60-GHz dielectric rod excitation by two decoupled stacked patch antennas for wideband bi-directional applications.

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**Introduction**

A wideband dual-circularly-polarized dielectric rod antenna is designed for bi-directional short-range wireless communication with rotational freedom while promoting spectral efficiency. Two stacked patch antennas and cascaded hybrid couplers are used to realize wideband isolation in 60-GHz frequency bands. Two types of antenna and coupler are introduced for paired realization.

**Planar Elements and Stack-up**

- Low-loss LCP and TPX dielectric materials are utilized in planar and rod structure, respectively.
- Port 1 (& port 3) is for transmitting and Port 2 (& port 4) for receiving signal path. Port-to-port isolation ($|S_{21}|$) is 30 dB for a wide frequency band.

**Figure 1:** Structure of the improved dielectric-rod antenna system.

- Two types of quadrature coupler are used for different output phases.

**Figure 2:** Characterization of two types of coupler.

**Antenna System Characterization**

- Two types of antenna system are introduced which exhibit wide isolation bandwidth.

**Figure 3:** $S$-parameters, antenna efficiency, realized gain, and axial ratio of different antenna types. (without the balun)

**Figure 4:** Application of the rod antenna for short-range distance. Characterization of the paired antenna systems.

**Reference**