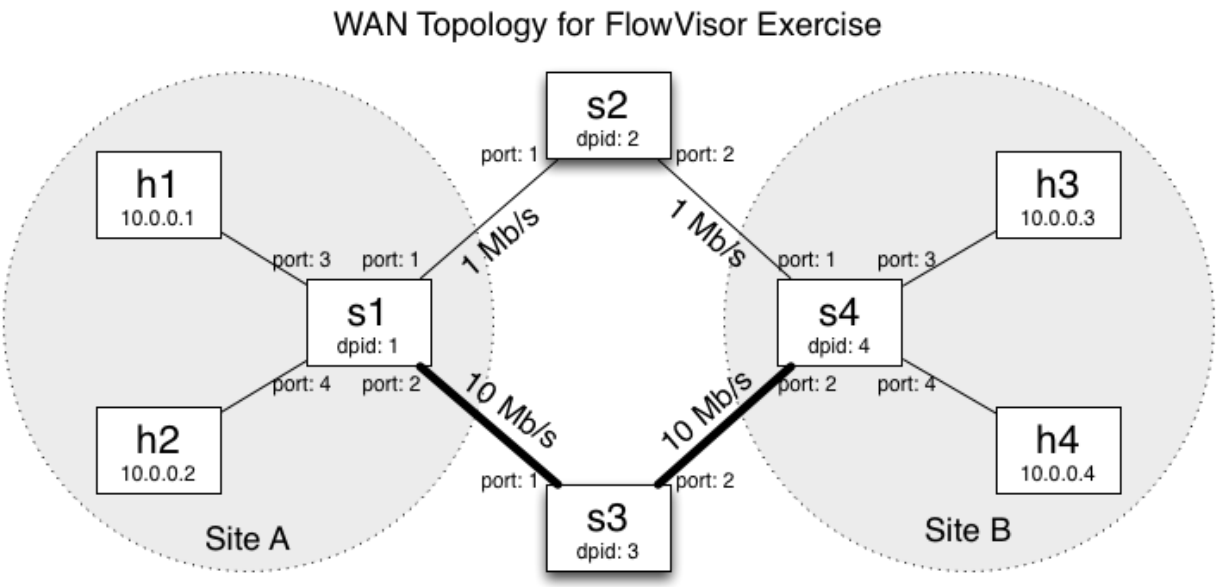
Exercise 7 – Mininet & FlowVisor

1. Create your own FlowVisor topology (50P)

(50P) Using the Mininet Python API, create the FlowVisor WAN topology (which you may know from earlier exercises) in a file **mini-fw-topo.py**:



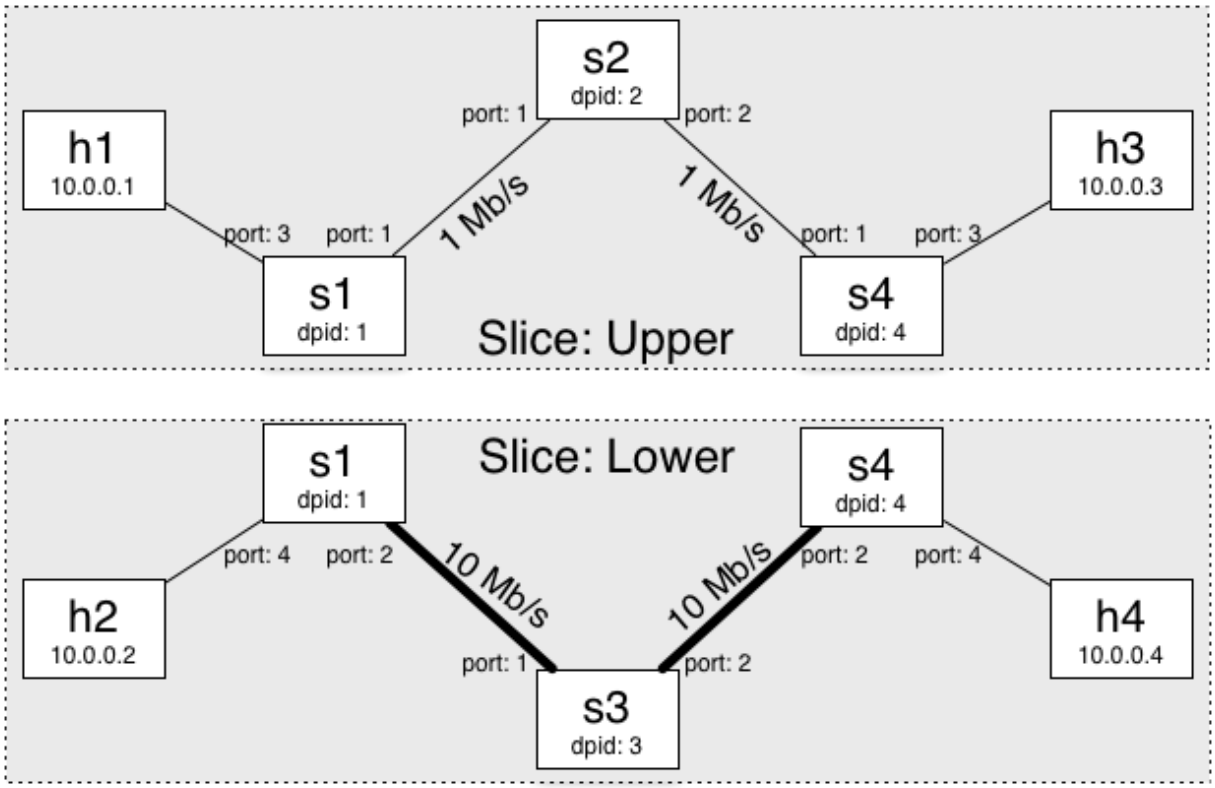
After you have defined it start your topology:

```
$ sudo mn --custom mini-fw-topo.py --topo <YOURTOPOCLASS> --link tc --controller remote --mac --arp
```

In the Mininet console, make sure that your topology is properly connected.

2. Slice the Network (100P)

Now, slice your network so that it supports the following slices:



In short, this slice arrangement allows traffic to be sent from h1 to h3 and h2 to h4 (and vice-versa) only, even though the topology itself would allow sending traffic between arbitrary pairs of hosts.

For slicing a network with FlowVisor in general, you need to take the following steps.

First, make sure you set up the flowvisor package correctly in Exercise 5. Then, start flowvisor in a new terminal:

```
$ sudo /etc/init.d/flowvisor start
```

We have to enable topology control for flowvisor as well:

```
$ fvctl -f /dev/null set-config --enable-topo-ctrl
```

Similar to **ovs-ofctl**, **fvctl** is the control channel that we will use for flowvisor. The option **–f** refers to the flowvisor password file. Since we have set the password to be empty, it we can hand it **/dev/null**. This part will be present in all the following fvctl calls.

Restart flowvisor:

```
$ sudo /etc/init.d/flowvisor restart
```

Now, have a look at the FlowVisor configuration:

```
$ fvctl -f /dev/null get-config
```

This also has the purpose of making sure that flowvisor is actually running and that all the switches have indeed a connection to flowvisor. The configuration should show this.

a. (5P) Which part of the configuration file tells you that all four switches have connected to flowvisor?

In the lecture, you also got a brief overview over the major flowvisor commands. Now, make use of these commands to

b. (5P) List the currently existing slices.
c. (5P) List the currently existing flowspaces.
d. (5P) List the currently connected switches.
e. (5P) List the currently existing links.

Afterwards, proceed with slicing your topology:

f. (10P) Create the appropriate slices.
g. (40P) Create the appropriate flowspaces.
h. (10P) Connect an instance of the POX controller to each of your slices
i. (10P) In Mininet, verify that your slicing works properly, i.e., h1 can reach h3 but not h2 and h4, and h2 can reach h4, but not h1 and h3.

SUBMISSION: Provide screenshots of the output of list-slices, list-flowspace, the controllers and your mininet console with the relevant information after you completed all steps.

3. Another Topology (50P)

Also do the slicing for the topology we saw in Exercise 3 (shown in the figure below).