DPDK
DATA PLANE DEVELOPMENT KIT

THE LINUX FOUNDATION

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协办方： SDNLAB 专注网络创新技术

视频支持方： IT大咖说

Accelerating the FD.IO/VPP Crypto Workload with the DPDK Cryptodev Framework

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Agenda

- Problem Statement
- DPDK Cryptodev Framework Introduction
- Enable DPDK Cryptodev Framework in VPP
- Performance
- Future work
- Conclusion

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Think about security at every step of the process: architecture, implementation, testing, documentation, distribution and deployment

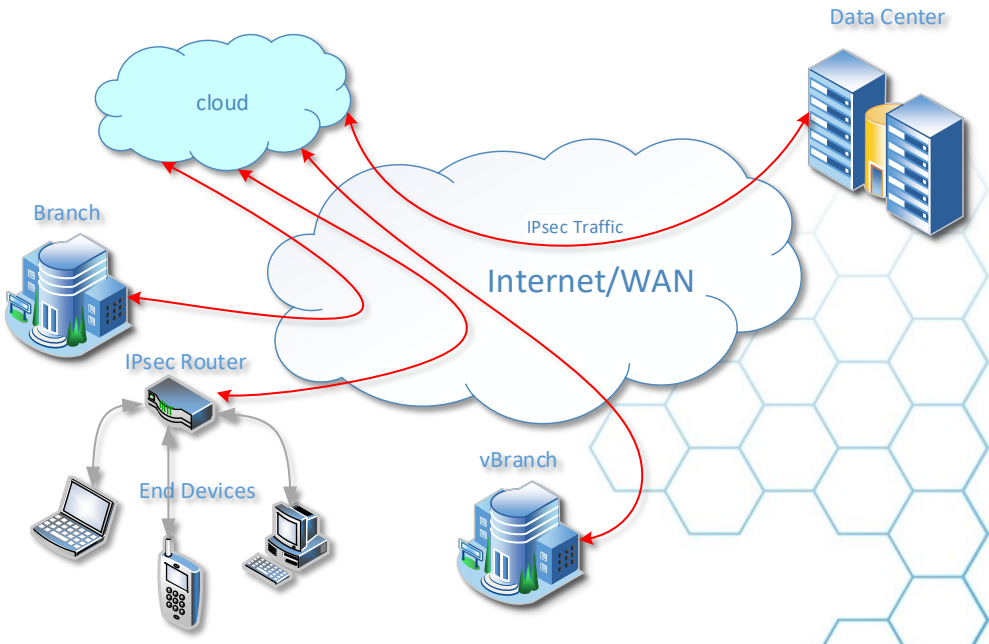
- *Dr. Nicko van Someren, CTO, Linux Foundation*

With VPP, a single core can do 40G, 100G or even higher throughput L2 forwarding

But what is the throughput after adding security protection?

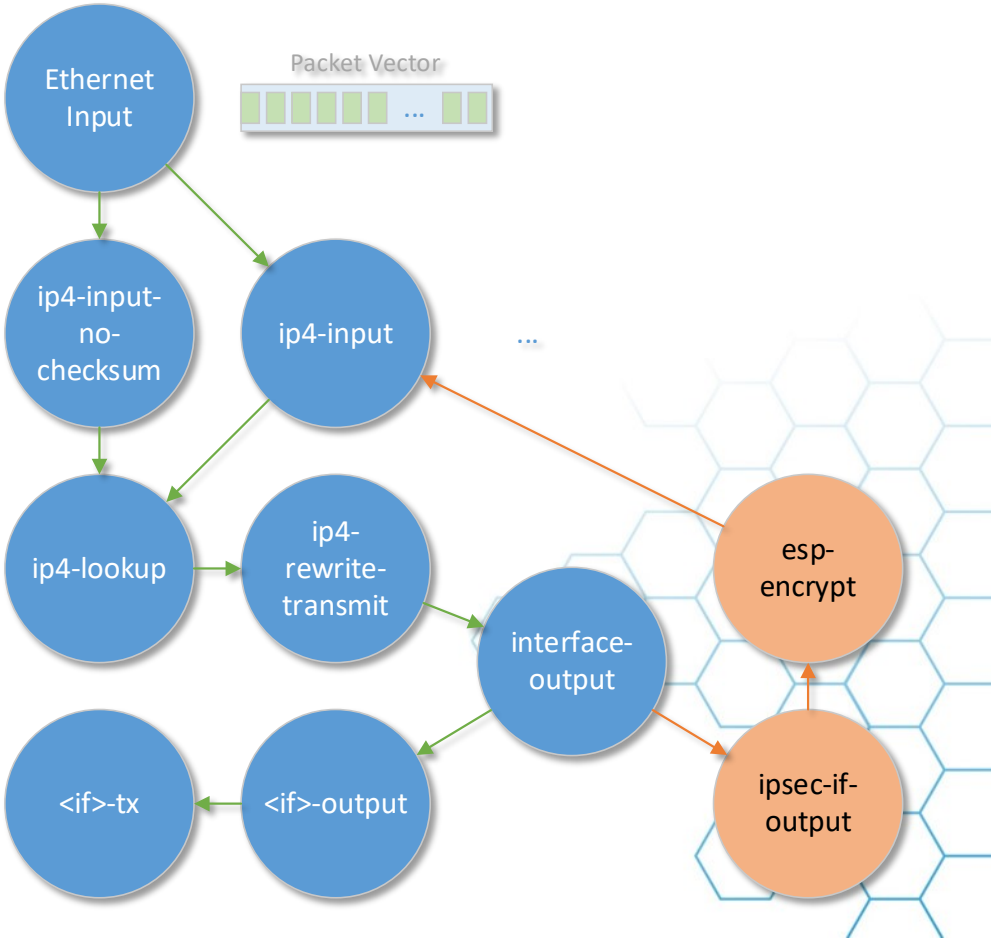
Let's take IPSec as an example

- > 20 years old but is still extremely popular
- Playing the role of security guardian in many network applications
- Requires lots of computations including crypto
- When traffic rate is high, efficient crypto implementation becomes necessary

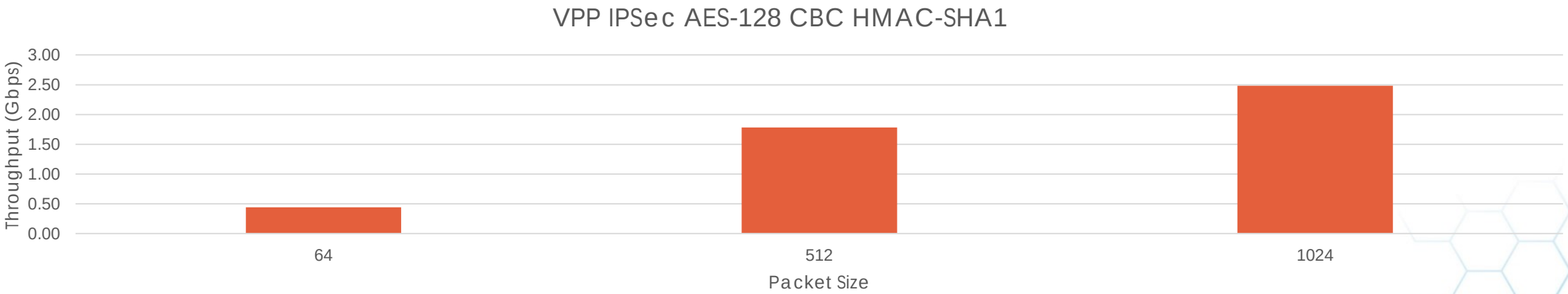


FD.io / VPP IPSec

- Supports IPv4/IPv6 IPSec ESP, tunnel/transport mode, and SA management
- DPDK EthDev integrated
- For crypto it uses OpenSSL by default
- Performance?



FD.io/VPP IPSec with OpenSSL as Crypto Performance§



- Does Securing the Network Application have to degrade performance?
- **Not Really**

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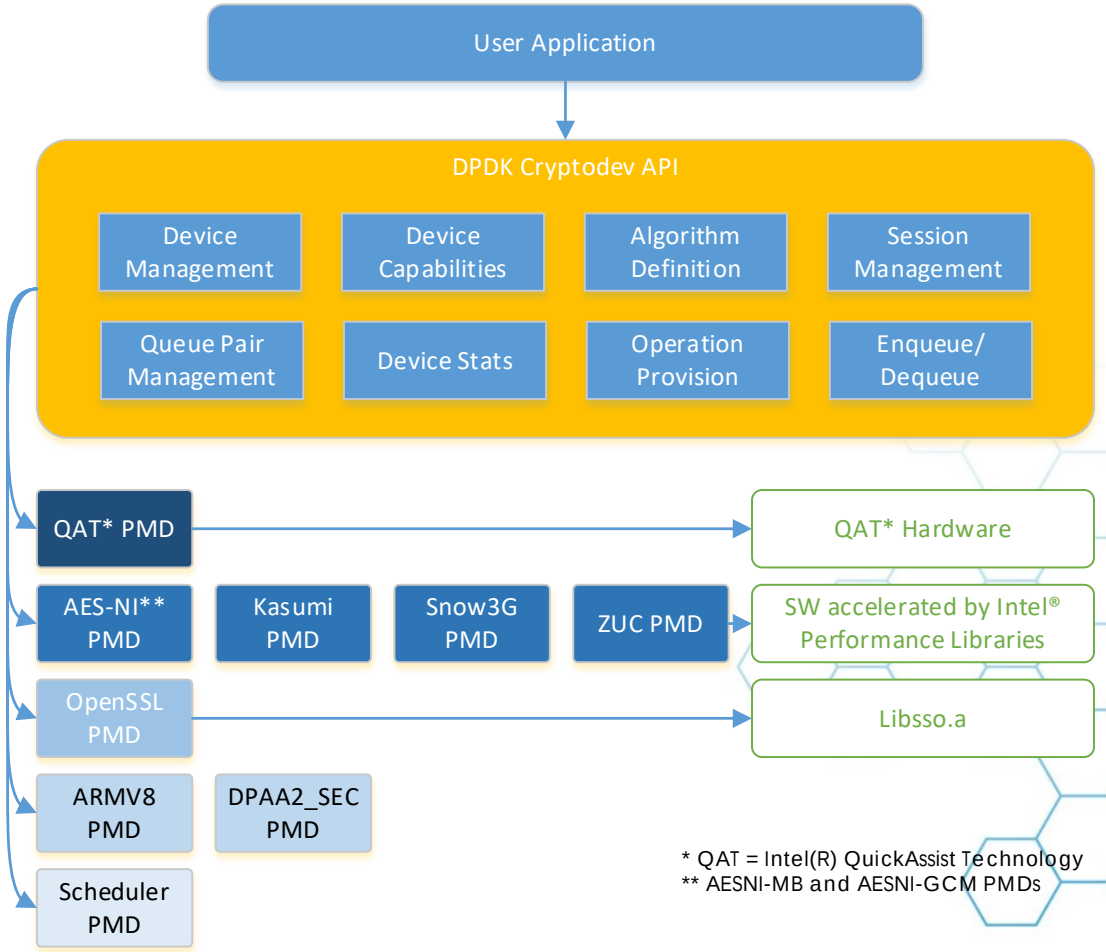
DPDK Cryptodev Framework

- Crypto framework for processing symmetric crypto workloads in DPDK.
- DPDK Cryptodev consists of:
  - SW and HW Crypto PMDs
  - A standard API supports all PMDs
  - Multi-queues for multi-thread sharing
- Effortless migration (SW-HW, PHY-VIRT)
- Asynchronous enqueue/dequeue



Supported Algorithms In Cryptodev

Cipher Algorithms	Hash Algorithms	AEAD Algorithms
• *AES CBC/CTR 128/192/256 bit* • *Snow3G (UEA2)* • *KASUMI F8,* • *ZUC EEA3* • *AES_CFB* • *NULL*	• *MD5_HMAC** • *SHA1/224*/256/384*/512,* • *AES XCBC,* • *Snow3G UIA2,* • *KASUMI F9,* • *ZUC EIA3,* • *NULL*	• *AES GCM 128/192**/256 bit*

* QAT = Intel(R) QuickAssist Technology
** AESNI-MB and AESNI-GCM PMDs

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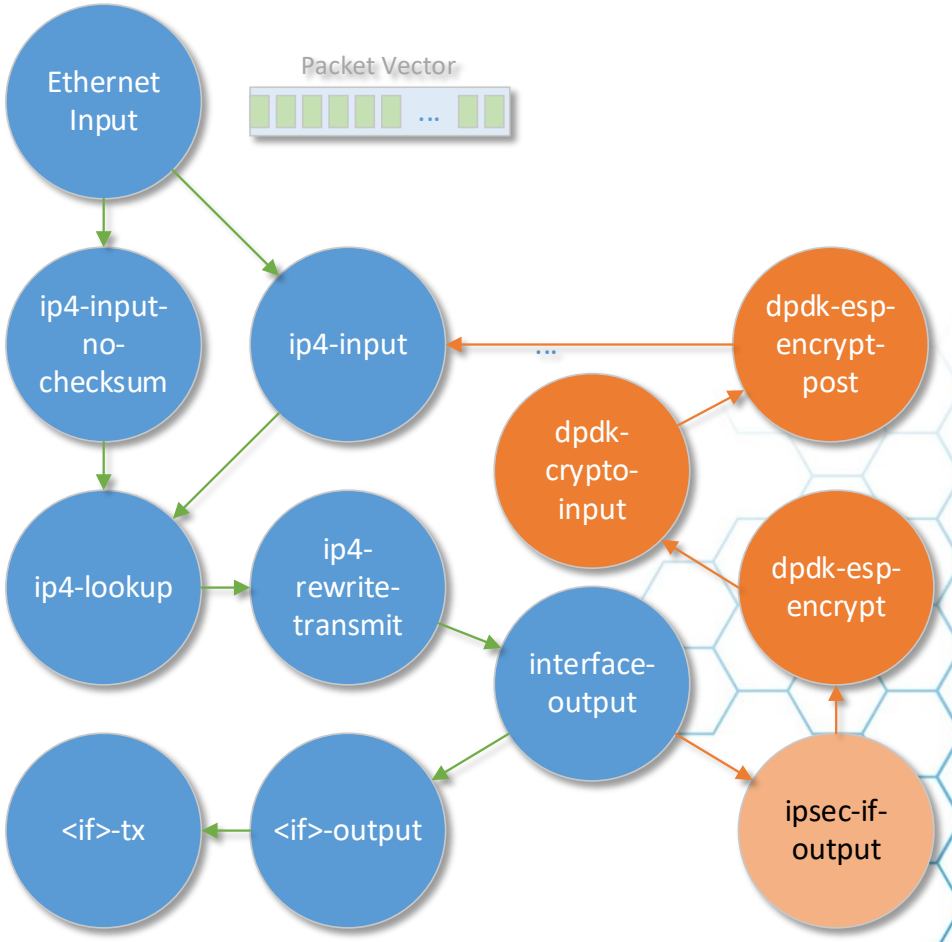
Enable DPDK Cryptodev in VPP IPSec

- Replaced 2 nodes:
  - esp-encrypt → dpdk-esp-encrypt
  - esp-decrypt → dpdk-esp-decrypt
- Added 3 nodes:
  - dpdk-crypto-input
  - dpdk-esp-encrypt-post
  - dpdk-esp-decrypt-post



VPP Configuration for DPDK Cryptodev

- Environmental option:
  - For software PMD:

  vpp_use_dpdk_cryptodev_sw=yes
- User only needs to provide Cryptodevs in startup.conf file
- Allocate crypto resources on best effort approach
- No special IPSec configuration is required
- More information can be found here

Sample Configuration:

```
dpdk {
  …
  #HW PMDs
  enable-cryptodev
  dev 0000:85:01.0
  dev 0000:85:01.1
  #SW PMDs
  vdev cryptodev_aesni_mb_pmd0,socket_id=1
  vdev cryptodev_aesni_mb_pmd1,socket_id=1
}
```

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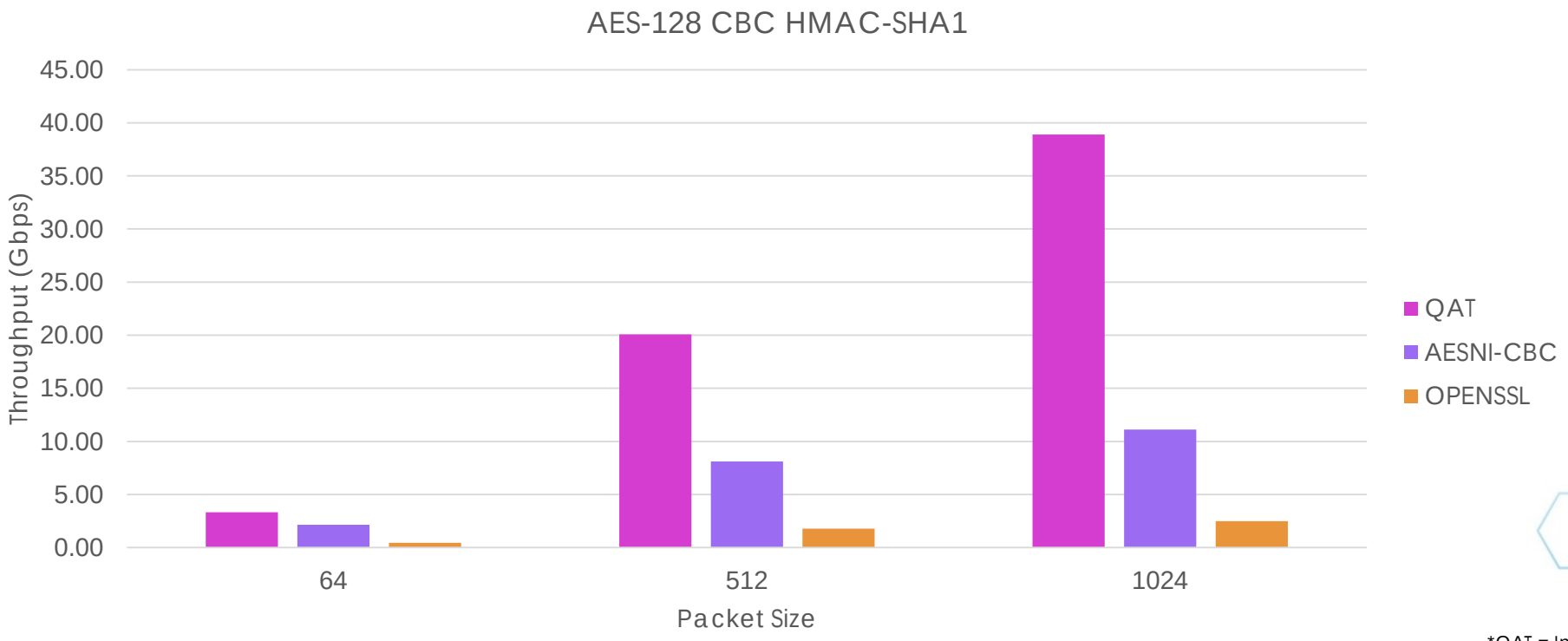
Performance§ from VPP IPSec



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Future Work

- DPDK Cryptodev Optimization
- Enable DPDK Cryptodev Framework in VPP IKEv2.
- VPP IPSec Performance Tuning
- Enable DPDK Cryptodev Scheduler PMD to increase crypto workload processing capability per-worker thread
- Virtio-Crypto Enabling

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Summary

- Achieved VPP IPSec Performance boost by enabling DPDK Cryptodev Framework
- QAT hardware accelerated VPP IPSec has more performance boost than the software alternative
- Seamlessly integrated into VPP, easy to enable and configure, no extra IPSec configuration is required
- Migration between Software and Hardware, Physical and Virtual, is effortless

Acknowledgement

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Q&A

Thanks!!

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