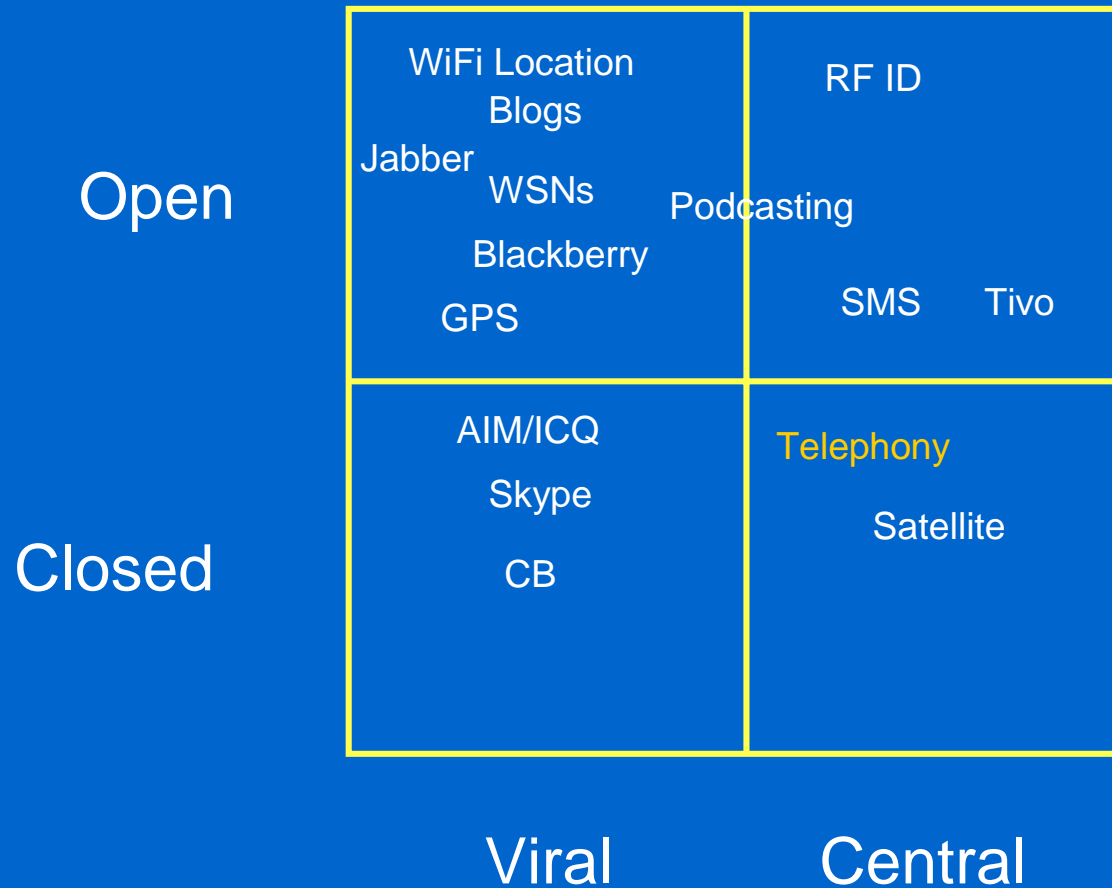
Frameworks

Architecture

		Architecture	
Open		Blogs WiFi-Location	Podcasting Tivo Blackberry Jabber
Closed		CB Skype WSNs	RF ID Satellite GPS AIM/ICQ Telephony SMS
		Viral	Central

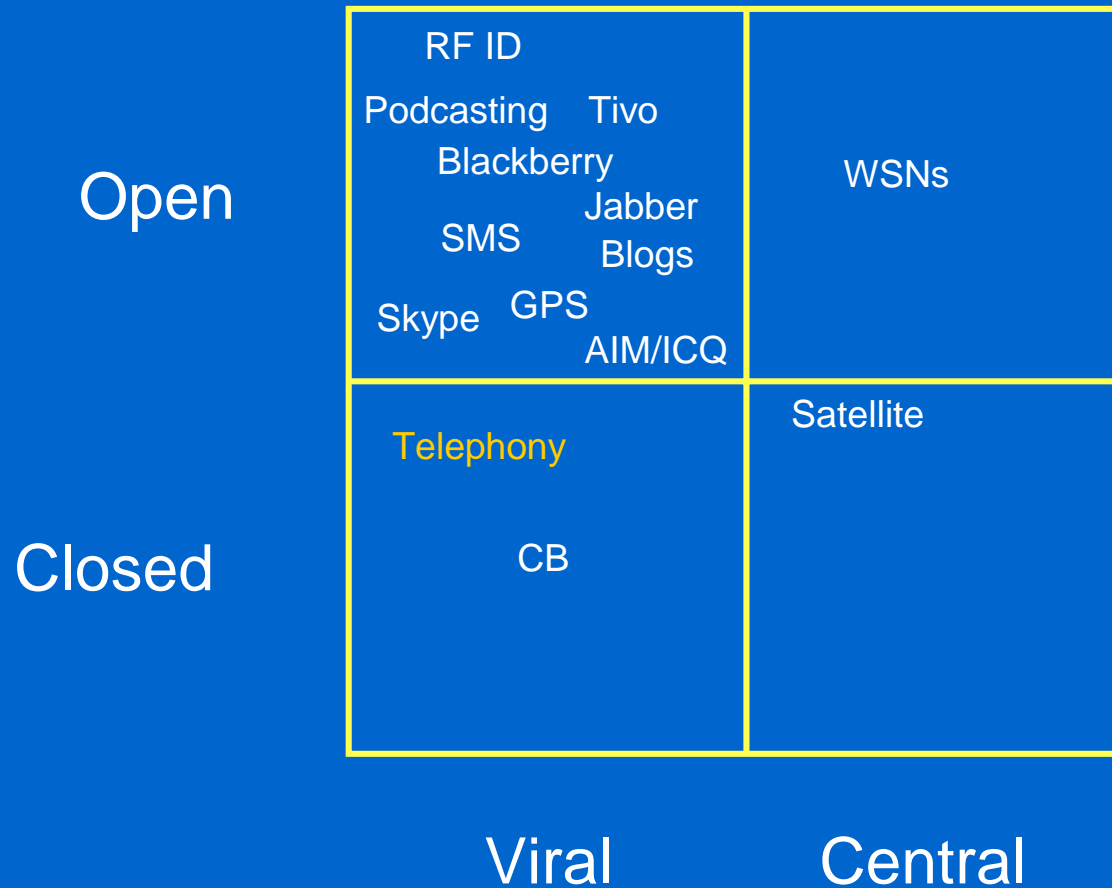
Frameworks

Interfaces



Frameworks

Marketing



Telephony Pre-History

1729 - Electricity through wire (Gray)

1746 - Leyden Jar

1753 - Anonymous writer in the Scot's Magazine suggested that electricity might transmit messages.

1800 - First battery: KEY because sustained low powered electric current was now possible (Volta)

1820 - Electromagnetism (Oersted)

1821 - Induction (Faraday)

1830 - First practical electrical signal (Henry)

1837 - First workable telegraph (Morse)

1854 - Writings on transmitting speech electrically (Bourseul)

1861 - The first non-working telephone (Reis) relied as did the telegraph on making/breaking a circuit.

1870s - Alexander Graham Bell and Elisha Gray were racing to invent a multiplexing telegraph, the ability to send multiple telegraph signals over a single wire

Inventors' Backgrounds

- Elisha Gray was a professional inventor, electrician, held some telegraph patents, co-founded Gray and Barton. Later 1/3 owned by Western Union Telegraph Company, and re-named Western Electric. Transmitting speech was an interesting goal, but not a life-long goal
- Alexander Graham Bell was interested with transmitting speech from the start. He was well schooled in speech, anatomy, physiology. His schooling revolved around the study and mechanics of speech and sound. Once moved from Edinburgh, Scotland to Canada, he soon became a vocal physiology professor at Boston College. He taught and tutored the deaf.

“The most valuable patent ever issued”

14 February, 1876

Bell's Patent is filed only hours before Gray.

The key to it was variable resistance, an idea scribbled in the margins, and a notion that perhaps came from Gray? Controversial.

This is, not surprisingly, one of the most litigated disputes in history.
There have been some 600 law suits involving this patent.

Lawsuits and research seem to confirm Bell as the inventor

Telephony Early History

1876 - Bell and Watson made the first call to date. Two miles. The design was seriously limited. It was "sound powered" meaning that the wire did not provide current on its own. Bell switched to a design by Francis Blake, which relied on line power

1877 - Sanders, Hubbard, and Bell formed the first Bell telephone company. Hubbard decided to LEASE phones, other equipment. rather than sell them. This one decision stuck for 100 years and helped sustain the Bell companies.

1877 - Bell: 3,000 phones.

1878 - First commercial switchboard in New Haven, CT. 21 telephones on 8 lines

1878 - First large city exchange opened by Western Union in San Francisco

1878 - First telephone installed in the White House

1878 - Bell: 10,755 phones

1878 - Bell won a patent infringement suit against Western Union in the Supreme Court.

1879 - Bell company became National Bell Company, then American Bell Company

1880 - American Bell: 133,000 telephones

1880 - Bell COO Theodore Vail bought a controlling interest in Western Electric. Now Western was producing phones for Bell.

Telephony: AT&T

1889 - Hartford, first public pay telephone

1892 - Bell: 240,000 telephones.

1892 - First automatic dial system, La Porte, Indiana in an independent. Alman Strowger's Step by Step SXS system. (Bell system didn't use automatic until 1919).

1893 - First central office exchange with a common battery for talking and signaling, Lexington, MA

1899 - American Bell Telephone reorganization, now American Telephone and Telegraph Company.

1903 - independent telephones: 2,000,000, Bell: 1,278,000. Bell: high prices, poor service.

1913 - Justice department antitrust pressure. AT&T became long-distance carrier and agreed to connect independents. No more buying up independents

1915 - First transcontinental line, NYC to San Francisco (3 min call: \$22.20, i.e. \$411.45 in today's dollars!)

1919 - AT&T introduces automatic switching equipment (Finally). Manufactured by and bought from their rival Automatic Electric

1927 - First commercial long-distance radio telephone service between U.S. and Great Britain.

1929 - First telephone installed at the president's desk

1934 - The FCC is established. It immediately pretty much ends radio phone development & innovation

1937 - Coaxial cable between Toledo, OH and South Bend, IN. Multiplexing enabled wire to carry many calls at once.

Telephony: AT&T (cont.)

1938 - Crossbar switching. Western Electric then improved by AT&T.

1943 - The longest line in operation became Edmonton, Alberta and Fairbanks, Alaska. 1500 Miles Long.

1948 - Bell Labs invents the transistor. It's a switch. It's an amplifier. It's magic.

1951 - First transcontinental microwave system. 107 Relays, 30 miles apart linked NYC and San Francisco.
Cost: \$40,000,000.

1958 - 400 Microwave stations = 13,000,000 miles of telephone, 1/4 of all long-distance. (600 conversations/2 tv programs).

1956 - The first transatlantic telephone cable started carrying calls. \$42,000,000.

--Mid-1950s AT&T began research to create computerized switching. Under more antitrust pressure, agreed not to get into the computer and business machine business. (Make way for IBM)

1958 - Wichita Falls, TX was the first Bell System city to start true-number calling.

1963 - The first modern touch-tone phone was introduced.

1963 - Digital carrier techniques introduced. T1 (Transmission One) became backbone of long-distance service.

1965 - The first commercial communications satellite was launched. 240 two-way telephone circuits.

1965 - No. 1Ess, Bell Systems first central office computerized switch.

1969 - FCC allows non-Bell equipment to be attached to Bell lines. Other companies flourish. Microwave Communications International – Carterphone decision

Late 1960s. Huge demand. Poor service. All the phone companies were affected, blamed.

Telephony: The Death of Big AT&T, deregulation

1974 - Justice department began to investigate AT&T for antitrust.

1977 - The FCC creates certification whereby anyone can make telephone equipment so long as it can meet the standards.

1978 - The last local cord switchboard (operators) replaced in Santa Cataline Island, California

1977 - Cellular Systems begin trials

1982 - AT&T Split up, bowing to antitrust pressure. They had been huge. \$155 billion in assets (\$256 bil today). A million employees. Regional bells became companies. Long distance forbidden to provide local service, local service forbidden to provide long distance

1984 - Western Electric ceases to exist.

Key Turning Points at the end of the Bell Monopoly

1957 – Hushaphone Decision

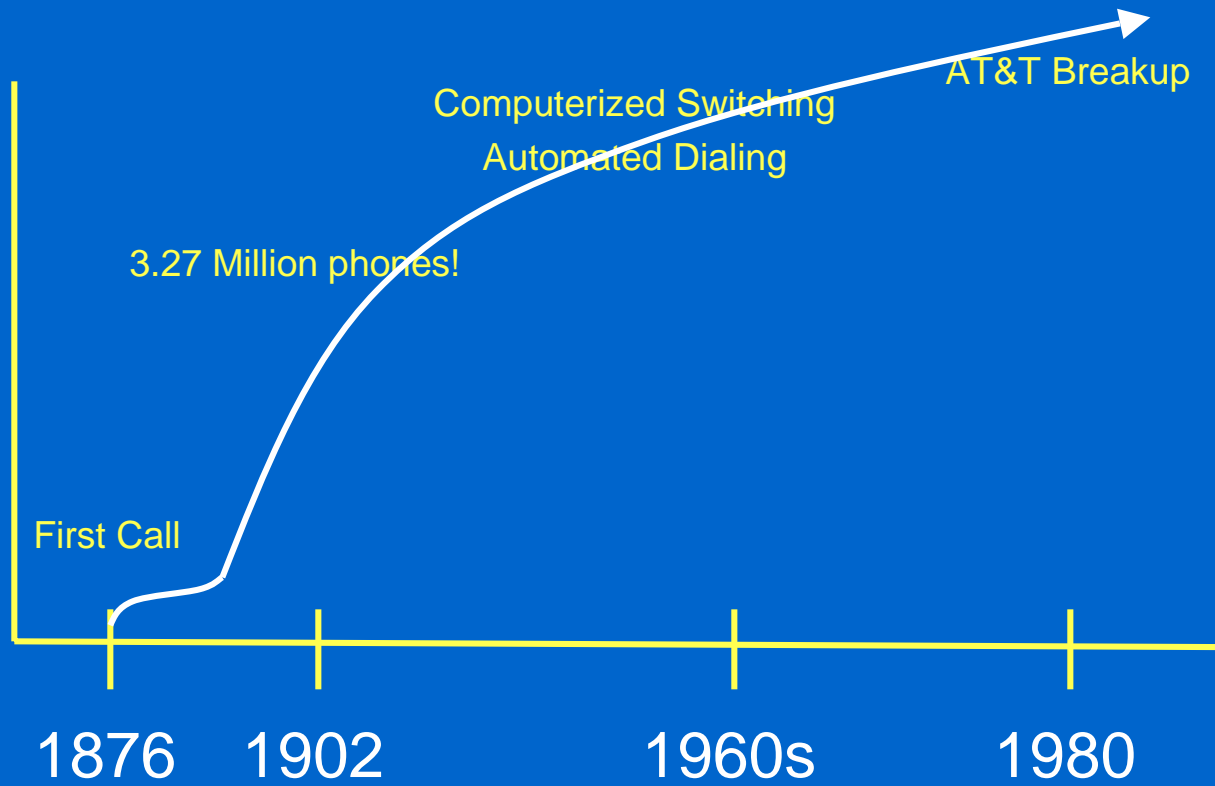
1968 – Carterphone Decision

Allows non-telco equipment to be added to the network

Opened the door for competition, answering machines, fax machines, modems, etc.

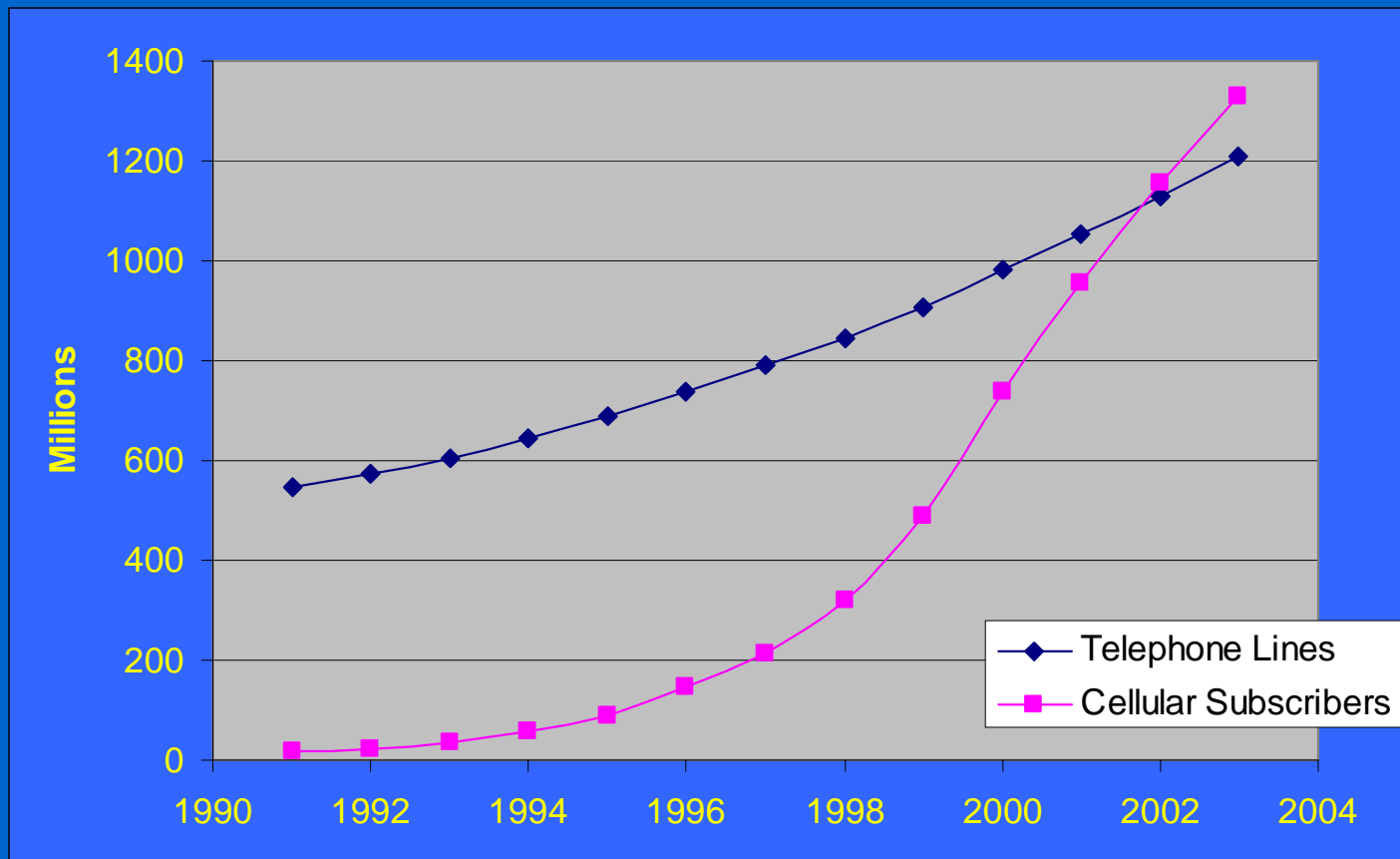


Telephone Growth, U.S



Land-Line Telephony Growth, Future?

Worldwide Telephone Lines vs. Cellular Subscribers



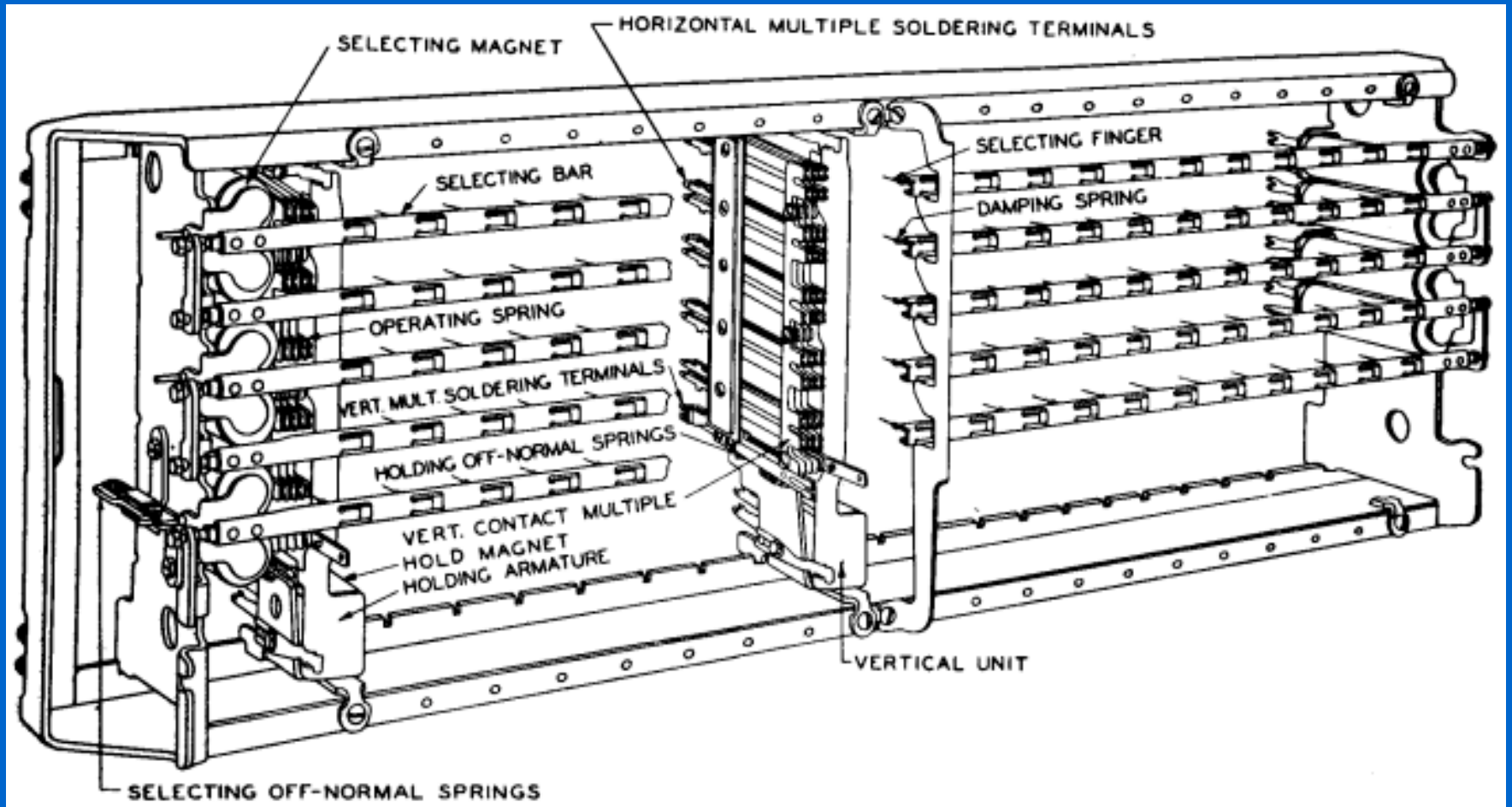
Source: ITU

Talking Points:

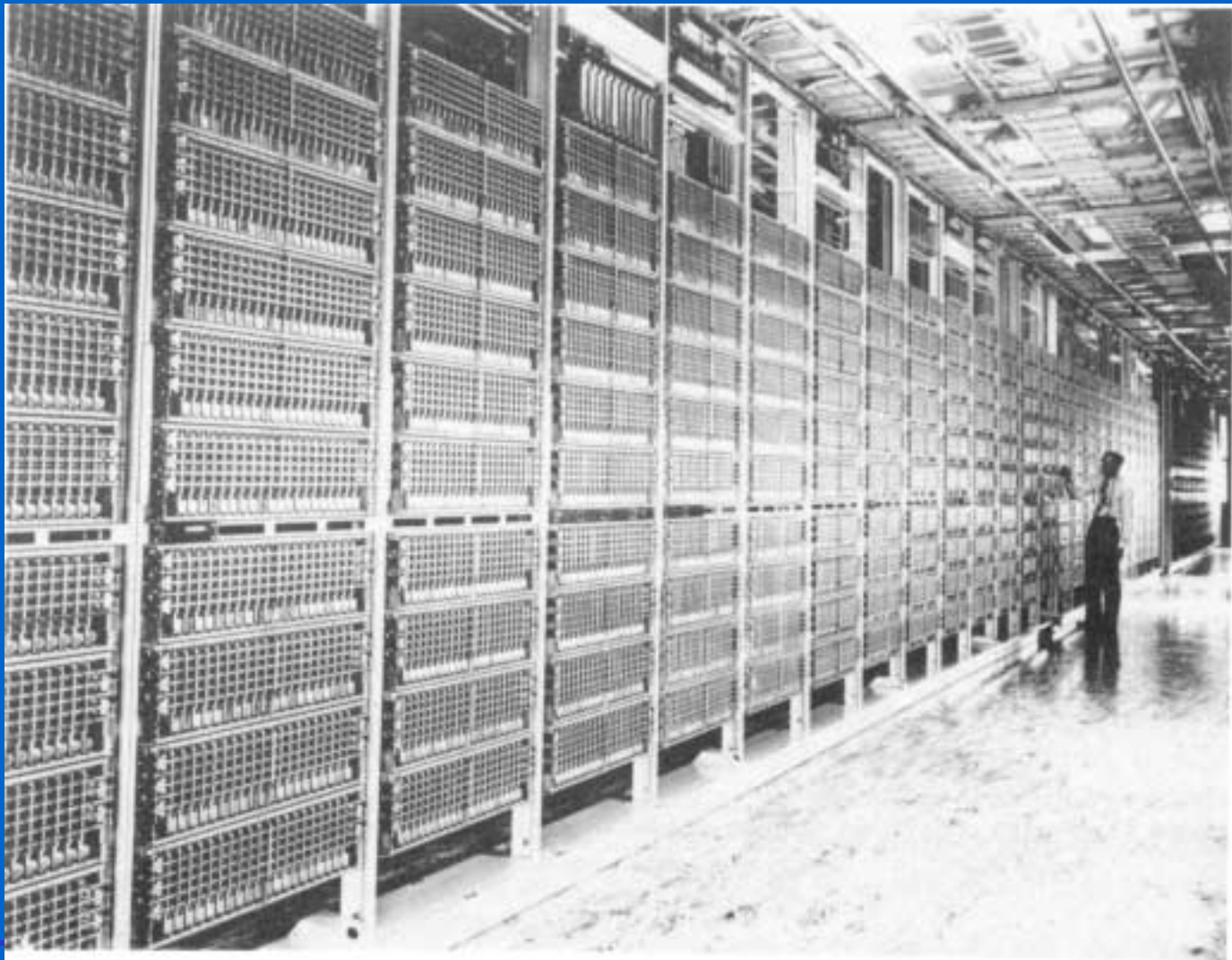
“Let us say that in the ultimate, whenever a baby is born anywhere in the world, he is given at birth a number which will be his telephone number for life. As soon as he can talk, he is given a watchlike device with 10 little buttons on one side and a screen on the other. Thus equipped, at any time when he wishes to talk with anyone in the world, he will pull out the device and punch on the keys the number of his friend. Then turning the device over, he will hear the voice of his friend and see his face on the screen, in color and in three dimensions. If he does not see and hear him he will know that the friend is dead.”

Osborne, Retired Chief of AT&T Engineering, 1954

Case Study: The Crossbar Switch



Case Study: The Crossbar Switch



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