Automating Your Network with Ansible and Cisco NSO

Enable Continuous Integration and Deployment with Zero Downtime

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Today's Presenters

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Agenda

1. Red Hat Ansible Automation
2. Cisco NSO Lifecycle Orchestration
3. Better Together: Ansible and Cisco NSO
4. Demo
5. Wrap-up

Automation with Ansible

No matter where you are on your path
to digital transformation, you can
make an impact with automation.

redhat.

How are you thinking about management?

What is your automation strategy?

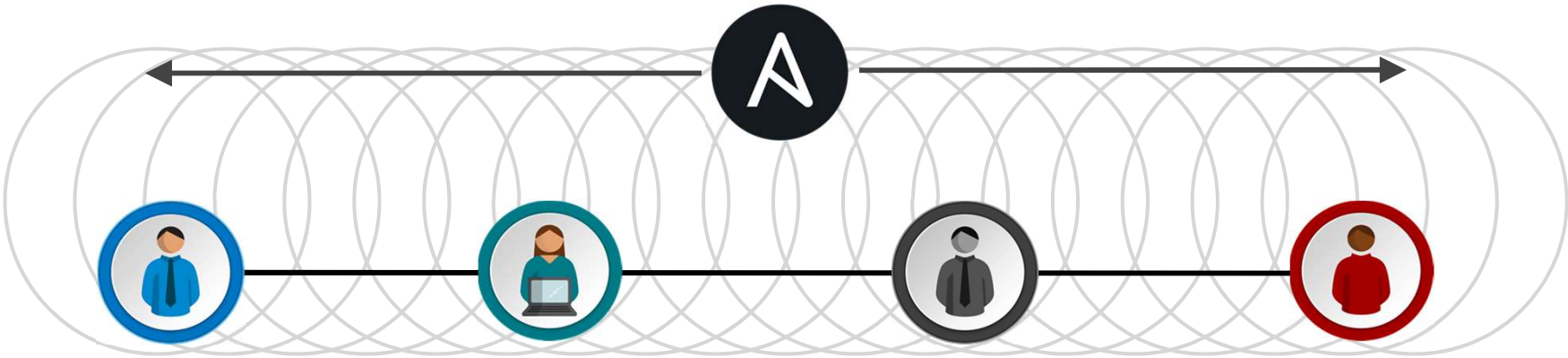
redhat.

Everyone is talking about

automation

redhat.

ANSIBLE IS THE UNIVERSAL LANGUAGE



BUSINESS DEV QA/SECURITY IT OPERATIONS

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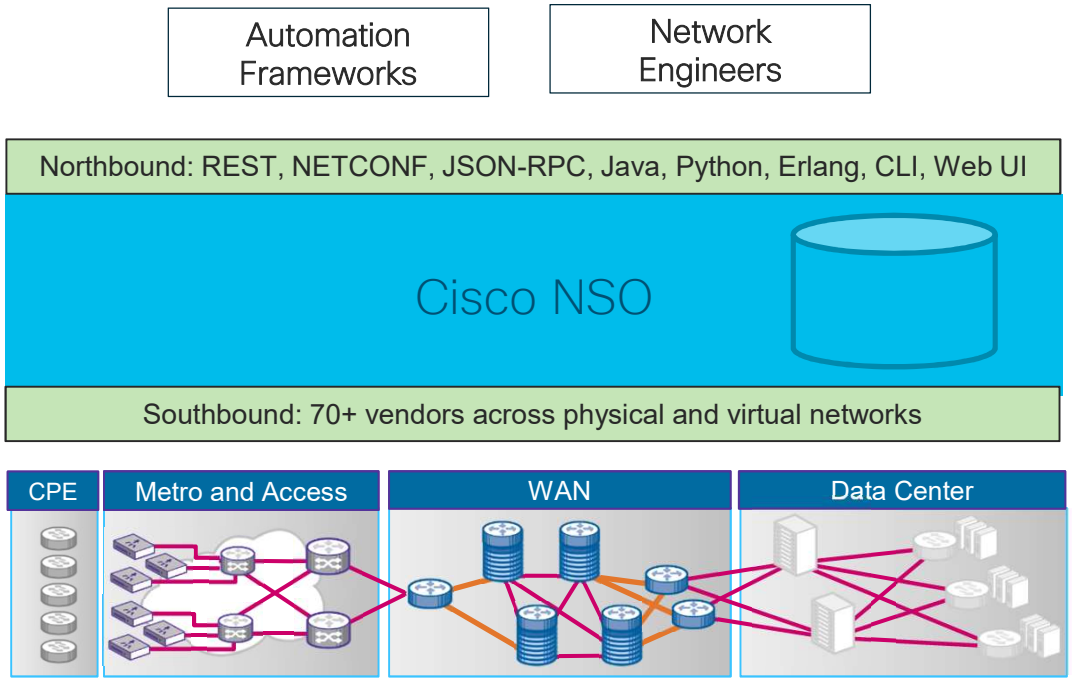
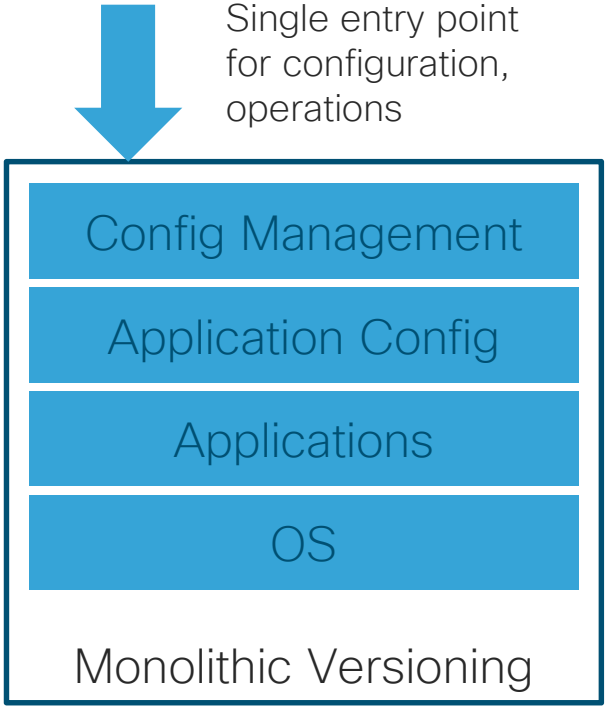
Cisco NSO
The Industry Leading Network Automation & Orchestration Platform

Cisco NSO – The Network API



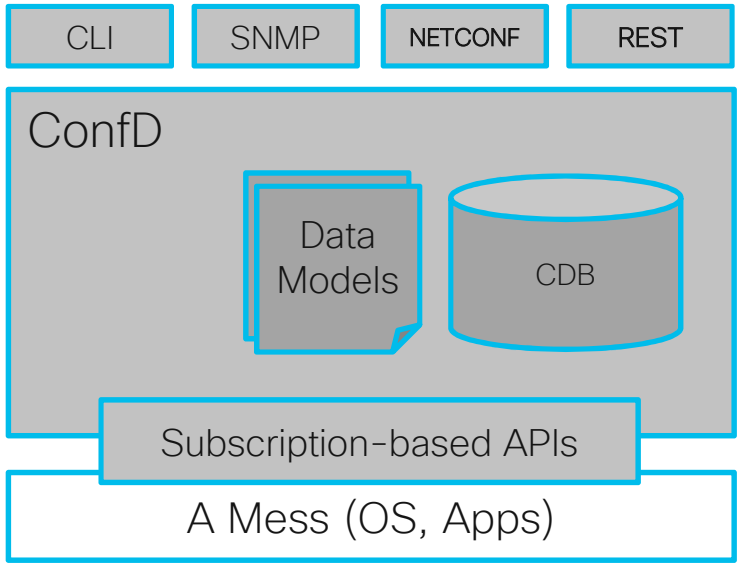
- No hard-coded assumptions about:
  - Network services
  - Network architecture
  - Network devices
- YANG-based data store driving the north- and southbound interfaces
- Southbound multi-protocol support including NETCONF, REST, CLI, SNMP
- Massively scalable architecture deployed in networks with 100k+ devices

Network Device Stack



	Features	Change Rate
Monolithic Versioning	CLI/NETCONF/etc with supporting infrastructure including config master db for inflight changes In-memory and/or artifacts on disk complicated updates through micro-orchestration	**High**, depends on location in network and service: • Day0/1 on install • Day N for services
	Proprietary applications, lifecycle as integrated product Non-mainstream (platform HAL, kernel patches, etc), lifecycle as integrated product	**Low**, as part of maintenance or security

From Devices (ConfD)…



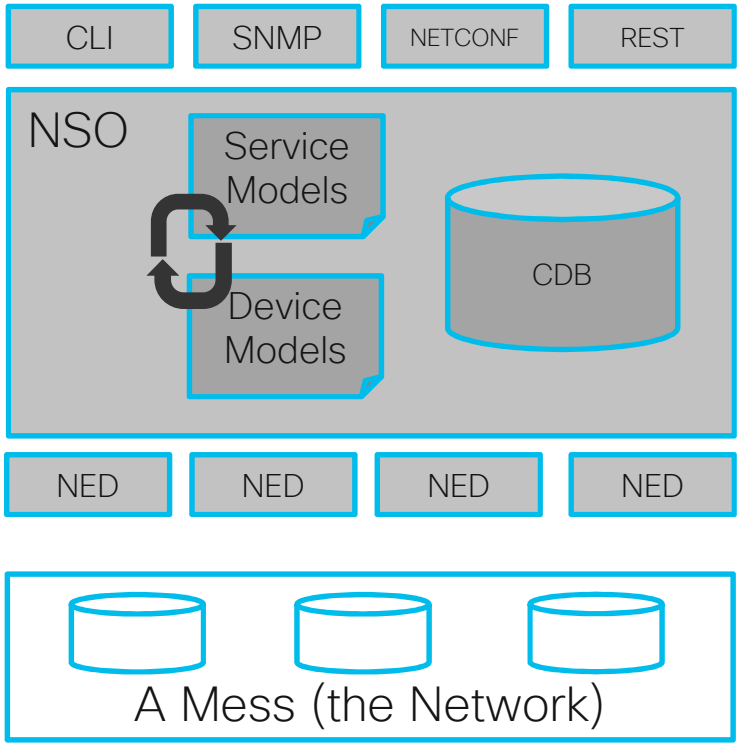
Challenges:

- Many different APIs and interfaces to the north
- Heterogenous environment to the south
- One operation may lead to many activities

Solution includes:

- APIs and interfaces driven by models
- Transaction-engine with flexible rollback

...to Networks (NSO)

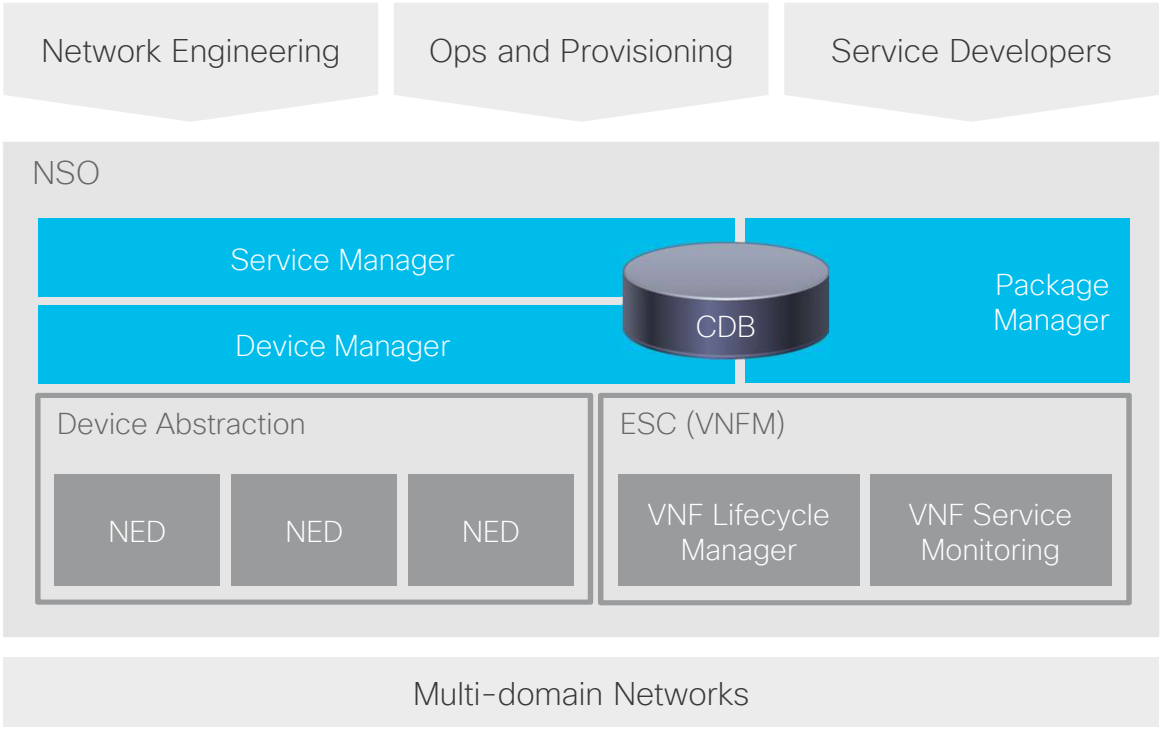


Challenges are very similar, but larger scale, more distributed

So we added some more to the solution:

- Layered models for abstraction
- Mapping between layers
- Adapters for talking different protocols

So Here We Are – Cisco NSO

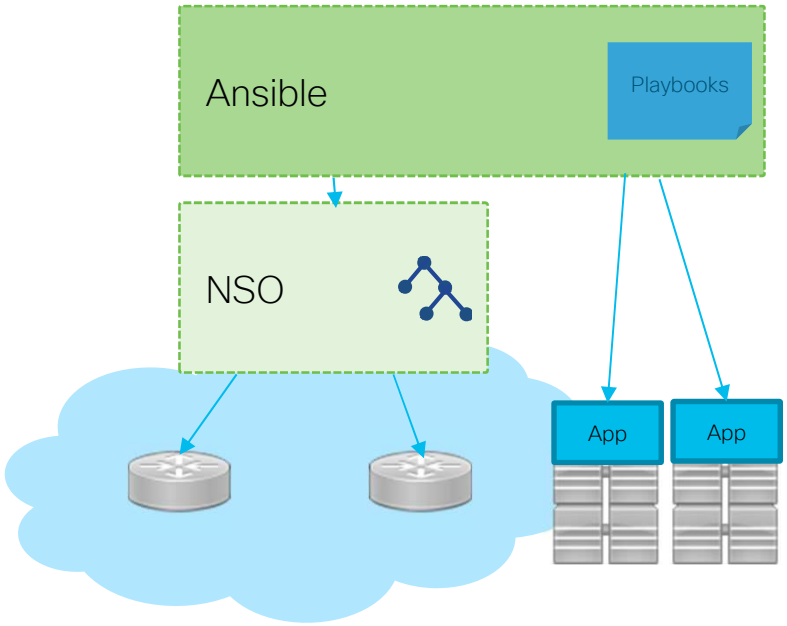


- Model-driven end-to-end service lifecycle and customer experience in focus
- Seamless integration with existing and future OSS/BSS environment
- Loosely-coupled and modular architecture leveraging open APIs and standard protocols
- Orchestration across multi-domain and multi-layer for centralized policy and services across entire network

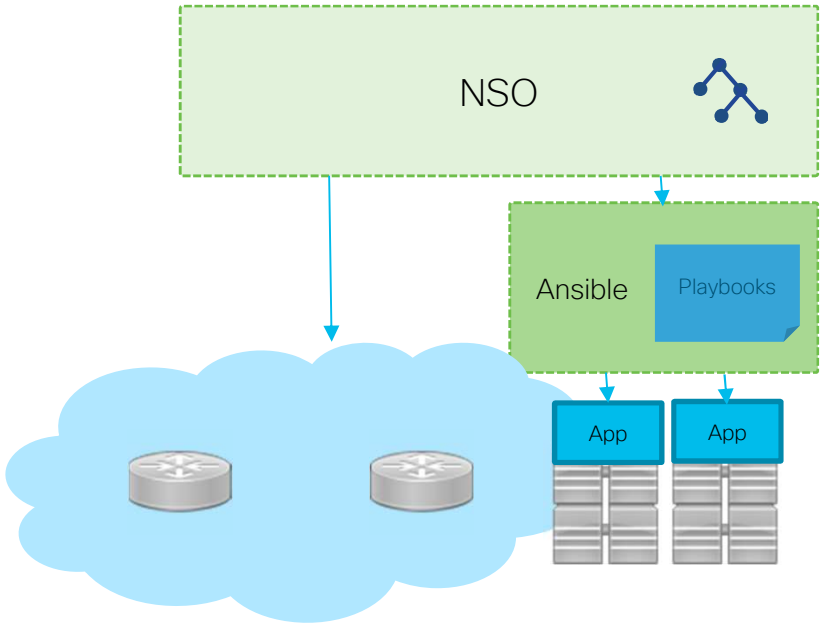
Automation Better Together with Ansible + NSO

Reference Architectures Spanning Applications and Networks

Application Centric



Connectivity Centric



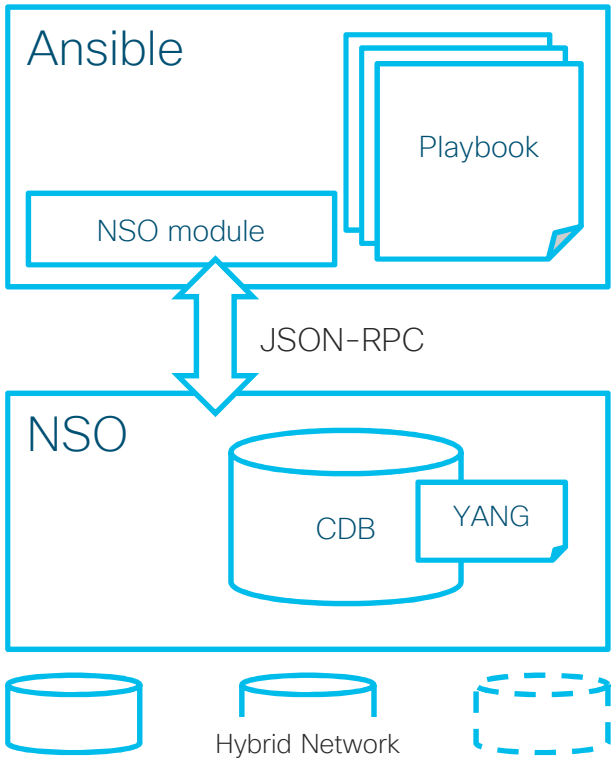
Ansible Plus Cisco NSO – Better Together

Red Hat Ansible Tower provides playbook-driven IT and network automation

Cisco NSO provides model-driven service orchestration in hybrid networks

- Ansible uses Playbooks to define named *tasks* that are executed by the *ansible-playbook* tool. The tasks use *modules* to perform activities. The *NSO modules* uses the version JSON-RPC API
- NSO uses *YANG modules* to describe the schema of the data that can be manipulated using *JSON-RPC.* Clients (in this case an Ansible module) perform operations on the data stored in CDB.
- Easily consumed by native Ansible allows application-centric services to unlock the full value of the network

Ansible + Cisco NSO – Roles and Responsibilities



Devops teams

- Owns lifecycle of playbook

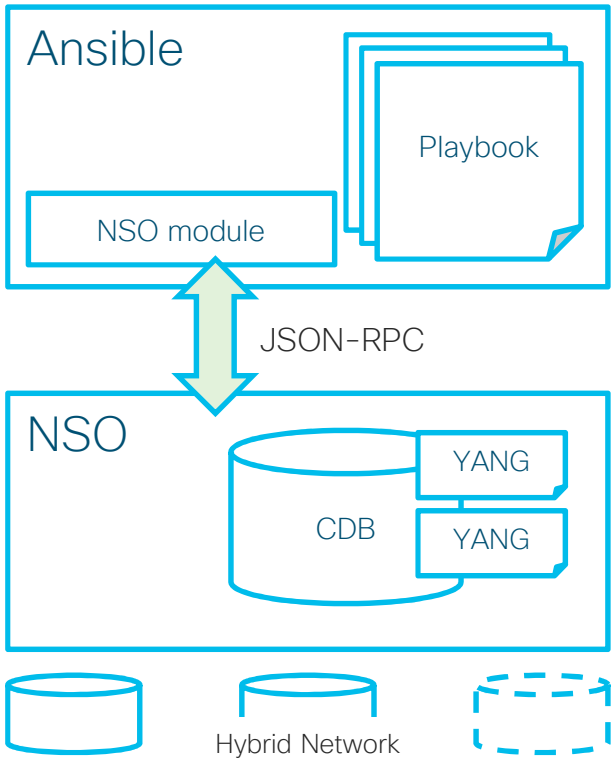
YANG becomes contract language between teams across infrastructure cycles:

- Requirements from apps device provided in YAML-format
- New services published by infra team as REST-interface update

Infrastructure teams:

- Owns lifecycle of network services

Applicable Cisco NSO Features



- NSO provides a full CRUD interface
  - Create – easy
  - Update – hard
  - Delete – very hard
- Transactions – either stuff entirely happens or no stuff happens
- Model-based (YANG) so clients can fetch and validate payloads

Three Ansible Modules for Cisco NSO

- The `nso_verify` module fetches data from NSO, compares with data in the task and reports any violations
- The `nso_action` module performs RPCs on NSO (e.g. check-sync) and validates the output
- The `nso_config` module is used to create and delete instance data in NSO

Module Commonality

- YAML data encoding for all Ansible features
- YAML encoding is straight translation from the JSON data structures natively provided by NSO, e.g:
  - `curl -H "Accept: application/yang-data+json" \`
    `http://localhost:8080/restconf/data/devices/ | json2yaml`
- Input data is runtime validated against applicable subset of NSO YANG modules

Value of Ansible Tower + Cisco NSO

- Single Ansible module leveraging NSO to support 70+ vendors across domains
- Integrated YANG-support for model-driven configuration validation
- Full rollback capabilities across vendors and device types

- Gain immediate control over the entire network from data center to CPE
- Significantly reduce the amount of time spent testing configuration changes
- Reduce fallouts requiring manual intervention to a minimum

Automating Your Infrastructure with Ansible Tower and Cisco NSO

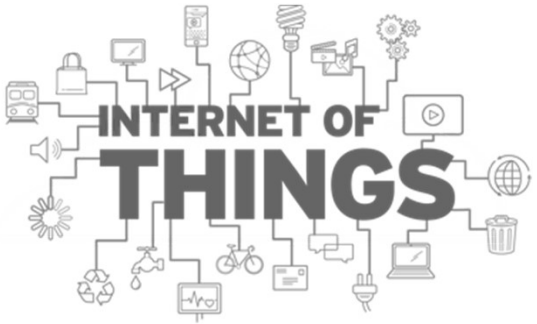
AUTOMATION >> Ansible + Cisco NSO Use Cases

Network Automation

Continuous Compliance

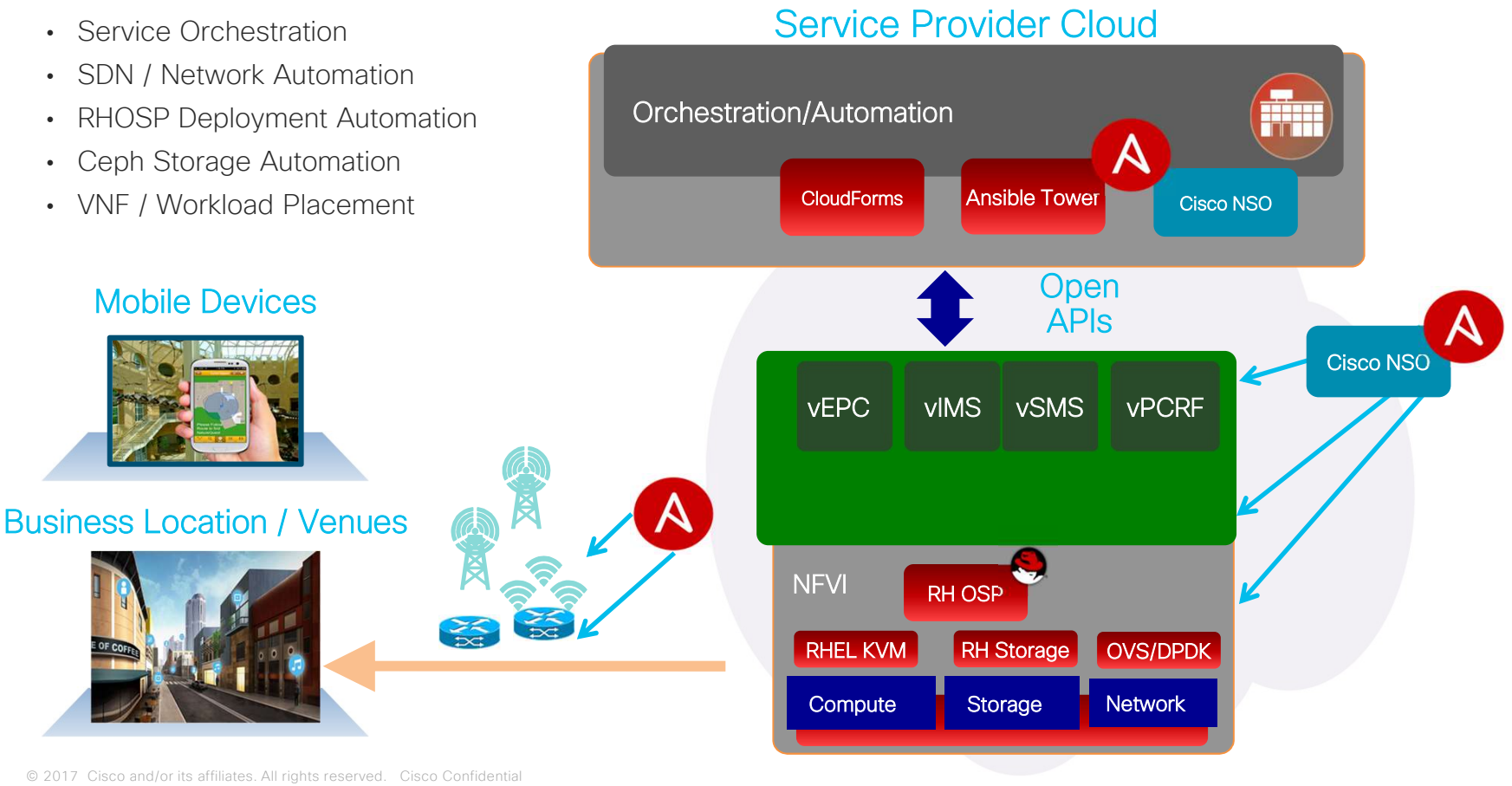
NFV / SDN

IoT



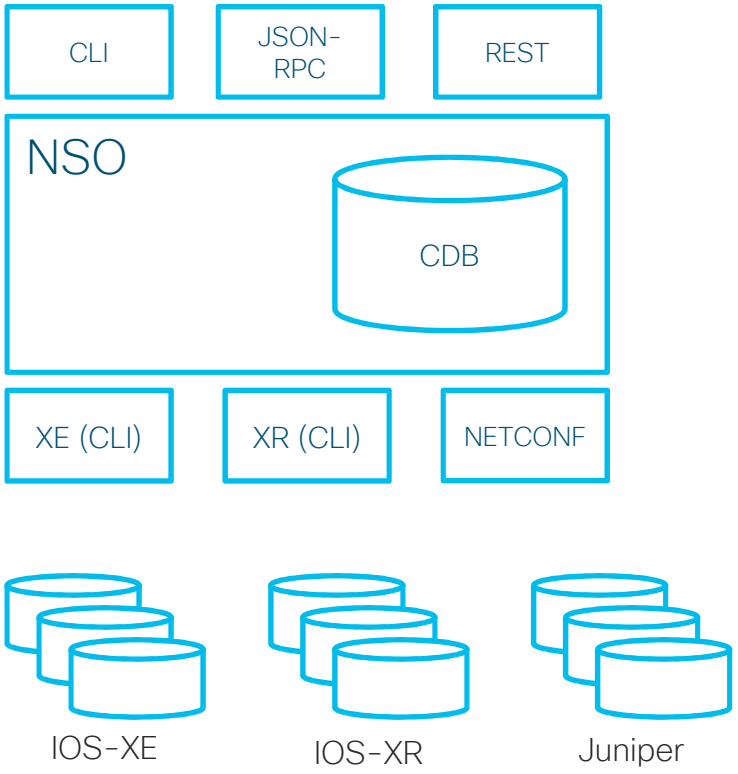
Automating Mobile Services – vIMS / vEPC Use Cases

- Service Orchestration
- SDN / Network Automation
- RHOSP Deployment Automation
- Ceph Storage Automation
- VNF / Workload Placement



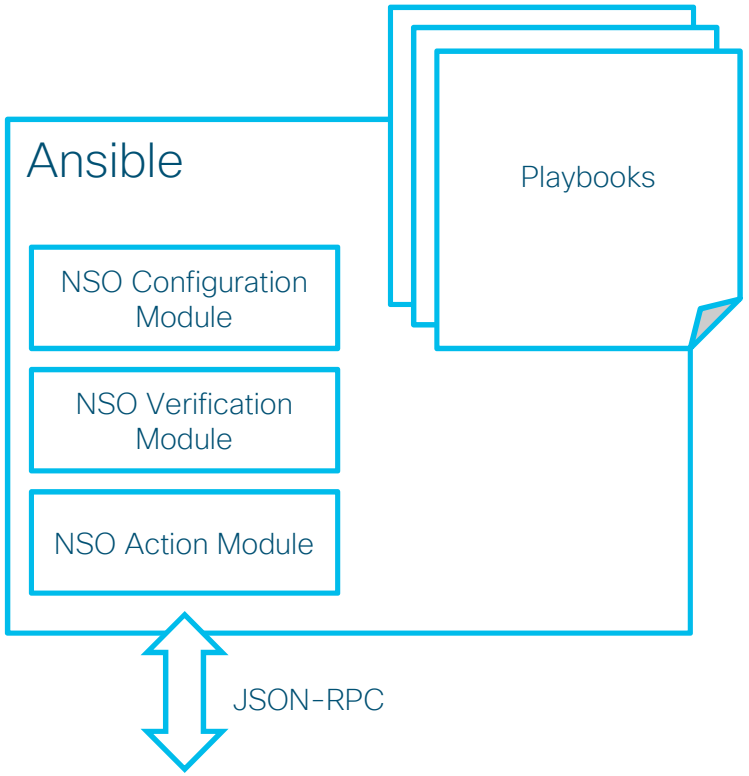
Demo Time!

Demo Setup – Cisco NSO



- Three groups of three routers each, running in netsim (management only, no packets passed)
- Appropriate NEDs loaded to support the router types and protocols
- I'll use the CLI and REST for manual steps, and Ansible will use the JSON-RPC interface

Demo Setup – Ansible



- Three NSO modules interacting with device- and service level abstractions
- A set of example playbooks using the modules

Summary

The Industry's Broadest Multivendor Support

Cisco NEDS + Ansible Modules / Playbooks with Community Innovation

What You Gain

Cisco Network Services Orchestrator + Ansible Tower

- Agility Throughout Service Lifecycle
  - Strict YANG model-driven solution
  - Auto-rendered business logic results in 90% less code
  - Effortlessly re-deployment of updated service and device models
  - DevOps for differentiation
- Full automation of Applications and Networks
- Robust and Proven in tier-1 Deployments
- Industry's Broadest Multivendor Support
- Relevant in today's and tomorrow's networks

For more information

Visit:

www.cisco.com/go/nso

www.redhat.com/ansible

And contact your Cisco and Red Hat account representatives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