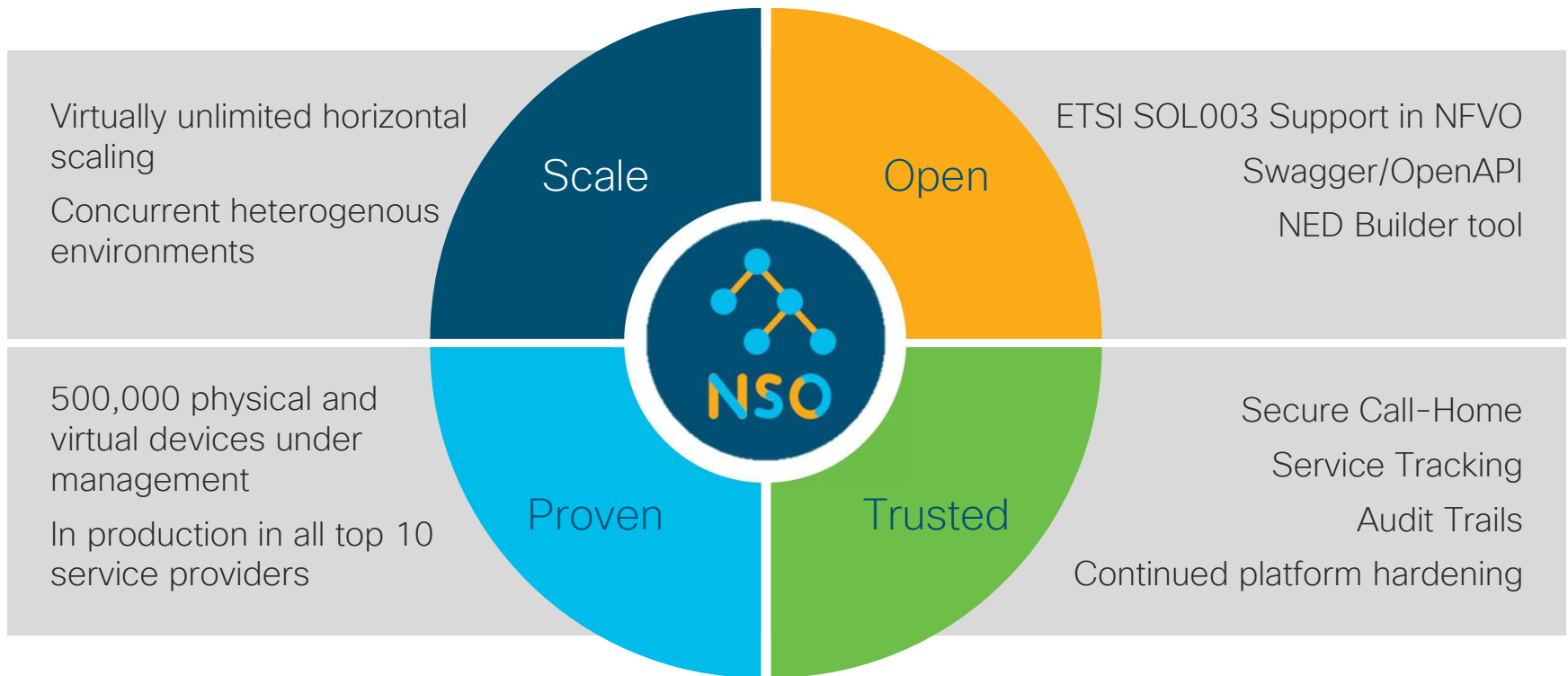




Cisco NSO 5 Update

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June 2019

What's New Around NSO 5



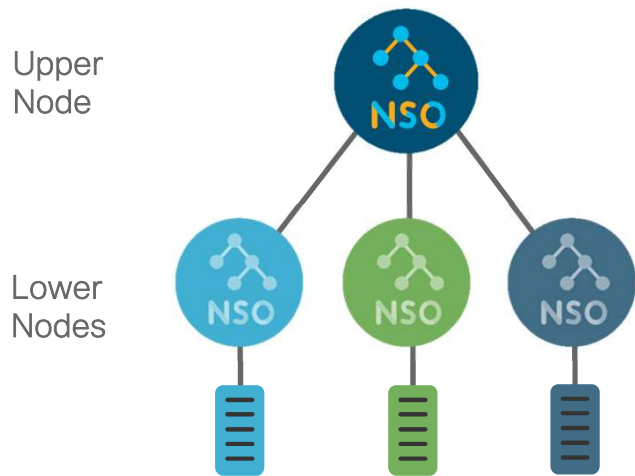
Scalable: NSO enables larger and more operational complex environments



“I have an issue with growth. While it’s a good problem to have, the number of physical and virtual devices I need to orchestrate is exploding and not all my services have consistent operational environments”

- Virtually unlimited horizontal scaling [4.5, 4.6]
- Multiple name spaces and NED versioning allow easy accommodation of multiple, concurrent disparate operational environments [5.0]

Layered Services Architecture (LSA)



- Horizontal scale-out architecture
- Improved performance through parallel service execution
- Device nodes can be organized by service type, device location, etc.
- Rolling and granular upgrades

Multiple Version Runtime Namespaces



- Allow NSO to runtime-load the same YANG module (as defined by namespace) of different versions
- Supports broader span of vendor versions found in very large networks
- Runtime analysis of version change impact across versions. I.e. what-if analysis on service code based on NED upgrades



Robust support for emerging NETCONF/YANG platforms

Open: NSO as unified cross-vendor, cross-domain programmatic interface



“My environment is always going to have a diversity of vendors—I will maintain control of my toolchain and I need tooling that will work with whatever I have today and whatever I might buy tomorrow—both up and down the stack.”

- Swagger/OpenAPI support [4.7]
- ETSI SOL003 support in both our NFV Orchestration Function Pack and ESC [5.1]
- NED Builder tool empowers customers to create their own NETCONF NEDs [5.2]
- Support for 177 NEDs beyond Cisco

Swagger/OpenAPI for RESTCONF

- Offline generation of Swagger 2.0 specifications from YANG for RESTCONF
- Provides a mapping between YANG schema constructs to JSON Schema to the extent possible
- Opens up for all tooling built around Swagger to access RESTCONF-exposed resources in NSO



Unlocking the use of OpenAPI tools ecosystem for NSO

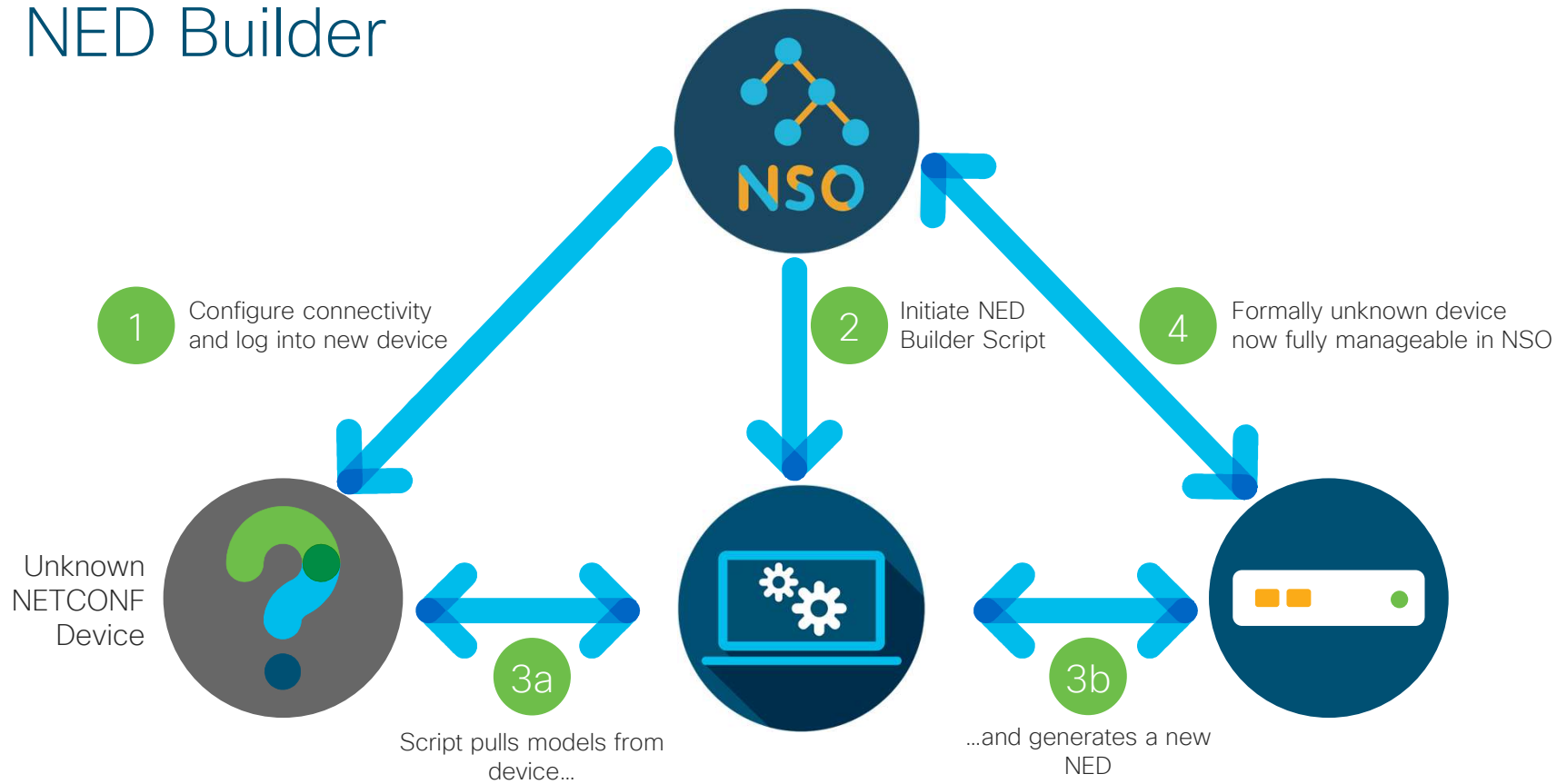
NETCONF NED Builder

- A tool for NSO users to automatically generate, build and load YANG-based NETCONF NEDs
- Significantly reduces the manual steps, and time spent on enabling never-seen devices to be completely managed by NSO
- Fine grained control over the process with steps including
 - Downloading and validating the YANG module content
 - Install and uninstall NEDs based on the specific combination YANG modules



Truly automated, zero-touch device integration

NED Builder



100+ NEDs supported—customization available



Trusted: NSO makes sure you can trust your infra so your customers can trust you



“With great power comes great responsibility—how do I make sure that my orchestration tooling is not turned against me?”

- Secure call home [5.0]
- Audit trails [4.7]
- Service tracking [4.7]
- Secure key management [5.0]

NETCONF call home

- RFC 8071 - *Enable a NETCONF or RESTCONF server to initiate a secure connection to a NETCONF or RESTCONF client, respectively*
- Allows network elements to securely call-home for management after cold start
- Client-initiated operations provide *stealth-mode* removing the need for open ports on the device
- Supports both NAT and direct scenarios



Standardized and secure call-home

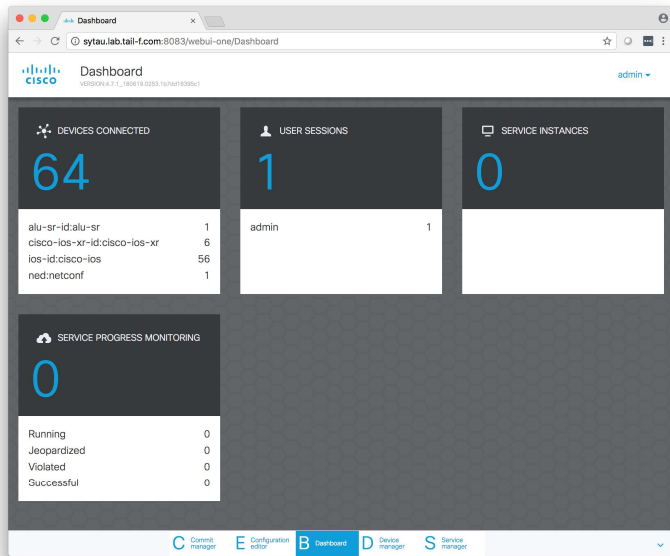
Audit Trails

- Provides the fundamental audit trails for regulated environments
- Trails include complete per-change information, including:
 - The nature and content of all changes performed through NSO
 - Both on the services layer, as well as any resulting device-layer changes
 - All changes mapped to the user triggering the changes



Fine-grained, transparent audit trails to support compliance

Monitoring Dashboard



- Connected devices and types
- Active user sessions
- Service instances
- Service progress monitoring



Overview of the running administrative status

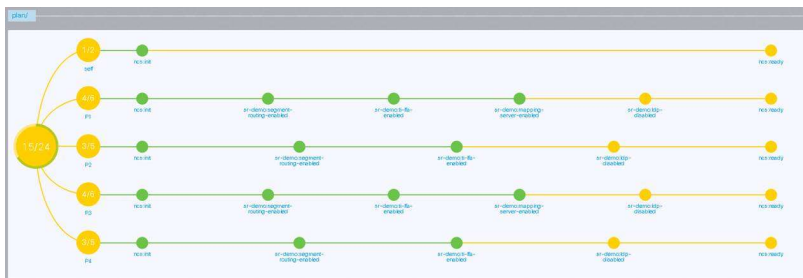
Service Progress Monitoring

- Enable monitoring of service delivery times
- Service models are associated with:
 - Expression on the plan
 - Time to jeopardized state
 - Time to violated state
- The expression is evaluated at the jeopardized and violated times
- Alarms are generated for jeopardized or violated SLAs



No-code, declarative tracking of service delivery

Plan and Commit Queue UI Applications



- Plan viewer in the configuration editor
- Commit queue content viewer in the commit manager
- Upload-and-merge of configuration data



New custom representations of configuration and state

Proven: NSO is a strategic choice

“Orchestration at scale is hard. My people don’t have the expertise and the tech seems to have a half-life measured in months. I don’t need products, I need a strategic partner.”

- In production since 2010 – 8 years of accumulated wisdom
- In production at the top 10 carriers
- Several customer networks have NSO managing more than 50k devices
- Pre-engineered solutions like MSX, ESC and Core Function Packs shorten time-to-value
- CX professional services and an active developer community provide hand-holding as needed

The NSO Ecosystem



What is a Core Function Pack?

- Ready-made implementations for specific features
- Productized and commercially supported
- 80/20 rule – reduce implementation cost and time to market
- Evolves with solution requirements

Core Function Packs – Brief Overview

- **NFVO CFP** – ETSI NFV MANO standards compliant multi-vendor NFV Orchestrator
- **vBranch CFP** – scalable, multi-tenant, multi-vendor virtual branch orchestration
- **T-SDN CFP** – Transport network automation for SR-TE
- **SAE CFP** – virtualized, multi-vendor demilitarized zone (DMZ) managing security between consumers and providers of data and applications
- **SDWAN CFP** – scalable, multi-tenant, on-premise SDWAN orchestration with multi-vendor branch

NSO Developer Days, June 18-20 2019



Annual community event in Stockholm for Orchestration and Automation Professionals. Focus on increasing knowledge through valuable content. Promote experience sharing, active and vivid discussions on the [NSO Developer Hub](#)

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Questions?



