

CN2 AND APSTRA INTEGRATION SIMPLIFIES DATA CENTER NETWORKING

Integrating overlay and underlay networking to automate data center and cloud operations

Challenge

The application performance gains of Single Root/Input Output Virtualization come at the expense of time and complexity as these workloads are stitched manually to Kubernetes overlay networks.

Solution

Juniper CN2 and Apstra integration automates networking across overlay and underlay cloud stack layers allowing data center and cloud operations teams to deploy services dynamically and securely without delays, CLI configurations, or complex scripting sequences.

Benefits

- Simplified network and cloud operations
- DevOps agility across separate cloud infrastructure layers
- Immediate time-to-value

Kubernetes overlay networking and data center switching fabrics are cloud and networking abstractions that simplify the definition, deployment, and full life-cycle management of what are otherwise extremely complex systems. Using intent-based language and automation workflows, NetOps can easily isolate, secure, and connect workloads through dynamic networking.

While instrumental to operations, these systems have a significant blind spot. Workloads orchestrated and connected to the underlay data center switching fabric do not connect to or register with workloads or networks orchestrated within Kubernetes overlay networks. Managed and operated as independent layers, connecting virtual networks and workloads across and between these layers requires manual stitching—which adds time and cost while taking the agility out of the cloud.

Looking at the example in Figure 1 showing a current process to connect these systems, the fabric operations team must add a newly created Single Root/Input Output Virtualization (SR-IOV) pod to an existing “green” overlay network. This scenario is common for telco workloads where SR-IOV performance and low latency are critical for SLA conformance. NetOps must manually establish awareness and connectivity between the layers. While processes may differ, manual configurations interrupt the cloud operating model with time delays and the risk of manual errors.

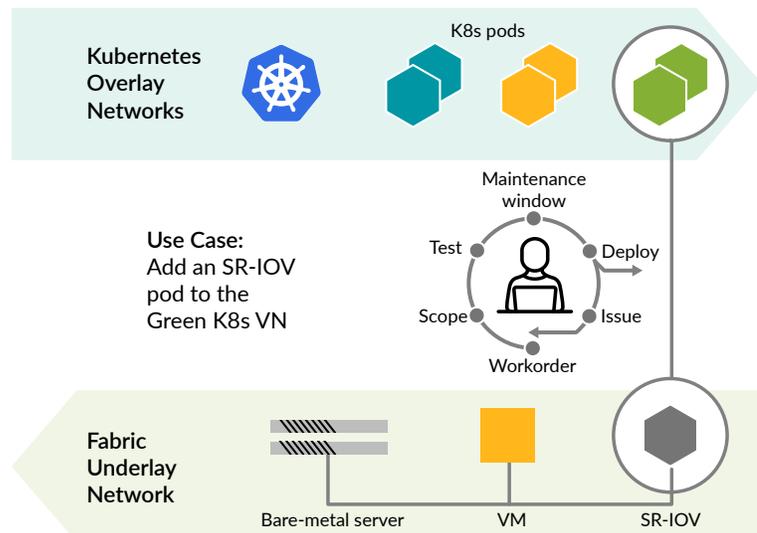


Figure 1: Manual stitching across layers is slow and costly.

The Juniper Automated Data Center

Juniper Networks® Automated Data Center simplifies Day 0-to-Day 2+ operations for service provider data centers, telco clouds, and enterprise data centers. The cornerstones of the Juniper data center solution are Juniper® Cloud-Native Contrail Networking (CN2), Juniper’s Kubernetes SDN, and Juniper Apstra software, an intent-based, multivendor data center fabric manager.

Although the switching fabric is generally considered the “underlay,” Apstra uses Ethernet VPN-Virtual Extensible LAN (EVPN-VXLAN) leaf- or edge-routed overlay tunnels across the data center switches. These overlays abstract the network membership of physically attached workloads from the underlying physical network. For example, the network membership of a bare-metal server (BMS) delivering Dynamic Host Configuration Protocol (DHCP) addressing to the “blue” network can be moved dynamically to a geographically distant “green” network without cable moves or IP address changes.

Juniper CN2 for Kubernetes automates the creation, isolation, and management of virtual networks using overlay networking including EVPN-VXLAN tunnels. Tunnel end points are established through the vRouter, the CN2 forwarding plane resident on each server node. In effect, CN2 overlay tunnels isolate and protect traffic between workloads and pods from the physical “underlay” networks. This allows NetOps to manage ephemeral, short-term workloads that can appear, expand, shrink, and disappear without concern of overlapping IP address ranges or misconfiguring security policies.

CN2 and Apstra had previously operated in the overlay and underlay respectively without knowledge or awareness of the other. With the release of CN2 version 23.1, Juniper has integrated CN2 and Apstra.

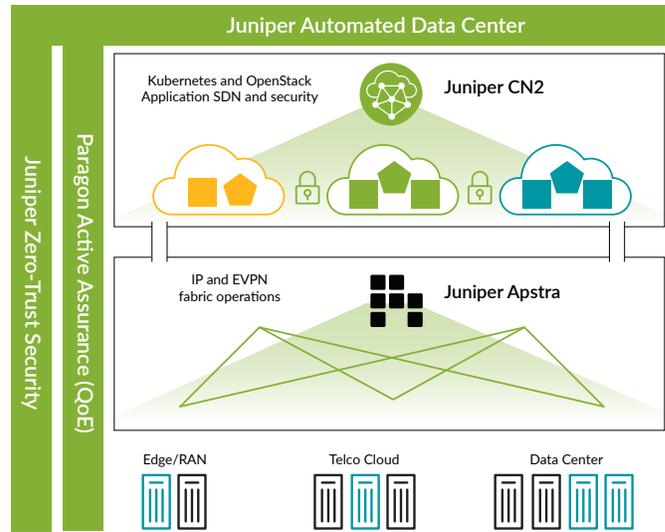


Figure 2: The Juniper Automated Data Center simplifies networking for the NetOps team.

A Better Way to Data Center

Now integrated, CN2 and Apstra together automate, secure, and simplify networking between Kubernetes SR-IOV-based workloads, normal Kubernetes workloads, and any other workload in the physical data center fabric next to the cluster. Connecting virtual networks and workloads across these layers is now Kubernetes-automated, dynamic, and hands-free for the NetOps team that manages Apstra and the physical fabric.

Juniper CN2 + Apstra Automate secure virtual-to-physical networking configured all within K8s

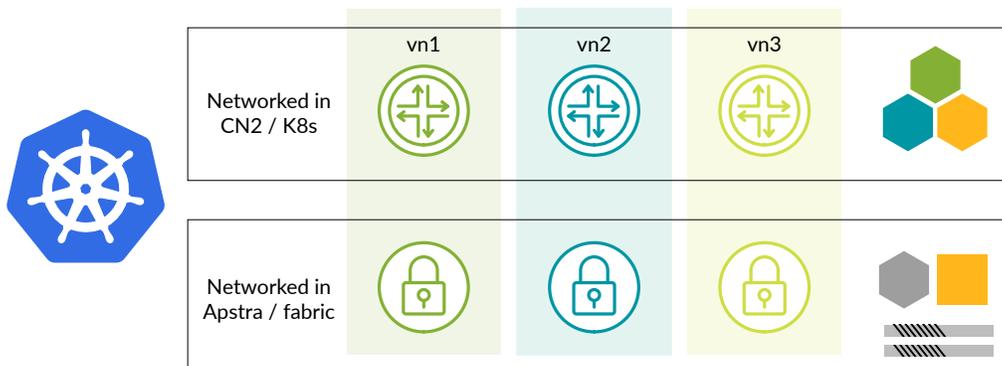


Figure 3: CN2-Apstra integration automates overlay-underlay networking.

CN2 version 23.1 introduces the CN2-Apstra plug-in, an API-driven application configured within CN2 that establishes a meaningful point of integration between overlay and underlay networks. When configured with the Apstra administration credentials and permissions, the CN2-Apstra plug-in listens for specific API calls to add or modify pod networking for BMS, virtual machines, and SR-IOV hosts connected to the IP fabric. By sharing network membership and configuration parameters with Apstra, the CN2-Apstra plug-in provides seamless and automated network associations for targeted pods. Network connectivity across the underlay and overlay network is automated saving time, reducing errors, and extending the cloud operational model across and between independent layers of the cloud infrastructure stack.

Summary—Delivering the Automated Data Center

Overlay-to-underlay networking breaks automation resulting in increased cost and complexity. The Juniper Automated Data Center provides continuous automation using DevOps principles across cloud infrastructure layers to simplify and scale data center, telco cloud, and edge cloud deployments.

Next Steps

For more information about the CN2 and Apstra integration, please read the blog, view the demo series, or contact your local Juniper Networks representative for more information.

About Juniper Networks

At Juniper Networks, we are dedicated to dramatically simplifying network operations and driving superior experiences for end users. Our solutions deliver industry-leading insight, automation, security and AI to drive real business results. We believe that powering connections will bring us closer together while empowering us all to solve the world's greatest challenges of well-being, sustainability and equality.



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