The Origins of Wireless Telecommunications :  
A New Brave World  
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1. Introduction
The history of the beginning of Wireless Telecommunication was revisited many times and recently the occurrences of the centennial of the fist experiments and of the transatlantic crossing kindred a large number of papers and commemorations. The exceptionality of the new unexpected communication method and of its applications were duly perceived by the contemporaries, not to name the impact on the general public. The method, its realisation, the consequences, all was new.

Just a couple of figures to prove the impact on the media: papers, books, newspapers clips and so on that are collected in Italian Libraries about the wireless activities in the biennium 1898 to 1900, amount to 443 items and to 1349 in the period 1899-1914. Extending [1] the analysis further in time, until the passing of Marconi, one finds astonishing figures, reaching more than 3000 entries.

The new technology and science to survive had to be brave and bold in breaking a very large number of grounds (technology, science, economics, commercial interest, competing methods, patents and their litigations, formation of technicians, rivalry between Nations and Industries, an incoming world war) and to navigate in an unknown endeavour.

It was really a sailing in unchartered waters. A “brave” approach was indeed of order, in all directions. Speaking of a new brave world, decision here was taken not to repeat the wireless saga nor to cover any specific technical subject. On the contrary, choice was made is to provide information on some “transversal” factors, such as the role of technical media for the formation of an opinion and for the diffusion of scientific and technical information and to provide a guideline for further readings, listing recent and easily available sources.

To enlarge a bit the panorama, two parallels between Marconi-Edison and radiotechnology-electrical transformer, will be presented and finally some references will be given about another controversial point regarding the scientific-technical formation of Guglielmo Marconi.

2. Recent Reviews
The British Institution on Electrical Engineers (IEE) wisely promoted in 1995 an International Conference “100 Years of Radio”, in associations with the British Vintage Wireless Society and URSI; the relevant Proceedings [2] being indeed an invaluable source of information. In these proceedings, one finds solution to a large number of puzzling questions, on which the previous literature was absent or controversial, for instance the technical details of the experiments for the transatlantic crossing performed on 1902, such the carrier frequency and power used, the detection techniques and a possible evaluation of all the factors, ionosphere included, that made the thing happen. The topics covered in the IEE Proceedings are here listed sub [3].

Concerning one of the main scientific questions, the role of ionosphere for the ocean crossing, URSI promoted, in 1974, an International Symposium on Radio Propagation in Natural Media, held in Florence. Being that year the centennial of the birth of Marconi, it was natural to give consideration to the relations between the ionosphere and early wireless telecommunication. The Proceedings appeared on Radio Science, in 1975; two papers were particularly important, by W.J.G. Beynon [4] and H.G.Booker [5].

For the readers, not specialist in the sector but interested in LF-VLF propagation, an useful reference are the 200-odd pages by Watt and Crogham, in the chapter Propagation of [6].

3. Printed Information
3.1. Books and Text-Books
The number of books and text-books before the 30thies is not very large; obvious are the reasons, because the new technology and science were painfully coming to the live, but, quite interestingly, also the books that appeared till the 30thies had a wide coverage of the early techniques, such as the high-frequency alternators and the VLF antennas. An interesting book is that of Vilbig [7], because also if it is
indeed late (1939). includes a bibliography, divided by topics, starting from the beginning of the Century; more than 3500 references are presented. Other books are collectively listed sub [8], but special mention must be given to Sterling & Kruse’s Radio Manual, because in two years the market absorbed 5 editions [9] and to Trinkle [10], because, also in consequence of the outcome of WW1, little is known outside of Germany about the accomplishments of the German radio industry in the early years of wireless communication.

3.2. Reviews and Magazines
Another way to grasp the innovation and the complexity of the new methods of communication, a faithful representation is offered by the technical magazines, some of which were appearing weekly, that flourished in the period. A few one were devoted to the new technology only, others were adaptation or transformation of existing magazines previously devoted to electrotechnology.
In the Bibliography, sub [11] are listed periodicals dealing with wireless technology, while sub [12] are listed periodicals on electricity or on electrotechnology, but featuring regularly news on the new technique.
In the Bibliographical entries, the number in brackets, is the year of the first known publication, this remark being necessary because in some cases the review disappeared, to have a rebirth under different name.

3.4 The “Radio” Magazine: Proceedings of the Institute of Radio Engineers
Possibly the most important, because devoted to radio only, were the well known Proceedings of the American Institute of Radio Engineers (IEE), chartered in 1913. The IRE gave place subsequently to the Institute of Electrical and Electronic Engineers (IEEE). The importance of the Proceedings of IRE (PIRE) is not to be undervaluated, for three reasons:
- a clear decision was taken, since the beginnings, to present tutorials and reviews papers as regular features,
- most of the papers were presented orally twice, usually in New York and in Boston, and the following discussions were collected and appeared in print; these discussions are sometimes illuminating,
- a number of factors connected to the wireless communication were covered, also if not, strictly speaking, technical oriented. Consequently one finds a wealth of information on:
  - the formation of technicians, and of ” Radio Officers”,
  - frequency allocations,
  - systems in competition,
  - patent infringements, etc.
A recent paper appeared on the Proceeding of the IEEE (PIEEE) by J.E.Brittain, making the history of Electrical and Electronic Engineering as can be perceived via the PIRE [13]. That paper is warmly recommended as it becomes a learned history of radio engineering. The IEEE has also planned for the year 1997 a “Classic Paper Reprint” program, in which 17 historical papers, ranging in time from 1913 to 1962, that appeared in PIRE, are to be reprinted in PIEEE during 1997. Also this series of papers is recommended, because at least 6 papers are dealing with the early wireless communications; the relevant list of these reprints is given at page 1856 of PIEEE, Vol. 84, 1996.

4. Two Parallels
4.1. The relevance of Advertising
Wireless activities were since the beginning supported and escorted by a penetrative action of opinion making. In this fact the policies of Marconi and of Edison were similar.
The two man were non at all alike, but in one point, the way to proceed with the media, they were equal. They deeply grasped the importance of the “public relations” and no efforts were spared, arriving in some cares to a covert bribery of the newspaper-men. Some useful publications made freely available were indeed a form of advertising [14] and both men had in their payrolls a number of advertising agents. The engineers of both industries were bitterly complaining that the first place in the payroll was given to layers for the patent litigations, the second to “kind” journalist and the third only for the people doing the real job.

4.2. Radio Communication and the a.c. Transformer
Less of twenty years before the wireless communication, the word of electricity was shaken by the experiments made in 1984, in Torino, with the first transmission of some 15 kW of a.c. power at about 40 km of distance. Striking were and are the consequences of the two facts, indeed both: arrived suddenly,
had to fight with academic opinions, the previous physics was not adequate to design the new devices, new theories and mathematical tools had to be developed, one was carrying with wires energy at distance, the other wireless information, promoted new technologies, schools and diffusions of technical information, with unprecedented span.

5. The Technical-Scientific Formation of the Young Guglielmo Marconi

The scientific-technical formation of Guglielmo Marconi is a controversial topic alimented by some unfounded, also if written statements: for instance that he had been a pupil of prof. Righi in Bologna. Boot denied, but this story is printed and printed again. In his speech, when the Nobel Price was delivered to him, he made, on 11th December 1909, an explicit mention to a professor Vincenzo Rosa he had met in Livorno around 1892:

“...In sketching the history of my association with Radio Telegraphy, I might mention that I never studied Physics or electrotechnics in the regular manner, although as a boy I was deeply interested in those subjects. I did however attend one course of lectures on Physics under the late Professor Rosa at Livorno. ...

Prof. Rosa admitted the teen-ager Marconi to his Laboratories, both at school and at home and gave to him the rudiments of electricity, how to use a lathe, to blow glass, to use chemistry to make a pile, etc. Using some fresh research, the relations between Marconi and Rosa were recently investigated [15].

Acknowledgements

All the entries quoted in the Bibliography, in particular those quoted sub [8], [11] and [12], were checked in the Library of the Istituto Elettrrotecnico Nazionale in Torino. The help of the Librarians Claudia Rota and Lucia Baliob-Giros is gratefully acknowledged.

BIBLIOGRAPHY

[3] Some of the topics considered in [2]:transmitters, antennas and propagation, the birth of radio, radio the early days, tunig, radio systems, etc. ...