


Université Libre de Bruxelles

# Implementation of High-Level Cryptographic Protocols using a SoC platform

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# Contents

# Objectives

- Real life use cases.
- Decrease CPU load.
- Improve performance.

# Cryptographic protocols

## VPN

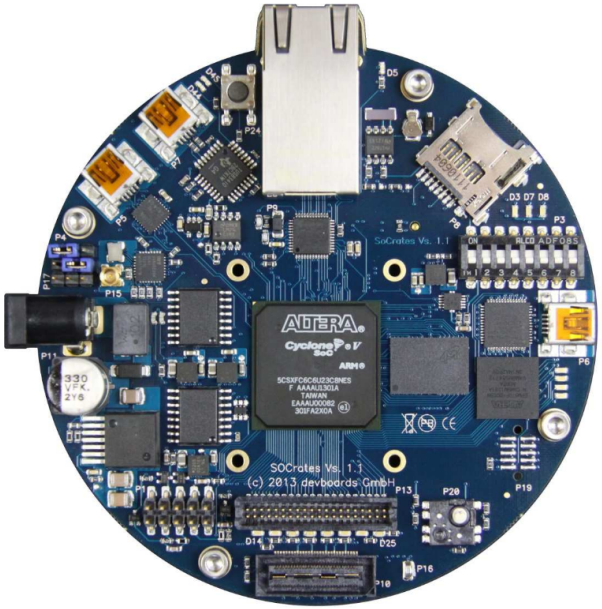
- TLS
- IPsec

## Schemes

- AES
- SHA-2
- Diffie-Hellman
- RSA

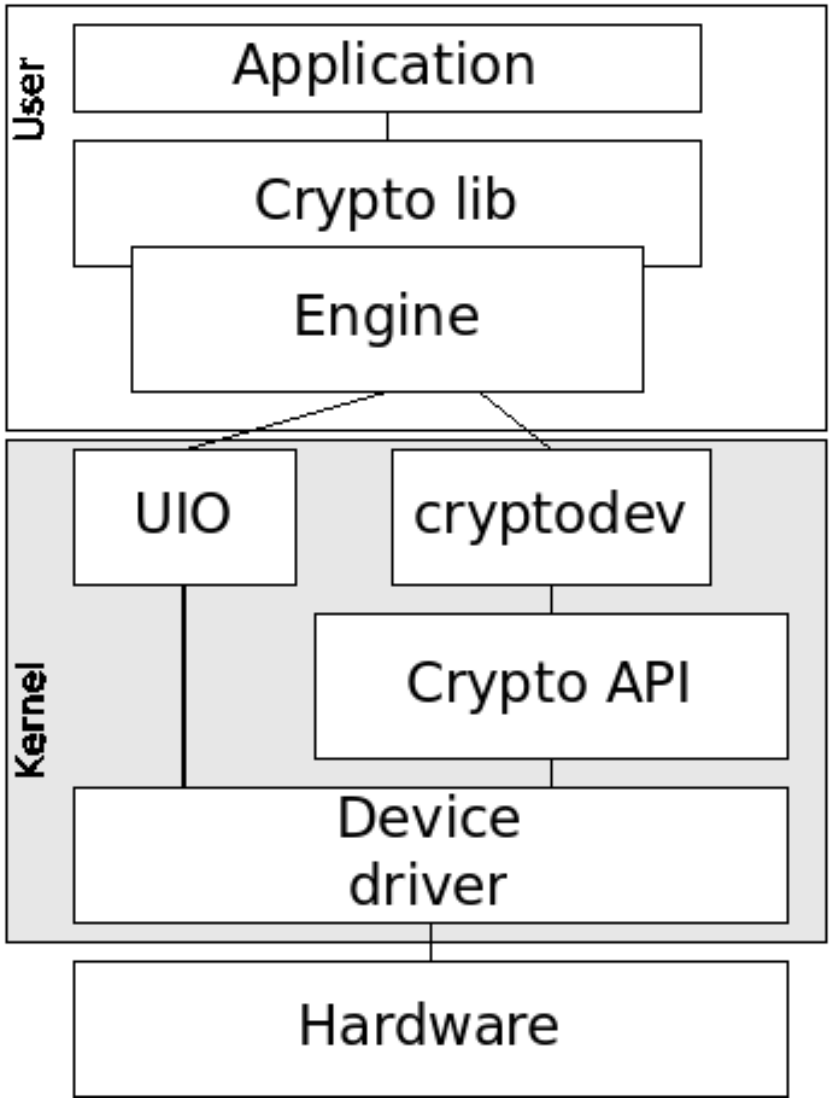
# Contents

# SoCrates

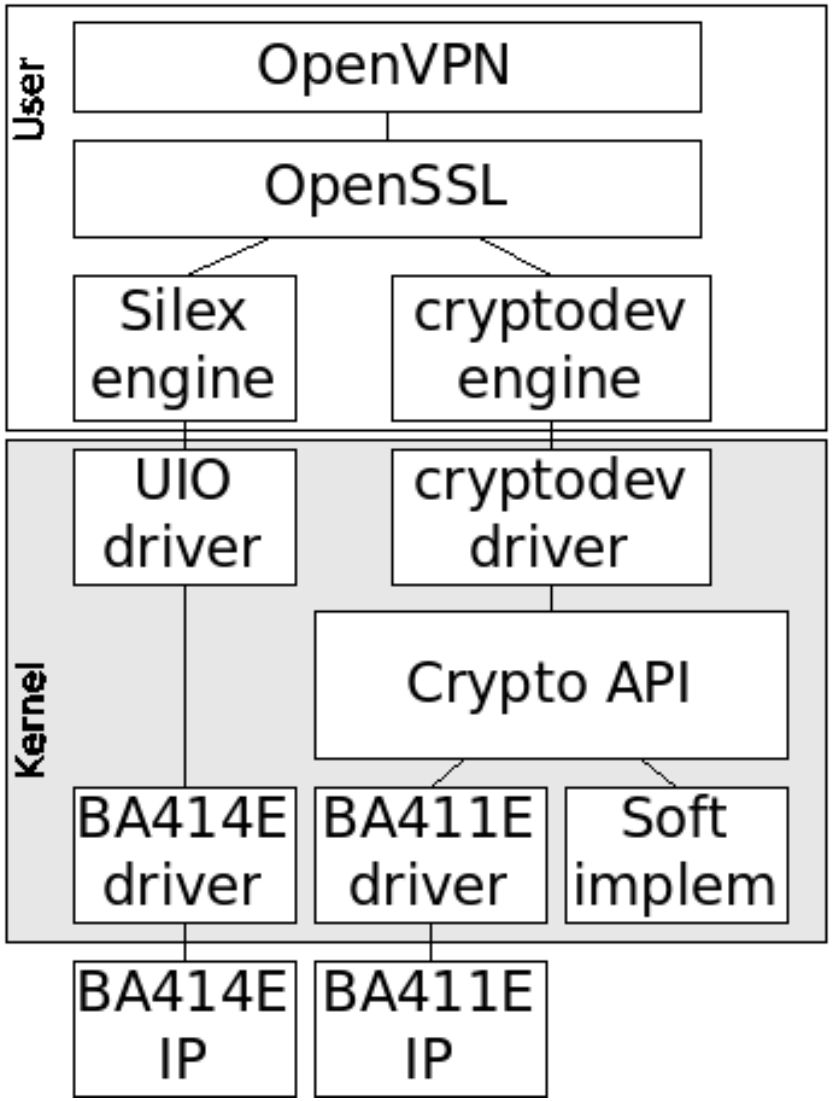



- Dual core ARM Cortex A9 @ 800MHz
- Altera Cyclone V
- Gigabit Ethernet

# Linux structure

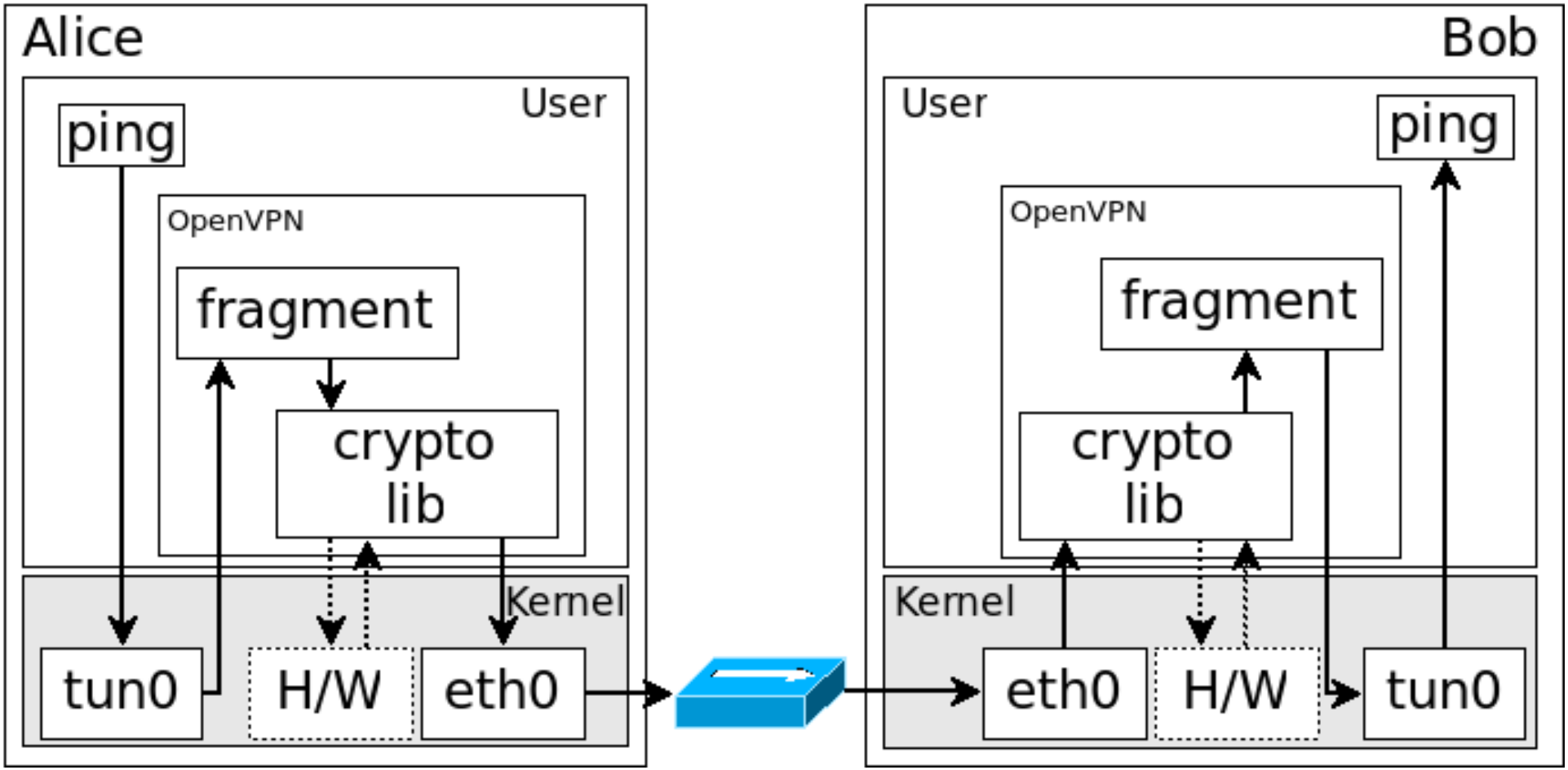


# Linux structure (Cont'd)

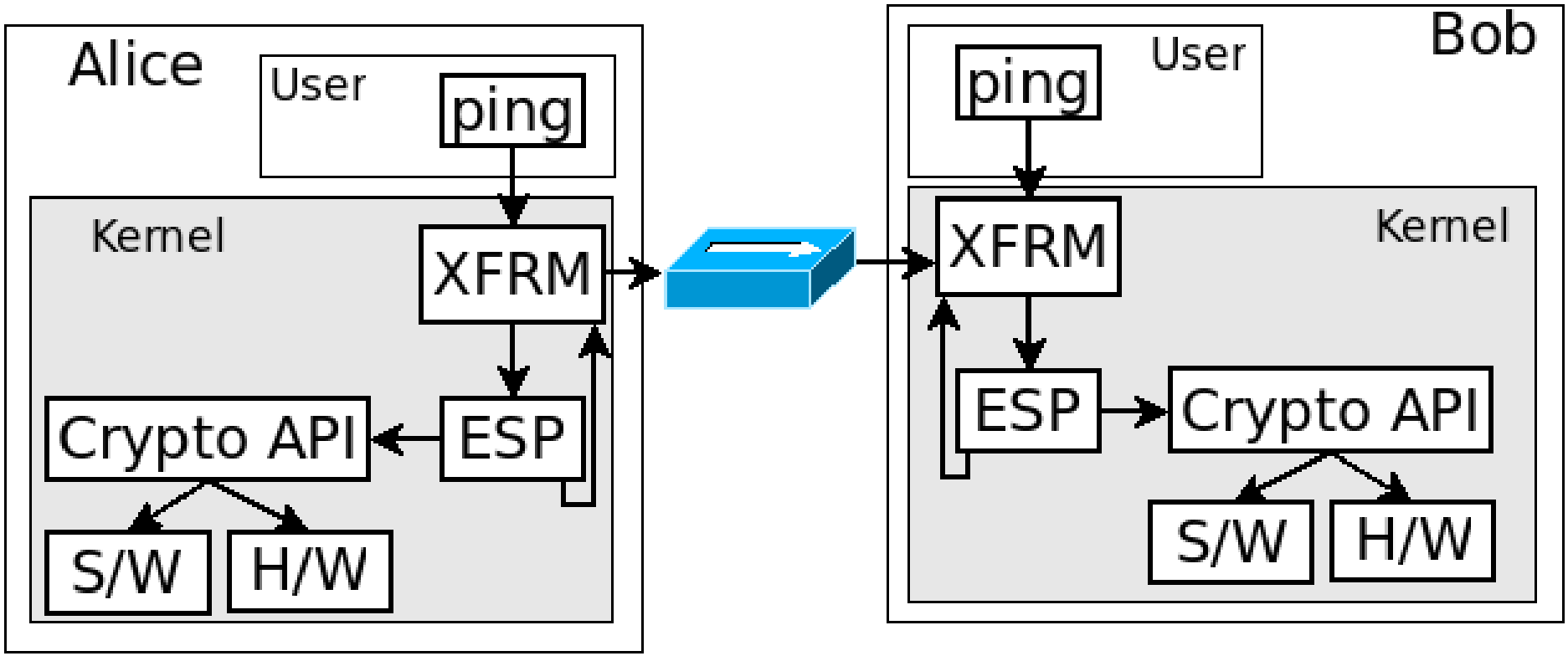


# Contents

# OpenVPN

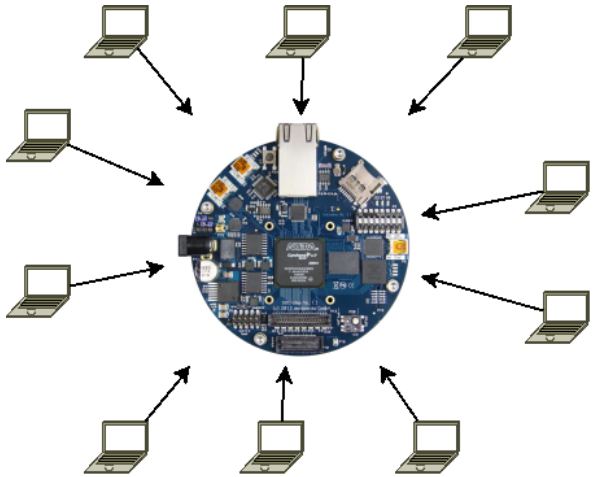

Alice
User
ping
OpenVPN
fragment
crypto
lib
Kernel
tun0
H/W
eth0
Bob
User
ping
OpenVPN
fragment
crypto
lib
Kernel
eth0
H/W
tun0

# IPsec


Alice
User
ping
Kernel
XFRM
Crypto API
ESP
S/W
H/W
Bob
User
ping
Kernel
XFRM
ESP
Crypto API
S/W
H/W

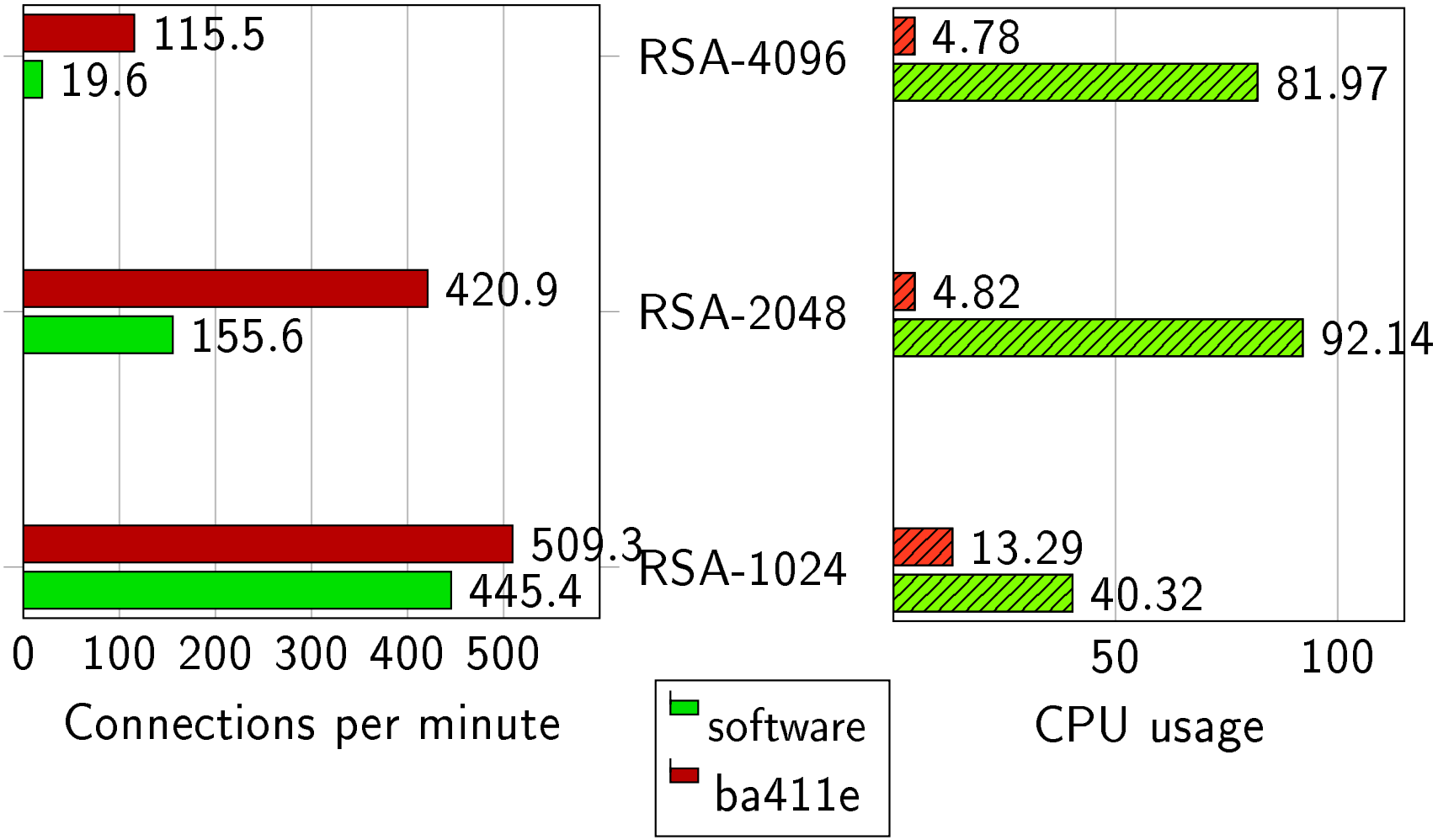
# Contents

# TLS connections – Context

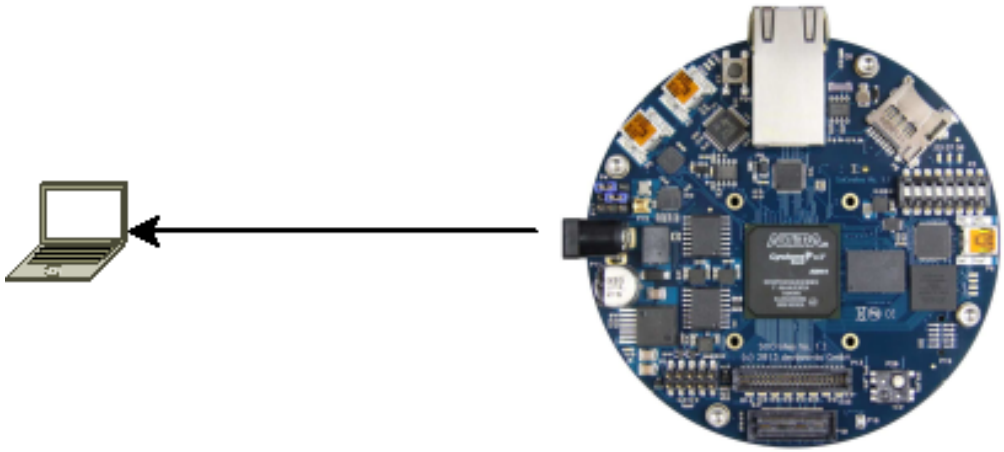


- 1 server, 10 clients
- 1-second connections
- RSA-1024/2048/4096
- OpenVPN

# TLS connections – OpenVPN

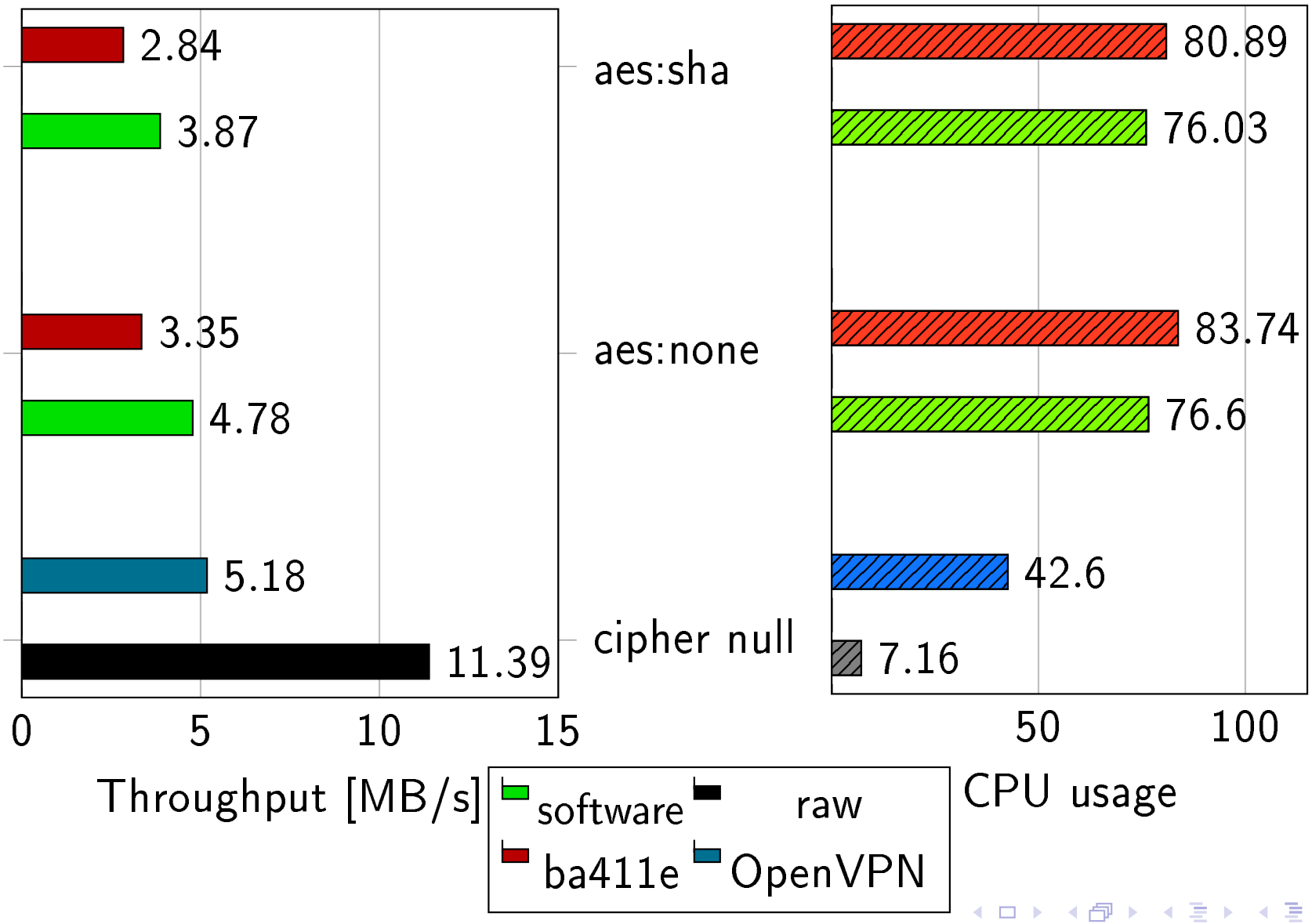


# File transfer – Context

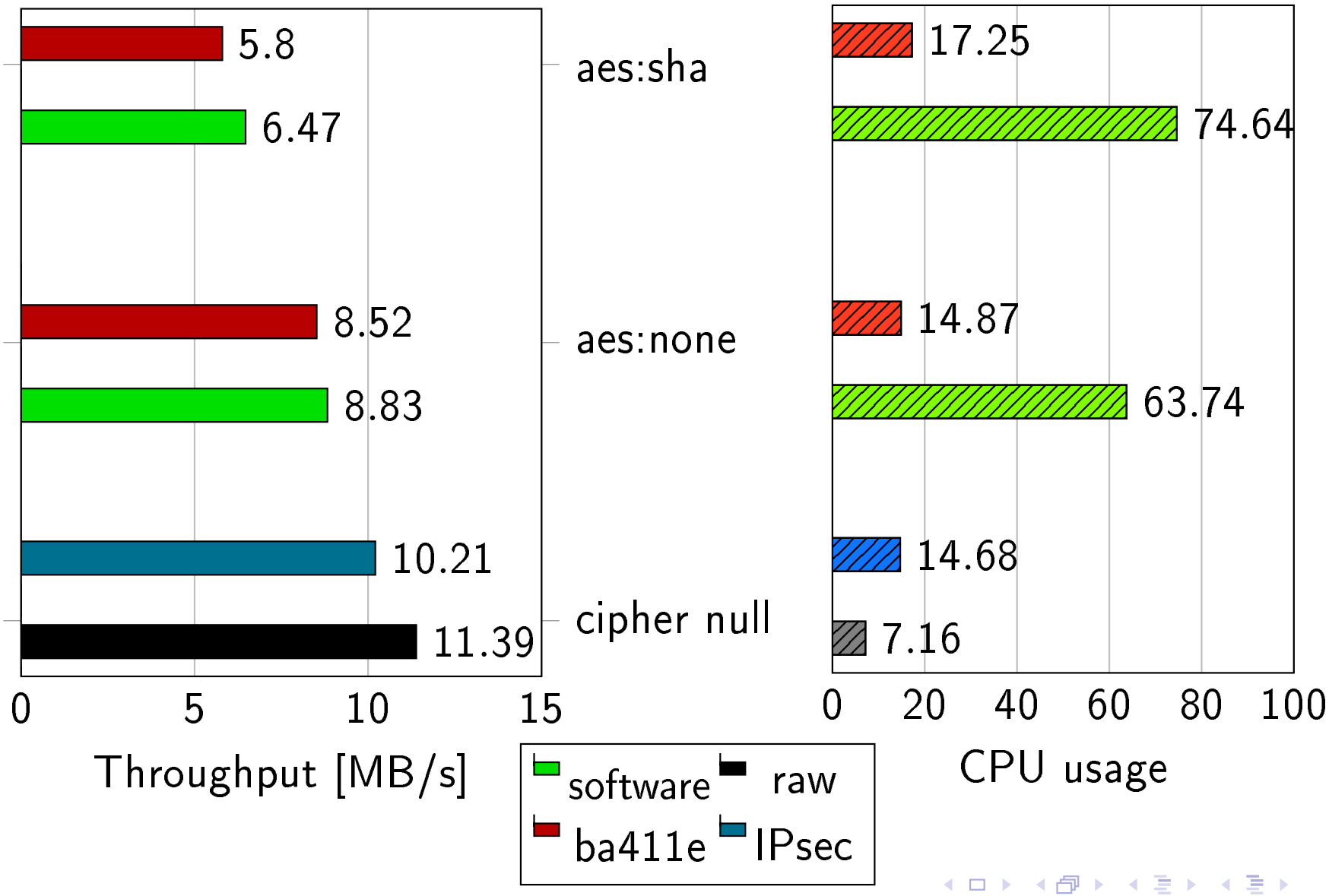


- 128MB file
- AES-256-CBC/SHA-256
- OpenVPN/IPsec

# File transfer – OpenVPN



# File transfer – IPsec



# Conclusion

## TLS connections

- 589% connections
- 5% the CPU usage

## File transfer

- Drop OpenVPN
- 89% performance
- 23% the CPU usage

# Conclusion

- Ongoing development