History of Wireless Communication

The use of light for wireless communications reaches back to ancient times. In former times, the light was either 'modulated' using mirrors to create a certain light on/light off pattern ('amplitude modulation') or, for example, flags were used to signal code words ('amplitude and frequency modulation', see chapter 2). The use of smoke signals for communication is mentioned by Polybius, Greece, as early as 150 BC.

In the 18th century, Claude Chappe invented the optical telegraph (1794), that long-distance wireless communication was possible with technical means. Optical telegraph lines were built almost until the end of the following century.

Wired communication started with the first commercial telegraph line between Washington and Baltimore in 1843, and Alexander Graham Bell's invention and marketing of the telephone in 1876 (others tried marketing before but did not succeed.

All optical transmission systems suffer from the high frequency of the carrier light. As every little obstacle shadows the signal, rain and fog make communication almost impossible.

At that time it was not possible to focus light as efficiently as can be done today by means of a laser, wireless communication did not really take off until the discovery of electromagnetic waves and the development of the equipment to modulate them.

The name, which is most closely connected with the success of wireless communication, is certainly that of Guglielmo Marconi (1874–1937). He gave the first demonstration of wireless telegraphy in 1895 using long wave transmission with very high transmission power (> 200 kW).

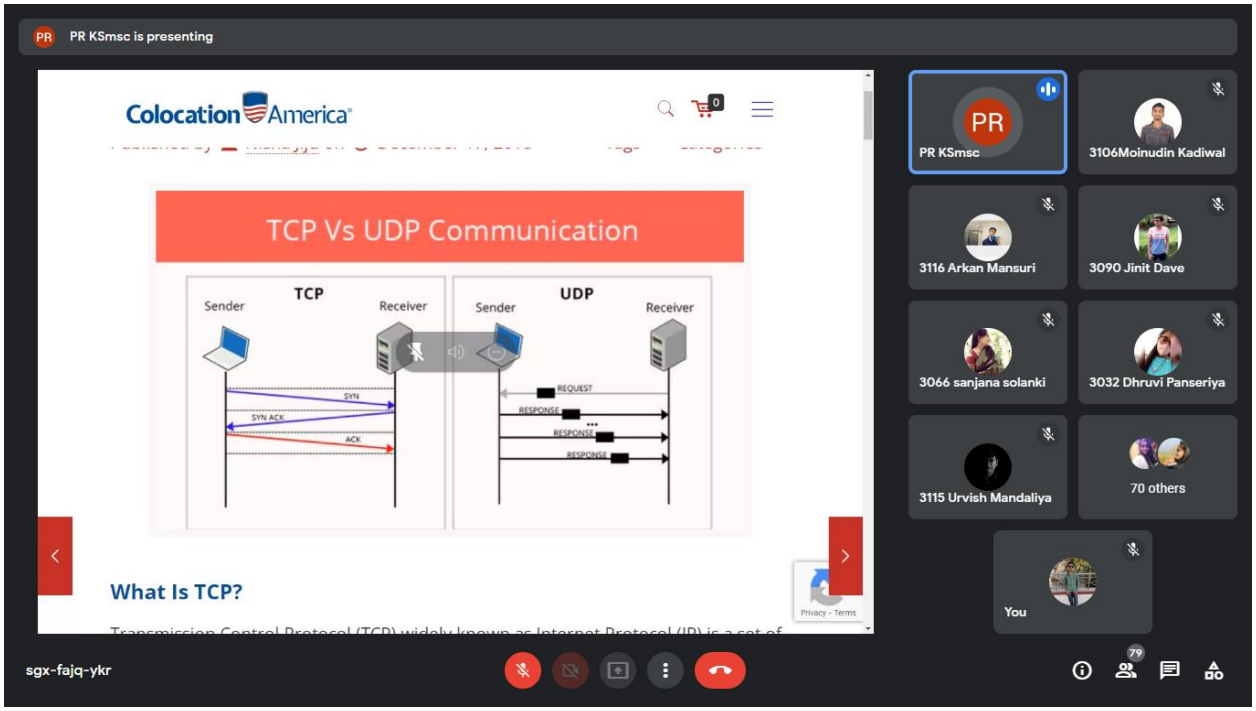
Only six years later, in 1907, the first commercial transatlantic connections were set up. Huge base stations using up to thirty 100 m high antennas were needed on both sides of the Atlantic Ocean.

The first radio broadcast took place in 1906 when Reginald A. Fessenden (1866–1932) transmitted voice and music for Christmas. In 1915, the first wireless voice transmission was set up between New York and San Francisco. The first commercial radio station started in 1920 (KDKA from Pittsburgh). Sender and receiver still needed huge antennas and high transmission power.

Nineteen twenty-eight was the year of many field trials for television broadcasting. John L. Baird (1888–1946) transmitted TV across the Atlantic and demonstrated color TV, the station WGY (Schenectady, NY) started regular TV broadcasts and the first TV news.

All wireless communication used amplitude modulation (see section 2.6), which offered relatively poor quality due to interference. One big step forward in this respect was the invention of frequency modulation in 1933 by Edwin H. Armstrong (1890–1954).

The northern European countries of Denmark, Finland, Norway, and Sweden (the cradle of modern mobile communications) agreed upon the nordic mobile telephone (NMT) system.



In 1983 the US system advanced mobile phone system (AMPS) started (EIA, 1989). AMPS is an analog mobile phone system working at 850 MHz.

Nineteen ninety-eight marked the beginning of mobile communication using satellites with the Iridium system (Iridium, 2002). Up to this time, satellites basically worked as a broadcast distribution medium or could only be used with big and heavy equipment – Iridium marked the beginning of small and truly portable mobile satellite telephones including data service. Iridium consists of 66 satellites in low earth orbit and uses the 1.6 GHz band for communication with the mobile phone.