

Article Overview

Qatar is advancing its telecommunications infrastructure with cutting-edge fiber technologies, including hollow-core and multimode fibers, to enable ultra-fast, low-latency, and quantum-safe communications.

Qatar's Fiber Initiatives

Qatar, through Ooredoo in collaboration with Hamad Bin Khalifa University (HBKU) and the Ministry of Defense, has deployed its first quantum-safe communications link over the country's core dark fiber network. This initiative integrates Quantum Key Distribution (QKD) into live telecommunications, ensuring secure transmission resistant to future quantum computing attacks. The deployment leverages existing fiber infrastructure, demonstrating Qatar's commitment to high-performance, secure networking without requiring specialized fiber topologies .

Hollow-Core Fiber (HCF) Technology

Hollow-core fiber is an optical fiber where light travels through an air-filled core rather than solid glass. This design significantly reduces latency because light propagates nearly at the speed of light in a vacuum, compared to ~68% of that speed in conventional silica fibers. HCF also reduces signal distortion and can achieve ultra-low loss, with recent designs demonstrating up to 45% faster data transmission and record low attenuation of 0.091 dB/km over long distances . These properties make HCF ideal for latency-sensitive applications, such as high-frequency trading, data center interconnects, and quantum communications.

Multimode and Anti-Resonant Hollow-Core Fibers

Recent research has advanced highly multi-mode anti-resonant hollow-core fibers, which can transmit significantly more light than traditional single-mode fibers. For example, a 24-tube anti-resonant fiber can carry approximately 50 times more light than a 7-tube fiber, enhancing capacity for high-bandwidth applications . Combining hollow-core designs with multimode capabilities allows networks to achieve both low latency and high throughput, supporting future-proof infrastructure.

Strategic Implications

By exploring hollow-core and multimode fiber technologies, Qatar positions itself at the forefront of next-generation optical networks. These fibers can support:

- o Quantum-safe communications with QKD integration
- o High-capacity data transmission for national and international backbones
- o Ultra-low latency links for financial, defense, and research applications

Qatar joins hollow-core fiber multimode

o Scalable infrastructure for data centers and submarine cables While hollow-core fiber remains expensive and specialized, Qatar's initiatives indicate a strategic move toward future-ready, high-performance networks that combine speed, security, and capacity. In summary, Qatar's engagement with advanced fiber technologies, including hollow-core and multimode fibers, reflects a national effort to modernize telecommunications, enhance digital resilience, and prepare for the demands of ultra-fast, secure, and high-capacity data networks.

A significant contributor to this imbalance in development is the general challenge of hollow core fibre fabrication. This requires the

Such a quantitative estimate is satisfactory by considering only the three lowest mode groups of the cladding tube. This

Optical fiber technology has revolutionized telecommunications, data transmission, and

A novel centro-symmetric nested antiresonant fiber (CNAF) design is proposed and investigated numerically for low-loss, multimode

Continuing growth in the volume of data traffic and the need for low latency will lead operators to deploy hollow-core

Two, multicore fiber and hollow core fiber, are both radical technologies offered to solve special problems. The third is simply

We report the fabrication and characterisation of a multi-core anti-resonant hollow core fibre with low inter-core coupling. The optical

We present a multi-mode nested anti-resonant hollow-core fiber optimized for 1550 nm operation. This fiber achieves

We investigate the design of hollow-core fibers for the delivery of 10s of kilowatt average power from multi-mode laser

At Mobile World Congress (MWC) Barcelona 2026, Yangtze Optical Fibre and Cable Joint Stock Limited Company (YOFC) unveiled

Standardization is blocked by multiple fiber designs being tried, with no clear winner

Multimode fibres transmit images via their many spatial modes, enabling endoscopes thinner than coherent fibre bundles -.

Qatar joins hollow-core fiber multimode

Multimode (MM) laser light has a vast application history spanning from laser pump sources, to high-speed optical

We report the design and fabrication of multi-mode hollow core fibers, guiding at least 50 spatial modes in the near

As a result, new optical communication systems have been inherently restricted by the loss characteristics and bandwidth of solid

The recent expansion of interest to use hollow-core fibers for telecommunications, nonlinear studies, and beam

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