

A close-up, low-angle shot of a golden wheat field under bright, warm sunlight. The wheat stalks are in sharp focus in the foreground, with a soft, blurred background of more wheat and a bright, hazy sky. The overall color palette is warm, dominated by yellows, oranges, and soft whites.

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StoneWork

by **PANTHEON.tech**

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- StoneWork
 - users, introduction
- FD.io
 - performance
 - features and programmability
- Ligato.io
 - quick overview
- How it all fits together



Solution architects

“**FD.io** based
solution with
enhanced
programmability”

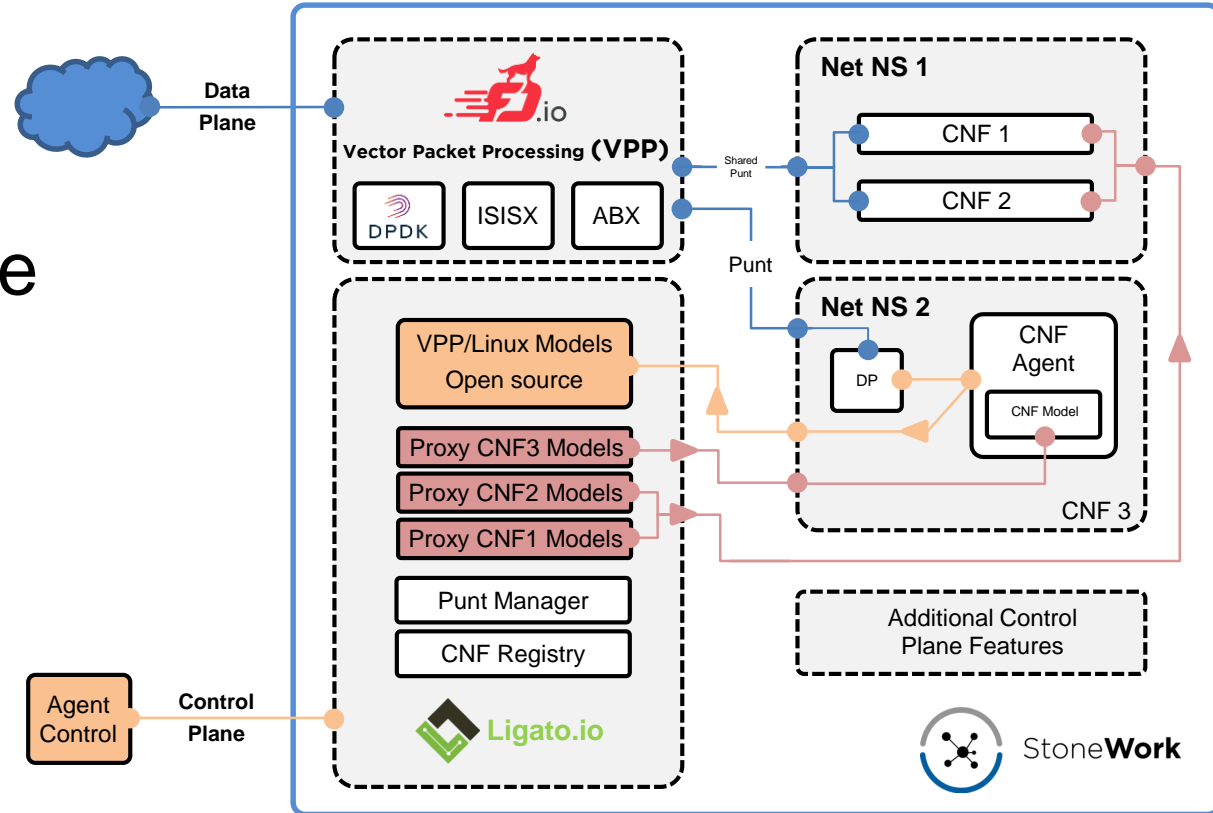
Service providers

Large **Enterprise**

“**FD.io distribution**
with extensible
control-plane”



“High-performance data plane, modular control plane solution.”





- CPU cycles per packet budget (oversimplified)
 - 2.4Ghz CPU, 10G NIC, 64B packets = **~160 cycles**
- What's the cost ?
 - Access times:
 - L1 cache reference ~ 1ns
 - Branch mispredict ~3ns
 - L2 cache reference ~ 4ns
 - Main memory reference ~ 100ns
 - Packet processing path
 - NIC - PCI - memory - CPU (I-cache & D-cache)

FD.io VPP - optimizations



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- Vector packet processing > CPU L1 I-cache
- Dual/Quad loops; SIMD > CPU L1 D-cache
- Data structures - size alignment > memory channels
- DPDK > Hugepages, Poll mode NIC drivers, HW offload
- DMA, DCA > a 'fast-path' from NIC to CPU

FD.io VPP 22.06 - features



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ACL Based Forwarding

ACLs for Security Groups

ADL

AF_XDP device driver

Address Resolution Protocol

Adjacency

Bidirectional Forwarding Detection

Binary API library

Binary API shared memory / socket transport library

Bit Indexed Explicit Replication

Bonding

Buffer Metadata Change Tracker

Buffers monitoring plugin

Builtin URL support for the static http or https server

Caching DNS name resolver

Classify

Cloud NAT

Data-Plane Objects

Dynamic Host Configuration Protocol

Feature Arc Support

Flow infrastructure

G2 graphical event log viewer

GPRS Tunneling Protocol

Generic Routing Encapsulation

HSI (Host Stack Intercept)

Hash infrastructure

IP Neighbour Database

IP Security

IP in IP tunnelling

IPFIX probe

IPSec crypto engine provided by Intel IPSecMB library

IPSec crypto engine provided by Openssl library

IPSec crypto engine provided by native implementation

IPv6 Neighbor Discovery and Proxy

Internet Group Management Protocol

L2TPv3

Layer 2 Forwarding

Layer 3 cross connect

Link Aggregation Control Protocol

Link Layer Discovery Protocol

Linux Control Plane (integration)

Load Balancer

Locator ID Separation Protocol Control Plane

Locator ID Separation Protocol Generic Protocol Extension

Multi-Protocol Label Switching

NSH

Netmap Device

Network Address Translation

Network Delay Simulator

PG

PPPoE

Pipe Device

Policy 1:1 NAT

Prom (Prometheus Exporter)

QUIC Protocol

Quality of Service

SRTP (Secure Real-time Transport Protocol)

SRv6 - Service Chaining Dynamic Proxy

SRv6 - Service Chaining Flow-based Proxy

SRv6 - Service Chaining Masquerading Proxy

SRv6 - Service Chaining Static Proxy

SRv6 Mobile

Segment Routing for IPv6 (SRv6)

Segment Routing for MPLS

Session Layer

Source VRF Select

Static HTTP(S) Server

TLS OpenSSL

Tap Device

Time-range-based MAC-address filter

Transmission Control Protocol

Transport Layer Security

Tunnel Infra

User Datagram Protocol

VNET GSO

VPP Comms Library

VPP infrastructure library

Virtio PCI Device

Virtual Router Redundancy Protocol

Virtual eXtensible LAN

VxLAN-GPE

Wireguard

 protocol

arping command

host-interface Device AF_PACKET

ikev2 plugin

rdma device driver

vlib/unix

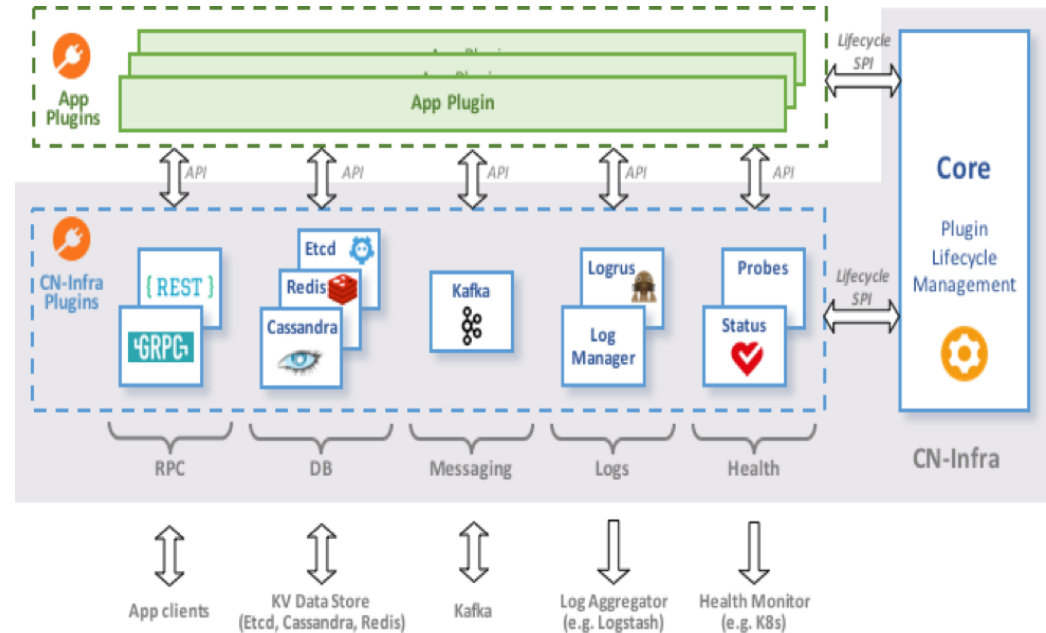
vmxnet3 device driver



- debug CLI (vppctl)
- binary API
 - generated language bindings:
 - C, C++
 - Python
 - GoLang
 - Java, Lua, Rust, ...



“CN-Infra (cloud-native infrastructure) is a **Golang** framework for building **control plane agents** for cloud-native Virtual Network Functions”



ligato.io - Vpp agent

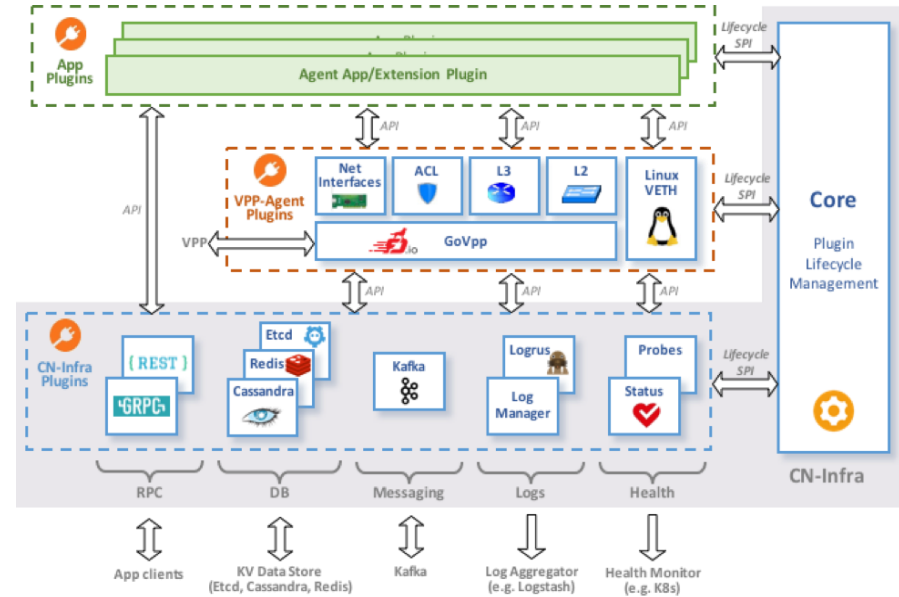


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“**VPP Agent** is set of VPP-specific plugins that use the CN-Infra framework and exposes VPP functionality to client apps via a **higher-level model-driven API**”



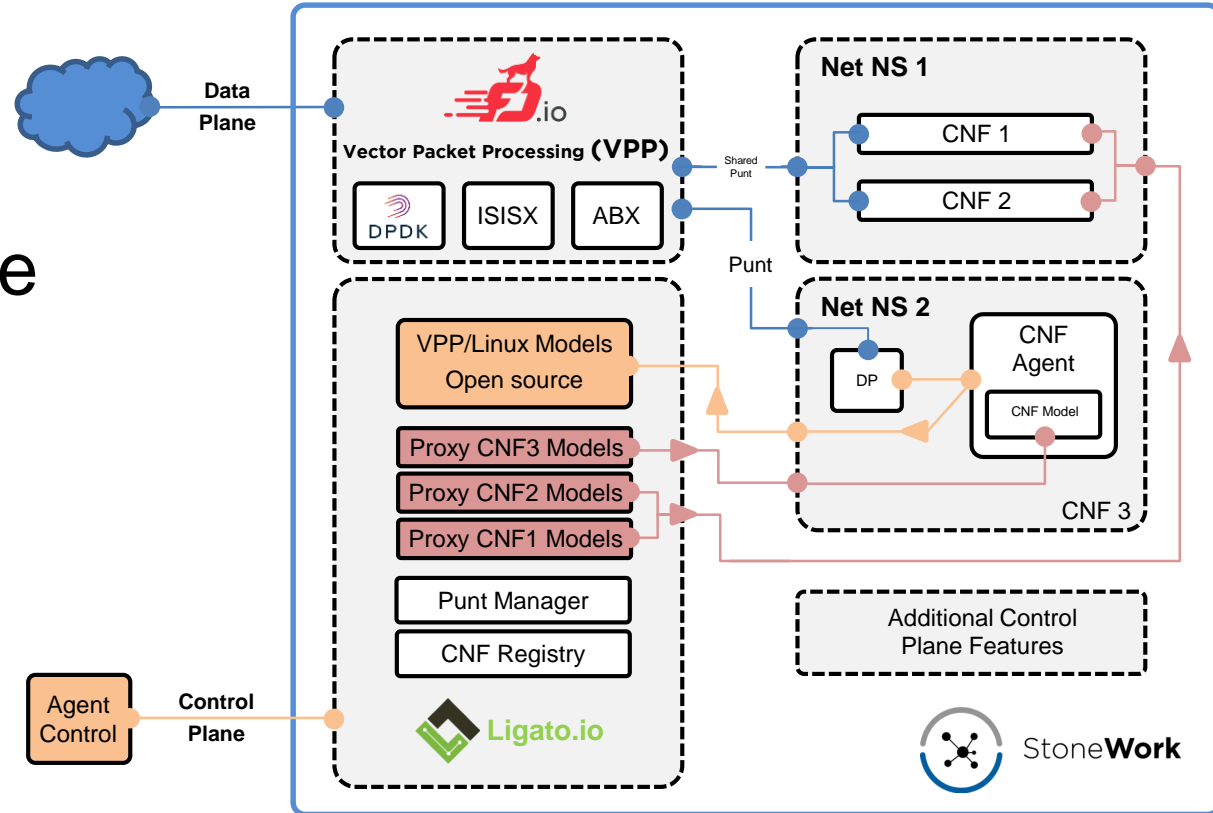


Components:

- FD.io vpp
- ligato.io vpp-agent
- StoneWork extra plugins:
 - vpp - acl-based & IS-IS cross-connect
 - ligato - abx, bfd, cnfreg, isisx, nat64, puntmgr

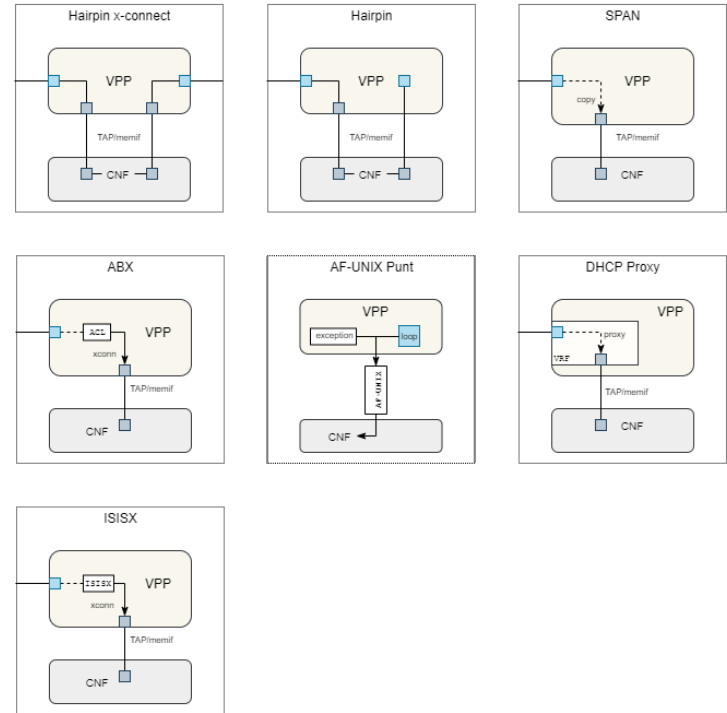


“High-performance data plane, modular control plane solution.”





A way how to
deliver control plane
packets to control
plane applications



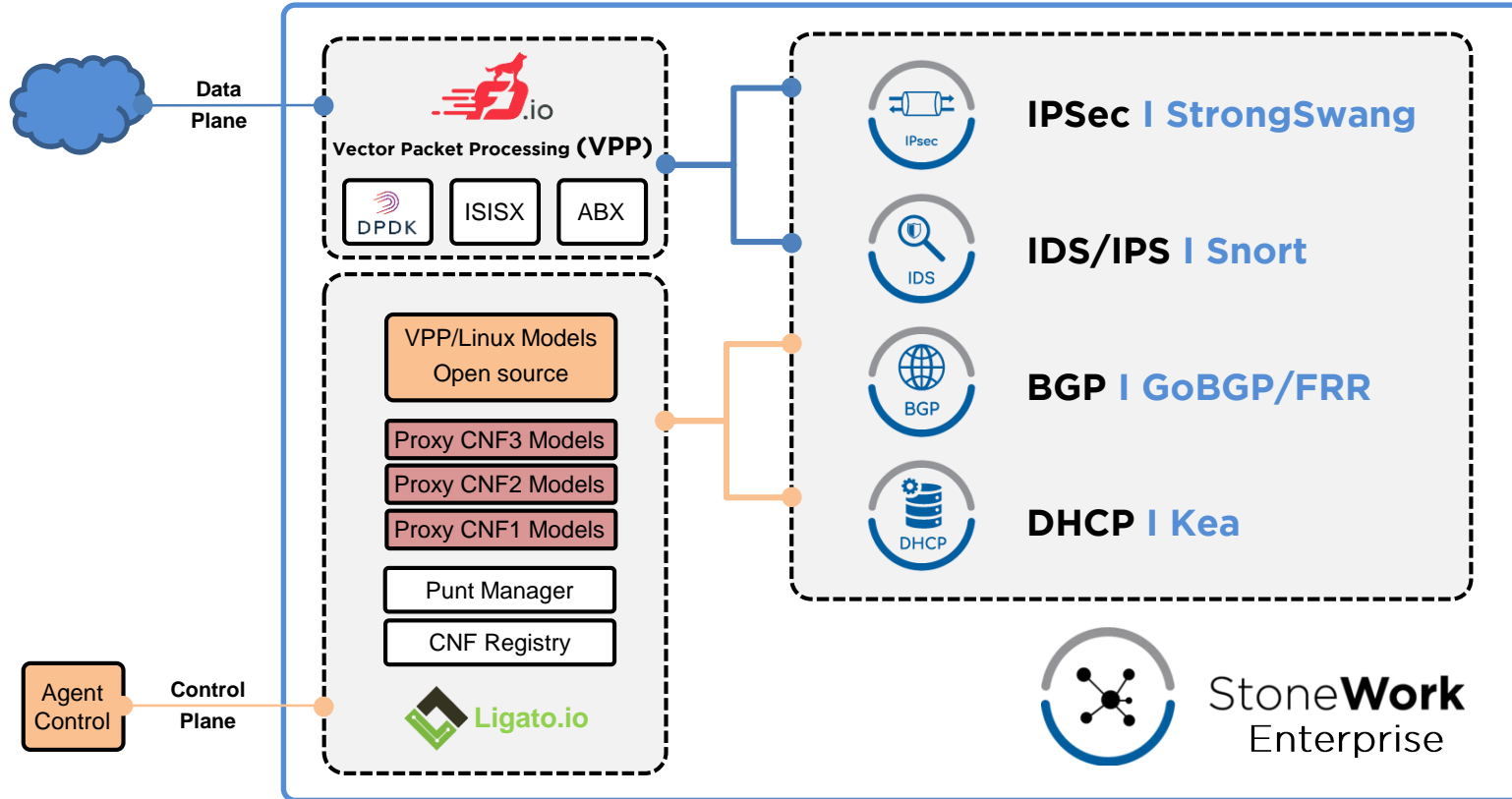
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Containerised Network Functions



Connectivity: [NAT64](#) | [NAT464](#) | [Transit Tunnel](#) | [Rate Limiter](#)

Routing: [BGP](#) | [OSPF](#) | [Multi-Domain: Routing](#) | [Switch](#)

Security: [Firewall](#) | [IDS](#) | [VPN](#) | [IPSec](#)

Services: [DHCP-Proxy](#) | [DHCP](#) | [DNS Cache](#) | [Radius](#)

Monitoring: [IPFIX](#) | [Port Mirror](#) | [Traffic Analyser](#)

Thank you for attending!

- **Useful links**

- pantheon.tech
- fd.io
- ligato.io

- StoneWork @ github



A background image of a golden wheat field under a bright, hazy sky. The wheat stalks are in sharp focus in the foreground, creating a sense of depth and texture. The overall color palette is warm, dominated by yellows and oranges.

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