Cutting-Edge Technologies: GPS/Satellite Communications-Based Tracking System

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Despite wide-spread adoption of GPS and satellite-communication technologies within the freight and transportation industries, commercially-available telemetry tracking systems have not kept pace with the evolving demands of ecological research. Commercial GPS tracking collars are costly ($1,500 to $5,000 USD), often unreliable, and are severely constrained in terms of data storage capacity and battery-life expectancy. Collars equipped with remote-communications technologies (e.g., ARGOS and GSM) are limited by service availability, expense, and data throughput. We developed a GPS/Satellite Communication-based tracking system allowing temporally-intensive (e.g., 5-min intervals) collection of GPS and sensor data over long deployment lifetimes (e.g., 1 year) while providing real-time, two-way communication between user and deployed collar with 24/7 global service availability. Data collected by this system are stored on removable, Secure Digital (SD) memory cards (e.g., 8 gigabytes). Power demand during 90-99% of the system duty-cycle is less than 90 uW. The user employs the Iridium satellite constellation to download stored data or alter the configuration of deployed collars via email communication with a satellite modem integrated into each collar. Cost for materials used to construct these collars is about $1,500 USD. Store-on-board-only collars having only GPS and SD-card storage capabilities cost about $450 for construction materials. This system has been extensively tested on range cattle and is currently undergoing cold-temperature performance evaluations while deployed on reindeer in central Alaska. These advanced technologies should greatly enhance the ability of researchers, resource managers, and agriculture producers to study and manage rangeland livestock and wildlife species.

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