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RESEARCH ON HIGH-THROUGHPUT DATA ROUTING TECHNOLOGY FOR LOW-EARTH-ORBIT
(LEO) MEGA-CONSTELLATIONS ALL-OPTICAL NETWORKS

Abstract

The development trend of the low-earth-orbit (LEO) mega-constellations Internet is moving towards an all-optical network, which effectively addresses the issue of limited frequency resources in a mega-constellation and enhances system capacity. To optimize routing strategies and further improve data exchange throughput within the mega-constellation all-optical network, we propose a high-throughput data exchange technology that utilizes optical network coding to double the optical network's throughput in a mega-constellation. Through numerical simulations, we analyze the performance of this approach. Additionally, by leveraging regularity, symmetry, and predictability in satellite distribution patterns, we evaluate and analyze hop numbers within the mega-constellation all-optical network with a focus on minimizing inter-satellite forwarding hops. These findings provide valuable insights for designing efficient routing strategies within such networks.