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NEW DEVELOPMENT OF DIGITAL BEAM FORMING FOR SATELLITE COMMUNICATIONS

Abstract

These days, many companies have the projects to launch a lot of small satellites into the low Earth orbit in order to build the worldwide internet services. The ground stations are required to communicate simultaneously with several satellites. It is impossible for the parabolic antenna to track simultaneously several satellites. Therefore, we are newly developing a ground receiving station using the Phased Array Antenna and the Digital Beam Forming technologies. We presented at the 2017 IAC at Adelaide we had already built the first pilot model of the receiving antenna at the frequency of X-band and succeeded in receiving the signal from the satellites. In this paper, we are developing the next phased array antenna for the S-band communications, which has quite different configuration from X-band antenna, and are performing a demonstration to receive simultaneously the signals of the THREE satellites using Digital Beam Forming technology. We will explain this newly developed Digital Beam Forming and PSK demodulator for S-band communications and the demonstration to receive from the satellites. We have developed the FPGA to convert the signals from analog to digital with a high speed AD-converter and to analyze the data by Digital Beam Forming technology to sort the received signals into the information of each satellite. On the other hand, we are developing to generate analog signals to transmit simultaneously the signals to several satellites by the Digital Beam Forming.