

TRANSPORT, NETWORK, AND DATA LINK LAYER PROTOCOL DESIGNS  
TO IMPROVE GEO-STATIONARY EARTH ORBIT SATELLITE DATA SET  
TRANSMISSION PERFORMANCE

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ABSTRACT

Geo-stationary earth orbit (GEO) satellites are wireless transmission media that provide near-earth Internet and Intranet data communication, but are limited to low Megabits per second transmission rates and small messages. They can provide communication infrastructure to rural earth locales, are not affected by terrorist events and natural disasters that render terrestrial channels unusable, and can replace terrestrial communication infrastructure. In this thesis, we present new designs for a transport layer data transmission protocol, a network layer routing strategy, and a data-link layer medium access control strategy. Through simulation, we show that our designs permit earth stations to transmit large data sets at high transmission rates over GEO satellites in less time than the Transmission Control Protocol variant Reno and frequency division multiplexing. Our designs can be used by organizations that wish to transmit large data sets quickly over GEO satellites that exhibit large bandwidth delay products and large bit error rates.