SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Advanced Technologies (5)

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A NOVEL SYSTEM FRAMEWORK WITH NETWORK CODING FOR SATELLITE COMMUNICATION

Abstract

This paper proposes a novel system-level framework to apply network coding in satellite communication networks. Generally speaking, network coding is a generation of routing and it needs combine packets at the network layer to achieve the min-cut capacity of multicast. In satellite communication, the satellite is a capability-constrained relay which can serve a large number of users over a huge area. To fully exploit these characteristics of network coding and satellite communication, our framework 1) schedules and combines the packets of different flows to establish artificial multicast; and 2) uses a joint network coding and channel coding design such that the channel coding and decoding overload at the satellite is decreased or even totally removed. Under our framework, network coding in satellite communication is more powerful and more efficient than that in the traditional terrestrial communication. In particularly, two schemes are investigated under the two satellite communication modes: on-board processing mode and bent-pipe mode. The analysis and simulation show that our schemes have several advantages compared to the traditional satellite communication systems: (1) decreasing average transmission delay, (2) increasing customer capacity, and (3) enhancing information security.