Transforming Service Life Cycle Through Automation with SDN and NFV

Automated workflows improve TCO for service delivery

Table of Contents

Executive Summary

The evolution of virtualization technology has accelerated service delivery. Cloud service providers are leveraging these virtualization technologies with automation to roll out new platforms and services. As enterprises shift their communication services to cloud environments, these nimble cloud service providers, unimpeded by legacy processes, have been effectively addressing the market demand for customized services with optimal cost structures through the benefits gained by leveraging virtualization and automation.

To be relevant in today's market, service providers must leverage their expertise in managed network and security services. At the same time, they need to provide automated, on-demand, and programmable virtualized services to create a new service delivery model that exceeds customers' evolving expectations.

This paper describes Juniper Networks' insight for areas to automate that can have an immediate and positive impact on the service life cycle, with direct CapEx and OpEx benefits. Additionally, this paper will discuss how automated virtualization can effectively streamline service delivery, minimize complexity, and deliver highly customized innovative services to customers today and into the future.

Introduction

Software-defined networking (SDN) and Network Functions Virtualization (NFV) are transformational technologies that automate service delivery. Service providers can create a highly programmable network with automated workflows that supports every single step of the service life cycle. Automation simplifies operation, manages complexity, and improves accuracy; it also allows for more complex and personalized services to be constructed without adversely affecting delivery service-level agreements (SLAs). Automation also effectively addresses dynamic market conditions that ultimately improve network scalability and agility.

Today's Challenges

Today's network infrastructures are designed and deployed in a rigid and complex fashion, with hardcoded workflows and limited flexibility. This complexity and rigidity forces most service providers to take a risk-averse approach to service development and deployment, which can take from 12 to 18 months, require large upfront investments, and demand significant resources to integrate, test, and roll out. This approach, however, is contrary to the needs of today's enterprises, which require new and customized services to be developed and delivered rapidly. With automation and efficient service delivery, service providers will be able to quickly roll out new services in order to capture new market opportunities and deliver results for their customers.

Customers from multinational corporations to small and medium sized enterprises are relying on managed network services to support communication and commercial transactions. Under traditional systems, there is a significant time gap between order placement and service delivery. Any subsequent changes in the service life cycle, including modifications, expansion, and updates, are complicated processes that require support visits from the service provider. Customers today demand a flexible and global network where they have the ability to adjust their services to immediately respond to global demands and market conditions.

The challenges to service providers mainfest themselves in the form of cost controls around network, labor, and maintenance to meet customer demands. By leveraging the agility and flexibility realized through an automated virtualized infrastructure, each of these areas can see significant improvements.

Functions to Automate in a Service Delivery Network

Juniper Networks sees automation as having an immediate impact on key functions in a service delivery network. The service life cycle encompasses all of the steps involved in managing service delivery: its conception; order; development; provision; move, add, change, and delete (MACD); expansion; operation; maintenance; policies; reporting; assurance; and optimization. Each step anchored within the life cycle contains a unique set of drivers supporting the overall service delivery objectives. Today, many of these steps are complex and manual processes. Automation effectively streamlines each step and reduces service deployment time.

The following section describes how automation improves each stage of the service life cycle:

- **Order and Fulfillment:** Customers, using a self-care portal, can select a variety of services from a catalog. The order process is intuitive. Using a drag-and-drop graphical user interface, customers can design service parameters, network architecture, and service footprint. Automated fulfillment provisions services based on existing repeatable service templates; configures services based on the customer's parameters; and cross references with the network to ensure optimal performance, resource design, constraints, and allocation. When a customer orders a new service, a management and organization (MANO) layer within NFV dynamically defines initial service configuration, policies, resource pooling, and performance objectives.

- **Configuration Management and Control:** Automation gives customers substantial visibility into and control over their services. Customers have the flexibility to activate, modify, remove, and relocate services. This empowers them with the ability to manage overall network usage, including on-demand and quality-of-service (QoS) levels, while at the same time allowing them to address the elastic behavior of business requirements. For the service provider, these changes and updates translate into configuration changes that can be fully automated across a programmable infrastructure. Changes are pushed out instantly, with fewer errors.

- **Security**: Automated security creates policy-driven user profiles where only authenticated profiles are allowed access to the network. From a customer standpoint, automated security improves overall business process by providing differentiated and secure network access to internal departments, partners, and vendors. From a network operations standpoint, automated security provides encryption and key management, where only authorized customers and applications can access network management and control functions. Automation proactively uses real-time feeds on emerging threats so that security enforcement points within the network can automatically filter malicious traffic without requiring any human interaction.

- **Policies**: Automated policy-based coordination and management provide effective configuration, assurance, control, and enforcement across services and network resources. Service objectives and customer profiles can be incorporated as part of network policy that automatically adjusts network resources, including bandwidth and traffic priorities, allowing the network to dynamically provide differentiated services and adjust to ever-changing market conditions.

- **Assurance**: Network assurance capabilities provide automated error detection and fault reporting. Error information is collected at each network component and aggregated to provide a global view on service-level impact. Customers are notified immediately with a status update, potential cause, trouble resolution, as well as identified impacts. Network operations can, based on fault reporting, recover or reroute services to limit network disruptions.

- **Performance**: Quality across network element is constantly monitored, analyzed, and benchmarked against specific Key Performance Indicators (KPIs). Performance capabilities also include usage metrics and capacity analysis, allowing network operations to take a proactive approach toward traffic engineering while maintaining service performance objectives.

- **Analytics**: An analytics capability automatically collects and analyzes information across network domains, assembling a real-time operational picture of end-to-end services, network components, and both physical and virtual network infrastructures. Analytics ensure that network operations have real-time visibility and access to critical data needed to accelerate capacity planning, traffic prediction, and expansion decisions. Analytics and usage reports can also be applied toward network optimization; this proactive approach improves network performance, reduces downtime, and increases agility.

- **Usage and Reporting**: Automated reporting features collect and measure usage patterns, traffic volumes, and any specific service component usage of network resources. This usage information is compiled and presented in on-demand or scheduled reports.
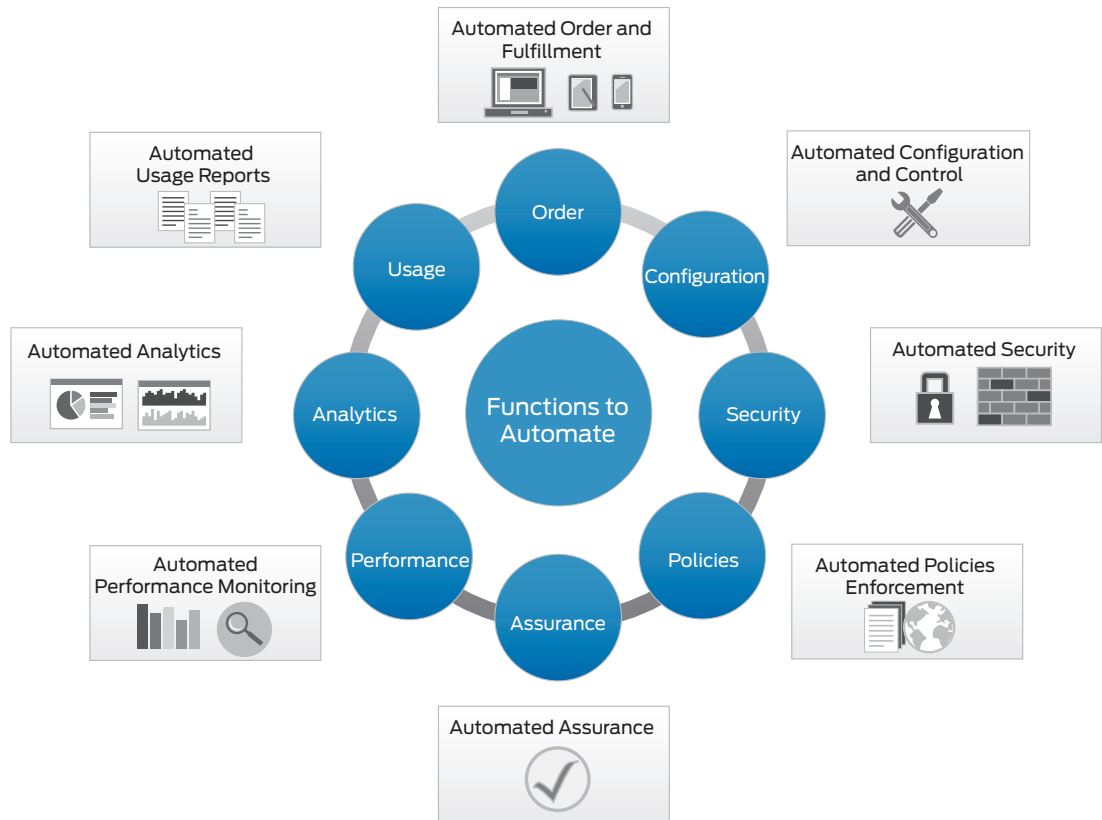
Figure 1: Functions to automate in a service delivery network

To realize the full benefits of SDN and NFV, service providers must adopt a DevOps approach for product and application development. DevOps is an IT best practice that brings together teams of developers and operations professionals to rapidly and iteratively develop and implement new products and services. An integrated development and operational team will foster idea sharing with emphasis on people over processes, achieve a higher risk tolerance, continue process improvement, and ensure quality, availability and security of services. Additional information on how Juniper supports DevOps with the Juniper Networks® Contrail Cloud Platform can be found here.

Benefits of Automation

Business and operational process excellence is imperative to the success of service providers in today's highly competitive world. With SDN and NFV, service providers have the ability to create highly programmable networks and Telco clouds. Utilizing a seamless blend of virtual and physical infrastructure, an automated Telco cloud drastically simplifies operations and enables operationally efficient management, orchestration, and fulfillment of services.   The opportunity is to migrate complex tasks requiring intensive manual processes with automated workflows.

Figure 2 illustrates a manual workflow for service deployment in today world, while Figure 3 demonstrates the same workflow in an automated service delivery network.
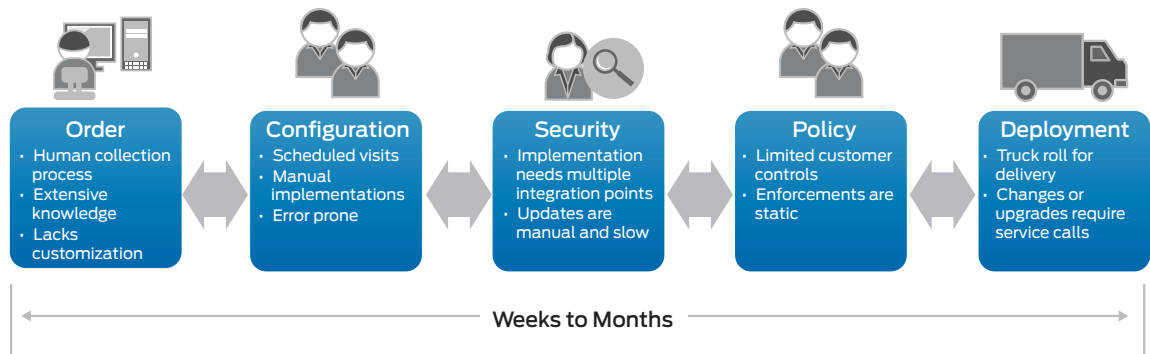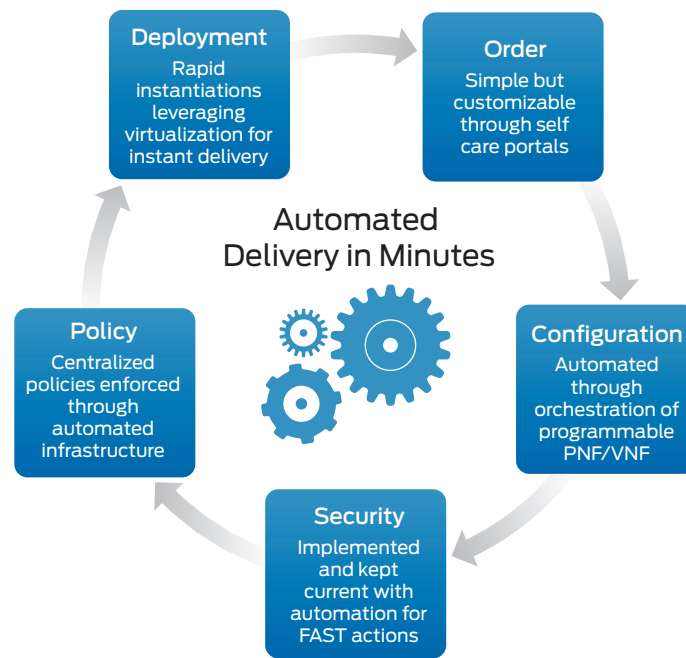

Figure 2: Manual service deployment

Figure 3: Automated service deployment

Implementing this automated approach across multiple workloads in a service delivery network can fundamentally reduce cost structures across network, labor and maintenance, improving overall productivity. Areas for measuring the impact on business operations include:

- Fulfillment cycles
- Deployment timelines
- Maintenance procedures
- Time to repair
- Time to market and sales cycle
- Productivity in the labor force

These represent a small sample of the potential impacts that automation can have on service provider business and operational metrics. The adoption of automation will also result in a 40% to 80% savings in operating expenses, depending on network and operational variables.

Deliver Automation with Juniper's NFV Solution

Juniper offers an automated and programmable end-to-end NFV solution—the only one that combines carrier-grade reliability and security bundled with intelligent automation to address every step of the service life cycle. Juniper's market-leading NFV platform consists of three components:

- **NFVI**—The Network Functions Virtualization Infrastructure consists of Juniper Networks MX Series 3D Universal Edge Routers as the routing foundation; SRX Series Services Gateways to perform traffic analysis and policy enforcement; and data center and cloud networks based on Juniper Networks MetaFabric™ architecture.
- **VNFs**—Juniper is one of the first vendors to introduce virtualized network functions, including our carrier-grade vMX virtual router, IP VPN, and an expansive virtual security services platform with the vSRX.
- **MANO**—Contrail Cloud Platform is an integrated cloud management platform that serves as the foundation for Juniper's open cloud networking and NFV solutions. Contrail Cloud Platform delivers carrier-grade automation and orchestration of services, storage, and networking resources, enabling the creation of differentiated services that meet dynamic business needs with speed, agility, and flexibility.
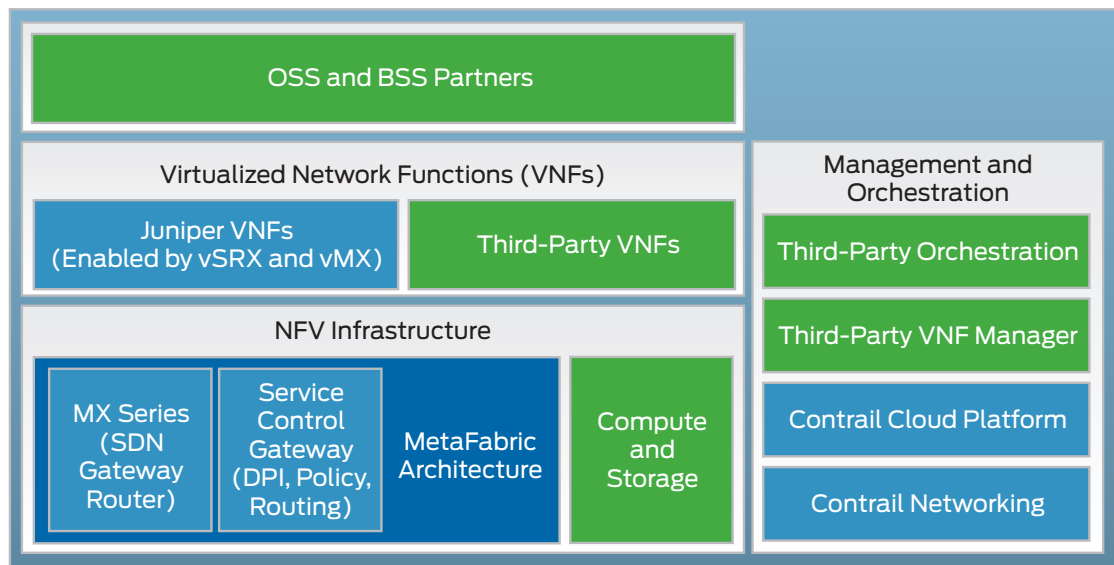
Figure 4: Juniper's NFV solution architecture

NFV Use Case: vCPE

Customer premises equipment (CPE) is a prime example of how automation and programmability can drive improved operational efficiencies. CPE has traditionally been part of a managed on-premise service such as VPN and security. Capabilities and functionalities are limited to the hardware and software platform deployed with the initial CPE rollout. Deployment is a time-consuming process where CPE must be ordered, configured, scheduled, and provisioned. Installation is labor-intensive and requires a truck roll. Any subsequent repairs or changes require manual updates across databases and network elements. Chances of errors are high, where a mistake in one component could ripple through and disrupt the entire network.

Virtual CPE (vCPE) is the virtualization of all CPE functions, where newly virtualized components can be managed and upgraded independent of the hardware. vCPE revolves around an x86 appliance that replaces multiple dedicated CPE hardware devices. vCPE supports a variety of customizable VNFs, including IP VPN, virtual firewalls, and other security applications at that provider edge. Customers can order these customized VNFs from a self-care portal, and service is automatically provisioned and orchestrated into the appliance from a telco cloud.

With vCPE, service providers can rapidly deliver consistent and repeatable services. A centralized MANO layer automates service delivery in minutes. New services, capacities, and policies can be dynamically inserted into existing vCPE, improving scalability and eliminating overprovisioning. Service changes and security updates can be automatically reconfigured, replacing traditional labor-intensive processes and reducing the likelihood of errors and network interruptions. Usage reporting and analytics provide real-time visibility to service performance and access to critical data to improve capacity planning.

Juniper has been at the forefront in delivering vCPE and on-demand VNF to service providers. The implementation of vCPE with automated service delivery enables service providers to drastically improve agility, flexibility, speed of delivery, and TCO. Additional information about Juniper's vCPE solution, as well as customer use cases, can be found here.

Conclusion

Automation with NFV represents a new paradigm in service deployment. Virtualization changes the economics for service providers, removing the need for large upfront costs and enabling agility and flexibility. However, the true promise of NFV can only be realized with an intelligent automated framework that supports every phase of the service life cycle. The result of operational excellence reduces overall TCO of the service delivery network.

The introduction of automation in a virtualized network provides an efficient method to deliver innovative VNF to customers today. By combining best-in-class virtual and physical infrastructures with an open NFV platform, virtualization effectively streamlines service provisioning, minimizes complexity, and reduces time to market, driving business results while meeting customer expectations.

Juniper has an unwavering commitment to open standards. It is our belief that the future of networking will experience multiple changes, and NFV will continue with the tremendous pace of innovation. Only an open approach, with feature parity across both virtual and physical platforms, will truly deliver the most flexible and agile automated NFV solution.

For more information about Juniper's NFV solution, please visit www.juniper.net. To inquire about the opportunity to automate, contact Juniper Networks Sales at 866-298-6428. To assess how automation can improve your services, please schedule an appointment with your local Juniper account representative or contact Juniper Networks Professional Services via e-mail at proservsales@juniper.net.

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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