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ANALOG MESH PROCESSOR FOR INDIAN SPACE PROGRAMME

Abstract

Analog Mesh Processor is an on-board traffic control system at VHF-band which allows a mean to increase the capacity of multi-beam satellite through the use of different types of fixed finer bandwidth channelization using SAW filters and independent routing of sub-channels in each beam using tele-commandable switch matrix. In a conventional multi-beam satellite, links are established at the transponder level by setting on-board switches. In order to fill the transponder, sufficient users requiring the identical link must be identified. This results in either latency in the information transfer which may not be acceptable for delay sensitive services or underutilization of transponder's capacity. An effective way to mitigate problem of unused capacity in conventional multi-beam satellite is the use of Mesh Link by creating sub-channels that can be routed independently and permitting the gain of each sub-channel to be adjusted independently having input range of -44dBm to -60dBm and output range of -28dBm to -22dBm to accommodate different classes of terminals for each sub channel as well as to equalize the uplink signal levels of all beams, before being combined for down link. Mesh Link is a switching control system that separates individual transmission from a bunch of signal and matches each of them with its intended destination. The analog mesh-processor is developed to provide highly efficient and flexible mesh connectivity in multi-beam Indian GEO-communication satellite. It offers the way for rapidly switching sub-channel to beam connections, including one is-to one, multi-cast and full broadcast mode. It is a drop-in-box which is independent of uplink/downlink frequency and operates in parallel with basic payload to efficiently manage the partial transponder traffic while maintaining the standard microwave payload for the full transponder traffic. Hence the 'same destination users' are combined into common transponder for down link. FPGA based digital interface control logic implementation done for tele-command controller.

Conclusion - Fully indigenous Analog Mesh Processor was designed, developed and qualified for space use in one of the multibeam GEO-communication satellite of Indian Space Programme. All the required performance parameters and intended functionality were achieved. The processor was subjected to stringent electrical, mechanical and environmental tests and is successfully inducted into Indian satellite system.