The NFV Service Edge

Networks that know how to customize the user experience for each and every subscriber

Challenge

Service providers want to be more responsive to customer needs and quickly adapt the network to meet emerging demands. Today's infrastructures are so rigid, however, that this process can take weeks and even months.

Solution

NFV offers a dynamic, agile environment for lowering costs and creating subscriber value. Juniper's service edge is a gateway to creating and managing an agile telco cloud architecture that drives new service creation, greater revenue streams, and lower operational costs.

Benefits

- Combines knowledge (DPI), understanding (policy) and execution (traffic steering) into a single service selection platform
- Helps service providers create and deliver dynamic, policy-driven service offerings by automating service paths through physical and virtualized network elements
- Drives faster service creation, new revenue streams, and lower operational costs.

For service providers, the ability to quickly develop and deliver new services for their subscribers makes the difference between success and failure.

Technologies such as SDN and NFV are essential to enabling service providers to modify and fine-tune network resources in real time to provide unique and customized networking experiences. With a virtualized telco cloud environment, service providers can literally establish new policies that route traffic through new service chains and begin experimenting with new revenue-generating functions by the end of the day, not the end of the month.

Juniper combines deep packet inspection, policy, and traffic steering into a single platform, offering an intelligent anchor point for the edge of an NFV deployment and ultimately a telco cloud evolution. Juniper's Service Control Gateway (SCG) allows service providers to optimize network resources and deliver customized service experiences to their subscribers, creating a network that knows how to deliver a unique experience for subscribers, and new value for service providers.

The Challenge

Service providers today are embracing the telco cloud—the virtualization and distribution of functionality throughout the network to achieve greater agility in lowering expenses while establishing a platform for new service innovation.

Technologies like SDN and Network Functions Virtualization (NFV) give service providers the unprecedented ability to adapt network resources in near real time, making it possible to deliver customized networking experiences based on factors such as device, location, appliances, and subscriber type.

Typically, today's service providers employ a "service delivery complex," which is typically a static collection of appliances that provide a specific set of capabilities to optimize the network and enable services. While this collection of appliances usually resides north of the subscriber termination function—broadband network gateway (BNG), evolved packet core (EPC), cable modem termination system (CMTS), or other—the need for the services complex is universal and independent of access network type.

Whether subscriber, location, or device, all traffic—regardless of type—typically passes through this single, monolithic "service chain," making it impossible to route appropriately. As a result, service providers must resort to overprovisioning to guarantee sufficient capacity. For instance, if a particular service or appliance is only required by 10% of the traffic but that traffic is impossible to isolate from the rest, the provider must secure enough capacity for 100% of the traffic just to ensure that the 10% is processed. Clearly this is not an efficient or cost-effective use of resources. This arrangement also makes it operationally difficult to move, add, or change applications. Implementing functionality is nearly impossible, preventing service providers from experimenting with or innovating new service elements.

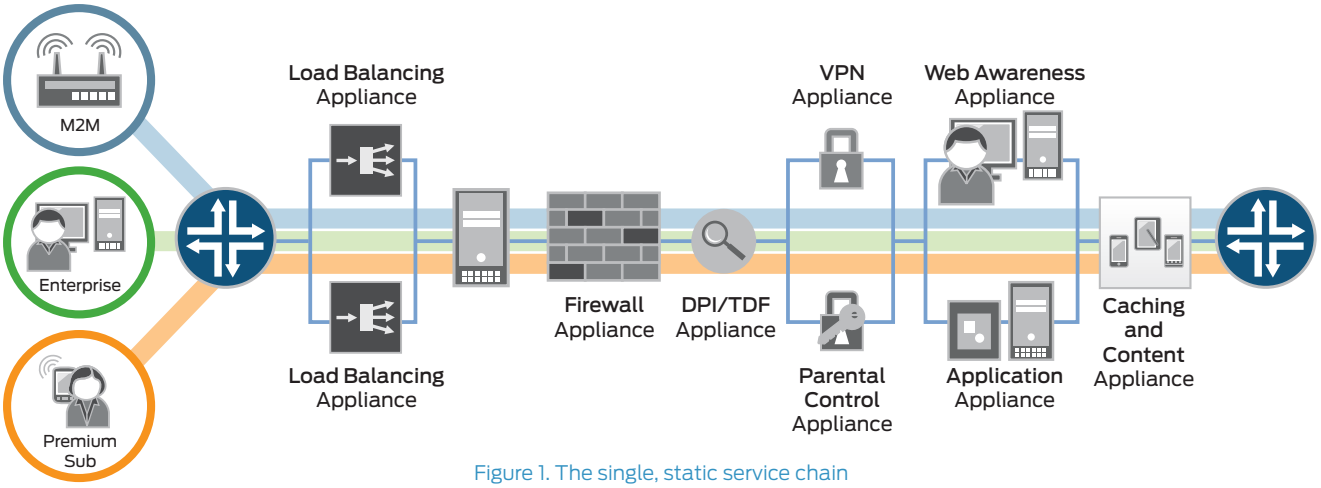

Figure 1. The single, static service chain

The Juniper Networks NFV Service Edge

Built on the award-winning, high-performance Juniper Networks® MX Series 3D Universal Edge Routers, Juniper's intelligent NFV service edge solution serves as the anchor point for a broader telco cloud evolution. Additional software can be combined with the MX Series, depending on the application and deployment requirements, to create an NFV service edge for businesses and enterprises, for broadband (DSL/cable) subscribers, and for mobile subscribers.

Juniper's Service Control Gateway (SCG), an MX Series router with integrated L4-L7 deep packet inspection/ traffic detection and granular traffic steering functionality with policy interfaces, gives service providers maximum visibility into and control over their customers' network usage. The service control gateway can also be combined with other embedded networking functions (such as carrier-grade NAT and firewall/ load balancer) to consolidate components of the service delivery complex into a single network element.

Service Selection Made Easy

As traffic enters the service control gateway, the deep packet inspection (DPI) function identifies and classifies it based on four central properties: subscriber type, device type, application, and location. With knowledge of the traffic flow in place, the policy engine selects the appropriate service path into/through the service delivery complex. Once these policies are pushed into the service control gateway, and traffic is quickly routed into a unique service tunnel based on the defined characteristics.

Juniper is simplifying service selection by combining network functions together (DPI, policy interface, traffic steering). As a result, service providers can create unique service chains based on any combination of these properties.

For example, due to potential security vulnerabilities, a service provider may wish to target all traffic from early versions of Android and route it through a secondary level of security to ensure that the data is clean. Or, at the request of a large enterprise customer, a service provider may create a set of specific services and capabilities designed to add value to the service offering, or drop a new Facebook optimization engine into the service chain as a virtual machine and establish a policy to route traffic through it.

Driving Operational Savings at the NFV Service Edge

While the service control gateway can be used with existing, appliance-based service chains, its true power comes when it is combined with a virtualized service edge as part of a broader telco cloud initiative. As service appliances are transformed into virtualized network functions as part of an NFV conversion, the service control gateway and its Traffic Detection and Steering Function (TDSF) capabilities for the policy control and enforcement function are needed to steer traffic to the appropriate service paths.

The use of SDN and NFV orchestration systems to automate the instantiation of network functions, as well as the scale up/scale out of capacity, results in an automated service delivery complex. Network functions are created, scaled, and adapted as virtualized objects. Inserting new virtual functionality is an easy, point-and-click operation with Juniper Networks Contrail, which is Juniper's SDN/NFV controller for establishing a new virtual route path between objects in seconds.

A Platform for Service Creation

While there are tremendous operational benefits to be derived from intelligent traffic detection and steering, the real value in the NFV service edge is the ability to drive new revenues. Classifying traffic and routing it to the appropriate set of network functions helps right-size network elements while enabling service providers to charge based on the capabilities or services being delivered.

The service control gateway's billing/policy interface enables it to report what traffic is routed through which service chain, establishing an end-to-end accounting of the subscriber, device, application, and/or location of all traffic passed through each chain. Centralizing the control point for service chains enables service providers to establish different rates for traffic, from zero to premium, based on the service chains it runs through.

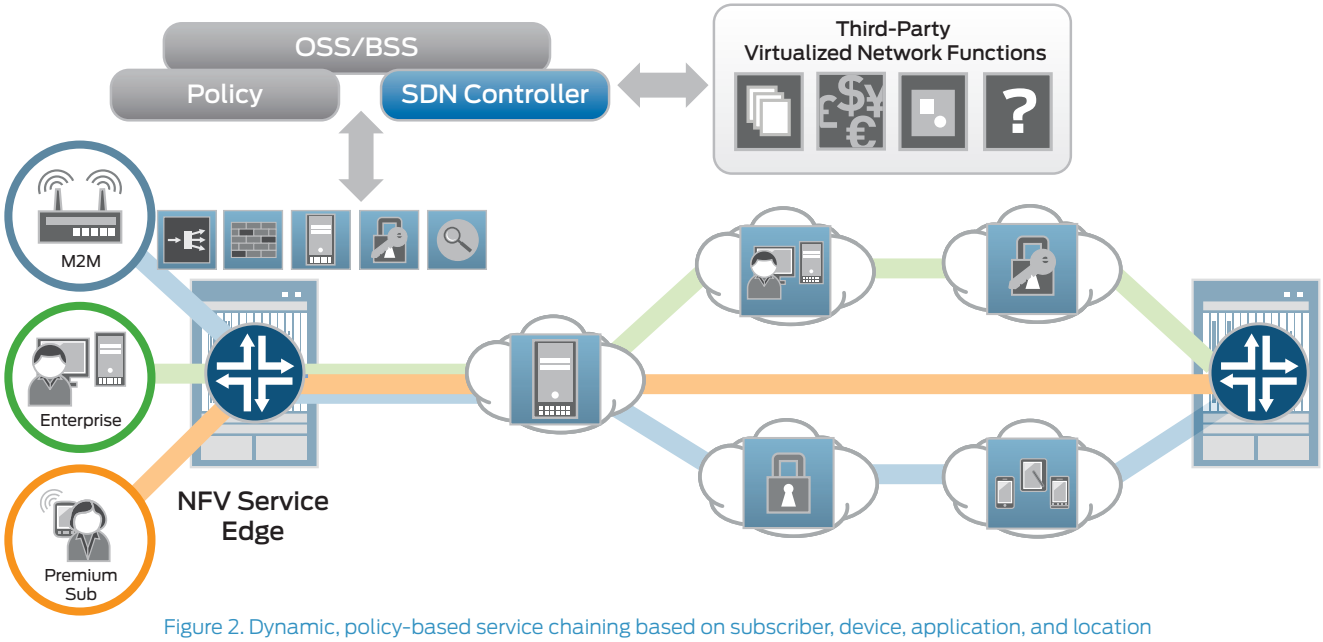

Figure 2. Dynamic, policy-based service chaining based on subscriber, device, application, and location

The agility that comes from a virtualized telco cloud turns the generic service delivery complex into a platform for service innovation. Whereas before it was difficult, costly, and time-consuming to insert new applications and appliances into the service chain, dropping in a virtualized object can now be accomplished in a matter of minutes. Service providers can literally establish new policies that route traffic through the new service chain and begin experimenting with new revenue-generating functions by the end of the day.

> "The integration of Juniper Networks high-performance technology as a "service hub" brings increased flexibility to introduce new service features to our customers. We leverage Juniper's expertise to make SDN/NFV technologies the key to shortening time to market and improving cost effectiveness."
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> Paolo Fasano,
>
> Data Networks Innovation, Telecom Italia, June, 2014

Features and Benefits

For many service providers, whether they provide residential (cable, DSL), business (VPN), or mobile access, the services complex is a rigid, monolithic structure. Moves, additions, and changes can take weeks or even months to complete. Juniper's NFV service edge is the gateway to creating and managing an agile telco cloud architecture to drive faster service creation, new revenue streams, and lower operational costs.

Juniper's service control gateway has been designed specifically as a platform for simplifying NFV deployments.

- **Service consolidation:** The service control gateway brings together three critical elements—understanding who and what is using the network; anticipating and knowing what to do; and automating and executing the requirements. The consolidation of these capabilities into a single platform creates an NFV service edge solution that provides the anchor for a truly intelligent telco cloud.
- **Access network-agnostic:** The service control gateway can be deployed with a mobile service core (Gi LAN) or with cable, fixed, and even business services. Service providers can consolidate and normalize service delivery for customers regardless of access type. Policies can be implemented and enforced uniformly, regardless of device (smartphone, tablet) or access network (LTE, DSL, Wi-Fi).
- **Deployment flexibility:** Juniper believes in a pragmatic, evolutionary approach to NFV and supports a range of deployment options. These include existing physical network elements while adding new virtualized network functions, distributing NFV service pools throughout the network, or consolidating them into large data centers.
- **Simplified billing/charging:** Rather than having each network element handle accounting and billing, the service control gateway tracks usage through specific service chains on a per-user and per-device basis, simplifying the billing of services as well as accounting for software usage.

Solution Components

The Juniper Networks service control gateway was designed to meet the flexibility and scalability requirements of an NFV service edge. Built on the industry-leading MX Series router platform, Juniper's service control gateway has several key capabilities which give service providers precise control over traffic, as well as the ability to create a differentiated experience for their subscribers.

- **Deep packet inspection:** DPI capabilities have been available for years, but traditional approaches have been missing a key component—traffic steering and network routing. By combining DPI with a full-featured routing platform, Juniper provides extremely granular control over how traffic is routed and ensures a favorable user experience.
- **Policy interfaces:** The MX Series supports interfaces to existing policy management systems such as policy and charging rules function (PCRF) and authentication, authorization, and accounting (AAA), enabling networking policies to be made once, then initiated and enforced directly on the gateway.
- **Traffic detection and steering:** Based on DPI results and driven by requirements from the policy engine, the service control gateway provides line-rate traffic routing and steering into dynamic "service chaining."
- **Contrail service orchestration:** Contrail, Juniper's NFV service orchestration component, automates the creation of network paths based on policy and service templates. Contrail's L3 IP VPN approach simplifies connectivity between and with both physical and virtualized network elements.

In defining the NFV service edge, Juniper has created an intelligent service node with the knowledge, agility, and performance to enable service providers to create and implement truly differentiated services and delight their customers.

Summary—Juniper NFV Service Edge Solution Redefines Service Delivery

Technologies such as SDN and NFV make it possible for service providers to tune and modify network resources in real time to provide unique and customized networking experiences for their subscribers. Juniper Networks offers an intelligent anchor point for the telco cloud evolution that allows service providers to optimize network resources and deliver customized service experiences.

The NFV service edge solution, built on Juniper Networks MX Series 3D Universal Edge Routers and service control gateways, gives service providers unparalleled visibility into, and control over, their customers' network usage.

By combining high-performance routing, L4-L7 traffic detection and steering with policy control and enforcement, the Juniper NFV service edge solution tells service providers who is using their network and how, providing a level of detail never available before. This application-aware networking ensures that resources can be tuned and adjusted in near real time to create a customized experience that customers can be billed for with unprecedented accuracy.

Next Steps

For more information about Juniper's service control gateway, or Juniper's vision for the telco cloud, please visit us at www.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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