Network to Code

Introduction

August, 2023

Who is Network to Code

Network Automation Solutions Provider

We are laser-focused on helping companies transform the way their networks are deployed, managed, and consumed using network automation and DevOps technologies.

A Diverse Team, with Deep Expertise

Engineers and developers in network automation, software and security, with leadership from vendors, integrators, and top tier consulting firms - all drive value to our clients.

Driven by Community & Industry Collaboration

Rooted in Community, NTC believes industry-wide collaboration is the catalyst needed for true innovation. Host 27,000+ members and 300+ channels at slack.networktocode.com

Industry-Recognized Thought Leaders

Working with clients across all industries and geographies, we promote a vendor- and tool-agnostic approach, making automation a reality for any network.

>>> Your Expected Benefits

Modernized Network Management and Optimized Service Delivery

Lower Costs

- Increase engineer efficiency
- Reduce time spent managing, changing and troubleshooting your network
- Reallocate engineers to strategic and creative business priorities

Increased Reliability

- Avoid unexpected outages and excessive downtime
- Promote predictable network behavior
- Fully leverage technical advances in performance monitoring and resource management

Enhanced Security

- Increased adherence to best practices and standards
- Reduce security oversights
- Enhanced security incident response
- Reduced response times

Enhanced Business Agility

- Reduced Time to Market
- Reduced deployment timelines
- Simplified adoption of new technologies
- Reduced technical debt

Improved Insight & Control

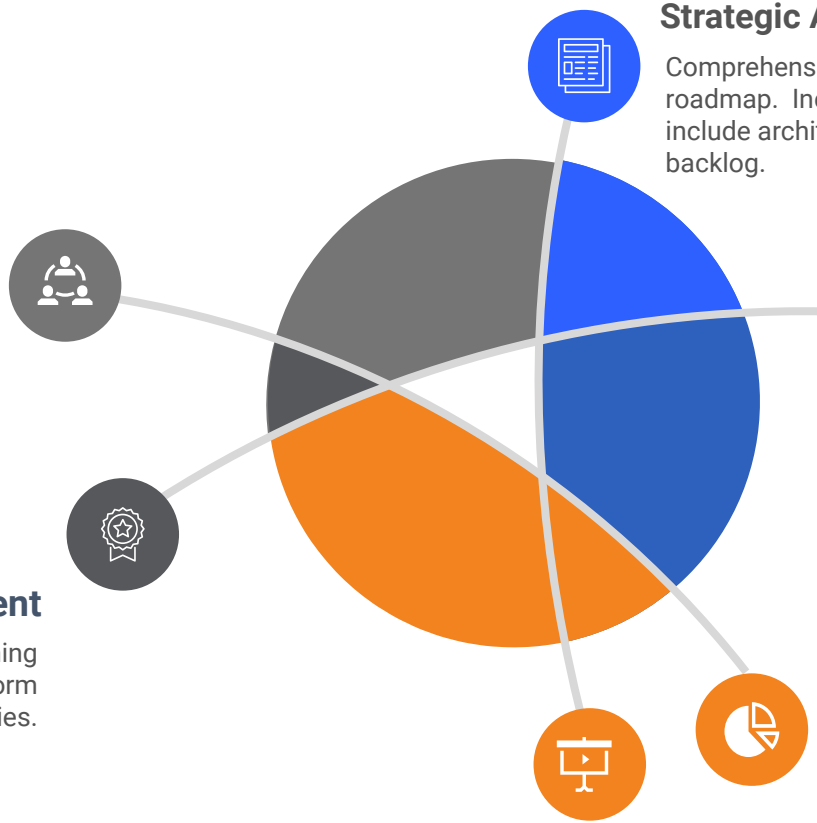
- Leverage advances in network monitoring and analytics
- Expanded data visibility and ingestion capabilities
- Simplified and streamlined visualization

"Building innovation, adaptability and resilience into digital business will not only optimize business value from technology investments, but will also help to future proof business." - Rita Sallam - Gartner Fellow

>>> Customer We Work With

Our Services

Network to Code Services



Strategic Architecture Design and Analysis

Comprehensive 3-5 year network automation roadmap. Includes thorough deliverables that include architecture, design, and prioritized backlog.

Consulting or Jump Start / FTS

Targets quick wins that provide an immediate ROI back to the business. Hands on keyboard, delivering successful outcomes.

Transformation

Dedicated team delivering change on how organizations consume and manage their networks. Includes: Automation Architecture, Design, Workflow development, Enablement, Support.

Enablement

Network automation training specifically tailored to transform your team's skills and abilities.

Managed Automation Services & Support

Continuous network automation using the NTC turnkey network automation platform; access to automation experts with NTC Automation Operations Center.

Fast Track Solutions (FTS)

>>> Fast Track Solutions - Catalog

Jump start specific network automation use cases using NTC Fast Track Solutions that are ready to be deployed on the NTC Automation Platform

OS Upgrades
Series of automation that allow the *safe* upgrading of network devices, firewalls, and wireless controllers.

Firewall Rule Automation
Deployment of firewall rules from an ITSM tool or other automation system.

Switchport Configuration
Drive switchport configuration changes by updating the database and pushing configurations.

Tech Refresh Accelerator
Simplify and automate tech refreshes codifying standard designs and integrating with your SoT.

Automated Incident Resolution
Programmatically diagnose and resolve incident tickets with zero human intervention

Configuration Remediation
Automate the return to compliance of a non-compliant configuration.

ChatOps
Integrate automation to send outbound only chatbot requests. This allows for direct linking to automation system

Greenfield Builder
Simplify and automate new site, rack and device deployments codifying standard designs and integrating with your SoT.

Configuration Compliance
Quickly determine where the configuration on the device deviates from golden configurations.

Device Lifecycle Management
Gather data and generate reports about device out of maintenance or running old/unsecure software.

Circuit Maintenance Management
Process circuit maintenance emails autonomically. Suspend monitoring, ticketing, neighborships, ect.

Strategic Architecture & Design Analysis
Turnkey approach to build strategic recommendations and multi-year plan for a network automation journey

Nautobot SoT Deployment
Deploy Nautobot & YAML files as a Source of Truth using NTC certified HA designs.

Nautobot SoT Data Population
Populate the SoT automatically from an existing network. IP, Interfaces, vlans, cabling, Routing, ACLs ..

Nautobot SoT Data Sync
Synchronize, unify, and enrich network data sources using the Single Source of Truth framework.

Telemetry and Observability
Extend visibility with real time data from multiple sources and enriched with metadata

Pre-Post Change State Validation
Quickly determine when the operational state is not as intended.

FTS Roadmap
Currently deployed as PS Projects

Cloud Networking
Automate the provisioning of Cloud resources (VPC, ALB, MLB etc ..)

Nautobot SoT Version Control
Nautobot powered by Dolt to support native Version Control, e.g. Branch, PR , and Merge.

Config Compliance

Solution Brief

>>> Configuration Compliance Value

Increased Reliability

- Reliable and predictable networks result because definition and enforcement is done at the enterprise level.
- Avoid outages caused by misconfigurations
- Ensure compliance with a regularly scheduled job

Enhanced Security Posture

- Define security requirements across the enterprise as new threats emerge.
- Ensure 100% compliance on a single UI.
- Discover unintended changes which create new vulnerabilities.

Increased Visibility

- Full compliance visibility is readily accessible from the dashboard. Reducing the amount of time spent developing, generating and correcting compliance audits.
- Quickly navigate to individual instances of non-compliance from the report view.
- Compliance is maintained regardless of network complexity or scale.

Enhanced Disaster Preparedness

- Expedites the rapid restoration of service, by storing backup and intended configurations.
- Version controlled configurations make it easy to restore to any point in time.
- New versions of your configuration can be defined while devices are offline.

"80% of outages impacting mission-critical services will be caused by people and process issues, and more than 50% of those outages will be caused by change/configuration/release integration and hand-off issues." - Gartner Research

Risks of Outages Caused by Poor Compliance

>>> Major Network Outages - Headlines and Enforcement Actions

Widespread Verizon outage reported on East Coast

- **Date**: Jan 26th, 2021
- **Duration:** 7 Hrs
- **Effects:** 100,000+ Offline, FCC & Homeland Security Investigation

"**FCC Reaches $19.5M Settlement of T-Mobile 911 Outage Investigation**" - FCC.gov

Japanese Telecom KDDI to pay millions in damages

- **Date**: July 2nd - 4th, 2022
- **Duration:** 61 Hours
- **Effects:** 30 million users affected. Disrupted Banking Systems, Parcel Delivery, Emergency Services, Network-connected Cars and several other services
- **Cost:** ¥7.3 Billion ($54 Million) in direct compensation

Major outage at Amazon disrupts businesses across the US

- **Date:** December 7th, 2021
- **Duration:** 8 Hrs
- **Effects:** Dozens of enterprise customer services unavailable (Netflix, Disney+, Ring, Robinhood, Instacart, Roku & many others)
- **Cost:** $1 Billion+ (Customer revenue losses + Amazon's direct Losses)

"Lesson from AWS outage: stop putting your eggs in the same basket" - CIO.com

Rogers network resuming after major outage hits millions of Canadians

- **Date**: July 8th, 2022
- **Cause:** Core Network Maintenance
- **Duration:** 19 Hours
- **Effects:** 95,000 Small Businesses Impacted

"**CRTC gives Rogers 10 days to answer for massive outage**" - Toronto Sun
"**Industry Minister to meet with telecoms after unacceptable Rogers outage**" - The Globe And Mail

>>> Configuration Compliance Quantified

Configuration compliance addresses these risks with a thorough approach

Manual Configuration Compliance

Cost Prohibitive

- A single thorough audit across 5,000 nodes costs in excess of $100k and requires over 1,600 hours of labor to generate.
- Performed too infrequently to prevent outages.

Unreliable Data

- Contains inaccuracies due to human error
- Data is stale soon after collection due to drift.

Exhibits Poor Outage Prevention

- Gartner reports that a single network outage costs an average of $5,400/min. However, for some organizations, costs could exceed $1MM/hr.
- A significant outage also damages a businesses reputation, reduces customer loyalty and will require an exhaustive IT effort in remediation and post mortem analysis.

Poorly Defined

- Compliance is not defined by an authoritative system

Nautobot Configuration Compliance

Cost sensitive

- Reports are generated automatically using predefined standards.

Reliable Data

- A routine audit is performed which ensures sustained compliance.

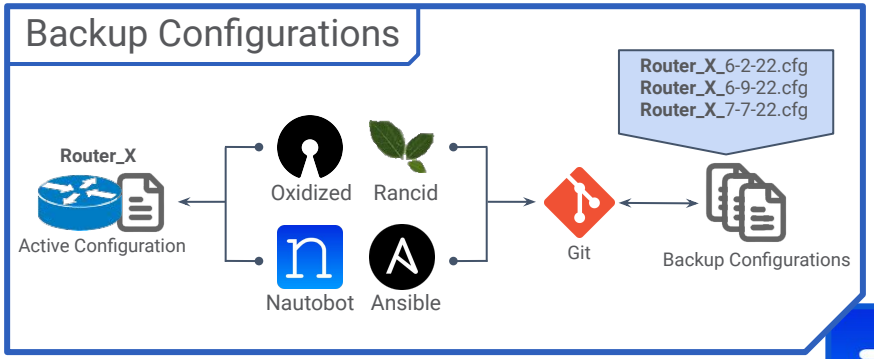
Prevents and Mitigates Outages

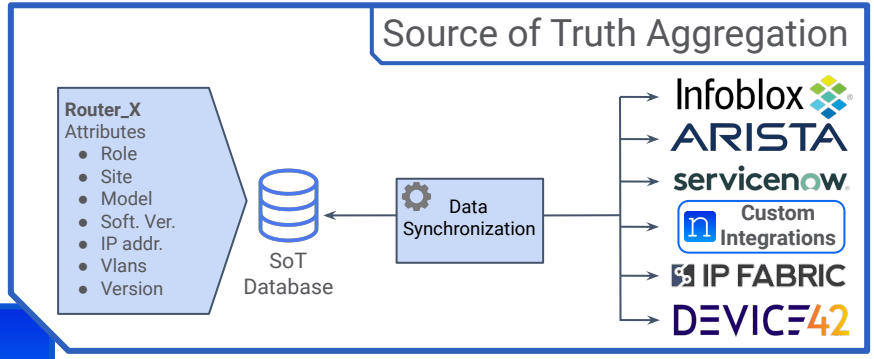
- Holistically evaluates the network. Taking care to account for the dynamic nature of modern networks.
- Indicates when a device's configuration is not in the intended state and displays exactly what must be done to remediate the problem.
- A historical record of every device's configuration is kept and is quickly retrievable.

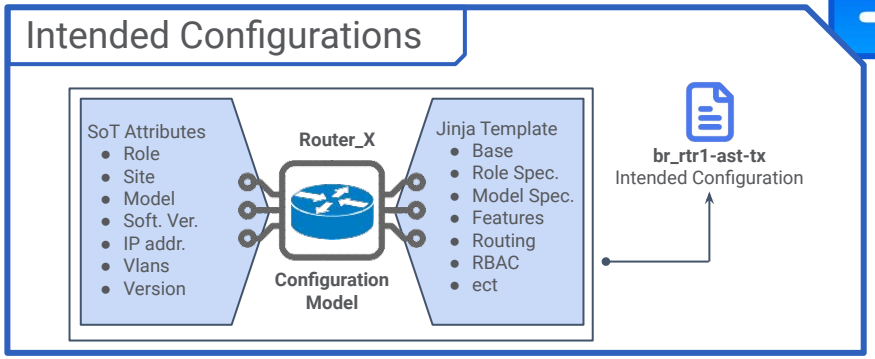
Expertly Defined

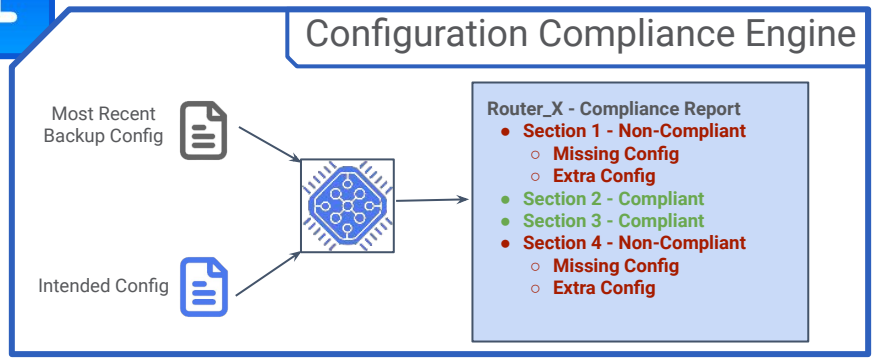
- Each network devices unique configuration can be granularly defined.

>>> Configuration Compliance Solution Overview - Four Components





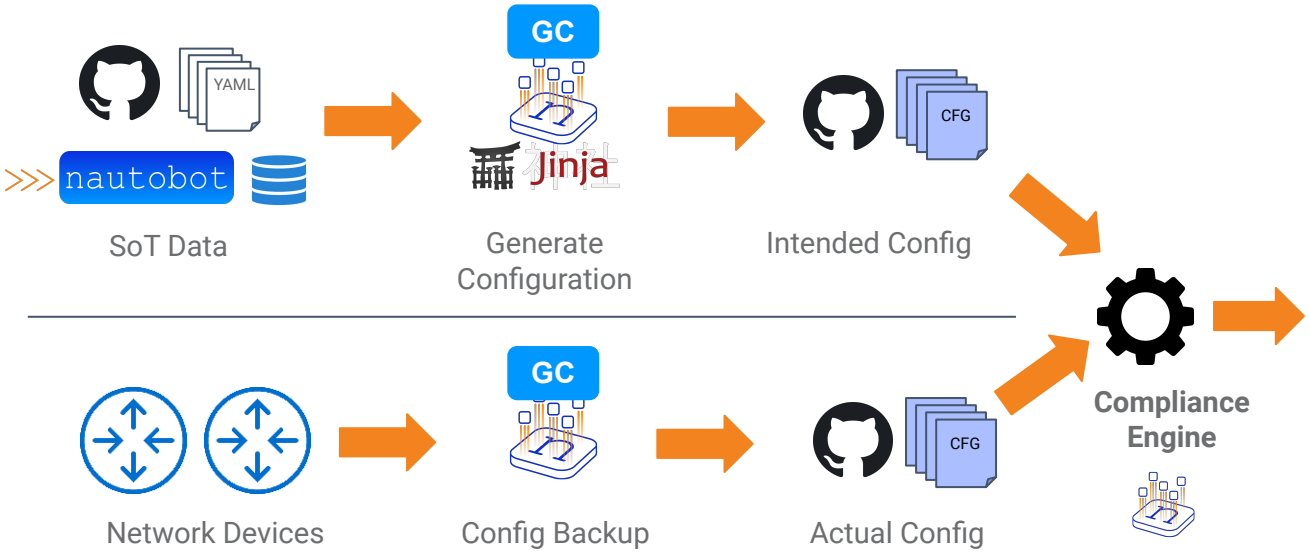




Nautobot allows customers to leverage existing solutions for both backup and intended configurations

Config Compliance - Fully Leveraging Golden Config

- **Intended configuration:** generated with Jinja2 templates and the Nautobot Golden Config App, pushed to a Git repo
  - Data comes from YAML files and data in Nautobot via a GraphQL query (SoT Aggregation Query)
- **Configuration Backups:** Nautobot Golden Config App, pushed to a Git repo
- **Config Compliance:** Golden Config Nautobot App pulls intended and backup configs from repos and analyzes them according to the defined rules



Configuration Compliance - UI Screenshots

Dashboard View

Device	aaa	acl	bgp	dns
nyc-spine-01.infra.ntc.com	✗	✓	✓	✓
jcy-spine-01.infra.ntc.com	✗	✓	✓	✗
jcy-spine-02.infra.ntc.com	✗	✓	✓	✗
nyc-spine-02.infra.ntc.com	✗	✓	✓	✓
jcy-rtr-01.infra.ntc.com	✗	✓	✓	✗
nyc-leaf-02.infra.ntc.com	✗	✓	✓	✓
jcy-bb-01.infra.ntc.com	✗	✓	✓	✗
nyc-leaf-01.infra.ntc.com	✓	✓	✓	✓
nyc-bb-01.infra.ntc.com	✓	–	✓	–
nyc-rtr-02.infra.ntc.com	✓	–	✓	–
nyc-rtr-01.infra.ntc.com	✓	–	✓	–

Delete Selected

Status Page

Device	Backup Status	Intended Status	Compliance Status	Actions
jcy-bb-01.infra.ntc.com	May 4, 2022 1:26 p.m.	May 4, 2022 1:26 p.m.	May 4, 2022 1:26 p.m.	
nyc-leaf-01.infra.ntc.com	May 4, 2022 1:26 p.m.	May 4, 2022 1:26 p.m.	May 4, 2022 1:26 p.m.	
jcy-bb-01.infra.ntc.com	May 4, 2022 1:26 p.m.	May 4, 2022 1:26 p.m.	May 4, 2022 1:26 p.m.	

Backup Config
Aggregate Data
Intended Config
Run Job
Compliance Details

Device Compliance Views

Configuration Compliance - nyc-spine-01.infra.ntc.com

Feature Navigation: Compliant | Non-Compliant | Clear

Arista EOS - ntp	Arista EOS - snmp	Arista EOS - aaa
Arista EOS - intf	Arista EOS - host	Arista EOS - dns

AAA

Status: Non-Compliant

Intended Configuration:

```
aaa authorization exec default local
no aaa root
username ntc privilege 15 secret sha512 $6$I96u7PN2rdf8y1xH$1Iq523MXOQlfsZDiFPmZiSOvpfFsCpH.EuSblMyQvokhVfCqreJLHbzFlG6SPHzbL1mIElnDIm8Px6Jw55IN1/
management api http-commands
   protocol http
   protocol unix-socket
   no shutdown
management api gnmi
   transport grpc default
      port 830
```

Actual Configuration:

```
aaa authorization exec default local
no aaa root
username ntc privilege 15 secret sha512 $6$pE5h.iNjTivxKHaV$TW7CKUWP5YLQANyqliRuumMVLi6lEP7a3kKGv8MWduRTRNoTWSe4jiHRvHxko0UbfiixGCkA.zFaKNfKBdeK./
management api http-commands
   protocol http
   protocol unix-socket
   no shutdown
management api gnmi
   transport grpc default
      port 830
```

Missing Configuration:

```
username ntc privilege 15 secret sha512 $6$I96u7PN2rdf8y1xH$1Iq523MXOQlfsZDiFPmZiSOvpfFsCpH.EuSblMyQvokhVfCqreJLHbzFlG6SPHzbL1mIElnDIm8Px6Jw55IN1/
```

Extra Configuration:

```
username ntc privilege 15 secret sha512 $6$pE5h.iNjTivxKHaV$TW7CKUWP5YLQANyqliRuumMVLi6lEP7a3kKGv8MWduRTRNoTWSe4jiHRvHxko0UbfiixGCkA.zFaKNfKBdeK./
```

>>> Configuration Compliance

Solution Summary

- Automated validation of observed configuration state (what is in the network device) versus the intended configuration (what configuration would be rendered from the Source of Truth data and templates)
- The observed and intended configurations can be taken from external sources (via Git Repositories) or gathered from Nautobot
- Seamless integration with Nautobot data and secrets

Solution Components

Nautobot Source of Truth
Nautobot Golden Configuration App
Git Repositories: Backups, Templates, Intended Configuration

Scope Summary

- Install the Nautobot Golden Configuration (GC) App
- Configure Nautobot Golden Configuration App for desired Git repos required for backups, intended configurations and optionally Jinja templates
- Configure compliance and validation rules for up to five (5) global configuration features (SNMP, AAA, NTP, DNS , etc.)
- Configure compliance and validation rules for interfaces and routing
- Configure GC to perform device backups (if needed)
- Configure GC to generate configurations and build Jinja templates (if needed)

Estimated Project Length

4-6 months

PS Add-on