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DEVELOPMENT OF A LOW-COST COMMERCIAL MICROSAT CAPABLE OF 1.0 METER GSD IMAGERY

Abstract

This paper addresses the development of an international commercially available visible imaging MicroSat with a 1.0 Meter GSD resolution at Low Earth Orbit. The emergence of high performance and low cost spacecraft components, driven primarily by the maturing CubeSat industry, is enabling a new class of NanoSat's and MicroSat's that provide high performance at a low cost. Andrews Space (Andrews) has leveraged this trend to developing an imaging spacecraft based on its SENTRY 3000 bus that can provide 1.0 to 1.5 meter visible imagery at a recurring satellite price of less than $3,500,000 USD. This paper summarizes Andrews' development of an ultra-low cost commercial MicroSat capable of 1.0 meter imagery as well as the spacecraft subsystems and performance.

Developing a high resolution imaging spacecraft in the visible spectrum requires careful selection of components and a flexible architecture to enable quick upgrades and component swaps to fine tune spacecraft performance. Additionally, international regulation drives the use of commercially available components, used in non-traditional ways. By focusing on the end utility of the spacecraft solution, part selection is driven by efficient selection of externally available products and components on the global market. The specific spacecraft overall architecture and tradespace are discussed and treatment of specific subsystems based on their technical maturity are addressed. The selection and testing of components and subsystems is discussed including the technical and cost trades performed. Notional single satellite and satellite constellation formations and orbitology strengths and weaknesses are also covered. The specific results to date and technical performance analysis are presented. Future plans for the manufacture of a prototype satellite and supporting ground station architecture are also presented.