**thebeginning-timeline**

**The Beginning Timeline**

**A Data Communication Historical Series**

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**Data Communication; The Beginning**

I suppose if one goes back into the past far enough, we would find data communications began with the waving of an object to relay information or relaying information through the use of fire and/or smoke signals; also flags and banners were used to indicate various situations and conditions (200 BC to 100 BC). Runners and horseback riders (200 BC to 100 BC) were the first to use voice communications in addition to delivering messages (data). Carrier pigeons (776 BC) were probably considered a high-speed data delivery media. Mirrors were used (37 BC) to send messages by the Romans.

When using a flag or pair of flags (semaphore), the various flag(s) positions represent situations, conditions or individual characters of the alphabet. Individually controlled mechanical semaphore telegraph systems located on high ground, with each one about fifteen miles apart, using semaphore signaling, were used before the Electric Telegraph system was implemented.

Flashing lights used in the past and today, such as those used on ships, with blinking (blinder) controls are used in a manner similar to sending ‘Morse / International code’.

Then the crude telegraph devices that provided short and long-distance message communications using needles (pointers) and ‘dots and dashes’ to represent alphanumeric characters were invented. This activity primarily used overhead wires on poles for the transmission medium. The transmitted dots and dashes created indentations on a tape or paper at the receiving end. The receiving operatordeciphered the dots and dashes (non-printing) and wrote down the appropriate characters in the order received, compiling a complete message. One hoped a complete message without errors was received.

When the printing Telegraph media was just beginning the devices printed ‘dots’ and ‘dashes’ or in some cases roman numerals /characters were printed based onthe received dots and dashes, also other experimental codes were used. The dots and dashes could be viewed as the present-day computer bits. A ‘1’ bit being a voltage level for a period of time and the ‘0’ bit being the absence of voltage for a period of time. The difference was the 1 bit could be for a short or long-time duration, short for the dot and long for the dash. There also could be a pause between the bits; a longer 0 bit (no voltage). This subject is discussed further in the Morse code and Teletypewriter Chapters.

The Morse code was the next major step in data communications. It was decided that instead of deciphering the indentations or printing of the dots and dashes the receiving operator could listen to the dots and dashes, then decode and record the characters as they are received. This created the ‘key’ for creating the dots and dashes that were received on the new clicking ‘sounder’.

This was followed by the development of the ‘Teletypewriter’ (early 1900s), which started the future rapid paced technological advances for transmitting messages (data).

The lines for connecting the communication devices to each other were primarily iron (steel) in the beginning and then copper was used. The line (wire) was strung on poles between long distance user locations and some underground cable was used for short distances. The wire was fastened to a glass insulator on the pole cross arms to avoid shorting out the voltage (current) on the line. Even though copper came into use in the early days not all the iron (steel) wires were replaced immediately and some were still in use in the 1960s. The iron wires rusted and sometimes the wire would be about twice its original size (diameter) because of the rust. The actual wire would deteriorate to the point where the original conducting wire size would decrease in diameter because of the rust, which affected the signal quality. Also, this decrease in the wire diameter would cause the wire to break easily.

When it rained, or a heavy fog was present, the voltage leakage to ground increased because the glass insulators would collect dust and dirt and when wet created a voltage conduction source. The rust, when wet, also helped create a voltage leakage to ground at the insulators. Copper wire helped solve the rust problem and did not deteriorate in quality like the iron wire, which definitely helped improve signal quality. The power source for the communication lines, to about 1936, was Direct Current (DC), which deteriorated in power level much quicker than the AC (analog) power (signals) utilized in the late 1930s forward.

Most lines on poles, referred to as land-lines when radio came on the scene, were constructed along railroad lines because this allowed easy access for construction and maintenance. And in time, within a City, the lines (circuits) were contained in multiple pair underground cables or strung on poles. Cables were buried underground or placed in any available tunnel within a city, which could be an underground sewer or drainage system or other special underground tunnel system. All this activity happened prior to the microwave and satellite systems and the TV coax and fiber optic cable systems.

Many inventions helped create the message (data) communications media, and the beginning years were the learning and testing years. The invented and developed devices went from crude telegraph systems to the high-speed computer systems of today in only a hundred and fifty years. It didn’t all happen so fast when it’s stated in terms of 150 years.

**Development Timeline:**

A few of the important Data (message) communication developments:

1. 1828: Crude printing devices using dots and dashes for the transmission code were the first telegraphic devices used in the USA.
2. 1850: Then the Morse code became the mainstay message delivery system for many years until the invention and implementation of the reliable teletypewriter.
3. 1908-1911: After the invention of the Teletypewriter Morse code was gradually phased out, with some small communities relying on Morse code through the 1950’s.
4. 1910-1915: The paper tape perforator and transmitter became widely used devices
5. 1930’s: The invention of the ‘Carrier device’ provided the capability to transfer data over the telephone lines. The Carrier converted the DC (Direct Current) signal to an AC (alternating Current) signal, which was comparable to a voice-generated signal. The Carrier then converted the AC signal back to a DC signal. Prior to the Carrier device all power for message (data) transmission was DC.
6. 1930’s: Electronic multiplexing systems were developed, which replaced the electrical-mechanical systems; more efficient simultaneous common line sharing.
7. 1940’s & 50’s: The continued improvements in the Teletypewriter equipment provided for a more controlled terminal environment and allowed shared lines to function efficiently.
8. 1945-1957: Message switching advanced from the manual paper tape perforator and transmitter operation to the semi-automatic and automatic message switching centers.
9. 1958: Bell’s Data-Phone service; high-speed data transmission over telephone circuits
10. 1959: Computers: A viable message switching media using the transistor (ca1948).
11. 1960s: Microwave systems provided nationwide high-speed broadband communications.
12. 1962: The full-duplex MODEM: Functionally improved upon the Carrier device andprovided protocol and control functions between the connected devices.
13. 1968: The next generation of communication computers utilized integrated circuitry and chip technology, which allowed for higher speed, smaller physical size and less cooling requirements because less heat was produced by the computer component parts. Electronic chip technological advancements continued to shrink the size of computers.
14. 1969: Packet Switching was implemented and became the backbone for the Internet.
15. 1970’s: Computer devices and terminals became more automated and programmable.
16. 1974: Western Union launches Westar I; first U. S. domestic communications satellite.1980’s: The ‘Server’ system allowed the rapid development of the Local Area Networks (LAN). The Bulletin Board System (BBS), the precursor to E-mail and chat rooms, became popular. The Personal Computer (PC) arrived.
17. 1990’s: The World Wide Web (WWW) (Internet) arrived on the scene and rapidly developed; Cable MODEM(s) went into service.
18. 21st Century: Wide open for further development!