

Contrail Cloud

Product Overview

Since the inception of NFV, service providers have been trying to reap its business and operational benefits.

However, the road to telco cloud is fraught with challenges, including the complexities of integrating disparate product components, coordinating support across multiple vendors, and filling the development and operational skills gap when deploying and operating an NFV solution.

Contrail Cloud simplifies the deployment and operation of telco cloud infrastructure, allowing service providers to navigate the complexities of cloud deployment and operations with a trusted, open, and integrated software stack—without compromising performance, scale, or availability.

Product Description

Juniper® Contrail® Cloud is a fully managed telco cloud solution for running Network Functions Virtualization Infrastructure (NFVI) with always-on reliability and service assurance for virtualized network functions (VNFs).

Contrail Cloud components are tested and integrated to guarantee interoperability, stability, and high performance. Based on open-source technologies such as OpenStack, OpenContrail, and Ceph with standard APIs, the platform provides the freedom to add 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 compatible 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. Juniper Professional and Advanced Services teams can build and operate the entire telco cloud for NFV at a customer's site, providing follow-on operational services and continuous remote managed services as requested to minimize downtime and guarantee SLA compliance.

Architecture and Key Components

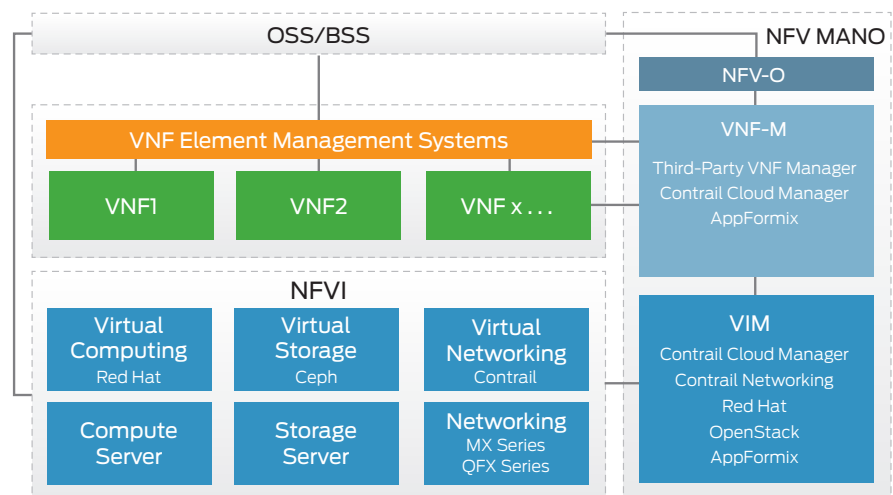


Figure 1: Contrail Cloud architecture



Contrail Cloud includes the following components:

- **Red Hat OpenStack:** OpenStack is the de facto standard for the Virtualization Infrastructure Manager (VIM) layer of NFV. Red Hat OpenStack Platform (RHOSP) is the leading OpenStack distribution developed by Red Hat, 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:** Red Hat Enterprise Linux (RHEL) host operating system, coupled with KVM hypervisor, provides a high-performance compute virtualization layer for virtual machines (VMs).
- **Red Hat 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. Red Hat Ceph is a commercially available version of the Open Source Project.

- **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.
- **AppFormix:** Juniper Networks AppFormix® 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 for Kubernetes, OpenStack, and Amazon Web Services. AppFormix introduces an NFV-centric service assurance capability that leverages machine learning to provide continuous response and learning capabilities for uninterrupted operation. AppFormix comes with an OpenStack, Ceph, and Contrail Networking adapter, which automatically discovers the infrastructure so that VNFs integrated on the Contrail Cloud platform 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.

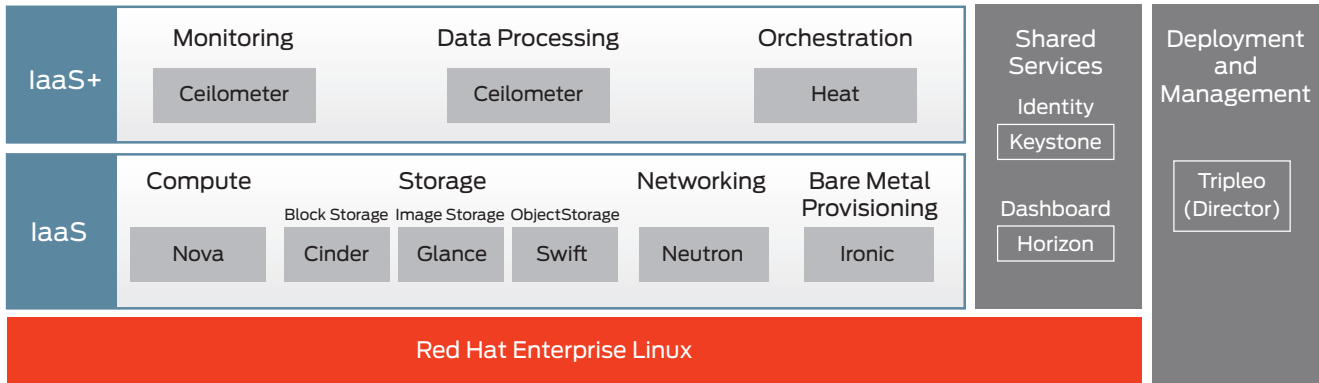


Figure 2: Red Hat OpenStack platform

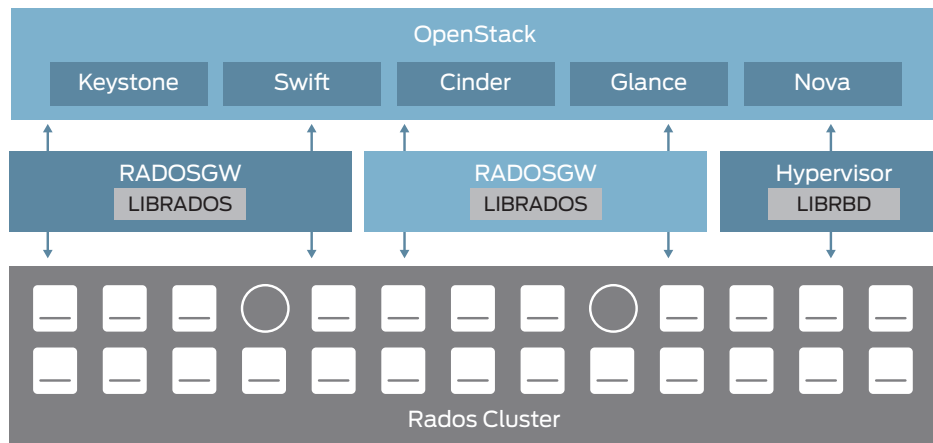


Figure 3: Red Hat Ceph architecture

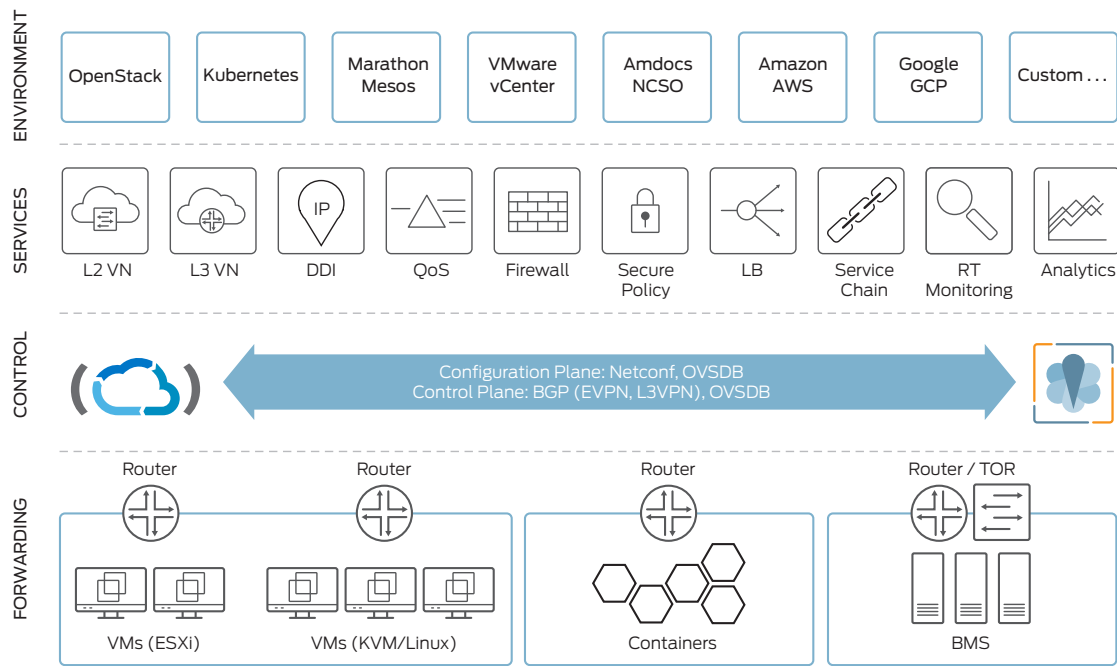
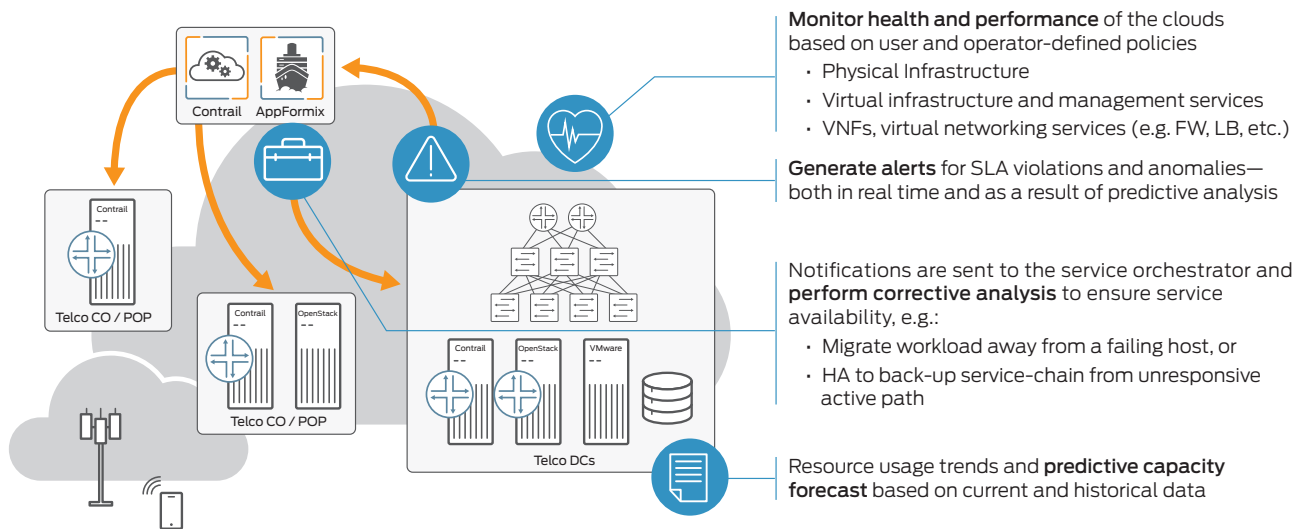


Figure 4: Contrail Networking architecture



- Monitor health and performance** of the clouds based on user and operator-defined policies
 - Physical Infrastructure
 - Virtual infrastructure and management services
 - VNFs, virtual networking services (e.g. FW, LB, etc.)
- Generate alerts** for SLA violations and anomalies—both in real time and as a result of predictive analysis
- Notifications are sent to the service orchestrator and **perform corrective analysis** to ensure service availability, e.g.:
 - Migrate workload away from a failing host, or
 - HA to back-up service-chain from unresponsive active path
- Resource usage trends and **predictive capacity forecast** based on current and historical data

Figure 5: AppFormix Service Assurance for NFV

Use Cases

Contrail Cloud can be preconfigured on Juniper Networks QFX Series switches and MX Series 3D Universal Edge Routers along with a pre-vetted list of compatible servers, guaranteeing a rapid and efficient telco cloud deployment. Contrail Cloud can also be delivered with Affirmed Networks' Mobile Content Cloud (MCC), Juniper Networks vSRX Virtual Firewall, and other third-party VNFs.

When combining Contrail Cloud with validated VNFs, Juniper can deliver a complete end-to-end NFV solution for specific telco use cases such as virtual evolved packet core (vEPC) used to deliver mobile broadband services. New use cases will be added in future releases, including:

- Virtual IP Multimedia Subsystem (IMS)
- Wi-Fi offload
- Mobile edge computing
- Narrow-band Internet of Things (IoT)

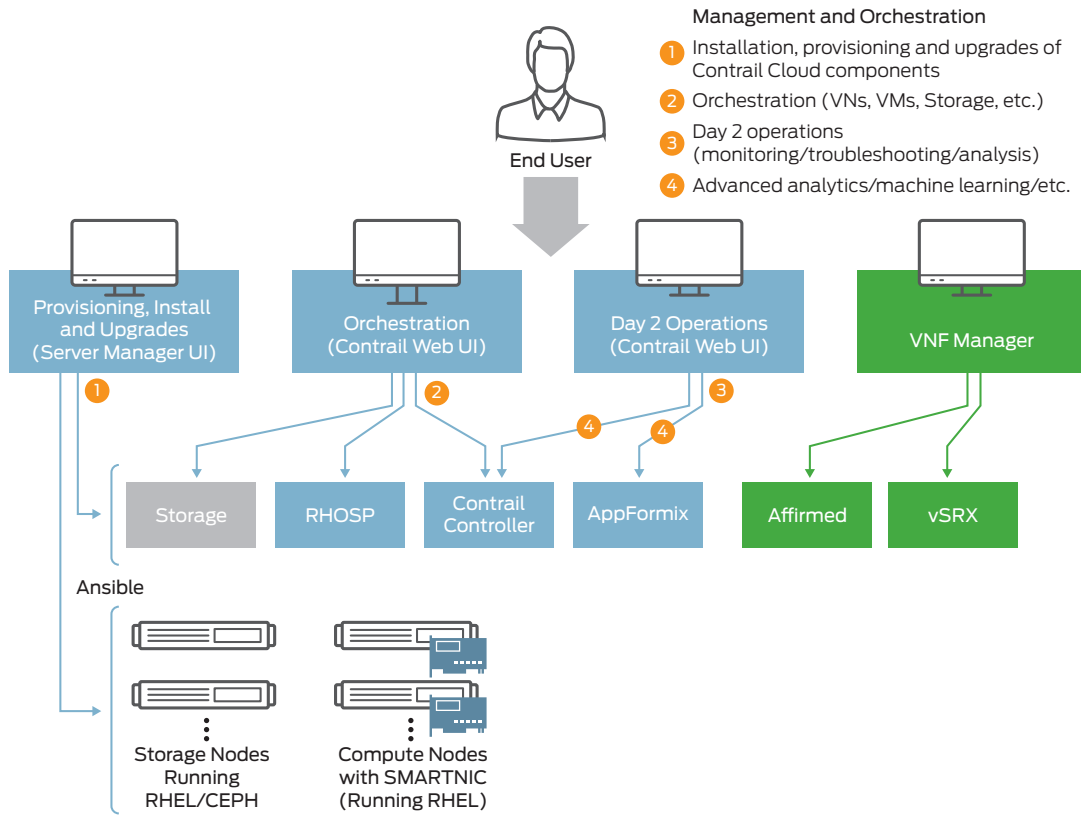


Figure 6: Contrail Cloud Manager

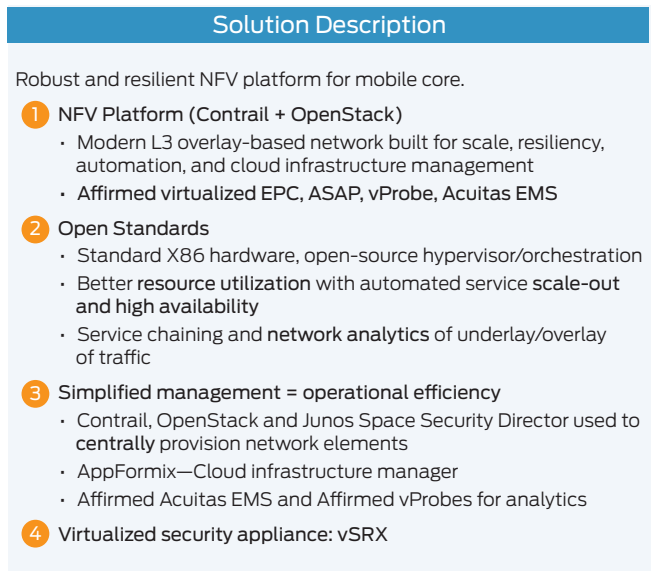
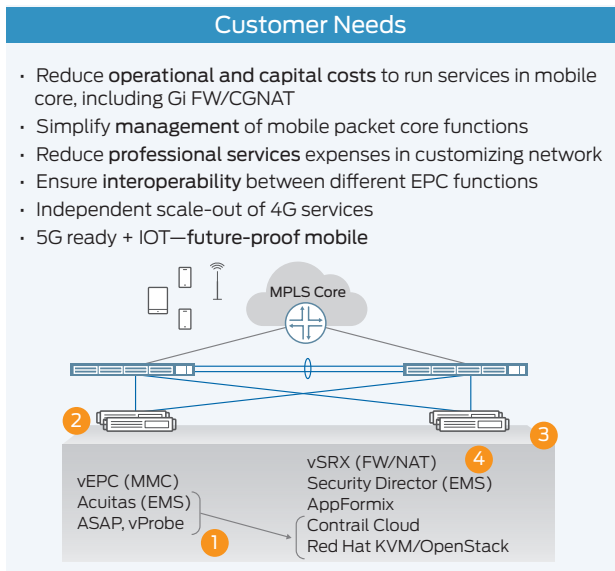


Figure 7: vEPC for GI-LAN/firewall services

Features and Benefits

Table 1: Contrail Cloud Features and Benefits

Feature	Benefit
Single pane of glass automates the provisioning, configuration, and operation of compute, storage, and networking resources needed by cloud applications.	Unified GUI simplifies the application provisioning process while improving operational efficiency and reducing operational costs.
Scale-out software architecture along with in-service software upgrades provide high availability and scalability for both OpenStack and Contrail Networking.	Provides anytime cloud availability for the operation, activation, and management of new and existing application workloads.
SR-IOV- and DPDK-enabled vRouter performs hardware acceleration and vRouter data path offload on SmartNIC hardware.	Improves cloud performance over legacy OVS-based implementations through better resource utilization, reducing CapEx and OpEx.
AppFormix provides actionable, real-time optimization and continuous analysis of key metrics.	Guarantees efficient resource utilization.
Local optimizations for shared CPU resources and global optimizations for workload placement ensure high performance and reliability.	Accelerates prediction of potential failures, enabling proactive responses to prevent service impact.
Predictive analytics offer: <ul style="list-style-type: none"> Comprehensive cross-layer monitoring of workloads, infrastructure, and services Performance optimization and resiliency through state-driven automation and orchestration Real-time visibility and alarms, as well as reporting and capacity planning tools 	Utilizes predictive analytics powered by machine learning to issue alerts and take remedial action before performance problems impact users, ensuring SLA compliance.
Validated VNFs are integrated with proven, industry-leading components.	Accelerates telco cloud deployments to drive faster time to revenue.
Service instance model enables VM cluster horizontal scale out and load balancing for any service function.	High-performance vRouter and service model unleashes vEPC and Gi-Service performance.
Juniper offers managed services to plan, build, and operate the telco cloud.	Enables users to focus on delivering innovative services to customers, driving faster time to revenue.

Specifications

Server Specifications

Role	CPU	Memory	Disk	Network	Qty.	Benefit
Undercloud Host	Intel Xeon 2600v4 series	128 GB	1 x 480 GB SSD (Cassandra Journaling) 2 x 1 TB HDD (SW RAID)—Host OS 3 x 1 TB HDD—Data	2 x 10 Gbps: VM traffic 2 x 10 Gbps: Storage traffic 2 x 1 Gbps: IPMI and management	1	NA
Controller Host	Intel Xeon Platinum 8100 series	256 GB	1 x 480 GB SSD (Cassandra Journaling) 2 x 1 TB HDD (SW RAID)—Host OS 3 x 1 TB HDD—Data	2 x 10 Gbps: VM traffic 2 x 10 Gbps: Storage traffic 2 x 1 Gbps: IPMI and management	3	NA
Compute Host	Intel Xeon Platinum 8100 series	256 GB	2 x 1 TB HDD (SW RAID)—Host OS 4 x 1 TB HDD—Data	2 x 10 Gbps: VM traffic or 2 x 25 Gbps: SmartNIC (optional) 2 x 10 Gbps: Storage traffic 2 x 1 Gbps: IPMI and management	16	18
Storage Host	Intel Xeon Gold 6100 series	256 GB	2 x 1 TB HDD (SW RAID)—Host OS 5 x 480 GB SSDs—Ceph Journaling (1:8) 40 x 1 TB HDDs—Ceph OSDs 3 x Spares	2 x 10 Gbps: VM traffic 2 x 10 Gbps: Storage traffic 2 x 1 Gbps: IPMI and management	3	6

Network Specifications

Role	Model	Quantity (1 Rack)	Quantity (Additional Rack)
Leaf TOR Switches	Basic Network Fabric	QFX5110-48S	2
	Advanced Network Fabric	QFX5110-48S	4
	SmartNIC	QFX5200-32C	2
Spine Switches	Basic Network Fabric	QFX10002-72Q	2 for every 18 racks
	Advanced Network Fabric	QFX10002-72Q	4 for every 36 racks
Gateway Router	MX480	2	NA
Management Switch	EX4300-48T	2	2

Ordering Information

Product Number	Description
CNTR-CL-CTRL-1	Contrail Cloud Controller; includes OpenStack, 64 TB storage, AppFormix, 10 Compute nodes with Contrail Base and NFV Pack—1 Year (support included)
CNTR-CL-CMP-1	Contrail Cloud; license for 1 managed Compute includes Contrail Base, NFV Pack, OpenStack, AppFormix—1 year (support included)
CNTR-CL-256TB-1	Contrail Cloud Storage, up to 256 TB—1 year (support included)
CNTR-CL-1PB-1	Contrail Cloud Storage, up to 1 PB—1 year (support included)

Controller SKU is required; all other SKUs based on capacity consumption (compute, storage).

Controller SKU includes 10 Compute Nodes licenses, and 64 TB storage.

Contrail Cloud product SKUs for annual subscription licenses include support.

About Juniper Networks

Juniper Networks challenges the status quo with products, solutions and services that transform the economics of networking. Our team co-innovates with customers and partners to deliver automated, scalable and secure networks with agility, performance and value. Additional information can be found at [Juniper Networks](#) or connect with Juniper on [Twitter](#) and [Facebook](#).

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