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Four Port MIMO Integrated Antenna System with DRA for Cognitive Radio Platforms

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ABSTRACT

An integrated four-port multi input multi output (MIMO) system with Cylindrical Dielectric Resonator Antenna (CDRA) for Cognitive Radio (CR) application is investigated. In this study the proposed design performs dual state operation i.e ultrawideband (UWB) and narrowband (NB) functionality with modified feeding mechanism, where the feeding line of UWB antenna is made orthogonal to NB CDRA. In UWB state the proposed integrated antenna consisting of two port circular radiators, excited by micro-strip transmission line. In NB state two CDRAs are integrated on the UWB radiators where the current density is effectively low. The DRAs are excited by aperture coupled orthogonal T feed micro-strip transmission line to perform the triband operation at targeted bands. The proposed integrated MIMO system occupies a compact total area of $0.18\lambda_0^2$ ($\lambda_0$is the highest operating wavelength) with isolation less than -15 dB among all ports. The design approach is verified by fabricating the antenna prototype and the performances are experimentally evaluated in terms of S parameter, radiation pattern and gain. Moreover, the MIMO performance metrics in terms of Envelope correlation coefficient (ECC), diversity gain (DG) and mean effective gain (MEG) are also evaluated for satisfactory diversity performance.

KEYWORDS: Cognitive Radio; Ultrawideband; Narrowband; MIMO; CDRA