Abstracts

Innovations in Microwave Filters and Multiplexing Networks for Communications Satellite Systems

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The advent of commercial satellite communications in the late 1960s provided a challenge to the microwave industry. It demanded technological advances to reduce the mass and volume of the communications payload and, at the same time, more efficient delivery of higher effective isotropic radiated power (EIRP) to the ground stations. One of the areas most dramatically impacted has been that of microwave filters and multiplexing networks. The past two decades have seen an order of magnitude improvement in the mass and volume of microwave filters. In the area of frequency combining or multiplexing, it is now possible to design and implement microwave multiplexing networks with arbitrary frequency spacing and channel bandwidths with an accuracy that was once reserved for individual microwave filters. This has allowed implementation of single mode transmit antennas. Such an antenna design provides maximum gain over a given coverage area and hence a maximum of EIRP. The net effect of these innovations has been the lowering of cost of a satellite channel. This paper describes the evolution of microwave filters and multiplexer for space application. The many advances are described within the context of the design of the overall communications subsystem. Extra emphasis is placed on the multipaction and passive intermodulation (PIM) considerations in (designing high power multiplexer. The impact of microwave filter technology in the channel characterization of satellite systems is described. The future directions of research and development are briefly discussed.

❑ Return to main document.