

CS422 Computer Networks (Spring 2024): Homework 4

(Due Date: **23:59:59PM Friday April 5, 2024**, Total: **20 points**)

1. **True or False (each 1 point).**

- (a) [**T** **F**] The main difference between Link State and Distance Vector algorithms is that the Link State algorithm requires global information at the router and does not need to run in an iterative way.
- (b) [**T** **F**] Hierarchical OSPF is more scalable than pure OSPF because hierarchical OSPF does not need to send link state update to every router within the same AS.
- (c) [**T** **F**] The actual path from the source host to the destination host over the Internet is not guaranteed to be least-cost.
- (d) [**T** **F**] To provide global end-to-end packet delivery at networking layer, all the routers over the internet must run the same routing protocol.

2. **(10 points)** Consider the network shown in Figure 1. Suppose AS3 and AS2 are running OSPF for intra-AS routing. AS1 and AS4 are running IS-IS intra-AS routing. Suppose both eBGP and iBGP are used for inter-AS routing. Initially, there is no physical link between AS2 and AS4.

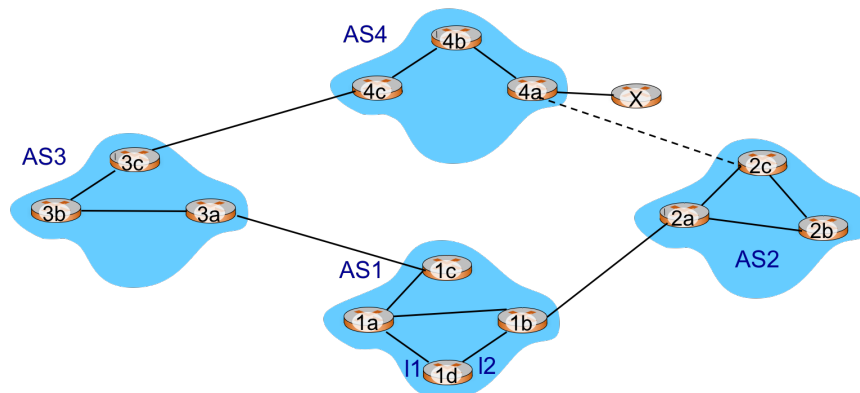


Figure 1: Network topology

- (a) Router 3c learns prefix x from which routing protocol? OSPF, IS-IS, eBGP, iBGP?
 - (b) Router 3a learns prefix x from which routing protocol?
 - (c) Router 1c learns prefix x from which routing protocol?
 - (d) Router 1d learns prefix x from which routing protocol?
 - (e) Once Router 1d learns prefix x, it will put an entry (x,I) into its forwarding table. Will I be I1 or I2 for this entry? Explain why in one sentence?
 - (f) Now suppose there is a physical link between AS2 and AS4, shown in the dotted line. Suppose router 1d learns that x is accessible via AS2 as well as via AS3. Assume that each link cost is equal (say, 1). Will I be I1 or I2 for this entry? Explain why in one sentence?
3. **(6 points)** Figure 2a shows the network topology discussed in the class to understand the impact of BGP policies. Please read our lecture slide or the textbook on BGP policy settings. Consider the path information that reaches stub network W, X and Y as well as BGP policies, Figure 2b shows the Y's view of the topology, which is not the exact same as the TRUE topology shown in Figure 2a.

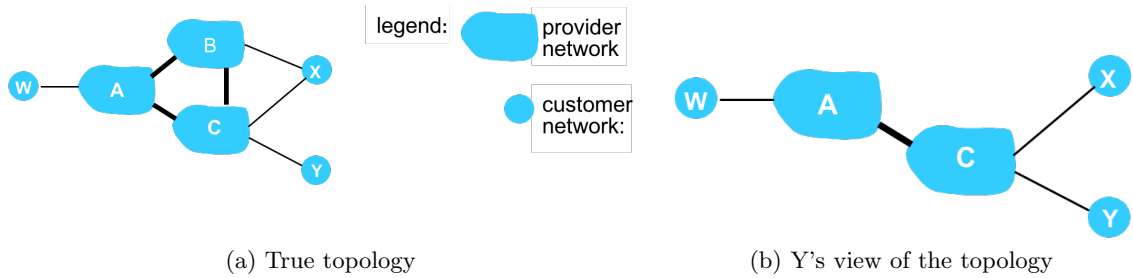


Figure 2: A Simple BGP Policy scenario in the network topology which was discussed in the class.

- (a) Based on the information available at W, what is its respective views of the network topology? Justify your answer.
- (b) Based on the information available at X, what is its respective views of the network topology? Justify your answer.