

## Optimizing GEO Orbital Monitoring: Multi-Static Radar for Improved Tracking

Conventional surveillance radar sensors operate on monostatic radar principles. However, a better approach involves employing remote radio frequency telescopes as bistatic receivers, enhancing tracking capabilities without replacing the existing monostatic radar systems. This innovative method not only maximizes the use of existing facilities but also enhances tracking accuracy by providing supplementary information. The multi-static radar system can provide improved Geostationary Earth Orbit (GEO) coverage and enhance resident space objects' detection and tracking capabilities by utilizing multiple receive antennas and a single transmit antenna. This study investigates the conditions in which a multi-static radar is advantageous and shows concrete results based on simulated data. Here, we investigate the sensor, Tracking and Imaging Radar (TIRA) in Germany as a transmitter and a number of receivers in Europe. The results show significant improvements in Initial Orbit Determination (IOD) and tracking accuracy, offering a promising direction for future Space Surveillance and Tracking (SST) efforts.

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