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LESSONS LEARNED FROM 30 YEARS OF EXPERIENCE IN GROUND NETWORKS DESIGN

Abstract

SSC has over 30 years of experience in designing ground networks –the geographical placement of ground stations, their characteristics and the associated data handling and interconnecting systems. This paper will present some experience, lessons learned and thoughts on how to design ground networks, the metrics that can be applied and how to approach the ground network in a systems perspective. The ground segment and space segment has traditionally to a large degree been seen as separate and different systems, handled by different teams, standards and technologies resulting in local optimizations and an inflexible operational concept. To utilize the combined space and ground segment to its fullest, in order to get the maximum benefit from the end-user service, space system designers need to evaluate and design these as a combined system. This is required for the data centric new constellations as well as individual missions. Benefits of co-designed space and ground segment are reduced spacecraft complexity and increased flexibility with an optimized operational concept. Metrics such as daily data capacity, latency and direct coverage is explained in the paper, and illustrative examples on how to use these to optimize for an efficient joint space and ground segment and their operational interaction. The aim of the paper is to give the reader a set of initial tools to approach the design process, a complex process but where a set of metrics can give a valuable start.