
netblow Documentation

Release 0.1.2

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netblow is a vendor agnostic network testing framework to stress network failures.

1.1 Why?

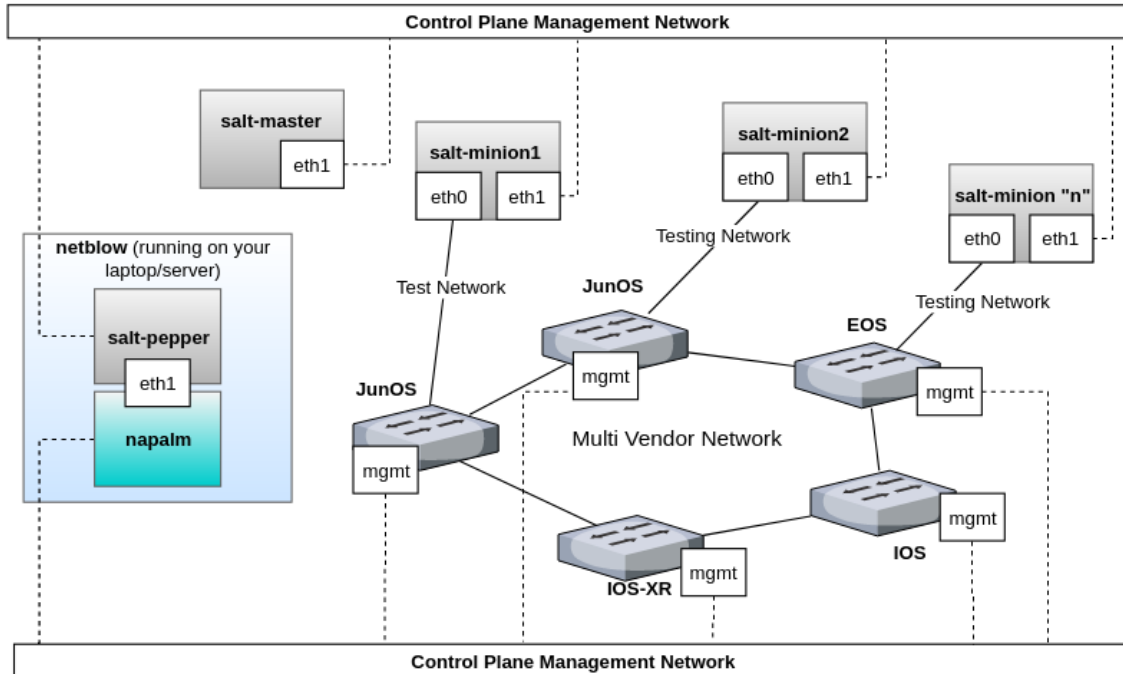
- You want to stress network failures to validate if the network control plane is converging as expected.
- Maybe you've just got a bleeding-edge control plane software update that hasn't been extensively tested yet :)
- You'd like to make sure that control plane changes are first validated in a CI/CD testing environment for a couple of hours or even days, before pushing to production.

1.2 Features

- netblow exposes functions to stress the control plane and network failures, such as *interfaces_down*, *interfaces_up*, *interfaces_flap*, *reboot*, and *config_rollback*.
- These functions have a common set of arguments, which simplifies the business logic of your tests.
- You can either write your tests directly in Python or in a yml file.
- Tests can be run either asynchronously or synchronously in multiple devices.
- Devices re-connections are handled automatically.
- Data plane validation with salt minions (next release).
- Memory leak detection (next release).

1.3 Architecture

A general idea of how netblow is designed to perform network failures stress tests in the control plane is illustrated below.



In order to have both control of the control plane, and also to perform validation in the data/forwarding plane, netblow leverages both napalm and salt-pepper. In summary, these are the main components that compose the entire software stack:

- **netblow:** Testing framework that exposes network failures functions on top of napalm and facilitates the business logic of control plane tests.
 - **napalm:** Enables netblow to manage networking devices in an agnostic manner.
 - **salt-pepper:** Lightweight HTTP client API to interface with salt-master and salt-minions remotely to perform validation of the data/forwarding plane. As a result, this allows netblow to orchestrate tests in the data plane in conjunction with the control plane tests, which is more end-to-end oriented.
- **salt-master:** Responsible for managing minions.
- **salt-minions:** Responsible for actually running the forwarding plane tests between other minions in the topology, which is up to you to define. For example, you could simply run ping, fping, nuttcp, iperf3, or use any other testing tool, as long as it's available in the minions.

Note: You don't necessarily have to have salt-master and salt-minions running somewhere, they are just needed if you really need.

2.1 Pypi

```
pip3 install netblow --user
```

2.1.1 Upgrading

```
pip3 install netblow --user -U
```

Note: Legacy python (2.7) is not supported. 2020 is just around the corner, eh?

2.2 Docker

```
docker pull quay.io/viniciusarcanjo/netblow
```


netblow has the following execution mode modifiers, which are mutually exclusive:

3.1 Dry run

Dry run is used for validating all network stress tests calls without actually connecting in the device or committing them. You certainly want to experiment with dry run first, before starting to run the actual tests. Plus, dry run is also used to validate if all kwargs are specified correctly.

3.2 Connectivity check

It's just used for validating that napalm can in fact connect with all devices in the topology. If any parameters are wrong, or authentication is not allowed you'll see errors. You probably want to perform some connectivity check when you are first building your topology.

3.3 Once

Once is really useful when you just want to limit the execution of all specified tests to a single iteration. Plus, when the once mode is on, it will show napalm diffs. So, once is great for the first validating that all specified tests are indeed running as expected and quickly. As soon as you have validated your tests with the once mode, you are good to go for the tests that are supposed to last long.

Warning: Be warned that netblow actually commits the configuration in the network device if you are running in any mode other than dry run or connectivity check. Don't run in production, unless you know what you're doing.

Note: napalm diffs are disabled in the normal testing mode by design. netblow assumes you have validated your tests with the once mode first. Also, as a result, the execution is faster, which is important if you are trying to have little delay as possible between iterations.

Either you choose to write your tests directly in Python, by instantiating NetBlow, or in yml files and run them in the CLI (command line interface).

4.1 Code Snippets

Let's say you want to perform some asynchronous interface flaps and afterwards, you want to keep tearing down the entire BGP configuration for a few seconds. In this case, I have two devices *eos1* and *junos1*:

Note: The devices kwargs (keyword arguments) are exactly the same as documented in napalm RTD <http://napalm.readthedocs.io/en/latest/base.html>

```
#!/usr/bin/env python
# -*- coding: utf-8 -*-

from netblow.netblow import NetBlow

def main():
    """Main func."""

    topology = {
        'devices': {
            'eos1': {
                'driver': 'eos',
                'hostname': 'labhost',
                'username': 'vrnetlab',
                'password': 'vrnetlab9',
                'optional_args': {
                    'port': 4443
                }
            }
        }
    }
```

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```

    },
    'junos1': {
        'driver': 'junos',
        'hostname': 'labhost',
        'username': 'vrnetlab',
        'password': 'vrnetlab9',
        'optional_args': {
            'port': 2224
        }
    }
}

nb = NetBlow(topo=topology)
devices = ['eos1', 'junos1']
interfaces = [['Ethernet 2'], ['ge-0/0/2']]

# Interfaces flap stress async on 'eos1' and 'junos1'. Iterates 3 times.
for dut, intfs in zip(devices, interfaces):
    nb.interfaces_flap(dut, interfaces=intfs, sync=False, iterations=3)
nb.await_threads() # async await

# Completely tear down current BGP synchronously during 30 secs.
cmds = [['no router bgp'], ['delete protocols bgp']]
for dut, cmds in zip(devices, cmds):
    nb.config_rollback(dut, commands=cmds, duration=30)

if __name__ == "__main__":
    main()

```

Note: You can find more snippets in the [integration test folder](#) on github.

If you were to run this Python code, you'd see an output similar to this:

```

~/repos/netblow/docs master*
python examples/flap_rollback.py
2018-05-01 12:49:58 [MainThread] [ INFO] Devices in the topology ['eos1', 'junos1']
2018-05-01 12:49:58 [MainThread] [ INFO] Trying to open connections to all devices...
2018-05-01 12:49:58 [ eos1] [ INFO] Trying to connect on eos1...
2018-05-01 12:49:58 [ junos1] [ INFO] Trying to connect on junos1...
2018-05-01 12:50:01 [ junos1] [ INFO] Successfully connected on junos1
2018-05-01 12:50:02 [ eos1] [ INFO] Successfully connected on eos1
2018-05-01 12:50:02 [MainThread] [ INFO] All devices are CONNECTED
2018-05-01 12:50:02 [ eos1] [ INFO] Test interfaces_flap started on eos1
2018-05-01 12:50:02 [ junos1] [ INFO] Test interfaces_flap started on junos1
2018-05-01 12:50:02 [MainThread] [ INFO] Waiting for async tests to finish...
2018-05-01 12:50:02 [ eos1] [ INFO] Iteration #1/3 on eos1
2018-05-01 12:50:02 [ junos1] [ INFO] Iteration #1/3 on junos1
2018-05-01 12:50:02 [ eos1] [ INFO] Shutting interfaces ['Ethernet 2'] down
2018-05-01 12:50:02 [ junos1] [ INFO] Shutting interfaces ['ge-0/0/2'] down
2018-05-01 12:50:04 [ junos1] [ INFO] Bringing interfaces ['ge-0/0/2'] up
2018-05-01 12:50:06 [ junos1] [ INFO] Iteration #2/3 on junos1
2018-05-01 12:50:06 [ junos1] [ INFO] Shutting interfaces ['ge-0/0/2'] down
2018-05-01 12:50:08 [ junos1] [ INFO] Bringing interfaces ['ge-0/0/2'] up

```

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```

2018-05-01 12:50:09 [ eos1] [ INFO] Bringing interfaces ['Ethernet 2'] up
2018-05-01 12:50:10 [ junos1] [ INFO] Iteration #3/3 on junos1
2018-05-01 12:50:10 [ junos1] [ INFO] Shutting interfaces ['ge-0/0/2'] down
2018-05-01 12:50:12 [ junos1] [ INFO] Bringing interfaces ['ge-0/0/2'] up
2018-05-01 12:50:15 [ eos1] [ INFO] Iteration #2/3 on eos1
2018-05-01 12:50:15 [ eos1] [ INFO] Shutting interfaces ['Ethernet 2'] down
2018-05-01 12:50:21 [ eos1] [ INFO] Bringing interfaces ['Ethernet 2'] up
2018-05-01 12:50:27 [ eos1] [ INFO] Iteration #3/3 on eos1
2018-05-01 12:50:27 [ eos1] [ INFO] Shutting interfaces ['Ethernet 2'] down
2018-05-01 12:50:34 [ eos1] [ INFO] Bringing interfaces ['Ethernet 2'] up
2018-05-01 12:50:41 [ eos1] [ INFO] Test config_rollback started on eos1
2018-05-01 12:50:41 [ eos1] [ INFO] Iteration #1/31536000 on eos1
2018-05-01 12:50:41 [ eos1] [ INFO] Applying commands ['no router bgp'] on_
↪eos1
2018-05-01 12:50:48 [ eos1] [ INFO] Performing rollback
2018-05-01 12:50:52 [ eos1] [ INFO] Iteration #2/31536000 on eos1
2018-05-01 12:50:52 [ eos1] [ INFO] Applying commands ['no router bgp'] on_
↪eos1
2018-05-01 12:50:59 [ eos1] [ INFO] Performing rollback
2018-05-01 12:51:03 [ eos1] [ INFO] Iteration #3/31536000 on eos1
2018-05-01 12:51:03 [ eos1] [ INFO] Applying commands ['no router bgp'] on_
↪eos1
2018-05-01 12:51:10 [ eos1] [ INFO] Performing rollback
2018-05-01 12:51:14 [ eos1] [ INFO] Duration timeout exceeded. Aborting test.
2018-05-01 12:51:14 [ junos1] [ INFO] Test config_rollback started on junos1
2018-05-01 12:51:14 [ junos1] [ INFO] Iteration #1/31536000 on junos1
2018-05-01 12:51:14 [ junos1] [ INFO] Applying commands ['delete protocols bgp
↪'] on junos1
2018-05-01 12:51:16 [ junos1] [ INFO] Performing rollback
2018-05-01 12:51:17 [ junos1] [ INFO] Iteration #2/31536000 on junos1
2018-05-01 12:51:17 [ junos1] [ INFO] Applying commands ['delete protocols bgp
↪'] on junos1
2018-05-01 12:51:19 [ junos1] [ INFO] Performing rollback
2018-05-01 12:51:20 [ junos1] [ INFO] Iteration #3/31536000 on junos1
2018-05-01 12:51:20 [ junos1] [ INFO] Applying commands ['delete protocols bgp
↪'] on junos1
2018-05-01 12:51:22 [ junos1] [ INFO] Performing rollback
2018-05-01 12:51:23 [ junos1] [ INFO] Iteration #4/31536000 on junos1
2018-05-01 12:51:23 [ junos1] [ INFO] Applying commands ['delete protocols bgp
↪'] on junos1
2018-05-01 12:51:25 [ junos1] [ INFO] Performing rollback
2018-05-01 12:51:26 [ junos1] [ INFO] Iteration #5/31536000 on junos1
2018-05-01 12:51:26 [ junos1] [ INFO] Applying commands ['delete protocols bgp
↪'] on junos1
2018-05-01 12:51:28 [ junos1] [ INFO] Performing rollback
2018-05-01 12:51:29 [ junos1] [ INFO] Iteration #6/31536000 on junos1
2018-05-01 12:51:29 [ junos1] [ INFO] Applying commands ['delete protocols bgp
↪'] on junos1
2018-05-01 12:51:31 [ junos1] [ INFO] Performing rollback
2018-05-01 12:51:32 [ junos1] [ INFO] Iteration #7/31536000 on junos1
2018-05-01 12:51:32 [ junos1] [ INFO] Applying commands ['delete protocols bgp
↪'] on junos1
2018-05-01 12:51:34 [ junos1] [ INFO] Performing rollback
2018-05-01 12:51:35 [ junos1] [ INFO] Iteration #8/31536000 on junos1
2018-05-01 12:51:35 [ junos1] [ INFO] Applying commands ['delete protocols bgp
↪'] on junos1
2018-05-01 12:51:37 [ junos1] [ INFO] Performing rollback

```

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```

2018-05-01 12:51:39 [ junos1] [ INFO] Iteration #9/31536000 on junos1
2018-05-01 12:51:39 [ junos1] [ INFO] Applying commands ['delete protocols bgp
↪'] on junos1
2018-05-01 12:51:41 [ junos1] [ INFO] Performing rollback
2018-05-01 12:51:42 [ junos1] [ INFO] Iteration #10/31536000 on junos1
2018-05-01 12:51:42 [ junos1] [ INFO] Applying commands ['delete protocols bgp
↪'] on junos1
2018-05-01 12:51:44 [ junos1] [ INFO] Performing rollback
2018-05-01 12:51:45 [ junos1] [ INFO] Duration timeout exceeded. Aborting test.
2018-05-01 12:51:45 [MainThread] [ INFO] Closing connections to all devices

```

4.2 CLI

netblow also ships with a CLI, which you should probably use if you'd rather write tests in yml file than writing them directly in Python.

4.2.1 Options

In addition to the execution modes, in the CLI you also have to specify the topology yml file *-f* and the tests yml file *-t*, which describes all the arguments of your tests and how they are supposed to be executed.

```

netblow -h
usage: netblow [-h] [-d | -c | -l] [-l {info,debug}] [-v] [-f TOPOLOGY]
              [-t TESTS]

netblow. Vendor agnostic network testing framework to stress network failures.

required arguments:
  -f TOPOLOGY, --topology TOPOLOGY
                        topology yml file
  -t TESTS, --tests TESTS
                        tests yml file

optional arguments:
  -h, --help            show this help message and exit
  -d, --dryrun          show tests calls, won't connect to any devices
  -c, --concheck        check connectivity with all devices in the topology
  -l, --once            iterates only once and perform napalm diffs
  -l {info,debug}, --level {info,debug}
                        logging verbosity level (default: info)
  -v, --version          show version

```

4.2.2 XDG-based directories

If you intend to also write tests in yml files, you probably want to organize these files somewhere. You could simply use the current working directory, or alternatively, XDG-based directories:

- *~/.config/netblow/topologies*: yml files in this folder represent all network devices involved in the tests, which you can target individually in the command line.
- *~/.config/netblow/scenarios_tests*: yml files in this folder are the actual tests specification and test execution.

4.2.3 Topology yml files

Let's say you have a topology with two EOS devices, you can create a yml file named, for instance, *eos_topo.yml*:

```
---
devices:
  eos1:
    driver: 'eos'
    hostname: 'labhost'
    username: 'vrnetlab'
    password: 'vrnetlab9'
    optional_args:
      port: 4443
  eos2:
    driver: 'eos'
    hostname: 'labhost'
    username: 'vrnetlab'
    password: 'vrnetlab9'
    optional_args:
      port: 4444
```

4.2.4 Tests yml file

The yml tests file are composed of two main keys:

- *tests_specs*: specifies all tests, which are nested dictionaries that tell which function on netblow the user wants to run and which kwargs should be used.
- *tests_execution*: it's a list of dictionaries that dictates how the tests should be run, and scheduled either synchronously or asynchronously. Essentially, it's just a cross reference with the definitions in the *tests_specs*.

Let's assume I have two EOS networking devices, *eos1* and *eos2*, and I'd like to stress interface flaps. First, I have to specify how exactly I want the *interface_flap* kwargs for each device and then which order they are supposed to be run. In this case, I created the *scenarios_tests/eos_tests.yml*, which have two *test_specs* definitions, and three scheduled tests based on these definitions:

```
---
tests_specs:
  eos1_interfaces_flap:
    function: 'interfaces_flap'
    dut: 'eos1'
    interfaces: ['Ethernet 7', 'Ethernet 8']
  eos2_interfaces_flap:
    function: 'interfaces_flap'
    dut: 'eos2'
    interfaces: ['Ethernet 2', 'Ethernet 3']

tests_execution:
- tests: [eos1_interfaces_flap]
  kwargs:
    iterations: 2
- tests: [eos1_interfaces_flap, eos2_interfaces_flap]
  kwargs:
    sync: False
- tests: [eos1_interfaces_flap, eos2_interfaces_flap]
  kwargs:
    duration: 3
```


This section gives an example of the recommended workflow to run the *eos_tests.yml* test file in the *eos_topo.yml* mentioned in *Topology yml files* section:

1. Dry run mode to verify the yml syntax:

```
netblow -f topologies/eos_topo.yml -t scenarios_tests/eos_tests.yml -d
2018-05-01 13:56:37 [MainThread] [ INFO] Dry run mode
2018-05-01 13:56:37 [MainThread] [ INFO] Loading topology file /home/arcanjo/repos/
↪netblow/topologies/eos_topo.yml
2018-05-01 13:56:37 [MainThread] [ INFO] Devices in the topology ['eos1', 'eos2']
2018-05-01 13:56:37 [MainThread] [ INFO] Loading test file /home/arcanjo/repos/
↪netblow/scenarios_tests/eos_tests.yml
2018-05-01 13:56:37 [MainThread] [ INFO] Waiting for async tests to finish...
2018-05-01 13:56:37 [MainThread] [ INFO] Mock call trace:
2018-05-01 13:56:37 [MainThread] [ INFO] call.interfaces_flap('eos1', interfaces=[
↪'Ethernet 7', 'Ethernet 8'], iterations=2)
2018-05-01 13:56:37 [MainThread] [ INFO] call.interfaces_flap('eos1', interfaces=[
↪'Ethernet 7', 'Ethernet 8'], sync=False)
2018-05-01 13:56:37 [MainThread] [ INFO] call.interfaces_flap('eos2', interfaces=[
↪'Ethernet 2', 'Ethernet 3'], sync=False)
2018-05-01 13:56:37 [MainThread] [ INFO] call.interfaces_flap('eos1', duration=3,
↪interfaces=['Ethernet 7', 'Ethernet 8'])
2018-05-01 13:56:37 [MainThread] [ INFO] call.interfaces_flap('eos2', duration=3,
↪interfaces=['Ethernet 2', 'Ethernet 3'])
```

2. Connectivity check mode:

```
netblow -f topologies/eos_topo.yml -t scenarios_tests/eos_tests.yml -c
2018-05-01 13:56:41 [MainThread] [ INFO] Loading topology file /home/arcanjo/repos/
↪netblow/topologies/eos_topo.yml
2018-05-01 13:56:41 [MainThread] [ INFO] Devices in the topology ['eos1', 'eos2']
2018-05-01 13:56:41 [MainThread] [ INFO] Trying to open connections to all devices...
2018-05-01 13:56:41 [ eos1] [ INFO] Trying to connect on eos1...
2018-05-01 13:56:41 [ eos2] [ INFO] Trying to connect on eos2...
```

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```

2018-05-01 13:56:44 [ eos2] [ INFO] Successfully connected on eos2
2018-05-01 13:56:45 [ eos1] [ INFO] Successfully connected on eos1
2018-05-01 13:56:45 [MainThread] [ INFO] All devices are CONNECTED
2018-05-01 13:56:45 [MainThread] [ INFO] Closing connections to all devices
2018-05-01 13:56:45 [MainThread] [ INFO] Closing connections to all devices

```

3. Once mode:

In this case, I don't have a long lasting test, but it's also super useful to see napalm diffs:

```

netblow -f topologies/eos_topo.yml -t scenarios_tests/eos_tests.yml -1
2018-05-01 13:56:49 [MainThread] [ INFO] Loading topology file /home/arcanjo/repos/
↪netblow/topologies/eos_topo.yml
2018-05-01 13:56:49 [MainThread] [ INFO] Devices in the topology ['eos1', 'eos2']
2018-05-01 13:56:49 [MainThread] [ INFO] Trying to open connections to all devices...
2018-05-01 13:56:49 [ eos1] [ INFO] Trying to connect on eos1...
2018-05-01 13:56:49 [ eos2] [ INFO] Trying to connect on eos2...
2018-05-01 13:56:51 [ eos1] [ INFO] Successfully connected on eos1
2018-05-01 13:56:52 [ eos2] [ INFO] Successfully connected on eos2
2018-05-01 13:56:52 [MainThread] [ INFO] All devices are CONNECTED
2018-05-01 13:56:52 [MainThread] [ INFO] Loading test file /home/arcanjo/repos/
↪netblow/scenarios_tests/eos_tests.yml
2018-05-01 13:56:52 [ eos1] [ INFO] Test interfaces_flap started on eos1
2018-05-01 13:56:52 [ eos1] [ INFO] Iteration #1/1 on eos1
2018-05-01 13:56:52 [ eos1] [ INFO] Shutting interfaces ['Ethernet 7',
↪'Ethernet 8'] down
2018-05-01 13:56:59 [ eos1] [ INFO] Diff:
@@ -23,8 +23,10 @@
 interface Ethernet6
 !
 interface Ethernet7
+ shutdown
 !
 interface Ethernet8
+ shutdown
 !
 interface Ethernet9
 !
2018-05-01 13:57:01 [ eos1] [ INFO] Bringing interfaces ['Ethernet 7',
↪'Ethernet 8'] up
2018-05-01 13:57:09 [ eos1] [ INFO] Diff:
@@ -23,10 +23,8 @@
 interface Ethernet6
 !
 interface Ethernet7
- shutdown
 !
 interface Ethernet8
- shutdown
 !
 interface Ethernet9
 !
2018-05-01 13:57:11 [ eos1] [ INFO] Test interfaces_flap started on eos1
2018-05-01 13:57:11 [ eos2] [ INFO] Test interfaces_flap started on eos2
2018-05-01 13:57:11 [MainThread] [ INFO] Waiting for async tests to finish...
2018-05-01 13:57:11 [ eos1] [ INFO] Iteration #1/1 on eos1
2018-05-01 13:57:11 [ eos2] [ INFO] Iteration #1/1 on eos2

```

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```

2018-05-01 13:57:11 [ eos1] [ INFO] Shutting interfaces ['Ethernet 7',
↳ 'Ethernet 8'] down
2018-05-01 13:57:11 [ eos2] [ INFO] Shutting interfaces ['Ethernet 2',
↳ 'Ethernet 3'] down
2018-05-01 13:57:17 [ eos1] [ INFO] Diff:
@@ -23,8 +23,10 @@
interface Ethernet6
!
interface Ethernet7
+ shutdown
!
interface Ethernet8
+ shutdown
!
interface Ethernet9
!
2018-05-01 13:57:17 [ eos2] [ INFO] Diff:
@@ -13,8 +13,10 @@
interface Ethernet1
!
interface Ethernet2
+ shutdown
!
interface Ethernet3
+ shutdown
!
interface Ethernet4
!
2018-05-01 13:57:20 [ eos2] [ INFO] Bringing interfaces ['Ethernet 2',
↳ 'Ethernet 3'] up
2018-05-01 13:57:21 [ eos1] [ INFO] Bringing interfaces ['Ethernet 7',
↳ 'Ethernet 8'] up
2018-05-01 13:57:28 [ eos2] [ INFO] Diff:
@@ -13,10 +13,8 @@
interface Ethernet1
!
interface Ethernet2
- shutdown
!
interface Ethernet3
- shutdown
!
interface Ethernet4
!
2018-05-01 13:57:29 [ eos1] [ INFO] Diff:
@@ -23,10 +23,8 @@
interface Ethernet6
!
interface Ethernet7
- shutdown
!
interface Ethernet8
- shutdown
!
interface Ethernet9
!
2018-05-01 13:57:31 [ eos1] [ INFO] Test interfaces_flap started on eos1

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```

2018-05-01 13:57:31 [ eos1] [ INFO] Iteration #1/31536000 on eos1
2018-05-01 13:57:31 [ eos1] [ INFO] Shutting interfaces ['Ethernet 7',
↳ 'Ethernet 8'] down
2018-05-01 13:57:37 [ eos1] [ INFO] Diff:
@@ -23,8 +23,10 @@
interface Ethernet6
!
interface Ethernet7
+ shutdown
!
interface Ethernet8
+ shutdown
!
interface Ethernet9
!
2018-05-01 13:57:39 [ eos1] [ INFO] Bringing interfaces ['Ethernet 7',
↳ 'Ethernet 8'] up
2018-05-01 13:57:47 [ eos1] [ INFO] Diff:
@@ -23,10 +23,8 @@
interface Ethernet6
!
interface Ethernet7
- shutdown
!
interface Ethernet8
- shutdown
!
interface Ethernet9
!
2018-05-01 13:57:49 [ eos1] [ INFO] Duration timeout exceeded. Aborting test.
2018-05-01 13:57:49 [ eos2] [ INFO] Test interfaces_flap started on eos2
2018-05-01 13:57:49 [ eos2] [ INFO] Iteration #1/31536000 on eos2
2018-05-01 13:57:49 [ eos2] [ INFO] Shutting interfaces ['Ethernet 2',
↳ 'Ethernet 3'] down
2018-05-01 13:57:55 [ eos2] [ INFO] Diff:
@@ -13,8 +13,10 @@
interface Ethernet1
!
interface Ethernet2
+ shutdown
!
interface Ethernet3
+ shutdown
!
interface Ethernet4
!
2018-05-01 13:57:58 [ eos2] [ INFO] Bringing interfaces ['Ethernet 2',
↳ 'Ethernet 3'] up
2018-05-01 13:58:04 [ eos2] [ INFO] Diff:
@@ -13,10 +13,8 @@
interface Ethernet1
!
interface Ethernet2
- shutdown
!
interface Ethernet3
- shutdown

```

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```

!
interface Ethernet4
!
2018-05-01 13:58:06 [ eos2] [ INFO] Duration timeout exceeded. Aborting test.
2018-05-01 13:58:06 [MainThread] [ INFO] Closing connections to all devices

```

4. Run the original specified tests without modifiers:

```

netblow -f topologies/eos_topo.yml -t scenarios_tests/eos_tests.yml
2018-05-01 13:58:18 [MainThread] [ INFO] Loading topology file /home/arcanjo/repos/
↪netblow/topologies/eos_topo.yml
2018-05-01 13:58:18 [MainThread] [ INFO] Devices in the topology ['eos1', 'eos2']
2018-05-01 13:58:18 [MainThread] [ INFO] Trying to open connections to all devices...
2018-05-01 13:58:18 [ eos1] [ INFO] Trying to connect on eos1...
2018-05-01 13:58:18 [ eos2] [ INFO] Trying to connect on eos2...
2018-05-01 13:58:21 [ eos2] [ INFO] Successfully connected on eos2
2018-05-01 13:58:21 [ eos1] [ INFO] Successfully connected on eos1
2018-05-01 13:58:21 [MainThread] [ INFO] All devices are CONNECTED
2018-05-01 13:58:21 [MainThread] [ INFO] Loading test file /home/arcanjo/repos/
↪netblow/scenarios_tests/eos_tests.yml
2018-05-01 13:58:21 [ eos1] [ INFO] Test interfaces_flap started on eos1
2018-05-01 13:58:21 [ eos1] [ INFO] Iteration #1/2 on eos1
2018-05-01 13:58:21 [ eos1] [ INFO] Shutting interfaces ['Ethernet 7',
↪'Ethernet 8'] down
2018-05-01 13:58:29 [ eos1] [ INFO] Bringing interfaces ['Ethernet 7',
↪'Ethernet 8'] up
2018-05-01 13:58:35 [ eos1] [ INFO] Iteration #2/2 on eos1
2018-05-01 13:58:35 [ eos1] [ INFO] Shutting interfaces ['Ethernet 7',
↪'Ethernet 8'] down
2018-05-01 13:58:41 [ eos1] [ INFO] Bringing interfaces ['Ethernet 7',
↪'Ethernet 8'] up
2018-05-01 13:58:49 [ eos1] [ INFO] Test interfaces_flap started on eos1
2018-05-01 13:58:49 [ eos2] [ INFO] Test interfaces_flap started on eos2
2018-05-01 13:58:49 [ eos1] [ INFO] Iteration #1/1 on eos1
2018-05-01 13:58:49 [MainThread] [ INFO] Waiting for async tests to finish...
2018-05-01 13:58:49 [ eos1] [ INFO] Shutting interfaces ['Ethernet 7',
↪'Ethernet 8'] down
2018-05-01 13:58:49 [ eos2] [ INFO] Iteration #1/1 on eos2
2018-05-01 13:58:49 [ eos2] [ INFO] Shutting interfaces ['Ethernet 2',
↪'Ethernet 3'] down
2018-05-01 13:58:55 [ eos1] [ INFO] Bringing interfaces ['Ethernet 7',
↪'Ethernet 8'] up
2018-05-01 13:58:55 [ eos2] [ INFO] Bringing interfaces ['Ethernet 2',
↪'Ethernet 3'] up
2018-05-01 13:59:03 [ eos1] [ INFO] Test interfaces_flap started on eos1
2018-05-01 13:59:03 [ eos1] [ INFO] Iteration #1/31536000 on eos1
2018-05-01 13:59:03 [ eos1] [ INFO] Shutting interfaces ['Ethernet 7',
↪'Ethernet 8'] down
2018-05-01 13:59:09 [ eos1] [ INFO] Bringing interfaces ['Ethernet 7',
↪'Ethernet 8'] up
2018-05-01 13:59:17 [ eos1] [ INFO] Duration timeout exceeded. Aborting test.
2018-05-01 13:59:17 [ eos2] [ INFO] Test interfaces_flap started on eos2
2018-05-01 13:59:17 [ eos2] [ INFO] Iteration #1/31536000 on eos2
2018-05-01 13:59:17 [ eos2] [ INFO] Shutting interfaces ['Ethernet 2',
↪'Ethernet 3'] down
2018-05-01 13:59:24 [ eos2] [ INFO] Bringing interfaces ['Ethernet 2',
↪'Ethernet 3'] up

```

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```
2018-05-01 13:59:30 [ eos2] [ INFO] Duration timeout exceeded. Aborting test.  
2018-05-01 13:59:30 [MainThread] [ INFO] Closing connections to all devices
```

Currently, to test the source code of netblow, the following test stages and test suites are in place:

- **linters:** flake8, pycodestyle and pydocstyle.
- **unit:** pytest. All networking I/O are mocked in the CI/CD pipeline.
- **integration:** pytest. This suite is run outside of the pipeline because it needs actual networking devices (JunOS, EOS, IOS-XR and IOS).

Since I can't run the integration test suite on travis-ci (CI/CD pipeline), I will use this section to post the results of these tests that I run locally for the record:

Note: Let me know if you can host these instances publicly somewhere, just so I could have full integration with the current CI/CD and increase the test coverage.

Note: I'm running virtual instances of OES, JunOS, IOS-XR and IOS-XE on qemu on Docker engine, so chances are, the performance of the output commands are probably worse that what you would have in a device running the OS natively.

6.1 Integration test results

```
pytest tests/integration -s
=====
↪test session starts_
↪=====
platform linux -- Python 3.6.4, pytest-3.5.1, py-1.5.3, pluggy-0.6.0
rootdir: /home/arcanjo/repos/netblow, inifile:
plugins: xdist-1.22.2, forked-0.2, cov-2.5.1
collected 17 items
```

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```

tests/integration/test_eos.py 2018-05-01 14:21:05 [MainThread] [ INFO] Devices in the
↳ topology ['eos1', 'eos2']
2018-05-01 14:21:05 [MainThread] [ INFO] Trying to open connections to all devices...
2018-05-01 14:21:05 [ eos1] [ INFO] Trying to connect on eos1...
2018-05-01 14:21:05 [ eos2] [ INFO] Trying to connect on eos2...
2018-05-01 14:21:09 [ eos1] [ INFO] Successfully connected on eos1
2018-05-01 14:21:09 [ eos2] [ INFO] Successfully connected on eos2
2018-05-01 14:21:09 [MainThread] [ INFO] All devices are CONNECTED
2018-05-01 14:21:09 [ eos1] [ INFO] Test interfaces_down started on eos1
2018-05-01 14:21:09 [ eos2] [ INFO] Test interfaces_down started on eos2
2018-05-01 14:21:09 [MainThread] [ INFO] Waiting for async tests to finish...
2018-05-01 14:21:09 [ eos2] [ INFO] Iteration #1/1 on eos2
2018-05-01 14:21:09 [ eos2] [ INFO] Shutting interfaces ['Ethernet 7',
↳ 'Ethernet 8'] down
2018-05-01 14:21:09 [ eos1] [ INFO] Iteration #1/1 on eos1
2018-05-01 14:21:09 [ eos1] [ INFO] Shutting interfaces ['Ethernet 7',
↳ 'Ethernet 8'] down
2018-05-01 14:21:17 [ eos1] [ INFO] Test interfaces_up started on eos1
2018-05-01 14:21:17 [ eos2] [ INFO] Test interfaces_up started on eos2
2018-05-01 14:21:17 [ eos1] [ INFO] Iteration #1/1 on eos1
2018-05-01 14:21:17 [MainThread] [ INFO] Waiting for async tests to finish...
2018-05-01 14:21:17 [ eos2] [ INFO] Iteration #1/1 on eos2
2018-05-01 14:21:17 [ eos1] [ INFO] Bringing interfaces ['Ethernet 7',
↳ 'Ethernet 8'] up
2018-05-01 14:21:17 [ eos2] [ INFO] Bringing interfaces ['Ethernet 7',
↳ 'Ethernet 8'] up
.2018-05-01 14:21:24 [ eos1] [ INFO] Test interfaces_down started on eos1
2018-05-01 14:21:24 [ eos1] [ INFO] Iteration #1/1 on eos1
2018-05-01 14:21:24 [ eos1] [ INFO] Shutting interfaces ['Ethernet 7',
↳ 'Ethernet 8'] down
2018-05-01 14:21:30 [ eos2] [ INFO] Test interfaces_down started on eos2
2018-05-01 14:21:30 [ eos2] [ INFO] Iteration #1/1 on eos2
2018-05-01 14:21:30 [ eos2] [ INFO] Shutting interfaces ['Ethernet 7',
↳ 'Ethernet 8'] down
2018-05-01 14:21:35 [ eos1] [ INFO] Test interfaces_up started on eos1
2018-05-01 14:21:35 [ eos1] [ INFO] Iteration #1/1 on eos1
2018-05-01 14:21:35 [ eos1] [ INFO] Bringing interfaces ['Ethernet 7',
↳ 'Ethernet 8'] up
2018-05-01 14:21:42 [ eos2] [ INFO] Test interfaces_up started on eos2
2018-05-01 14:21:42 [ eos2] [ INFO] Iteration #1/1 on eos2
2018-05-01 14:21:42 [ eos2] [ INFO] Bringing interfaces ['Ethernet 7',
↳ 'Ethernet 8'] up
.2018-05-01 14:21:49 [MainThread] [ INFO] Devices in the topology ['eos1', 'eos2']
2018-05-01 14:21:49 [MainThread] [ INFO] Trying to open connections to all devices...
2018-05-01 14:21:49 [ eos1] [ INFO] Trying to connect on eos1...
2018-05-01 14:21:49 [ eos2] [ INFO] Trying to connect on eos2...
2018-05-01 14:21:53 [ eos1] [ INFO] Successfully connected on eos1
2018-05-01 14:21:53 [ eos2] [ INFO] Successfully connected on eos2
2018-05-01 14:21:53 [MainThread] [ INFO] All devices are CONNECTED
2018-05-01 14:21:53 [ eos1] [ INFO] Test config_rollback started on eos1
2018-05-01 14:21:53 [ eos1] [ INFO] Iteration #1/1 on eos1
2018-05-01 14:21:53 [ eos1] [ INFO] Applying commands ['hostname eos1eos1']
↳ on eos1
2018-05-01 14:22:00 [ eos1] [ INFO] Diff:
@@ -3,6 +3,8 @@
! boot system flash:/vEOS-lab.swi

```

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```

!
transceiver qsfp default-mode 4x10G
+!
+hostname eosleos1
!
spanning-tree mode mstp
!
2018-05-01 14:22:03 [ eos1] [ INFO] Performing rollback
.2018-05-01 14:22:07 [ eos2] [ INFO] Test show started on eos2
2018-05-01 14:22:07 [ eos2] [ INFO] Iteration #1/1 on eos2
2018-05-01 14:22:07 [ eos2] [ INFO] Applying show commands ['show version']_
↪on eos2
2018-05-01 14:22:09 [ eos2] [ INFO] show version
Arista vEOS
Hardware version:
Serial number:
System MAC address: 5254.005a.ebe5

Software image version: 4.20.1F
Architecture: i386
Internal build version: 4.20.1F-6820520.4201F
Internal build ID: 790a11e8-5aaf-4be7-a11a-e61795d05b91

Uptime: 1 day, 22 hours and 25 minutes
Total memory: 2017260 kB
Free memory: 1038628 kB

.2018-05-01 14:22:09 [ eos1] [ INFO] Test reboot started on eos1
2018-05-01 14:22:09 [ eos1] [ INFO] Iteration #1/1 on eos1
2018-05-01 14:22:09 [ eos1] [ INFO] Rebooting eos1
2018-05-01 14:22:11 [ eos1] [ INFO] Trying to connect on eos1...
2018-05-01 14:22:41 [ eos1] [ INFO] Retry #1
2018-05-01 14:22:41 [ eos1] [ INFO] Socket error during eAPI connection: _ssl.
↪c:761: The handshake operation timed out
2018-05-01 14:22:41 [ eos1] [ INFO] Waiting for 30 seconds...
2018-05-01 14:22:41 [ eos1] [ INFO] 569 seconds left before timeouting...
2018-05-01 14:23:11 [ eos1] [ INFO] Trying to connect on eos1...
2018-05-01 14:23:42 [ eos1] [ INFO] Retry #2
2018-05-01 14:23:42 [ eos1] [ INFO] Socket error during eAPI connection: _ssl.
↪c:761: The handshake operation timed out
2018-05-01 14:23:42 [ eos1] [ INFO] Waiting for 30 seconds...
2018-05-01 14:23:42 [ eos1] [ INFO] 509 seconds left before timeouting...
2018-05-01 14:24:12 [ eos1] [ INFO] Trying to connect on eos1...
2018-05-01 14:24:36 [ eos1] [ INFO] Successfully connected on eos1
.
tests/integration/test_ios.py 2018-05-01 14:24:36 [MainThread] [ INFO] Devices in the_
↪topology ['ios1']
2018-05-01 14:24:36 [MainThread] [ INFO] Trying to open connections to all devices...
2018-05-01 14:24:36 [ ios1] [ INFO] Trying to connect on ios1...
2018-05-01 14:24:44 [ ios1] [ INFO] Successfully connected on ios1
2018-05-01 14:24:44 [MainThread] [ INFO] All devices are CONNECTED
2018-05-01 14:24:44 [ ios1] [ INFO] Test interfaces_down started on ios1
2018-05-01 14:24:44 [ ios1] [ INFO] Iteration #1/1 on ios1
2018-05-01 14:24:44 [ ios1] [ INFO] Shutting interfaces ['GigabitEthernet12',
↪ 'GigabitEthernet13'] down
2018-05-01 14:26:21 [ ios1] [ INFO] Test interfaces_up started on ios1

```

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```

2018-05-01 14:26:21 [ ios1] [ INFO] Iteration #1/1 on ios1
2018-05-01 14:26:21 [ ios1] [ INFO] Bringing interfaces ['GigabitEthernet12',
↳ 'GigabitEthernet13'] up
2018-05-01 14:26:26 [ ios1] [ERROR] SCP file transfers are not enabled.␣
↳Configure 'ip scp server enable' on the device.
2018-05-01 14:26:26 [ ios1] [ INFO] Trying to connect on ios1...
2018-05-01 14:26:33 [ ios1] [ INFO] Successfully connected on ios1
.2018-05-01 14:26:33 [MainThread] [ INFO] Devices in the topology ['ios1']
2018-05-01 14:26:33 [MainThread] [ INFO] Trying to open connections to all devices...
2018-05-01 14:26:33 [ ios1] [ INFO] Trying to connect on ios1...
2018-05-01 14:26:40 [ ios1] [ INFO] Successfully connected on ios1
2018-05-01 14:26:40 [MainThread] [ INFO] All devices are CONNECTED
2018-05-01 14:26:40 [ ios1] [ INFO] Test config_rollback started on ios1
2018-05-01 14:26:40 [ ios1] [ INFO] Iteration #1/1 on ios1
2018-05-01 14:26:40 [ ios1] [ INFO] Applying commands ['router bgp 65000']␣
↳on ios1
2018-05-01 14:26:51 [ ios1] [ INFO] Diff:
+router bgp 65000
2018-05-01 14:28:18 [ ios1] [ INFO] Performing rollback
Exception in thread ios1:
Traceback (most recent call last):
  File "/usr/lib64/python3.6/threading.py", line 916, in _bootstrap_inner
    self.run()
  File "/usr/lib64/python3.6/threading.py", line 864, in run
    self._target(*self._args, **self._kwargs)
  File "/home/arcanjo/repos/netblow/netblow/netblow.py", line 590, in blow_thread
    **kwargs)
  File "/home/arcanjo/repos/netblow/netblow/netblow.py", line 785, in config_rollback
    dut_driver.rollback()
  File "/home/arcanjo/repos/netblow/.direnv/python-3.6.4/lib/python3.6/site-packages/
↳napalm/ios/ios.py", line 471, in rollback
    self.device.send_command_expect("write mem")
  File "/home/arcanjo/repos/netblow/.direnv/python-3.6.4/lib/python3.6/site-packages/
↳netmiko/base_connection.py", line 1069, in send_command_expect
    return self.send_command(*args, **kwargs)
  File "/home/arcanjo/repos/netblow/.direnv/python-3.6.4/lib/python3.6/site-packages/
↳netmiko/base_connection.py", line 1051, in send_command
    search_pattern))
OSError: Search pattern never detected in send_command_expect: xt\ force

.2018-05-01 14:29:49 [ ios1] [ INFO] Test show started on ios1
2018-05-01 14:29:49 [ ios1] [ INFO] Iteration #1/1 on ios1
2018-05-01 14:29:49 [ ios1] [ INFO] Applying show commands ['show version']␣
↳on ios1
2018-05-01 14:29:50 [ ios1] [ INFO] show version
Cisco IOS XE Software, Version 16.06.02
Cisco IOS Software [Everest], Virtual XE Software (X86_64_LINUX_IOSD-UNIVERSALK9-M),␣
↳Version 16.6.2, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2017 by Cisco Systems, Inc.
Compiled Wed 01-Nov-17 07:24 by mcpre

Cisco IOS-XE software, Copyright (c) 2005-2017 by cisco Systems, Inc.
All rights reserved. Certain components of Cisco IOS-XE software are
licensed under the GNU General Public License ("GPL") Version 2.0. The
software code licensed under GPL Version 2.0 is free software that comes

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with ABSOLUTELY NO WARRANTY. You can redistribute and/or modify such GPL code under the terms of GPL Version 2.0. For more details, see the documentation or "License Notice" file accompanying the IOS-XE software, or the applicable URL provided on the flyer accompanying the IOS-XE software.

ROM: IOS-XE ROMMON

```
csr1000v uptime is 1 day, 22 hours, 31 minutes
Uptime for this control processor is 1 day, 22 hours, 32 minutes
System returned to ROM by reload
System image file is "bootflash:packages.conf"
Last reload reason: Reload Command
```

This product contains cryptographic features and is subject to United States and local country laws governing import, export, transfer and use. Delivery of Cisco cryptographic products does not imply third-party authority to import, export, distribute or use encryption. Importers, exporters, distributors and users are responsible for compliance with U.S. and local country laws. By using this product you agree to comply with applicable laws and regulations. If you are unable to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at: <http://www.cisco.com/wwl/export/crypto/tool/stqrg.html>

If you require further assistance please contact us by sending email to export@cisco.com.

```
License Level: ax
License Type: Default. No valid license found.
Next reload license Level: ax
```

```
cisco CSR1000V (VXE) processor (revision VXE) with 2190795K/3075K bytes of memory.
Processor board ID 9CT15UOLWFI
10 Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
3984840K bytes of physical memory.
7774207K bytes of virtual hard disk at bootflash:.
0K bytes of WebUI ODM Files at webui:.
```

```
Configuration register is 0x2102
.2018-05-01 14:29:50 [ ios1] [ INFO] Test reboot started on ios1
2018-05-01 14:29:50 [ ios1] [ INFO] Iteration #1/1 on ios1
2018-05-01 14:29:50 [ ios1] [ INFO] Rebooting ios1
2018-05-01 14:31:21 [ ios1] [ INFO] Trying to connect on ios1...
2018-05-01 14:31:36 [ ios1] [ INFO] Retry #1
2018-05-01 14:31:36 [ ios1] [ INFO] Error reading SSH protocol banner
2018-05-01 14:31:36 [ ios1] [ INFO] Waiting for 30 seconds...
2018-05-01 14:31:36 [ ios1] [ INFO] 584 seconds left before timeouting...
2018-05-01 14:32:06 [ ios1] [ INFO] Trying to connect on ios1...
2018-05-01 14:32:22 [ ios1] [ INFO] Retry #2
2018-05-01 14:32:22 [ ios1] [ INFO] Error reading SSH protocol banner
2018-05-01 14:32:22 [ ios1] [ INFO] Waiting for 30 seconds...
```

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```

2018-05-01 14:32:22 [ ios1] [ INFO] 539 seconds left before timeouting...
2018-05-01 14:32:52 [ ios1] [ INFO] Trying to connect on ios1...
2018-05-01 14:32:59 [ ios1] [ INFO] Successfully connected on ios1
.
tests/integration/test_iosxr.py 2018-05-01 14:32:59 [MainThread] [ INFO] Devices in_
↳the topology ['iosxr1']
2018-05-01 14:32:59 [MainThread] [ INFO] Trying to open connections to all devices...
2018-05-01 14:32:59 [ iosxr1] [ INFO] Trying to connect on iosxr1...
2018-05-01 14:33:10 [ iosxr1] [ INFO] Successfully connected on iosxr1
2018-05-01 14:33:10 [MainThread] [ INFO] All devices are CONNECTED
2018-05-01 14:33:10 [ iosxr1] [ INFO] Test interfaces_down started on iosxr1
2018-05-01 14:33:10 [ iosxr1] [ INFO] Iteration #1/1 on iosxr1
2018-05-01 14:33:10 [ iosxr1] [ INFO] Shutting interfaces ['GigabitEthernet0/0/
↳0/1', 'GigabitEthernet0/0/0/2'] down
2018-05-01 14:33:13 [ iosxr1] [ INFO] Test interfaces_up started on iosxr1
2018-05-01 14:33:13 [ iosxr1] [ INFO] Iteration #1/1 on iosxr1
2018-05-01 14:33:13 [ iosxr1] [ INFO] Bringing interfaces ['GigabitEthernet0/0/
↳0/1', 'GigabitEthernet0/0/0/2'] up
.2018-05-01 14:33:15 [MainThread] [ INFO] Devices in the topology ['iosxr1']
2018-05-01 14:33:15 [MainThread] [ INFO] Trying to open connections to all devices...
2018-05-01 14:33:15 [ iosxr1] [ INFO] Trying to connect on iosxr1...
2018-05-01 14:33:27 [ iosxr1] [ INFO] Successfully connected on iosxr1
2018-05-01 14:33:27 [MainThread] [ INFO] All devices are CONNECTED
2018-05-01 14:33:27 [ iosxr1] [ INFO] Test config_rollback started on iosxr1
2018-05-01 14:33:27 [ iosxr1] [ INFO] Iteration #1/1 on iosxr1
2018-05-01 14:33:27 [ iosxr1] [ INFO] Applying commands ['router bgp 65001']_
↳on iosxr1
2018-05-01 14:33:29 [ iosxr1] [ INFO] Diff:
---
+++
@@ -385,6 +385,8 @@
 interface GigabitEthernet0/0/0/127
 shutdown
 !
+router bgp 65001
+!
 xml agent tty
 !
 netconf-yang agent
2018-05-01 14:33:31 [ iosxr1] [ INFO] Performing rollback
.2018-05-01 14:33:31 [ iosxr1] [ INFO] Test show started on iosxr1
2018-05-01 14:33:31 [ iosxr1] [ INFO] Iteration #1/1 on iosxr1
2018-05-01 14:33:31 [ iosxr1] [ INFO] Applying show commands ['show version']_
↳on iosxr1
2018-05-01 14:33:32 [ iosxr1] [ INFO] show version
Cisco IOS XR Software, Version 6.0.1[Default]
Copyright (c) 2016 by Cisco Systems, Inc.

ROM: GRUB, Version 1.99(0), DEV RELEASE

ios uptime is 1 day, 22 hours, 36 minutes
System image file is "bootflash:disk0/xrwr-os-mpi-6.0.1/mbixrwr-rp.vm"

cisco IOS XRv Series (Pentium Celeron Stepping 3) processor with 3145215K bytes of_
↳memory.
Pentium Celeron Stepping 3 processor at 2607MHz, Revision 2.174
IOS XRv Chassis

```

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```
128 GigabitEthernet
1 Management Ethernet
97070k bytes of non-volatile configuration memory.
866M bytes of hard disk.
2321392k bytes of disk0: (Sector size 512 bytes).

Configuration register on node 0/0/CPU0 is 0x2102
Boot device on node 0/0/CPU0 is disk0:
Package active on node 0/0/CPU0:
iosxr-infra, V 6.0.1[Default], Cisco Systems, at disk0:iosxr-infra-6.0.1
    Built on Mon May  9 12:06:47 UTC 2016
    By iox-lnx-003 in /auto/srcarchive12/production/6.0.1/xrivr/workspace for pie

iosxr-fwding, V 6.0.1[Default], Cisco Systems, at disk0:iosxr-fwding-6.0.1
    Built on Mon May  9 12:06:47 UTC 2016
    By iox-lnx-003 in /auto/srcarchive12/production/6.0.1/xrivr/workspace for pie

iosxr-routing, V 6.0.1[Default], Cisco Systems, at disk0:iosxr-routing-6.0.1
    Built on Mon May  9 12:06:47 UTC 2016
    By iox-lnx-003 in /auto/srcarchive12/production/6.0.1/xrivr/workspace for pie

iosxr-ce, V 6.0.1[Default], Cisco Systems, at disk0:iosxr-ce-6.0.1
    Built on Mon May  9 12:06:48 UTC 2016
    By iox-lnx-003 in /auto/srcarchive12/production/6.0.1/xrivr/workspace for pie

xrivr-os-mpi, V 6.0.1[Default], Cisco Systems, at disk0:xrivr-os-mpi-6.0.1
    Built on Mon May  9 12:07:35 UTC 2016
    By iox-lnx-003 in /auto/srcarchive12/production/6.0.1/xrivr/workspace for pie

xrivr-base, V 6.0.1[Default], Cisco Systems, at disk0:xrivr-base-6.0.1
    Built on Mon May  9 12:06:47 UTC 2016
    By iox-lnx-003 in /auto/srcarchive12/production/6.0.1/xrivr/workspace for pie

xrivr-fwding, V 6.0.1[Default], Cisco Systems, at disk0:xrivr-fwding-6.0.1
    Built on Mon May  9 12:06:48 UTC 2016
    By iox-lnx-003 in /auto/srcarchive12/production/6.0.1/xrivr/workspace for pie

xrivr-mgbl-x, V 6.0.1[Default], Cisco Systems, at disk0:xrivr-mgbl-x-6.0.1
    Built on Mon May  9 12:06:55 UTC 2016
    By iox-lnx-003 in /auto/srcarchive12/production/6.0.1/xrivr/workspace for pie

iosxr-mps, V 6.0.1[Default], Cisco Systems, at disk0:iosxr-mps-6.0.1
    Built on Mon May  9 12:06:47 UTC 2016
    By iox-lnx-003 in /auto/srcarchive12/production/6.0.1/xrivr/workspace for pie

iosxr-mgbl, V 6.0.1[Default], Cisco Systems, at disk0:iosxr-mgbl-6.0.1
    Built on Mon May  9 12:06:47 UTC 2016
    By iox-lnx-003 in /auto/srcarchive12/production/6.0.1/xrivr/workspace for pie

iosxr-mcast, V 6.0.1[Default], Cisco Systems, at disk0:iosxr-mcast-6.0.1
    Built on Mon May  9 12:06:48 UTC 2016
    By iox-lnx-003 in /auto/srcarchive12/production/6.0.1/xrivr/workspace for pie

xrivr-mcast-supp, V 6.0.1[Default], Cisco Systems, at disk0:xrivr-mcast-supp-6.0.1
    Built on Mon May  9 12:06:48 UTC 2016
    By iox-lnx-003 in /auto/srcarchive12/production/6.0.1/xrivr/workspace for pie
```

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```

iosxr-bng, V 6.0.1[Default], Cisco Systems, at disk0:iosxr-bng-6.0.1
  Built on Mon May  9 12:06:45 UTC 2016
  By iox-lnx-003 in /auto/srcarchive12/production/6.0.1/xrwr/workspace for pie

xrwr-bng-supp, V 6.0.1[Default], Cisco Systems, at disk0:xrwr-bng-supp-6.0.1
  Built on Mon May  9 12:06:45 UTC 2016
  By iox-lnx-003 in /auto/srcarchive12/production/6.0.1/xrwr/workspace for pie

iosxr-security, V 6.0.1[Default], Cisco Systems, at disk0:iosxr-security-6.0.1
  Built on Mon May  9 12:06:39 UTC 2016
  By iox-lnx-003 in /auto/srcarchive12/production/6.0.1/xrwr/workspace for pie

xrwr-fullk9-x, V 6.0.1[Default], Cisco Systems, at disk0:xrwr-fullk9-x-6.0.1
  Built on Mon May  9 12:07:39 UTC 2016
  By iox-lnx-003 in /auto/srcarchive12/production/6.0.1/xrwr/workspace for pie
.2018-05-01 14:33:32 [   iosxr1] [ INFO] Test reboot started on iosxr1
2018-05-01 14:33:32 [   iosxr1] [ INFO]   Iteration #1/1 on iosxr1
2018-05-01 14:33:32 [   iosxr1] [ INFO]     Rebooting iosxr1
2018-05-01 14:34:07 [   iosxr1] [ INFO] Trying to connect on iosxr1...
2018-05-01 14:34:19 [   iosxr1] [ INFO] Successfully connected on iosxr1
.
tests/integration/test_junos.py 2018-05-01 14:34:19 [MainThread] [ INFO] Devices in_
↳the topology ['junos1']
2018-05-01 14:34:19 [MainThread] [ INFO] Trying to open connections to all devices...
2018-05-01 14:34:19 [   junos1] [ INFO] Trying to connect on junos1...
2018-05-01 14:34:21 [   junos1] [ INFO] Successfully connected on junos1
2018-05-01 14:34:21 [MainThread] [ INFO] All devices are CONNECTED
2018-05-01 14:34:21 [   junos1] [ INFO] Test interfaces_down started on junos1
2018-05-01 14:34:21 [   junos1] [ INFO]   Iteration #1/1 on junos1
2018-05-01 14:34:21 [   junos1] [ INFO]     Shutting interfaces ['ge-0/0/1', 'ge-0/0/
↳2'] down
2018-05-01 14:34:24 [   junos1] [ INFO] Test interfaces_up started on junos1
2018-05-01 14:34:24 [   junos1] [ INFO]   Iteration #1/1 on junos1
2018-05-01 14:34:24 [   junos1] [ INFO]     Bringing interfaces ['ge-0/0/1', 'ge-0/0/
↳2'] up
2018-05-01 14:34:26 [   junos1] [ INFO] Test interfaces_flap started on junos1
2018-05-01 14:34:26 [   junos1] [ INFO]   Iteration #1/1 on junos1
2018-05-01 14:34:26 [   junos1] [ INFO]     Shutting interfaces ['ge-0/0/1', 'ge-0/0/
↳2'] down
2018-05-01 14:34:28 [   junos1] [ INFO]     Bringing interfaces ['ge-0/0/1', 'ge-0/0/
↳2'] up
.2018-05-01 14:34:30 [MainThread] [ INFO] Devices in the topology ['junos1']
2018-05-01 14:34:30 [MainThread] [ INFO] Trying to open connections to all devices...
2018-05-01 14:34:30 [   junos1] [ INFO] Trying to connect on junos1...
2018-05-01 14:34:33 [   junos1] [ INFO] Successfully connected on junos1
2018-05-01 14:34:33 [MainThread] [ INFO] All devices are CONNECTED
2018-05-01 14:34:33 [   junos1] [ INFO] Test config_rollback started on junos1
2018-05-01 14:34:33 [   junos1] [ INFO]   Iteration #1/1 on junos1
2018-05-01 14:34:33 [   junos1] [ INFO]     Applying commands ['set system domain-
↳name lab.com', 'set system ntp peer 10.10.10.10'] on junos1
2018-05-01 14:34:34 [   junos1] [ INFO]       Diff:
[edit system]
+ domain-name lab.com;
+ ntp {
+   peer 10.10.10.10;
+ }

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2018-05-01 14:34:35 [ junos1] [ INFO] Performing rollback
.2018-05-01 14:34:37 [ junos1] [ INFO] Test show started on junos1
2018-05-01 14:34:37 [ junos1] [ INFO] Iteration #1/1 on junos1
2018-05-01 14:34:37 [ junos1] [ INFO] Applying show commands ['show interfaces_
->terse', 'show version'] on junos1
2018-05-01 14:34:38 [ junos1] [ INFO] show interfaces terse

Interface          Admin Link Proto      Local          Remote
ge-0/0/0           up    up
lc-0/0/0           up    up
lc-0/0/0.32769     up    up    vpls
pfe-0/0/0          up    up
pfe-0/0/0.16383   up    up    inet
                  inet6
pfh-0/0/0          up    up
pfh-0/0/0.16383   up    up    inet
pfh-0/0/0.16384   up    up    inet
ge-0/0/1           up    up
ge-0/0/2           up    up
ge-0/0/3           up    up
ge-0/0/4           up    up
ge-0/0/5           up    up
ge-0/0/6           up    up
ge-0/0/7           up    up
ge-0/0/8           up    up
ge-0/0/9           up    up
ge-0/0/10          up    up
ge-0/0/11          up    up
ge-0/0/12          up    up
ge-0/0/13          up    up
ge-0/0/14          up    up
ge-0/0/15          up    up
ge-0/0/16          up    up
ge-0/0/17          up    up
ge-0/0/18          up    up
ge-0/0/19          up    up
ge-0/0/20          up    up
ge-0/0/21          up    up
ge-0/0/22          up    up
ge-0/0/23          up    up
ge-0/0/24          up    up
ge-0/0/25          up    up
ge-0/0/26          up    up
ge-0/0/27          up    up
ge-0/0/28          up    up
ge-0/0/29          up    up
ge-0/0/30          up    up
ge-0/0/31          up    up
ge-0/0/32          up    up
ge-0/0/33          up    up
ge-0/0/34          up    up
ge-0/0/35          up    up
ge-0/0/36          up    up
ge-0/0/37          up    up
ge-0/0/38          up    up
ge-0/0/39          up    up
ge-0/0/40          up    up

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ge-0/0/41	up	up
ge-0/0/42	up	up
ge-0/0/43	up	up
ge-0/0/44	up	up
ge-0/0/45	up	up
ge-0/0/46	up	up
ge-0/0/47	up	up
ge-0/0/48	up	up
ge-0/0/49	up	up
ge-0/0/50	up	up
ge-0/0/51	up	up
ge-0/0/52	up	up
ge-0/0/53	up	up
ge-0/0/54	up	up
ge-0/0/55	up	up
ge-0/0/56	up	up
ge-0/0/57	up	up
ge-0/0/58	up	up
ge-0/0/59	up	up
ge-0/0/60	up	up
ge-0/0/61	up	up
ge-0/0/62	up	up
ge-0/0/63	up	up
ge-0/0/64	up	up
ge-0/0/65	up	up
ge-0/0/66	up	up
ge-0/0/67	up	up
ge-0/0/68	up	up
ge-0/0/69	up	up
ge-0/0/70	up	up
ge-0/0/71	up	up
ge-0/0/72	up	up
ge-0/0/73	up	up
ge-0/0/74	up	up
ge-0/0/75	up	up
ge-0/0/76	up	up
ge-0/0/77	up	up
ge-0/0/78	up	up
ge-0/0/79	up	up
ge-0/0/80	up	up
ge-0/0/81	up	up
ge-0/0/82	up	up
ge-0/0/83	up	up
ge-0/0/84	up	up
ge-0/0/85	up	up
ge-0/0/86	up	up
ge-0/0/87	up	up
ge-0/0/88	up	up
ge-0/0/89	up	up
ge-0/0/90	up	up
ge-0/0/91	up	up
ge-0/0/92	up	up
ge-0/0/93	up	up
ge-0/0/94	up	up
cbp0	up	up
demux0	up	up
dsc	up	up

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eml                up    up
eml.0              up    up    inet    10.0.0.4/8
                  128.0.0.1/2
                  128.0.0.4/2
                  inet6   fe80::5254:ff:fe55:5801/64
                  fec0::a:0:0:4/64
                  tnp     0x4
esi                up    up
fxp0               up    up
fxp0.0             up    up    inet    10.0.0.15/24
gre                up    up
ipip               up    up
irb                up    up
jsrv               up    up
jsrv.1             up    up    inet    128.0.0.127/2
lo0                up    up
lo0.16384          up    up    inet    127.0.0.1        --> 0/0
lo0.16385          up    up    inet
lsi                up    up
mtun               up    up
pimd               up    up
pime               up    up
pip0               up    up
pp0                up    up
rbeb               up    up
tap                up    up
vtep               up    up

2018-05-01 14:34:38 [ junos1 ] [ INFO]      show version

Model: vmx
Junos: 17.2R1.13
JUNOS OS Kernel 64-bit [20170523.350481_builder_stable_10]
JUNOS OS libs [20170523.350481_builder_stable_10]
JUNOS OS runtime [20170523.350481_builder_stable_10]
JUNOS OS time zone information [20170523.350481_builder_stable_10]
JUNOS network stack and utilities [20170601.185252_builder_junos_172_r1]
JUNOS modules [20170601.185252_builder_junos_172_r1]
JUNOS mx modules [20170601.185252_builder_junos_172_r1]
JUNOS libs [20170601.185252_builder_junos_172_r1]
JUNOS OS libs compat32 [20170523.350481_builder_stable_10]
JUNOS OS 32-bit compatibility [20170523.350481_builder_stable_10]
JUNOS libs compat32 [20170601.185252_builder_junos_172_r1]
JUNOS runtime [20170601.185252_builder_junos_172_r1]
JUNOS Packet Forwarding Engine Simulation Package [20170601.185252_builder_junos_172_
↔rl]
JUNOS py extensions [20170601.185252_builder_junos_172_r1]
JUNOS py base [20170601.185252_builder_junos_172_r1]
JUNOS OS vmguest [20170523.350481_builder_stable_10]
JUNOS OS crypto [20170523.350481_builder_stable_10]
JUNOS mx libs compat32 [20170601.185252_builder_junos_172_r1]
JUNOS mx runtime [20170601.185252_builder_junos_172_r1]
JUNOS common platform support [20170601.185252_builder_junos_172_r1]
JUNOS mx libs [20170601.185252_builder_junos_172_r1]
JUNOS mtx Data Plane Crypto Support [20170601.185252_builder_junos_172_r1]
JUNOS daemons [20170601.185252_builder_junos_172_r1]
JUNOS mx daemons [20170601.185252_builder_junos_172_r1]

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JUNOS Services URL Filter package [20170601.185252_builder_junos_172_r1]
JUNOS Services TLB Service PIC package [20170601.185252_builder_junos_172_r1]
JUNOS Services SSL [20170601.185252_builder_junos_172_r1]
JUNOS Services Stateful Firewall [20170601.185252_builder_junos_172_r1]
JUNOS Services RPM [20170601.185252_builder_junos_172_r1]
JUNOS Services PTSP Container package [20170601.185252_builder_junos_172_r1]
JUNOS Services PCEF package [20170601.185252_builder_junos_172_r1]
JUNOS Services NAT [20170601.185252_builder_junos_172_r1]
JUNOS Services Mobile Subscriber Service Container package [20170601.185252_builder_
↪junos_172_r1]
JUNOS Services MobileNext Software package [20170601.185252_builder_junos_172_r1]
JUNOS Services Logging Report Framework package [20170601.185252_builder_junos_172_r1]
JUNOS Services LL-PDF Container package [20170601.185252_builder_junos_172_r1]
JUNOS Services Jflow Container package [20170601.185252_builder_junos_172_r1]
JUNOS Services Deep Packet Inspection package [20170601.185252_builder_junos_172_r1]
JUNOS Services IPSec [20170601.185252_builder_junos_172_r1]
JUNOS Services IDS [20170601.185252_builder_junos_172_r1]
JUNOS IDP Services [20170601.185252_builder_junos_172_r1]
JUNOS Services HTTP Content Management package [20170601.185252_builder_junos_172_r1]
JUNOS Services Crypto [20170601.185252_builder_junos_172_r1]
JUNOS Services Captive Portal and Content Delivery Container package [20170601.185252_
↪builder_junos_172_r1]
JUNOS Services COS [20170601.185252_builder_junos_172_r1]
JUNOS AppId Services [20170601.185252_builder_junos_172_r1]
JUNOS Services Application Level Gateways [20170601.185252_builder_junos_172_r1]
JUNOS Services ACL Container package [20170601.185252_builder_junos_172_r1]
JUNOS Extension Toolkit [20170601.185252_builder_junos_172_r1]
JUNOS jfirmware [20170601.185252_builder_junos_172_r1]
JUNOS Online Documentation [20170601.185252_builder_junos_172_r1]

.2018-05-01 14:34:38 [ junos1] [ INFO] Test reboot started on junos1
2018-05-01 14:34:38 [ junos1] [ INFO] Iteration #1/1 on junos1
2018-05-01 14:34:38 [ junos1] [ INFO] Rebooting junos1
2018-05-01 14:34:39 [ junos1] [ INFO] Trying to connect on junos1...
2018-05-01 14:34:39 [ junos1] [ INFO] Retry #1
2018-05-01 14:34:39 [ junos1] [ INFO] ConnectRefusedError(labhost)
2018-05-01 14:34:39 [ junos1] [ INFO] Waiting for 30 seconds...
2018-05-01 14:34:39 [ junos1] [ INFO] 599 seconds left before timeouting...
2018-05-01 14:35:09 [ junos1] [ INFO] Trying to connect on junos1...
2018-05-01 14:35:24 [ junos1] [ INFO] Retry #2
2018-05-01 14:35:24 [ junos1] [ INFO] ConnectError(host: labhost, msg: Negotiation_
↪failed)
2018-05-01 14:35:24 [ junos1] [ INFO] Waiting for 30 seconds...
2018-05-01 14:35:24 [ junos1] [ INFO] 554 seconds left before timeouting...
2018-05-01 14:35:54 [ junos1] [ INFO] Trying to connect on junos1...
2018-05-01 14:36:09 [ junos1] [ INFO] Retry #3
2018-05-01 14:36:09 [ junos1] [ INFO] ConnectError(host: labhost, msg: Negotiation_
↪failed)
2018-05-01 14:36:09 [ junos1] [ INFO] Waiting for 30 seconds...
2018-05-01 14:36:09 [ junos1] [ INFO] 509 seconds left before timeouting...
2018-05-01 14:36:39 [ junos1] [ INFO] Trying to connect on junos1...
2018-05-01 14:36:42 [ junos1] [ INFO] Successfully connected on junos1
.

=====
↪17 passed in 937.32 seconds_
↪=====

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```
2018-05-01 14:36:42 [MainThread] [ INFO] Closing connections to all devices
2018-05-01 14:36:42 [MainThread] [ INFO] Closing connections to all devices
2018-05-01 14:36:42 [MainThread] [ INFO] Closing connections to all devices
2018-05-01 14:36:42 [MainThread] [ INFO] Closing connections to all devices
2018-05-01 14:36:42 [MainThread] [ INFO] Closing connections to all devices
2018-05-01 14:36:42 [MainThread] [ INFO] Closing connections to all devices
2018-05-01 14:36:42 [MainThread] [ INFO] Closing connections to all devices
2018-05-01 14:36:46 [MainThread] [ INFO] Closing connections to all devices
2018-05-01 14:36:46 [MainThread] [ INFO] Closing connections to all devices
```


CHAPTER 7

Contact

If you have questions, or suggestion about features, feel free to file an [issue](#), or you can reach me out on [twitter](#).