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AUTOMATED CONJUNCTION RESPONSE FOR A FLEET OF CUBESATS

Abstract

Planet owns and currently operates over 140 3U CubeSats in LEO in order to achieve a daily revisit rate with its fleet of Earth imaging satellites. The unprecedented number of satellites operated by a single organization in heterogeneous orbits results in large operational challenges such as scheduling, ensuring safety of the satellites, and automation. Planet strives to be a responsible space operator by adhering to good industry practices, operating below the densest orbital regimes, ensuring satellite orbital lifetime matches operational lifetime, actively tracking its satellites via GPS and radio ranging, being open and transparent about operational policies and orbit data, and closely working with the JSpOC for tracking and Conjunction Assessment.

Manual assessment of conjunction data requiring input from human operators is infeasible when tracking such large numbers of satellites. Nominal operations are automated, where the operators are only involved with troubleshooting and experimentation. Therefore, an automated conjunction assessment and response strategy is vital. The Automated Conjunction Response Tool uses JSpOC conjunction data messages, the publicly available space catalog, the Space Data Association (SDA), and position measurements from Planet and non-Planet assets. Data from these multiple sources is fused, and analyzed to automatically create attitude and differential drag maneuvers in order to minimize the probability of collision. Maneuvers are screened for potential future conjunctions internally against the space catalog, and by using the JSpOC's services.