Computer Comm & Networks - ITCS 6166

Assignment - 4 **Due on**: ***04/08/2021 11:59pm***

Goal: Implement shortest path packet forwarding application using Dijkstra's algorithm with the help of RYU SDN controller framework.
Extra Credit for validating your forwarding application, you should verify it for the given network topology using Mininet SDN Emulator.

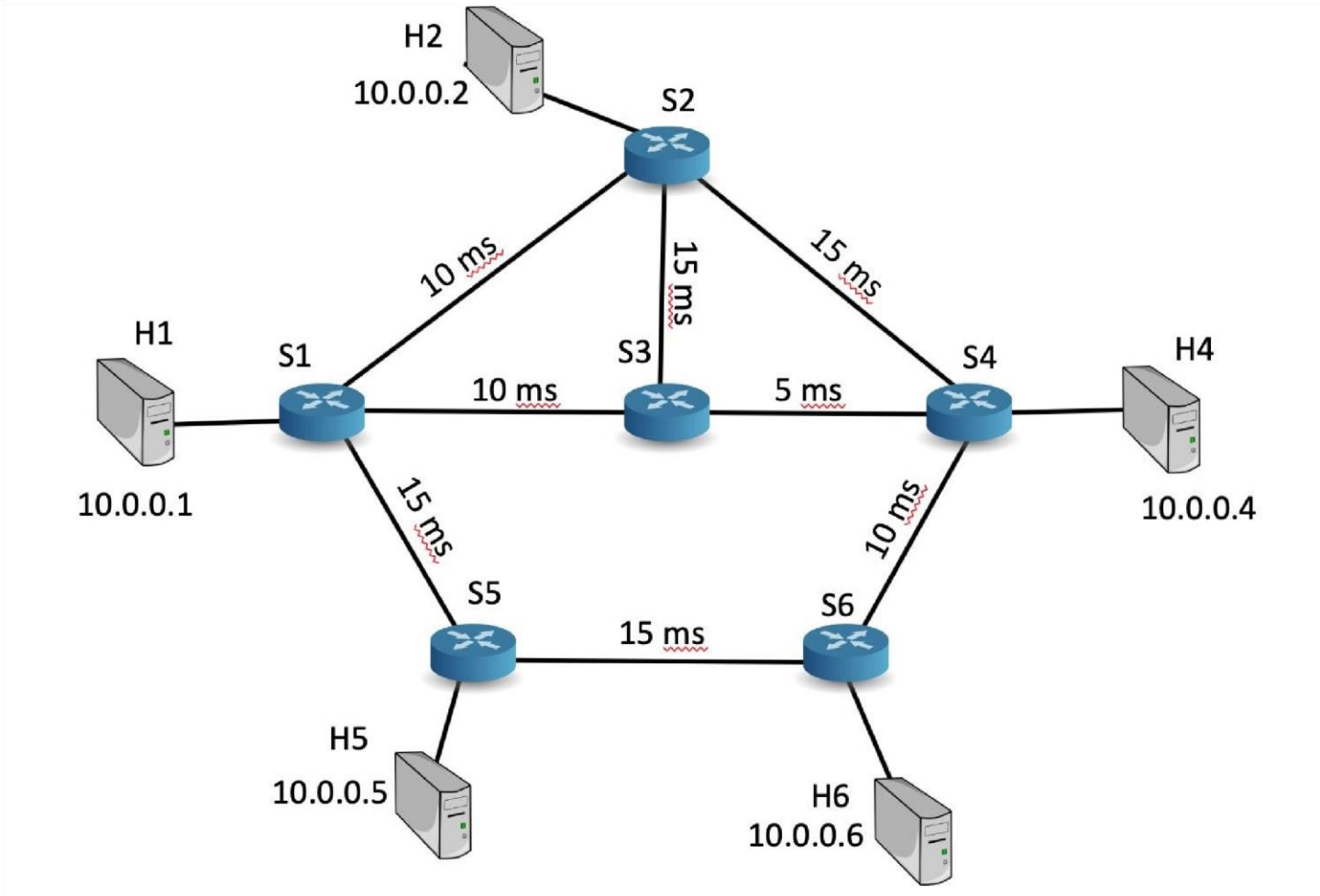
Discussion Topic: Assignment – 4: RYU Shortest Path Packet Forwarding

Overview: SDN controller is the brain of the network. It is essential for the SDN network controller to have complete view of the underlying network in the form a topology. With the obtained network topology information, network application developers can implement network applications such as routing, firewall, packet forwarding etc.

In previous assignments, you created a network topology using Mininet API and implemented RYU topology application for gathering networking topology.

In this assignment, you are asked to extend your RYU topology application with shortest path packet forwarding capability based on Dijkstra's algorithm with link delay as the cost.

Topology:



Milestones:

1. Your RYU application should be able to forward packets from source to destination over the low-delay link using.
   Dijkstra's shortest path algorithm. **(40 pts)**
   a. **RYU application should learn the network topology.**
   b. **Implement the dijkstra's algorithm in you RYU application.**
   c. **Using the learned network topology and implemented shortest path algorithm find the shortest path and print it.**

2. Upload a self-recorded video clip explaining your code **(10 pts)**
   a. Explain how you implemented Dijkstra's algorithm and the output of paths selected for a single source / destination pair.
3. **[Extra credit]** Show that your ryu controller code install Openflow rules and packets are forwarded based on Dijkstra's shortest path **(5 pts)**

Submitting your Code:

- You need to turn-in 2 separate python files for topology and RYU application, with the following naming convention yourname_topo.py and yourname_ryu.py
- Link to video file hosted to your UNCC google drive or YouTube
- Submit your zip file in Canvas submission link
- The Question 3 is an extra credit option

References:

1. http://mininet.org/api/hierarchy.html
2. https://github.com/mininet/mininet/wiki/Documentation
3. https://www.tutorialspoint.com/python/
4. https://osrg.github.io/ryu-book/en/Ryubook.pdf
5. https://osrg.github.io/ryu-book/en/html/switching_hub.html