In the opening remarks at the third annual dinner of the Institute of Electrical Engineers, held in London on November 13, 1891, William Crookes, the institute's president, referred to the "bewildering possibility of telegraphy without wires, posts, cables, or any of our present costly appliances". In the following article extract, he optimistically expanded his ideas on the potential for longrange radio signaling, a very advanced idea when this article appeared, because at the time no one could transmit and receive the signals farther than a few hundred meters. The two main experimenters reviewed are Heinrich Hertz of Germany, and Oliver Lodge of Britain. But there is also an allusion to an earlier, unnamed individual, as Crookes notes that "some years ago I assisted at experiments where messages were transmitted from one part of a house to another without an intervening wire by almost the identical means here described". This third experimenter was later identified as British Professor David E. Hughes, who had performed the experiments beginning in 1879. Because of the distances involved, it is very likely that Hughes' transmissions were the result of radio waves. Unfortunately, he was discouraged from following up on his initial work -- thus it fell to Hertz to conclusively prove the existence of electro-magnetic radiation in 1887.

This article also speculated about other areas of electrical research, including the suggestion that "Another point at which the practical electrician should aim is nothing less than the control of the weather", and wondering, with respect to England, "Shall we ever be able, not to reduce our rainfall in quantity, but to concentrate it on a smaller number of days, so as to be freed from a perennial drizzle?"

Fortnightly Review, William Crookes, February 1, 1892, pages 174-176:

SOME POSSIBILITIES OF ELECTRICITY.

Whether vibrations of the ether, longer than those which affect us as light, may not be constantly at work around us, we have, until lately, never seriously inquired. But the researches of Lodge in England and of Hertz in Germany give us an almost infinite range of ethereal vibrations or electrical rays, from wave-lengths of thousands of miles down to a few feet. Here is unfolded to us a new and astonishing world--one which it is hard to conceive should contain no possibilities of transmitting and receiving intelligence.

Rays of light will not pierce through a wall, nor, as we know only too well, through a London fog. But the electrical vibrations of a yard or more in wave-length of which I have spoken will easily pierce such mediums, which to them will be transparent. Here, then, is revealed the bewildering possibility of telegraphy without wires, posts, cables, or any of our present costly appliances. Granted a few reasonable postulates, the whole thing comes well within the realms of possible fulfilment. At the present time experimentalists are able to generate electrical waves of any desired wave-length from a few feet upwards, and to keep up a succession of such waves radiating into space in all directions. Possible, too, with some of these rays, if not with all, to refract them through suitably-shaped bodies acting as lenses, and so direct a sheaf of rays in any given direction ; enormous lens-shaped masses of pitch and similar bodies have been used for this purpose. Also an experimentalist at a distance can receive some, if not all, of these rays on a properly-constituted instrument, and by concerted signals messages in the Morse code can thus pass from one operator to another. What, therefore, remains to be discovered is--firstly, simpler and more certain means of generating electrical rays of any desired wave-length, from the shortest, say of a few feet in length, which will easily pass through buildings and fogs, to those long waves whose lengths are measured by tens, hundreds, and thousands of miles; secondly, more delicate receivers which will respond to wave-lengths between certain defined limits and be silent to all others; thirdly, means of darting the sheaf of rays in any desired direction, whether by lenses or reflectors, by the help of which the sensitiveness of the receiver (apparently the most difficult of the problems to be solved) would not need to be so delicate as when the rays to be picked up are simply radiating into space in all directions, and fading away according to the law of inverse squares.

Any two friends living within the radius of sensibility of their receiving instruments, having first decided on their special wave length and attuned their respective instruments to mutual receptivity, could thus communicate as long and as often as they pleased by timing the impulses to produce long and short intervals on the ordinary Morse code. At first sight an objection to this plan would be its want of secrecy. Assuming that the correspondents were a mile apart the transmitter would send out the waves in all directions, filling a sphere a mile in radius, and it would therefore be possible for any one living within a mile of the sender to receive the

communication. This could be got over in two ways. If the exact position of both sending and receiving instruments were accurately known, the rays could be concentrated with more or less exactness on the receiver. If, however, the sender and receiver were moving about, so that the lens device could not be adopted, the correspondents must attune their instruments to a definite wavelength, say, for example, 50 yards. I assume here that the progress of discovery would give instruments capable of adjustment by turning a screw or altering the length of a wire, so as to become receptive of wavelengths of any preconcerted length. Thus, when adjusted to 50 yards, the transmitter might emit, and the receiver respond to, rays varying between 45 and 55 yards, and be silent to all others. Considering that there would be the whole range of waves to choose from, varying from a few feet to several thousand miles, there would be sufficient secrecy ; for curiosity the most inveterate would surely recoil from the task of passing in review all the millions of possible wave-lengths on the remote chance of ultimately hitting on the particular wave-length employed by his friends whose correspondence he wished to tap. By "coding" the message even this remote chance of surreptitious straying could be obviated.

This is no mere dream of a visionary philosopher. All the requisites needed to bring it within the grasp of daily life are well within the possibilities of discovery, and are so reasonable and so clearly in the path of researches which are now being actively prosecuted in every capital of Europe that we may any day expect to hear that they have emerged from the realms of speculation into those of sober fact. Even now, indeed, telegraphing without wires is possible within a restricted radius of a few hundred yards, and some years ago I assisted at experiments where messages were transmitted from one part of a house to another without an intervening wire by almost the identical means here described.
