




THE HISTORY OF THE TELEPHONE

FROM INVENTION TO MOBILE PHONE

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The History of The Telephone: From Invention to Mobile Phone | Part One: Before Electric Phones

Before electric telephones there were mechanical acoustic devices that were used to transmit speech and music over greater distances than that which would have been heard during normal direct speech.

These devices worked by connecting two (2) diaphragms with string or a wire.

For sound to be heard from one diaphragm to the other the string (or wire) had to be stretched to its fullest extent, allowing for the sound vibrations to travel along the string.

These devices were known as the acoustic tin can telephone or the “lovers” telephone.

Some of the earliest known experiments regarding the device were conducted by Robert Hooke from 1664 to 1685.

For a few years in the late 1800s acoustic telephones were marketed commercially as a competitor to the electric telephone, but quickly went out of business when the patents for the Bell telephone expired and new manufacturers began competing.

Vocabulary:

Acoustic: _____

Transmit: _____

Diaphragm: _____

Commercially: _____

Competitor: _____

Answer the questions:

1. What two names were the mechanical acoustic devices known as?

2. What were the devices used for?

Complete the sentences:

1. Some of the earliest known _____ regarding the device were conducted by _____ from _____ to _____.
2. These devices _____ by connecting _____ with _____.

Try this fun experiment:

You will need:

2 paper cups

Piece of string (thicker string works best) several feet long

Instructions:

Poke a small hole in the bottom of each cup, just small enough for the string to fit through.

Thread the string into one cup from the bottom and tie a small knot to hold it inside. Do the same on the other end of the string.

Stretch the string as far as it will go without breaking the cups or the string. While one person talks into the cup the other holds the cup up to their ear.

Can you hear the other person talking?

The History of The Telephone: From Invention to Mobile Phone | Part Two: The Invention of Electric Phones

The telephone is an invention that stemmed from the making of the electronic telegraph. The electronic telegraph was a system designed to send messages using Morse Code.

The invention of the telephone has been a disputed topic.

Some of the people credited with the invention include Charles Boursel, Innosenzo Manzetti, Antonio Meucci, Johann Philipp Reis, Alexander Graham Bell, and Elisha Gray.

The early history of the telephone remains confusing; however, the Bell and Edison patents were the most convincing as they dominated telephone technology and were upheld by US court decisions.

Alexander Graham Bell was the first to patent the telephone as an “apparatus for transmitting vocal and other sounds telegraphically” and is often credited as the inventor of the first practical telephone. Thomas Edison invented the carbon microphone, which converts sound to an electrical audio signal.

There is some controversy as to whether Alexander Graham Bell and Elisha Gray invented the telephone independently or if Bell may have stolen the invention from Gray.

With that said, the modern telephone is the works of many people.

Johann Philipp Reis is said to have stopped just short of a successful device and Antonia Muecci has been recognized by the U.S. House of Representatives for his contributions to the invention.

Vocabulary:

Apparatus: _____

Patent: _____

Answer these questions:

1. Name the people listed that have been credited with the invention of the telephone:

- | | |
|----------|----------|
| 1. _____ | 4. _____ |
| 2. _____ | 5. _____ |
| 3. _____ | 6. _____ |

2. Why is the early history of the telephone confusing?

3. What was the controversy between Alexander Graham Bell and Elisha Gray?

Complete the Sentences:

1. The invention of the _____ is a _____ topic.
2. _____ is said to have stopped just short of a _____ and _____ has been recognized by the U.S. _____ for his contributions to the invention.

Study:

Research Morse Code and write a report.

The History of The Telephone: From Invention to Mobile Phone | Part Three: Telephone Exchange

The Electric Telegraph Exchange

The main users of the electric telegraph were post offices, railway stations, government ministries, stock exchanges, a few nationally distributed newspapers, the largest internationally important corporations, and wealthy individuals.

Telegraph exchanges worked mainly on a *store and forward* basis. Store and forward is a telecommunications technique in which information is sent to an intermediate station, where it is kept and sent later to the destination or to another intermediate station.

The Telephone Exchange

Before the invention of the telephone switchboard, pairs of telephone were paired directly to each other. So, you could only connect with the places your telephone was paired with.

The telephone exchange allowed for individual subscriber lines to be connected to other homes, businesses, and public spaces. It only serviced a small area and was either operated manually by an operator or automatically by machine switching equipment.

The telephone exchange was the idea of Tivadar Paskà in 1876, while he was working for Thomas Edison on a telegraph exchange.

The first commercial exchange was opened with 21 subscribers in a storefront of the Boardman Building in New Haven, Connecticut.

George W. Coy designed and built the world's first switchboard for commercial use. It was constructed of "carriage bolts, handles from teapot lids, and bustle wire." According to the company records, all the furnishings of the office, including the switchboard, were worth less than forty dollars.

While the switchboard could connect as many as 64 customers, only 2 conversations could be handled at one time and 6 connections had to be made for each call.

The District Telephone Company of New Haven went into operation with only 21 subscribers, who each paid 1.50 USD a month. By February 21st, 1878, when the first telephone directory was published by the company, 50 subscribers were listed. Most of them were businesses, only 11 were residences, 4 of which were people associated to the company.

By 1880 the company had the right from the Bell Telephone Company to service all of Connecticut and western Massachusetts. As it expanded, the company was first renamed Connecticut Telephone, then Southern New England Telephone in 1882.

The site of the first telephone exchange was granted designation as a National Historic Landmark on April 23rd, 1965, but it was withdrawn in 1973 to demolish the building to construct a parking garage.

Vocabulary:

Technique: _____

Intermediate: _____

Subscriber: _____

Ministries: _____

Commercial: _____

Exchange: _____

Associated: _____

Designation: _____

Answer the questions:

1. Who were the main users of the electric telegraph?

2. What happened that allowed for individual subscribers to be connected with other homes, businesses, and public spaces?

3. Who designed and built the world's first switchboard for commercial use?

Complete the sentences:

1. Telegraph exchanges worked mainly on a _____ and _____ basis.
2. While the switchboard could connect as many as _____ customers, only _____ conversations could be handled at one time, and _____ connections had to be made for each _____.
3. The site of the first _____ was granted designation on _____, 1965, but it was withdrawn in _____ to demolish the building and construct a _____.

The History of The Telephone: From Invention to Mobile Phone | Part Four: Early Telephones

Early telephones were diverse. Some used liquid transmitters, such as the water microphone, some were dynamic, but most used carbon transmitters.

They were locally powered and used a dynamic transmitter or powered the transmitter with a local battery. One of the jobs of the outside plant (you might know these as power boxes) personnel was to visit each telephone periodically to inspect the battery.

Early telephones had only one wire for both transmitting and receiving of audio and one opening for sound. Which resulted in the user having to alternate speaking and listening.

At first, telephones were release in pair to the subscriber. For example, one for home and one for the shop, but the subscriber had to arrange with telegraph contractors to construct a line between them. Users who wanted more than what was originally provided had to obtain and set up multiple telephones and line.

Making a phone call was somewhat crude in the fact that the user would whistle into the transmitter to alert the other end. Exchange operations changed this later by adding bells to alert the other end. The bell was first operated over a second wire, but was later operated over the same wire using a condenser.

Telephones that were connected to the earliest Strowger automatic exchanges had seven wires. One for the knife switch (power), one for the telegraph key, one for the bell, one for the push button, and 2 for speaking.

Rural and other telephones that were not on a common battery exchange had a hand crank generator called a magneto.

In the 1890s the “candlestick” telephone was introduced. It was smaller and the transmitter stood on a stand making it look like a candlestick.

Vocabulary:

Contractors: _____

Obtain: _____

Condenser: _____

Transmitters: _____

Dynamic: _____

Periodically: _____

Answer the questions:

1. Name the 3 types of transmitters early telephones used.

2. At first, how many telephones were released to the subscriber?

3. What phone was introduced in the 1890s?

Complete the sentences:

1. Early telephones had _____ for both _____ and _____ and one _____ for _____.

2. Telephones that were _____ to the earliest _____ automatic exchanges had _____.

Research:

Research dynamic, liquid, and carbon transmitters. Write a report and answer these questions:

What are they? Why are they different?

The History of The Telephone: From Invention to Mobile Phone | Part Five: Phones in the 20th Century

By 1904 over 3 million phones were connected by manual switchboard exchanges.

In the early 20th century a telephone design was introduced where the transmitter and receiver were both placed in a single molded plastic handle. When not in use the handle was placed on a cradle base unit. The base unit had a rotary dial to dial the numbers.

In the 1930s the ringer was enclosed in the telephone instead of having a separate ringer box.

Power was also added to each subscriber line by central office batteries, rather than the users local battery, which required periodic service.

In 1960 touch tone signaling began replacing the rotary dial.

Vocabulary:

Receiver: _____

Manual: _____

Answer the questions:

1. How many phones were connected by manual switchboard exchanges by 1904?

2. What year was the ringer enclosed in the telephone?

Complete the sentences:

1. In 1960 _____ signaling began replacing the _____.
2. In the _____ the ringer was enclosed in the _____ instead of having a separate _____.

Activity:

Using your research skills, find pictures of each style of phone you have read about in the lessons so far.

Tin can telephone, original telephone, candlestick telephone, rotary telephone, and touch tone telephone.

Cut out the pictures and glue them to a sheet of paper in the order of when they were around. Label each with its name and tell a little about it.

The History of The Telephone: From Invention to Mobile Phone | Part Six: Before Mobile Phones

In 1908, a Professor Albert Jahnke and the Oakland Transcontinental Aerial Telephone and Power Company claimed to have developed a wireless telephone. They were accused of fraud, but the charge was dropped.

1918- German railroad system tests wireless telephony on military trains between Berlin and Zossen.

1924- Public trials start with telephone connection on trains between Berlin and Hamburg.

1925- The company Zugtelephonie AG was founded to supply train telephony equipment.

1926- Telephone service in trains of the Deutsche Reichsbahn and the German mail service on the route between Hamburg and Berlin is approved and offered to first class travelers.

Vocabulary:

Fraud: _____

Answer the questions:

1. What did Professor Jahnke claim to have developed?

2. When did public trials start with telephone connection on trains?

3. What company was founded in 1925 to supply train telephony equipment?

Complete the sentences:

1. _____ railroad system tests _____ telephony on _____ trains between Berlin and _____.

2. Telephone service in _____ in the _____ Reichsbahn and the _____ mail service on the _____ between Hamburg and _____ is approved and offered to _____ travelers.

Research:

Research the towns and companies on this sheet. Write a report to tell a little about each.

The History of The Telephone: From Invention to Mobile Phone | Part Seven: Mobile Phones in Automobiles

Household radio transceivers have been available since the 1940s. Mobile phones for automobiles became available around the same time from some companies.

These early devices were bulky, consumed high power, and the network supported only a few simultaneous conversations.

In the United States, engineers from Bell Labs began working on a system to allow mobile users to place and receive calls from automobiles, leading to the inauguration of mobile service on June 17th, 1946 in St. Louis, Missouri.

Soon after, AT&T offered Mobile Telephone Service.

Mobile Telephone Service was a wide range of mobile telephone services, but had limited coverage area and only a few available channels in urban areas.

From 1957-1961, Leonid Kupriyanovich, an engineer, developed and presented many pocket sized communication radios.

In 1965, the Bulgarian company, "Radioelektronika" presented the mobile automatic phone combined with base station.

Vocabulary:

Transceiver: _____

Simultaneous: _____

Urban: _____

Inauguration: _____

Answer the questions:

1. How long have radio transceivers been available?

2. When did AT&T start offering Mobile Telephone Service?

3. What did the engineer, Leonid Kupriyanovich develop?

Complete the sentences:

1. In the United _____, engineers from Bell Labs began _____ on a system to allow _____ users to place and _____ calls from _____, leading to the _____ of mobile phone service on _____, 1946 in St. Louis, _____.
2. _____ have been available since the _____.

Research:

Research the company AT&T. Write a report and answer the following questions.

When was the company established? What was their purpose? How long was the company in business?

The History of The Telephone: From Invention to Mobile Phone | Part Eight: About Early Mobile Services

-MTS-

1949: AT&T commercialized Mobile Telephone Service. It was introduced in 100 towns and highway corridors. It was a rarity with only 5,000 customers placing about 30,000 calls per week.

Calls were set up manually by an operator. The user had to press a button to talk and release the button to listen.

Only 3 radio channels were available, so only 3 customers in any given city could make telephone calls at one time.

The service was expensive at 15.00 USD per month and .30 to .40 USD per local call. This is about 176.00 USD and 3.50-4.75 USD per call by today's rates!

The UK had what was called Post Office Radiophone Service, which was launched in Manchester in 1959. It required the callers to speak with an operator, but it was possible to be put through to any subscriber in Great Britain.

-IMTS-

In 1965 AT&T introduced an improved version of MTS. It had additional channels and introduced customer dialing, but in agreement with state regulatory agencies, AT&T limited the service to just 40,000 customers system wide.

-Radio Common Carrier-

Radio Common Carrier was introduced in the 1960s by independent telephone companies to compete against AT&T's IMTS.

It utilized paired UHF 454/459 MHz and VHF 152/158 MHz frequencies near those used by IMTS.

RCC based services were used until the 1980s when cellular AMPS systems made them obsolete.

-Other-

In 1969 Penn Central Railroad equipped commuter trains along the New York-Washington route with special pay phones that allowed passengers to place calls while the train was moving.

Vocabulary:

Commercialized: _____

Regulatory: _____

Independent: _____

Frequencies: _____

Obsolete: _____

Answer the questions:

1. In how many towns and highway corridors was MTS first introduced?

2. How did AT&T improve MTS?

3. What caused RCC based services to become obsolete?

Complete the sentences:

1. _____ were set up manually by an _____.
2. Radio _____ was introduced in the _____ by independent telephone _____ to compete against _____ ITMS.

Research:

Research UHF 454/459 MHz and VHF 152/158 MHz frequencies and AMPS. In your report tell what they are and how they are used.

The History of The Telephone: From Invention to Mobile Phone | Part Nine: Successive Generations

The advances in mobile telephony can be traced in successive generations.

0G- MTS and Improved Mobile Telephone Service

1G- Analogue Cellular Network

2G- Digital Cellular Network

3G- Broadband Data Services

4G- Native IP Networks

Vocabulary:

Successive: _____

Generations: _____

Research:

Research the generations above for 1G to 4G. In your report tell a little bit about each one.

The History of The Telephone: From Invention to Mobile Phone | Part Ten: Hand Held Mobile Phones

In 1971, a man named Henry Sampson was awarded a patent for the “gamma-electric cell”, this technology was then used in the invention of the cellular phone.

Prior to 1973 mobile telephony was limited to telephones installed in cars and other vehicles.

On April 3, 1973, Martin Cooper, a researcher and executive from Motorola, made the first mobile telephone call from handheld equipment. The phone call was placed to his rival, Dr. Joel S. Engel, of Bell Labs.

The proto type was quite large in comparison to today’s mobile phones. It was 9.1 by 5.1 by 1.8 inches and weighed 2.4 pounds.

It offered a talk time of 30 minutes and took 10 hours to recharge.

Vocabulary:

Proto Type: _____

Answer the questions:

1. Who made the first telephone call from a handheld mobile device?

2. How long did the proto type have to charge for 30 minutes of talk time?

3. Who invented the “gamma-electric cell”?

Complete the sentences:

1. Prior to _____ mobile telephony was limited to _____ installed in _____ and other vehicles.

2. The _____ was quite large in _____ to today’s _____.

Activity:

Using the information you have learned in this packet, make a timeline from the invention of the telephone to the invention of the mobile phone.