Paper ID: 3937
student

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Mobile Communications and Satellite Navigation Technology (2)

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ANALYTICAL APPROACH OF QOS-GUARANTEED CALL ADMISSION CONTROL AND HANDOVER MANAGEMENT SCHEME IN MULTISERVICE LEO SATELLITE NETWORKS

Abstract

Call Admission Control (CAC) and handover management scheme are substantial resource management techniques to guarantee Quality of Service (QoS) in Low-Earth Orbit (LEO) satellite Networks. While several threshold-based schemes dealing with single traffic class have been studied in the literature, little algorithm has challenged to guarantee QoS for integrated services in LEO satellite networks; thereby little effort has been made for mathematical modeling and, further, due to the overwhelming state space explosion which is caused by heterogeneous traffic and guaranteed handover policy. Our main contributions are the proposal of Multi-Threshold Channel Reservation (MTCR) scheme and the methodology of analyzing the call-level system performance. The proposed MTCR, which is tailored to LEO satellite network environment, is an integration of CAC and handover management scheme for individual QoS guaranteeing. As for the commonly confronted state space explosion problem in analytical modeling, we have proved that our four-dimensional Markov model is nicely true of Kolmogorov's criteria for product form of steady states probabilities, under some reasonable assumptions. The proposed analytical approach figures out the maximum traffic intensity under given operation parameters, while guaranteeing preset QoS requirements for each service type. Furthermore, numerical results have proved that the maximum traffic intensity that the system can afford can be improved significantly by setting the operation parameters of the scheme properly.