



DeveloperDays
Network Services Orchestrator

Automated NED Validation

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Quick Introduction

- Eswaramoorthy Ramasamy
- Software Team – CX India
- 9+ Years of experience in Automation & Orchestration

What is NED ?

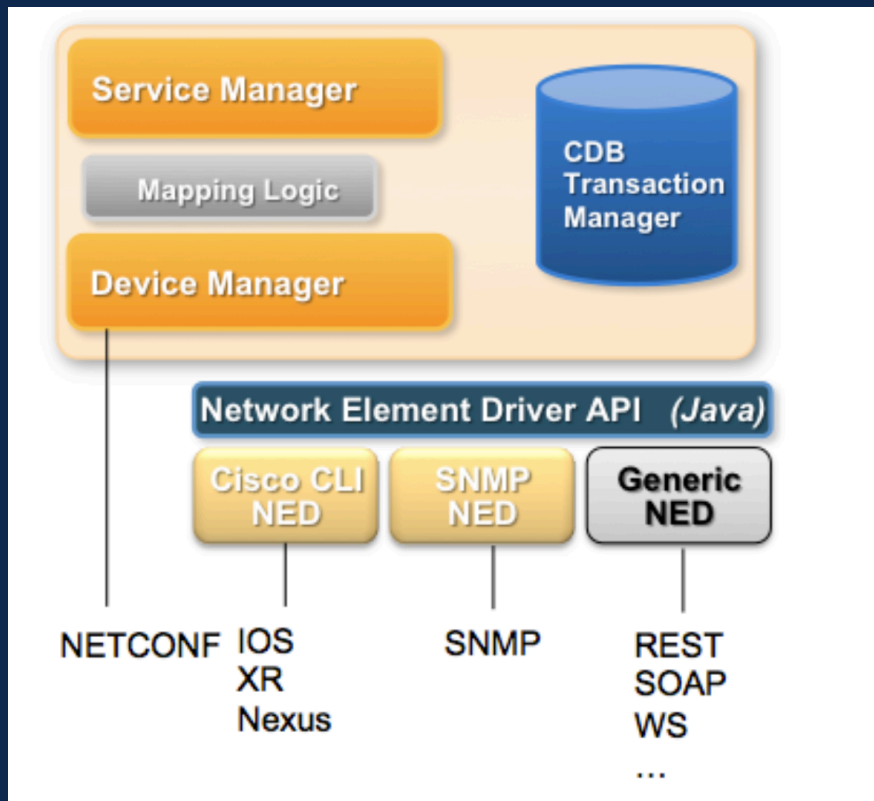
Network Element Driver

Abstraction layer between NSO and multi vendor Devices

Enables NSO to understand different device configs

Data models in YANG that specifies configuration and operation supported by device

Architecture



- NSO uses NED to communicate with devices
- NEDs can be easily updated
- Device model enhancement support

Problem Statement

NSO only cares about the data that is in the model for the NED. The rest is ignored.

- NED has multiple versions- Enhancements over the period of time to include the new configurations
- How do I know which NED version will support all the device configurations ?
- Usually the service developers, takes the service configuration and enters them manually in NSO Cli and validates if they are supported

What is the traditional way of performing validation?

Sample service config

```
interface Ethernet1/1

description ^:fabric:if:lan:uplink:Ethernet 1

mtu 9000

snmp trap link-status

ip address 172.19.120.131/31

ip arp timeout 900

ip pim sparse-mode

ip pim hello-interval 30000

lld disable

service-policy type queuing output queuignPolicy

service-policy type qos input qos-trust no-stats

no shut

!
```

```
admin@ncs(config)# devices device test config nx:interface Ethernet 1/1
admin@ncs(config-if)# mtu 9000
admin@ncs(config-if)# snmp trap link-status
admin@ncs(config-if)# ip address 172.19.120.131/31
admin@ncs(config-if)# ip arp timeout 900
admin@ncs(config-if)# ip pim sparse-mode
admin@ncs(config-if)# ip pim hello-interval 30000
admin@ncs(config-if)# uddl disable
admin@ncs(config-if)# service-policy type queuing output queuignPolicy
admin@ncs(config-if)# service-policy type qos input qos-trust no-stats
admin@ncs(config-if)# no shutdown
```

~ 5 minutes

Manually enter the commands in NSO CLI

What are the impacts ?

- Service Developers spend (manually) a minimum of 3-4 days' worth of effort to validate if a given config is supported by given NED
- Almost every NSO service use case will cross this stage. This effort multiplies with the number of NSO projects.
- For example we have 15 projects running, approximately 4*15 Man days are wasted in checking if the commands are supported
- This effort repeats again for each NED version change

Solution

Automated NED Validation Powered by *ciscoutils* package

- Get the whole config as input
- Prepare the config for validation based on NED type
- Validate the commands one by one and pick the commands that are not supported
- Generate a report with list of unsupported commands

Automated NED Validation

Sample service config

```
interface Ethernet1/1

description ^:fabric:if:lan:uplink:Ethernet 1

mtu 9000

snmp trap link-status

ip address 172.19.120.131/31

ip arp timeout 900

ip pim sparse-mode

ip pim hello-interval 30000

udld disable

service-policy type queuing output queuignPolicy

service-policy type qos input qos-trust no-stats

no shut

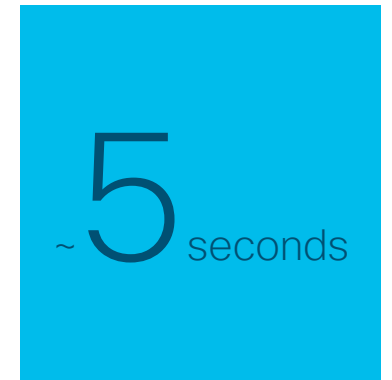
!
```

```
1 <input>
2 <ned_id>cisco-nx</ned_id>
3 <commands>
4 interface Ethernet1/1
5   description ^:fabric:if:lan:uplink:Ethernet 1
6   mtu 9000
7     snmp trap link-status
8   ip address 172.19.120.131/31
9   ip arp timeout 900
10  ip pim sparse-mode
11  ip pim hello-interval 30000
12  udld disable
13    service-policy type queuing output queuignPolicy
14    service-policy type qos input qos-trust no-stats
15  no shut
16  !
17 </commands>
18 </input>
```

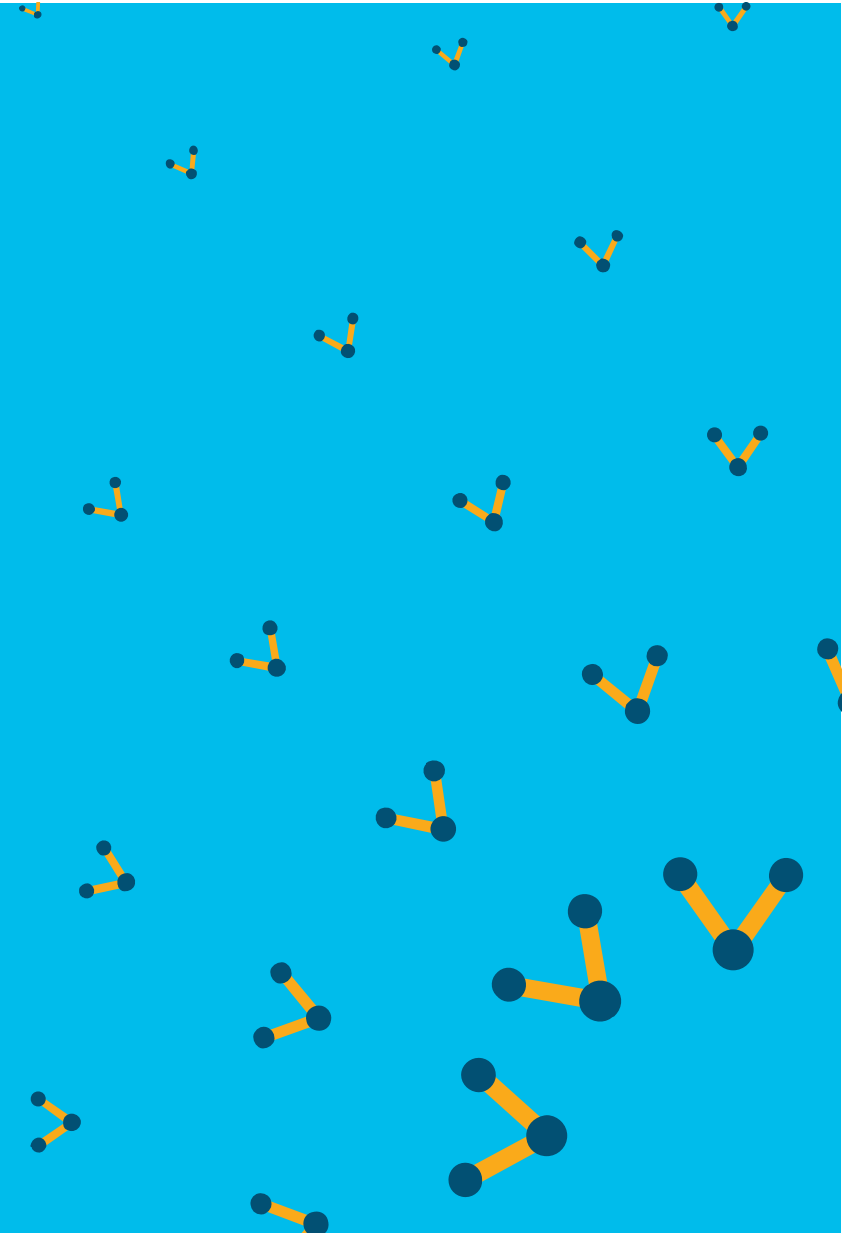
Body Cookies (1) Headers (6) Test Results

Pretty Raw Preview XML 

```
1 <output xmlns='http://cisco.com/ciscoutils'>
2   <success>true</success>
3   <message>Config is valid</message>
4 </output>
```



Live-Demo



Enhanced Solution

Automated Multi NED Validation

Powered by *ciscoutils* package
and NSO 5.0 CDM

- Validate configuration against multiple NED versions at the same time
- Takes following inputs
 - NED Family (cisco-nx, cisco-ios, cisco-ios-xr, jun-os etc.)
 - Start NED Version
 - End NED Version
- Generate a report with list of unsupported commands w.r.t to each NED version

Automated Multi NED Validation

Sample service config

```
interface Ethernet1/1

description ^:fabric:if:lan:uplink:Ethernet 1

mtu 9000

snmp trap link-status

ip address 172.19.120.131/31

ip arp timeout 900

ip pim sparse-mode

ip pim hello-interval 30000

udld disable

service-policy type queuing output queuignPolicy

service-policy type qos input qos-trust no-stats

no shut

!
```

```
1 <input>
2 <ned-family>cisco-nx</ned-family>
3 <start-version>0.0.0</start-version>
4 <end-version>9.9.9</end-version>
5 <commands>
6 interface Ethernet1/1
7   description ^:fabric:if:lan:uplink:Ethernet 1
8   mtu 9000
9   snmp trap link-status
10  ip address 172.19.120.131/31
11  ip arp timeout 900
12  ip pim sparse-mode
13  ip pim hello-interval 30000
14  udld disable
15  service-policy type queuing output queuignPolicy
16  service-policy type qos input qos-trust no-stats
17  no shut
18 !
19 </commands>
```

Body Cookies (1) Headers (6) Test Results

Pretty Raw Preview XML

```
1 <output xmlns='http://cisco.com/ciscoutils'>
2   <success>true</success>
3   <message>
4     Given config is valid on cisco-nx version 4.5.12
5   -----
6   -----
7   -----
8     Given config is valid on cisco-nx version 4.5.4
9   -----
10  -----
11  -----
12     Given config is valid on cisco-nx version 5.5.1
13  -----
14  -----
15  -----
16     Given config is valid on cisco-nx version 5.5.2
17  -----
18  -----
19  -----
20     Given config is valid on cisco-nx version 5.6
21  -----
22  -----
23  -----
24     Given config is valid on cisco-nx version 5.9.3
25  -----
26  -----
27 </output>
```

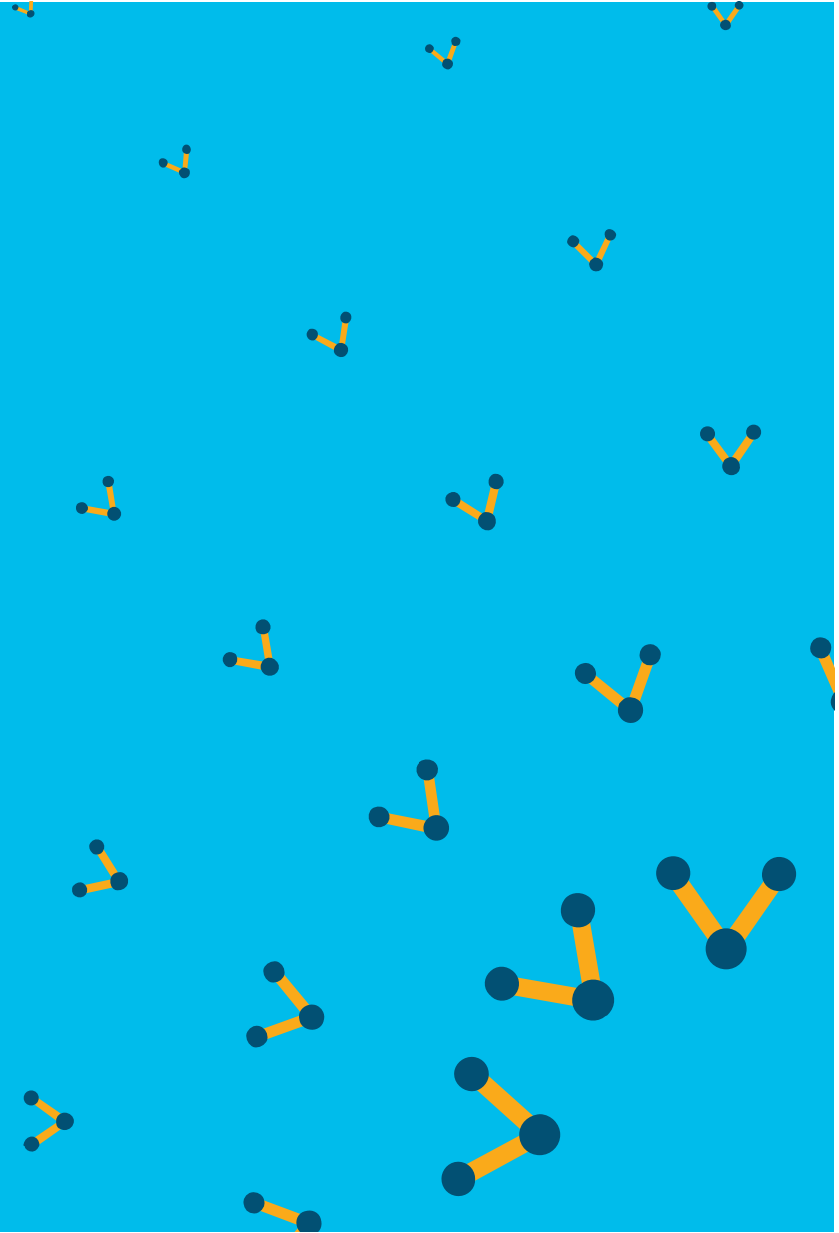
job-id 2019_06_14_20_39_05	end-version 9.9.9	turnaround-time 9
ned-family cisco-nx	start-timestamp 2019/06/14 20:39:05	
start-version 0.0.0	end-timestamp 2019/06/14 20:39:14	

validation-history	is-config-valid	unsupported-commands
<input type="checkbox"/> version		
<input type="checkbox"/> 4.5.12	true	NA
<input type="checkbox"/> 4.5.4	true	NA
<input type="checkbox"/> 5.5.1	true	NA
<input type="checkbox"/> 5.5.2	true	NA
<input type="checkbox"/> 5.6	true	NA
<input type="checkbox"/> 5.9.3	true	NA

~ 10 seconds

6^{NED}
Versions

Live-Demo



Supported NEDs

- cisco-ios
- cisco-nx
- cisco-iosxr
- cisco-staros
- arista-dcs
- cisco-asa
- juniper-junos

Usage

- Developing new automation services from scratch
- NED Migrations
- Capturing unsupported commands centrally and raising tickets if none of the available NED versions supports it

Benefits

Faster
Validation

Less
Human
error

Multi NED
support

High
ROI

Accurate
Results

Self
Service

Credits

- Imtiaz Ahmed
- Imran Baig
- Syed Ziaullah
- Bangalore CX Software Team

