Lab 7
Build a Simple IP Network
Build a Simple IP Network

• Create the topology
• Configure static routes
• Explore simple commands
• Show the impact of segment failure

<table>
<thead>
<tr>
<th>Dest. Prefix</th>
<th>Next Hop</th>
</tr>
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<tbody>
<tr>
<td>a.b.c.d/24</td>
<td>r.x.y.z.</td>
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<td>...</td>
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Using ipmininet

• An emulation tool to experiment with IPv4 and IPv6 networks
• Built on top of mininet; an SDN emulation tool

• These tools enable you to:
  • Create various components: routers, hosts, and links
  • Control link bandwidth and delay
  • Create subnets
  • Run various routing protocols
  • ...

on a single machine using simple APIs!
Installation

• Vagrant (Recommended)
  $ cd <WORK_DIR>
  $ vagrant init ipmininet/ubuntu-18.04
  $ vagrant up
  $ vagrant ssh

• Manual
  • time consuming and may break dependencies

• Both are OK for the lab
Vagrant Installation

• Create a VirtualBox VM
• Can be accessed through ssh
• A shared directory is created at:
  • Host: <WORK_DIR>
  • Guest: /vagrant

• So, you don’t need to write code inside the VM.
• Hosts and routers are processes

• Routers using existing software tools such as FRR (zebra, ospfd, ospf6d, bgpd, staticd)
  • These daemons run “inside” the routers!

• You control them by simple APIs
APIs: Overview

• Main class called IPTopo
  • To create a new topology, you inherit from that class
  • E.g., class MyNewTopo(IPTopo)

• To build the actual topology, you override the build function

• You can add:
  • routers: addRouter, addRouters
  • links: addLinks, addLink
  • host: addHost
  • subnet: addSubnet
  • daemon: addDaemon
APIs: Subnets

```python
self.addSubnet(nodes=[...], subnets=[...])
```
APIs: Daemons

• Run specific routing daemons and configure them!
• If you need to run BGP, you need to configure bgpd
  • [https://ipmininet.readthedocs.io/en/v0.9/daemons.html](https://ipmininet.readthedocs.io/en/v0.9/daemons.html)
• In our lab, we need to install static routes
  • Run staticd
  • Configure static_routes list
    • Each item is a StaticRoute object
      • StaticRoute defines destination prefix and next hop!
  • [https://ipmininet.readthedocs.io/en/v0.9/addressing.html#static-routing](https://ipmininet.readthedocs.io/en/v0.9/addressing.html#static-routing)
Command Line

• Run your program using sudo

• Will open a new prompt

mininet>

• Explore available commands using help
Questions?