

Abstract

Recent research has shown that existing TCP/IP protocol suit exhibits poor performance in space communication networks. To deal with communication challenges in deep space the architecture called Interplanetary Ad hoc Network (IPAN) is envisioned to establish a communication infrastructure in environment which allows to connect planets, natural and artificial satellites, and various mission elements such as spacecrafts and rovers. The communication links in IPANs possess the properties of low bandwidth, high error rate, high latency and link unavailability for longer period of time. Nodes in such networks are resource constrained in terms of storage, energy and processing power. This work proposes a probabilistic routing protocol called “Buffer Aware Routing Protocol in Interplanetary Ad hoc Network (BARPIN)” based on the store and forward principle of Delay Tolerant Networking (DTN). Here IPAN is modeled as the network of two kinds of nodes, one having deterministic mobility patterns with greater resources and the others having random movement patterns with limited resources in terms of storage and energy. The delivery ratio performance measure of BARPIN is studied for different network conditions by changing field sizes, traffic rates, available resources on various nodes and for different source-destination pairs. Further we propose a model to estimate the minimum required buffer size of nodes for different data rates to reduce the packet loss due to buffer overflow, and justified the simulation results with analytical results.