



CONTRAIL CLOUD SIMPLIFIES DELIVERY OF RELIABLE NFV SERVICES

Making telco cloud a reality for all service providers with simple, proven, and trusted platform

Challenge

Building and operating a telco cloud for NFV using components from different vendors is difficult, requiring the integration of various multivendor hardware and software stacks. Once the environment is built, managing it presents a new set of challenges that require unique expertise tailored for cloud.

Solution

Contrail Cloud is a fully managed telco cloud solution built to run high-performance NFV with always-on reliability. It transforms a service provider's existing infrastructure into a cloud-grade solution with simple, automated operations and trusted, agile services, making telco cloud a reality.

Benefits

Contrail Cloud empowers service providers to:

- Accelerate time to value and improve customer satisfaction through agile "DevOps oriented" service creation
- Achieve operational excellence and reduce operational costs using simple and trusted platforms with always-on reliability
- Minimize business risks and accelerate delivery of innovative services

With the 5G era approaching, service providers have an extraordinary opportunity to transform their networks with a cloud-native, software-defined approach that improves the user experience while significantly lowering the cost of service delivery. By moving toward a more distributed cloud infrastructure, service providers will be able to innovate rapidly, take advantage of new opportunities, and quickly change direction in response to dynamic market conditions. This strategy mandates a new approach, one that leverages technologies and processes that accelerate service delivery, simplify operational models, and seamlessly implement pervasive security.

The Challenge

Some of the world's largest service providers have shown that leveraging cloud architectures to deliver enterprise and mobility services can yield immense benefits, including greater agility and speed of innovation, not to mention lower costs. However, the road to a distributed, scalable, and always-available cloud is full of operational challenges. Tedious procurement processes; the complexities inherent in building clouds; integration and interoperability challenges; coordinating support across multiple vendors; and bridging IT skills gaps in managing carrier-grade service-level agreements (SLAs)—all of these issues can potentially complicate the process.

Service providers need a more prescriptive approach to managing and operating the cloud without compromising scale, performance, or SLA compliance. Due to the challenges and unfulfilled promises of telco cloud, service providers have yet to fully realize the benefits of higher revenues and lower TCO.

Contrail Cloud Delivers Telco Cloud for NFV

Juniper® Contrail® Cloud is an integrated telco cloud platform built to run high-performance NFV with always-on reliability and service assurance, enabling service providers to deliver innovative offerings with greater agility. The platform works seamlessly with supporting hardware to intelligently orchestrate and automate the provisioning, operations, and management of a wide range of VNFs and physical network functions (PNFs) from Juniper as well as its ecosystem of partners.

Empowering providers to deliver services with uncompromised cloud-grade performance and reliability, Contrail Cloud is European Telecommunications Standardization Institute (ETSI) NFV-compatible and seamlessly interoperates with other standards-based solutions. Using Contrail Cloud, service providers can quickly and easily build a dynamic and elastic cloud foundation based on commercial

off-the-shelf (COTS) servers, whether in a distributed fashion for central office locations or in a centralized fashion for data centers. Hardware resources are abstracted, pooled, and presented to hosted network functions, where they are allocated on demand. Service providers can customize service chains and communicate them through Contrail Cloud using a set of high-level policies.

Contrail Cloud components are tested and integrated to guarantee interoperability, stability, and high performance. The platform is based on open-source technologies like OpenStack, OpenContrail, and Ceph with standard APIs, providing the freedom to incorporate third-party components as needed.

Contrail Cloud combines products from industry leaders in cloud infrastructure (compute, storage, networking virtualization) and application management software into a single solution that provides high scale, high availability, and high performance with always-on service reliability. The platform can be deployed over any compliant compute, storage, or networking hardware, including SmartNIC for transparent network offload acceleration.

Contrail Cloud can also be delivered with complete, end-to-end professional and advanced services for building and operating the service provider cloud infrastructure. This feature allows Juniper Professional Services teams to build and operate the entire telco cloud for NFV at the customer site, providing follow-on operational services and continuous remote managed services, as requested, to minimize downtime and guarantee SLA compliance.

Features and Benefits

When moving to an agile, virtualized future, it's best to work with innovative technology leaders who understand the service provider industry intimately, who have significant experience in both networking and IT, and who build solutions based on open principles. Contrail Cloud distinguishes itself by delivering virtualization in such a way that service providers get a robust NFV platform built with trusted components that ensure always-on reliability.

- **Faster time to market:** Avoids the complexity and resource requirements of building telco cloud by offering Contrail Cloud as a managed service, or a fully integrated software stack with Juniper and third-party pre-validated VNFs.
- **Always-on services:** Automates and optimizes physical, virtual, and container infrastructure, including VNFs, for optimal operation and performance. Comprehensive visualization, smart analytics, and automated preventative remediation capabilities mean services are delivered with carrier-grade reliability.
- **Reduced risk:** Lowers business risk by leveraging components from Contrail Networking, one of the leading commercially-available SDN controllers with an industry-proven OpenStack vendor, Red Hat. The Contrail Cloud OpenStack platform is uniquely tuned to enhanced the performance of your VNFs.

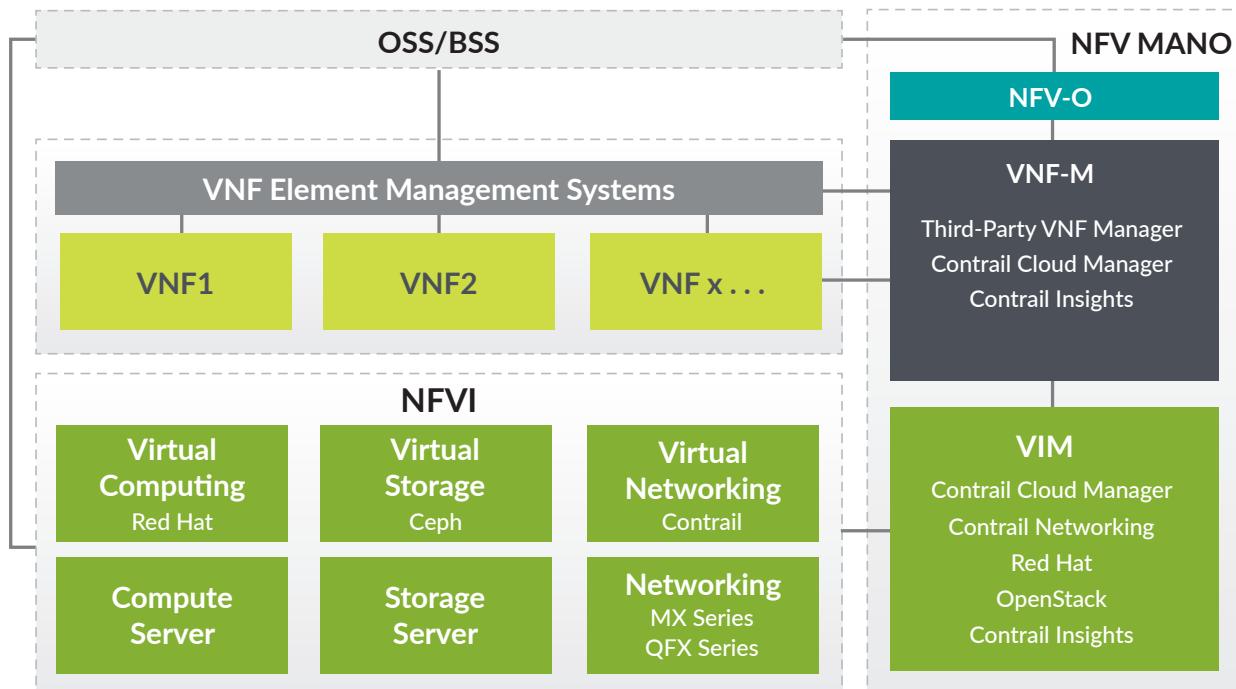


Figure 1: Contrail Cloud for NFV components

Contrail Cloud Architecture

Contrail Cloud includes the following components:

- **RedHat OpenStack:** OpenStack is the de-facto standard for the Virtualization Infrastructure Manager (VIM) layer of NFV. The RedHat OpenStack Platform (RHOSP) is a leading OpenStack distribution solution developed by RedHat, the world leader in open source and the largest contributor to the OpenStack community. RHOSP uses OpenStack director (OSPd), based on the OpenStack Triple-O project, to manage the RHOSP life cycle.
- **RHEL/KVM:** RedHat Enterprise Linux (RHEL) host operating system, coupled with KVM hypervisor, provides a high-performance compute virtualization layer for virtual machines (VMs).
- **RedHat Ceph:** Ceph is a massively scalable, open-source, software-defined storage system capable of auto-scaling to the exabyte capacity, providing a common OpenStack infrastructure for file, object, and block storage. RedHat Ceph is a commercially available version of the system.
- **Contrail Networking:** The leading SDN solution for service providers, Juniper Contrail Networking offers the highest level of scalability, availability, and performance for network virtualization in NFV infrastructure.
- **Contrail Insights:** Juniper Networks Contrail Insights is an optimization and management software platform for public, private, and hybrid clouds. This intent-driven software manages automated operations, visibility, and reporting in cloud and NFV use cases. Contrail Insights uses an OpenStack adapter, which automatically discovers the OpenStack distribution and architecture so that VNFs integrated on Contrail Cloud are monitored, analyzed, and optimized in real time.
- **Contrail Cloud Manager:** This single-pane-of-glass management software component automates the deployment and upgrade of Contrail Cloud through a one-click interface for managing the life cycle of VNFs.
- **SmartNIC Integration:** When deployed with SmartNIC hardware, Contrail Cloud can offload virtual routing data path, providing line-rate forwarding performance and freeing up significant CPU cores that would otherwise be consumed with network I/O processing. These freed-up CPU cores ensure much more efficient use of hardware for VNF workload.

Key Solution Use Cases

Contrail Cloud helps service providers build the right cloud infrastructure to meet their business needs and objectives. While new use cases for NFV are being created at a rapid pace, the following list describes a few of the leading areas where Contrail Cloud is delivering the agility to optimize operating costs and drive new revenue streams.

Mobile Content Cloud

Contrail Cloud comes preconfigured with validated VNFs, one of which is the Affirmed Networks Mobile Content Cloud—a virtual evolved packet core (vEPC) solution featuring fully virtualized instances of each key mobile core function and select value-added services. The flexible deployment model supports single or multiple packet core and Gi-LAN elements. For example, a virtualized network element may contain multiple service instances such as the gateway GPRS support node (GGSN), Packet Data Network Gateway (PGW), and Serving Gateway (SGW); or each network function might be deployed in its own virtualized network element. This approach provides the mobile network operator with greater flexibility in terms of deploying and scaling individual or combined network elements. In each scenario, the Affirmed Networks architecture enables scale in and scale out, based on the demand of a function and the required capacity.

The Mobile Content Cloud's native service chaining capabilities and easy-to-use graphical interface enable operators to quickly combine a multitude of value-added services and policies to create innovative, customized, revenue-generating services. The Affirmed Open Workflow features a unique Services Workflow Orchestration framework that provides subscriber classification and functions chaining, allowing operators to construct subscriber-specific services. The Affirmed Acuitas Element Manager allows for simplified, centralized provisioning and management of Mobile Content Cloud functions and services for greater agility and flexibility. It also integrates seamlessly with the Operation, Administration, and Maintenance (OAM) layer to provide unified visibility and control across the entire network.

Subscriber-Aware Services

With automated resource orchestration and dynamic service chaining, Contrail Cloud not only reduces service provisioning time from months to minutes, it also enables granular customization for the subscriber. Service providers can offer personalized combinations of services quickly and efficiently to satisfy subscribers who want the network their own way. Contrail Cloud can dynamically set up service chains based on subscriber requirements on demand, and program the network to steer different subscribers to different service chains based on their identity.

This use case manifests itself in two ways in mobile and fixed broadband networks:

- **Gi-LAN value-added, application-oriented services for mobile subscribers:** The current practice of deploying mobile value-added services is operationally complex and practically inflexible. Contrail Cloud can transform the mobile services architecture to quickly and cost-effectively support personalized service offerings for mobile subscribers with different tariffs, or dynamically set up different service chains for mobile-connected branches, dial-backup connections, or temporary event connections, presenting new revenue-generating opportunities to mobile operators.
- **Value-added services for broadband subscribers:** Due to the high cost of personalization associated with hardware-based network functions, broadband subscribers normally get one-size-fits-all types of services. Contrail Cloud unlocks the benefits of cloud service automation so that service providers can cost-effectively achieve mass customization, enabling them to rapidly create, deploy, and modify personalized services that increase market penetration and improve customer satisfaction.

Summary—Virtual Revolution, Real Benefits, Now

Service providers are constantly looking for new ways to create and deliver new services faster, at lower cost than traditional approaches. Contrail Cloud delivers a highly automated, scalable, and reliable virtualized solution, allowing service providers to deploy new services faster, innovating and differentiating through simplified operations running on trusted platforms to deliver always-on reliable services. With Contrail Cloud, service providers can transition quickly and efficiently to a virtualized mobile architecture; automate new mobile service introduction through policy and business logic-based orchestration; dynamically scale resources to right-size capacity in the network; effectively manage virtual environments and services; leverage new customer insights through analytics to quickly launch and scale targeted offerings; and realize the scale and security benefits of the telco cloud with a true carrier-grade NFV infrastructure.

About Juniper Networks

Juniper Networks brings simplicity to networking with products, solutions and services that connect the world. Through engineering innovation, we remove the constraints and complexities of networking in the cloud era to solve the toughest challenges our customers and partners face daily. At Juniper Networks, we believe that the network is a resource for sharing knowledge and human advancement that changes the world. We are committed to imagining groundbreaking ways to deliver automated, scalable and secure networks to move at the speed of business.

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