

Get Control of Your Cloud with IBM Cloud Orchestrator and Juniper Networks Contrail



Redguides
for Business Leaders



- Enabling service providers to achieve revenue growth in a commodity marketplace
- Leveraging technological advances for flexibility and profit
- Evaluating two complementary solutions with significant combined benefits



Executive summary

Perhaps more than members of any other industry, communications service providers (CSPs) are on the bleeding edge of change, whether they are prepared for it or not. With technological advances moving at unprecedented speeds, “just keeping up” is no longer a viable option for service providers who expect to sustain long-term growth and future profitability.

As mobile subscriber growth slows, voice revenues decline, average revenue per user drops and network infrastructure is strained by the surge in data usage, CSPs are seeking new ways to reduce costs, optimize their networks and innovate new sources of revenue. We believe one response that holds significant promise for tomorrow is combining the benefits of virtualizing network functions with the automated orchestration of cloud computing services.

These two innovations when leveraged together give CSPs not only greater flexibility to offer new services more quickly, but also help drive down both capital expenditures (CapEx) and operating expenses (OpEx), both prerequisites for sustainable growth and achieving a rapid return on investment (ROI).

Relying on traditional physical network functions often bogs down the speed of adaptation while adding to infrastructure sprawl and potentially raising costs at every turn. By embracing automated cloud services and network virtualization, CSPs can create, connect, and reconnect networks in seconds. In most instances, analytics also play a large role in helping service providers visualize the network, specifically, traffic patterns-to shine a brighter light on future revenue-generating opportunities. Clients are demanding the flexibility that comes from hybrid (a blend of public and private) clouds, along with the ability (and in some cases, the requirement) to interface with public cloud platforms. That means service providers need agile systems and a smarter network to maintain a competitive advantage.

We believe, without question, the two most critical tools that can help service providers generate additional revenue and lower costs going forward are these: 1) a comprehensive portfolio of automated cloud capabilities, including a cloud infrastructure, delivery, and aggregation platform; and 2) proven network virtualization tools (such as software-defined networking (SDN)) to add flexibility to the infrastructure and drive down costs. Deployed together, these solutions provide the agility that CSPs require to meet future undiscovered client needs and find new revenue streams.

Business challenges

As the world grows more digitally connected, global consumption of telecommunications services continues to increase. At the same time, revenue forecasts for CSPs are virtually stagnant for one simple reason: the costs of providing the infrastructure for more data continue to climb faster than any growth in revenue. Known as the “operator’s dilemma,”¹ this paradoxical combination of growing demand with shrinking revenue growth and lower profit margins has the potential for extreme fiscal damage.

CSPs need to find new, innovative ways to drastically simplify operations to reduce costs, while investing in all-digital network services and deploying analytics to focus on customers’ behaviors and preferences. You need to put systems and infrastructure in place with the speed, flexibility, and dexterity to react to, even anticipate, client needs. This kind of transformation of the entire CSP network infrastructure requires new thinking and new technologies that can work together to lower costs, increase productivity, and improve agility. The daunting challenge facing virtually all CSPs is to grow revenue at a faster pace than the costs to deliver that revenue and virtually every CSP in the world is looking for answers.

Extend virtualization from the data center to your network

Virtualization has proven itself a reliable, elastic, cost-effective technology for tasks like CPU utilization and storage optimization. By creating multiple virtual compute nodes and storage partitions, enterprises around the world have already found that virtualization can:

- ▶ Reduce the expenses of equipment acquisition
- ▶ Save on both floor space and power and cooling costs
- ▶ Simplify systems administration

By combining systems management into centralized locations, IT personnel with moderate training can now efficiently manage what once required substantial amounts of system admin experience and know-how, helping lower your resource costs.

However, at the same time, these advances have created new formidable challenges for senior IT management, including:

- ▶ Finding ways to achieve results without adding to data center sprawl and complexity
- ▶ Managing the growing volume of heterogeneous equipment and vendors
- ▶ Providing communications compatibility between operating systems
- ▶ Maintaining complementary high-speed cross data center pathways

As has likely been experienced in past expansions of your IT infrastructure, replacing physical devices with virtual services must be automated in order to affect a dramatic improvement in productivity. In short, making a transformational move from physical assets to virtual ones requires companies and solutions you can trust. You need proven results from vendors who have the capabilities and expertise to handle your challenges effectively, efficiently, and with minimal impact on operations.

Combining cloud orchestration and network virtualization can help you address four key challenges:

1. Enable delivery of services by integrating the CSP infrastructure from the transport, core, and backhaul networks into the packet core, and across heterogeneous access

¹ Chetan Sharma, “Operator’s Dilemma (And Opportunity): The 4th Wave”, Chetan Sharma Consulting, 10 September 2013, retrieved at: <http://www.chetansharma.com/OperatorsDilemmaFourthWave.htm>

2. Use network and subscriber analytics to break down silos of insight and data - allowing operations, marketing, customer care, and engineering teams access to information that can simplify network processes and reduce OpEx while maximizing operational efficiency
3. Transform the network infrastructure, reduce costs, and improve the user experience across fixed and wireless infrastructure by optimizing and integrating IT and network technology with network functions virtualization (NFV), SDN, real-time operations support systems (OSS), and analytics
4. Support policy, charging, and control in the network to intercept network events in real time and monetize the experience and content of those events

Business value for an integrated platform for cloud service creation, delivery, and management

Implementing new IT strategies is essential for CSPs to create networks that are more agile, smarter, and more efficient. Regardless of your established or strategic role in the communications value chain, top-performing service providers need to optimize operations globally to rationalize, digitize, and integrate processes that remove complexity, and uncover new efficiencies. These changes can help infuse speed and flexibility into your organization while dramatically reducing both overall and unit costs.

The power and potential of the API

Your subscribers expect access to all of their communications services, applications, and content on demand, on the device of their choice. Supporting these demands, and positioning your company for the constant change that is inevitable, requires not only new thinking, but an innovative approach to service creation and delivery based on an adaptable platform that simply and flexibly connects new applications, content sources, and devices to network capabilities.

Such a platform exposes services and features as application programming interfaces (APIs) and also leverages cloud technology to minimize capital expenses. This arrangement gives developers outside the CSP the freedom and capabilities to build and contribute their own services and applications-activities that can improve your revenue with significantly less expenditures than current service creation processes.

As CSPs move from controlling the entire service creation process to cultivating an ecosystem that taps the creativity of the global developer and service provider community, you can expand your value proposition. IBM® and Juniper Networks believe CSPs will be in an ideal position to drive enterprise mobility with bring your own device (BYOD) support and specialized services for industries such as banking, transportation, IT, and healthcare.

Using your cloud to sell their services

It is increasingly common for carriers to include services operated by others using syndicated cloud services. This new approach offers considerable advantages over traditional delivery models.

This new model allows you to expand your offerings portfolios more rapidly and with less up-front capital investment. It also enables you to bundle services from various providers and offer them through your own online storefronts. By doing this, you keep your own operations lean while providing the convenience of a single bill to the subscriber. This approach helps

contain the costs of innovation while expanding your brand, even though more new services are hosted outside the CSP's domain.

Another major emerging category of services that builds on this foundation is machine-to-machine (M2M) connectivity for the Internet of Things (IoT). Many of the newest devices connecting to mobile and fixed networks are sensors, actuators, meters, and cameras.

Creating the kind of network with the agility, elasticity, and capabilities to take maximum advantage of these exciting new revenue opportunities requires two key components:

1. A cloud infrastructure that includes the intelligence and reliability of an orchestration engine to dynamically manage virtualized services, and optimize workloads, resources, and services.
2. A software defined network controller that can serve as a network function virtualization enabler in service provider networks, supporting dynamic service chaining and IP flow-based traffic steering.

With both of these pieces of the puzzle in place, CSPs can realize significant savings by replacing physical customer premises equipment (CPE) with network function virtualization, as shown in Figure 1.

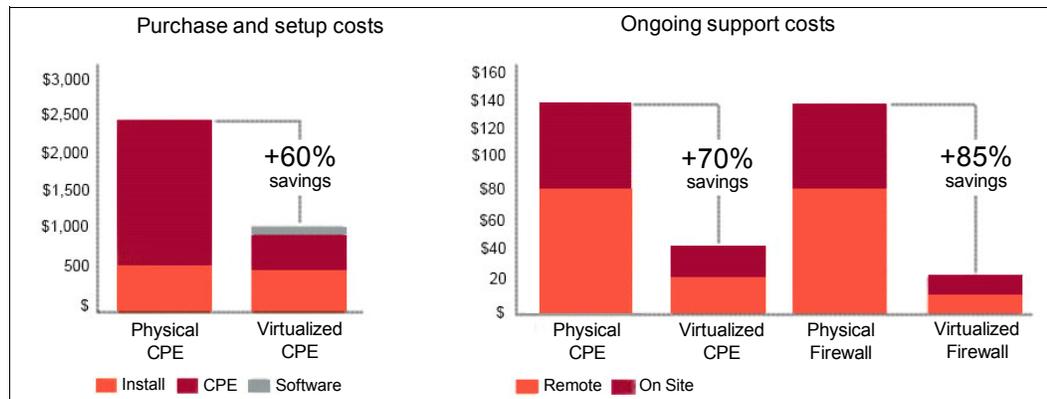


Figure 1 Savings with network function virtualization versus physical assets

About the IBM Cloud Orchestrator and Juniper Networks Contrail solution components

The combination of IBM Cloud Orchestrator and Juniper Networks Contrail offers CSPs a comprehensive platform that allows the transfer of network functions from dedicated hardware to the service provider edge or data center complex (see Figure 2 on page 5). The two individual components involved, IBM Cloud Orchestrator solution and Juniper Networks Contrail software-defined networking solution, work together in a unique way to help CSPs expand and customize services at a relatively lower cost than traditional processes.

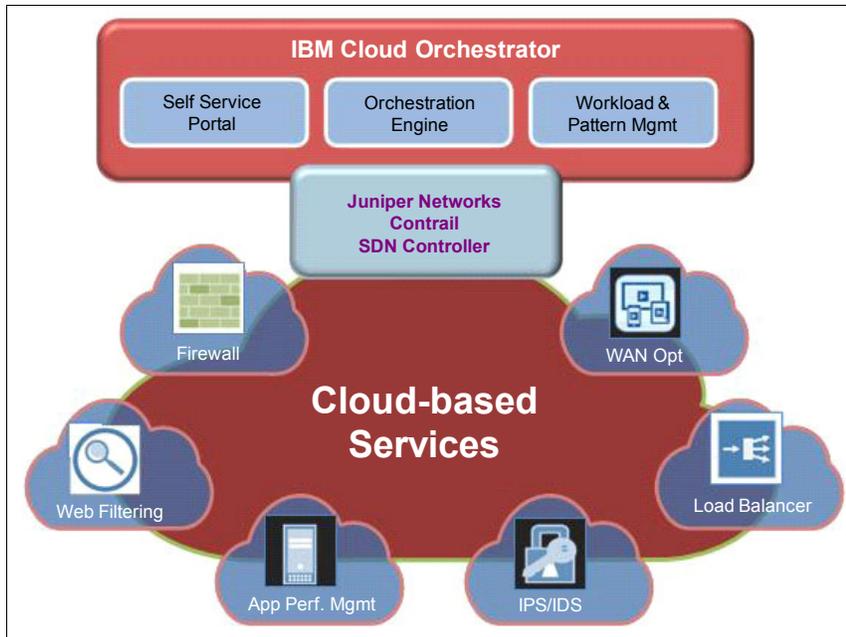


Figure 2 Agile cloud-based service delivery

IBM Cloud Orchestrator: Simplifying cloud management and data center automation

The primary responsibility of the IBM Cloud Orchestrator solution is to orchestrate - the automated deployment of data center resources, cloud-enabled business processes, and cloud services. IBM Cloud Orchestrator provides cloud management for your IT services, allowing you to accelerate the delivery of software and infrastructure. Based on open standards, it reduces the number of steps to manage public, private, and hybrid clouds with an easy-to-use interface.

Cloud Orchestrator gives you access to ready-to-use patterns and content packs helping to speed configuration, provisioning, and deployment. It integrates management tools such as metering, usage, accounting, monitoring, and capacity management into your cloud services. It also empowers IT staff to create, maintain, and reuse infrastructure, middleware, and application templates across heterogeneous environments, whether automating just one business process or the entire data center. These templates are a way to deliver applications with more efficiency than manual scripting, and they provide building blocks for standardizing processes and creating repeatability for faster service delivery.

CSPs can add new power to self-created tools and help simplify management of the orchestration process. Built on a foundation of open standards, the IBM Cloud Orchestrator solution provides common cloud services for compute, storage, and network resources, while also supporting multiple hypervisors and multivendor platforms. It is designed to simplify and speed the creation of process workflows that can help shorten deployment times and change processes in the cloud to help lower the cost of introducing services.

IBM Cloud Orchestrator is based on open standards, including OpenStack, and uses community-provided best practices. It cannot only easily integrate with an existing environment, but also scale and adapt to changing needs.

The IBM Cloud Orchestrator solution supports three tiers of cloud management services:

- ▶ Infrastructure services: Integrate configuration, provisioning, resource allocation, and capacity monitoring across highly flexible, heterogeneous environments.
- ▶ Platform services: Simplify deployment and lifecycle management of middleware and application patterns, ideally with planned support of the Topology and Orchestration Specification for Cloud Applications (TOSCA) standard from the Organization for the Advancement of Structured Information Standards (OASIS).
- ▶ Orchestration services: Automate setup and deployment of complex IT tasks, as well as specific cloud-deployed business processes - leveraging existing skills, processes, and technology artifacts, ideally with support of the Open Services for Lifecycle Collaboration (OSLC) standard from OASIS.

IBM Cloud Orchestrator enables CSPs to build and manage a workload-optimized dynamic cloud, which helps improve the utilization of IT resources and cut licensing and hardware costs. The self-service portal enables users to request services quickly and simply. The entire configuration and integration of existing tools such as network devices, firewall rules, and load balancer policies during service deployment is handled automatically without complexity. This can greatly simplify building, deploying, and managing infrastructure as a service (IaaS) and platform as a service (PaaS) services.

To help meet the most stringent service level agreements, Cloud Orchestrator also provides a single interface for monitoring the health and performance of the cloud environment, tracking both virtual and physical infrastructure components, including network and storage resources. IBM Cloud Orchestrator is the cloud component of this combined solution that enables administrators to:

- ▶ Manage the lifecycle of cloud services, from deployment to patch management and security compliance, to help reduce risks.
- ▶ Automate change management, including service requests and approval workflows, to help improve the integrity of cloud services that are deployed, updated, or deleted.
- ▶ Leverage an integrated approach to service management, linking service requests to asset and change management, to help improve quality of service and business resiliency.

Juniper Networks Contrail: Advanced networking for the virtual world

Juniper Networks Contrail, an open SDN controller, delivers advances in networking specifically optimized for the virtual world. Contrail SDN Controller is a software defined network virtualization and service delivery solution that brings advanced network virtualization capabilities into cloud environments. Contrail brings the agility of virtualization to networking by automating support for Network Function Virtualization. Contrail also enables CSPs to rapidly scale up and out cloud architectures with this simplified networking solution.

Traditional virtualization technologies, developed to meet the needs of enterprise IT environments, have matured to achieve the carrier-grade scalability and reliability requirement demanded of commercial cloud service environments. Virtualization has ushered in an era of automated compute resources that provide previously unimaginable levels of elasticity.

Yet, networking these virtual machines (VMs) and virtual services has remained a very manual process. In fact, configuring networks today is still often managed through a command-line interface (CLI), not unlike early computer programming handled through DOS or UNIX text commands, leaving network administration stuck in the 1980s.

To maintain profitable growth, service providers need to evolve their infrastructure and business processes to manage and meet changing market dynamics. This calls for cloud infrastructures that are:

- ▶ **Agile:** They must be able to support today's requirements, and identify current networking trends and tomorrow's opportunities. Virtualized networking enables service providers to connect and reconnect networks in a matter of seconds.
- ▶ **Simple:** This means simplifying how networks are created, and how services are deployed and managed within the network. Translating high-level operational objectives ("connect this network to the Internet") into actionable commands that seamlessly network together with physical and virtual resources to overcome the complexities of manual configuration.
- ▶ **Open:** CSPs are reluctant to be locked into a single vendor, especially with technology advancements arriving so quickly. Support for open protocols, the ability to interface with a range of northbound orchestration and operational support systems, along with support for multiple hypervisors, are all requirements for an open cloud solution.

Contrail provides a robust network virtualization solution by leveraging L3VPN standards for IP networking overlays and E-VPN standard for L2 networking overlays. The VPN containers provide a clean approach to address networking requirements even in your most demanding multi-tenant cloud environment.

As the industry's first NFV solution, Contrail provides comprehensive management of the infrastructure (compute, storage, and networking) as well as both virtualized and physical networking services. With integrated service-chaining capabilities, these networking services are then automatically linked using routing protocols to maintain the operational paradigm of the physical network.

Contrail exposes the concept of "SDN as a compiler" by translating abstract commands into specific rules or policies to automate the provisioning of workloads and enable service chaining of network and security services. Your client can request VMs without getting into the details of underlying elements like ports, VLANs, subnets, switches, routers, and other parts of network topology.

The analytics engine built into Contrail is designed for very large-scale ingest and querying of structured and unstructured data and is exposed using REST APIs and a rich GUI. It provides both real-time and historical information about application usage, infrastructure utilization, system logs, and network statistics like flows, latencies, jitter, and other variables.

Contrail can eliminate the need for rip and replace by supporting many standards-based protocols that facilitate interoperability in a multivendor physical infrastructure, helping maximize your in-place investment. In addition, complete source code and product binaries are available under the Apache v2.0 open source license for all our clients and partners.

Use case examples of the combined solution

IBM and Juniper Networks are creating solutions with our ecosystem partners to deliver significant benefits to help them expand and grow their businesses.

As seen in Figure 3 on page 8, implementing these two complementary solutions can help service providers unlock network potential and bring new service offerings to market faster. The synergy of this combination is already delivering important benefits to CSPs:

- ▶ Increased agility and velocity of network services supporting critical network functions
- ▶ Reduced capital and operational expense using network simplification
- ▶ Added network value by building on subscriber and application aware service chaining

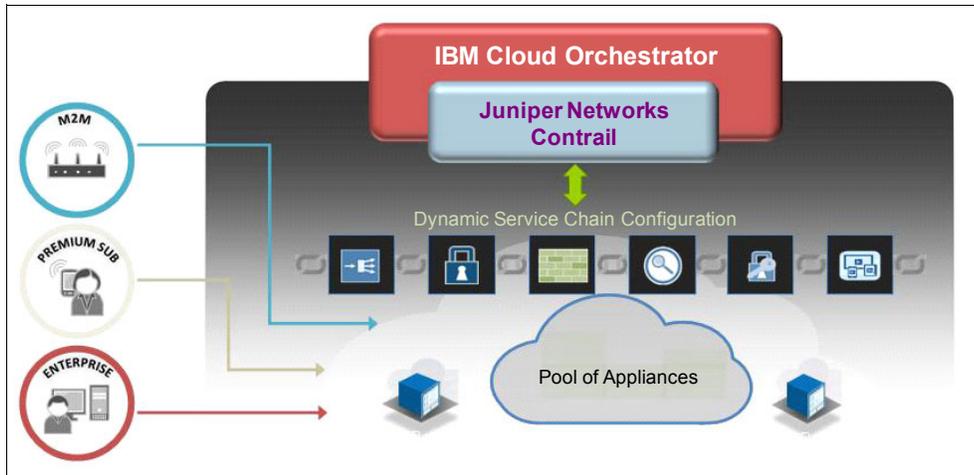


Figure 3 New service offerings via IBM Cloud Orchestrator and Juniper Networks Contrail

Conclusion

Many organizations need the flexibility, security, and control that a private cloud offers, but they do not want the complexity or expenses that accompany many of today's cloud implementations. In addition, many CSPs are unsure how to most effectively and cost-efficiently address the challenge of implementing promising new virtual network capability into their multivendor physical network at scale.

IBM Cloud Orchestrator can help organizations react quickly to changing demands, scale resources dynamically, and accelerate performance across diverse applications, infrastructure and management tools. At the same time, Juniper Networks Contrail is delivering the industry's first truly open, modular, standards-based software solution that is capable of seamlessly blending existing physical infrastructure and virtualized network functions in the service provider edge network as well as the data center.

The combination of these two technological advances, deployed in tandem, can support multiple delivery models, platforms, and workload types, helping to minimize risk and deliver value for the long term, providing both agility and cost savings (CapEx and OpEx) to service providers.

A collaboration that can make a real difference for CSPs

Beginning in 2000, IBM and Juniper Networks built a strong working relationship that offers leading-edge network products and technologies. Our broad-based strategic alliance has collaborated on R&D and incorporated Juniper's innovative technology in IBM's own centers helping us build greater business value and more robust solution offerings. By combining the automated orchestration of cloud service offerings with the transition from hardware network components to virtual functions, service providers like you can approach the future with less apprehension and greater potential for increasing revenue into the future.

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