Lab 9 Guide

NSOT Updates:

First add the unit tests for the new devices, here I am adding ping tests for all devices as a
new unit test in my suite:

```python
def ping_test(host):
    try:
        # Run the ping command with 4 packets
        output = subprocess.check_output(["ping", "-c", "1", host], universal_newlines=True)
        return "Success"
    except subprocess.CalledProcessError:
        return "Failure"

def network_ping_test():
    ping_dict = {}
    fail=0
    csv_file = "/home/student/Documents/CSCI5840_Advanced_Network_Automation/Lab4/devices.csv"
    with open(csv_file, "r") as file:
        reader = csv.DictReader(file)
        for row in reader:
            if ping_test(row["ip"]) == "Success":
                ping_dict[row["hostname"]] = "Success"
                print(row["hostname"]+":"+row["ip"]+" Success")
            else:
                ping_dict[row["hostname"]] = "Failure"
                print(row["hostname"]+":"+row["ip"]+" Failure")
        for i in ping_dict.values():
            if i == "Failure":
                print("Connectivity fails for: "+row["hostname"]+":"+row["ip"])
                fail+=1
        if fail > 0:
            return False
        else:
            return True
```

```
student@csci5840-vm2-loch1722:~/Documents/CSCI5840_Advanced_Network_Automation$ python3 Lab7/unit_tests.py
...........R1:10.100.0.6 Success
R2:10.100.0.7 Success
R3:10.100.0.8 Success
R4:10.100.0.9 Success
S1:10.200.0.1 Success
S2:10.200.0.2 Success
S3:10.100.0.3 Success
S4:10.100.0.4 Success
R6:10.40.100.2 Success
R7:10.40.101.2 Success
......
```

(devices R8 and S5 will be added and shown in the lab9video)

Next add new devices to the gnmic.yml file for gRPC connectivity:

```yaml
username: admin
password: admin
insecure: true

targets:
  R1:
    address: 10.100.0.6:6030
  R2:
    address: 10.100.0.7:6030
  R3:
    address: 10.100.0.8:6030
  R4:
    address: 10.100.0.9:6030
  S3:
    address: 10.100.0.3:6030
  S4:
    address: 10.100.0.4:6030
  S1:
    address: 10.200.0.1:6030
  S2:
    address: 10.200.0.2:6030
  R8:
    address: 10.40.200.2:6030
  S5:
    address: 10.40.201.2:6030

subscriptions:
  interface-counters:
    paths:
      - /interfaces/interface/state/oper-status
      - /components/component/cpu/utilization/state/instant
    sample-interval: 10s

outputs:
  influxdb:
    type: influxdb
    url: http://localhost:8086
    org: boulder
    bucket: netman
    token: 0CfjUWAHt5zRKmUYMINjsDGAUIq0AgjLfM2VCWvvG4tvna0QNGpjSOB8no9QESj_5K3To1BOON6nE2vG4koqRw==
    override-timestamps: false
    timestamp-precision: s
    health-check-period: 30s
    debug: true
```

Next add new devices to the Prometheus.yml file for SNMP connectivity:

```yaml
    static_configs:
#       - targets: ['localhost:9
  - job_name: 'snmp'
    static_configs:
      - targets:
          - 10.100.0.6
          - 10.100.0.7
          - 10.100.0.8
          - 10.100.0.9
          - 10.100.0.3
          - 10.100.0.4
          - 10.200.0.1
          - 10.200.0.2
          - 10.40.200.2
          - 3.3.3.2
    metrics_path: /snmp
    params:
      auth: [public_v2]
```

Next, add devices to the IPAM and to get golden configs use the tool on the website.

Device Configs:

First configure the DHCP options on R1:

```
ip dhcp relay information option

dhcp server
    subnet 10.40.200.0/24
        reservations
            mac-address a2b2.a1b1.c3c3
```

```
            ipv4-address 10.40.200.2
      !
      range 10.40.200.3 10.40.200.100
      default-gateway 10.40.200.1

   subnet 3.3.3.0/24
      reservations
         mac-address 12:3a:44:4a:55:55
            ipv4-address 3.3.3.2
      !
      range 3.3.3.6 3.3.3.100
      default-gateway 3.3.3.1
   !
!

interface Ethernet2.100
   encapsulation dot1q vlan 100
   ip address 10.100.0.6/24
   dhcp server ipv4
!

!
```

Next, configure relay options on R2:

```
interface Ethernet3
   no switchport
   ip address 10.40.200.1/24
   ip helper-address 10.100.0.6
!

ip dhcp relay information option
#ip dhcp relay always-on
ip dhcp relay all-subnets default
!
```

Next do a dhclient eth1 on R8 and use ZTP tool to apply day0 config:

```
snmp-server community NMAS ro
snmp-server host 10.100.0.5 version 2c NMAS
!
logging host 10.100.0.5
!
management api gnmi
```

```
    transport grpc def
!
management api netconf
    transport ssh def
!

ip dhcp relay information option
ip dhcp relay always-on
ip dhcp relay all-subnets default
!
interface Ethernet1
    no switchport
    ip address 10.40.200.2/24
!
interface Ethernet2
    no switchport
    ip address 3.3.3.1/24
    ip helper-address 10.100.0.6
!
interface Loopback0
    ip address 10.40.8.1/32
!
ip routing
!
ipv6 unicast-routing
!
ip route 10.100.0.0/24 10.40.200.1
!
router ospf 20
    router-id 10.40.8.1
    network 3.3.3.0/24 area 20
    network 10.40.200.0/24 area 20
    max-lsa 12000
!
```

Next do a dhclient eth1 on S5 and apply config using ZTP tool:

```
snmp-server community NMAS ro
snmp-server host 10.100.0.5 version 2c NMAS
!
logging host 10.100.0.5
!
management api gnmi
    transport grpc def
!
```

```
management api netconf
    transport ssh def
!

vlan 10
    name HOST_10
interface Ethernet2
    switchport access vlan 10
!
interface Ethernet3
    switchport access vlan 10
!
interface Vlan10
    ip address 3.3.3.2/24
!
no ip routing
!

interface Ethernet1
    switchport mode trunk
    switchport
!
```

Finally, apply day1 config for R8 to connect the devices:

```
interface Ethernet2
no ip address
no ip helper-address
interface Ethernet2.10
    encapsulation dot1q vlan 10
    ip address 3.3.3.1/24
    ip helper-address 10.100.0.6
!
```