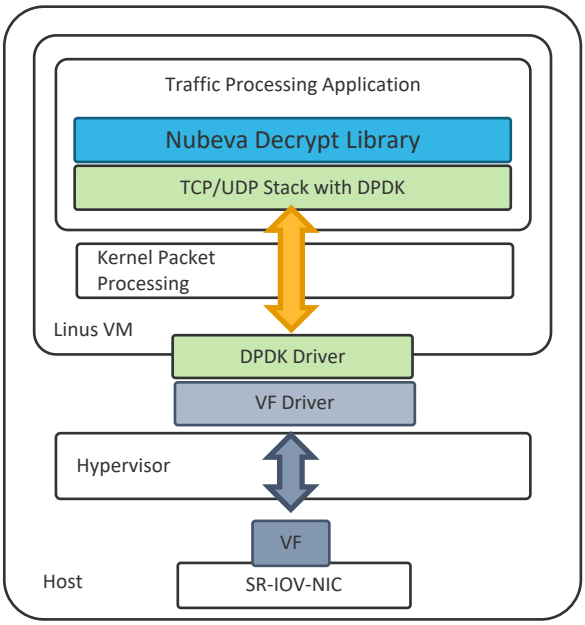
SKI Decrypt Library

Nubeva's Decryption Library supports high speed TLS 1.3 and TLS 1.2 PFS decryption using final session encryption secrets extracted by Nubeva Discovery Sensors or other source able to obtain TLS master keys to decrypt.

Product Overview

The decryption library is a static C library designed to provide high decryption throughput of TLS records. The library receives TCP payloads from the data path and operates independently of packet acceleration custom architectures.

Application Layer
Session Sub-Layer (TLS)
Transport Layer (TCP/UDP)
Network Layer (IP)
Data Link Layer
Physical Layer



SR-IOV hypervisor bypass
DPDK VM Kernel Bypass

Product Applications

Inline Systems	Passive Systems	5G and Service Mesh
Enables inline security systems such as Firewalls, IPS's, Proxies, Secure Web Gateways, SD-WAN and DLP systems with low-latency, line-rate decryption	Enables out-of-band, monitoring systems such as IDS's, NDR's, and Application Performance Monitoring systems to "see" into PFS traffic at scale.	Enables 360-degree container traffic inspection in 5G packet cores, Service-Mesh and general Kubernetes environments with micro resource load and impact

- For appliances (physical and virtual) and embedded services
- For datacenter, cloud, and hybrid

Performance

The decryption library is designed to work seamlessly with high throughput packet processing configurations, including NICs, SRI-OV, and customized packet processing using DPDK. The library supports TLS 1.2, TLS 1.2 PFS, and TLS 1.3 ciphers. The library provides high decryption throughput at 80% of an OpenSSL speed test. The following table shows decryption throughput in Gbps on an AWS m4.xlarge AWS Linux 2, with an Intel(R) Xeon(R) CPU E5-2686 v4 @ 2.30GHz, with AES-NI support enabled. Throughput is shown for a single thread. Multi threading enables 40G, 100G and higher throughput.

Cipher	Block Size	Decrypt Gbps
AES-1280-GCM Mac=AEAD	1024	13.95
AES-258-GCM Mac=AEAD	1024	11.12
CHACHA20-POLY1305	1024	5.86

Cipher	Block Size	Decrypt Gbps
AES-128-CBC-HMAC=SHA1	1024	4.01
AES-128-CBC-HMAC=SHA256	1024	2.04
AES-256-CBC-HMAC=SHA1	1024	3.80
AES-256-CBC-HMAC=SHA256	1024	1.97

Supported Ciphers

TLS 1.3
TLS_AES_256_GCM_SHA384
TLS_CHACHA20_POLY1305_SHA256
TLS_AES_128_GCM_SHA256
TLS 1.2
ECDHE-ECDSA-AES256-GCM-SHA384
ECDHE-RSA-AES256-GCM-SHA384
DHE-RSA-AES256-GCM-SHA384
ECDHE-ECDSA-CHACHA20-POLY1305
ECDHE-RSA-CHACHA20-POLY1305
DHE-RSA-CHACHA20-POLY1305
ECDHE-ECDSA-AES128-GCM-SHA256
ECDHE-RSA-AES128-GCM-SHA256
DHE-RSA-AES128-GCM-SHA256
ECDHE-ECDSA-AES256-SHA384
ECDHE-RSA-AES256-SHA384
DHE-RSA-AES256-SHA256
ECDHE-ECDSA-AES128-SHA256
ECDHE-RSA-AES128-SHA256
DHE-RSA-AES128-SHA256
AES256-GCM-SHA384
AES128-GCM-SHA256
AES256-SHA256
AES128-SHA256
ECDHE-PSK-CHACHA20-POLY1305
RSA-PSK-AES256-GCM-SHA384
ECDHE-PSK-CHACHA20-POLY1305
RSA-PSK-AES256-GCM-SHA384
DHE-PSK-AES256-GCM-SHA384
RSA-PSK-CHACHA20-POLY1305
DHE-PSK-CHACHA20-POLY1305
RSA-PSK-AES128-GCM-SHA256
DHE-PSK-AES128-GCM-SHA256
ECDHE-ECDSA-AES256-SHA
ECDHE-RSA-AES256-SHA
ECDHE-ECDSA-AES128-SHA
ECDHE-RSA-AES128-SHA
ECDHE-RSA-AES256-SHA384

TLS Parsing and Decryption

The underlying packet processing system need not be aware of TLS records, or perform any TLS parsing operations. The underlying packet processing system should perform standard TCP layer termination and re-assembly and eliminate packet deduplication that could occur if traffic is tapped at multiple points. The Decryption library parses and decrypts all possible TLS encapsulations in TCP payloads containing:

- a single complete TLS record
- multiple TLS records:
- one or more TLS records followed by the first fragment of the next TLS record
- a fragment of a TLS record which is not the last fragment
- the last fragment of a TLS record and one or more TLS records

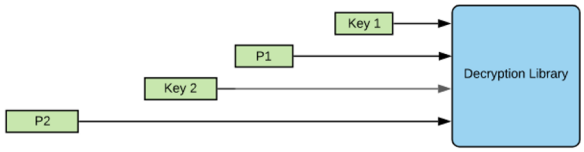
Lost Frame Recovery

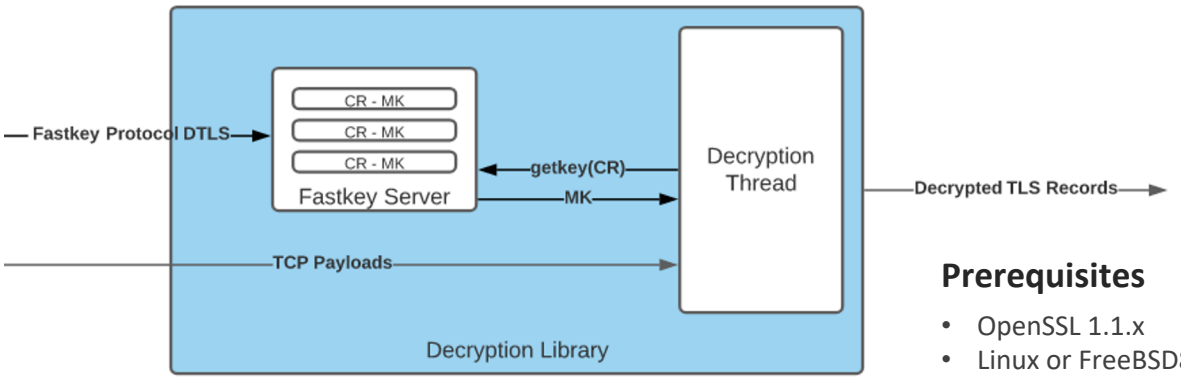
The decryption library attempts to continue decrypting a TLS session when TCP packets containing TLS records or TLS record fragments are lost. Recovery is supported for TLS 1.3 AES_128_GSM, TLS 1.3 AES_256_GSM, TLS 1.2 AES_128_GSM, and TLS 1.2 AES_256_GSM ciphers.

FastSKI™ Delivery Protocol

Nubeva Sensors send session master secrets 200µs after the secrets are created, and 500µs before the first encrypted application data is received.

The Key Server receives and buffers these keys until they are requested for decryption. The use of the Key Server is optional and can be enabled or disabled when the decryption library is initialized. If users choose to manage keys independently, they should provide the library with a key-lookup function to the Decryption Library.





Prerequisites

- OpenSSL 1.1.x
- Linux or FreeBSD8

Core Benefits

- Decrypt more traffic without complicating architecture or compromising security
- Execute with high performance by eliminating latency and throughput issues
- Reduce operational inefficiencies for you users with no more certificate and exception management
- Eliminate current limitations in your product suite to speed adoption
- Lead the way to competitive advantage with better functionality, ease, price performance and a solution for universal use

SKI (Session Key Intercept) – Product Suite:

The SKI Decryption library is a key component in the Nubeva Session Key Intercept solution architecture for the decryption of modern TLS, enabling deep packet inspection for inline and passive applications. SKI's model is to learn and capture TLS session secret keys from TLS clients or servers in real-time, using next-generation agents and containers (Nubeva SKI Sensors). Then to security and quickly forward them to inspection systems for decryption. SKI offers an alternative to the legacy methods of man-in-the-middle, proxy termination, and passive decryption offering superior capability, price/performance, and simplicity.