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Author: Ms. Flor G. Ortiz-Gomez
Universidad Politécnica de Madrid, Spain

Dr. Ramon Martinez Rodriguez-Osorio
Universidad Politécnica de Madrid, Spain
Dr. Miguel Salas-Natera
Universidad Politécnica de Madrid, Spain
Dr. Salvador Landeros-Ayala
Universidad Nacional Autónoma de México (UNAM), Mexico

ON THE USE OF MACHINE LEARNING FOR FLEXIBLE PAYLOAD MANAGEMENT IN VHTS SYSTEMS

Abstract

High Throughput Satellites (HTS) exceeds the capacity of traditional systems that provide FSS and BSS (Fixed and Broadcasting Satellite Services, respectively) that use contoured regional footprints and Very High Throughput Satellites (VHTS) are next generation of satellite systems to meet the demands of increase on data traffic. The objective of VHTS systems is to achieve 1 Terabit/s by satellite communications in the near future. HTS and VHTS systems are based on multi-beam payloads with polarization and frequency reuse schemes, with VHTS using Q/V bands in the feeder link to increase available bandwidth. These systems provide a greater satellite capacity at a reduced cost per Gbps in orbit but further optimization is needed in order to use the full capacity of the satellite over the time. For instance, flexible payloads are required in VHTS to meet changing traffic demands.

Actually, the interest to use Machine Learning (ML) algorithms in satellite communications has increased recently. There have been technological advances in the use of ML on-board communications satellites (e.g. by NASA for cognitive space communications), but these advances mainly focus on control and autonomous operations (e.g. by the Italian company AIKO).

Whereby, this contribution presents a study of how and where Machine Learning algorithms can be used to manage a flexible payload architecture. We analyze the problem of resource allocation in a flexible payload architecture and propose the cost function to implement the application of ML techniques using supervised and/or unsupervised algorithms as a solution for non-uniform traffic demand and its changes over the time in the service area.