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(57) Abstract :

The era of 6G technology has an essential need for advancement as data transfer is evolving in daily life and it keeps getting an upgrade ever since. The envisioned dual-band antenna promises enhancement in connectivity and versatility via operating on two distinct frequency bands establishing enhanced performance and refined adaptability with ultra-high-speed wireless communication systems, enabling data rates exceeding 100 Gbps which is crucial for next-generation networks (6G and beyond). The miniature design of the antenna encourages portability and is suitable for various wireless communication devices and different military applications. Terahertz antennas are deployed in telescopes to observe celestial phenomena, as certain molecular spectral lines, such as carbon monoxide, fall in this range. The design consists of two patch ends one of them being a Pentagon with a circle etched on it and the other one being a Heptagon with an Octagon etched on it and radiating over particular Dual-band terahertz frequencies (0.16 THz and 0.1678 THz) respectively, for 6G implementations with a compact design having dimensions 1300 μm x 1400 μm x 100 μm crafted of Gallium Arsenide dielectric material which has a high electron mobility with a value of High-frequency dielectric constant (ε∞): 10.9 and can be used for various implementations for instance Ultra-Fast Data Transmission, Non-Destructive Testing (NDT), and Molecular Spectroscopy. Apart from being highly suitable for 6G communication it also provides robustly secured connections that promote High-Directionality for Privacy. It can also be used for wireless communication devices, and this can enable diverse sectors of implementation, such as Holographic Communication: Real-time transmission of 3D holograms for immersive remote experiences. Changing the AR/VR domains immensely.

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