AGILITY WITHOUT COMPROMISE WITH JUNIPER SDN

Simplify operations, increase agility, accelerate services, and cut costs with a software-defined network powered by Juniper

Challenge

As cloud adoption accelerates and more organizations rely on cloud-based applications, the network has become a bottleneck, as traditional networks are not capable of provisioning and deploying applications as fast as organizations require.

Solution

Juniper's switches, routers, orchestration, and management tools work together to deliver a comprehensive, open, intelligent and automated SDN solution, enabling a broad range of organizations—including service providers, enterprises, and emerging cloud companies—to achieve their vision of delivering ITaaS.

Benefits

- Simplify operations
- Increase business agility
- Accelerate service delivery
- Reduce costs

The broad adoption of the next generation of cloud, mobile, M2M, and big data applications is having profound impacts on IT and network infrastructures. Compared to traditional applications, these applications have much shorter life cycles. You must be able to spin them up, spin them down, and grow and shrink them on demand. Furthermore, you must be able to move these application workloads within a data center or across geographically distributed data centers, resulting in increased management complexities.

Chances are you've been adopting more and more SDN-type approaches when it comes to virtualizing your networks and supporting your cloud-building activities through the use of SDN technologies. But to maximize the power of SDN, you need a strategy that ensures freedom of choice so your network can evolve over time without being locked into legacy systems. Juniper has compiled a broad portfolio of products that delivers a leading SDN solution that separates your network's brains and brawn, enabling you to take a centralized network view for more efficient orchestration and automation. By unchaining the network from its inflexible past, you can lower TCO, accelerate time to market, and scale up and down to meet changing market demands.

The Challenge

Organizations like yours want to architect their networks to meet the connectivity and service requirements of a wide range of increasingly dynamic applications. To do that, you need the network to be policy-driven, programmable, scalable, and automated. But the traditional way of implementing networking and services in hardware makes networks static, rigid, manual, and unable to respond to application requirement changes rapidly.

Juniper has identified three distinct types of organizations that can benefit from SDN. They each approach SDN from slightly different starting points. However, they all drive towards the same business goals of improving application performance, business agility, and cost reduction.

- **Service providers**—If you're a service provider such as a telecommunications firm, you're seeking to improve the performance of the network functions that form the foundation of the services you sell to customers. You want to leverage the biggest asset you have: your carrier network. By leveraging network services virtualization and service orchestration, you hope to achieve the ultimate elastic cloud. To do this, you need to be able to program network resources and paths in real-time response to traffic patterns and loads to be more efficient, enable business agility, contain CapEx and OpEx, and meet elastic service turn-up requirements.

- **Enterprises**—If your business is an enterprise, your IT investments are driven by your need to flexibly deploy and deliver applications to your users while keeping costs as low as possible. Hybrid clouds represent the next evolution in enterprise cloud architecture, and they promise to deliver ultimate resource elasticity, greatest agility, and scale-out federated architecture performance.

But getting there is a challenge. In your journey from legacy IT data centers to the cloud, you've started off by virtualizing your data center and then adding orchestration software so it has a "cloud-like architecture." However, to achieve true IT as a Service (ITaaS) powered by private cloud infrastructure, you need to fully automate the network, compute, and storage. You also need to integrate the network into the cloud orchestration, and achieve seamless location-independent connectivity. After that, you want to add public cloud into the mix to enable consumption of resources on demand from a cloud service provider's data center to run workloads in conjunction with your own data center. This can only be achieved through public-private cloud integration, location-independent scale-out connectivity, and federated workload orchestration across hybrid clouds.

- **Emerging cloud companies**—If you're pursuing your business agenda by leveraging open cloud infrastructure principles in providing cloud services to your customers, then you're what Juniper calls an "emerging cloud company." You seek to carve out your niche in larger everything-as-a-service (XaaS) markets through nimble and highly sophisticated yet open standards with no vendor lock-in. You recognize OpenStack as the de facto orchestration solution for the cloud infrastructure integrated stack—server, storage and network. However, you're also struggling to manage the different community release versioning, complexities, and shortcomings in storage and networking pieces in terms of scaling, reliability, monitoring, and setup. To mitigate intrinsic risks associated with relying on open source, you seek to achieve a balance between open source, commercial solutions, and community-sourced open source software stacks integrated into commercial alternatives.

The Juniper Networks SDN Solution

Juniper cloud service orchestration and management solutions combine virtual and physical switches, routers, security, and software to form a comprehensive SDN solution that enables a broad range of organizations—including service providers, enterprises, and emerging cloud companies—to simplify operations, increase business agility, and accelerate service delivery.

- **Juniper Networks MetaFabric Architecture**– a key element of the Juniper SDN solution, enabling simple, open and smart networks that accelerate the deployment and delivery of applications within and across multiple data centers and clouds. The MetaFabric architecture is delivered through a tested and validated implementation of Juniper powerful switching, routing, and security platforms leveraging feature-rich silicon, programmable systems, network orchestration, SDN, and open APIs that enable integration with the technology ecosystem.
- **Juniper Networks® Contrail Networking**—a simple, open, and agile SDN solution that automates and orchestrates the creation of highly scalable virtual networks, these virtual networks let you harness the power of the cloud—for new services, increased business agility, and revenue growth.
- **Juniper Networks NorthStar network controller**—a software platform providing online and offline WAN analysis and optimization, NorthStar combines Juniper Networks Junos® operating system carrier-grade peering capabilities with WANDL IP/MPLSView's proven multilayer optimization expertise in a unified, highly integrated controller package.
- **Junos® Space Network Director**—a smart, comprehensive, and automated network management tool that simplifies network operations by unifying wired and wireless management for the complete life cycle of campus and data center networks from a single pane of glass.
- **Juniper Networks SRX Series Services Gateways**—high-performance network security solutions for enterprises and service providers that pack high port density, advanced security, and flexible connectivity into easily managed platforms.
- **Juniper Networks Firefly**—delivers purpose-built security for virtualized and cloud environments and provides flexible and comprehensive protection for enterprises and service providers by delivering a multilayered solution that secures traffic from all directions.

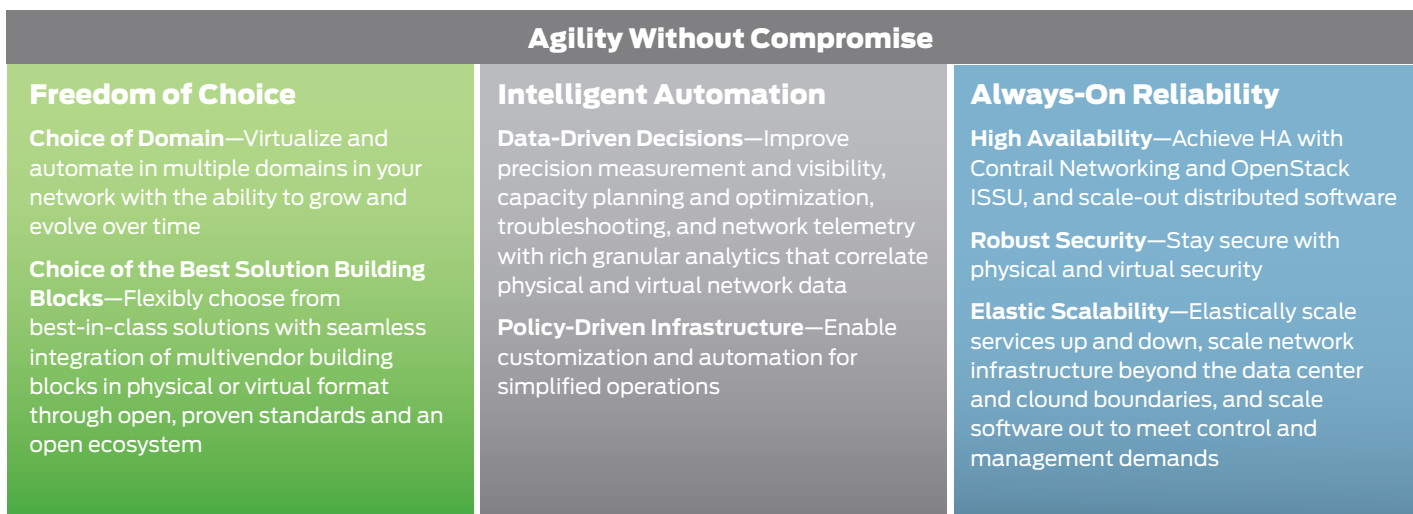| Agility Without Compromise		
Freedom of Choice	**Intelligent Automation**	**Always-On Reliability**
Choice of Domain—Virtualize and automate in multiple domains in your network with the ability to grow and evolve over time **Choice of the Best Solution Building Blocks**—Flexibly choose from best-in-class solutions with seamless integration of multivendor building blocks in physical or virtual format through open, proven standards and an open ecosystem	**Data-Driven Decisions**—Improve precision measurement and visibility, capacity planning and optimization, troubleshooting, and network telemetry with rich granular analytics that correlate physical and virtual network data **Policy-Driven Infrastructure**—Enable customization and automation for simplified operations	**High Availability**—Achieve HA with Contrail Networking and OpenStack ISSU, and scale-out distributed software **Robust Security**—Stay secure with physical and virtual security **Elastic Scalability**—Elastically scale services up and down, scale network infrastructure beyond the data center and clound boundaries, and scale software out to meet control and management demands

Figure 1: Juniper SDN provides agility without compromise

- **Service control gateways (SCGs) and service delivery gateways (SDGs)**—provide consolidated network service delivery and automation based on Juniper Networks MX Series 3D Universal Edge Routers for either Juniper or third-party services. Subscriber-aware service chaining and service auto scaling in the Juniper SDN solution deliver significant efficiencies as well.
- **Juniper Networks EX Series Ethernet Switches, QFX Series switches, MX Series routers, and PTX Series Packet Transport Routers**—provide highly optimized routing and switching forwarding planes, enabling Juniper's SDN solution to interconnect multiple data centers and clouds seamlessly.

Features and Benefits

The Juniper SDN solution gives you freedom of choice, intelligent automation, and always-on reliability.

- **Freedom of choice**—Juniper delivers a production-ready SDN solution covering multiple use cases and spanning multiple network domains. No rip and replace of existing infrastructure is required, making it easy for you to get all of the advantages of SDN while protecting your existing networking investments. You avoid expensive vendor lock-in with an open architecture that interoperates with a wide range of networking and service options: physical or virtual; implemented in hardware or software; Juniper or third party. This empowers you to choose best-in-class building blocks for your SDN solution with seamless integration of multivendor solutions in physical or virtual format through open, proven standards and an open ecosystem. You also get

your choice of domain (data center, WAN, core, edge, access, and campus), and can virtualize and automate in multiple domains in your network with the ability to grow and evolve over time.
- **Intelligent automation**—Juniper allows you to simplify operations and lower OpEx through a policy-driven infrastructure that is highly responsive to network and service requirements. A feedback loop powered by rich, granular analytics lets you make data-driven decisions. The correlation of physical and virtual network data points improves precision measurement and visibility, capacity planning and optimization, troubleshooting, and network telemetry. This ability to automate network and service scaling and tuning greatly improves resource provisioning and creates new opportunities for network monetization.
- **Always-on reliability**—Juniper SDN solution is based on scale-out distributed software that is highly available, always-on, and elastic, as well as Network Equipment Building System (NEBS)-compliant for service provider deployments in various scenarios. Enhanced security integrated with cloud platforms ensures robust security with perimeter- and hypervisor-level security that uses open source for transparency. Juniper SDN solution also ensures that you can elastically scale services up and down, scale your network infrastructure beyond data center and cloud boundaries, and scale software out to meet any control and management demands.

	Open	Intelligent	Reliable	Automated
Orchestration OpenStack, CloudStack, Third-Party Orchestration Systems	REST APIs to third-party orchestration systems; OpenStack	Open to support third-party analyst engines; policy rendering	OpenStack deployed in HA mode	Common plaform for physical, virtual NF orchestration and management
Control Contrail Networking, NorthStar	OpenContrail; MP-BGP and VPN to the host	Contrail Networking analytics, overlay underlay analytics correlation; Contrail Networking policy engine	Scale-out distributed software and ISSU; multi-DC and inter-cloud federation; virtual security	Respond to dynamic network changes in automated fashion
Services SCG, SDG, SRX Series, Firefly, DDoS Secure	Support for third-party VNFs	Range of interfaces to policy engines (PCRF, AAA) Works with existing policy servers	High-availability security; data center security	Subscriber-aware service chaining; service auto-scaling
Forwarding MX Series, vMX, Switch Fabric	Physical or virtual, multivendor interoperability	Physical status; Network Director 2.0	NEBS-compliant hardware; HA and ISSU	Chef, Puppet, and Mirantis fuel integration; Network Director

Figure 2: Juniper SDN overview

Solution Components

- **Orchestration**—Integrated with orchestration software, Juniper SDN automates the entire infrastructure across compute, storage, and the network so that applications and services can be set up, scaled up, or scaled down on demand. Orchestration allows all resource allocation and adjustment decisions to be made in a holistic manner based on business processes and infrastructure states. Juniper SDN is integrated with OpenStack as a foundational orchestration technology through Contrail Networking for overlay network control, and Junos Space Network Director for orchestration of network management functions. Juniper's SDN solution can also connect to third-party orchestration systems such as IBM Smart Cloud Orchestration and VMware vCloud through REST APIs. All this delivers a common platform for physical and virtual orchestration management.

- **Control**—With Contrail Networking, you can build virtual networks that interoperate with a wide range of hypervisors, and orchestration systems that integrate seamlessly with existing physical networks. Additionally, the Northstar network controller provides online and offline wide-area network (WAN) analysis and optimization. The overall Juniper SDN solution enables scale-out distributed control software, with multiple data center and inter-cloud federation capabilities. Juniper is also partnering with VMware to integrate NSX controller capabilities on some of its routing and switching products to give you the widest range of controller options. With all this functionality, Juniper SDN allows you to harness your dynamic network changes in a highly automated fashion.

- **Services**—Juniper SDN provides network services such as load balancing, WAN optimization, content caching, deep packet inspection (DPI), or security services such as firewalls. They can be either physical or virtual, running on routers, as standalone appliances, or as virtual machines on compute platforms. The Juniper SDN solution includes both internally developed (SRX Series and Firefly) and third-party virtual network functions (VNFs).

- **Forwarding**—The Juniper SDN forwarding plane can be physical (such as MX Series, EX Series, QFX Series, or PTX Series platforms) or virtual (Contrail Networking vRouter, vMX), and implemented in hardware or software, depending on its location in the network or on performance/scaling requirements. For high-performance and high-scaled systems, forwarding implemented in ASICs tends to provide the same level of performance with a much smaller footprint, power, and cooling compared to software implementations on generic hardware. Juniper's SDN solution supports multivendor interoperability through the use of standards-based protocols in the forwarding layer, and provides intelligent analysis of network statistics using Junos Space Network Director's analytics capabilities.

Summary—Juniper Networks' SDN: Taking You Where You Want to Go

As your company transitions to the cloud or solidifies its position as an early cloud adopter, you're finding that your traditional network is simply not capable of moving as swiftly as you require. SDN is the answer. Juniper Networks offers a comprehensive SDN solution that is open, intelligent, reliable, and automated. Juniper cloud service orchestration and management solutions, together with virtual and physical switches and routers, form a comprehensive SDN solution that enables a broad range of organizations—including service providers, enterprises, and emerging cloud companies—to simplify operations, increase business agility, and accelerate service delivery.

Next Steps

To learn more about Juniper SDN, please visit www.juniper.net or contact your account manager.

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**.

To purchase Juniper Networks solutions, please contact your Juniper Networks representative at +1-866-298-6428 or authorized reseller.

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