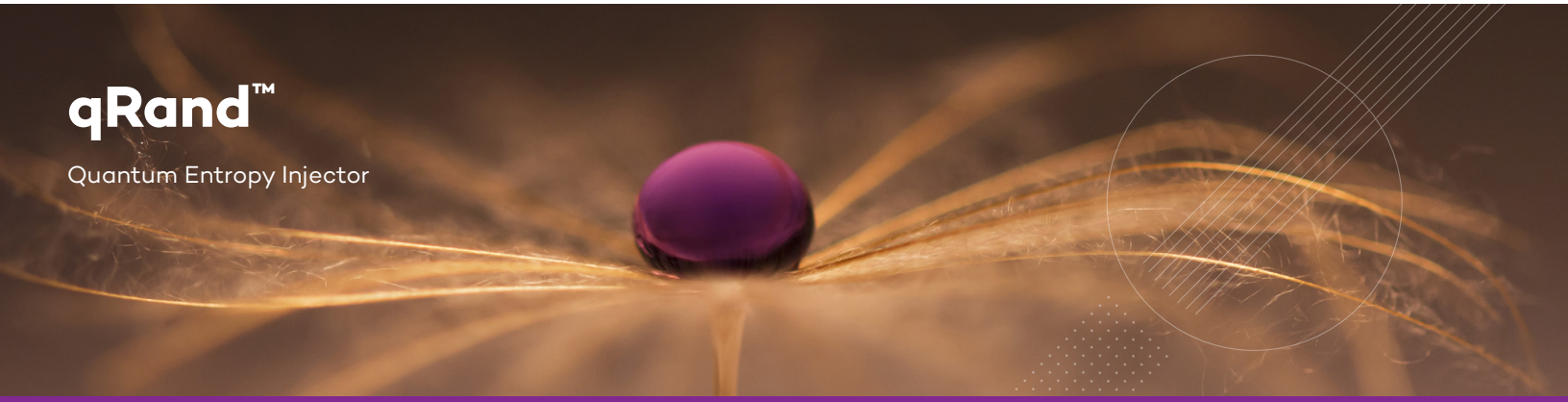
Quintessence Labs

qRand™

Quantum Entropy Injector



Feeds quantum random numbers to the entropy pool of a computer

Prevents issues when /dev/random blocks due to insufficient entropy

Ensures applications always have sufficient entropy, even in virtual environments

Overview

qRand augments a computer's entropy pool with full entropy random bits, solving the problem of "entropy starvation". This prevents performance degradation of applications using entropy, or the security compromise of using low entropy pseudo-randomness.

The Challenge of Entropy Limitations

qRand solves the problem of "entropy starvation", by augmenting a computer's entropy pool when it falls below a lower bound.

Entropy starvation is a major concern, especially in environments using virtual machines, including in cloud infrastructure. It degrades performance, with applications failing to respond due a lack of randomness for cryptographic operations. Equally worrisome is the fact that many applications use a "non-blocking" source of pseudo randomness to overcome this first issue. This can compromise security, resulting in vulnerabilities, including duplicate cryptographic keys.

RNG in Linux

Any process that needs random numbers can get them from /dev/random. However, /dev/random will only return random numbers if there is enough entropy available. If not, /dev/random simply blocks resulting in performance degradation. Many applications remedy this using "non-blocking" sources of randomness such as /dev/urandom. This degrades security, resulting in potential vulnerabilities such as duplicated cryptographic keys. Other Linux packages that provide random numbers like "rngd" and "haveged" can also result in entropy dilution if insufficient entropy is available, with the potential for security risks.

This is particularly challenging in environments where normal entropy gathering does not yield enough entropy, for example in VMs or embedded devices.

qRand can address these issues by feeding entropy into the entropy-pool of a computer. The entropy provided is delivered from QuintessenceLabs qStream QRNG.

How qRand Works

qRand monitors entropy status on a computer, and when it falls below a defined lower bound, augments it with entropy from the qStream Quantum Random Number Generator. This enables applications on the computer to generate and use high quality cryptographic keys without any changes to the application itself.

Users can configure the behavior of qRand in several ways, such as setting the lower limit of the entropy status, the order of qCrypt devices from which to get entropy, and logging options.

qStream

qStream uses groundbreaking quantum technology to deliver random numbers with full-entropy at 1 Gbit/s. qStream is available as a stand alone appliance, or as part of the qCrypt product suite.

SPECIFICATIONS

qRand™

Quantum-Powered True Randomness

Key Features	• Linux daemon, running as a native system service, that monitors entropy status in system • When entropy levels fall below lower limit, qRand retrieves entropy from qStream • User configurable
User settings	• Lower bound of entropy (in bits) • Entropy fill watermark (in bits) • Enable/disable use of deterministic entropy sources • Naming of random objects • Enable/disable audit logging; log verbosity level
Supported OS	• Ubuntu (64-bit) 16.04, 18.04 • RHEL (64-bit) 6.10, 6.9, 7.5, 7.6 • CentOS 6.10, 7.6 • Support for more Linux distributions planned
qStream	• Quantum random number generator delivering 100% entropy • 8 Gbit/s quantum entropy source, 1Gbit/s conditioned entropy • Meets all requirements of NIST SP 800-90A, 90B and 90C (draft) standards for Non-Deterministic Random Bit Generators • Refer to qStream documentation for more details

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