

# Milestone-Proposal: Proposal

Docket #:2021-18

*This proposal has been submitted for review.*

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**To the proposer's knowledge, is this achievement subject to litigation?** No

**Is the achievement you are proposing more than 25 years old?** Yes

**Is the achievement you are proposing within IEEE's designated fields as defined by IEEE Bylaw I-104.11, namely: Engineering, Computer Sciences and Information Technology, Physical Sciences, Biological and Medical Sciences, Mathematics, Technical Communications, Education, Management, and Law and Policy.** Yes

**Did the achievement provide a meaningful benefit for humanity?** Yes

**Was it of at least regional importance?** Yes

**Has an IEEE Organizational Unit agreed to pay for the milestone plaque(s)?** Yes

**Has an IEEE Organizational Unit agreed to arrange the dedication ceremony?** Yes

**Has the IEEE Section in which the milestone is located agreed to take responsibility for the plaque after it is dedicated?** Yes

**Has the owner of the site agreed to have it designated as an IEEE Milestone?** Yes

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**Year or range of years in which the achievement occurred:**

1924

**Title of the proposed milestone:**

S. Y. ELETTRA -- MARCONI'S FLOATING WIRELESS RESEARCH LABORATORY

**Plaque citation summarizing the achievement and its significance:**

In October 1924 Guglielmo Marconi experimentally discovered 'Daylight waves' -- short-wave radio communication at 32 meters aboard Elettra while cruising in the Mediterranean and harboring near Syrian coast, that inaugurated revolutionary new era in long distance wireless communication. Later pioneering achievements of Marconi with S.Y. Elettra include discovery (1932) of over the horizon communication with ultra short waves (50 centimeter) and blind navigation using radio beacons (1934-1935). (66 words)

**In what IEEE section(s) does it reside?**

ITALY SECTION REGION 8

# IEEE Organizational Unit(s) which have agreed to sponsor the Milestone:

## IEEE Organizational Unit(s) paying for milestone plaque(s):

**Unit:** Dr. Probir Kumar Bondyopadhyay (BONDY), IEEE Senior Life Member, 06695225, by a personal check in memories of Mrs. Gioia Marconi Braga (Marconi's second daughter) and Dr. Francesco Paresce Marconi (Marconi's eldest Grandson) [NO IEEE (HISTORY COMMITTEE) INVOICE WILL BE NEEDED]

**Senior Officer Name:** Dr. Probir Kumar Bondyopadhyay (BONDY). Philanthropist, Houston, Texas, U.S.A.

## IEEE Organizational Unit(s) arranging the dedication ceremony:

**Unit:** Guglielmo Marconi Museum for IEEE Italy Section (DUTY-BOUND)

**Senior Officer Name:** Dr. Barbara Valotti, Museum Director, Guglielmo Marconi Museum. Villa Griffone, via Celestini, I-40037 Pontecchio Marconi, Bologna, Italy.

## IEEE section(s) monitoring the plaque(s):

**IEEE Section:** ITALY SECTION (DUTY BOUND)

**IEEE Section Chair name:** YEAR 2022 Section Chair (DUTY BOUND)

# Milestone proposer(s):

**Proposer name:** Dr. Probir Kumar Bondyopadhyay, IEEE Life Senior Member, 06695225 Forensic Historian of Science and Technology, Houston, Texas, U.S.A.

**Proposer email:** *Proposer's email masked to public*

**Please note:** your email address and contact information will be masked on the website for privacy reasons. Only IEEE History Center Staff will be able to view the email address.

## Street address(es) and GPS coordinates of the intended milestone plaque site(s):

Fondazione Guglielmo Marconi – Villa Griffone. via Celestini, 1 – 40037 Pontecchio Marconi (BO), ITALY, 44.4314° N, 11.2676° E [VILLA GRIFFONE IS AN ITALIAN NATIONAL MONUMENT]

**Describe briefly the intended site(s) of the milestone plaque(s). The intended site(s) must have a direct connection with the achievement (e.g. where developed, invented, tested, demonstrated, installed, or operated, etc.). A museum where a device or example of the technology is displayed, or the university where the inventor studied, are not, in themselves, sufficient connection for a milestone plaque.**

**Please give the address(es) of the plaque site(s) (GPS coordinates if you have them). Also please give the details of the mounting, i.e. on the outside of the building, in the ground floor entrance hall, on a plinth on the grounds, etc. If visitors to the plaque site will need to go through security, or make an appointment, please give the contact information visitors will need.** The proposed new IEEE Plaque recognizing historic contribution of S.Y. Elettra, must be placed next to Marconi's Standing Statue adjacent to the piece of S.Y. Elettra displayed as shown in the picture below. [Pictures 1 and Picture 2] To appreciate this assertion, read E.H. Armstrong's historic assessment in 1953 [2] of Marconi's unique achievements.



Picture 1 Proposed location spot for the S.Y. Elettra Milestone (in winter)  
[read E. H. Armstrong paper [2] for justification]



Picture 2 Proposed location spot for the S.Y. Elettra Milestone (in spring)  
[read E. H. Armstrong paper [2] for justification]

**Are the original buildings extant?**

S.Y. Elettra was destroyed in the second World War by Allied bombing in the Adriatic Sea off Yugoslavia on January 22, 1944. It was salvaged, cut into pieces and the various pieces are located at several places in Italy [7].

**Details of the plaque mounting:**

Next to the standing statue of Guglielmo Marconi, adjacent to the displayed piece of S.Y. ELETTRA as shown in the pictures above. Dr. Barbara Valotti, Director of the Guglielmo Marconi Museum at Villa Griffone will handle the details. Villa Griffone is an Italian National Monument.

**How is the site protected/secured, and in what ways is it accessible to the public?**

Villa Griffone is an Italian National Monument. [see, [www.fgm.it](http://www.fgm.it)]

**Who is the present owner of the site(s)?**

Fondazione Guglielmo Marconi with presence of University of Bologna. [Villa Griffone is an Italian National Monument].

**What is the historical significance of the work (its technological, scientific, or social importance)?**

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Without Elettra it would have been impossible to carry out my experiments in the Mediterranean and in the Atlantic; I would not have been able to continue and develop my research into short wave transmissions. With my seaborne laboratory – unique in the world – I have been able to realize my dreams. For example, how to beam (direct) a radio signal and to use radio for navigational purposes. This yacht has not only made me independent, but also freed me from distractions and the curiosity of others. I have been able to work at any time of the night and day and move around in a way that would have been quite impossible on dry land [7].

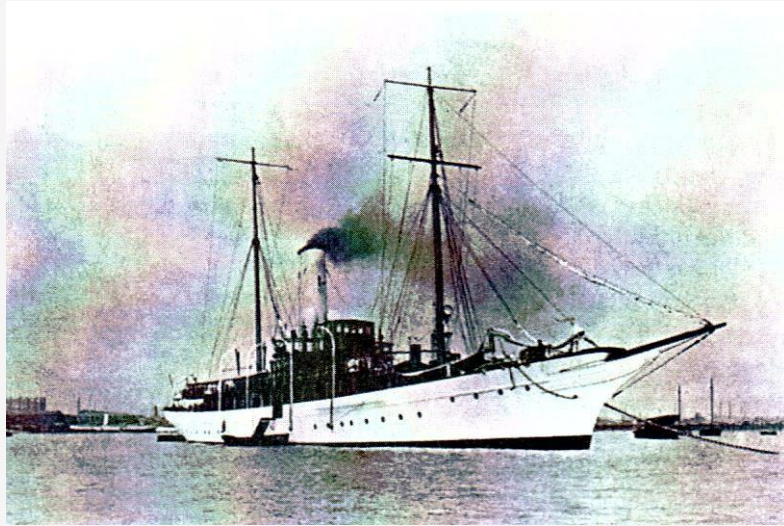


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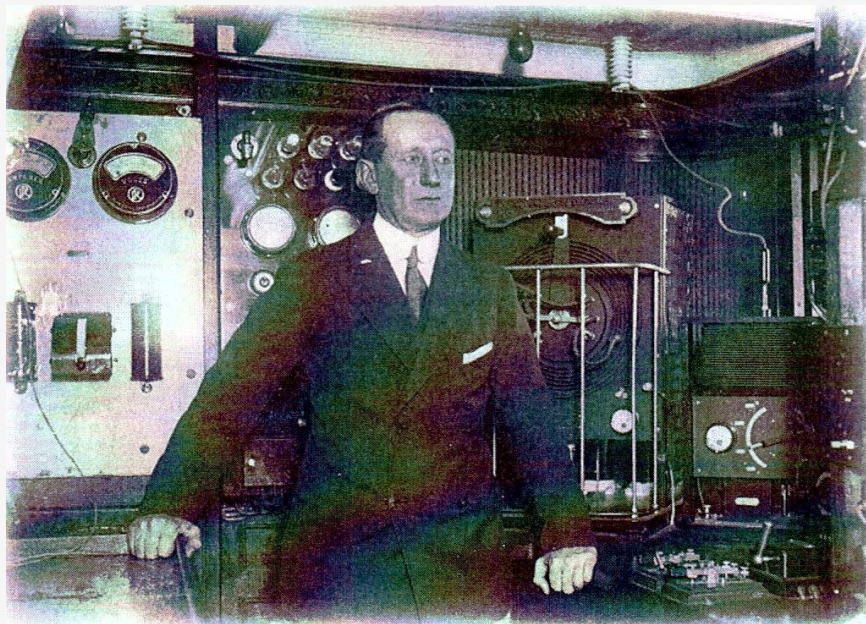
Marconi's discovery of the 'daylight' wave (shortwave wireless communications at 32 meters) in October 1924 opened up long distance (trans-oceanic) wireless communications during the day time. In the first quarter of the twentieth century trans-oceanic wireless communications were limited only during night time, made possible with long waves (several kilometers in wavelengths (in the kilo Hertz range). High power Alexanderson alternators and Beverage long-wave antennas were the work horse of this nighttime long wave transoceanic wireless communications, inaugurated earlier, first, by Marconi with his famous December 12, 1901 trans-Atlantic wireless communication experiment, made possible by ionospheric E-Layer or Heaviside-Kennelly layer.

Second World War was conducted with short wave radio made possible by Marconi's discovery of October 1924.

By discovering that ionospheric F- layer was responsible for successful day time long distance wireless communications with short waves, Edward Victor Appleton, received Nobel Prize in Physics (1947) for successfully explaining Marconi's experimental discovery aboard S. Y. Elettra made in 1924.



Steam Yacht Elettra [Picture 3]



Marconi standing in the wireless communication room inside S.Y. Elettra [Picture 4]



Marconi in action on his desk at the Wireless room aboard S. Y. Elettra [Picture 5]

### **What obstacles (technical, political, geographic) needed to be overcome?**

The classic IEEE paper of Guglielmo Marconi himself [1] which was originally published in 1928 (address before a joint session of AIEE and IRE, now IEEE, in 1927 in New York City) and reprinted in the Proceedings of the IEEE October 1998 issue, answers this question.

The technical obstacle in the first quarter of the twentieth century was that trans-oceanic wireless communication was possible only at the night time using long waves (wavelengths of several kilometers in the 10KHz – 100KHz frequency range). This required large amount of transmitter power (for example, 200 Kilo Watt Alexanderson alternator) and large antenna structures with low efficiency and slow data rate (Morse code). Exploration of short waves (below 200 meters) for trans-oceanic communications was a practical necessity.

The geographic obstacle was that easily maneuverable wireless communication system on a continuously moving platform was needed for exploration of the unknown. The solution was a wireless communication laboratory on a floating platform and S.Y. Elettra was the logical answer. After the first world war Marconi purchased the Yacht in 1919 at an auction in Southampton, Great Britain for 19,000 British pounds. Built in 1904 the Yacht (named Rovenska) originally belonged to Archduchess Maria Theresa of Austria [7].

Marconi's eldest daughter Degna Marconi, in her 1962 book: MY FATHER MARCONI, said that she did not like the fact that her father sold one of his houses to buy the Steam Yacht ELETTRA.

### **What features set this work apart from similar achievements?**

This question has been answered best by Edwin Howard Armstrong (inventor of superheterodyne radio receiver and Frequency Modulation radio etc. and winner of first IRE Medal of Honor) in 1953 [2]. Wireless wizard Guglielmo Marconi's life-long mission and passion was to connect the entire world with wireless. Accordingly, after the World War I Marconi wanted to thoroughly explore experimentally the capability of short waves in establishing long distance (trans-oceanic) wireless communications during the daytime. As explained by Mr. Gerald Isted (Marconi's personal technical assistant, 1926-1936) in his paper [6], Marconi was intrigued by the wireless propagation results obtained on short waves (between 15 and 100 meters)

by his assistant C.S. Franklin in communications experiments conducted in 1915 over the North Sea between Holland (Zandvoort) and Great Britain (Southwold, Hendon and Birmingham) involving network of test routes with mixed paths ('all land', 'all sea' and 'mixed land and sea' routes) which suggested that each route was having its unique mode of transmission over the surface of the earth and sea.

Dr. Harold Henry Beverage (Oct. 14, 1893 - Jan.27, 1993), Director of Radio Research at RCA (and 1937 President of IRE, now IEEE) who knew Marconi personally and attended Marconi's 1922 lecture on Radio Telegraphy in New York City and whom this proposer of this IEEE Milestone knew personally, told this proposer in 1988 that Marconi had a hunch that short waves below 100 meters were needed to be further explored for long distance communications in the day time [5]. The underlying reason was that trans-oceanic wireless communications were possible only during the nighttime with long waves (wavelengths of several kilometers) facilitated by reflections from the ionospheric E-layer (Heaviside Kennelly layer) and requiring enormous electrical power for the transmitter and very large structures.

Edwin Howard Armstrong [2] and Harold Henry Beverage [5] the two eye-witness of the era have given first-hand accounts of Marconi's discovery of day-light wave in October 1924 and the excitements the discovery generated.

Guglielmo Marconi, the world pioneer on this achievement, had no competition.

**Supporting texts and citations to establish the dates, location, and importance of the**

**achievement:** Minimum of five (5), but as many as needed to support the milestone, such as patents, contemporary newspaper articles, journal articles, or chapters in scholarly books. 'Scholarly' is defined as peer-reviewed, with references, and published. **You must supply the texts or excerpts themselves, not just the references.** At least one of the references must be from a scholarly book or journal article. All supporting materials must be in English, or accompanied by an English translation.

(1). Guglielmo Marconi, RADIO COMMUNICATION, Proc. IRE, vol. 16, pp. 40-69, 1928 [Delivered before the American Institute of Electrical Engineers (AIEE) and The Institute of Radio Engineers (IRE), New York City, October 17, 1927], reprinted as a Classic paper, Proceedings of the IEEE, vol. 86, No.10 pp. 2094-2105, October 1998 (with an Introduction). [uploaded as MARCONI\_PAPER\_ON\_MARCONI.pdf]

(2). Edwin H. Armstrong, "THE SPIRIT OF DISCOVERY – An appreciation of the work of Marconi", Electrical Engineering (predecessor of IEEE Spectrum), pp. 670-676, August 1953. [uploaded as ARMSTRONG\_PAPER\_ON\_MARCONI.pdf]

(3). Orrin E. Dunlap, Jr., MARCONI-THE MAN AND HIS WIRELESS, The Macmillan Company, 1937, Chapter XX-XXI, April 1937. [uploaded as DUNLAP\_BOOK\_ON\_MARCONI.pdf]

(4). Probir K. Bondyopadhyay, Introduction to RADIO COMMUNICATION (by Guglielmo Marconi), Proc. IEEE, Vol. 86, No. 10, pp. 2090-2093, Oct. 1998, [uploaded as BONDY\_PAPER\_ON\_MARCONI.pdf]

(5). Harold H. Beverage, "Some notes on the history of antenna developments 1913 through 1937", IEEE Antennas and Propagation Society, Newsletter, vol.31, issue 2, pp. 13-18, April 1989. [uploaded as BEVERAGE\_PAPER\_ON\_MARCONI.pdf]

(6). Gerald A. Isted, "Guglielmo Marconi and the History of Radio – Part-II", GEC Review, Vol. 7, No. 2, 1991, pp. 110-122. [uploaded as ISTED\_PAPER\_ON\_MARCONI.pdf]

(7). MARCONI E LO YACHT ELETTRA um grande connubio per il progresso della radio, a cura di Giuliano Nanni Sasso & Dintorni, Anno VIII, No. 24, (in Italian) available on line.

[uploaded as MARCONI\_E\_LO\_YACHT\_ELETTRA.pdf]

**Supporting materials (supported formats: GIF, JPEG, PNG, PDF, DOC):** All supporting materials must be in English, or if not in English, accompanied by an English translation. **You must supply the texts or excerpts themselves, not just the references.** For documents that are copyright-encumbered, or which you do not have rights to post, email the documents themselves to [ieee-history@ieee.org](mailto:ieee-history@ieee.org). Please see the [Milestone Program Guidelines](#) for more information.

Six pictures have been uploaded. The first one is a copy of Marconi's signature for authenticity of the statement shown at the designated place,

Picture 1 Proposed location of the Plaque Winter view [MUST read Reference [2] to appreciate this ]

Picture 2 Proposed location of the Plaque spring view [MUST read Reference [2] to appreciate this]

Picture 3 The Steam Yacht Elettra

Picture 4 Marconi in front of the wireless communication set-up inside Elettra

Picture 5 Marconi in action on his Desk inside the wireless communication room of the Elettra

**Please email a jpeg or PDF a letter in English, or with English translation, [from the site owner\(s\)](#) giving permission to place IEEE milestone plaque on the property, and a letter (or forwarded email) from [the appropriate Section Chair](#) supporting the Milestone application to [ieee-history@ieee.org](mailto:ieee-history@ieee.org) with the subject line "Attention: Milestone Administrator." Note that there are multiple texts of the letter depending on whether an IEEE organizational unit other than the section will be paying for the plaque(s).**