

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Near-Earth and Interplanetary Communications (4)

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LOW-COST SATELLITE COMMUNICATION NETWORK FOR EQUATORIAL REGION

Abstract

Communication is very crucial for daily life. Networks enable us to communicate with each other, share world and regional news, and notify others about emergency situations. Wired and mobile communications are generally the fastest and easiest mechanisms for these purposes. However, these terrestrial communication networks have some limitations in terms of coverage. Several regions in the world still encounter problems with connection. Most of these regions are located in remote areas of developing countries, particularly in the Equatorial Region. One viable solution is a communication network via satellite. Using this system, users can enjoy untethered mobile communication anywhere within the footprints of the satellite. In addition, satellite networks have much simpler delivery paths or topology that result in more manageable network performance. Current satellite communication systems provide relatively good quality services such as voice, messages, and internet. However, the acquisition of these services is relatively high in cost, above what most developing countries can afford. Hence, a low-cost satellite communication network that can provide SMS and MMS service for developing countries in the Equatorial Region is proposed. Two types of communication systems will be discussed. One is using inter-satellite communications, which can provide immediate delivery of messages. Since this system requires multiple satellites, very precise attitude and orbital control systems, and additional power for transmitting information between satellites, this kind of infrastructure is quite expensive. On the other hand, a communication system using a “constellation of satellites and ground stations network” can offer message delivery with delay, but acceptable delay and at relatively low cost. Moreover, this network is more reliable because it is independent of the number of satellites and ground stations, and can function even with one satellite and one ground station. Since providing a low-cost service to developing countries is considered, communication using “satellites and ground stations” is chosen. This research will demonstrate the efficiency of the system depending on the 1) number of satellites, their orbital parameters and beam width of the antenna, 2) number of ground stations and their locations for supporting the operability of the constellation, and 3) the capacity of the network and number of potential users.