CSC4200/5200 – COMPUTER NETWORKING

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BGP - CONTINUED

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Tennessee TECH

Apps (HTTP)

Data

Apps (HTTP)

Transport (TCP/UDP)

Segments

Transport (TCP/UDP)

Network (IP)

Packets

Network (IP)

Link (Ethernet)

Frames

Ethernet Interface

Ethernet Interface

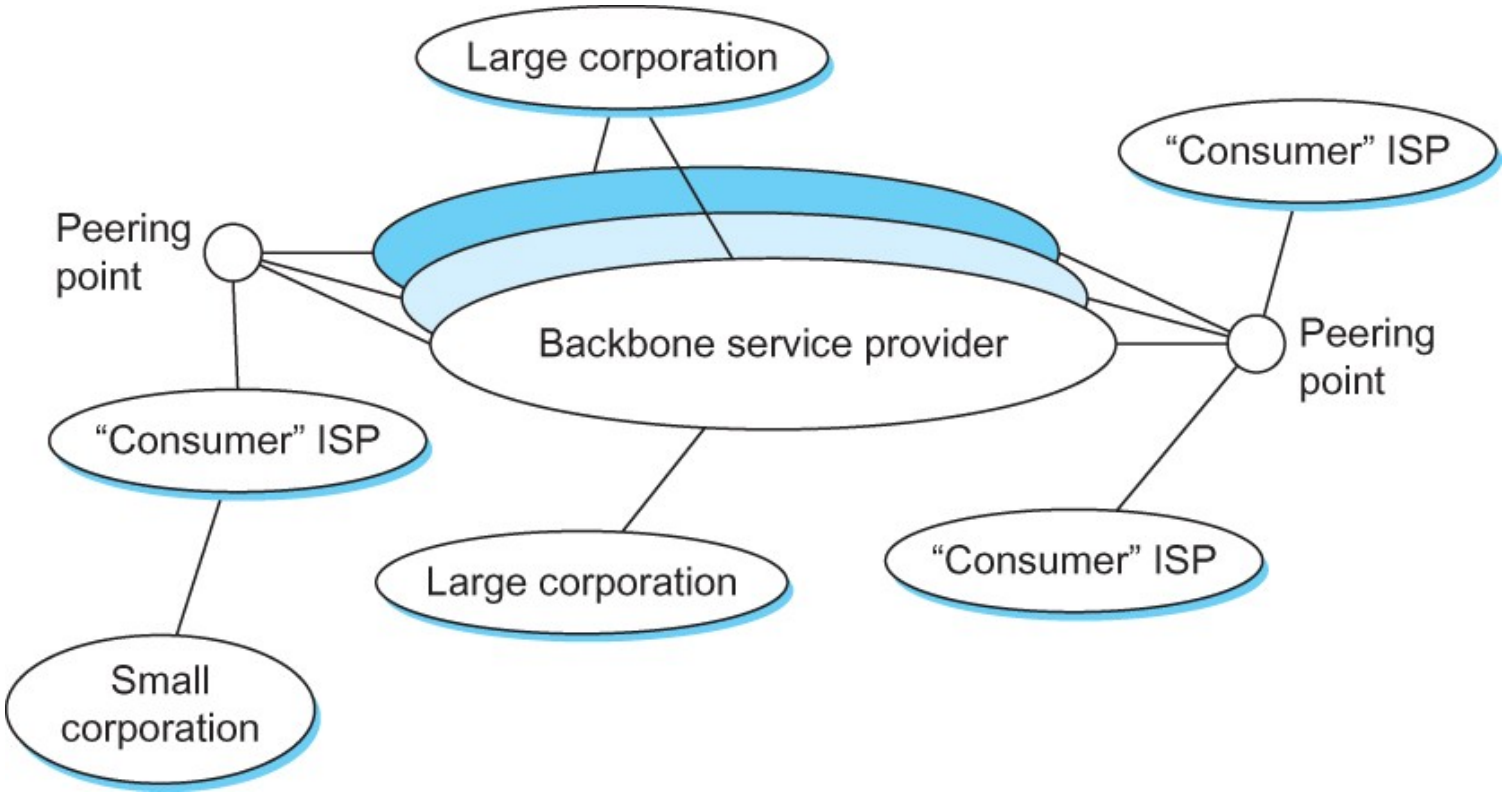
Link (Ethernet)

Bits (1010001)

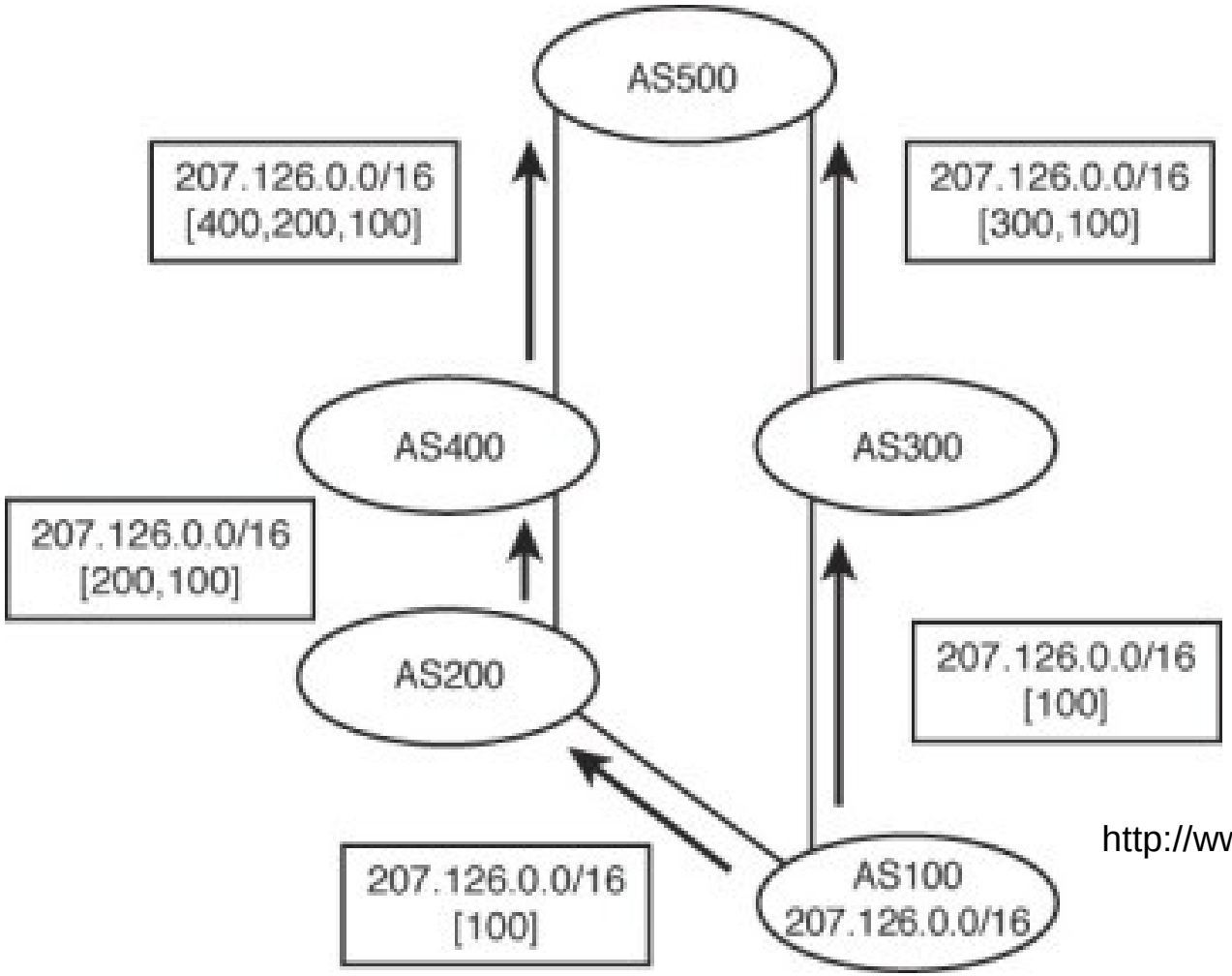
So far...

- Routing
  How do we scale routing?

Internet now



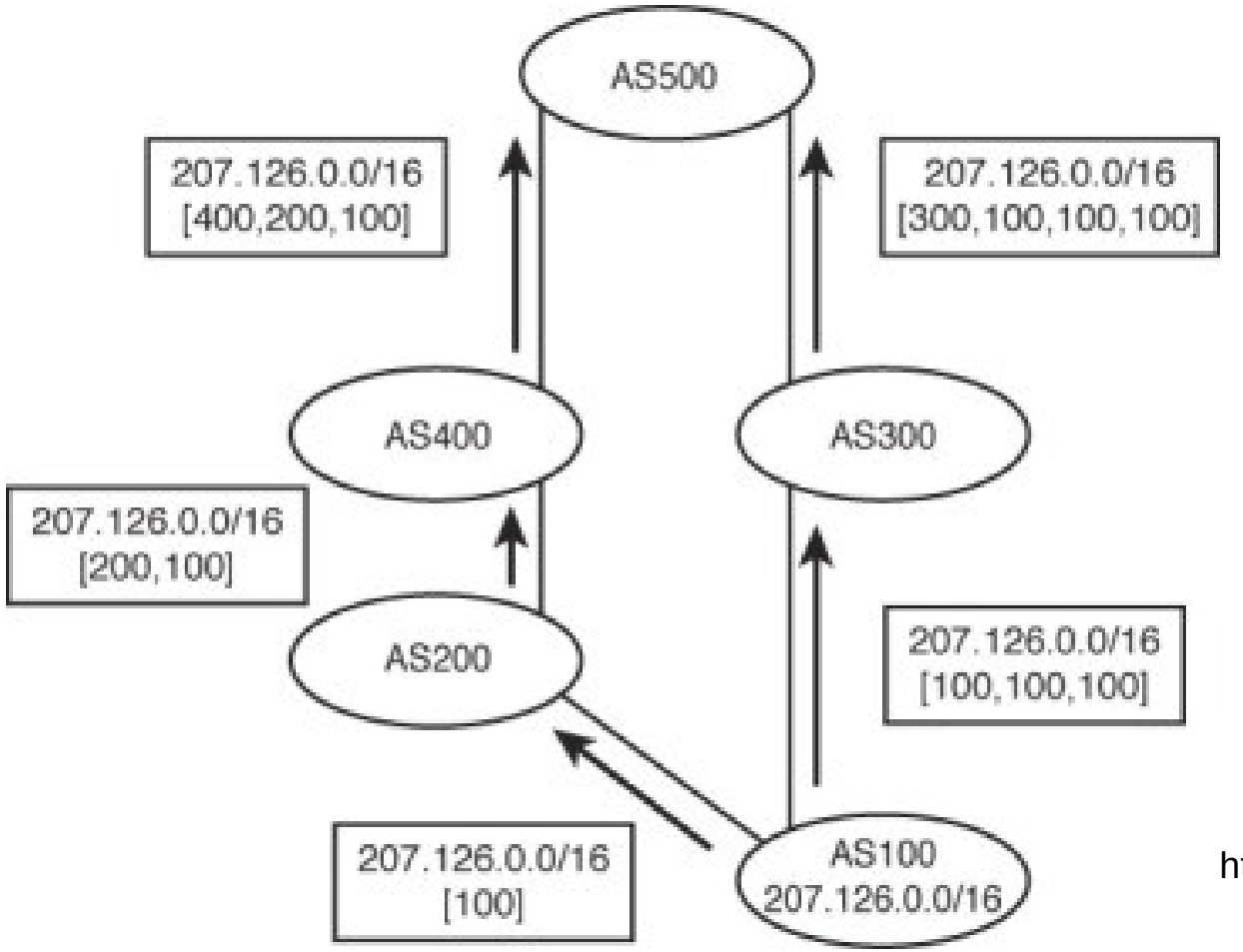
BGP Attribute – AS PATH



Each hop adds ASN to the path
-Only externally

http://www.ciscopress.com/articles/article.asp?p=2738462&seqNum=2

BGP Attribute – AS PATH

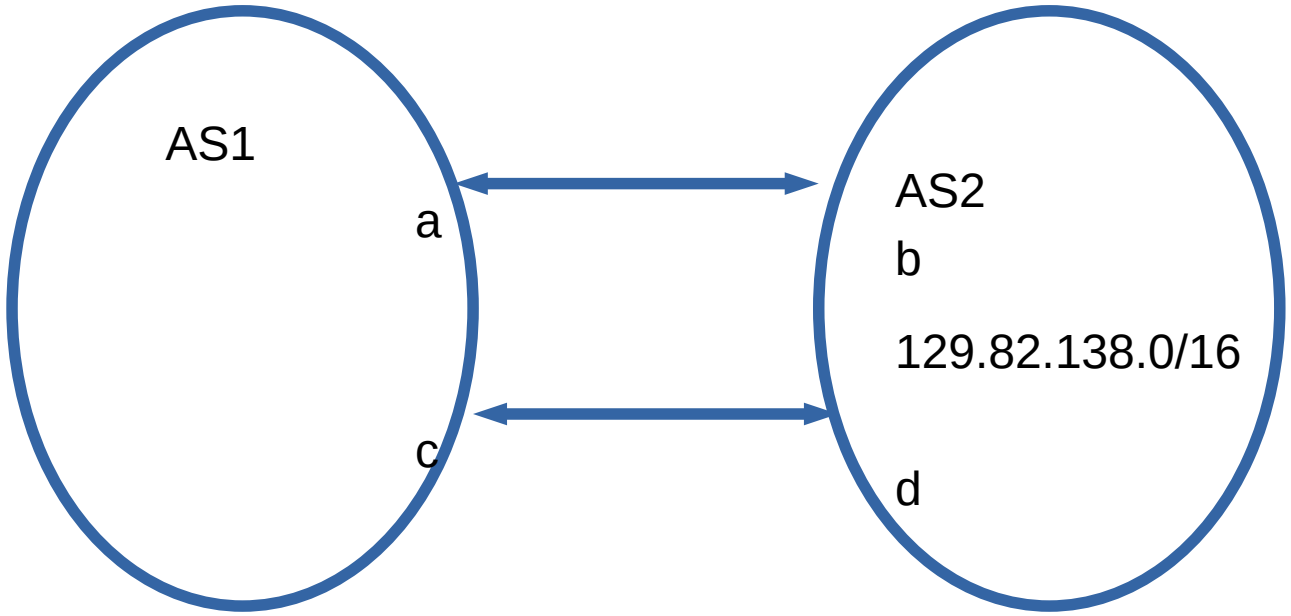


AS100 trying to influence path selection at AS500

- Append multiple path

http://www.ciscopress.com/articles/article.asp?p=2738462&seqNum=2

BGP Attribute – Local Preference



How do you load balance between two links using BGP?

At A:

129.82.138.0/17 → 10
129.82.138.128/17 → 5

At C:

129.82.138.0/17 → 5
129.82.138.128/17 → 10

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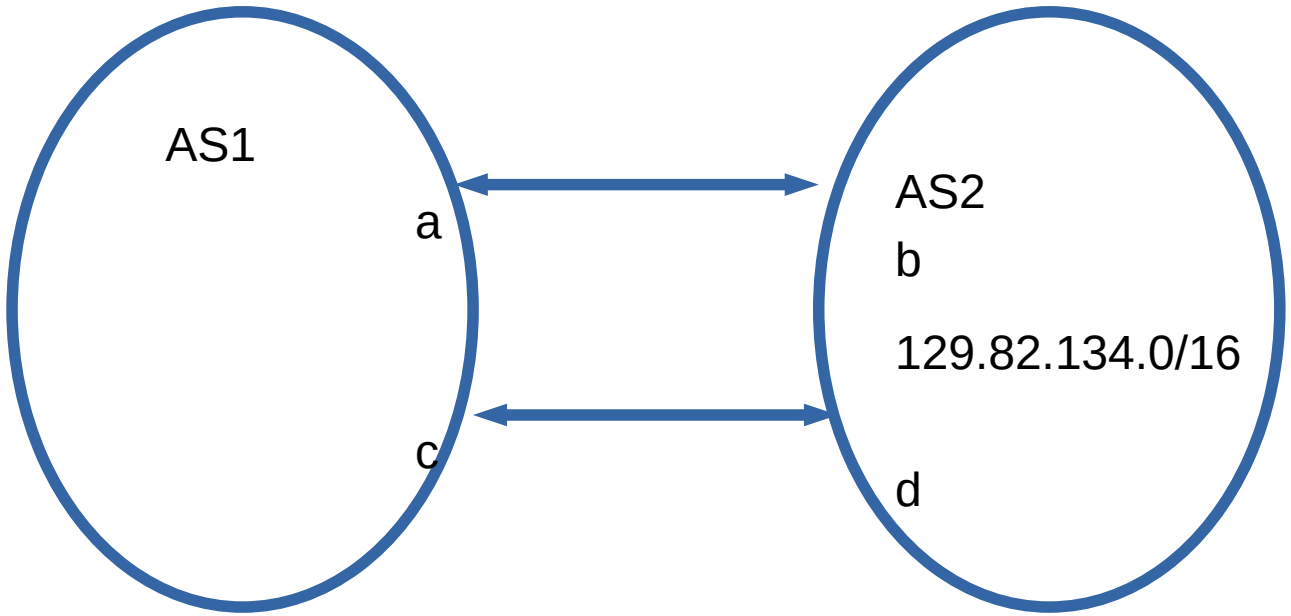
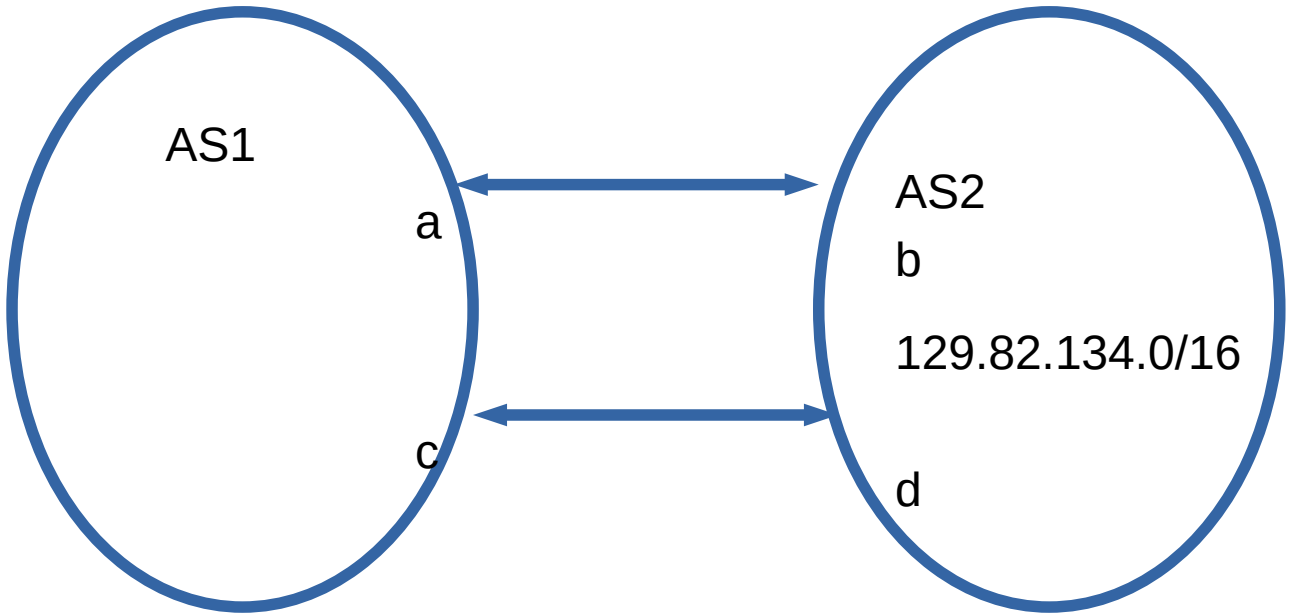
BGP Attribute – Local Preference



How does AS1 prefer a-b over c-d?
Higher preference wins!

http://www.ciscopress.com/articles/article.asp?p=2738462&seqNum=2

BGP Attribute – MED (Multi exit discriminator

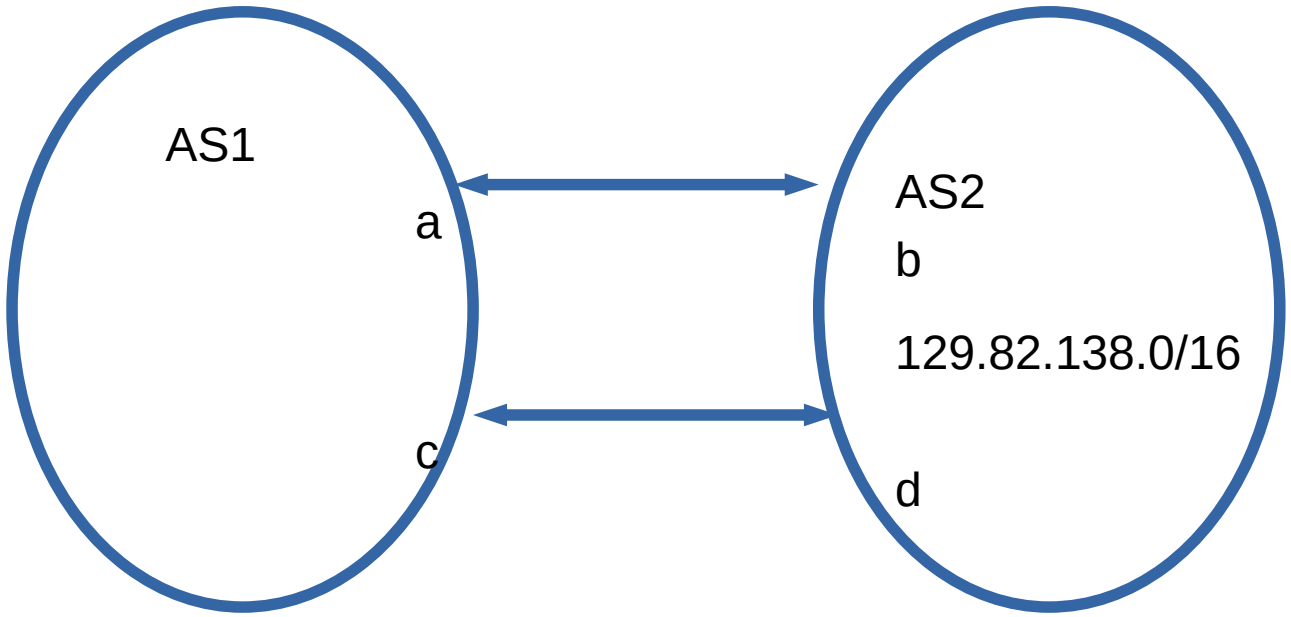


AS1 and AS2 has two paths between them

AS1 tells AS2 it's MED for influencing AS2's path selection

Lower cost wins

BGP Attribute – MED



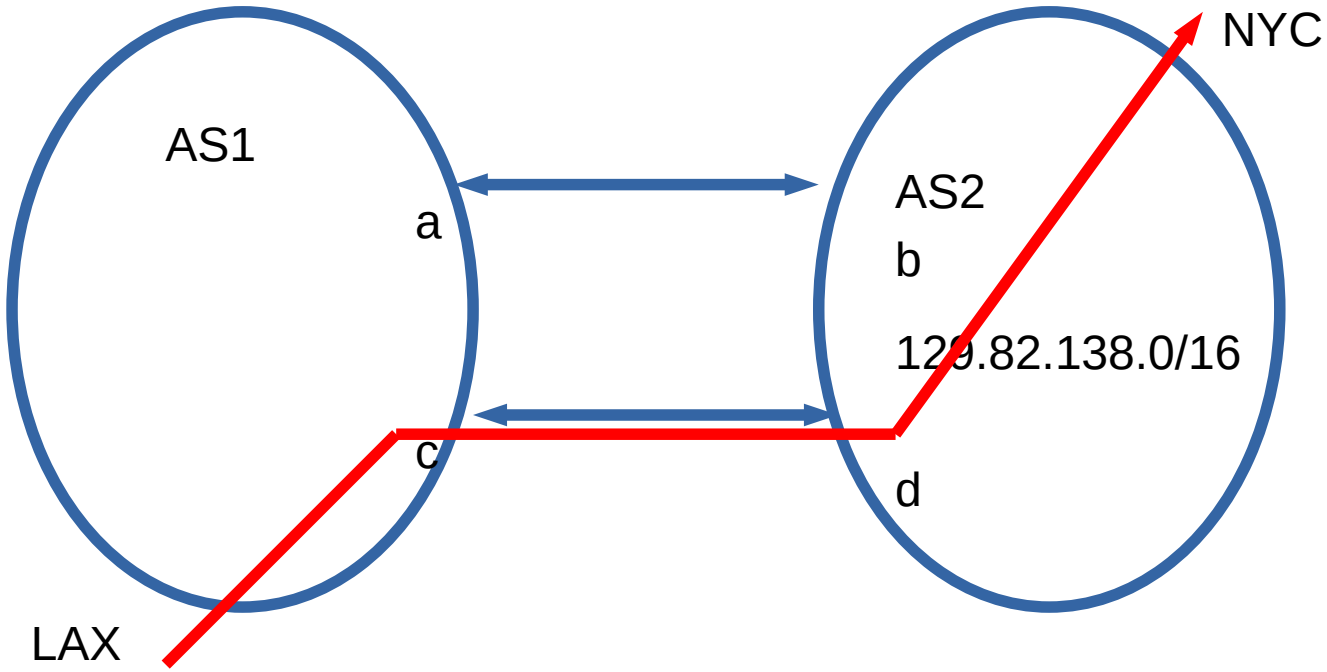
How would AS1 make AS2 send
129.82.138.0/17 over a-b
and
129.82.138.128/17 over c-d?

AS1 tells AS2

129.82.138.0/17 MED 5 via a
129.82.138.128/17 MED 10 via a

129.82.138.0/17 MED 10 via c
129.82.138.128/17 MED 5 via c

BGP Attribute – MED



Typically used in provider/subscriber
Not between peers – why?

One AS may force the other to carry traffic for it

Local Pref vs MED

LOC_PREF → Internal – you tell your routers which route to use

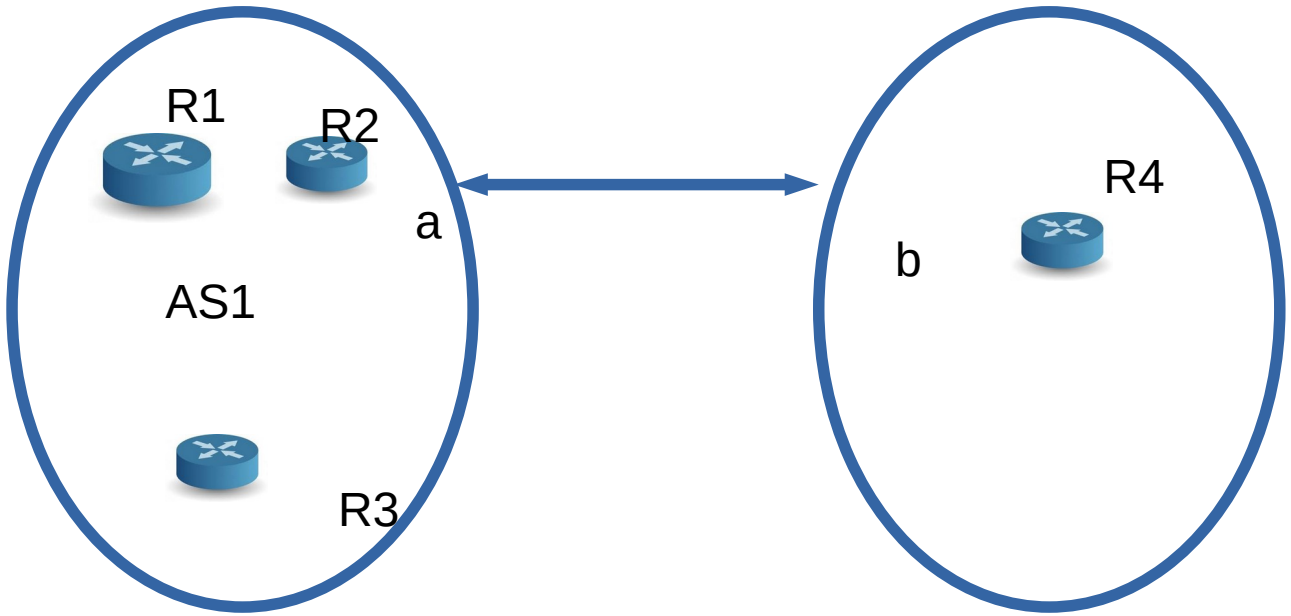
MED → External – you tell you neighbors which route you prefer
Neighbor is an autonomous system, so it can ignore you

BGP Attribute - Community

Put anything you want – between Ases, not known publicly

COMMUNITY: 17:210 17:13 4195:10 416:13 45:1103

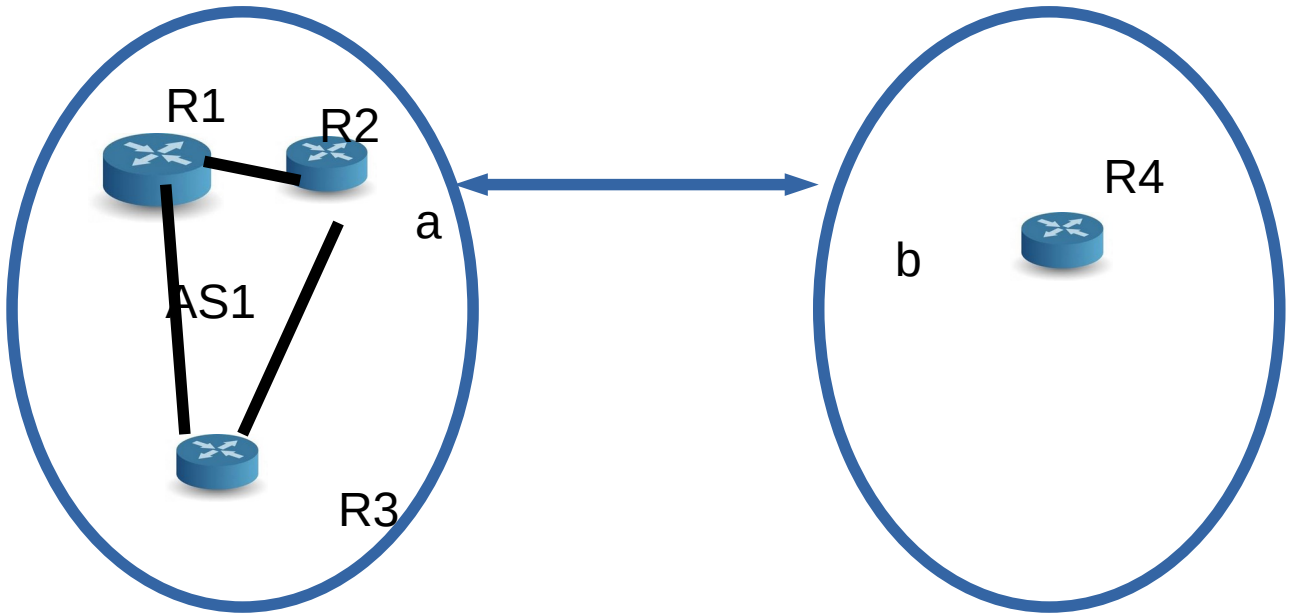
Internal vs External BGP



BGP between R2 and R4

What is between R1, R2, and R3?

Internal vs External BGP



BGP between R2 and R4

What is between R1, R2, and R3?

IBGP (Internal)
Different rules:
- If you learn from outside, advertise
- If you learn from inside, don't

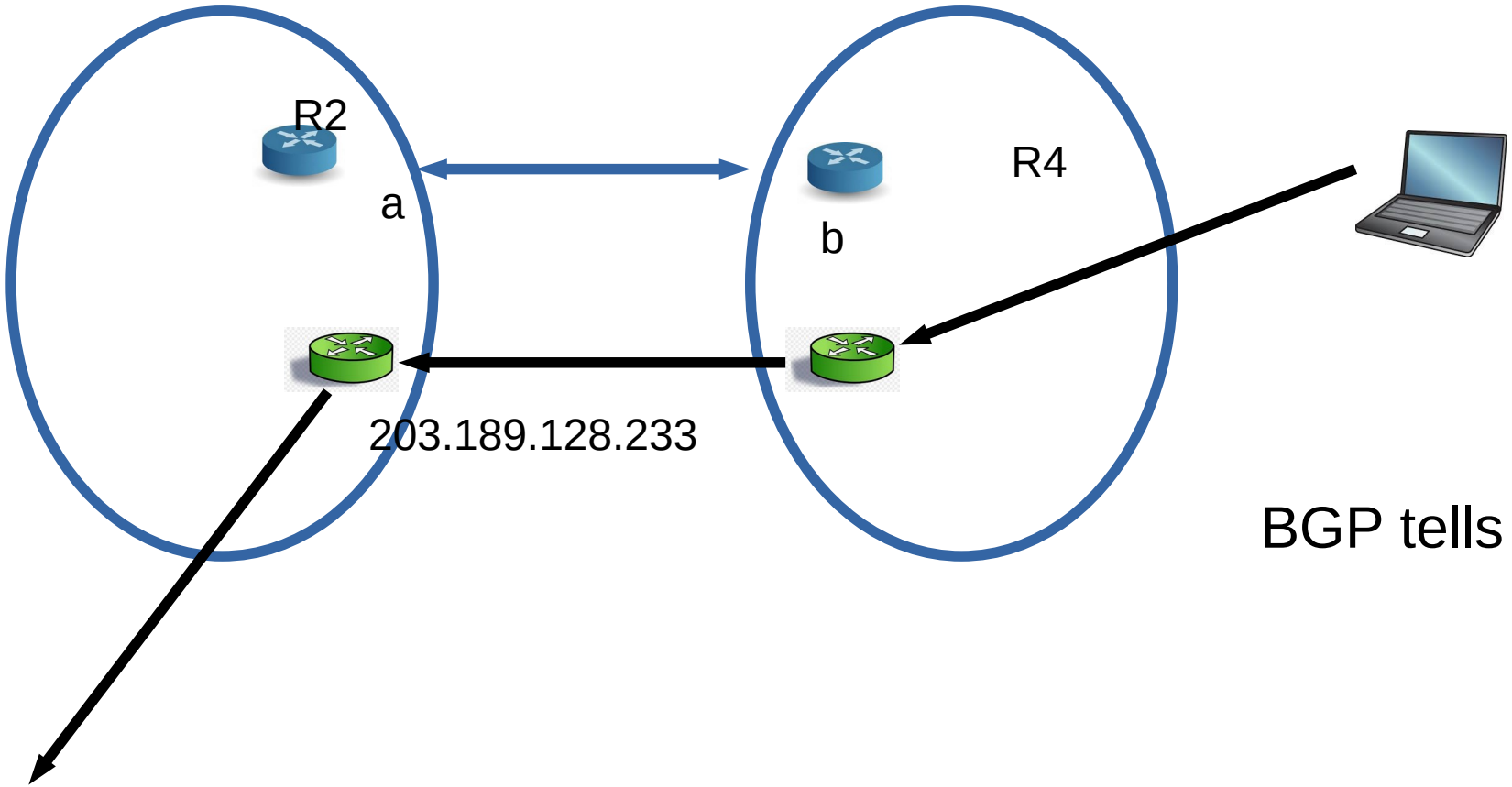
R2 can tell R3 and R1 about R4
R2 can not tell R1 about prefixes from R2 -loop!

IBGP must be a mesh!

BGP vs IP routers

Next hop | Announcing AS| Target Prefix| Path

203.189.128.233 | 23673 | 149.149.0.0/16 | 23673 1299

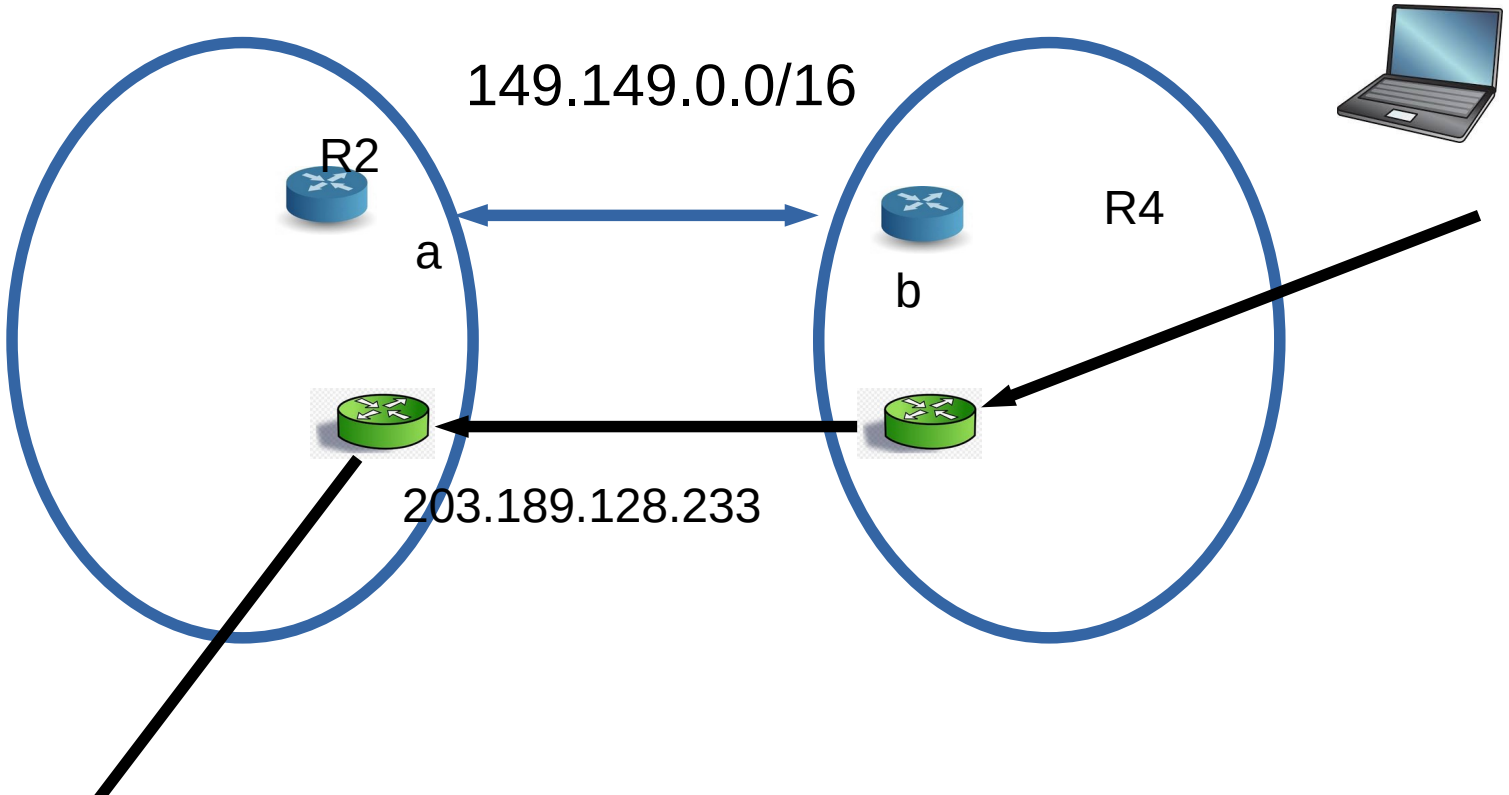


BGP tells you which IP router to use

BGP Decision process

Next hop | Announcing AS| Target Prefix| Path | LOCAL_PREF | MED| Next Hop Cost

203.189.128.233 | 23673 | 149.149.0.0/16 | 23673 1299 | 10 | 5| 100
203.189.128.233 | 23673 | 149.149.0.0/16 | 23673 1299 | 100 | 50| 10



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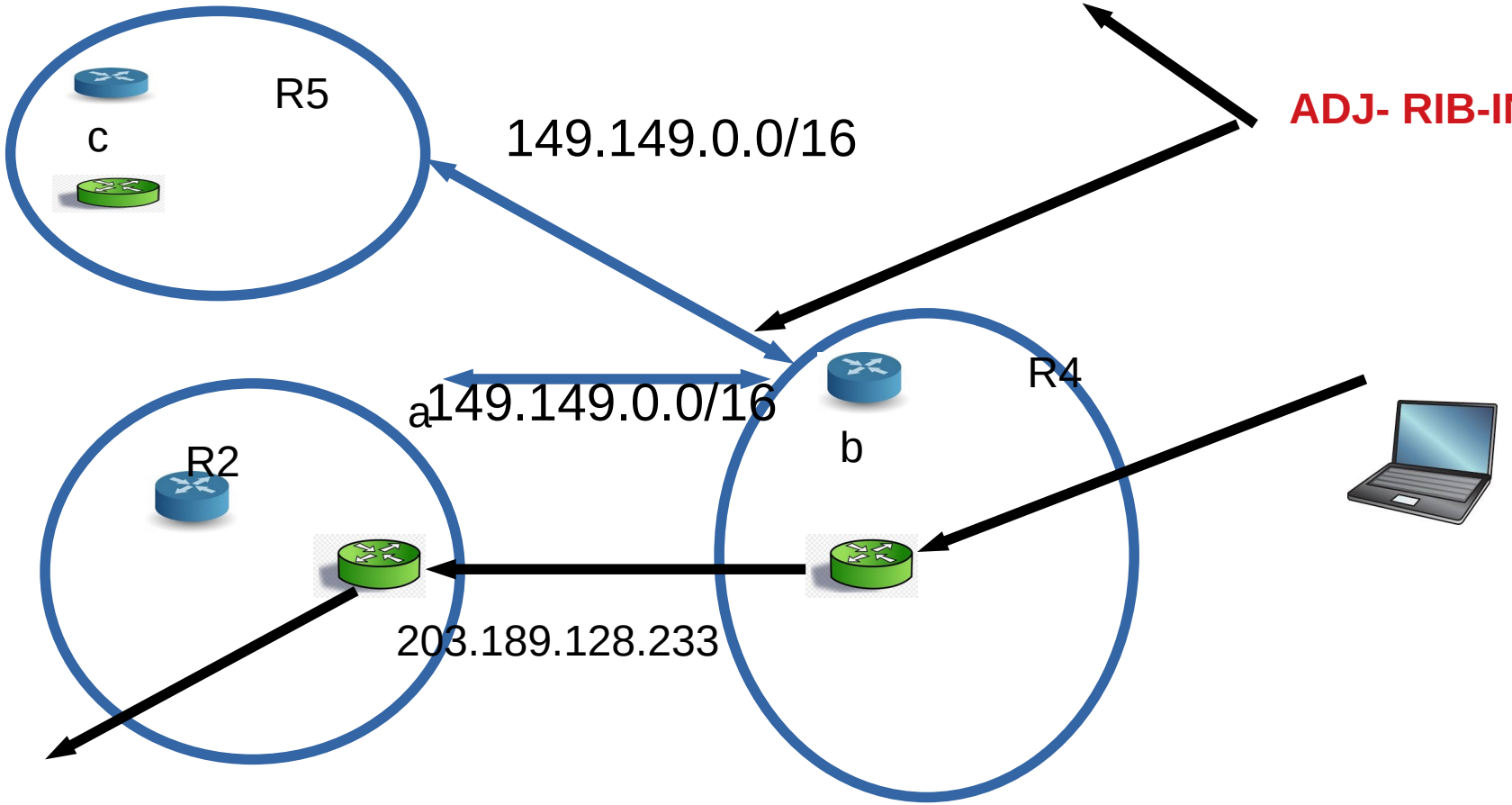


BGP Decision process

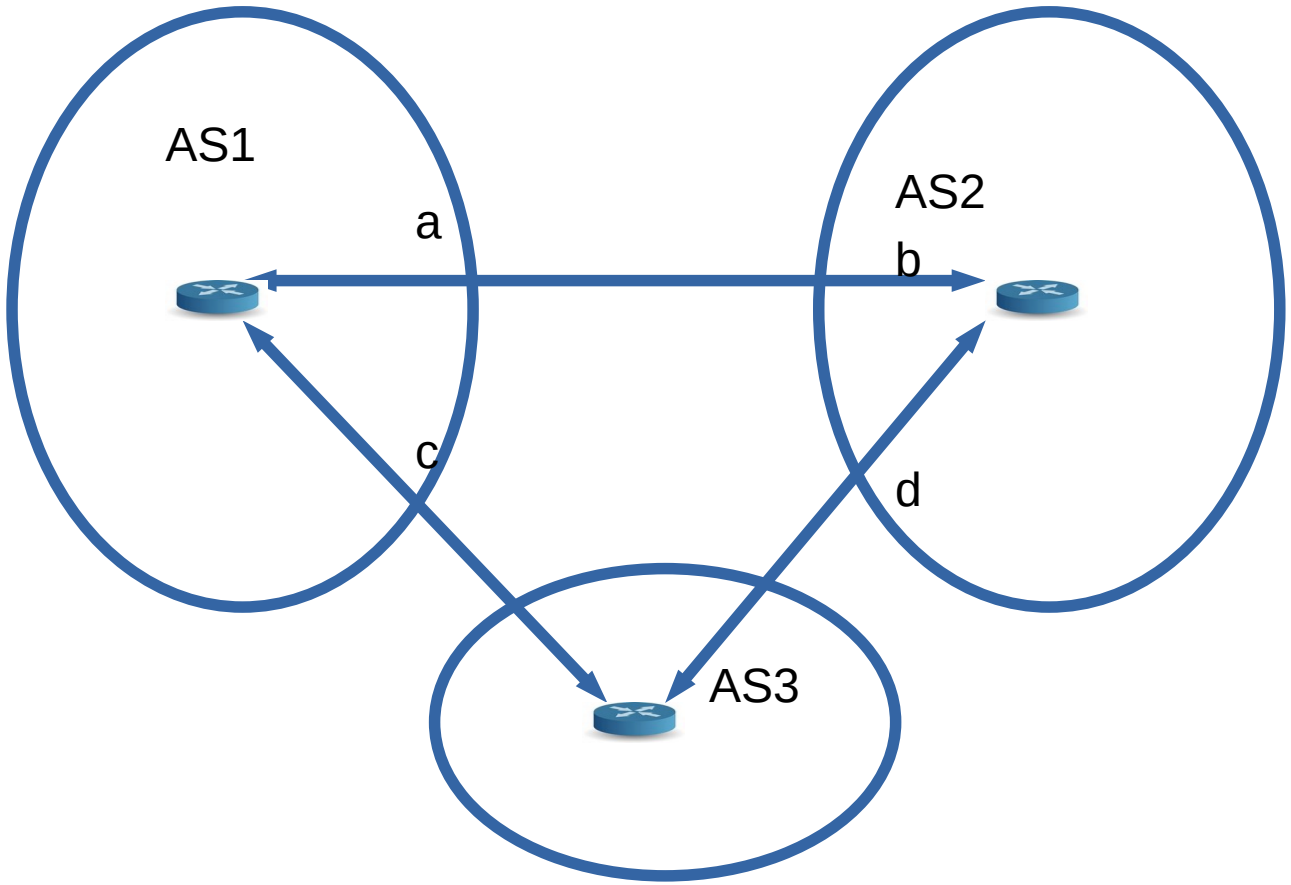
At ADJ-RIB-IN calculate degree of preference until one route for each destination remains!!

- select route with highest LOCAL-PREF
- Select route with shortest AS-PATH
- Select route with lowest MED
- Select route with smallest NEXT-HOP cost
- Select route learned from E-BGP peer with lowest ID
- Select route learned from I-BGP peer with lowest ID

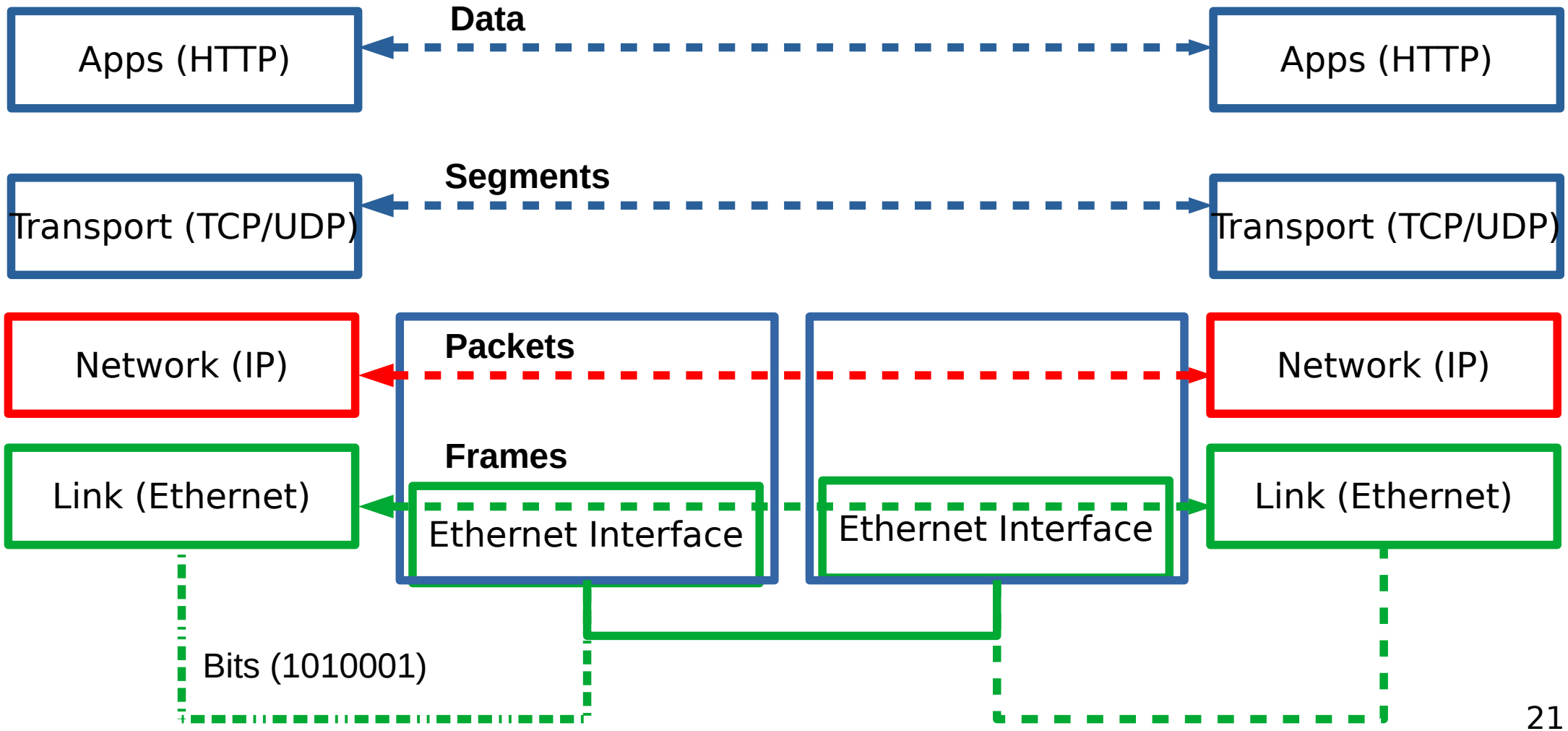
- Install selected route in LOC-RIB

- Update ADJ-RIB-OUT, notify peers
  - You can only send what is in LOC-RIB (or a subset of it)

BGP



1 will prefer 2 over 3
1 will not accept traffic from 3
2 will prefer path to 3 via 1
3 will utilize both paths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