IAF EARTH OBSERVATION SYMPOSIUM (B1)
Future Earth Observation Systems (2)

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CONSTELLATIONS PROPOSALS FOR REMOTE SENSING WITH UAV –INTERLEAVED WITH CUBESAT/SMALLSAT NETWORKS

Abstract

There is an increase in demand for remote sensing data usage by various users and researchers round the globe. Currently the remote sensing data is provided to various users by major spacefaring agencies. The current scenario and system for remote sensing data dissemination has a limitation with respect to latency in time.To meet the demand effectively it is proposed a UAV - Cube satellite constellations with commercial components. The UAVs are DC power limited and do not possess required higher computational power. The data generated on the UAVs can be transmitted to the user/Ground stations via the links on the satellite constellations. The Microsat acting as Master satellite acquires the data from various cube-satellites, process the data and in-turn will transmit the data via LEO-GEO Intersatellite link directly to the user/ground station. This eliminates the stringent tracking requirements for the UAV/ Satellite in the Low earth orbit

As shown in the figure the UAV is flying in an area which has a visibility to Satellite in Orbit1.The ground station to receive the data from UAV has a visibility to satellites in Orbit3. Data cannot be transmitted from UAV to Earth station and can be transmitted by using data relay systems /Intersatellite links. The configuration proposed has the following features: a) LEO Satellite Connectivity: Unlike the present connectivity of GEO Satellites with UAVs ,connectivity with LEO is proposed. This is proposed as UAV have limited DC power generation and RF Power capabilities. b) Larger Coverage area with more Number of UAVS : With Multiple Satellites in different orbits seamless connectivity can be ensured to more number of UAVs. For bigger countries with larger area of coverage more no of UAVs can be deployed and Data can be received. c)Reduced Complexity: Complexity of RF systems in UAVs will be high for establishing links with GEO satellite. Larger amount of RF power needs to be expedited as compared to establishing the link with LEO satellites. d) Cost of Operation: The manufacture cost of LEO satellites is lesser compared to GEO Satellites. The LEO satellites can be upgraded with lesser costs corresponding to changes in UAVs e) Reception at multiple Ground Stations: By providing satellite connectivity to UAVs data from UAV can be made available at multiple ground stations. The data replayed through various satellites helps for reception of data at multiple ground stations.