



The bridge to possible

Integrating Cisco Catalyst Center with NetBox and Ansible as part of a modern Network Automation Architecture

Rich Bibby, Technical Advocate
NetBox Labs
[@rich_bibby](#)

Agenda

- Introducing NetBox and NetBox Cloud
- A reference architecture for modern network automation
- Extending the NetBox data model to integrate with Cisco Catalyst Center
- NetBox integration with Ansible for dynamic inventory
- Demo – Putting it all together



*“We make it easier to build and manage
complex networks.”*

NetBox Labs

Network Automation Requires a Network Source of Truth (NSoT)

- NSoT: representation of the **intended configuration and state of the devices, connections, and services** of the network
- Captures **intended state** - different than operational state
- **Structured, cohesive, comprehensive data model** for network intent - forces completeness & correctness in design, planning, configuration management, operations

NetBox – Your Network Source of Truth


- Your system of record for network management & automation:
- Eliminate spreadsheets
- Break down DCIM & IPAM data silos
- Accelerate network automation (REST API, GraphQL, Webhooks etc)
- Everything is in NetBox and everything is correlated

The screenshot displays the NetBox web interface for a site named 'DM-Scranton'. The left sidebar shows a navigation menu with categories like SITES, RACKS, TENANCY, CONTACTS, and DEVICES. The main content area shows the site details, including its location (North America / United States / Pennsylvania), status (Active), and physical address (1725 Slough Avenue, Suite 200, Scranton, PA, 18540). A 'Related Objects' section on the right lists various network objects associated with the site, such as Locations, Racks, Devices, Virtual Machines, Prefixes, VLAN Groups, VLANs, ASNs, and Circuits. A 'Non-Racked Devices' section is also visible, showing a list of devices. The interface is clean and modern, with a search bar at the top and a user profile in the top right corner.

NetBox is Powered by a Massive Community

5000+ Networking pros building, helping, sharing - 24x7

10K+ Global deployments





13k+ GitHub  Widely loved by networking teams



11k+ Software commits. Feature complete, battle tested

NetBox Cloud Accelerates & De-risks Network Operations



NetBox Cloud Instances



3

 ✓ Started   





Instance	Version	Region
NetBox DevOps	3.7.1	  AWS Dublin, IE



Secrets

Admin Username  



Admin Password  



bitter-mountain-5851.cloud.netboxapp.com

 ✓ Started   





Instance	Version	Region
webinar	3.6.9	  AWS Dublin, IE


Secrets

Admin Username  



Admin Password  



ozpu4920.cloud.netboxapp.com

 ✓ Started   

Instance	Version	Region
Guided Demo	3.7.1	 AWS North Virginia, US

Secrets

Admin Username  

Admin Password  

spring-paper-9469.cloud.netboxapp.com

Go Faster

- Eliminate overhead with push-button lifecycle operations
- Enjoy hassle free automatic upgrades
- Quickly build your network model with turn-key network discovery from our partners
- Implement event-driven, real-time automations with Cloud Event Stream (coming soon)

The screenshot displays the NetBox Cloud interface. At the top, the 'Overview' section shows the service 'NetBox Cloud', version '3.6.9', and deployment region 'AWS Dublin, Ireland'. Below this, the 'Version Upgrade' section is active, showing a table of available versions. The 'Recommended Version' is 3.7.1, released on Jan 17, 2024, with a status of 'recommended'. A button indicates an upgrade from NetBox BGP 0.11.1 to 0.12.0. The 'Other Versions' section is currently empty. At the bottom, there is a button to 'UPGRADE VERSION 3.6.9'.

Version ↑	Released	Status	Plugins Compatibility	Release Notes
Recommended Version				
3.7.1	Jan 17, 2024	recommended	NetBox BGP 0.11.1 -> 0.12.0	
Other Versions				

Go Safely

- Rock-solid, highly available platform configured your way
- Cloud Firewall with IP Allow Lists, mTLS & a dedicated IP address
- Automated backups, Single-Sign On (SSO) and Two-Factor Authentication
- Simplified Plugin management, no compatibility worries

The screenshot displays the 'Overview' page of the NetBox Cloud application. At the top, it shows the service name 'NetBox Cloud', version '3.6.9', and deployment region 'AWS Dublin, Ireland'. Below this, there are several expandable sections: 'Version Upgrade' with a 'Need Help?' link, 'Secrets', 'IP Allow List' (showing 1 entry) with 'Publish' and 'Add' buttons, 'Plugins' (showing 1 plugin installed), 'Logs' (showing 1 pod) with a 'Last updated: 4 minutes ago' timestamp, and 'Backup And Restore' (showing 'Last Backup: 37 minutes ago') with a 'See Restore History' link and a 'Back Up Now' button.

Overview ozpu4920.cloud.netboxapp.com		
Service	Version	Deployment Region
NetBox Cloud	3.6.9	AWS Dublin, Ireland

Version Upgrade [Need Help?](#)

Secrets

IP Allow List [Entries: 1](#) [Publish](#) [Add](#)

Plugins [1 plugin installed](#)

Logs [1 pod](#) [Last updated: 4 minutes ago](#)

Backup And Restore [Last Backup: 37 minutes ago](#) [See Restore History](#) [Back Up Now](#)

Go Farther

- 100s of plugins extend NetBox's functionality to every use case
- Seamless integration with major automation platforms
- Built-in device configuration generation
- Highly extensible and customizable data model

The screenshot displays the NetBox web interface for a device named 'ceos-sw-1' under the 'ContainerLab' namespace. The page title is 'ceos-sw-1 - Config'. It includes a breadcrumb trail 'Devices > ContainerLab' and a status bar indicating 'Created 2023-08-01 19:20 - Updated 1 week ago'. Action buttons for '+ Add Components', 'Bookmark', 'Clone', 'Edit', and 'Delete' are visible. The main content area has tabs for 'Device', 'Interfaces' (with a count of 3), 'Config Context', 'Render Config', 'Contacts', 'Journal', and 'Changelog'. The 'Config Context' tab is active, showing a 'Config Template' section with fields for 'Config Template' (cSEOSLab), 'Data Source' (webinar), and 'Data File' (config_templates/cEOSLab.j2). To the right is a 'Context Data' section with a dropdown arrow. Below these is the 'Rendered Config' section, which displays a snippet of configuration text and a 'Download' button.

```
!
no aaa root
!
username admin privilege 15 role network-admin secret sha512 $6$Nfus.CLqubtUkR/5$RMXV7ErzvU2M1UeycFsgIZx5rAQoyp5WsfvUXH6u4xM6bT0AKNhpB.MqBhL1AbBj3PI4Cue8w2hC1nM.Zw/
!
transceiver qsfp default-mode 4x10G
!
service routing protocols model multi-agent
!
hostname ceos-sw-1
!
spanning-tree mode mstp
!
vlan 100
 name Data
!
vlan 200
 name Voice
!
```

The journey to network automation starts with implementing a NSoT

Document

Converge legacy sources of truth

Discovery or manual capture of additional network data

Change operational processes to start with documentation

Model

Connect network data through cohesive models

Enforce consistency across models

Automate

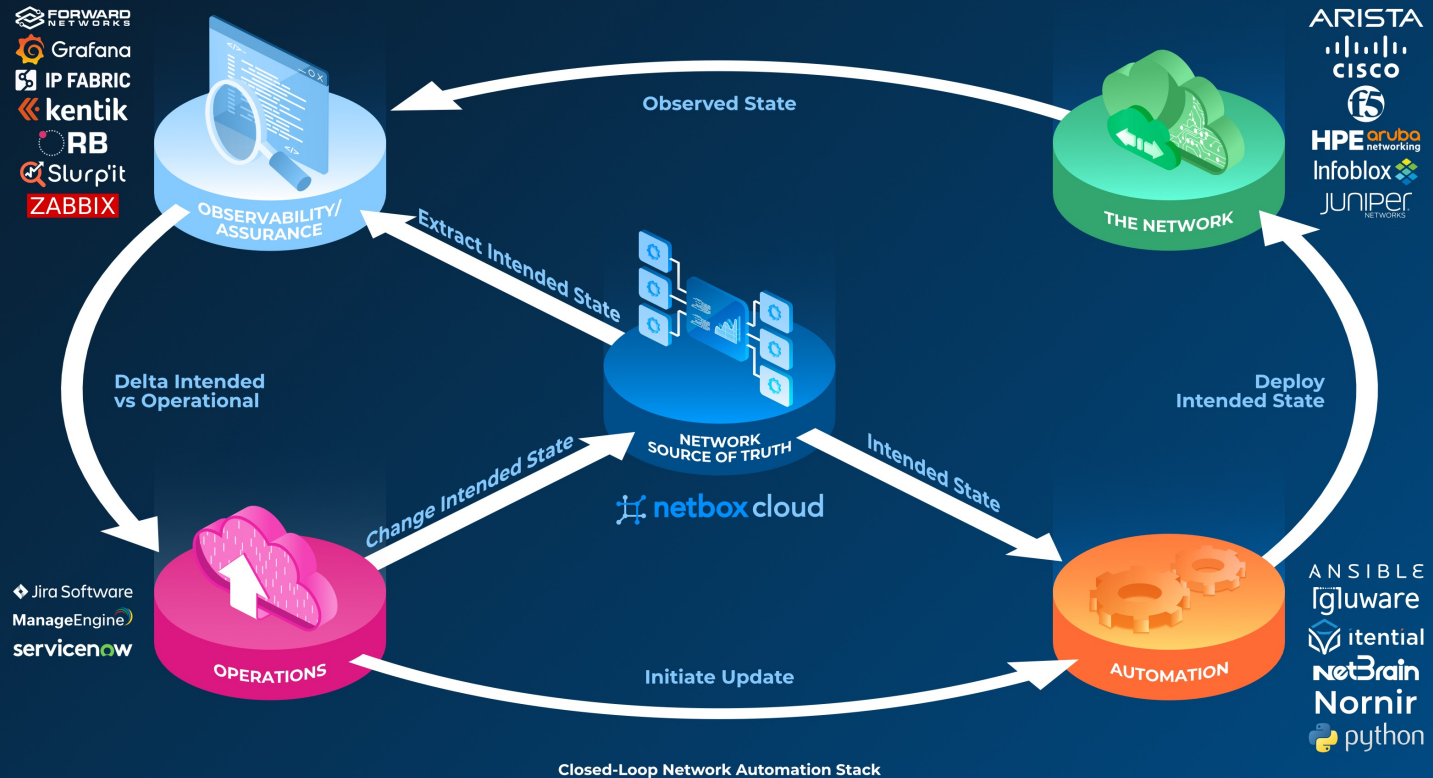
Implement change management starting with NSoT / intent

Generate configs from model data

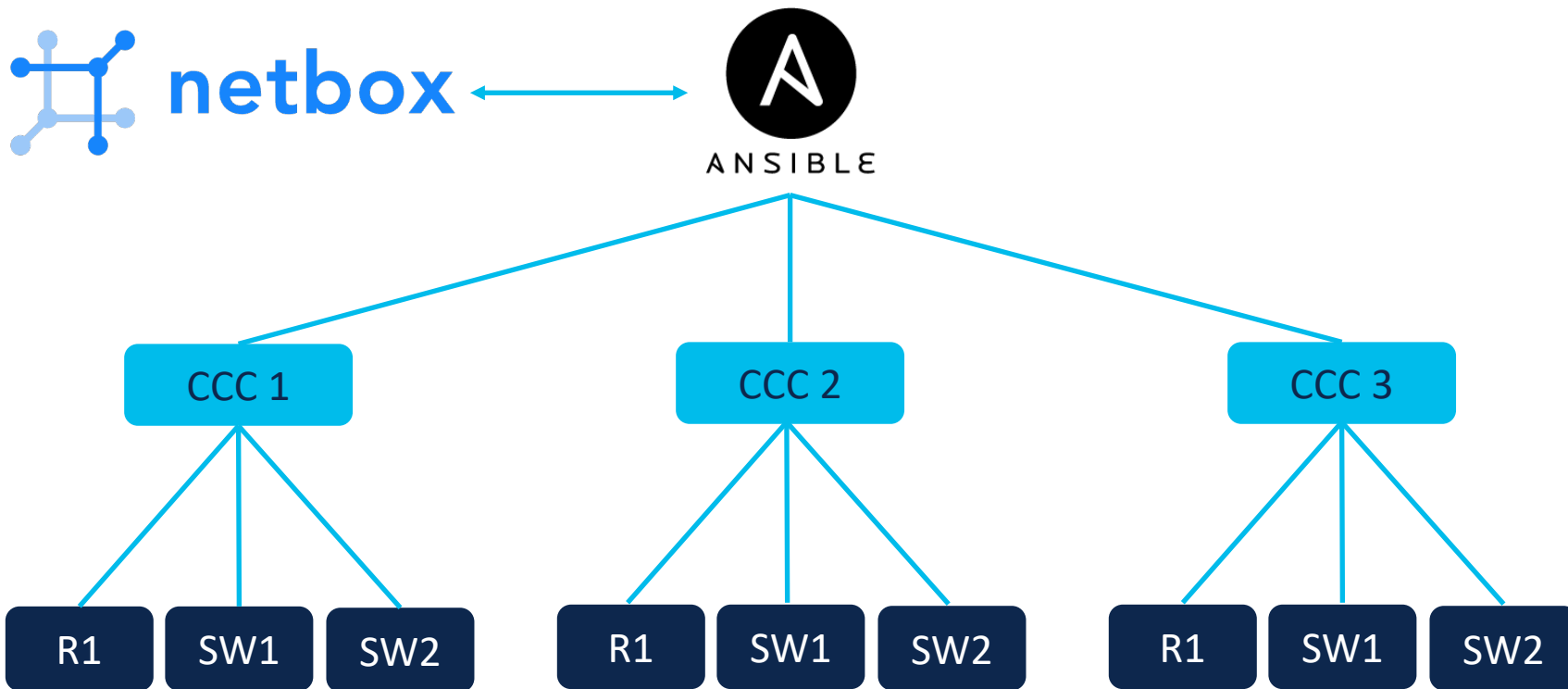
Drive automations from dynamic inventory

Assurance to identify/resolve operational drift

Modern Network Automation Architecture



Automating Against Multiple Catalyst Center Controllers



Extending the Data Model - NetBox Custom Fields

- NetBox administrators can extend NetBox's built-in data model by adding custom fields to most object types.

Devices > Cisco DevNet

sw1

Created 2024-01-05 10:30 · Updated 3 days, 18 hours ago

dcim.device:35

+ Add Components Bookmark Clone Edit Delete

Device Interfaces 10 Config Context Render Config Contacts Journal Changelog

Device

Region	—
Site	Cisco DevNet
Location	—
Rack	—
Position	—
GPS Coordinates	—
Tenant	—
Device Type	Cisco C9KV-UADP-8P (1U)
Description	—
Airflow	—
Serial Number	9SB9FYAFA20
Asset Tag	—
Config Template	—

Custom Fields

Ccc device id	32446e0a-032b-4724-93e9-acbbab47371b
Cisco catalyst center	sandboxdnac.cisco.com

Management

Status	Active
Role	DISTRIBUTION
Platform	ios-xe
Primary IPv4	10.10.20.175
Primary IPv6	—
Out-of-band IP	—

Services

Name	Parent	Protocol	Ports	Description
— No services found —				

+ Add a service

Images

Content Type	Parent	Image	Name	Size (Bytes)	Created
— No image attachments found —					

+ Attach an image



Demo

Continue your education

CISCO *Live!*

- Code and slides:
<https://github.com/netboxlabs/netbox-ansible-cisco-cc>



- NetBox Zero to Hero course – coming very soon to Cisco U
- NetBox Cloud Free 14-Day Trial:
<https://netboxlabs.com/trial/>

Fill out your session surveys!



Attendees who fill out a minimum of four session surveys and the overall event survey will get Cisco Live-branded t-shirt (while supplies last)!

All surveys can be taken in the Cisco Events Mobile App or by logging in to the Session Catalog and clicking the "Attendee Dashboard" at

<https://www.ciscolive.com/emea/learn/sessions/session-catalog.html>





The bridge to possible

Thank you

CISCO *Live!*

