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Novel Concepts for GPS III Related to Low Earth Orbiter Navigation

Stephen M. Lichten, Catherine L. Thornton, Lawrence E. Young, Thomas P. Yunck
Jet Propulsion Laboratory, California Institute of Technology

The Global Positioning System has revolutionized the fields of navigation and geodesy. GPS-based techniques for low-earth orbiter positioning have achieved unprecedented accuracy, exemplified by the 2 cm demonstration of radial orbit accuracy on TOPEX/Poseidon. However, this performance was only possible after the fact, and required differential tracking techniques involving over a dozen ground receiver sites. Real-time, on-board positioning capabilities currently vary from 50-100 meters for stand-alone conventional tracking accuracy to 50 cm or better using wide area differential corrections to the GPS measurements.

The US Department **of Defense** has begun a **design study** on the next generation satellite system, termed GPS III. The study addresses military and civilian applications and requirements. This paper examines GPS design and operation policy issues which currently limit capabilities for real-time, on-board precision positioning. A number of concepts are then presented which could benefit civilian applications, especially in real-time low earth orbiter navigation. Each concept is discussed in terms of its impact on system performance and operation.