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Advance Higher Throughput Communications for GEO and LEO satellites (3)

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ADVANCEMENTS OF MULTIPLE ACCESS TECHNOLOGIES IN PROVIDING SATELLITE DATA  
SERVICES

**Abstract**

Satellite data services are essential to modern communication systems with a wide range of applications. The proliferation of linked devices and the growing need for data-intensive applications are causing revolutionary changes in the current satellite communication landscape. Emerging multiple access technologies are becoming more and more prominent as a solution to the challenges that this rapidly evolving environment presents.

Multiple access technologies enable satellite systems to dynamically allocate resources in real-time in order to meet traffic demands, ensure optimal utilization and enhanced service quality for users with varying needs, and position satellite data services to serve a broader spectrum of applications, from disaster relief critical communication to catering to the growing demand for internet connectivity in underserved areas.

This paper explores multiple access technology developments in more detail, with an emphasis on how they can improve the effectiveness and performance of satellite data services. The evolution of multiple access methods is examined in the context of satellite communication, encompassing Frequency Division Multiple Access (FDMA), Code Division Multiple Access (CDMA), and Time Division Multiple Access (TDMA). Furthermore, a detailed examination and illustration are given to more dynamic and scalable return link technologies that integrate the advantages of Single Channel Per Carrier (SCPC) and standard Multiple Access Technologies (MATs).

This research also examines new developments, such as the incorporation of sophisticated MATs with terrestrial networks like 5G. The goal of ongoing research in this field is to combine satellite and terrestrial networks in a seamless manner, promising improved connectivity and a superior user experience.