

Independent market research and competitive analysis of next-generation business and technology solutions for service providers and vendors

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Leveraging Automation in Telco Environments

A Heavy Reading white paper produced for Red Hat



redhat.

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INTRODUCTION

Service providers are looking to improve their operational efficiency to better compete against more nimble hyperscale and over-the-top (OTT) players. Their existing operational environments are complex, full of legacy tools and methodologies that are preventing them from moving as quickly and flexibly as their competitors that have already adopted cloud-native approaches. Many service providers have started down the automation road as part of their network functions virtualization (NFV)-led transformations, understanding that they will reap the most benefit from virtualization by moving all the way to cloudification.

Automation solutions are now available that can meet the requirements of both the developer and operations communities. Developers benefit from automating software deployment tasks, which not only lowers the time to complete tasks, but also reduces the risk of human error. Operations teams benefit from automating routine and repetitive tasks, as well as from consistent management that reduces the risk of downtime. Automation solutions orchestrate workflows using prescriptive but responsive descriptions to direct the system on how to execute various tasks. Control systems can provide a centralized view to coordinate across multiple environments in the organization. Automation solutions must be simple enough for first-time users to learn quickly, flexible enough for multiple groups to be able to use it, and agentless to reduce complexity.

The automation solutions described above are applicable in a host of telecom environments. They can be used to discover and configure devices to automate heterogeneous networks. Service providers can define policies that can be applied consistently across devices from different vendors, running different operating systems. Automation is also useful in the context of service providers' NFV Infrastructure (NFVI) deployments, particularly for scaling resources to support increased demands from the virtualized network functions (VNFs). Service providers are challenged to ensure their network configurations are in compliance, which is a task easily supported by automation solutions. Similarly, as they try to reduce their network complexity and migrate to new architectures, automation tools can accelerate the testing and validation of different scenarios to ensure the new devices are executing properly.

Red Hat offers a range of automation tools that both developer and operations teams can leverage in many telco-specific use cases. Red Hat Ansible Engine drives the automation tasks, while Ansible Tower provides a centralized enterprise-wide framework to control, secure and manage Ansible environments across the organization.

MARKET DYNAMICS

Competitive Threat From Hyperscale & OTT Players Forcing Change

Service providers now compete against companies that have adopted new business models based on hyperscale architectures and cloud-native approaches that have allowed them to be markedly more agile. This allows them to operate at a lower cost and put downward pressure on costs in their markets. To respond, service providers will need to adopt many of these same strategies so they can operate on an equal footing. They will need to transform their networks to be much more flexible so they can adapt to changing market conditions and customer demands in near real time. These networks cannot compromise reliability as they deliver differentiated services to ensure customer loyalty.

Current Operational Environments Inhibit Agility

Many service providers are managing heterogeneous networks, making their operational environments complex and expensive to operate. Their services are defined by the infrastructure used to deliver them, which are often monolithic proprietary platforms, most of which are managed using command line interface (CLI)-only methodologies. These factors lead to teams with domain-specific skill sets operating in silos using legacy operational practices, which makes it difficult, if not impossible, for service providers to operate with the same levels of agility as their hyperscale competitors.

Many Already on the NFV Transformation Journey

Some service providers are already transforming their networks to support NFV, with cloud architectures as the likely end state. They see a tsunami of mobile data traffic coming, and know that more distributed architectures will be needed to support 5G. VNF suppliers will re-architect some of their products to support a microservices model to improve efficiency. The only way to effectively deal with the expected rapid traffic growth and increased complexity will be to automate their operations – a key tenet of the cloud-native approach.

TECHNOLOGY CONSIDERATIONS

Automation Solutions Should Cover Needs of Developer & Operations Teams

Developers and operations personnel have different motivations for using automation solutions. Developers are looking to automate software deployment tasks, while operations must manage the IT environment on an ongoing basis, simply and efficiently. Both can benefit from automating routine and repetitive tasks, such as configuration management, inventory tracking and daily, weekly and monthly scheduled management tasks. Backups and restores can be automated, changes can be done incrementally or on a wholesale basis, and operations can manage confirmed "golden master" approved configurations. Using a common solution helps to remove the barriers between the two organizations, in part because it will allow for a single source of truth.

Automation solutions are available to orchestrate workflows by defining how automated tasks must be done using prescriptive but responsive descriptions. Individual modules of code are called by the system to execute specific tasks in the manner prescribed in the workflow. These tasks can be characterized into reusable units to allow the same process to be executed consistently in different environments and scenarios.

Control solutions allow teams to centralize control of the different environments with a dashboard to manage the activities across the organization. Role-based access control limits risk. Some of the other capabilities include job scheduling, integrated notifications and graphical inventory management. Using REST application programming interfaces (APIs) and CLIs help integrate control solutions into existing tools and processes.

Important Automation Solution Product Characteristics

Simplicity

Automation solutions should be simple enough for new users to quickly learn how to automate their daily tasks. For example, network engineering should be able to easily convert

how the policies they are accustomed to working with map to individual tasks. They can then implement a repeatable process for installing, provisioning, configuring and maintaining network equipment in a production network.

Flexibility

An automation solution must be flexible enough that multiple groups within a data center can use it. Its underlying architecture and automation engine should enable the development of modules and plugins to make it relevant across organizational boundaries. Many solutions initially developed to automate server-specific tasks are now being adapted for use in networking environments, including operationalizing automation of existing networking CLIs.

Agentless

Having an agentless automation solution negates the need to manage an additional application when managing a network device, while leveraging existing transport mechanisms, such as Secure Shell (SSH). Not using an agent also eliminates the concern about proper functioning after performing a networking operating system update or patch. It also reduces the CPU and memory processing requirements for the devices running the solution.

TELCO USE CASES

The capabilities described in the previous section are useful in multiple use cases common in telco environments, including network automation, NFV/software-defined networking (SDN), compliance and network migration.

Network Automation

Service providers have heterogeneous networks that make them complex to manage. Automation tools can help network engineers discover and configure devices from multiple vendors and with different operating systems in private and public cloud infrastructure. When the data model is decoupled from the execution, service providers can orchestrate services across multiple vendors, enhance their operational models through scalable, repeatable patterns, and integrate them into agile DevOps workflows.

The operations team can use control software to run or schedule jobs specifically to deploy and update certain network services across multi-vendor physical or virtual infrastructure. The development team can build workflows or scripts that compare running configurations to master templates to ensure consistency and proper operation of each device. Automation solutions allow them to define intent and policies that can be applied across multiple device types and vendors.

NFV/SDN

In order for the NFVI deployment to be successful, control software and associated networking add-on modules can help configure the underlying infrastructure and ensure that it is operating correctly between when a networking device is powered on and when it's provisioned. The automation solution can be used to spin up new instances of OpenStack (and Ceph) as the NFVI needs to scale out to cater for increased workload demand at the VNF layer.

Continuous Compliance

In addition, automation solutions can be used to ensure that network configurations are in compliance. They test and validate the existing network state so service providers consistently meet regulatory requirements in their multi-vendor networks. Using this approach helps to mitigate risk and allows them to schedule compliance jobs based on business requirements.

Network Migration

Many service providers are trying to simplify their operations by reducing the numbers of networks they need to manage. Over time they deployed numerous access, aggregation, distribution, concentration and backbone networks using multiple vendors' equipment, increasing the management challenge tremendously. The network services they offer are tied to the underlying infrastructure, so migrating those services as that infrastructure changes can be risky, and requires strict processes and procedures to execute properly.

Automation solutions can assist with network migration by accelerating the testing and validation of different scenarios. They can mitigate the business impact by reducing the time needed to execute the migration. These solutions can also help ensure that business requirements are consistently met by scheduling sanity checks and compliance jobs while the migration is taking place.

RED HAT ANSIBLE AUTOMATION

Red Hat offers a range of automation tools that can be used by development and operations teams to support telco use cases. Its Ansible Automation portfolio includes Red Hat Ansible Engine and Red Hat Ansible Tower – the capabilities of which are presented in **Figure 1**.

Figure 1: Red Hat Ansible Automation Offering

	Red Hat Ansible Engine	Red Hat Ansible Tower
Description	Red Hat Ansible Engine offers support for the Ansible automation engine, as well as hundreds of modules that enable users to automate all aspects of telco environments and processes.	Red Hat Ansible Tower is an enterprise framework for controlling, securing and managing Ansible automation environments with a user interface and RESTful API.
Value Proposition for Telcos	Red Hat Ansible Engine offers 24x7 support from Red Hat's global support organization and all the benefits of a Red Hat subscription, including Open Source Assurance, regular security and maintenance updates, and more. Red Hat Ansible Engine is also available with new Networking Add-on to address a critical component of today's modern infrastructure, including full engineering support for the following networking-specific Ansible modules: Arista (EOS), Cisco (IOS, IOS-XR, NX-OS), Juniper (Junos OS), Open vSwitch, VyOS.	Red Hat Ansible Tower layers control, knowledge and delegation on top of Ansible's automation engine. As mission control, Red Hat Ansible Tower centralizes and controls Ansible infrastructure with a visual dashboard that provides a heads-up NOC-style display of everything going on in the environment, role-based access control, job scheduling and graphical inventory management. Because it centralizes Ansible, Ansible Tower also makes it easier to integrate Ansible into other systems or workflows required for agile processes.

Source: Red Hat

CONCLUSION

Automation solutions are a valuable tool for service providers looking to improve their operational efficiency. By automating manual tasks, service providers can reduce the risk of human errors and time spent on mundane tasks, thus lowering their operational costs. They can minimize the risk of systemic errors through automated analysis, detection and resolution. By bringing technology into service faster through accelerated IT processes, they can speed their time to revenue and improve their ability to compete against the cloud native players. Automation solutions, such as Red Hat's Ansible Engine and Ansible Tower, can help service providers in their NFV- and SDN-led transformations by automating the software deployment, configuration, policy and validation tasks needed to efficiently manage telcos' development and operations environments.