CS 168
Spring 2025

Border Gateway Protocol

Discussion 5

1 True/False

1.1 iBGP is used for intradomain routing.

False. its for inter domain, for distributing external routes internally.

1.2 Avoiding loops is one reason why BGP uses path vector.

TRUE

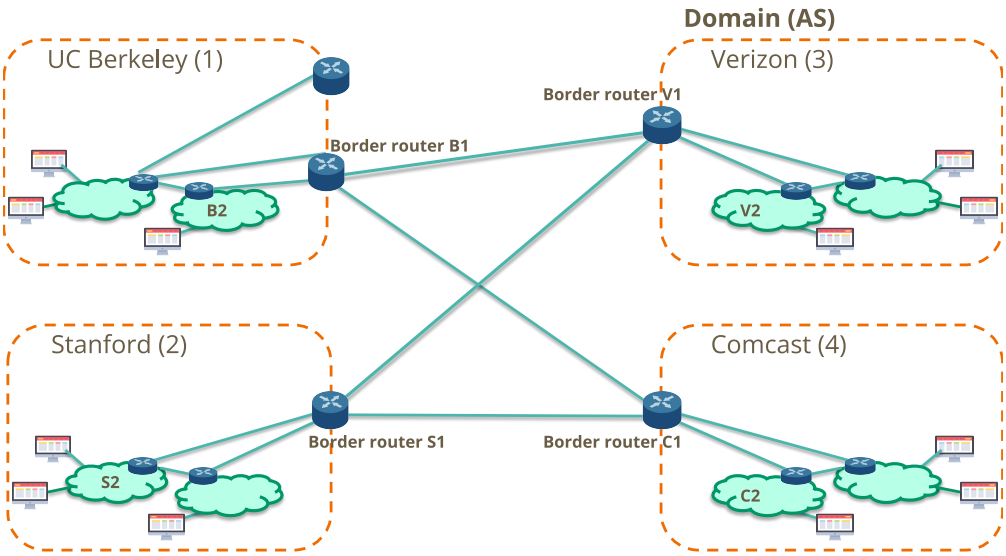
1.3 BGP always advertises a shortest path.

False. it relies on other policy

1.4 BGP route advertisements use classless addressing.

True

2 Interdomain vs Intradomain



Consider the four ASes in the diagram above. ASes Berkeley, Verizon, Stanford, and Comcast have border routers **B1, V1, S1,** and **C1** respectively, and internal routers **B2, V2, S2,** and **C2** respectively.

Berkeley and Stanford both use Comcast's and Verizon's services. The (fake) cost metrics are 10/MB for using Comcast's bandwidth and 20/MB for using Verizon's bandwidth.

Please answer the following questions with the assumption made in lecture: a border router establishes iBGP sessions to all other routers within its AS.

2.1 Which one of **eBGP, iBGP,** and **IGP** distributes externally learned routes internally, and which routers, if any, speak it?

iBGP, all routers mentioned above speak it

2.2 Which one of **eBGP, iBGP,** and **IGP** learns routes to external destinations, and which routers, if any, speak it?

eBGP, the boarder routes- V1 C1 B1 S1

2.3 Which one of **eBGP, iBGP,** and **IGP** provides internal reachability, and which routers, if any, speak it?

IGP, all routers

2.4 Which AS would Berkeley use to reach Stanford, in terms of cost-effectiveness?

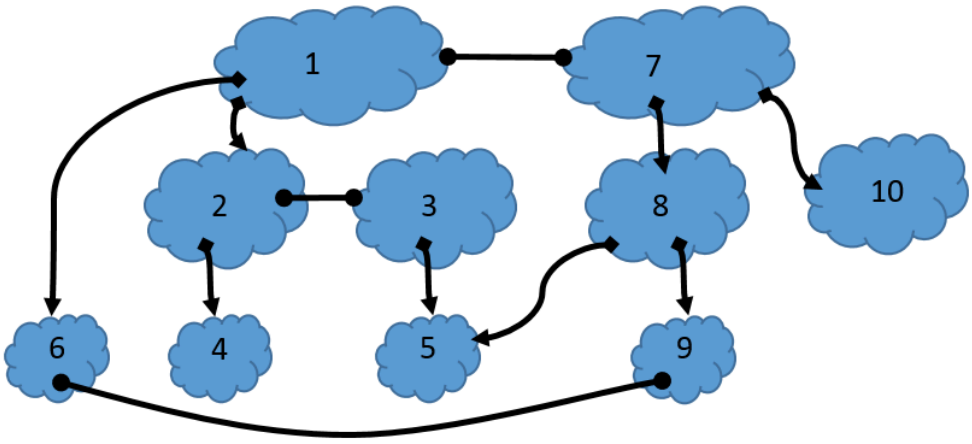
Comcast

2.5 Given that Comcast now knows Berkeley and Stanford don't get along with each other, it doesn't advertise its route of Berkeley to Stanford, or the other way around. However, Verizon remains neutral. Which AS would Berkeley use to reach Stanford now?

Verizon

3 BGP

Consider the following configuration of autonomous systems and their relationships.



A square-triangle line indicates a provider-customer relationship, and a circle-circle line indicates a peer relationship. We have two tier 1 providers (**1** and **7**).

Assume we are using the following selection and export rules for all ASes:

Selection: Prefer to send data through customers > peers > providers in order to minimize costs. **Export:** To customers, advertise all paths. To all other ASes, advertise only paths to customers (and paths to your own AS, of course).

3.1 A user in **AS 4** tries to send data to a friend in **AS 5**. What path (if any) would the data take to get to the friend?

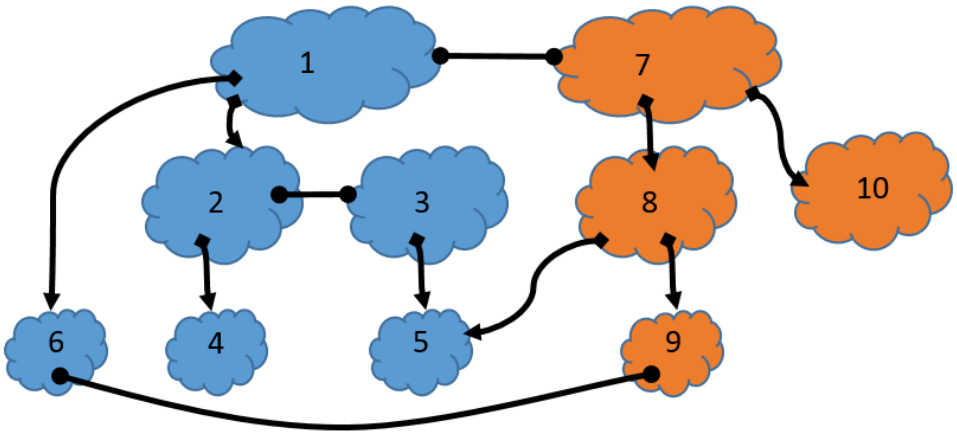
4 > 2 > 3 >5

3.2 A user in **AS 6** tries to send data to a friend in **AS 5**. What path (if any) would the data take to get to the friend?

6 > 1 > 7> 8 > 5

3.3 A user in **AS 1** tries to send data to another user in **AS 9**. What path (if any) would the data take?

1 > 7 > 8 > 9



Now assume all autonomous systems are using the same selection policy but also adopting new export rules because they are part of nation states in an information war. Autonomous systems ranging from **1 to 6** form a group of allies, and autonomous systems ranging from **7 to 10** form another group of allies:

Export:

(a) To a customer AS that is an ally, advertise all paths.
(b) To all other ASes that are allies, advertise only paths to customers.
(c) Advertise nothing to ASes that are not allies.

3.4 A user in **AS 6** tries to send data to their friend in **AS 5**. Will the friend receive the data?

NO

3.5 Will a user in **AS 9** be able to receive data from another in **AS 1**?

NO

3.6 Imagine **AS 10** set up a deal with **AS 1** in which **AS 1** is to act as a spy for **AS 10's** alliance. **AS 1** will advertise all customer paths to **AS 7**. With this new agreement, **AS 10** now wants to report its findings to **AS 5**. Will the data be able to get from **AS 10** to **AS 5**? If so, what path would the data take?

NO because 2 wont adverise its path to 1 that it cant reach 5