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THE COMMUNICATION INDUSTRY OF THE UNITED STATES

by

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Members of the Army Industrial College

In accepting the invitation of the Secretary of War and the officers of the Army Industrial College to appear here and speak on the subject of The American Communication Companies and National Preparedness, it seems to me fitting that a brief word as to my qualifications is in order.

With one short interruption during the period of the World War, when I served as Director of the Council of National Defense and of the Advisory Commission, practically all of my active life since graduating from college has been concerned with the problems of electrical communication and with the building up of an organization, the Bell System, designed to provide the people of the United States with the best, most comprehensive and most economical system of electrical communication which physical science and human organization make possible.

Specifically my experience has covered not only the problems of the directing and operating units of the Bell System but likewise the problems of the Western Electric Company, which in our Bell System organization is responsible for the manufacture or supply of the physical things which our research and development organization, Bell Telephone Laboratories, develops and designs.

Even the interruption in this life work occasioned by the incidents of my World War duties was not really a break in the continuity of my connection with the problems of electrical communication, since many of the vital questions with which the Council had to deal were directly or indirectly concerned with matters of electrical communication, either for the combat forces in Europe or at home or with the civilian activities which were their source.

While I am not myself a trained scientist or engineer, and so hardly competent to express a worth while opinion on highly technical details, my more than thirty years of association with the problems and operations of the multitude of material instrumentalities on which the whole art

and service of electrical communication is based has given me, I think a proper appreciation of the major problems involved in the question we are here considering.

As I see it, the fundamental problems concerned with electrical communication in connection with the national defense are not alone those which, when the emergency of war arises, will insure to the combat forces of the nation an adequate supply of communication material and an adequate personnel of men trained in its use and with an ability rapidly to instruct a larger number of other men to equal efficiency.

Of equal or even greater importance are two other problems which in my judgment must never be lost sight of if the primary objective of the military forces, victory, is to be achieved. One of these is that the material and personnel required initially for the combat forces (and which will, unaided, have to withstand the first shocks) must be arranged for in advance so as to be almost instantaneously available without producing an equally instantaneous disruption of the civilian service of communication.

The second problem which must not be lost sight of is that the demands of the combat forces on the civilian establishment, whether for material or personnel, must not so cripple the latter as to leave it incapable of providing for a suddenly enlarged and newly distributed demand for communication within the underlying service of supply.

We know from our experience during the World War, not only that the demands for electrical communication, both by telephone or telegraph, peak up enormously on the first impact of war, but, what is even more disconcerting, that the distribution of traffic undergoes violent change and that telephone and telegraph routes which under normal peace-time conditions are little used become overnight main arteries of traffic demand. Further, experience both in the emergencies of war and peace, show that the too rapid introduction of untrained personnel into the operating organization of an electrical communication system tends automatically to degrade the ability of the communication network to provide satisfactory service. Moreover, beyond

a certain point further introduction of such personnel tends to accelerate the downward spiral.

Having stated the major problems as I see them, let me say now a word about my view as to our potential ability to cope with them.

As I see it, the United States above all other nations is most favored in this direction. While its normal telephone and telegraph facilities are operated by independent agencies rather than being concentrated within a single governmental administration, as is the case in most foreign countries, they can readily be made to function, if needed, as a single integrated whole. In addition, they have the advantage of certain stimuli of private initiative, which seems to be denied to political administrations whatever the form of government. Added to this is the fact that the Bell System, with its all-inclusive services of research and development, manufacture and operation, is not only by far the largest communication organization in the world, but is likewise, I think, generally recognized throughout the world as the most advanced in its development of electrical communication.

If in what follows I seem to dwell largely on the Bell System and on telephony, it is partly because of this predominant position of the Bell System in the whole art of electrical communication, and partly because the technical problems of telephony are in general more difficult than the technical problems of telegraphy and, when solved satisfactorily, carry in that solution generally the automatic solution of a host of telegraph problems.

With this preface related to the general aspects of our subject, let me now turn to a brief historical review and to some of what seem to me the more important details of the problem.

What we might term the modern role in warfare of the electrical transmission of intelligence, particularly by telephone, is of very recent inception. It dates from 1917 and 1918, i.e., from the closing chapters of the World War. It therefore vied with chemical warfare and certain forms of mechanized warfare in the rapidity of its development. The

military forces which went into the conflict in 1914 were equipped with simple forms of wire and radio telephones. Those that emerged from it, and especially the American Expeditionary Forces, had at their command a far-flung communication network involving not only thousands of miles of wire and cable together with fully developed telephone and telegraph exchanges and systems of the most modern sort, but also radio telephones with which flying aircraft could for the first time keep in touch with one another and with the ground, and with which naval ships could communicate by spoken word across hundreds of miles of water.

The rapid ascension of the telephone, both wire and radio, in military affairs was the direct consequence of certain epoch-making developments in the telephone art itself. Science contributed certain devices like the repeater, the vacuum tube amplifier, the modulator and the electric wave filter, which were entirely new in principle, with the result that about 1914 or 1915, it became possible for the first time to say that the telephone was in a fair way to overcome all terrestrial distances. January, 1915, saw the opening of the first transcontinental telephone line linking New York and San Francisco, and in the summer and fall of the same year speech was successfully transmitted by radio from Arlington, Virginia, to Honolulu and across the Atlantic to Paris.

These two American accomplishments were quick to receive recognition from the United States Army and Navy. It was January, 1916, sixteen months prior to this country's entrance into the War, that we of the Bell System were asked to assist the Army and Navy communication people in determining how our new discoveries and developments could be adapted to their needs. It was in that month that J. J. Carty (later General Carty), then Chief Engineer of the American Telephone & Telegraph Company, read an important and confidential paper before the Army War College. This was at the request of General McComb, President of the College, and the paper was soon repeated before the Naval War College. Two months later, and again with the intention of demonstrating the military significance of some of the new developments for which the Telephone Company had been responsible, Mr. Carty arranged a demonstration in the course