

NuCrypt

Securing Optical Communication Networks

Physical-Layer Encryption for Optical Communications

NuCrypt provides technology for ultrahigh security over optical communication networks. We use the inherent noise in light to enhance the best state-of-the-art encryption technology while remaining compatible with conventional optical infrastructure.

Who We Are

NuCrypt employs a team of highly skilled scientists and engineers who have developed a system that reliably provides ultrahigh security for data transmission over long distances. The team includes researchers who demonstrated the first such systems at Northwestern University.

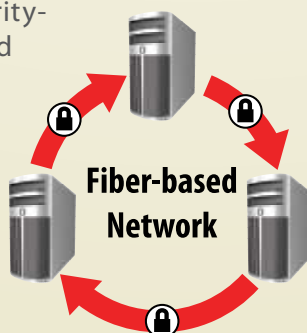
NuCrypt has a strong heritage in optical communication systems and received funding from the Department of Defense.

Four SBIR grants have reached phase two.

What Problem We Solve

Ultrahigh security is a critical issue in military and corporate communications. But to be deployed, it must come at a reasonable cost and convenience. NuCrypt's **AlphaEta™** uses commercially available off-the-shelf components and is compatible with traditional optical infrastructure. It operates at high data rates, making it the first practical, physics-based ultrahigh security optical encryption technology on the market.

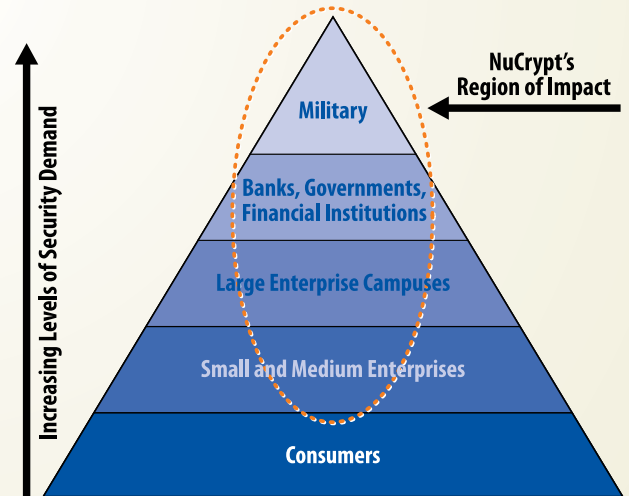
- The bandwidth explosion has led to a corresponding growth in the transmission of sensitive information, such as financial, medical and legal records, as well as homeland security and first responder communications.
- Since traditional encryption schemes are not provably secure, there is a continued need to utilize every possible tool to enhance the secrecy of critical communications.
- Effective security is usually built in layers. Therefore, multiple layers of security-oriented technologies are required to thwart the many possible types of attacks.
- New physics-based methods for the first time allow quantifiable security characteristics and, thus, are a better method of security.



Secured
Free Space Link



NuCrypt's Entry Strategy Top Down



How We Solve It

We build systems for securing the physical layer of optical communication networks. **AlphaEta™** interfaces between the transmitter or receiver and the optical channel and makes the transmitted message difficult to eavesdrop on. **AlphaEta™** works by adding optical noise to the encryption process.

- NuCrypt security is built using standard optical communication components so it is compatible with current long haul infrastructure. Users can deploy it without investing in additional equipment or leasing new lines. End-to-end security is available without significant investment.
- Our technology can be deployed over conventional fiber-optic infrastructure as well as in emerging wireless optical networks.
- The significantly high cost of the new equipment required to tap into data protected by this system deters eavesdropping.
- Data is protected by the best security paradigm on the horizon.

Management Team:

Prem Kumar, Ph.D.

AT&T Professor of Information Technology in the Department of Electrical Engineering and Computer Science and Director of the Center for Photonic Communication and Computing at Northwestern University; co-founded NuCrypt following successful demonstration of the AlphaEta™ technology at the Center.

V. Srikant, Ph.D.

A business technologist with experience in product and market development. At Corning, Inc., he commercialized various optics and photonics products. He holds approximately 40 patents.

Gregory Kanter, Ph.D.

Director of product development, has a Ph.D. in electrical engineering from Northwestern University. He has experience in high-speed electronic signal processing in optical communication systems and has researched optical regeneration, quantum optics, and the use of quantum noise in secure communications. He has several publications and three patents pending.



How It Works

We use novel physics-based methods that exploit the fundamental graininess of light, adding optical noise to bolster state-of-the-art encryption technology.

- Optical noise by nature is random. Random numbers often are used in cryptography to enhance security. **AlphaEta™** automatically generates randomness every single data bit. This randomness is combined with the best-known traditional encryption algorithms to help shield the encrypted communication from observation by the attackers.
- NuCrypt's **AlphaEta™** security system can be deployed over both fiber-optic (wireline) and free space optical (wireless) networks. Because the system works with a variety of platforms, security among all communication links is assured.

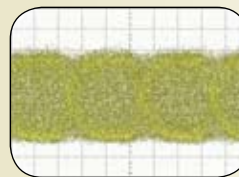
Current State of Encryption

- Encryption uses mathematical algorithms to 'scramble' a digital signal.
- Security is built on 'layers' – layers should have independent security models.
- Encryption on all layers (from application to physical layer) is currently similar.

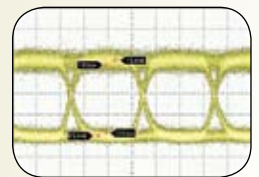
Enter AlphaEta™, a New Security Paradigm

- Physics-based encryption with a qualitatively different security model.
- **AlphaEta™** encryption exploits unavoidable optical quantum noise to improve security.
- Combines the best current algorithms with quantum noise to enhance security.
 - Adds high-speed randomization and physical measurement burden.
- Compatible with current optical infrastructure.
 - Uses commercially available off-the-shelf components.

Encrypted Eye



Decrypted Eye



NuCrypt

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