

EECS 489 - WN 23

Discussion 9

Announcements

Assignment 3 is out.

Due date: **03/24 2023, 11:59 PM (a week to go)**

Lateday policy:

You have 3 group latedays in total for assignment 2 - 4.

Please compile your code in the VM and test it carefully.

Routing

- Intra-Domain Routing

- OSPF

- Link State

- RIP

- Distance Vector



IGP = Interior Gateway Protocol

- Inter-Domain Routing

- BGP = Border Gateway Protocol

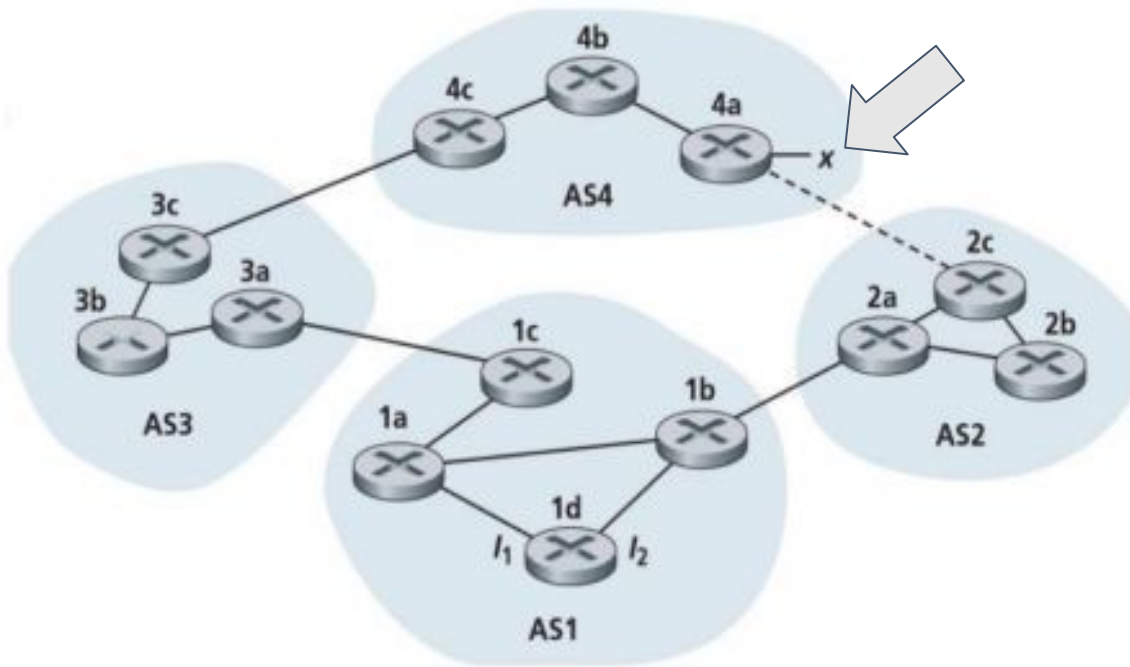
- eBGP = external BGP

- iBGP = internal BGP

Route Attributes

Priority	Rule	Remarks
1	LOCAL PREF	Pick highest LOCAL PREF
2	ASPATH	Pick shortest ASPATH length
3	MED	Lowest MED preferred
4	eBGP > iBGP	Did AS learn route via eBGP (preferred) or iBGP?
5	iBGP path	Lowest IGP cost to next hop (egress router)
6	Router ID	Smallest next-hop router's IP address as tie-breaker

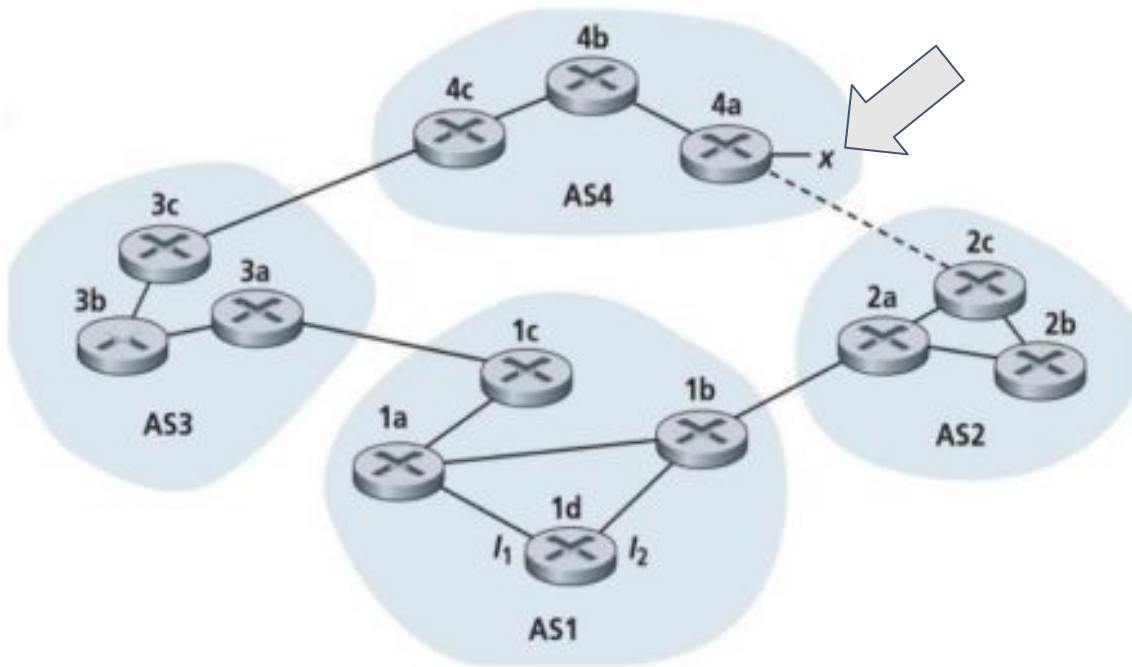
Q1



In the given network, suppose AS2 and AS3 are running OSPF for their intra-AS routing protocol. Suppose AS1 and AS4 are running RIP for their intra-AS routing protocol. Suppose eBGP and iBGP are used for the inter-AS routing protocol, and there is **no** physical link between AS2 and AS4. Assume every link in an AS has the same cost.

- Router 3c learns about prefix x from which routing protocol?
- Router 3a learns about prefix x from which routing protocol?
- Router 1c learns about prefix x from which routing protocol?

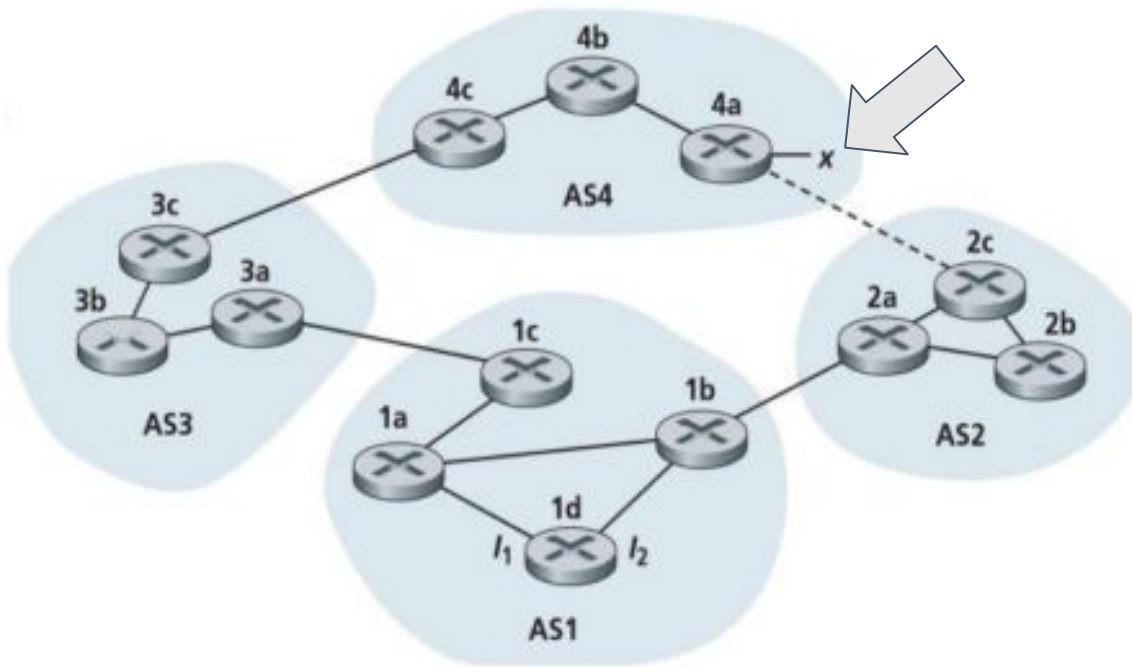
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- Router 3c learns about prefix x from which routing protocol? **eBGP**
- Router 3a learns about prefix x from which routing protocol? **iBGP**
- Router 1c learns about prefix x from which routing protocol? **eBGP**

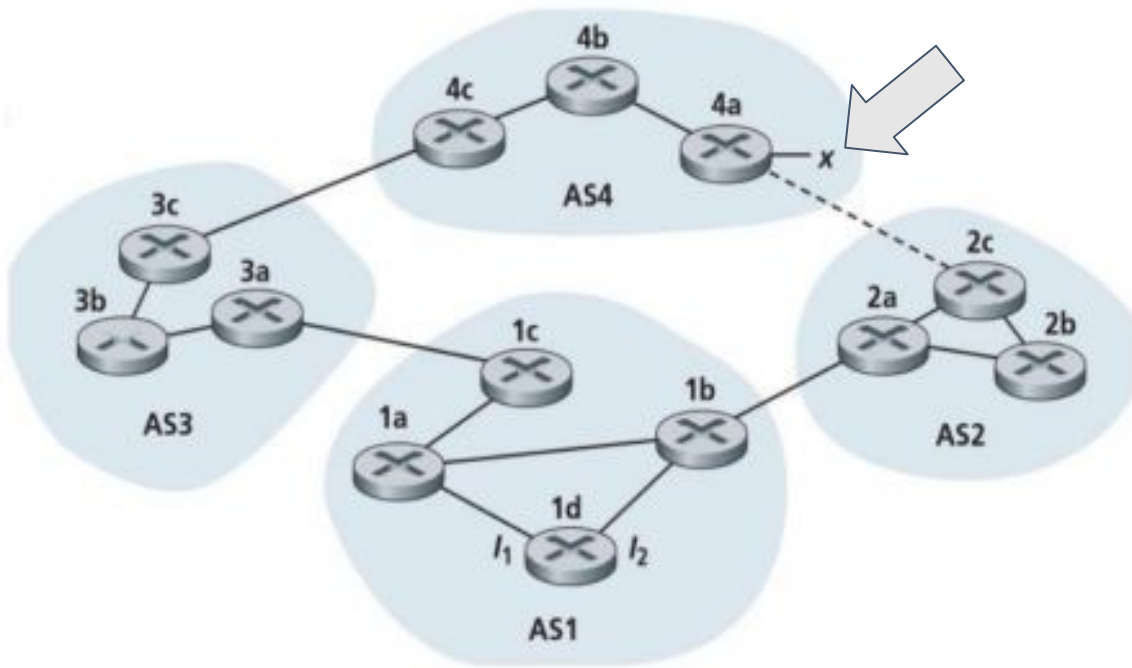
Q1



Once router 1d learns about x it will put an entry (x, I) in its forwarding table.

- Will I be equal to I1 or I2 for this entry
- Now suppose that there is a physical link between AS2 and AS4, shown by the dotted line. Suppose router 1d learns that x is accessible via AS2 as well as via AS3. Will I be set to I1 or I2 ?
- Now suppose there is another AS, called AS5, which lies on the path between AS2 and AS4. Suppose router 1d learns that x is accessible via AS2, AS5, AS4 as well as AS3, AS4. Will I be set to I1 or I2 ?

Q1



Once router 1d learns about x it will put an entry (x, l) in its forwarding table.

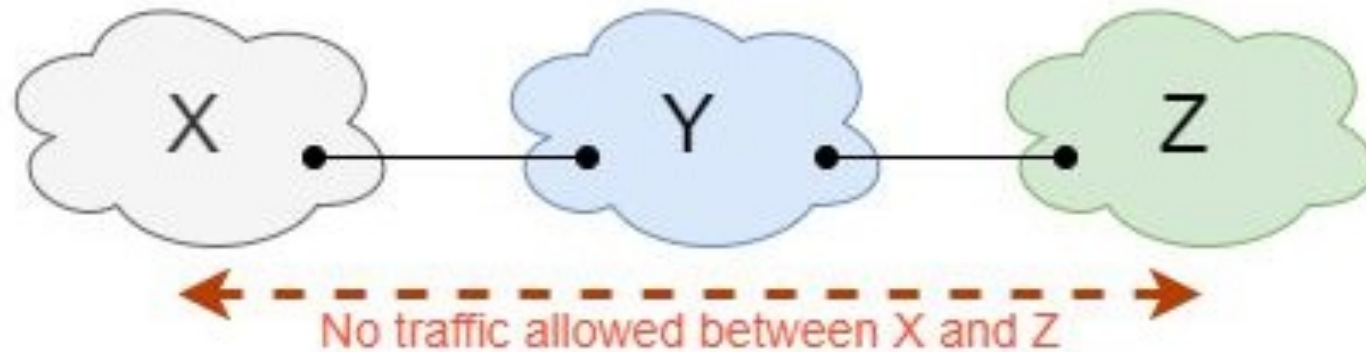
- Will l be equal to l1 or l2 for this entry? **l1**
- Now suppose that there is a physical link between AS2 and AS4, shown by the dotted line. Suppose router 1d learns that x is accessible via AS2 as well as via AS3. Will l be set to l1 or l2 ? **l2**
- Now suppose there is another AS, called AS5, which lies on the path between AS2 and AS4. Suppose router 1d learns that x is accessible via AS2, AS5, AS4 as well as AS3, AS4. Will l be set to l1 or l2 ? **l1**

Q2

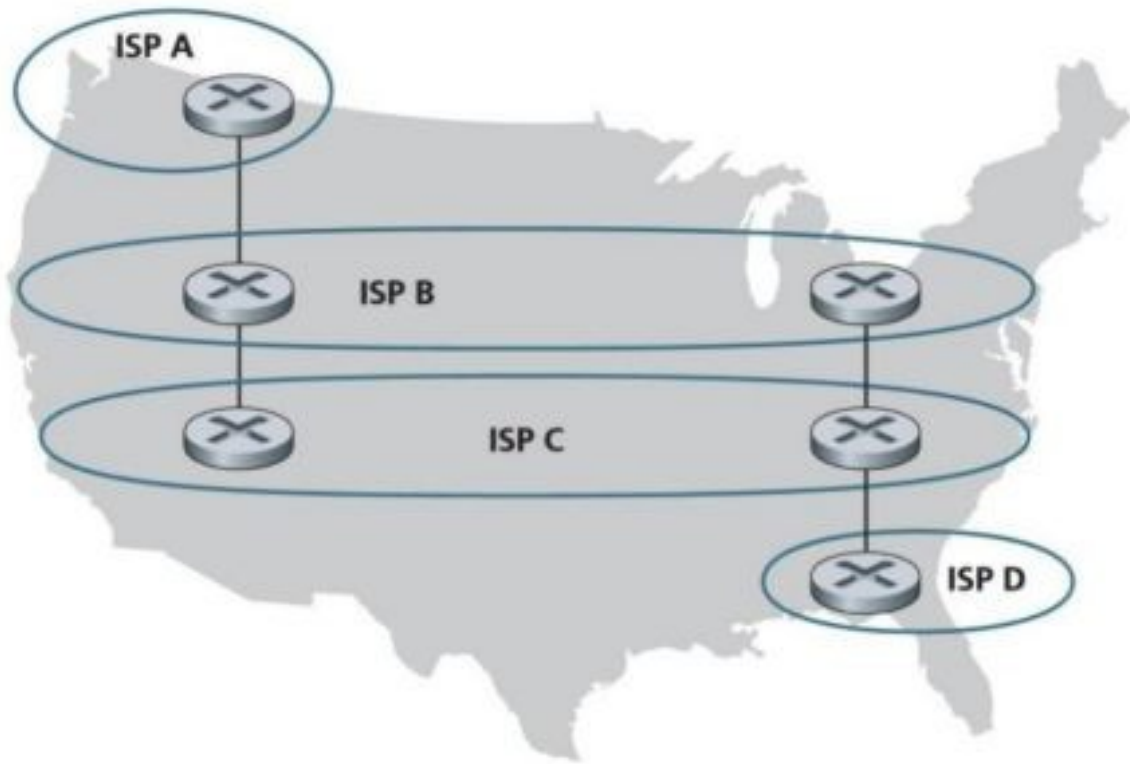
Suppose AS X and AS Z are not directly connected but instead are connected by AS Y. Further suppose that X has a peering agreement with Y, and that Y has a peering agreement with Z. Draw the relationship graph like the the ones in the lecture slides. Can X and Z communicate with each other?

Q2

Suppose AS X and AS Z are not directly connected but instead are connected by AS Y. Further suppose that X has a peering agreement with Y, and that Y has a peering agreement with Z. Draw the relationship graph like the ones in the lecture slides. Can X and Z communicate with each other?

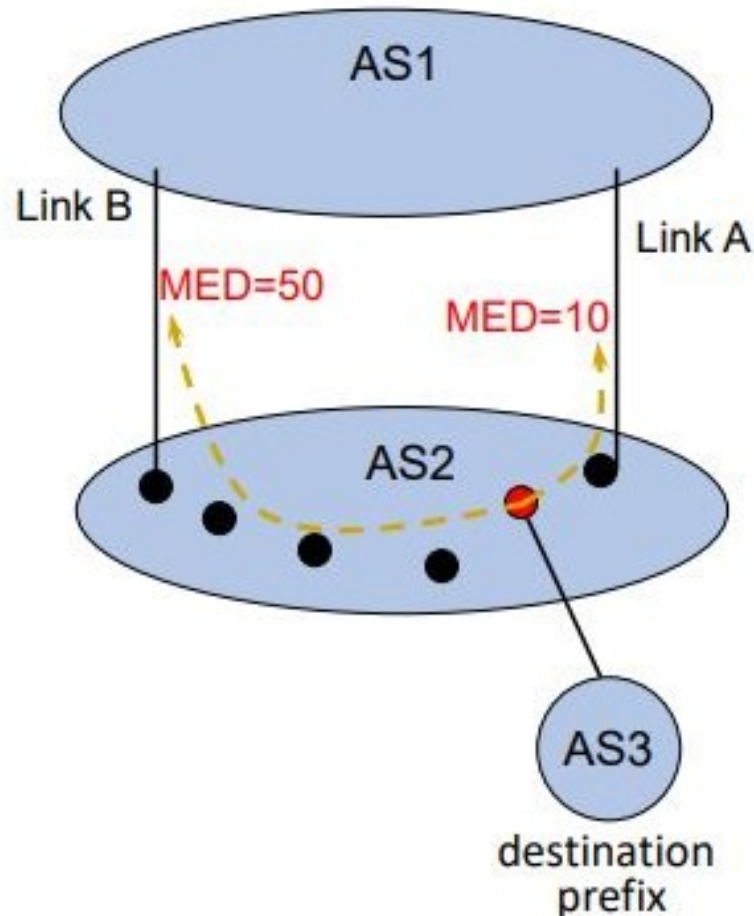


Q3



In the given network, ISP B provides national backbone service to regional ISP A. ISP C provides national backbone service to regional ISP D. Each ISP consists of one AS. B and C peer with each other in two places using BGP. Consider traffic going from A to D. B would prefer to handle that traffic over to C on the West Coast (so that C would have to absorb the cost of carrying the traffic cross-country), while C would prefer to get the traffic via its East Coast peering point with B (so B would have carried the traffic across the country). What BGP mechanism might C use so that B would hand over A-to-D traffic at its East Coast peering point?

MED



- Multi-exit discriminator (MED) is used when ASes are interconnected via **2 or more links**; it specifies how close a prefix is to the link it is announced on
- Lower is better
- AS that announces a prefix sets MED
- AS receiving the prefix (optionally!) uses MED to select link

Thanks

Have a good one!