

Enhanced Capacity and Expanded Coverage: the Penta-Beam Low Band Antenna Solution

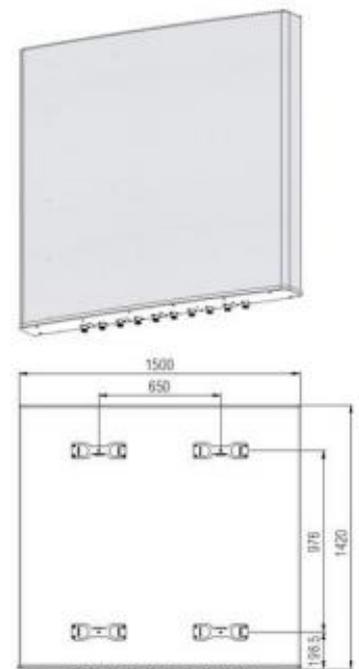
The insatiable global demand for mobile data continues to escalate as smartphones and social media evolved. In this connected era, network operators face a perpetual challenge: delivering high-capacity coverage everywhere, from dense urban canyons to the deepest corners of indoor environments. The demand for voice and data connections is soaring, often leading to network overload and degraded user experience. To meet these escalating demands, service providers are actively seeking innovative solutions to expand network capacity and enhance coverage effectively.

While high band frequency is crucial for capacity, the low-band spectrum remains the foundational bedrock of mobile networks. This frequency is the workhorses for achieving unparalleled geographic reach and superior building penetration, ensuring that a reliable signal is available to the widest possible user base.

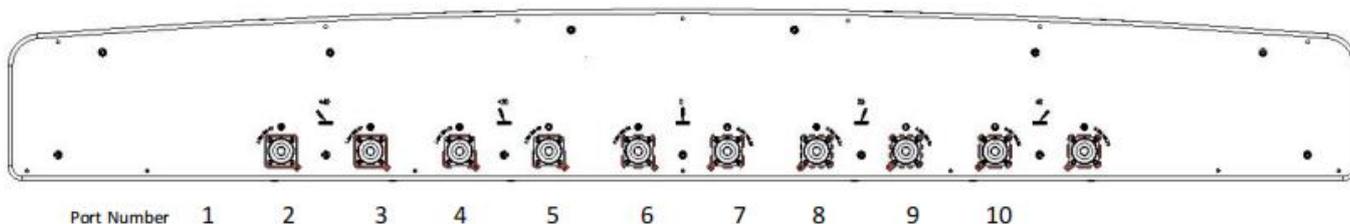
Solution

Faced with coverage gaps and capacity constraints, traditional antenna systems often added cells and purchased additional spectrum. However, this approach creates a complex, congested tower environment, leading to excessive wind loading, aesthetic concerns, and extraordinary costs. Moreover, this pattern lacks the precision needed for modern network optimization, resulting in high levels of inter-cell interference and inefficient use of spectrum resources.

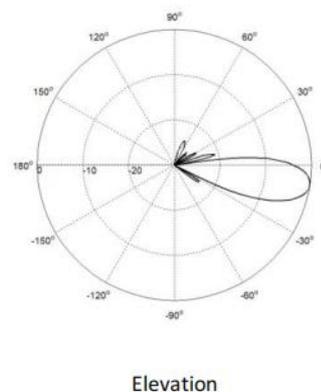
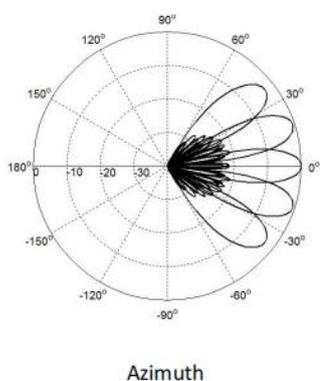
It is within this context of escalating demand and technological limitation that we introduce a paradigm shift in antenna design: the BROADRADIO Penta-Beam Low Band Antenna, with each beam operating at 2T2R. This innovative solution is not merely an incremental improvement but a revolution of low-band coverage. By replacing a single, wide beam with five distinct narrow beams, the penta-beam antenna delivers comprehensive coverage and optimal performance.



This penta-beam architecture, supported by 10 ports in the 694-960 MHz low band, is engineered to provide up to 21dBi gain. The result is a solution that transforms network performance in high-density environments, turning challenging coverage areas into zones of exceptional capacity and connectivity.



The BROADRAIO Penta-Beam Antenna redefines low-band coverage by moving beyond the "one cell, one wide beam" paradigm. Each of the five narrow beams operates independently, creating distinct, high performance coverage zones. By directing energy exactly where it is needed and minimizing spillover into adjacent areas, the antenna dramatically reduces interference. This precise control transforms the low-band spectrum from a blanket coverage tool into a powerful, capacity-boosting asset, enabling more efficient frequency reuse and a cleaner connect environment.



Validation&Results

The field and OSS assessment demonstrate that the Penta-Beam Low Band Antenna delivers significant network performance improvement while maintaining overall KPIs stability:

- 50% reduction in DL PRB utilization, from 80% to 40%, indicating more efficient spectrum resource use.
- 300% , 400% DL throughput, UL throughput gain respectively, with DL throughput increasing from 1.8Mbps to 7Mbps, translating into greater user experience.
- ~150% enhancement in UL SINR on PUSCH, accompanied by an ~80% enhancement in UL MCS, resulting in a more stable and reliable connection for user data transmission.

- 78% reduction of UL retransmission figures, reflecting more stable link quality.
- 53% improvement in BLER trend, resulting in better UL reliability.



Drive test data confirm that the antenna achieves excellent beam separation, reducing overlap between adjacent beams and enhancing SINR in previously weak coverage zones.

The throughput improvement is primarily driven by higher MCS utilization and increased PRB availability, indicating the antenna’s strong capability in optimizing network efficiency and user experience.



Since 2010, Broadradio has been at the forefront of advancing global telecommunications. Through a fully integrated approach that combines R&D, manufacturing, and sales, we provide innovative full-scene wireless solutions for governments, operators, and enterprises worldwide. Our global team is passionate about building reliable networks, guided by the belief that a seamlessly connected future is within reach.

