Automate industrial switches with Red Hat and Rockwell

Gaps at implementation create inconsistencies in network architecture

As manufacturers increasingly integrate hybrid processing power into their operations, the complexity, scale, and security needs of their industrial networks grow. While modernizing and automating network infrastructure can help address these challenges, gaps in implementation are a separate challenge in themselves.

In many industrial settings, operational technology (OT) teams purchase managed switches, but lack the network expertise to configure them effectively. As a result, they may rely on IT personnel unfamiliar with OT requirements—leading to misconfigurations—or they may leave the switches in a default, unmanaged state. Even when network experts are involved, the configuration process remains highly manual, involving numerous steps that are both time consuming and error prone. These challenges increase costs and introduce the risk of misconfiguration. Automation offers a way to simplify this process, reduce human error, and free up valuable time for teams to focus on higher-impact work.

These gaps create real consequences: downtime, security vulnerabilities, inconsistent performance, and a lack of scalability. Even well-meaning teams hesitate to make needed changes, fearing they will break something in the process. This not only undermines the value of digital investments, but makes it harder for system integrators, original equipment manufacturers (OEMs), and vendors to collaborate on scalable, resilient solutions.

This detail explores how Red Hat and Rockwell Automation are helping manufacturers reduce the complexity of industrial switch deployment by combining Rockwell's validated network designs with Red Hat® Ansible® Automation Platform to deliver consistent, scalable automation across industrial environments.

The unique requirements of the industrial OT environment

Addressing the complexity in network automation implementation requires an understanding of the unique requirements of operational technology (OT) environments, outlined below:

- **Industry specific reference architectures**
  Most industry standards require careful alignment between IT and OT layers. Configuring these architectures often involves specialized knowledge of virtual local area networks (VLANs), routing, segmentation, and zone-based architectures. It also requires coordination across multiple vendors, systems, and traditional equipment, along with familiarity and experience using command line interface (CLI) tools.

- **Industrial protocol compatibility**
  Manufacturing systems often rely on proprietary or industrial protocols such as EtherNet/IP, Modbus, PROFINET, and OPC UA. These protocols demand network infrastructure that supports deterministic communication and low latency, along with automation solutions that either natively support or can be easily adapted to these specialized protocol.

- **Manual, multistep configuration processes**
  The deployment and configuration of industrial switches, firewalls, and controllers frequently involve highly manual and multistep processes. These often rely on step-by-step documentation spanning hundreds of pages, manual firmware updates, and security configurations, all of which come with a high risk of misconfiguration due to human error. The consequences of such missteps include costly downtime and increased vulnerability.

- **Workforce skills gaps**
  While many manufacturing teams possess deep mechanical or process expertise, they often lack experience with network topology design, Layer 2/3 switch configuration, and cybersecurity or software-defined network (SDN) technologies. This workforce skills gap further complicates efforts to modernize the network.

- **Traditional system integration**
  Older systems present additional challenges, as they often lack support for automation application programming interfaces (APIs) or remote management. As a result, organizations must invest in retrofitting or even replacing traditional systems to integrate with newer platforms, which adds to both cost and timeline.

- **Cybersecurity and compliance complexity**
  Implementing automation in industrial settings must be accompanied by strong cybersecurity and compliance measures. This includes the use of inline monitoring, anomaly detection, access controls, and alignment with cybersecurity standards such as ISA/IEC 62443 and NIST frameworks.

Distinctive characteristics of manufacturing sites can add additional challenges

Different types and implementations in manufacturing can add complexity because of different core needs and incumbent challenges related to them including:

- **Process manufacturing**
  - High availability is paramount. 24x7 uptime is required.
  - Rather than focusing solely on high-speed updates, process manufacturing environments typically require consistent, predictable update intervals.
  - A 1-second update time is common, not necessarily for raw speed, but to maintain reliable and repeatable communication cycles.
  - Included in this type of manufacturing are industries such as pharmaceutical and oil and gas.

- **Discrete manufacturing**
  - Ultra-high-speed communication may not always be necessary, but consistent, reliable timing and communication remain essential to maintaining efficient automation.
  - Speed and precision timing are especially critical in discrete manufacturing. These environments often demand tight synchronization and fast response times to maintain accuracy and efficiency.
  - A 1-microsecond update time is common, not simply for consistency, but to support the high-speed, precision-driven operations typical of these systems.
  - Included in this type of manufacturing are industries such as mail sorting and automotive.

- **Hybrid manufacturing**
  - A combination of both types, with flexible requirements depending on where it is needed in the plant.
  - A food and beverage facility might require high availability and consistent timing for process operations such as mixing and pasteurization, while also depending on high-speed, modular systems for packaging and distribution.
  - These hybrid environments demand a blend of precision timing and adaptable connectivity throughout different areas of the plant.

General considerations for industrial sites that can add to the challenges of implementation

In addition to architectural and operational challenges, industrial sites face broader infrastructure and connectivity considerations that can complicate implementation efforts.

Cloud interaction
It is common for OT environments to have minimal cloud interaction, typically limited to remote desktop operations or VPN access. However, this is changing. Increasingly, data is being pulled into cloud-based analytics platforms as well as manufacturing execution systems (MES), computerized maintenance management systems (CMMS), and other cloud tools. These new data flows require extra layers of security posture and, in some cases, unidirectional data paths to preserve safety and compliance.

Latency and bandwidth
Latency and bandwidth are critical performance considerations for industrial environments, especially when dealing with time-sensitive workloads and high availability expectations. Core concerns include:

- **Real-time requirements**. Depending on the workloads performed, latency requirements can be less than 1 microsecond. This often necessitates the use of:
  - Network Time Protocol (NTP).
  - Precision Time Protocol (PTP).
  - Time Sensitive Networking (TSN), an emerging technology that supports real-time communication over Ethernet.
- **Network availability.** The general expectation in industrial environments is to have consistently high availability. Redundancy technologies such as Parallel Redundancy Protocol (PRP) and Device Level Ring (DLR) are commonly used to make sure there is fault tolerance. In less critical areas, simplex architectures may still be acceptable, depending on performance requirements.

Tools to solve challenges

Red Hat and Rockwell on the shop floor

Both Red Hat and Rockwell offer solutions for your switch automation challenges on the shop floor.

Red Hat and Rockwell: Solving automation challenges today

Rockwell Automation has decades of experience designing reliable industrial automation networks. Through tools such as Integrated Architecture Builder (IAB) and Process System Estimator (PSE), along with detailed design documentation and implementation guides, Rockwell provides proven, field-tested network architectures.

These architectures are validated in Rockwell's internal labs and collaborative labs with Cisco, making sure they have reliable performance under industrial conditions. Rockwell provides proven, field-tested network designs that help customers plan and build complex industrial networks. These tools help define plant-wide architectures based on key parameters such as I/O counts, switch placement, and network topology—providing a strong foundation for effective and secure operations.

Red Hat and Rockwell are now working together to extend the value of these designs through automation. While Rockwell's estimator tools and configuration guidance reduce design complexity, much of the switch configuration work still requires manual effort. Teams must interpret documentation, program individual devices, and validate configurations—steps that increase time, cost, and the potential for error.

Ansible Automation Platform addresses these challenges. It helps industrial teams automate infrastructure and network tasks using simple, repeatable playbooks. By aligning estimator tool outputs with Ansible workflows, Red Hat and Rockwell support automation that mirrors tested network architectures. This collaboration helps OT and IT teams reduce manual configuration, improve accuracy, and speed up deployment. Today, this joint effort is making it more efficient to deploy and manage industrial automation networks reliably and at scale.

Future integrations may further accelerate this vision by automating configuration from the earliest stages of network design. But the work currently underway is bringing tangible benefits to industrial automation environments.

Implementation scenarios

Automating industrial switch deployment

Red Hat and Rockwell are collaborating to simplify and accelerate the configuration and deployment of industrial switches, including Rockwell Stratix and Cisco Catalyst switches, as part of converged Plantwide Ethernet (CPwE) architectures. These architectures, codeveloped by Cisco and Rockwell, are designed specifically for industrial environments and are extensively documented in PlantPAx system guidance.

From design tools to field deployment

Today, system integrators often reference PlantPAx documentation and CPwE design guides to plan out network topologies. They use Rockwell tools such as Integrated Architecture Builder (IAB) and Process System Estimator (PSE) to determine appropriate configurations, calculate I/O counts, and generate bills of materials. Once the design is finalized, integrators manually configure switches—often with help from lengthy manuals or internal expertise.

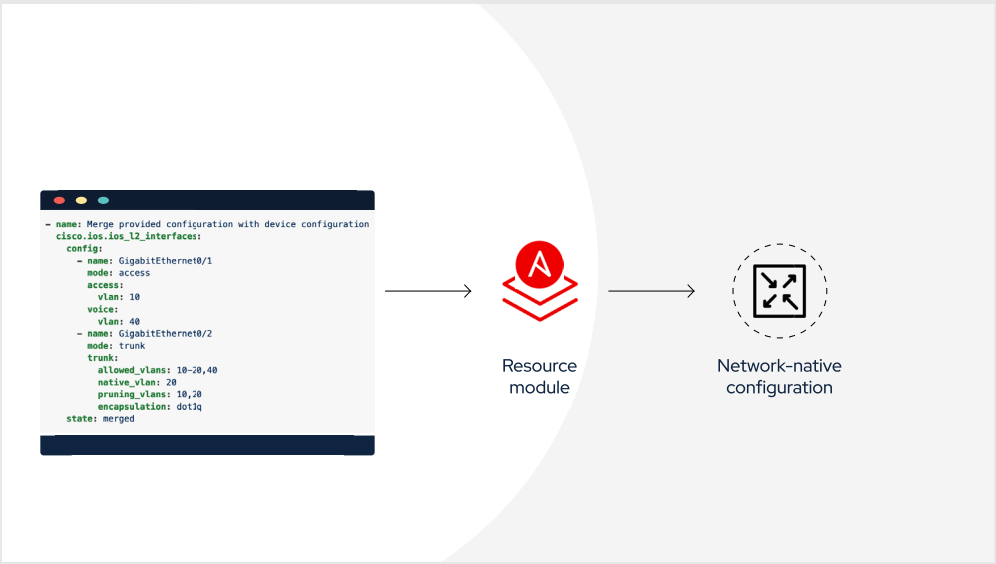

Figure 1. Example of a playbook using Ansible Automation Platform and based on Rockwell's validated architecture

Red Hat and Rockwell are working to simplify the configuration of industrial switches by linking design outputs to automation tools. Today, tools like IAB and PSE define what switches are needed, how many, and where they should be placed. Red Hat Ansible Automation Platform builds on this foundation by using playbooks generated by those validated architectures to configure switches through a simple, form-generated interface.

This approach creates real operational value. Instead of requiring field teams to manually interpret documentation and apply settings one-by-one, they can apply a standardized, proven configuration directly. Distributors can go a step further, delivering switches that are already preconfigured according to the validated project architecture. This minimizes on-site errors, accelerates deployment timelines, and improves consistency across installations. It is a practical solution already in use to reduce setup time, cut human error, and help teams scale their automation efforts more efficiently.

Ansible Content Collections and Cisco API integration

Ansible Automation Platform includes collections with Cisco APIs, supporting Catalyst switches common in CPwE-based architectures. This facilitates scalable automation for both Rockwell and Cisco hardware. With Ansible Content Collections, Red Hat can help partners like Rockwell extend their infrastructure designs into repeatable, automated deployments.

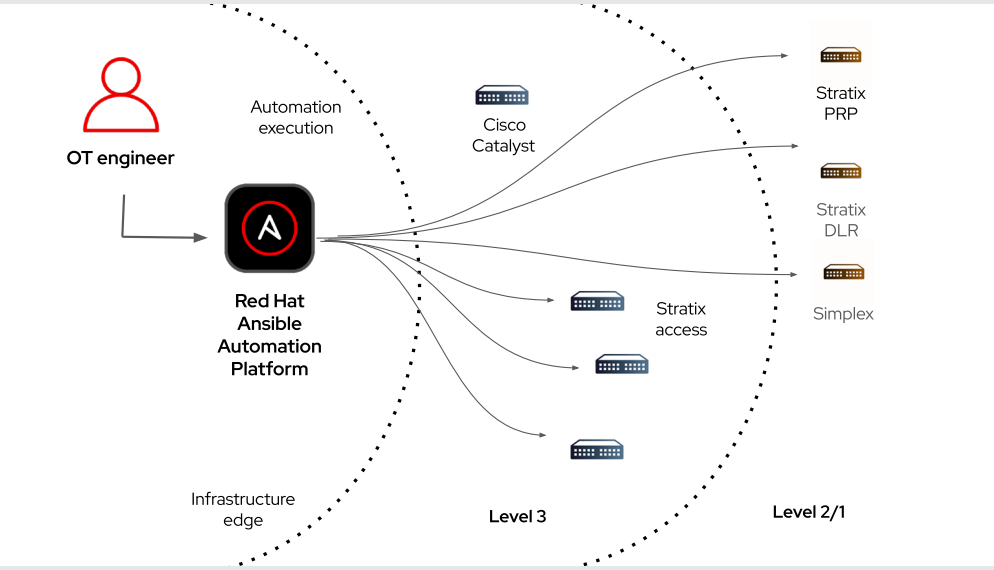

Figure 2. Example of repeatable, automated deployments using Ansible collections using Cisco APIs

Reducing risk and time to value

Pairing tested reference architectures with automation can save time, reduce human error, and lower complexity. Rockwell provides switch configuration guidance in PlantPAx documentation along with CPwE guidance.

When a customer decides to build a PlantPAx system, they make choices regarding redundancy and resiliency. When they make these decisions, the system integrator is informed, and is able to purchase the correct quantity and type of each switch, either by using Rockwell's IAB/PSE tools or through network expertise.

Stratix industrial switches are often used because they are heavily tested to offer some level of performance in the industrial automation system. Much like the way Red Hat and Rockwell have collaborated on virtual machine playbooks for typical requirements, they will also be able to provide customers with playbook templates built from specific network design requirements. With Ansible Automation Platform, Rockwell can generate these templates to support a user-friendly and consistent configuration of switches—translating validated architectures into deployable, repeatable automation workflows.

Red Hat is building playbooks and forms to allow for switch configuration using the existing Ansible Automation Platform APIs for Cisco-type switches. Red Hat maintains an extensive set of Cisco patterns in its Ansible Content Collection that support robust, scalable automation. Now, Red Hat is extending this capability into the industrial space by incorporating protocols critical to industrial environments—such as EtherNet/IP and others—into its automation collections. This evolution reflects Red Hat's continued commitment to supporting both traditional IT and emerging industrial OT needs through unified automation practices.

Creating value on Day 2 and beyond

The value of automation does not end with initial deployment. With Ansible Playbooks, switch configurations can be saved and reused, allowing repeatable changes and improving time to recovery. Organizations can use automation to implement security patches, audit configurations, or roll out updates with minimal disruption.

In future scenarios, organizations may also extend automation to lifecycle operations—helping maintain compliance, streamline troubleshooting, and adapt infrastructure as operational requirements evolve. By continuing to invest in automation beyond deployment, teams can reduce manual maintenance and support long-term operational resilience.

A vision for IT and OT

Red Hat and Rockwell are already delivering meaningful progress in simplifying and accelerating industrial switch deployment. By pairing Rockwell's field-proven architectures and configuration tools with Red Hat's automation expertise, the 2 companies are helping industrial teams reduce complexity, shorten deployment timelines, and improve long-term maintainability.

The work underway is more than just a future vision—it is a foundation for addressing today's configuration challenges. Ansible Automation Platform transforms manual, error-prone steps into repeatable, validated workflows that reflect Rockwell's design intent. IT and OT teams alike benefit from this consistency, helping reduce risk, cut setup time, and improve operational outcomes.

As these integrations deepen, organizations will gain even more automation capabilities—from preconfigured hardware deployments to lifecycle management and security updates. Together, Red Hat and Rockwell are equipping industrial organizations to scale more efficiently and operate with greater confidence across the network lifecycle.

Continue your automation journey

If you are exploring how automation can improve consistency, reduce set-up time, or support your team's operational goals, connect with your Red Hat account team or visit Red Hat industrial automation homepage to learn more.

About Red Hat

Red Hat is the world's leading provider of enterprise open source software solutions, using a community-powered approach to deliver reliable and high-performing Linux, hybrid cloud, container, and Kubernetes technologies. Red Hat helps customers develop cloud-native applications, integrate existing and new IT applications, and automate and manage complex environments. A trusted adviser to the Fortune 500, Red Hat provides award-winning support, training, and consulting services that bring the benefits of open innovation to any industry. Red Hat is a connective hub in a global network of enterprises, partners, and communities, helping organizations grow, transform, and prepare for the digital future.

North America	Europe, Middle East, and Africa	Asia Pacific	Latin America
1 888 REDHAT1 www.redhat.com	00800 7334 2835 europe@redhat.com	+65 6490 4200 apac@redhat.com	+54 11 4329 7300 info-latam@redhat.com

facebook.com/redhatinc
twitter.com/RedHat
linkedin.com/company/red-hat

redhat.com

Copyright © 2025 Red Hat, Inc. Red Hat, Ansible and the Red Hat logo are trademarks or registered trademarks of Red Hat, Inc. or its subsidiaries in the United States and other countries. All other trademarks are the property of their respective owners.