

Tech Day

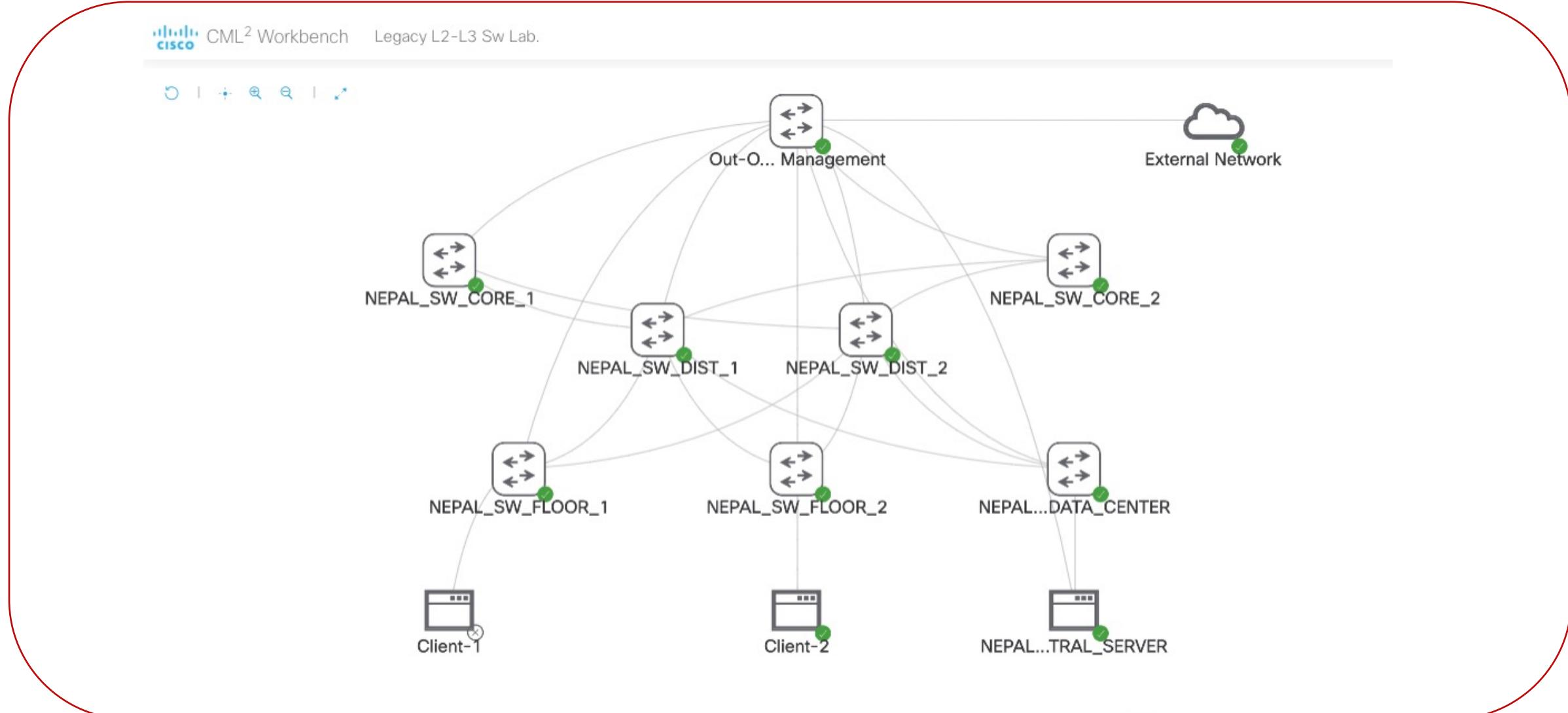
Network Automation

NEP@L

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NEPAL Topology - L2 legacy network Simulation



Network Topology – Features on simulation

Devices

```
NEPAL_SW_CORE_1 host=10.54.154.151
NEPAL_SW_CORE_2 host=10.54.154.154
NEPAL_SW_DIST_1 host=10.54.154.152
NEPAL_SW_DIST_2 host=10.54.154.153
NEPAL_SW_FLOOR_1 host=10.54.154.155
NEPAL_SW_FLOOR_2 host=10.54.154.156
NEPAL_SW_DATA_CENTER host=10.54.154.157
```

Features simulated

- Vlans 10,20,30 (Floor1, Floor2, Datacenter)
- VRP for GW redundancy
- Double Distribution layer
- Double Core Layer
- STP Load Balance for Root Redundancy
- Advanced STP

Use Case definition – Master config vs Device config

- Define topology
- Create device configs
 - Interfaces
 - Vlans
 - Redundancy
 - Trunks
 - STP Advanced protocol
 - VRRP
 - VLAN load Balancing
 - L3 Vlans interfaces
 - Test all configs
 - Test all features
- Define Master configs
 - Save in NEP@L DB
- Create Diff templates
 - Diff Blocks
 - Lines to Add
 - Lines to Remove
 - Reports
- Execute and find Diff
 - Master config vs Device config
 - Report differences

L2 Interfaces & features

```
interface GigabitEthernet0/0
description to NEPAL_SW_CORE_1
switchport trunk allowed vlan 1,3-4094
negotiation auto
!
interface GigabitEthernet0/1
description to NEPAL_SW_CORE_2
switchport trunk allowed vlan 1,3-4094
negotiation auto
!
interface GigabitEthernet0/2
description to NEPAL_SW_DATA_CENTER
switchport trunk allowed vlan 1,3-4094
negotiation auto
!
interface GigabitEthernet0/3
description Interface Mgmt
no switchport
ip address 10.54.154.153 255.255.255.224
negotiation auto
```

Advanced STP

```
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 1,10,30 priority 28672
spanning-tree vlan 20 priority 24576
```

L3 interfaces & features

```
interface Vlan10
description gateway vlan 10
ip address 10.1.10.252 255.255.255.0
vrrp 10 ip 10.1.10.254
vrrp 10 preempt delay minimum 5
!
interface Vlan20
description gateway vlan 20
ip address 10.1.20.252 255.255.255.0
vrrp 20 ip 10.1.20.254
vrrp 20 preempt delay minimum 5
vrrp 20 priority 110
!
interface Vlan30
description gateway data-center
ip address 10.1.30.252 255.255.255.0
vrrp 20 timers advertise 110
vrrp 30 ip 10.1.30.254
vrrp 30 preempt delay minimum 5
```

Use case definition: Master configs on NEPAL Db

The screenshot shows the MongoDB Compass interface with the following details:

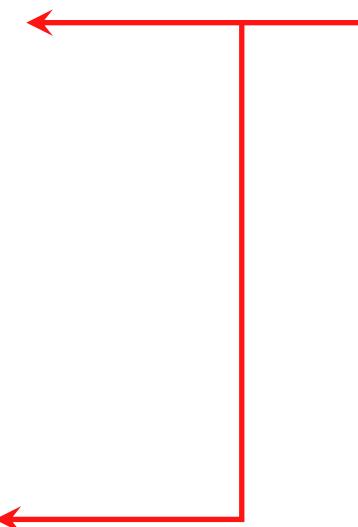
- Left Sidebar:** Shows the database structure under "Nepal MongoDB (7)". The "master_configs" collection is selected.
- Top Bar:** Shows three tabs: "Welcome", "db.getCollection('master').find()", and "db.getCollection('master').find()".
- Central Area:** A table titled "master" showing the results of the query "db.getCollection('master').find({})".

Key	Value	Type
> (1) ObjectId("60039aa5c3be46...")	{ 6 fields }	Object
> (2) ObjectId("60039aa5af03dd...")	{ 6 fields }	Object
__ _id	ObjectId("60039aa5af03ddfe9031c3...")	Objectid
__ hostname	NEPAL_SW_FLOOR_1	String
__ ip	10.54.154.155	String
__ category	master	String
__ time	Wed Jan 27 07:09:56 2021	String
__ source	Building configuration...Current config...	String
> (3) ObjectId("60039aa57c6cdd...")	{ 6 fields }	Object
__ _id	ObjectId("60039aa57c6cdd2cb6c...")	Objectid
__ hostname	NEPAL_SW_DIST_2	String
__ ip	10.54.154.153	String
__ category	master	String
__ time	Wed Jan 27 07:09:56 2021	String
__ source	Building configuration...Current config...	String
> (4) ObjectId("60039aa579648...")	{ 6 fields }	Object
> (5) ObjectId("60039aa59511fa...")	{ 6 fields }	Object
> (6) ObjectId("60039aa524190...")	{ 6 fields }	Object
> (7) ObjectId("60039aa597a747...")	{ 6 fields }	Object
- Bottom Area:** A "Logs" tab showing the following configuration details:

```
Building configuration...
Current configuration : 3739 bytes
!
! Last configuration change at 10:41:18 UTC Tue Jan 26 2021 by nepal
!
version 15.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
service compress-config
!
hostname NEPAL_SW_FLOOR-1
!
boot-start-marker
boot-end-marker
!
no logging console
enable secret 5 $1$K.sw$Whr2BTFhX2HmggW86uLFx.
!
username nepal privilege 15 secret 5 $1$MEFZ$aSrxNhU7m55FyaLkwmco2/
no aaa new-model
```

NEPAL Diff Algorithm find differences

db.getCollection('master').find({})		
Key	Value	Type
✓ (1) ObjectId("60039aa5c3be46... { 6 fields }	Object	Object
└ _id	ObjectId("60039aa5c3be46508d40a...	ObjectId
└ hostname	NEPAL_SW_CORE_2	String
└ ip	10.54.154.154	String
└ category	master	String
└ time	Wed Jan 27 07:09:56 2021	String
└ source	Building configuration...Current config...	String
> (2) ObjectId("60039aa5af03dd... { 6 fields }	Building configuration...	Object
> (3) ObjectId("60039aa57c6cd... { 6 fields }	Building configuration...	Object
> (4) ObjectId("60039aa579648... { 6 fields }	Current configuration : 3965 bytes	Object
> (5) ObjectId("60039aa59511fa... { 6 fields }	Last configuration change at 10:29:38 UTC Tue Jan 26 2021 by nepal	Object
> (6) ObjectId("60039aa524190... { 6 fields }	version 15.2	Object
> (7) ObjectId("60039aa597a747... { 6 fields }	service timestamps debug datetime msec service timestamps log datetime msec no service password-encryption service compress-config hostname NEPAL_SW_CORE-2 boot-start-marker boot-end-marker no logging console enable secret 5 \$1\$1L58\$Xk/KW0wbThaySSTzUC2rR/ username nepal privilege 15 secret 5 \$1\$2QOQ\$N8KyL9XC5hPVhxP3nqah/ no aaa new-model	Object

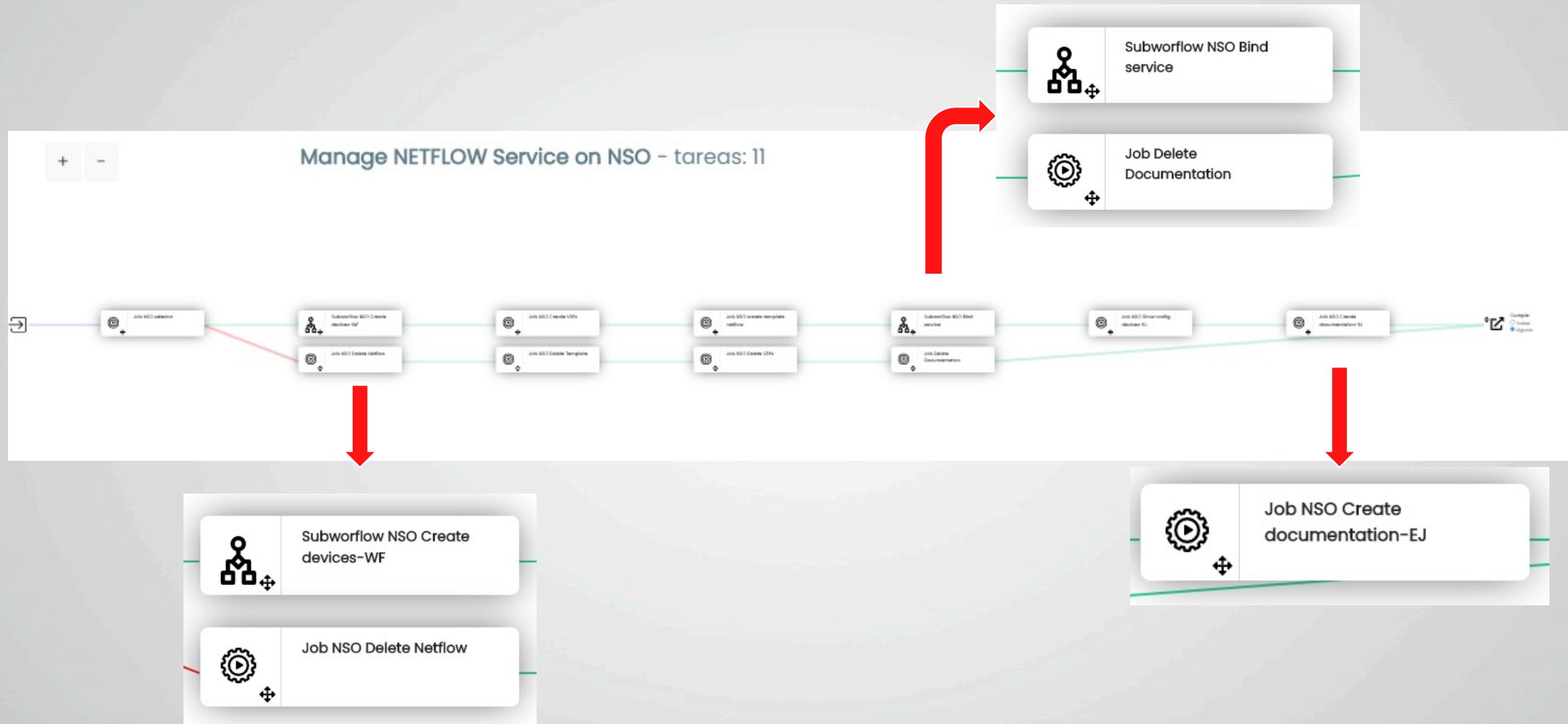


```
## Block of Diff
--- original
+++ current
@@ -59,7 +59,6 @@
 ip ssh server algorithm encryption aes128-ctr aes192-ctr aes256-ctr
 ip ssh client algorithm encryption aes128-ctr aes192-ctr aes256-ctr
 ip scp server enable
-logging host 10.54.158.25 transport udp port 5140
 control-plane
```

Dev config

```
interface GigabitEthernet0/2
description to NEPAL_SW_DATA_CENTER
switchport trunk allowed vlan 1,3-4094
negotiation auto
!
interface GigabitEthernet0/3
description Interface Mgmt
no switchport
ip address 10.54.154.153 255.255.255.224
negotiation auto
!
interface GigabitEthernet1/0
negotiation auto
!
interface GigabitEthernet1/1
description to NEPAL_FL00R_1
switchport trunk allowed vlan 1,3-4094
negotiation auto
!
interface GigabitEthernet1/2
description to NEPAL_FL00R_2
switchport trunk allowed vlan 1,3-4094
negotiation auto
!
ip forward-protocol nd
!
ip http server
ip http secure-server
!
ip route 0.0.0.0 0.0.0.0 10.54.154.129
ip ssh version 2
ip ssh server algorithm encryption aes128-ctr aes192-ctr aes256-ctr
ip ssh client algorithm encryption aes128-ctr aes192-ctr aes256-ctr
```

NEP@L WorkFlow Manager



NEP@L Use Case Reports

```
# Diff Config - NEPAL_SW_CORE_1

Date: 2021-01-27 - Time: 11:25:55
User: nepal

Automatización del servicio Configuration Differences - by NEP@L

## Block of Diff
--- original
+++ current
@@ -59,7 +59,6 @@
    ip ssh server algorithm encryption aes128-ctr aes192-ctr aes256-ctr
    ip ssh client algorithm encryption aes128-ctr aes192-ctr aes256-ctr
    ip scp server enable
-logging host 10.54.158.25 transport udp port 5140
  control-plane
  banner exec ^C
  C

## Lines to Add
> logging host 10.54.158.25 transport udp port 5140

## Lines to Remove
No lines to Delete
.....
```

NEP@L Config Enforcer Algorithm

```
db.getCollection('master').find({})
```

Key	Value	Type
Objectid("60039aa5c3be46...")	{ 6 fields }	Object
_id	Objectid("60039aa5c3be46508d40a...")	Objectid
hostname	NEPAL_SW_CORE_2	String
ip	10.54.154.154	String
category	master	String
time	Wed Jan 27 07:09:56 2021	String
source	Building configuration...Current config...	String
(2) Objectid("60039aa5af03dd...")	Building configuration...	Object
(3) Objectid("60039aa57c6cd...")	Building configuration...	Object
(4) Objectid("60039aa579648...")	Current configuration : 3965 bytes	Object
(5) Objectid("60039aa59511fa...")	Last configuration change at 10:29:38 UTC Tue Jan 26 2021 by nepal	Object
(6) Objectid("60039aa524190...")	version 15.2	Object
(7) Objectid("60039aa597a747...")	service timestamps debug datetime msec service timestamps log datetime msec no service password-encryption service compress-config ! hostname NEPAL_SW_CORE-2 ! boot-start-marker boot-end-marker ! no logging console enable secret 5 \$1\$158\$Xk/KW0wbThaySSTzUC2rR/ ! username nepal privilege 15 secret 5 \$1\$QOQ\$N8KyL9XC5hPVbhP3nqah/ no aaa new-model	Object

NCE - NEP@L Config Enforcer

```
## Block of Diff
--- original
+++ current
@@ -59,7 +59,6 @@
 ip ssh server algorithm encryption aes128-ctr aes192-ctr aes256-ctr
 ip ssh client algorithm encryption aes128-ctr aes192-ctr aes256-ctr
 ip scp server enable
-logging host 10.54.158.25 transport udp port 5140
 control-plane
```

NDA - NEP@L Diff Algorithm

Dev config

```
!
interface GigabitEthernet0/3
description Interface Mgmt
no switchport
ip address 10.54.154.153 255.255.255.224
negotiation auto
!
interface GigabitEthernet1/0
negotiation auto
!
interface GigabitEthernet1/1
description to NEPAL_FL00R_1
switchport trunk allowed vlan 1,3-4094
negotiation auto
!
interface GigabitEthernet1/2
description to NEPAL_FL00R_2
switchport trunk allowed vlan 1,3-4094
negotiation auto
!
ip forward-protocol nd
!
ip http server
ip http secure-server
!
ip route 0.0.0.0 0.0.0.0 10.54.154.129
ip ssh version 2
ip ssh server algorithm encryption aes128-ctr aes192-ctr aes256-ctr
ip ssh client algorithm encryption aes128-ctr aes192-ctr aes256-ctr
ip scp server enable
control-plane
!
```

New Dev config

```
!
!
ip forward-protocol nd
!
ip http server
ip http secure-server
!
ip route 0.0.0.0 0.0.0.0 10.54.154.129
ip ssh version 2
ip ssh server algorithm encryption aes128-ctr aes192-ctr aes256-ctr
ip ssh client algorithm encryption aes128-ctr aes192-ctr aes256-ctr
ip scp server enable
Logging host 10.54.158.25 transport udp port 5140
control-plane
!
```

When enabled, NCE will not allow any config change (except for authorized users). If any, NCE will rollback automatically

NEP@L Sensoring: Sensing KPIs



Thank you

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