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Guglielmo Marconi – the father of wireless communication

The last one hundred years have witnessed a dramatic acceleration in communications technology that has closed distances and spurred global growth. A century that began with visionary beliefs in wireless telegraphy ended with consumer cellular networks, a global electronic postal system and satellite networks spanning the globe and enabling the world to exchange and share information, education and entertainment. Behind this technology lies some remarkable intellect and entrepreneurial spirit. And few stand taller in their contribution than Guglielmo Marconi, a founding father of wireless communications.

Today, wireless communications impact the world in which we live in multiple ways. All of them owe a debt of gratitude to Marconi, his boundless energy to succeed, his ability to communicate his successes and his determination to commercialise his technology.

On 12 December 2001, it will be 100 years since Marconi accomplished one of his most notable feats: the transmission of a radio signal from Poldhu in Cornwall, England across the Atlantic to St Johns in Newfoundland, Canada. Against all odds and in the face of scientific thinking, Marconi achieved what was considered to be impossible and a new era in communications was born.

Communication companies such as Eutelsat have continued to drive this vision forward. Today Eutelsat, with its fleet of satellites in geostationary orbit, stands on the shoulders of giants such as Marconi in providing wireless communication solutions for professional and consumer, broadband and broadcast users. In honour of Marconi's accomplishments Eutelsat has dedicated its most recently launched satellite ATLANTIC BIRD™ 2 to Marconi. With its ability to connect the Old Continent with the New, this satellite follows in the wake of the route that Marconi opened 100 years ago.

1894: a milestone in technological innovation-Guglielmo Marconi builds the first radio equipment

Marconi in business

In 1897 Marconi found that he could transmit a radio signal at distances of 15 kilometres. In London in 1896, he filed a specification for a holding patent for a wireless telegraphy system. By June 1896, Marconi revised his patent application and submitted a full specification for the first patent in the world for wireless telegraphy. But in order to make his invention a commercial success, he needed to find a way to extend the range of his system with a powerful transmitter.

The Atlantic challenge

Wishing to realise the full potential of his wireless signal invention, Marconi embarked on his most ambitious project to date – the transatlantic transmission of wireless waves.

Scientific theory at the time believed that wireless waves travelled in a straight line and would not curve round the earth's surface. Marconi's experiments had left him convinced that it was possible and the building of a high powered transmitter was all that prevented success.

His first challenge was to secure funding for this ambitious task. The ship-to-shore business was not fully established and Marconi's Wireless Telegraphy Company was still living on its capital. In 1900, Marconi travelled to the United States to demonstrate his inventions and obtain American patent rights that had been acquired in the UK in 1894. On his return, he gave a demonstration of his selective tuning system to his Board of Directors and convinced them to agree his transatlantic test – at a mammoth cost of £50,000.

Marconi promptly began a selection of potential sites for the building of stations to transmit and receive his wireless messages. The Cornish coast offered advantages and in 1901 Marconi approved a site on Anngrouse Cliff, Poldhu. He also selected a site in Cape Cod, Massachusetts.

Work developing the Poldhu site began in 1901 with numerous experiments taking place in power control and high-frequency circuits.

In September 1901, a circle assembly of twenty 200-foot aerial masts erected at Poldhu was struck by a severe storm blowing the entire circle down. This disaster was greeted by dismay by the Marconi Company – meaning great financial loss and delays. It also threw into doubt the design of the aerial at Cape Cod, which was in fact later damaged by a storm. Through consultation with his team a decision was taken to replace the system of masts with a four wooden tower structure, which would prove to withstand stress and inclement weather.

Following the refinement of equipment, Marconi decided to test his system by sending a message to the nearest point across the Atlantic. To do this he needed to send it to Newfoundland – at the time a British Colony, that later became a province of Canada. 1,800 miles separated the two continents at these points.

The Board agreed the move and in November 1901, Marconi and his assistants set sail for Newfoundland. His equipment for the trip included gas cylinders, silk balloons, a number of kites and receiving apparatus. Landing on December 6 in Newfoundland, Marconi was met by local officials from the government of Newfoundland who offered him assistance for conducting his work. He was offered Signal Hill, which overlooked the town and located near the harbour, as a base. Marconi, with a keen sense of historic connections, found that this site was located close to a memorial tower built in honour of John Cabot, who discovered Newfoundland in the 15th century and established sea communication between that outpost of the Western Hemisphere and Europe. It was also located near to Hearts Content where the first transatlantic cable was landed in 1866, thereby opening another form of communication by submarine telegraphy with Europe.

1901 Poldhu in Cornwall, England. Marconi's station rebuilt after a storm that destroyed the original aerial built for the first transatlantic experiment.

By December 9 the equipment needed for the experiment was beginning to be prepared. Marconi's team in Poldhu received orders to begin the pre-arranged series of transmissions on December 11. The agreed message was the transmission of the Morse code letter 'S' (comprising three dots). This letter was chosen because it was felt that the switching arrangements at Poldhu were best suited to receiving a dotted rather than a dashed signal. In addition, the series of dots were felt to be more recognisable than any letter containing dashes. A weak signal was received that day but a strong wind led to the balloon used to hold the aerial up being blown away.

December 12 – the great transatlantic leap
A replacement kite was made and at 12.30pm (Newfoundland time) on December 12, the face of modern communication changed forever when the first transatlantic message was received.

Writing after the event, Marconi stated: "Unmistakably, the three sharp little clicks corresponding to three dots sounded several times in my ear… The electric waves, which were being sent out from Poldhu had traversed the Atlantic serenely ignoring the curvature of the earth which so many of my doubters considered would be a fatal obstacle, and they were now affecting my receiver in Newfoundland."

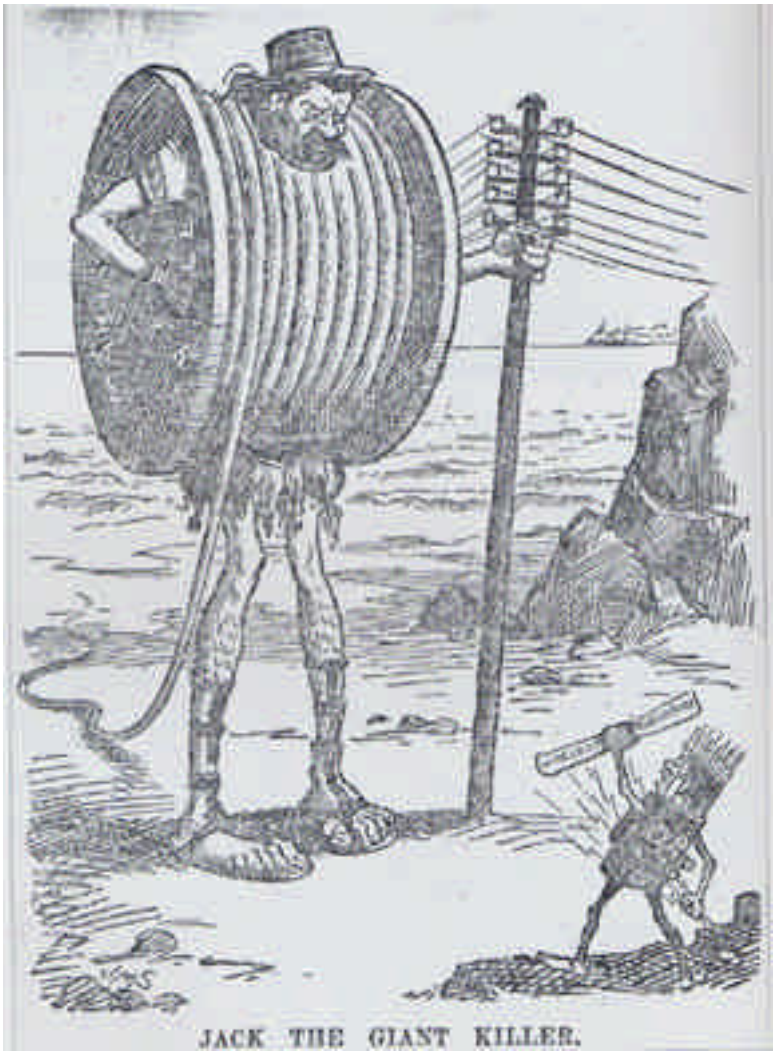
The tests continued on the next day and more signals were received. Bad weather saw the test concluded on December 14.

December 12, 1901: the first wireless transatlantic link, connecting Poldhu and St.John's

The reaction
Some were sceptical when receiving the news of Marconi's remarkable breakthrough. However, The Times in its editorial issue of December 12 commented: "There seems to be something far more than a probability that the close of the first year of the century has witnessed the greatest triumph of applied science in the department of electricity…. It is in some degrees a shock to all preconceived notions to be told that that he (Marconi) has received on the shores of Newfoundland signals transmitted from his station at Poldhu in Cornwall and that he even thinks it possible for wireless telegraphy across the Atlantic to be sufficiently developed within the space of

four years as to fulfil all commercial requirements". A full commercial transatlantic service would be operational in 1908.

Among many messages of support received was one from Alexander Graham Bell who offered him the use of his estate in Nova Scotia to facilitate his experiments. Cable telegraph companies, however, with strong vested interests immediately understood the commercial threat. The Anglo-American Telegraph Company sent Marconi a letter on December 15 reminding him of the monopolistic rights with which the company had been invested by a Charter.



Cartoon, Western Mail, December 1902

The news of Marconi's achievements led to the Government of Canada offering a free site for his work and a contribution of $80,000 toward building a wireless station at Cape Breton. This was given under certain conditions governing the cost of transmitting commercial messages and the Government's right to use the system for coastal signalling.

Marconi triumphs

In February 1902, Marconi once more set sail to the USA to prove to the world the validity of his invention. Travelling on the SS Philadelphia, with a number of specially constructed aerials attached to its masts, he carried out a number of tests at different distances as the ship made its way across the Atlantic.

The ship captain verified that readable messages were received on the journey – recorded up to 700 miles from Poldhu in daylight and up to 1,551 miles in the night. Reception of the three dots was recorded at 2,099 miles.

This fresh evidence was enough to silence critics. The voyage was also crucial for Marconi who realised that messages travelled further by night than by day.

Returning to Canada later in the same year, Marconi and the Canadian Government signed a contract to ratify the previous agreement made. He then chose his new site at Table Head, Glace Bay and the Marconi Company of Canada was formed. A Cape Cod site was also established as a permanent station. By the end of the year, messages were sent from the Governor of Canada and Marconi to King Edward VII and direct from Marconi to the King of Italy. This was followed in January 1903 when Cape Cod transmitted the first wireless message from the USA to England.

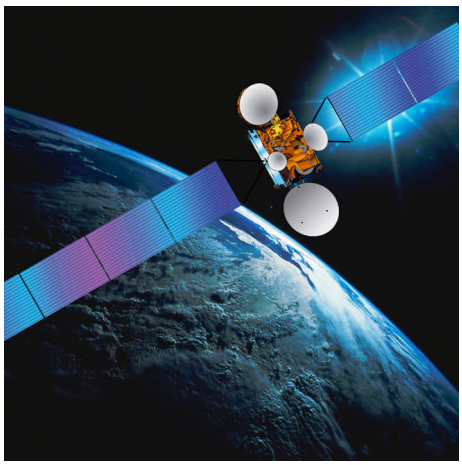
By 1903, Marconi's scientific vision, combined with his business acumen, was turning wireless telegraphy into a commercial reality. A number of stations were built and a growing number of ships were fitted with his wireless equipment. This led to the Marconi Wireless Telegraphy Company and its maritime subsidiary making a profit for the first time.

Marconi's work was honoured in 1909 when he was jointly awarded the Nobel Prize for Physics – sharing the success with a founder of the Telefunken Company. The value of having wireless sets on board large ships became apparent with countless lives saved through the ability to send SOS messages to the shore. Wireless communications also played a vital part in the First World War and subsequently increased in end-user popularity with the introduction of radio broadcasting in 1920.

Dec. 12th 1901: Guglielmo Marconi in St. John's, waiting for the S letter

Marconi continued to refine and develop his technology and in 1924 the UK adopted his high-speed Beam System – increasing the range of transmission. Marconi died on 20 July 1937.

One hundred years on from Marconi's great Atlantic achievement, Eutelsat recognises the importance of Marconi's work and pioneering spirit by dedicating its latest satellite to the great man. The ATLANTIC BIRD™ 2 satellite was launched from the European Spaceport in Kourou by Arianespace on September 25.



The new satellite is positioned in geostationary orbit at 8 degrees West and provides a full range of broadband and broadcasting services primarily across the Atlantic - echoing the path of that famous ‘S’ signal of Marconi’s of December 1901.

A thousand years of innovation
Some milestones in the History of Telecommunications

- 1530: Polish astronomer Nicolaus Copernicus postulates that the Earth revolves around the Sun. Despite church protest, the work lays the foundation for scientific thought governed by logic and deductive reasoning.
- 1600: English physician William Gilbert discovers electrical and magnetic properties.
- 1672: German physicist Otto von Guericke produces first electrical charge.
- 1837: American inventor and artist Samuel Morse invents the magnetic telegraph and Morse code.
- 1876: Alexander Graham Bell, who begins his career as a teacher for the deaf, invents the first workable telephone and microphone.
- 1894: Italian engineer Gugliemo Marconi builds first radio equipment.
- 1923: First transatlantic telephone calls connects New York and Britain.
- 1926: Television is invented in England.
- 1947: Bell Labs makes the first cellular telephone.
- 1957: Space age and space race begins with Soviet Union's launch of Sputnik.
- 1962: Telstar I becomes first satellite to transmit live TV signals and telephone conversations across the Atlantic.
- 1969: U.S. Defense Department develops ARPAnet, a four-computer network, forming of what is now the Internet.
- 1989: The World Wide Web comes into being, developed by English computer scientist Tim Berners-Lee for international researchers at the European Organization for Nuclear Research in Geneva.

About Eutelsat
Eutelsat S.A. is one of the world's leading providers of satellite communications solutions for business and private needs. The company provides television and radio broadcasting, Internet access and multimedia entertainment, IP business solutions, corporate network solutions and professional communications applications in Europe, the Middle East, Africa, South-West Asia and North and South America. From its HOT BIRD™ and other orbital positions Eutelsat broadcasts 900 TV channels and 560 radio channels to 98 million satellite and cable homes. Eutelsat operates a system of 18 satellites, uses capacity on three additional satellites and has a total of six satellites in construction.

For more information visit: www.eutelsat.com