

Review Questions 17

Your Name:

Please print out this form (two-sided, if you can) and write your answers *legibly* in the spaces provided. If you can't write legibly, type.

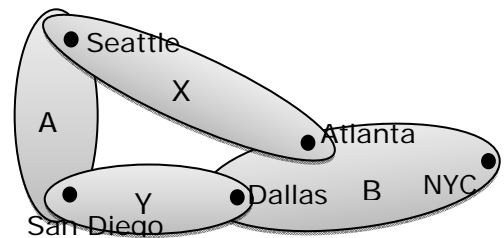
1. How does BGP prevent routers from selecting routes that pass through the same AS more than once?

The BGP AS_PATH attribute records the set of ASes that a path traverses as the corresponding BGP updates propagate from AS to AS. The BGP protocol specifies that an AS should discard any route for which it finds its own AS number already present in the route's AS_PATH. This ensures that loops cannot form.

2. Consider four ISPs, A, B, X and Y. A covers the West coast and is connected to X in Seattle and to Y in San Diego. B covers the Southern US from Texas to the East and connects to X in Atlanta and to Y in Dallas. In X's network, the shortest path from A's network to NYC in B is 5000 miles long. In Y's network, the shortest path from A to NYC is 2500 miles long.

Consider a packet going from Portland, Oregon to NYC. From A's perspective, is it better to forward the packet through X's network or Y's?

If A's goal is to minimize the amount of its own resources consumed by forwarding the packet, the best choice is to quickly hand the packet over to another AS. Hence, the "best" choice for A is to quickly forward the packet from Portland to Seattle and hand it over to X.



Is this the best choice from the user's perspective? Explain.

This is clearly not the best choice from a user's perspective, since its packets now need to travel more than 5,000 miles instead of a little over 2,500 miles.

What BGP mechanisms would ensure that A's packets destined for NYC and originating in Portland, always travel through X, while they would travel through Y if originating in LA?

If A sets the same LOCAL_PREF value for routes it learns from X and Y, BGP would use the internal path cost as the tie-breaker. This would ensure that packets are forwarded to the closest exit point, and hence that packets from Portland exit through X in Seattle and packets from LA exit through Y in San Diego. Note though that this assumes that the cost of the path from Portland (LA) to Seattle (San Diego) is cheaper than that of the path through San Diego (Seattle), which is reasonable.

Assume that X gives A a much cheaper deal to carry its traffic than Y does. What BGP mechanism would allow A to ensure that all its traffic for B goes through X?

If A were to configure BGP to assign a higher LOCAL_PREF value to all routes learned from X, then it would always prefer them over routes learned from Y even if an exit point through Y was closer.