H2020 i**P** **O**ver **I**c**N**- the bet**T**er IP (POINT)

Examples

Bootstrap an ICN-over-SDN POINT Network

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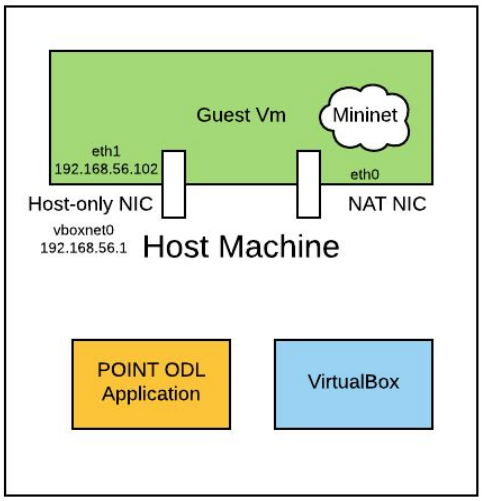
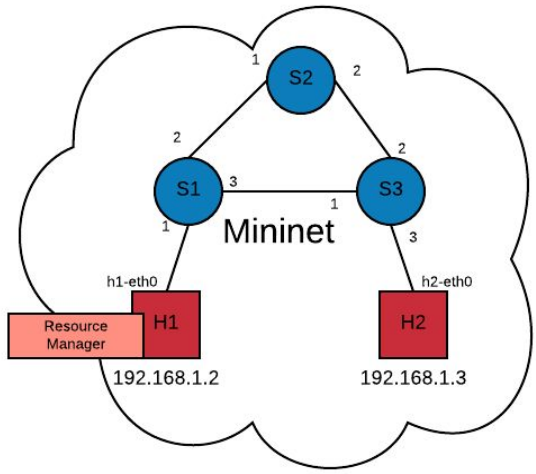
1. Overview

This example is about the ICN-over-SDN bootstrapping capabilities of POINT, using ODL that has the ABM feature published - in the Borron release. The example is based on a Mininet-emulated SDN topology, but could be replicated in any virtualized or physical SDN topology.

2. Prerequisites

The example assumes a basic setup including a host machine with Ubuntu 14.04 or 16.04, with Virtualbox installed, and a Guest Virtual Machine (VM) with Ubuntu 15.04 installed. The Guest VM is configured to include at least one network interface, ideally two network interfaces. One host-only NIC to connect to the host machine, and one NAT NIC to connect to the Internet. For the host-only NIC, it is assumed that prefix 192.168.56.1/24 is used, and Guest VM is given (statically) an IP address 192.168.56.102, while the Host Machine has 192.168.56.1.





In the host machine, it is assumed that the reader has successfully installed the prerequisites and built the POINT Opendaylight application, as indicated in HowTo-SDN document.
In the Guest VM, it is assumed that the reader has successfully installed Blackadder and ICN-SDN application following the instructions of the HowTo document.
In addition, in the Guest VM, the example have been tested with Mininet version 2.2.1 and Openvswitch version 2.4.0.

3. Run the Network

Assuming that the reader has already cloned the POINT repository to a folder point, follow the next steps.
In the Mininet VM, transfer the demo_topo.py and 00000001.conf files from the mininet-example folder to the home directory.

```
$ cp ~/point/sdn/mininet-example/demo_topo.py ~/demo_topo.py
$ cp ~/point/sdn/mininet-example/00000001.conf ~/00000001.conf
```

In the Mininet VM, build the resource-manager application:

```
$ cd ~/point/apps/resource-manager/
$ make all
```

In the host machine, build and execute the POINT Opendaylight application:

```
$ cd point/sdn
$ mvn clean install
$ ./distribution/opendaylight-karaf/target/assembly/bin/karaf
> feature:install tm-sdn
> feature:install point-ui
```

Check that Opendaylight runs properly by checking the Opendaylight console:

```
> log:tail
```

Run the custom python Mininet topology:

```
$ cd ~
$ sudo python demo_topo.py
```

In Mininet console, ping all hosts:

```
> pingall
```

To enable the communication between the SDN controller in the host machine, and the TM Mininet host (H1) in the Guest VM, add a route via the appropriate interface and IP address of your setup:

```
$ sudo ip route add 192.168.1.0/24 via 192.168.56.102 dev vboxnet0
```

Replace 192.168.56.102 and vboxnet0 with the IP address of your VM and the host-only interface of Virtualbox. To test it `ping 192.168.1.2` (Mininet host).

Configure the SDN controller with the TM parameters. Navigate with your web browser to http://localhost:8181/index.html, with username/password: admin/admin and go to the ICN-SDN tab at http://localhost:8181/index.html#/icnsdnui. Check that the indicated topology of the figure is depicted in the page.
Press the Bootstrap Topology button to initialize the automatic bootstrapping of SDN switches.

In your Mininet VM, check that ABM Openflow rules are configured:

```
> sudo ovs-ofctl dump-flows s1 -O OpenFlow13
> sudo ovs-ofctl dump-flows s2 -O OpenFlow13
> sudo ovs-ofctl dump-flows s3 -O OpenFlow13
```

You should see entries matching packets of IPv6 type and source or destination addresses.