

Data theft, eavesdropping from fiber!?

Technology Innovation

Apriori Network Systems LLC proposes a transformative innovation in optical fiber security that renders data transmission links physically untappable. Our technology employs patented multi-core fiber (MCF) infrastructure, integrated with optically modulated "chaff" signals transmitted through outer cores. This creates a cloaking effect that defends the central core carrying sensitive data—neutralizing any attempt at undetected physical tapping. Unlike conventional single-core fiber, our system intrinsically secures the transmission layer, complementing encryption rather than replacing it, and preventing in-transit interception altogether.

The origins of this innovation stem from a decade of internal R&D, conceptualized by founder Gary M. Weiner and refined in collaboration with leading photonics expert Advisors, Dr. Peter J. Winzer (Founder of Nubis Communications and former, Nokia Bell Labs) and Dr. Stan Lumish (former Bell Labs; CTO, JDS-Uniphase). The design targets of the fiber links emanated from meetings at Fort George Meade with an audience coalesced by The United States National Security Agency, The U.S. Department of Defense, The U.S. Dept. of Energy and several other agencies and departments.

The motivation arose from recognizing an unaddressed vulnerability: the ease with which adversaries can eavesdrop on fiber optic cables via physical tapping without detection—despite advanced encryption layers.

Apriori Network Systems launched a stealthy basement bunker of initial lab work to focus on validating critical technical challenges specific to this innovation:

- Demonstrating stable chaff modulation in outer cores without degrading the center core's transmission data fidelity.
- Assessing the signal-to-noise isolation and modal crosstalk to confirm transmission integrity.
- Validating compatibility with existing multi-core transceiver modules and integration into standard telecom environments.

The highest-risk research areas involve:

- Photonic system tuning for low-crosstalk performance at commercial speeds (100G+).
- Optical signal integrity through multiple-kilometer indoor link spans under hostile attack scenarios.

Apriori's approach is scientifically unique: photonic data protection through intrinsic photonic interference, rather than relying on algorithmic encryption or reactive detection systems, which already exist and are in commercial use, but have proven ineffective in

prevention of eavesdropping or worse, data theft without detection. This gives the Apriori Network Systems approach, a durable competitive advantage in environments where encryption alone is insufficient—such as national security, defense, enterprise networking, and financial data systems.

The Apriori Network System's privacy-over-fiber innovation introduces an entirely new category of privacy-assured-links (PALs) for optical infrastructure, positioning Apriori as a first-mover in a market increasingly exposed to high-level fiber tapping threats.

Technical Objectives and Challenges

The initial focus on proving the core scientific feasibility of Apriori's Privacy-Assured Links (PALs) system in operational environments:

1. Validate the effectiveness of outer-core optical “chaff” interference in defeating real-world fiber tapping.
2. Quantify transmission performance (BER, latency, SNR) of central-core data under multi-core modulation conditions.
3. Establish foundational system compatibility with standard multi-core fiber pluggable modules for future commercial deployment or, develop our own.

The most significant technical challenge is isolating optically generated chaff such that it cloaks the inner data stream without performance degradation or modal coupling. This includes investigating:

- Optical power balancing across cores.
- Precision in phase modulation and scattering dynamics.
- System resilience under physical manipulation simulating eavesdropping attempts.

These are high-risk, high-reward research challenges not yet solved by industry or academia. Existing approaches to fiber security rely on reactive methods—like alarmed conduits—or advanced encryption, neither of which prevents the act of tapping itself. By contrast, Apriori proposes a proactive, physics-based approach that thwarts intrusion at the transmission medium.

Apriori Network Systems is in process of moving from the groundwork stage to a manufacturing, operational stage with a scalable product, advancing secure optical communications where confidentiality, integrity, and availability cannot be compromised.

Market Opportunity

Apriori's near-term commercial focus targets internet service providers (ISPs) and telecom carriers provisioning connectivity into multi-tenant office buildings—a highly vulnerable environment where in-building fiber is most exposed to insider threats or third-party contractors. These unmonitored spans are frequently targeted by sophisticated adversaries

for corporate espionage or state-level intrusion.

Our primary customer profile includes service providers, government agencies, and enterprise security officers responsible for safeguarding sensitive data in transit. Their pain point is the inability to prevent physical fiber tapping using existing solutions, which only alert after a breach or depend solely on encryption.

Apriori's Privacy-Assured Link (PAL) addresses this gap with a plug-and-play, intrinsically secure fiber solution that integrates into existing infrastructure and actively prevents undetectable interception. By providing ISPs with a secure upsell offering, our solution also opens recurring revenue opportunities in regulated sectors where data protection mandates are intensifying.

Company and Team

Apriori Network Systems LLC is a privately funded small business headquartered in Bedminster, NJ. They are pioneering the development of physically untappable fiber-optic data links using multi-core fiber and patented optical chaff technologies. Their approach delivers a new class of physical-layer defense that complements, rather than competes with, encryption.

Founder Gary M. Weiner has a track record of successful telecom ventures. He leads all IP development, strategic commercialization, and customer engagement. Recognizing the critical need for technical validation, Mr. Weiner engaged two globally respected experts, in an Advisory capacity, to refine Apriori's system:

- Dr. Peter J. Winzer, former Global Head of Advanced Fiber Optical Transmission R&D at Nokia Bell Labs, brings deep insight into high-capacity fiber-optic systems.
- Dr. Stan Lumish, former JDSU CTO and Bell Labs Fellow, advises on photonic architecture and defense applications, from his experience working in the U.S. Dept of Defense.

Together, they form a cross-functional leadership team with commercial, technical, and regulatory expertise. Apriori holds 7 issued patents in the U.S., with additional patents already issued in EU, Japan, and China, with 10+ pending worldwide. The company is now preparing to field-test its PAL solution in a major U.S. market, targeting early deployments through a service-provider consignment model.

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