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# NEW RECEIVING GROUND STATION USING ACTIVE PHASED ARRAY ANTENNA FOR SATELLITES

**Abstract**

Today, it is anticipated that a lot of small satellites will be launched to observe the Earth with cameras of high resolution or radar systems. We have to build the ground infrastructure to receive the signals from a great number of the satellites. Especially, a lot of the ground receiving stations are required to beam high-speed internet down to Earth as Google's plan, because the signals from the satellites must be received to connect with the ground internet network in real time.

We are newly developing a ground receiving antenna system with technologies of the active phased array antenna rather than conventional parabolic antennas. The main purpose of this development is to establish the worldwide receiving antenna network for the real time communications with satellites, which can be controlled through the internet with over 100 ground stations in the world.

This receiving system has many great advantages, electrically scanning of the main beam all over the sky at a high speed versus parabolic dish mechanical drive, easy formation of multi-beam antenna patterns by controlling phase shifters in the active phased array antenna for simultaneous tracking of several satellites, almost maintenance-free without mechanical drives versus parabolic dishes with mechanical drives and the establishment of the worldwide network with remote control via internet.

We are developing the ground receiving stations at the X-band frequency of 8GHz, though the frequencies are easily modified to receive the signals from the satellites. The phased array antenna for the ground receiving station is composed of hundreds of antenna poles with several antenna elements. The single antenna element is consisted of a omni-directional antenna, an amplifier, a phase-shifter, a frequency mixer. The first antenna pole is designed with 32 antenna elements to scan omni-directionally the main beam, where this system can control beam directions electrically. We build the whole receiving antenna system with 10 antenna poles to examine the performance of the active phased array antenna as the receiving antenna.

We will present our result in detail in our presentation.