



## Introduction to Marconi's Nobel Lecture

It is now a century since the first transcontinental wireless transmission when Guglielmo Marconi received wireless signals across the Atlantic in December 1901. After that historical event the world has seen tremendous advances in wireless transmission culminating in today's ubiquitous cellphones. It all started with the fundamental theoretical work of James Clerk Maxwell, who using tremendous physical intuition and mathematical prowess, showed in 1865 that variable currents in a conductor produce electromagnetic waves in space and that these waves travel with the velocity of light. It took another 23 years before Heinrich Hertz produced and verified the existence of electromagnetic waves, using a spark gap, conclusively establishing the correctness of Maxwell's equations. In fact electromagnetic waves were known as 'Hertzian waves' in those days and remained a laboratory curiosity. It was the genius of Guglielmo Marconi that realised the possibility of using these waves for practical applications culminating in his obtaining a patent for a 'System of Wireless Telegraphy' in 1897. In 1898 the business intuition of Marconi led him to set up the Wireless Telegraph and Signal Company Limited which opened the world's first radio factory at Chelmsford, England in 1898. He was a rare combination of an experimental scientist, an inventor who obtained a large number of patents and a successful industrialist. The quality of his science won him the Nobel Prize in Physics for the year 1909. He shared the Nobel Prize with Karl Ferdinand Braun who modified Marconi's wireless transmitters significantly to increase their range and usefulness.

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mentions the fact that Acharya Jagdish Chandra Bose had demonstrated to the public in 1895 wireless communication, a full two years before Marconi. Acharya J C Bose was a quintessential scientist and did not bother about industrial applications, patents, etc. In fact another engineer, Nikola Tesla had also proposed the essential elements of radio communication in 1892 and 1893 but had not carried them through as Marconi did. Litigation on Marconi's basic patents was fought in the US, courts and finally the US Supreme Court in 1943 declared that Marconi's basic patents were 'anticipated' and therefore invalid. By that time the world had accepted Marconi as the 'father of wireless communication'.

The genius of Marconi was not to accept without experimental evidence 'conventional wisdom' which prevailed during his time that wireless waves cannot be transmitted over long distances due to the curvature of the earth. The way he persisted with his conviction that long distance wireless communication is possible and the way he went about constructing huge antennas and high power transmitters to transmit electromagnetic waves over long distances is expressed in detail by him in the Nobel lecture which he delivered in 1909. In this classic I have 'stitched together' (from the full Nobel lecture which is 26 pages long), the parts in which he recounts the work done by him until 1901 when he successfully transmitted wireless waves across the Atlantic and the conclusion part in which he predicts the emergence of global wireless communication. Those interested in reading the full lecture can visit the following website:

<http://www.nobel.se/physics/laureates/1909/marconi-lecture.pdf>

V Rajaraman