VyOS Networks

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# OPEN SOURCE NETWORKING AT SCALE

## VyOS 1.5 and VPP

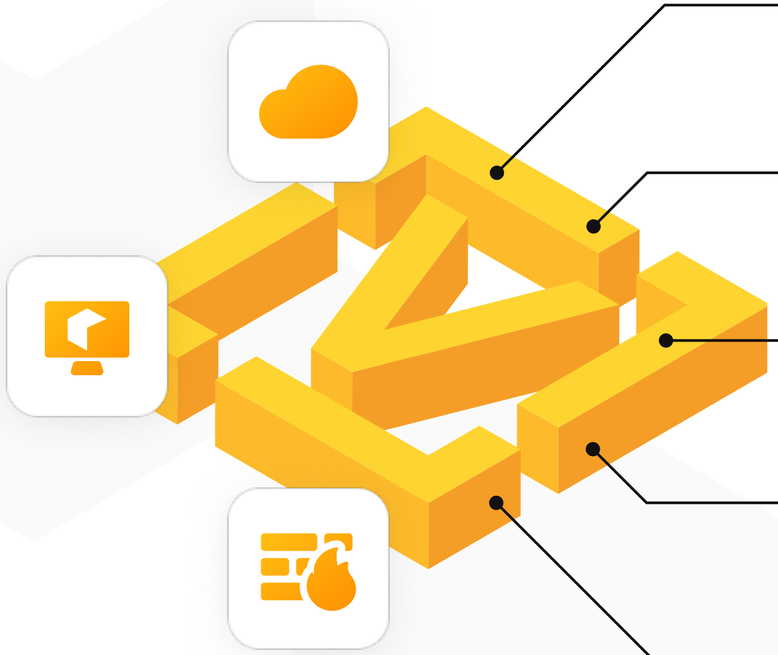
ESNOG TALK 2025

# INTRODUCTION

VyOS Networks

- An enterprise grade open source network OS
- VyOS 1.5 introduces Vector Packet Processing (VPP)
- Built for high performance and scalability
- Developed by Cisco and Intel > now under Linux Foundation (FD.io)

# WHAT IS VyOS



- AN ENTERPRISE GRADE OPEN SOURCE NETWORK OS BASED ON DEBIAN
- RUNS ON X86, FROM BARE METAL, VIRTUALIZED TO VARIOUS CLOUD PLATFORMS
- USED WORLDWIDE BY ENTERPRISES, SERVICE PROVIDERS AND INTEGRATORS
- SUPPORTED PRODUCT WITH LTS RELEASE AND A CLEAR ROADMAP
- PARTNERED WITH DELL, SUPERMICRO, ADVANTECH, LANNER AND OTHERS

# VyOS USE CASES

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- HIGH-PERFORMANCE EDGE AND CORE ROUTING
- SERVICE-PROVIDER BACKBONE NETWORKS
- DATA-CENTER AND CLOUD GATEWAYS
- INTERNET EXCHANGE POINTS (IXPS)

# CURRENT NETWORKING STACK

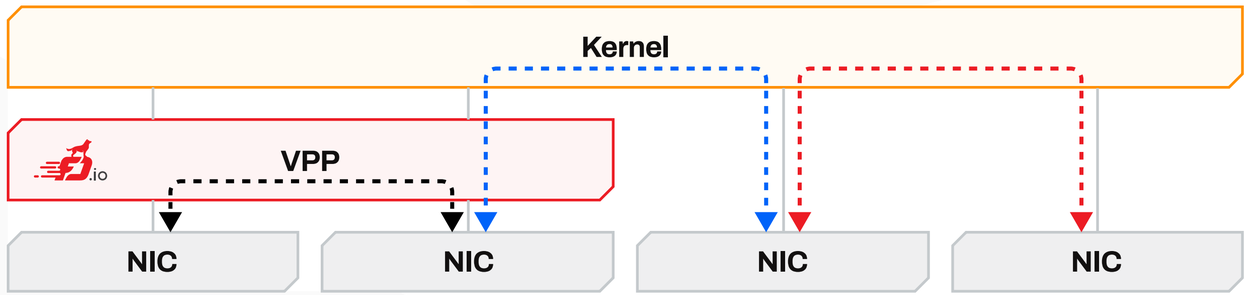
## VYOS RELIES ON THE LINUX KERNEL NETWORK STACK FOR PACKET FORWARDING

- Proven and stable from CPE’s to servers, throughput from 10, 25, 45 and up to 100Gbps
- Bottlenecks at high throughput
- CPU load rises with bandwidth > scaling limits
- Kernel path is still ideal for most of deployments

# ENTER VPP

- Vector Packet Processing (VPP) = user-space packet engine
- Built on DPDK; processes packets in vectors for efficiency
- Origin: Cisco + Intel > FD.io > Linux Foundation
- Proven in products from Red Hat, 6WIND, Cisco

## KERNEL+VPP COEXIST IN VYOS 1.5 > CHOOSE YOUR DATA PLANE



# PERFORMANCE AND THROUGHPUT

## TEST HARDWARE


### DELL POWEREDGE R6615

2x

CPU

AMD EPYC 9334 32 CORE

RAM

64GB RAM

100GBE NIC'S – INTEL & MELLANOX

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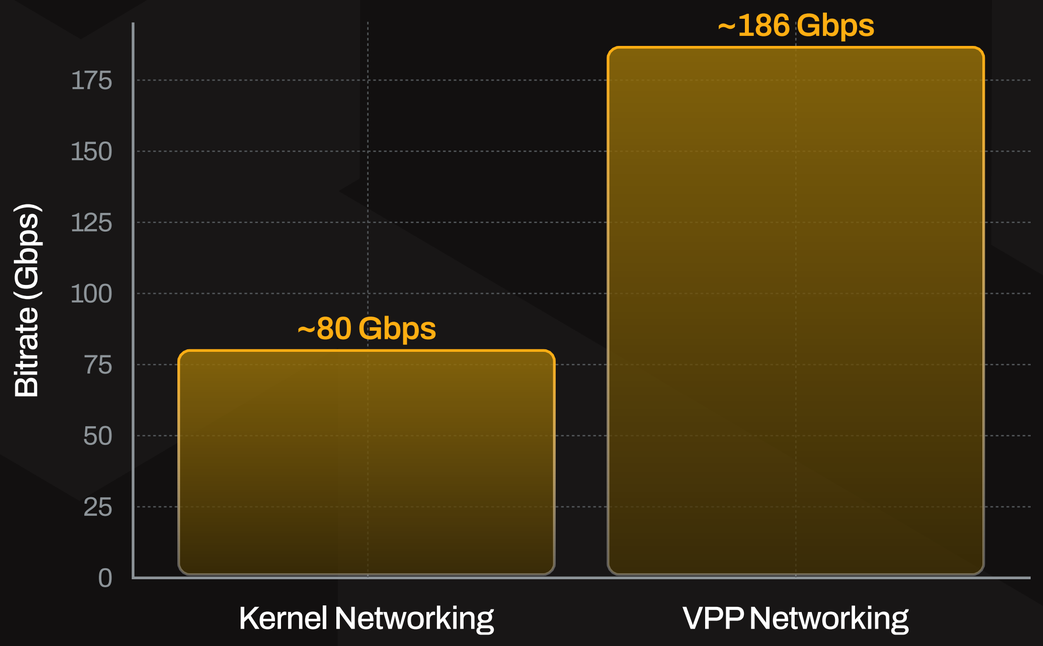
VyOS 1.5 Rolling

TRex
Realistic Traffic Generator

CISCO TRex

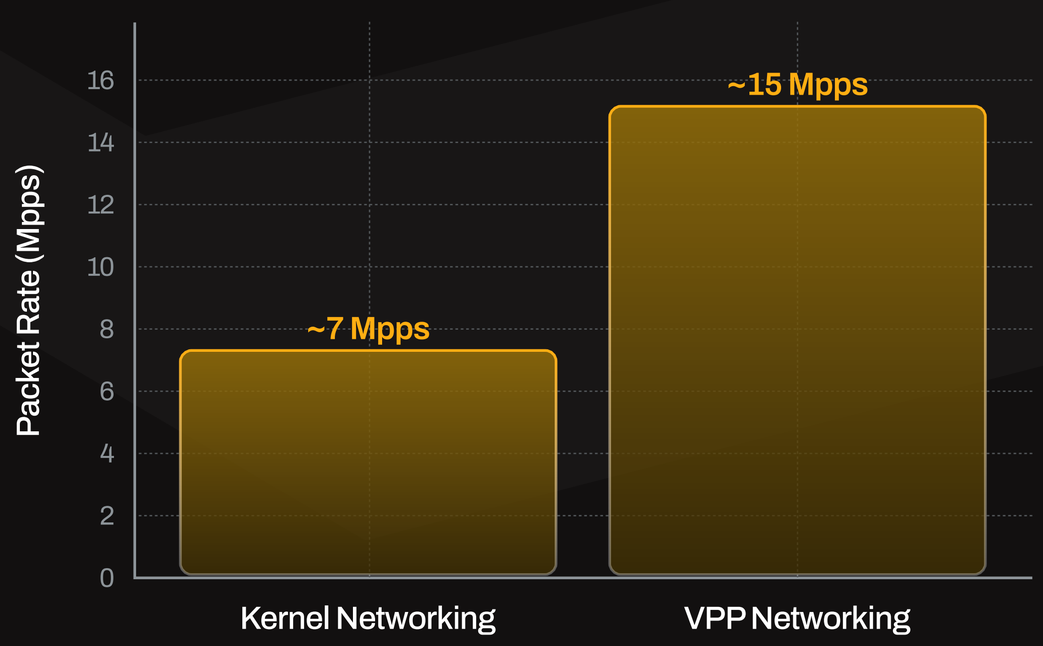
# 1518-BYTE ROUTING THROUGHPUT - KERNEL VS VPP

VyOS Routing Performance - Bitrate Comparison




Kernel ~80 Gbps / VPP ~186 Gbps **TREX 1518 bytes**

VyOS Routing Performance - Packet Rate Comparison

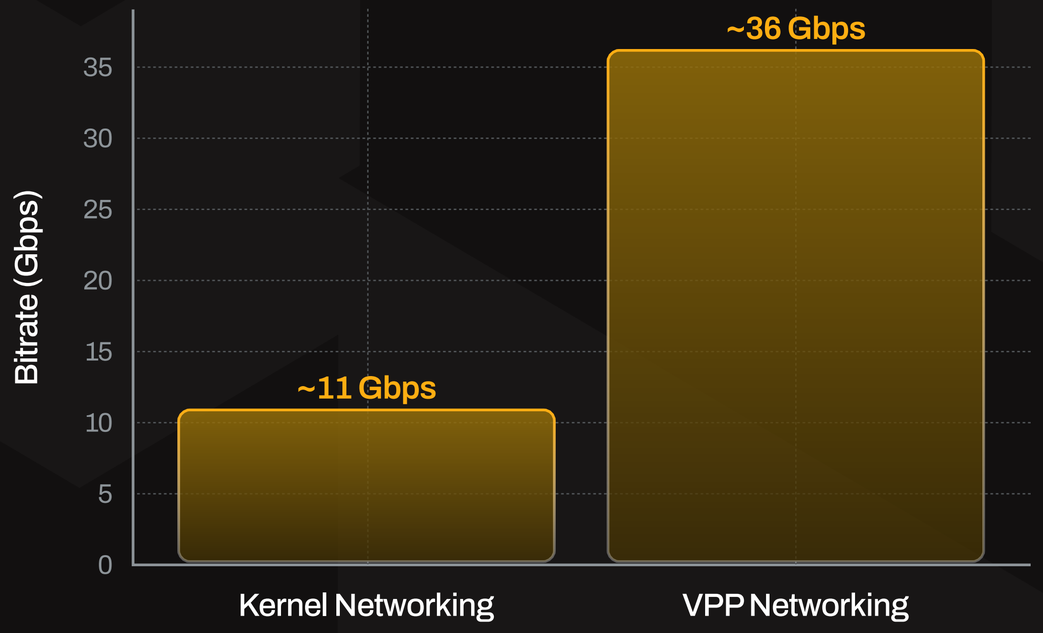



Kernel ~7 Mpps / VPP ~15 Mpps **TREX 1518 bytes**

http://performance.vyos.dev

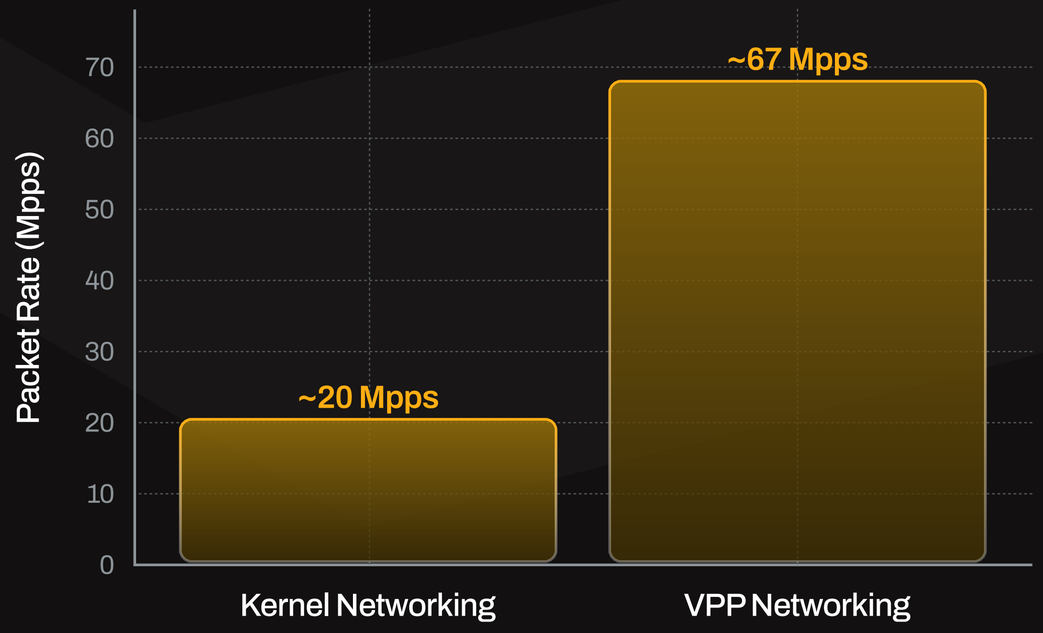
# 64-BYTE ROUTING THROUGHPUT - WORST-CASE PERFORMANCE

VyOS Routing Performance (64-byte packets) - Bitrate Comparison




Kernel ~11 Gbps / VPP ~36 Gbps **TREX 64 bytes**

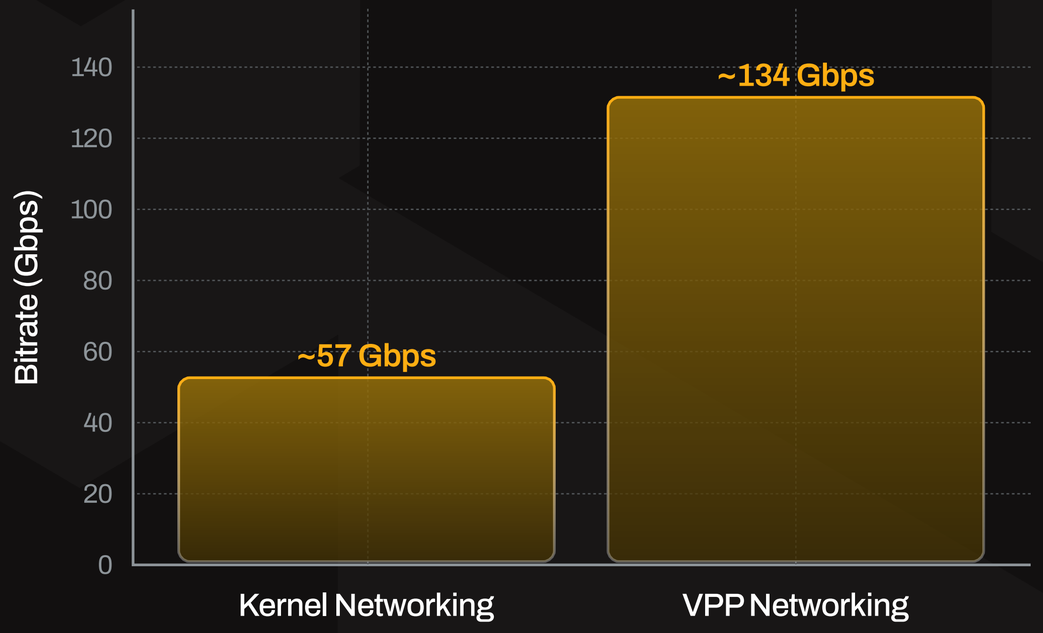
VyOS Routing Performance (64-byte packets) - Packet Rate Comparison




Kernel ~20 Mpps / VPP ~67 Mpps **TREX 64 bytes**

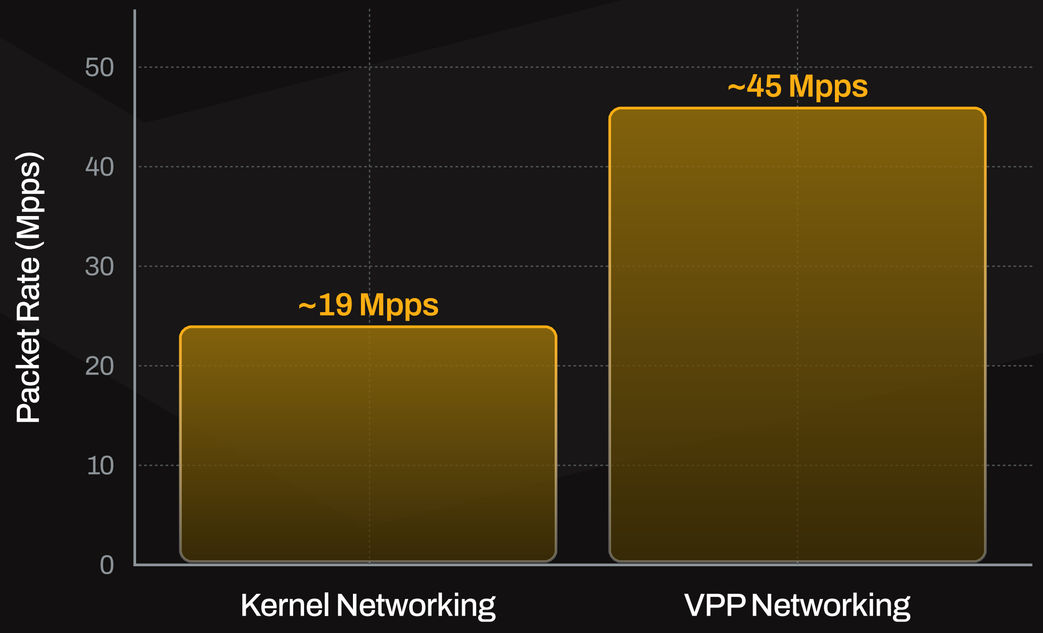
# IMIX ROUTING PERFORMANCE - REAL-WORLD PACKET MIX

VyOS Routing Performance (IMIX packets) - Bitrate Comparison




Kernel ~57 Gbps / VPP ~134 Gbps **TREX IMIX**

VyOS Routing Performance (IMIX packets) - Packet Rate Comparison




Kernel ~19 Mpps / VPP ~45 Mpps **TREX IMIX**

# PERFORMANCE SUMMARY

VPP DELIVERS

2X–3X HIGHER THROUGHPUT ACROSS ALL WORKLOADS

SMALL PACKETS (WORST CASE)

SEE THE BIGGEST JUMP IN PERFORMANCE

PACKET PROCESSING

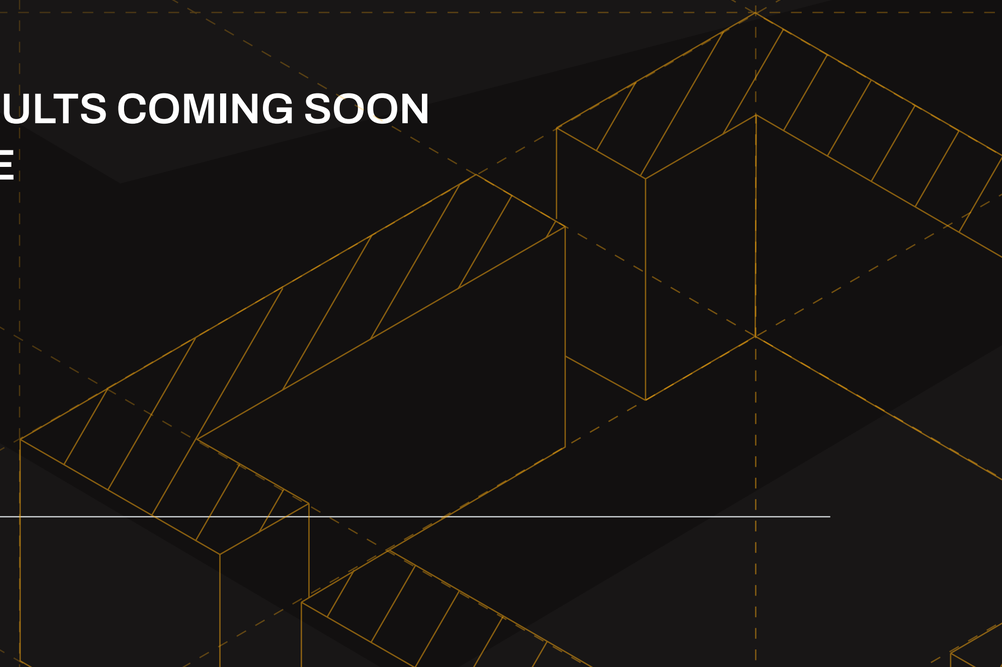
SCALES ACROSS CPU CORES, NOT STUCK ON ONE THREAD

INTERNAL TESTS

SHOW NAT RUNNING AT OR NEAR LINE-RATE

IPSEC ACCELERATION

TESTING IS ONGOING — RESULTS COMING SOON AVAILABLE ON OUR WEBSITE



# ADOPTION AND ROADMAP

## SUPPORTED IN VYOS 1.5

### VPP CORE

- Dynamic routing (BGP recommended, OSPF validated)
- GRE, IPIP, VXLAN tunnels
- IPsec offload + hardware acceleration
- L2 bridging & xconnect
- ACLs (MAC/IP/protocol/ports)
- NAT44 (SNAT/DNAT) + high-perf CGNAT
- sFlow / IPFIX monitoring
- VRRP for HA

# ADOPTION AND ROADMAP

## ADVANCES FOR CURRENT UPCOMING VERSION:

- Full integration with kernel routes & interfaces
- Tested on 100 GbE / multi-hundred-Gbps targets
- Core data plane in VyOS 1.5 — not an add-on

# ADOPTION AND ROADMAP

## NEXT

- New tunneling & encryption types
- Deeper config & monitoring integration
- Scaling toward 200–400 Gbps systems

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# WHY VPP MATTERS


- Open-source networking has reached enterprise-class performance
- VyOS and VPP prove open can outperform closed stacks
- Transparent, flexible, cost-efficient and fully supported

# QUESTIONS?

# WRAP-UP / CALL TO ACTION


- Open-source networking has reached enterprise-class performance
- VyOS and VPP prove open can outperform closed stacks
- Transparent, flexible, cost-efficient and fully supported


VyOS | **Open Source Networking at Scale**