

# Contrail Networking

## Product Overview

Contrail Networking is a simple, open, and agile cloud network automation product that leverages SDN technology to orchestrate the creation of highly scalable virtual networks. Combining a scale-out architecture featuring open interoperability with physical routers and switches, Contrail can elastically scale infrastructures beyond data center or cloud boundaries to facilitate dynamic workload mobility in a hybrid environment. Service providers can use Contrail Networking to accelerate the deployment of innovative new services, while enterprises can use it to increase business agility by enabling the migration of applications and IT resources to more flexible private or hybrid cloud environments.

## Product Description

Enterprises are under increasing pressure to meet dynamic business needs by adopting cloud architectures and delivering Infrastructure as a Service (IaaS) to their internal departments. Transitioning to the cloud from legacy data centers requires the adoption of an integrated architecture built around the orchestration of virtualized compute, storage, and network resources.

Service providers are also under pressure to rapidly monetize new and differentiated services to generate revenue while reducing CapEx and OpEx. For many traditional network service providers as well as new cloud service providers, expanding their portfolio to meet the needs of Network Functions Virtualization (NFV) and XaaS (i.e., IT as a Service, Software as a Service, etc.) is seen as the path to increasing monetization and differentiation. Offering these innovative services, however, requires a new approach to networking the cloud.

Enterprises and service providers expect to seamlessly migrate their existing physical infrastructure—incorporating millions of dollars of equipment and years of operational experience—to the cloud era without having to “rip-and-replace.”

For enterprises, Juniper Networks® Contrail Networking interoperates with OpenStack cloud orchestration platform to enable system-level automation and orchestration. It reduces the friction of migrating to cloud architectures by providing a virtualized networking layer that seamlessly delivers switching, routing, and networking services (security, load balancing, VPNs, etc.) over an existing physical network. It also provides API compatibility with public clouds like Amazon Web Services (AWS) for seamless workload provisioning in hybrid environments.

For service providers, Contrail Networking automates network resource provisioning and orchestration to dynamically create highly scalable virtual networks and to chain a rich set of Juniper or third-party virtualized network functions (VNFs) and physical network functions (PNFs) to form differentiated service chains on demand. Integrated with a cloud management platform such as OpenStack, Contrail Networking enables the agile creation and dynamic scaling of service instances with high availability and reliability. Contrail Networking also makes it really simple to onboard network functions onto the platform without requiring any API integration or modifications to third-party service software.

Contrail Networking's advanced analytics capabilities provide deep insights into application and infrastructure performance for better visualization, easier diagnostics, rich reporting, custom application development, and machine automation.

Contrail Networking is also designed as scale-out cloud native software to orchestrate virtualized networking for the most demanding elastic hybrid and public clouds, as well as the service provider's NFV infrastructure. Based on proven open networking standards, open APIs, and the OpenContrail open source project, Contrail Networking integrates with OpenStack through the Neutron plug-in. Delivering predictable business agility and a low

cost of ownership, this cloud networking platform will enhance and future-proof your investment in creating IT as a Service (ITaaS) with DevOps automation and bringing applications to the cloud.

On the journey to an agile and connected future, it's best to work with an innovative technology leader who understands the enterprise and service provider industries intimately—a partner with significant experience in both networking and IT who builds solutions based on open principles. Contrail Networking stands out by delivering software-defined cloud networking and cloud service automation in a way that gives customers freedom of choice, intelligent automation, and always-on reliability.

## Architecture and Key Components

Contrail Networking is comprised of the following key components:

- **Contrail Networking Controller** integrates with OpenStack cloud orchestration platform and with service provider operations support systems/business support systems (OSS/BSS). It sits between the orchestration system and network devices (physical underlay and virtualized appliances) and communicates via published RESTful APIs. Contrail Networking Controller has the following software components:
  - **Configuration:** Accepts requests from an orchestrator for provisioning a virtual machine (VM) and assigning a network, converting these high-level requests into low-level requests that can be understood by network elements.
  - **Control:** Interacts with network elements and directs network provisioning for a VM using Extensible Messaging and Presence Protocol (XMPP). This plane, which is logically centralized and physically distributed, is responsible for maintaining ephemeral network state. It interacts with its peer control planes using industry-standard BGP and ensures network uptime at all times.
  - **Analytics:** Collects, stores, correlates, and analyzes information across network elements. This information, which includes statistics, logs, events, and errors, can be consumed by end-user or network applications through Contrail's northbound RESTful API and can be analyzed with SQL style queries.
- **Contrail Networking vRouter** is part of the compute node, which gets reachability information from the control plane and ensures native L3 services for host-based virtual machines. Each vRouter is connected to at least two control planes to optimize system resiliency.

## Key Features

**Switching and Routing:** Hypervisor forwarding plane provides line-rate routing and switching in a multitenant virtualized environment that is completely decoupled from the underlying physical fabric switches.

**Load Balancing:** Load balancing is built right into the hypervisor's forwarding plane for balancing traffic across application tiers or network services.

**Security and Multitenancy:** The use of L3VPN to create virtual networks inherently provides a secure multitenant environment, where virtual networks cannot talk to each other without policies. The Contrail Networking vRouter has built-in distributed firewall capabilities that allow users to define security policies between virtual networks. The security policies can specify additional virtualized network services such as the Juniper Networks Firefly Perimeter application-aware firewall; and distributed threat prevention using Juniper Networks WebApp Secure, which can be spun up between virtual networks.

**Elastic, Resilient VPN:** L3VPN, E-VPN, and site-to-site IPsec are all delivered in software.

**Gateway Services:** Contrail interoperates with most routing equipment that supports L3VPN or E-VPN with the appropriate data encapsulation standards, including Juniper Networks MX Series 3D Universal Edge Routers to seamlessly connect to legacy workloads and non-virtualized physical services.

**High Availability:** All Contrail Networking components are made highly available and offer active/active redundancy. Each Contrail Networking vRouter is connected to a set of control planes and gets the same routing table and access control lists (ACLs).

**Analytics Services:** Rich visualization and diagnostics of virtualized and physical networks enable real-time and historical infrastructure analytics that can be consumed through RESTful APIs. Users can also view live packet capture of traffic between virtual networks.

**API Services:** RESTful API for configuration, operation, and analytics provides seamless integration with OpenStack or service provider OSS/BSS systems. This includes Virtual Private Cloud (VPC) API compatibility for seamless deployment of applications in a hybrid environment (e.g., private cloud and public cloud/AWS).

## Key Benefits

- Provides a simple way to connect physical networks with a virtual environment and provision underlying services, reducing the time, cost, and risk for customers when configuring the network
- Enables easy provisioning and management of network and security services through service chaining, which enhances the efficiency and agility in how customers deploy and use network resources

- Eliminates the risk of vendor lock-in for customers by leveraging a standards-based architecture that integrates with a wide variety of hypervisors, server operating systems, physical networks, and OpenStack distributions
- Seamlessly integrates with most industry switches and routers today, including Juniper Networks EX Series Ethernet Switches, QFX Series Switches, and MX Series routers, providing customers a quick and easy migration path to SDN without any disruption to underlying physical network architecture and investment
- Accelerates the connection of virtual resources and enables the federation of private, public, or hybrid cloud environments, increasing the speed of business and service innovation for customers by making the network more dynamic, flexible, and automated
- Enables fast troubleshooting and diagnostics through unique analytics capabilities, allowing customers to more intelligently and efficiently manage their networks

## Key Functionality

### Open Source, Open Standards for Seamless Interoperability:

Contrail Networking eliminates the need for rip-and-replace by supporting many standards-based protocols, enabling interoperability in a multivendor physical infrastructure to maximize investment protection. In addition, complete source code and product binaries are available under the Apache v2.0 open source license for all of our customers and partners. For more details and latest status, please visit [www.opencontrail.org](http://www.opencontrail.org).

**Network Virtualization:** Contrail Networking provides a robust network virtualization solution by leveraging the L3VPN standard for IP overlays, the E-VPN standard for L2 overlays, and a multitude of data encapsulation standards like MPLS over generic routing encapsulation (MPLSoGRE), MPLS over User Datagram Protocol (MPLSoUDP), Virtual Extensible LAN (VXLAN), etc. The VPN containers provide a clean approach to multitenancy and alleviate the challenges associated with a VLAN-based or L2-based segmentation approach (limited number of virtual tenant networks, instability associated with L2 switching technologies, extensibility across data center locations, and so on).

**Dynamic Service Chaining:** Contrail Networking provides dynamic service chaining of virtualized or physical network functions that simplifies the creation, deployment, and management of differentiated network services. Connecting these network functions through proven open networking standards, Contrail Networking simplifies integration with Juniper and third-party service software and has nurtured a rich technology ecosystem of partners who offer services on top of the platform. It is a key ingredient that enables service personalization and deployment of massively scalable and highly available VNFs for NFV.

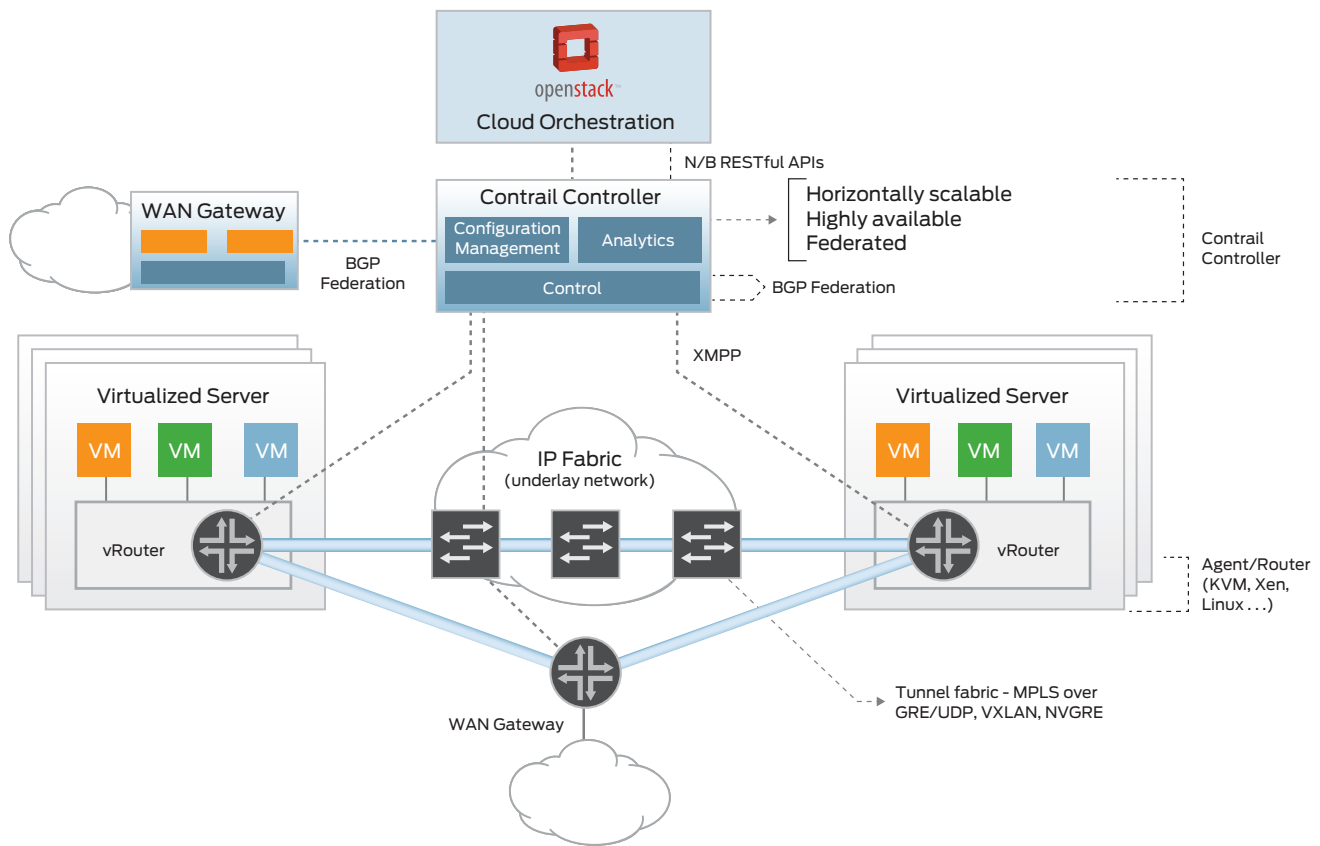
**Network Programmability and Automation:** Contrail Networking exposes the concept of “SDN as a compiler” by translating abstract high-level commands into specific rules/policies to automate the provisioning of workloads and enable service chaining of network and security services. The customer can request VM connectivity without getting into the details of underlying elements like ports, VLANs, subnets, switches, routers, etc. In addition, a unified information model for configuration, operation, and analytics is exposed through RESTful APIs, as well as libraries in various programming languages such as Python, Javascript, and Java, to name a few.

**Infrastructure Analytics and Visualization:** Contrail Networking provides insights into virtual and physical networks to simplify operations and decision making through proactive planning and predictive diagnostics. The analytics engine is designed for very large-scale ingest and querying of structured and unstructured data and is exposed using RESTful APIs and a rich GUI. This gives the user better insights to easily diagnose issues in the infrastructure, as it provides both real-time and historical information on application usage, infrastructure utilization, system logs, network statistics like flows, latencies, jitter, etc. In addition, users can employ RESTful APIs and modern programming frameworks like Hadoop to write custom applications for reporting and/or infrastructure automation.

## Contrail Networking Use Cases

Contrail Networking provides both service providers and enterprises with a dynamic and scalable network architecture to provision applications in a matter of seconds. Enterprises and service providers can use Contrail Networking to:

- Deploy private or public clouds
  - Provide multitenancy with complete isolation and full role-based access control (RBAC) capabilities
  - Automate for rapid network provisioning and services like routing and load balancing
  - Enable self-service for application developers and DevOps teams
- Deploy hybrid clouds and create VPC in a service provider public cloud
  - Move workloads seamlessly between private and public clouds
  - Ensure API compatibility with third-party cloud providers like AWS
- Automate NFV through service chaining of any network and security service
  - Provide service orchestration of any Juniper or third-party network and security service (physical or virtual)
  - Enable cloud customer premises equipment (CPE) and managed network services like security, guest access, etc. for service provider IP-VPN customers



- Enable virtualized evolved packet core (EPC) for consolidation of services such as mobility management entity/Serving GPRS Support Node (MME/SGSN), S-GW, etc.
- Provide virtualized subscriber or business edge with chaining of services, including deep packet inspection (DPI), security (firewall, anti-DDOS), proxies, and caching
- A subscription software license includes Juniper Care Software Advantage, entitling you to software updates and upgrades, 24x7 remote technical support, and online support.
- A perpetual software license excludes Juniper Care Software Advantage; the latter must be purchased.

## Specifications

### System Recommendations and Operating Environment

- Orchestration System: OpenStack
- Hardware: 64-bit dual x86 processor, minimum memory 12 GB RAM
- Storage: 30 GB Serial Advanced Technology Advancement (SATA), Serial Attached SCSI (SAS), or solid-state drive (SSD); Volume storage: 2 disks with 2 TB SATA
- Network: 1 GB interface card (1)
- OS: Linux OS (CentOS, RHEL 6.4, Ubuntu 13.x)

## Ordering Information

This product adheres to the Juniper Software Advantage pricing model; thus, please be advised of the following items that constitute an order:

- Select a software license based on the number of sockets required. The license is either subscription (fixed term) or perpetual (unlimited term).

- If your order includes a hardware product/platform, select a hardware license based on your networking, connectivity, and/or security requirements (e.g., interface options, I/O, services). You may need to purchase additional licenses in support of the base hardware license (e.g., power cables, network interface cards).
- If this is a virtual appliance/software product, you would not buy any hardware license from Juniper, but instead would procure the hardware elsewhere. For information on supported hypervisor(s) and VM requirements, please refer to the technical documentation for this product on our website ([www.juniper.net](http://www.juniper.net)) under the support section.

Juniper Networks products are sold directly as well as through Juniper partners and resellers. For information on how to buy, please visit: <http://www.juniper.net/us/en/how-to-buy/index.page>

## About Juniper Networks

Juniper Networks is in the business of network innovation. From devices to data centers, from consumers to cloud providers, Juniper Networks delivers the software, silicon and systems that transform the experience and economics of networking. The company serves customers and partners worldwide. Additional information can be found at [www.juniper.net](http://www.juniper.net).

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