

Phased Array Antenna System with Reduced Grating Lobes

We are looking to out-license the technology for its commercialization.

New design of phased array antennas which grating lobes are reduced even when phase shifters with a narrow phase shift range are used.

◆Background

A phased array antenna system is a communication device consisting of multiple antenna elements arranged in an array, with their phases controlled by phase shifters. In conventional systems, phase shifters with a 360° phase shift range are commonly used, but their large size and high losses limit device design flexibility. Furthermore, if the number of phase shifters is reduced to alleviate the above problems, grating lobes are generated, resulting in reduced beam efficiency.

◆Description

Researchers at Kyoto University developed a novel design for phased array antennas with multiple subarrays. With this design, the generation of grating lobes is reduced by appropriately controlling the phase shift amount, even when phase shifters with a shift range of less than 360° are used.

➤ Compatible with phase shifters with narrow phase shift ranges

Various phased array antenna systems, including large-scale antennas and distributed phased array antennas, can be constructed using small and low-loss phase shifters with narrow phase shift ranges. This new design is also suitable for building millimeter wave phased array antennas that require narrow spacing between antenna elements.

➤ Less grating lobe generation

In the conventional design with a reduced number of phase shifters, large grating lobes are generated around 10° when the beam scanning angle is set to -10° (Fig. 1, left). On the other hand, the novel system reduced the generation of large grating lobes during beam scanning (Fig. 1, right).

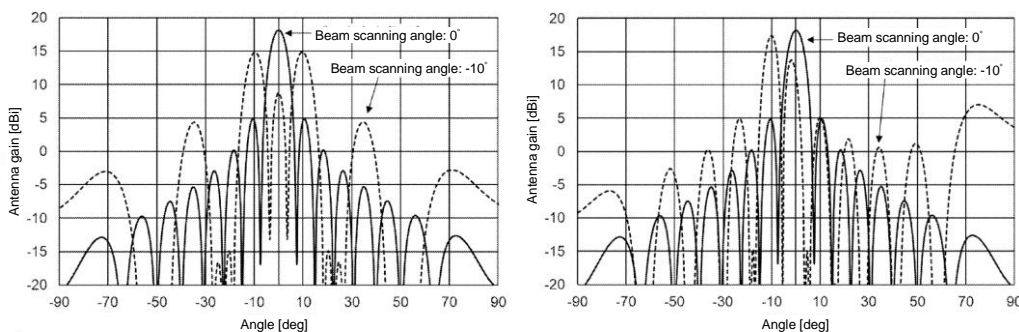


Fig. 1 Simulation results of directivity of the conventional (left) and novel (right) phased array antenna systems

The figure shows the directivity of 12 antenna elements arranged in a straight line, each excited with equal amplitude at a frequency of 5.75 GHz. The directivity is represented by the angle to the direction perpendicular to the antenna array direction and shown for beam scanning angles of 0° and -10°.

◆Development Status

Phased array antennas with the novel design and the conventional design were compared through simulation. The results confirmed that the novel design reduced the generation of grating lobes.

◆Applications

- Wireless power transfer
- 6G and other telecommunications

◆Offer

- Patent License
- Option for Patent License

◆Contact

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