NETWORK AUTOMATION

for everyone
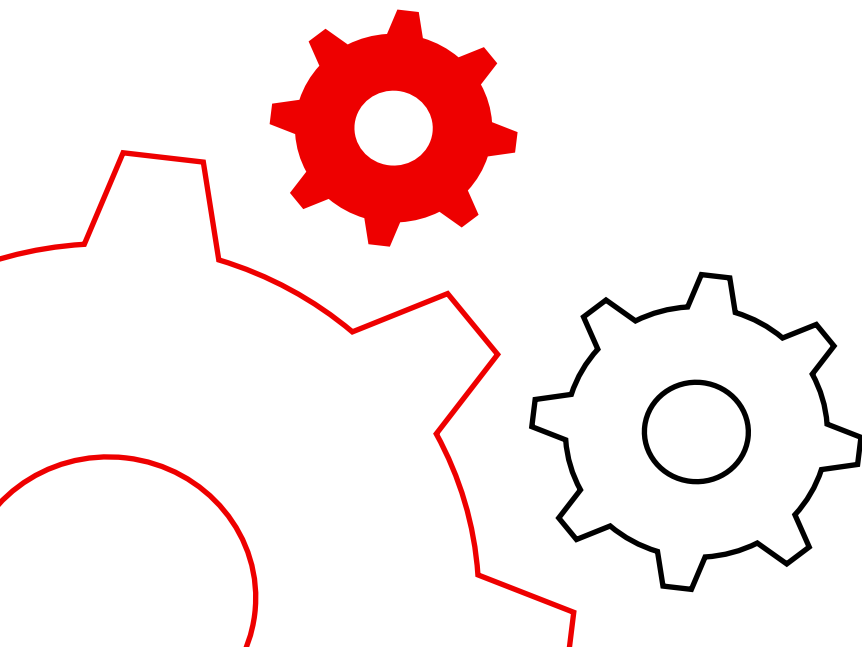
Contents

Now is the time for
network evolution

Networking is an essential part of both IT and operational technology (OT), supporting hybrid cloud applications, diverse devices for remote workforces, and edge deployments. But even as network and IT infrastructure technologies have evolved rapidly over the past several years, network management has not changed at the same pace. Networks are often built, operated, and maintained using a combination of custom scripts, single-function management tools, and manual processes. This approach makes it difficult to deliver timely, resilient network services while effectively managing security risks and compliance mandates across multivendor networks.

Despite enormous advances in software-defined networking (SDN) and datacenter technologies, along with new development techniques, this routine has been slow to change for many reasons:

- ▸ Network operations (NetOps) teams often specialize in highly isolated domains and platforms.

- ▸ Disparate, cross-departmental teams cannot collaborate effectively.

- ▸ Legacy operational practices are difficult to update and change.

- ▸ Increasing numbers of security threats overwhelm NetOps and security teams.

- ▸ Network vendors often focus on individual product capabilities and management, rather than overall operational improvements.

Network automation can help you accelerate operations

IT organizations today are faced with rapidly shifting application and developer requirements. Traditional, manual approaches to network configuration and updates are too slow to effectively support these needs. Manual processes make it difficult to:

- ▸ Provide a high level of service to users.

- ▸ Deliver resources to application development and IT operations teams on demand.

- ▸ Implement change control and configuration processes.

- ▸ Understand and manage inventory effectively.

- ▸ Maintain configuration standards across disparate network platforms.

- ▸ Build more proactive and self-sufficient NetOps teams and adopt NetSecOps approaches.

Programmable, software-based automation technologies can help your team better support your organization's digital initiatives. Even so, it can be challenging for NetOps teams to implement the same levels of automation as peer IT teams. Many NetOps teams apply automation only for specific tasks and in limited capacity. This results in hybrid processes in which some tasks are automated, but others still require manual intervention. There are several causes for this:

▸ Device-specific tools are often tough to incorporate into automation tooling.

▸ Policy-driven network configuration requirements can impede integration of multivendor environments.

▸ Teams may perceive automation as a loss of control and increased security risk.

▸ Many NetOps professionals feel unprepared or lack the skills to take advantage of automation technologies for specific network integrations.

Embracing end-to-end network automation can help you overcome these challenges to adopt agile NetSecOps approaches and deliver resilient, high-value network services on demand. The possibilities offered by network automation are expansive. You can automate Day 0, Day 1, and Day 2 operations and even respond to changing conditions in your network and IT environment without human intervention.

For example, if a security risk or incident affecting a network firewall is discovered, the impacted port could be shut down, the concerned network components could be quarantined, and an IT service ticket could be generated—all immediately and automatically. You could also automatically gather facts to support network-related IT service tickets, relieving your NetOps teams from interrupt-driven work patterns. Or you could automatically identify and remediate potential network issues before they impact operations and users, preventing many of the IT incidents and outages that result in after-hours and weekend calls. Overall, network automation can help you streamline ongoing operations, improve security and compliance, and free up your teams to focus on high-value priorities.
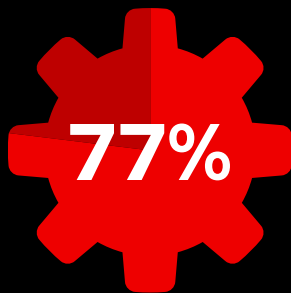
77% of surveyed technology professionals see room for improvement in their organizations' datacenter network automation strategies.[1]
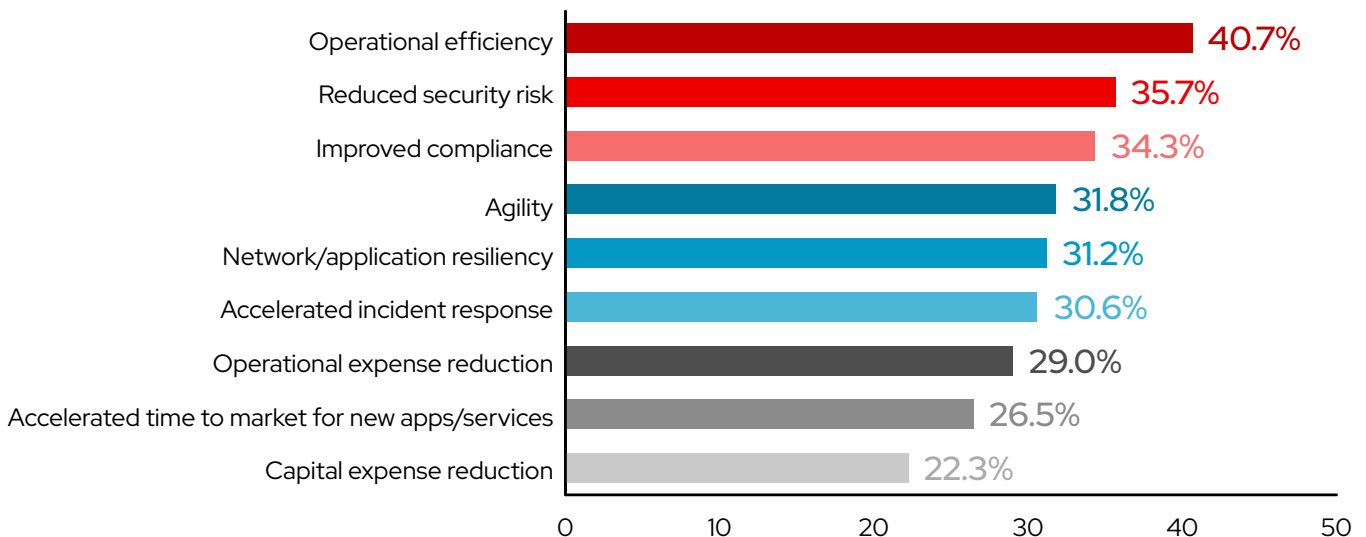
1 McGillicuddy, Shamus. "The Future of Data Center Network Automation." EMA, sponsored by Red Hat, February 2022.

Streamline processes
with programmable logic

Network automation uses programmable logic to manage network resources and services. It allows NetOps teams to rapidly configure, scale, secure, and integrate network infrastructure (layers 1–3) and application services (layers 4-7). Telecommunications and public cloud service providers were among the first to adopt network automation to streamline their fast-growing networks, but all organizations can now benefit from network automation technologies. With network automation, NetOps teams can quickly respond to ever-changing workload requirements for flexible capacity, application security, load balancing, and hybrid cloud integrations. They can implement self-service and on-demand network activities while ensuring corporate security policies are satisfied. They can also improve change management, documentation, and logging to increase visibility and transparency. And teams can take network automation efforts even further with event-driven approaches that respond automatically to changes in your network or IT environment as they are detected.

As a result, NetOps teams can collaborate effectively in cross-functional initiatives to support IT and business transformation and modernization.

Desired benefits from network automation[2]

Benefit	Percentage
Operational efficiency	40.7%
Reduced security risk	35.7%
Improved compliance	34.3%
Agility	31.8%
Network/application resiliency	31.2%
Accelerated incident response	30.6%
Operational expense reduction	29.0%
Accelerated time to market for new apps/services	26.5%
Capital expense reduction	22.3%

2 McGillicuddy, Shamus. "**The Future of Data Center Network Automation**." EMA, sponsored by Red Hat, February 2022.

Why automate your network?

Network automation delivers benefits for organizations of all sizes, across industries.

Reusable, scalable, software-defined automation gives you more control over and visibility into network resources. As a result, you can improve network uptime, staff productivity, network security, and configuration compliance.

Productivity

Improve your team's responsiveness to increased demand for changes.

► Streamline essential routine activities and allow all team members to perform basic operations.

► Test and deploy network changes automatically.

► Automate repetitive and unpopular tactical tasks across network domains.

► Integrate automated network operations into IT change management systems and workflows.

Security

Rapidly identify vulnerabilities and implement fixes across your entire network.

► Collect information about network devices.

► Build and maintain an inventory of devices on demand.

► Automatically mitigate simpler issues so staff can focus on more complex and sophisticated attack vectors.

► Adopt an event-driven approach using telemetry and integrations with network management systems to automatically mitigate security issues.
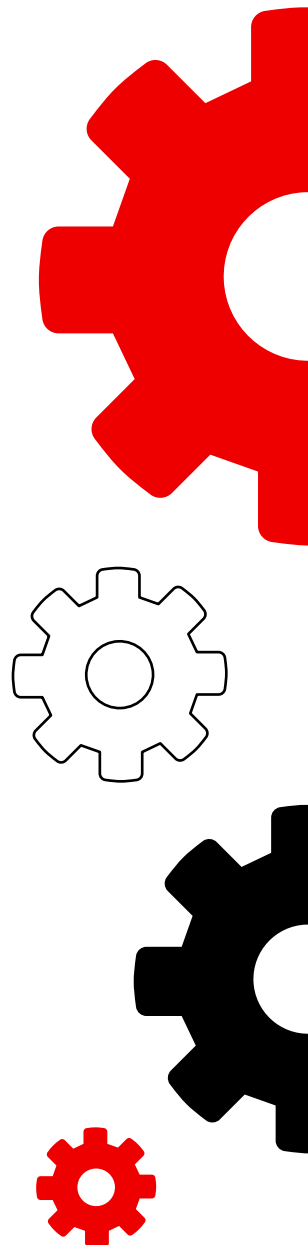
Compliance

Ensure continuous compliance with changing policies and regulations.

▸ Implement a consistent, centralized source of truth for GitOps processes.

▸ Automatically test changes before committing.

▸ Validate that changes were made appropriately.

▸ Automate auditing tasks and change logging.

▸ Automate drift notifications and remediation tasks.

Availability

Increase network uptime with more effective testing and management.

▸ Gain visibility into the impact of changes.

▸ Ensure consistency across your entire network.

▸ Reduce errors with automated change management.

▸ Scale network capacity to meet changing needs.

Resilience

Respond automatically in a predefined manner to observed events in your network and IT environment.

▸ Automatically identify and remediate potential issues before they impact operations and users.

▸ Simplify and speed up troubleshooting activities by automating initial response actions.

▸ Respond automatically to user administration requests like recovering passwords or managing network access.

▸ Watch for configuration drift and automatically apply updates to maintain the expected state of network infrastructure.

▸ Optimize your network performance automatically to meet user and application demand.

Run your network more efficiently

As a foundation for building and operating automation at scale, **Red Hat® Ansible® Automation Platform** lets you create and orchestrate complete IT workflows that support your business goals. Multiple domain teams can use the platform, allowing you to build, scale, and deploy automation across your entire organization while maintaining governance controls.

Ansible Automation Platform can orchestrate all aspects of your IT environment—from servers and networks to applications, security, and DevOps. It provides support for standalone and SDN-controlled devices across multivendor virtual, physical, and cloud environments so you can automate your entire network—and IT environment—using a single platform.

Using a common language, Ansible Automation Platform makes everyday tasks repeatable and scalable so you can run your network more efficiently. Choose to automate where you need it most. The platform's flexible framework embraces incremental change so you can start small and expand over time.

With Ansible Automation Platform, you can automate everything from individual network tasks—like device configuration updates—to complex processes that involve multiple network teams to entire workflows that cross IT domains. For example, you can use Ansible Automation Platform to manage the complete life cycles of cloud-native applications, including the underlying virtual machines, network connectivity, and other dependencies.

Common myths about using Ansible Automation Platform

▸ **You must know how to code to use it.**
There is no need to learn a programming language to get started with Ansible Automation Platform. You can automate your network using simple, human-readable commands, existing networking command line interfaces (CLIs), Network Configuration Protocol (NETCONF), and open application programming interfaces (APIs) for SDN controllers.

▸ **You will automate your job away.**
Automating tedious, time-consuming tasks frees you to focus on the high-value, strategic, and innovative projects that matter for your company and you as a professional.

▸ **It is only for servers.**
Ansible Automation Platform can be used to automate all aspects of your IT environment, including Linux®, Windows, security, cloud, storage, network, and edge technologies.

Watch this on-demand video playlist to learn more: **red.ht/AnsibleVideos**.

Simple

Ansible Automation Platform uses human-readable automation through YAML-based playbooks, roles, and rulebooks. Tasks are executed in order and can be combined to orchestrate even the most complex processes. Users can create simple, effective automation sequences using a visual user interface. No special programming skills are required, so NetOps engineers can start using the platform immediately.

Powerful

Using modules and plug-ins, Ansible Automation Platform can orchestrate your entire IT environment. It transfers instructions over existing transport mechanisms and provides templating engines for large-scale automation. Access to certified and validated automation content from network partners helps you create robust, enterprise workflows. You can also use existing CLIs and APIs directly within the platform. Ansible Automation Platform serves as an abstraction layer so you can implement network configurations as code and design workflows using a common set of states and commands across devices—the platform takes care of translating your commands for each endpoint via resource modules.

Agentless

Agents are not required with Ansible Automation Platform, so there is no need to install anything on your networking devices to automate them. A low attack surface improves network security. Connection plug-ins for network devices simplify deploying existing automation onto new device APIs.

Event-driven

Ansible Automation Platform includes powerful event-driven automation capabilities. Event-Driven Ansible lets you respond in a predetermined way to observed events and conditions in your IT environment, without manual intervention. Simply define *if-then* rules, event sources, and automated actions in Ansible Rulebooks. The platform matches events received from third-party monitoring and observability tools to the applicable rulebook, determines the appropriate action, and then performs that action.

What is a playbook?

Playbooks provide instructions for configuring, deploying, and orchestrating IT assets through Ansible Automation Platform. They consist of sets of commands called plays that define automation across an inventory of hosts. Each play includes 1 or more tasks that target 1, many, or all hosts in the inventory. Each task calls a module that performs a specific function like collecting information, managing configurations, or validating connectivity. Playbooks can be shared and reused by multiple teams to create repeatable automation.
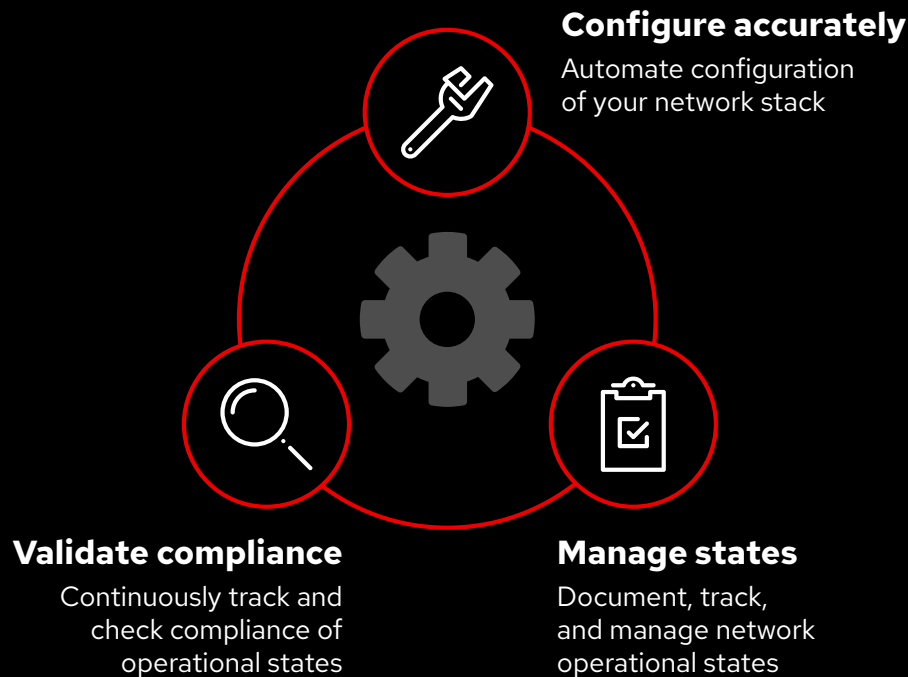
What is a Content Collection?

A **Content Collection** is a standardized distribution format for Ansible content that can include playbook examples, roles, modules, plug-ins, and more. You can install fully supported, **certified Content Collections** and access validated reference content from **Ansible automation hub**, available with your Ansible Automation Platform subscription.

What is a rulebook?

Rulebooks are sets of conditional rules that Event-Driven Ansible uses to perform actions in an event-driven automation model. They define 1 or more event sources, conditional rules, and corresponding actions. Rulebooks are written in YAML and use *if-then* rules to link specific events to automated actions.

Automate complete networking life cycles

With Ansible Automation Platform, you can manage your network infrastructure throughout the entire production life cycle.

Configure accurately
Automate configuration of your network stack

Validate compliance
Continuously track and check compliance of operational states

Manage states
Document, track, and manage network operational states

Deploy production-grade automation technology at scale

Ansible Automation Platform delivers the features and functionality needed to create, manage, and scale automation across teams and technologies. It includes:

▶ A CLI-based automation engine.

▶ A graphical management interface with API access

▶ Access to advanced analytics.

▶ Certified and validated automation content and content management.

▶ Enterprise-grade support.

The platform provides control over how automation is deployed and used, along with auditable knowledge about sources and outcomes.

Flexible architecture

Ansible Automation Platform delivers a scalable, security-focused fabric for describing, building, and managing automation across diverse enterprise IT environments. You can use a monolithic or decoupled architecture with centralized controlled and distributed execution. An encrypted **automation mesh** connects execution nodes and manages automation path redundancy, workload scaling, and bandwidth optimization.

Automation analytics

Ansible Automation Platform provides operational analytics through a **cloud-based interface** that helps you understand your current automation use, measure savings, and encourage collaboration and sharing between and across your teams.

Trusted content

Ansible Automation Platform offers certified, supported automation content to extend platform capabilities, integrate with third-party technologies, expand automation across domains, and ease adoption. You can also access validated content that provides tested, opinionated references. This can serve as a starting point for your automation initiatives. Simply download the appropriate playbook and adapt it for your operational needs.
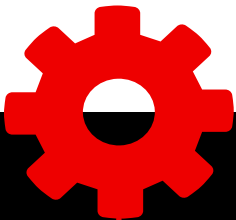
Key features and benefits

▸ **Single interface for multivendor networks:** Orchestrate your network across core, datacenter, campus, and edge locations with integrations and support for hundreds of third-party components.

▸ **Certified and Validated Content Collections:** Access **validated automation content** that is supported by Red Hat and certified partners.

▸ **Role-based access control (RBAC):** Specify access by people, processes, and devices from the built-in automation controller.

▸ **Dynamic inventory capabilities:** Connect to any data source in your network to build an inventory.

▸ **Workflows and scheduling:** Organize tasks and schedule playbooks to run at a specific time.

▸ **Restful API:** Send and receive messages and instructions from other tools like IT service management (ITSM) and IP address management (IPAM) solutions.

Adopt an open approach to network automation

Today's IT environments are complex, often containing a multitude of different technologies and products from a variety of vendors. And networking is not immune to this trend. Networking technologies must be integrated throughout multivendor IT stacks to ensure reliable, controlled, and security-focused connections. Vendor collaboration through strategic partnerships and open ecosystems is critical for building complete, reliable IT solutions and networks that meet unique customer needs.

Certified and validated content included

Ansible Content Collections offer more than 150 prebuilt modules, roles, and more from industry-leading partners, including a broad selection of **network vendors and technologies**. Red Hat Ansible Certified Content Collections help jump-start integration with these partner platforms while Ansible validated content provides an opinionated path for performing operational tasks.

Community project to commercial-grade product

Ansible Automation Platform is a fully supported product that incorporates many open source projects, giving you the innovation and longevity of the community with less risk. Our open development model unburdens your staff from managing, updating, and testing community releases, saving you time and money. Ansible Automation Platform also delivers common enterprise security capabilities like RBAC, auditing, logging, and integrations with authentication, authorization, and accounting (AAA) systems.

Complete support for your organization

We offers holistic, end-to-end support—from operating system to automation software to dozens of certified vendor integrations—encompassing all of your IT and network security and compliance needs. Every Red Hat subscription provides access to technical experts and support services to help you successfully build, deploy, and manage your solutions. Our approach is open and collaborative, giving you access to Ansible experts, the latest product knowledge, and best practices. Security patches and product updates are regularly provided by the Red Hat Global Support Services team.

Expertise and knowledge for your staff

Red Hat provides optional expert services and training to help you on your path to network automation. **Red Hat Consulting** works with your team to analyze your challenges and help you overcome them with comprehensive, cost-effective solutions. **Red Hat Training and Certification** provides hands-on training and practical certification that can help your staff learn and apply best practices to improve operations and productivity.

Build your skills

Red Hat offers training courses and resources to help you start automating sooner:

- ▸ **Ansible Basics** (DO007) provides an introduction to using Ansible Automation Platform.

- ▸ **Ansible for network automation** (DO457) teaches you how to automate network management.

- ▸ No-cost, **self-paced labs** offer a preconfigured environment for learning and experimenting.

- ▸ The **Network automation guide** provides good practices for implementing borader network automation.

- ▸ **Ansible Automates** are no-cost, 1-day, virtual events that demonstrate Red Hat's IT automation solutions.

- ▸ **Network automation webinars** cover a variety of network-related topics for different roles.

- ▸ No-cost, 60-day **trial subscriptions** let you try Ansible Automation Platform in your own environment.

Choice and flexibility for your network

Red Hat fosters a **large ecosystem** of certified partners and third-party products so you can deploy your preferred tools, clouds, software, and hardware you need, knowing they will work reliably with Red Hat products. Additionally, Ansible Automation Platform includes network-specific Content Collections with certified modules, plug-ins, and roles that let you automate devices and platforms from a large number of vendors.

Because Ansible Automation Platform works across **networks**, platforms, and tools, you can orchestrate complete workflows that incorporate the components and technologies you use today, in addition to those you plan to adopt in the future. Using certified integrations, you can combine network switches, routers, firewalls, load balancers, controllers, IP address management tools, and more into automated processes and workflows.
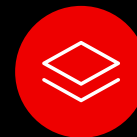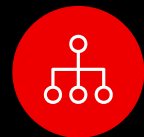
Switches	Enterprise firewalls	Routers	Load balancers	Controllers	IP address management

Ansible Automation Platform

Common use cases and customer successes

Start small and build over time to increase value

Red Hat Ansible Automation Platform can help you automate many aspects of your network. Most teams begin with one of these use cases.

Back up and restore configurations

Storing backups of configurations is a critical activity for NetOps. Ansible Automation Platform simplifies pulling an entire configuration, or just parts of the configuration, from 1 or more network devices. You can then restore these configurations to network devices as needed.

Collect facts to gain visibility

Read-only tasks like fact collection can help you gain visibility into your network inventory and state. Ansible Automation Platform helps you collect information from your network devices and create reports for compliance and standardized, agnostic network management with ease.

Create a structured source of truth

Knowing the configurations of your network devices is essential for efficient NetOps. Ansible Automation Platform can help you create an off-device source of truth that treats network configurations as structured variables for infrastructure as code management approaches. Modules let you transform the configurations of devices from a variety of network vendors into structured data.

Integrate your existing tools and devices

All NetOps teams need to make the most of their network investments. Ansible Automation Platform integrates with your existing network devices and management tools, along with other vendor-specific automation tools, to help you automate the network you have today.

Manage network configurations

Configuration drift happens. Ansible Automation Platform simplifies policy enforcement, drift monitoring and correction, and configuration maintenance. Using a network-as-code approach with structured configuration data, you can manage your network in the same way you manage servers.

Do more with event-driven automation

NetOps teams need to operate with speed and efficiency. Event-Driven Ansible, included with Ansible Automation Platform, lets you respond in a predetermined way to observed events in your IT environment, without manual intervention. With it, you can create advanced, end-to-end automation scenarios that initiate when certain events occur.

Experience real business outcomes via network automation

Many organizations are already gaining benefits by automating with Red Hat Ansible Automation Platform.

surescripts
The Nation's E-Prescription Network

Surescripts, a leading health information network in the United States, needed to improve its software development infrastructure and datacenter networking to help its DevOps team meet business demands. The company uses Ansible Automation Platform to support its new, microservices-based code infrastructure and launch new applications faster.

swisscom

To stay competitive, **Swisscom** needed a tool for enterprise-wide IT and network automation. The service provider used Ansible Automation Platform to automate the management and scalability of approximately 15,000 components, including servers, firewalls, storage devices, and network devices.

Streamlined IT management to reduce downtime and errors

Improved productivity through automation and reusable code

Enhanced system and data security with role-based access

Expected to save 3,000 hours per year in manual tasks

Streamlined common tasks with self-service capabilities

Improved collaboration with playbooks and sync meetings

"In the past, we had a few outages caused by staff running commands with unexpected results. Now, by routing everything through Red Hat Ansible [Automation Platform], we have much higher quality and availability assurance."

Michael Perzel
Senior Devops Engineer, Surescripts

ALSTOM

ANZ New Zealand

Alstom, a global leader in smart and sustainable mobility, wanted to improve signaling reliability and railway network velocity by upgrading the way its railway devices communicated with trains and back-office systems. The company standardized on Red Hat Enterprise Linux and adopted Ansible Automation Platform to automate edge device life cycles and deliver updates to fielded devices in real time or on demand.

ANZ New Zealand, the country's largest financial services group, decided to transition to a cloud-first approach, focused on automation and site reliability engineering to streamline network operation tasks. The organization worked with Red Hat to increase productivity and time to market through the adoption of agile practices and automation, ultimately reducing the time required for end-to-end domain name service (DNS) provisioning by 99.4%.

Created a data-driven IoT[3] hardware and software platform

Improved time to market and customer service

Streamlined complete edge device life cycles

Automated time-consuming manual tasks

Improved security hardening for distributed edge devices

Enhanced efficiency and collaboration

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"As Alstom deploys thousands of wayside devices throughout the globe, providing our customers with actionable intelligence from the edge, automation tools such as Ansible help ease the deployment and updates of containerized applications and security patches."[4]

Emilio Barcelos
Product Manager, Wayside Intelligence and Analytics, Alstom

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3 Internet of Things

4 *Red Hat press release.* "**Alstom and Red Hat Team to Transform Railway Communication with Edge Computing and Open Hybrid Cloud**," *26 April 2021.*

Get started with network automation
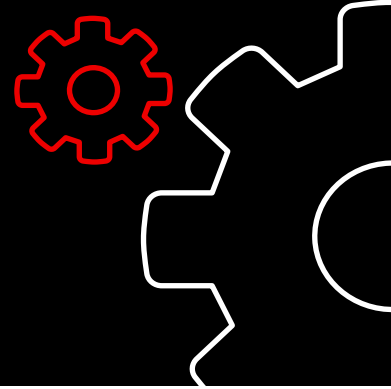
Red Hat can help you define your path to efficiency

Network automation is critical for supporting the increasing application and workload needs of modern, digital business. Red Hat Ansible Automation Platform gives you a path to modern network operations while still supporting current processes and legacy infrastructure.

While automating your network may seem like a daunting task, you can start small and make incremental changes at your own pace. Focus on solving the contained, tactical problems your team faces every day. Learn from these efforts and expand your automation efforts from there. As you move forward, be sure to develop success criteria and specific goals for your organization. Remember, automation is more than a tool; it's a strategy, a journey, and a culture.

It's easy to get started.

1

Create playbooks that read or check information only.

2

Build simple jobs to replace tedious and unpopular tasks.

3

Apply your team's current knowledge to automation.

15

Ready to start automating your networks?

Network automation can help you streamline operations, respond faster, and support modern business demands.

Red Hat Ansible Automation Platform gives you everything you need to automate your networks—and your IT environment—at scale. With flexible, easy-to-use automation, you can define a simple, powerful path to network efficiency without leaving your existing processes and infrastructure behind.

Get started at ansible.com/network-automation.

Red Hat