Very Low Earth Orbit (VLEO) Satellite communication system design

Recent research into satellite communication services operating from VLEO show the potential for an improved link budget due to lower latency and shorter transmission distance to ground terminals. Such systems also reduce transmit power requirements and can enable higher frequency operations than Ka-band. Achieving a viable spacecraft design requires aerodynamic shaping and propulsion system considerations that dictate the useful lifetime of such satellites in orbit. In this work, we look at the feasibility of VLEO spacecraft as communication satellites. We present a system engineering approach towards the sizing and design of VLEO satellites focused on satellite communications. A rarefied gas dynamics approach is presented for aerodynamic shaping, considerations made on payload sizing, thermal design, power system design and communications system design and further described. Future work into understanding environmental impacts including effects of oxidative degradation, electrical charges and radiation effects are on-going. This work aims to look at the feasibility of a VLEO based satellite communications system.