New Generation Wideband Smart Antenna System for Mobile Communication

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ABSTRACT

In this paper, we study the phased array theory and the phased array synthesis methods to design a multibeam SAS (smart antenna system) composed of a broadside collinear tentacle bowtie array, horizontal BFN (Beam Forming Network) and vertical BFN that is suitable for fourth generation wideband SAS in mobile communication base stations. The antenna produces a multibeam in the azimuth to reduce the co-channel interference. In the elevation plane the antenna produces narrower beam and downtilt in order to achieve good coverage and higher gain. In order to verify the function of the SAS, three kinds of measurement systems, indoor frequency domain measurement system, outdoor impulse time domain measurement system, and professional SAS test bed are utilized to measure the SAS. The patterns and data of SAS measured results are quite agreed with that of simulation and previous calculation. We actually verify the SAS of GSM and WCDMA mobile communication, which is experimented with test bed to measure the EVM (error vector magnitude) of SAS. We also study the test bed system, elaborate and connect a controllable LabVIEW interface of computer to modulate the operation of the mobile communication and measure quality of SAS performance., A wideband, linear polarization, electrical down tilted, pencil beam elevation pattern, and eight beam directions SAS are developed for the BTS (base transceiver system) applications in GSM and WCDMA. The results as measured by the performance of SAS are found to be consistent with that from simulation studies.

Keywords : SAS (Smart Antenna System) ; Tentacle Bowtie Antenna ; MBA (Multiple Beam Antenna) ; Multi-path ; Butler Matrix ; Uniform Power Divider ; Switched-Beam Antenna Array ; BFN (Beam Forming Network)

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