Solution Brief

Telecom Providers & Medium to Large Vertical Enterprises
Communications & Internet Service Providers; Systems Integrators

PANTHEON.tech's StoneWork Packages Open Source Network Functions

StoneWork uses virtualized, open source networking software to deliver multi-service routers for flexible, scalable enterprise and service provider networks; company uses Intel® architecture CPUs and Ethernet adapters for performance

With the growth of cloud, 5G and IoT, service provider and enterprise networking teams are growing more comfortable building their networks in new ways to deliver more agility, automation, scalability and flexibility.

Virtualization technology has enabled a dramatic move toward software-based network functions running on Intel® architecture-based servers and away from costly dedicated hardware-based networking appliances. This trend has been extended by containerization, which virtualizes applications as microservices using a container that isolates individual microservices across a shared operating system and other infrastructure resources.

Open source applications have benefited from virtualization because they are typically lightweight and portable and are distributed under licenses that make it easy to virtualize and scale.

But open source software can be challenging to deploy because there is no dedicated tech support, and the software can have less mature feature sets causing some technical challenges. For example, software upgrades can introduce conflicts into a network requiring specialized DevOps resources for debugging and patching.

PANTHEON.tech is an Intel® Network Builders ecosystem partner that makes open source easy to deploy. The company's StoneWork software platform integrates and supports the latest open source technologies to deliver advanced networking functionality allowing enterprises or service providers to deploy cost-effective, scalable multi-service routers that can be configured with more advanced networking infrastructure including network services, data security and other capabilities. This software solution makes use of the latest Intel architecture CPUs and network adapters for performance.

StoneWork Containerized Network Software

StoneWork is a software platform that enables a selection of open source software-based network functions to be implemented by an enterprise or service provider. Based on Kubernetes cloud native containerization, the StoneWork platform integrates and hardens open source networking applications (see Figure 1). This overcomes the technical challenges that organizations face during deployment while providing a flexible framework for delivering an expanding portfolio of cloud native functions (CNFs).

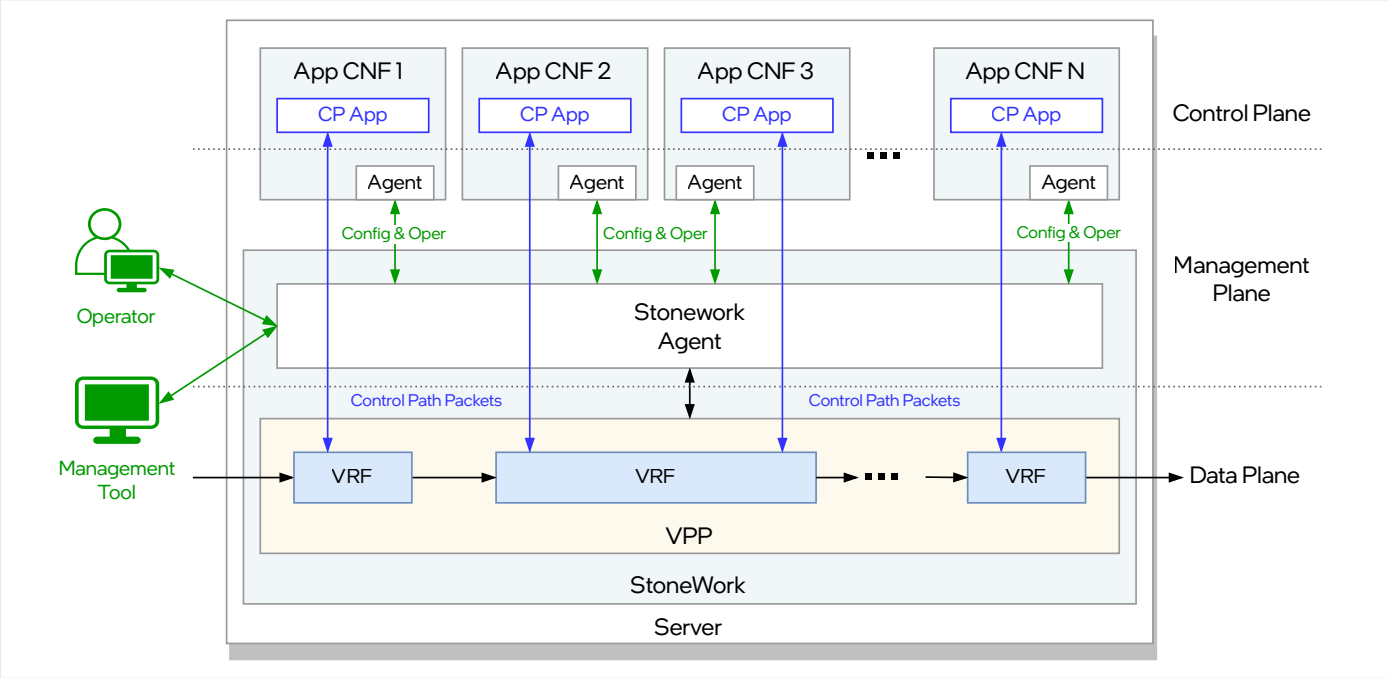

Figure 1. Block diagram of StoneWork platform showing support for multiple CNFs.

Data Plane Based on Vector Packet Processor

Vector Packet Processor (VPP) is a foundational software component for StoneWork. VPP provides both the data plane and can be configured to deliver additional network services. VPP is a high performance, packet-processing stack that includes a full function switch/router designed for high performance on Intel® architecture processors. Within StoneWork, VPP provides a virtualized data path supporting all of the other open source network functions that are part of StoneWork.

In addition, VPP provides some of the value add network services, including:

- Router that provides layer 3 routing of data traffic between multiple network function interfaces.
- Switch that forwards data at layer 2 between multiple network function interfaces.
- Network address translation 64 (NAT64) providing IPv6-to-IPv4 address translation.
- Network address translation 464 (NAT464) providing limited IPv4 connectivity across an IPv6-only network.
- Rate limiter: limits data rates on certain traffic passing through the network.
- Transit tunnel forward traffic to/from remote encrypted (GRE/VXLAN) tunnel endpoints.
- Virtual private network (VPN) encrypts data flows for a secure way to access protected services.
- IPsec forwards traffic to/from a remote IPsec peer to the desired destination.
- Dynamic Host Configuration Protocol (DHCP) proxy forwards DHCP requests to a remote DHCP server and proxies the replies to clients.
- Switched Port Analyzer (SPAN) port mirror copies traffic passing between two network function interfaces into a third interface for traffic analysis.

Management Plane based on Ligato

The Ligato Project provides the management plane software in addition to several network functions. The management plane uses a master agent for synchronization, scheduling and lifecycle management. The Master Agent dynamically pulls together models from all other individual agents and exposes them to the operator and northbound apps. This allows adding new open source software functionality to the network as needed.

Ligato also contributes a number of security functions and network services and monitoring services that can be added to a StoneWork network. These include:

- Access control list (ACL)-based firewall between network function interfaces.
- Intrusion prevention/detection system (IDS) Integrates open-source Snort IDS with Ligato to detect/prevent threats.
- Dynamic Host Configuration Protocol (DHCP) server to automatically assign IP addresses to network devices.
- Domain Name System (DNS) server which recognizes network destinations. This solution is based on BIND 9 and Ligato.
- Traffic analyzer provides an analysis and web-based visualization of all traffic coming to the network function. Uses both ntopng and Ligato.

StoneWork is Full Function Multi-Service Router

With its VPP-based data plane, modular control plane and Ligato-based management plane, StoneWork can provide a complete, high performance multi-service router (MSR) for enterprise or service provider networks.

The StoneWork MSR offers the ability to add additional data security or network address translation and other services. The management plane can be used to remotely configure each MSR in the network ensuring consistency and reducing misconfigurations.

The MSR can scale across a variety of network locations; for example, running on a white box server for a branch office or running on a data center class server for central office, co-location or large point of presence applications.

Control Plane

StoneWork's modular control plane enables selected control plane functions to be easily bundled together, providing control services for each network function running on the platform. This approach allows multiple chained control plane applications to control a single VPP data plane to build and scale flexible feature rich solutions to meet customer demands.

Intel® CPUs and Ethernet Adapters Ensure Throughput

StoneWork is designed to perform best on servers that are powered by Intel® Xeon® Scalable processors and Intel® Ethernet 800 Series Network Adapters. Intel Xeon Scalable processors are optimized for performance, scale and efficiency across a broad range of data center, edge and workstation workloads.

Launched early in 2023, the CPU family is the 4th Gen Intel® Xeon® Scalable line of processors. This family of CPUs is based on a balanced, efficient architecture that increases core performance, memory, and I/O bandwidth to accelerate diverse workloads from the data center to the network edge.

The CPUs offer higher memory speeds and enhanced memory capacity, which are important contributors to StoneWork performance.

These processors support up to 52 cores per processor and up to eight memory channels at up to 4800 MT/s, driving enhanced performance, throughput, and CPU frequencies compared to previous-gen processors.

"Fact:
Larger CPU cache can help to reduce time-consuming memory lookups."

StoneWork servers also need very high-speed network connectivity and specify 100GbE Intel Ethernet 800 Series Network Adapters. These adapters offer compatibility, interoperability, and performance. The adapter used in the tests was the Intel® Ethernet Network Adapter E810-CQDA2, which offers dual ports supporting 100/50/25/10GbE per port data rates. The adapter also features packet-classification and sorting optimizations, hardware-enhanced timing capabilities, and a fully programmable pipeline.

StoneWork also makes use of the integrated Intel® QuickAssist Technology (Intel® QAT) which provides hardware acceleration to assist with the performance demands of applications with extensive IPsec crypto requirements.

Conclusion

Virtualized open source software can play a big role in the flexible, scalable networks needed for 5G, IoT and other advanced services. PANTHEON.tech's StoneWork brings a stable and hardened platform that integrates open source networking software. Based on VPP, StoneWork creates a multi-service router that is scalable to meet any location in a network – from a central office to a branch office – and can have features added for data security, network addressing, network services and other functions. StoneWork relies on the compute performance provided by Intel Xeon Scalable processors and 100GbE Intel Ethernet Network Adapter E810-CQDA2 for the performance and scalability.

Learn More

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StoneWork

Intel® Xeon® Scalable processors

Intel® Network Builders

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