

[The following is an extract of a submission that I have prepared for *IEEE Canadian Review to be published in Spring 2022*]

Since its inception in 1983, the IEEE Milestones program has become one of the IEEE's most effective outreach activities and has been cited as the Institute's most valuable intangible asset. Once a milestone proposal is approved by the IEEE Board of Directors, one or more bronze plaques containing the milestone citation are cast, installed at specified location(s), and dedicated at a formal ceremony. As of late 2021, almost 250 Milestones have been approved worldwide, including 17 in Canada.

### The Trans-Canada Microwave System, 1958

On 17 January 2022, the IEEE Board of Directors approved recognition of the completion of the Trans-Canada Microwave System in 1958, as Canada's 18<sup>th</sup> IEEE Milestone with the following citation:

*On 1 July 1958, the Trans-Canada Microwave System introduced both live network television and direct-dialled long distance telephone service to Canadians from coast to coast. Comprising 139 microwave relay towers spanning more than 6275 kilometres, it was, at time of completion, the longest such network in the world. Later extended and upgraded, the system had an immense impact on Canada's society and economy.*

The route followed by the system is shown in Fig. 1, which is reprinted from [1]. The Milestone dedication is scheduled to be held at multiple locations across Canada on 1 July 2022 – exactly 64 years after the system's original opening ceremony. A joint IEEE-Industry team has taken on the task of ensuring that the event will be a memorable one.

### A Coast-to-Coast Television and Telephone Network

During the early-1950's, the operational feasibility of using inter-city microwave relays for telephone and television transmission was proven, first in Atlantic Canada and later in Central Canada. The effort soon shifted to overcoming the various financial and regulatory hurdles that made deployment of a coast-to-coast telephone and television network a truly daunting task. In the end, the task of building the first transcontinental microwave network in Canada fell to Bell Canada and other member companies of the Trans-Canada Telephone System, and the Canadian Broadcasting Corporation.

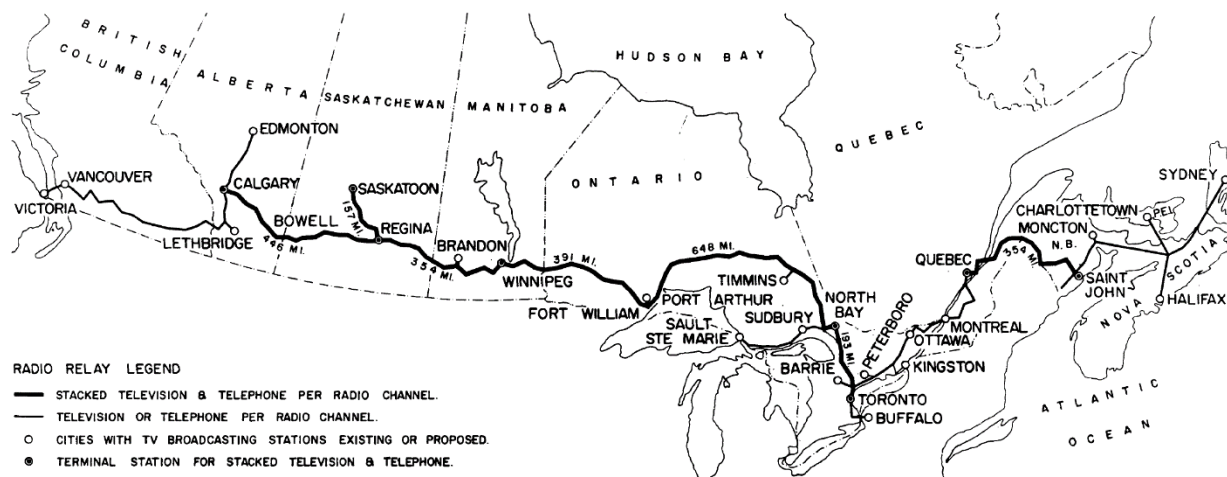


Fig. 1. Trans-Canada TD-2 radio system television and telephone network routes

On 8 March 1955, construction of the national system began. The essential elements of the overall system are described in three papers published between July 1956 and May 1958 [1]-[3]. Just over three years later, on 18 June 1958, operation of the entire network was successfully demonstrated. The system was officially opened on 1 July 1958 via a live coast-to-coast television broadcast called "A Memo to Champlain" and celebrated by a commemorative booklet [4].

At the time of completion, the Trans Canada Microwave System was the longest microwave relay network in the world. The number of microwave relay towers required to span the great distances involved meant that the deployment cost was at an order of magnitude higher than that of a regional network. Installing microwave towers in wilderness and mountainous areas far removed from roads and other infrastructure added to the difficulty and, ultimately, the cost.

### **Impact**

Previously selected by the Engineering Institute of Canada from a pool of 110 projects as one of the ten most exceptional and representative feats of Canadian Engineering's First Century (1887-1987, it is not difficult to argue that no other single engineering achievement of the past century has had a greater impact on Canada, its society, and its economy, and, indeed, individual Canadians.

By introducing live network television from coast-to-coast, it provided the Canadian Broadcasting Corporation with an opportunity to realize the full potential of television as a national medium and thus shaped how Canadians saw themselves as people and as a nation. By introducing direct-dialled long distance telephone service to Canadians from coast to coast, the system immediately transformed the way that Canadians communicated with each other for both business and pleasure.

The Trans-Canada Microwave System also served as a training ground for the generation of telecommunications engineers who would later export Canadian telecommunications expertise across the globe, establish the first domestic geostationary telecommunications satellite network just fourteen years later, and deploy Canada's first cellular telephone networks just thirteen years after that.

### **References**

[1] J. W. Noyes, G. Gaudet and S. Bonneville, "Development of transcontinental communications in Canada," *Transactions of the American Institute of Electrical Engineers, Part I: Communication and Electronics*, vol. 75, no. 3, pp. 342-352, July 1956, doi: 10.1109/TCE.1956.6372537.

[2] S. Bonneville, "The Canadian transcontinental microwave system," *Transactions of the American Institute of Electrical Engineers, Part I: Communication and Electronics*, vol. 76, no. 4, pp. 473-477, Sep. 1957. doi: 10.1109/TCE.1957.6372326.

[3] H. E. Curtis, U. C. P. Strahlendorf and A. J. Wade, "The simultaneous transmission of television and telephone multiplex over a single microwave channel on the trans-Canada TD-2 system," *Transactions of the American Institute of Electrical Engineers, Part I: Communication and Electronics*, vol. 77, no. 2, pp. 185-190, May 1958, doi: 10.1109/TCE.1958.6372781.

[4] Trans-Canada Telephone System, "From Sea to Sea: A record of events leading to an historic moment in Canada's progress - the formal opening, on July 1, 1958, of the coast-to-coast microwave network of the Trans-Canada Telephone System." Bell Telephone Company of Canada, 1958. 22 pp.