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REGIONAL HTS SERVICES FROM LOW EARTH ORBIT

Abstract

Broadband connections are generally provided either by Terrestrial Links or by Geostationary satellites. Extending Internet access to all especially in the rural areas is becoming a goal for every nation. A vast geographical coverage area, including the remote inaccessible areas can be covered by satellites. However, due to the power limitations of mobile phones, direct link between mobile phones and GEO satellites is extremely difficult. Also the Round trip time, which is the amount of time a packet of data takes to travel from the subscriber to the server via the satellite and returns back to subscriber is quite higher (480milliseconds). On the other hand, the Round trip time for LEO is 10-15msec. Since the power required and Round trip time is very less from LEO when compared to geostationary satellite, LEO-HTS is an attractive solution in providing internet. Consequently, in recent years, a lot of emphasis is put on Broadband services from LEO satellite. Additionally, LEO-HTS satellite constellation can be used for Inter-continental communications, including maritime as well as in flight high speed Internet connectivity. India can use LEO-HTS constellations to make broadband connectivity affordable, and outreach to the masses. The LEO constellation have been designed with specific focus on the Indian subcontinent coverage. In addition to the coverage over Indian Region, the constellation has a potential to provide services to the extended area, which comes naturally due to the constellation. Multiple options of constellations designs were explored. Out of which, two feasible options have been presented in this paper. The features for these options, along with their pros and cons and expected throughput of the constellations also have been highlighted. The first option utilises the Low Earth Equatorial Orbit with biased coverage towards the Northern Hemisphere in particular from 00N to 400N latitude. The second option assumes symmetric coverage about equatorial belt (400N to 400S) with placement of satellites in Low Inclined Orbits. Technological challenges for LEO-HTS have been outlined. The targeted coverage can be met with a minimal number of satellites as services intended are regional; hence this constellation can be an optimal cost effective solution. The constellation is flexible to accommodate more number of satellites depending on the satellite capability or throughput requirements. The paper concludes with the most optimum configuration, keeping “in view” the number of satellites, throughput and coverage requirements.