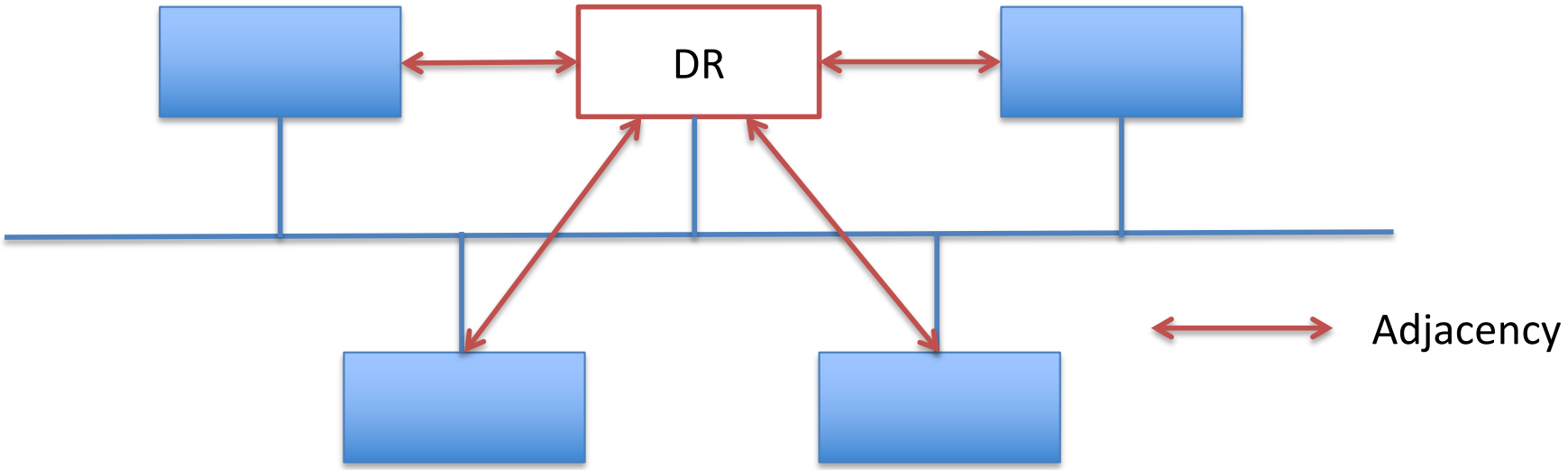
Supramental Contents on Routing

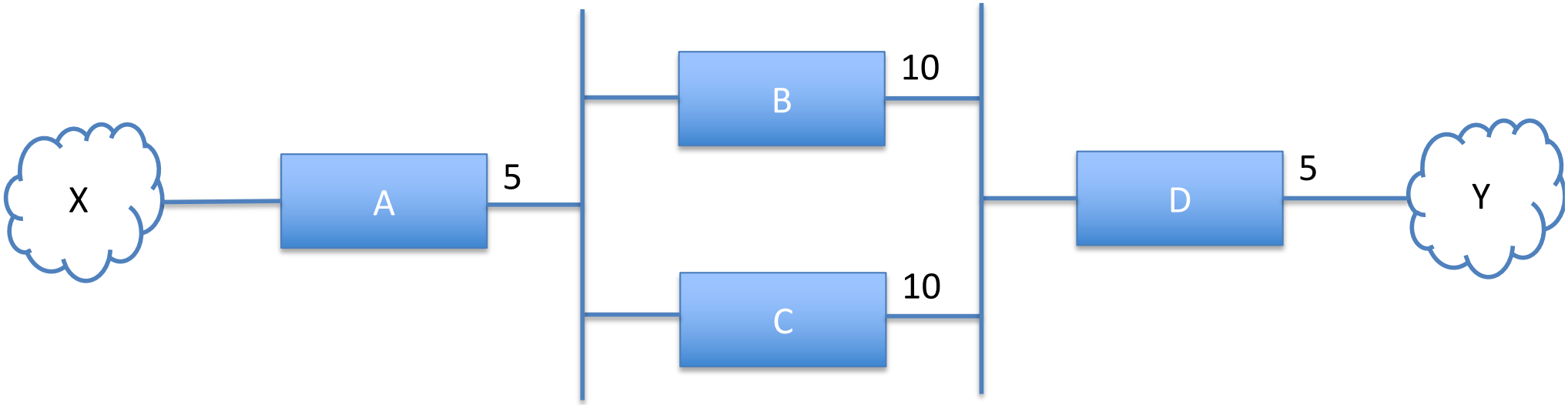
OSPF: Neighbor and Adjacency

- Neighbor: Relationship between OSPF routers in the same network
- Adjacency: Relationship between OSPF routers that exchange Link State
- Designated Router: Establish Adjacency to exchange Link State with other routers in the same network
  - Avoiding “FULL-Mesh” Link-state exchange
  - DR should have enough computation capacity



OSPF Equal Cost Multi Path

- Load balancing on the multiple paths that have same cost to reach destination

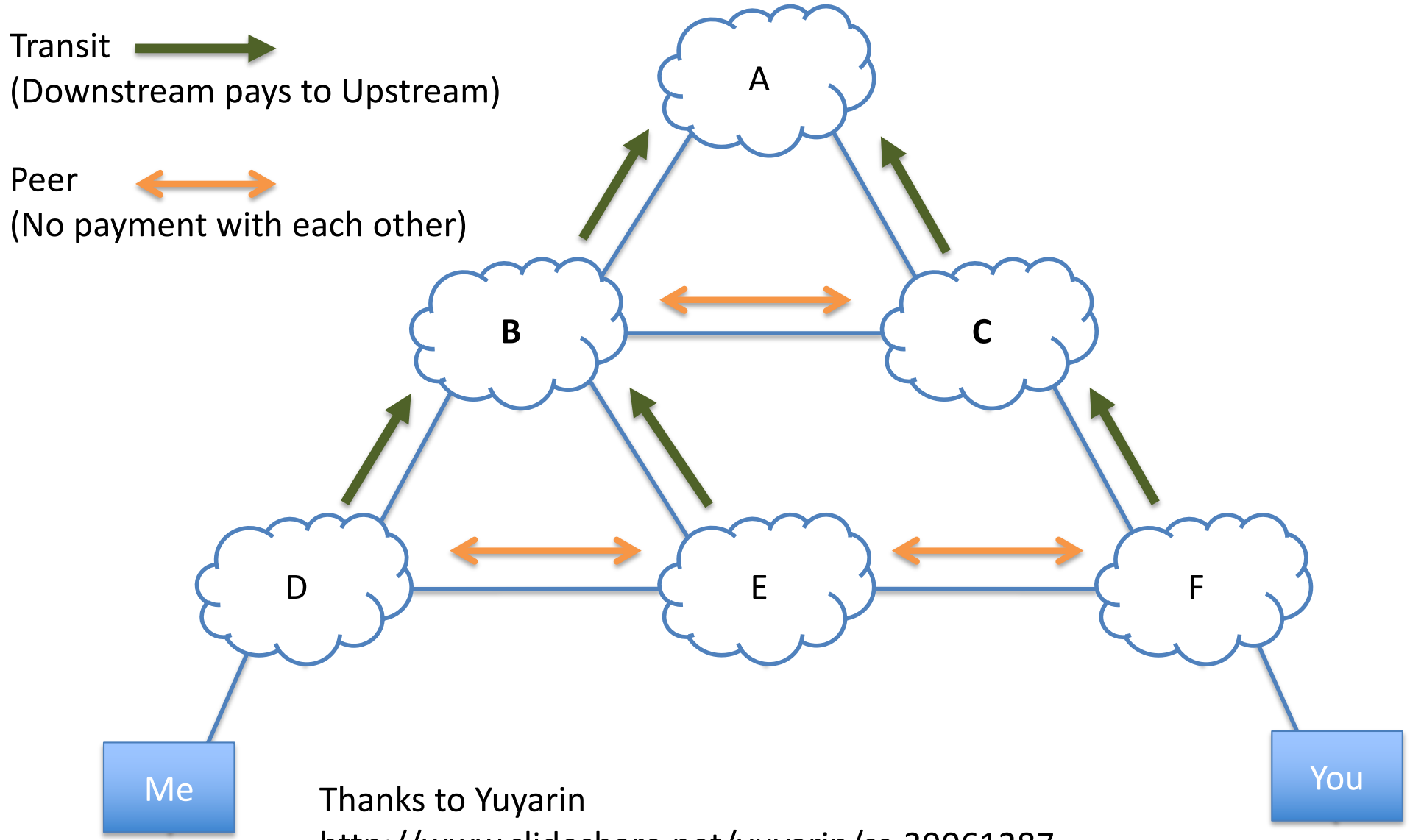


A's Routing Entries for Destination Y

Destination	Next Hop	Cost
Y	B	20
Y	C	20

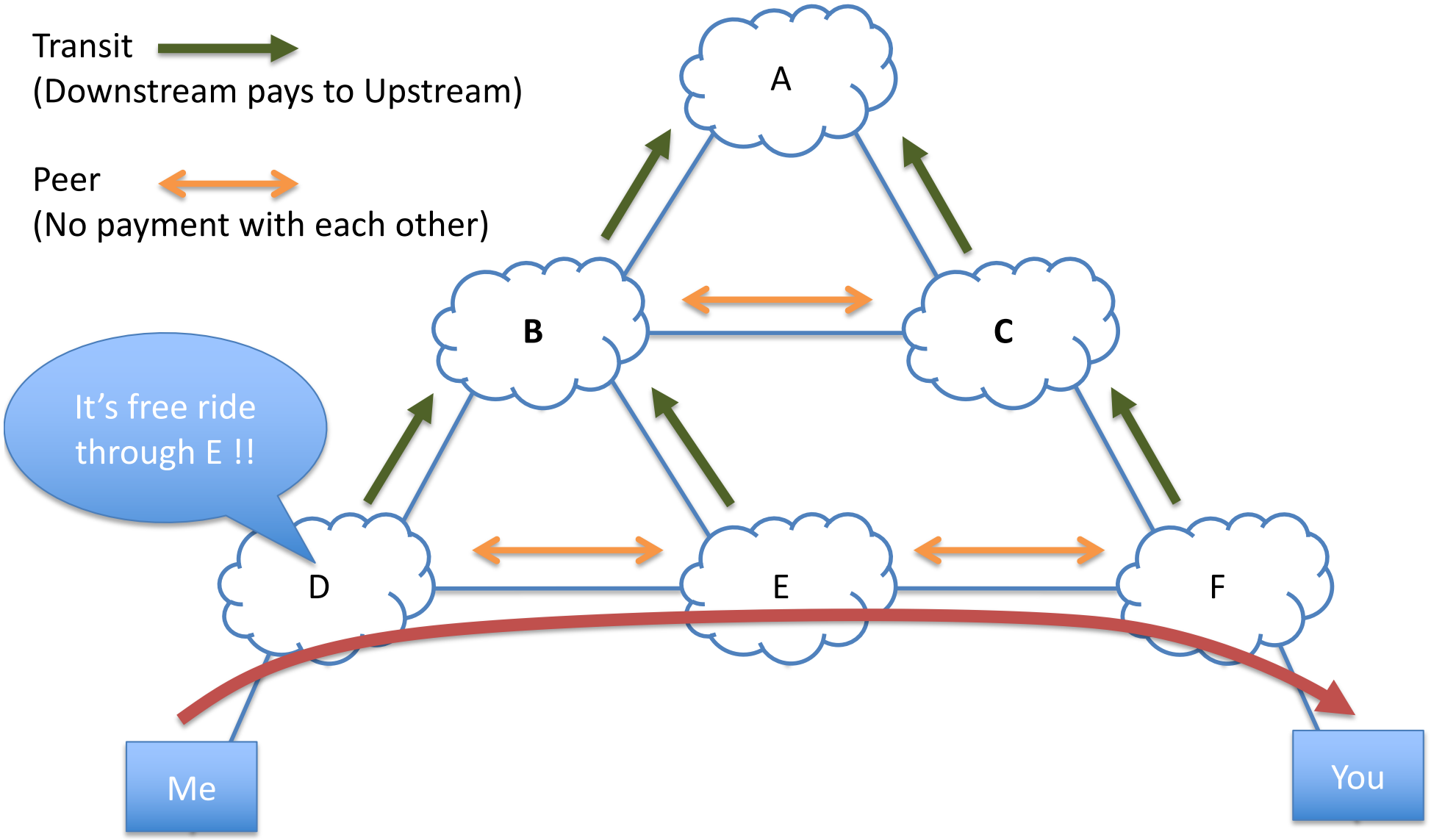
Q1. "Per-packet" or "Per-address" load balancing?
Q2. Will the amount of traffic be 50% + 50%?

Which way to go from me to you?

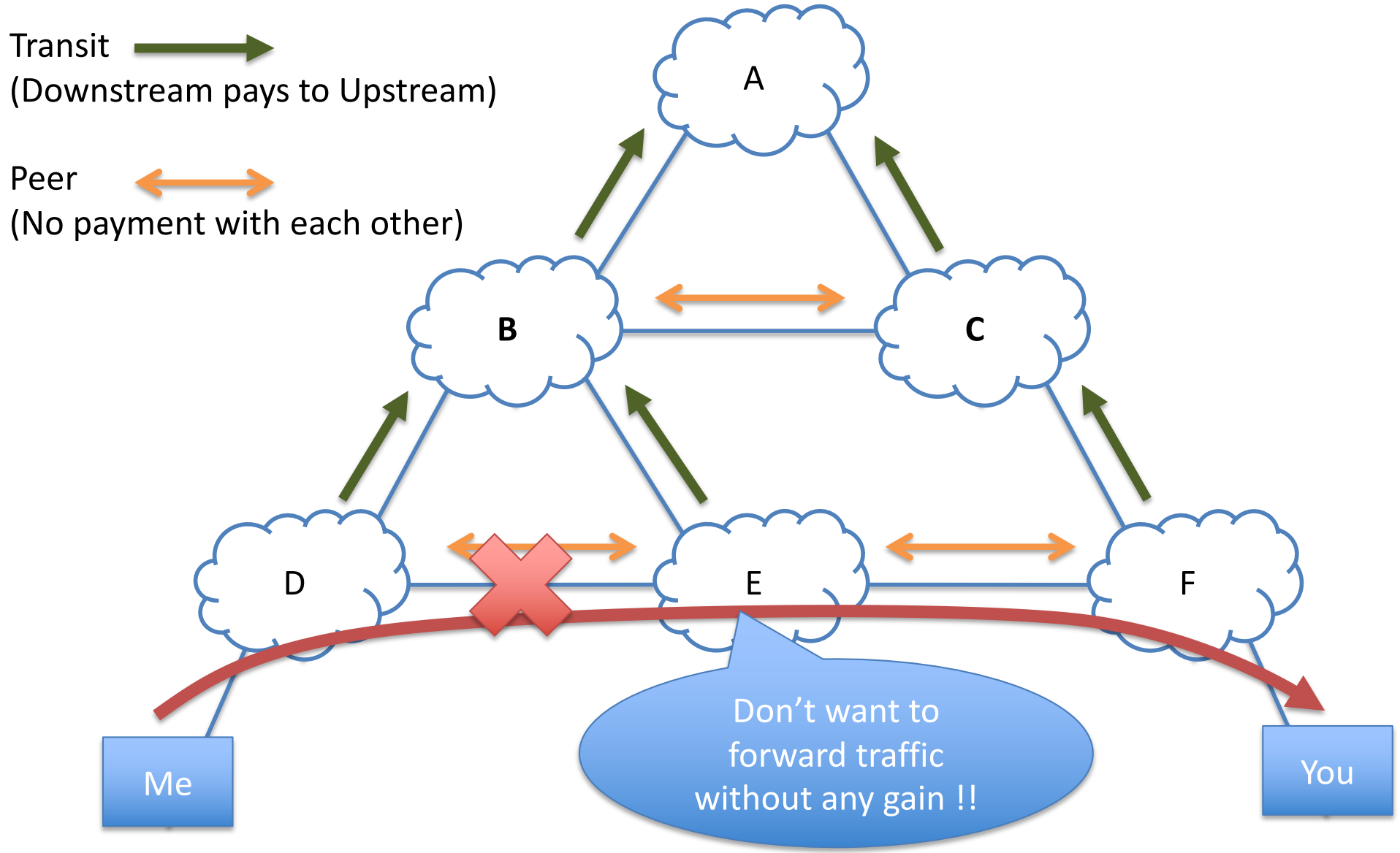


Thanks to Yuyarin
http://www.slideshare.net/yuyarin/ss-39061287

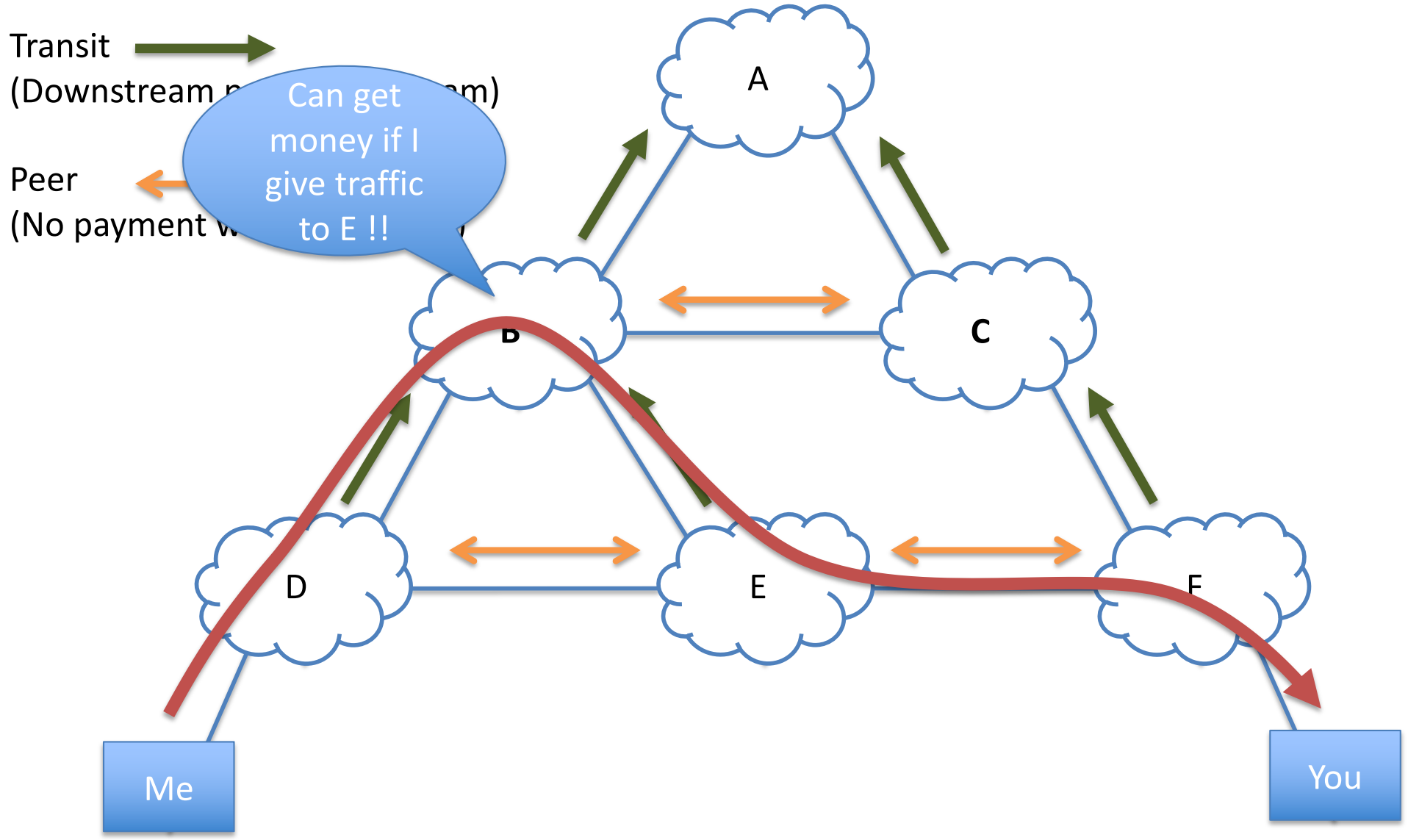
Answer 1 (1/2)


Transit
(Downstream pays to Upstream)
Peer
(No payment with each other)
A
B
C
D
E
F
It's free ride through E !!
Me
You

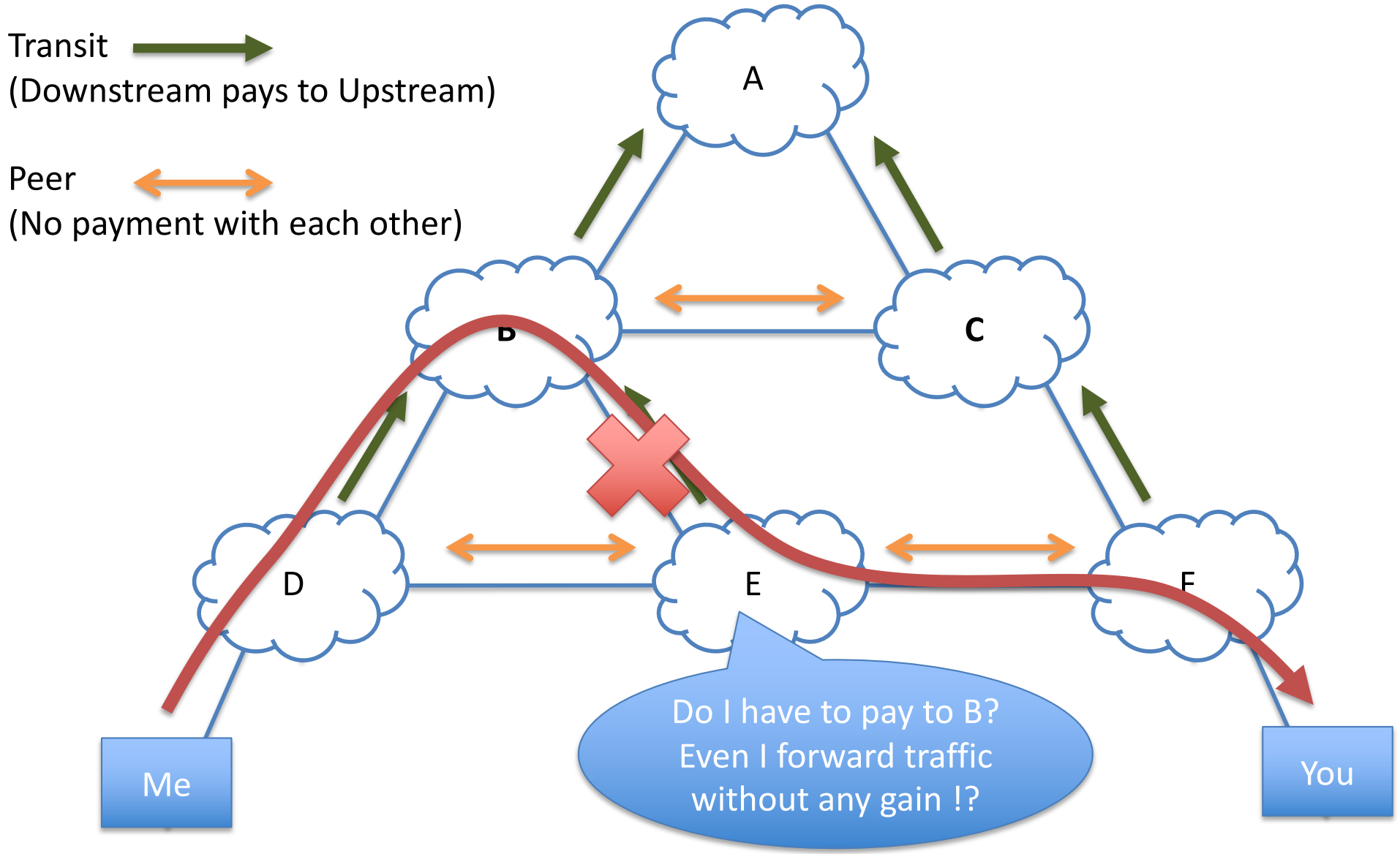
Answer 1 (2/2)


Transit
(Downstream pays to Upstream)
Peer
(No payment with each other)
A
B
C
D
E
F
Me
You
Don’t want to
forward traffic
without any gain !!

Answer 2 (1/2)

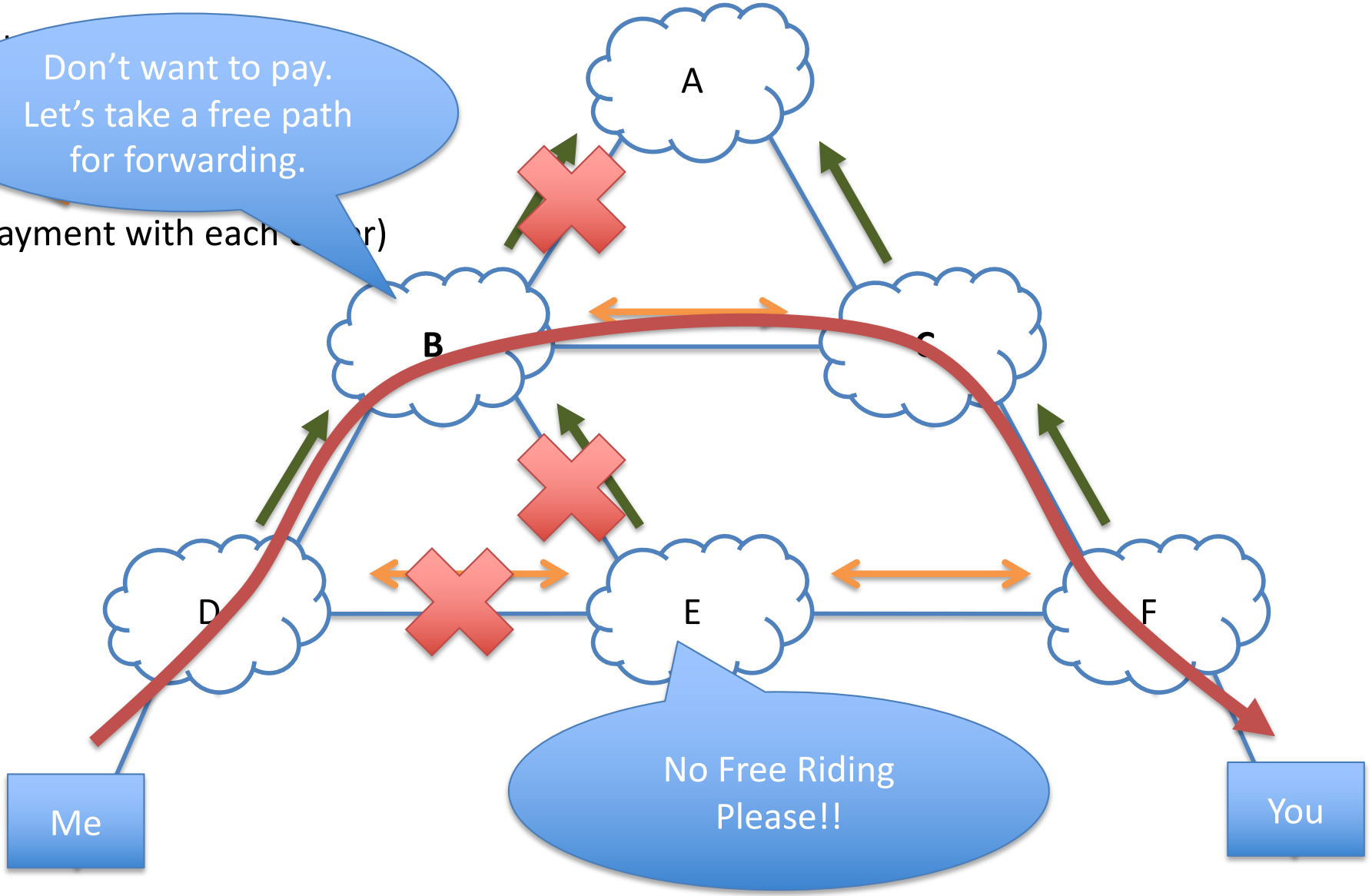

Transit
Peer
Can get money if I give traffic to E !!
A
B
C
D
E
F
Me
You

Answer 2 (2/2)


Transit
(Downstream pays to Upstream)
Peer
(No payment with each other)
A
B
C
D
E
F
Me
You
Do I have to pay to B?
Even I forward traffic
without any gain !?

Practical Answer

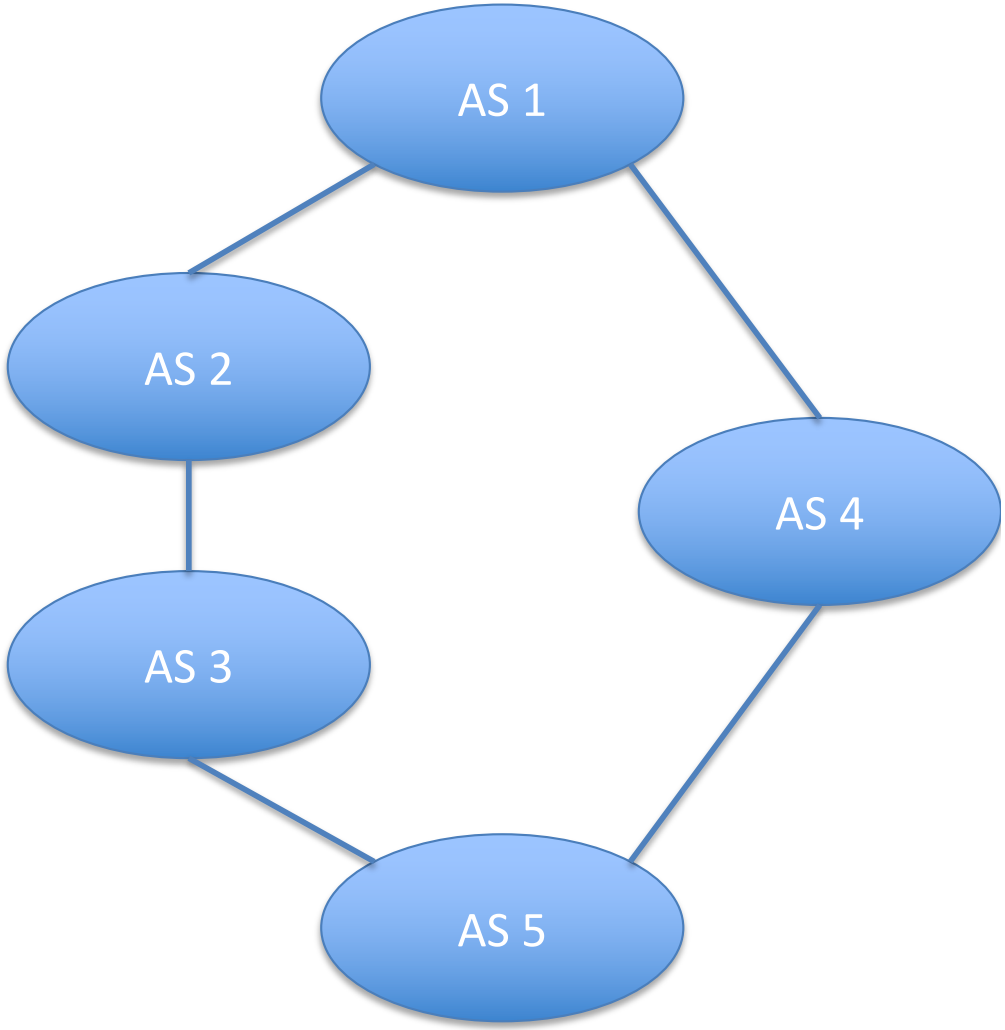
Trans
(
Peer
(No payment with each r)



BGP Traffic Engineering

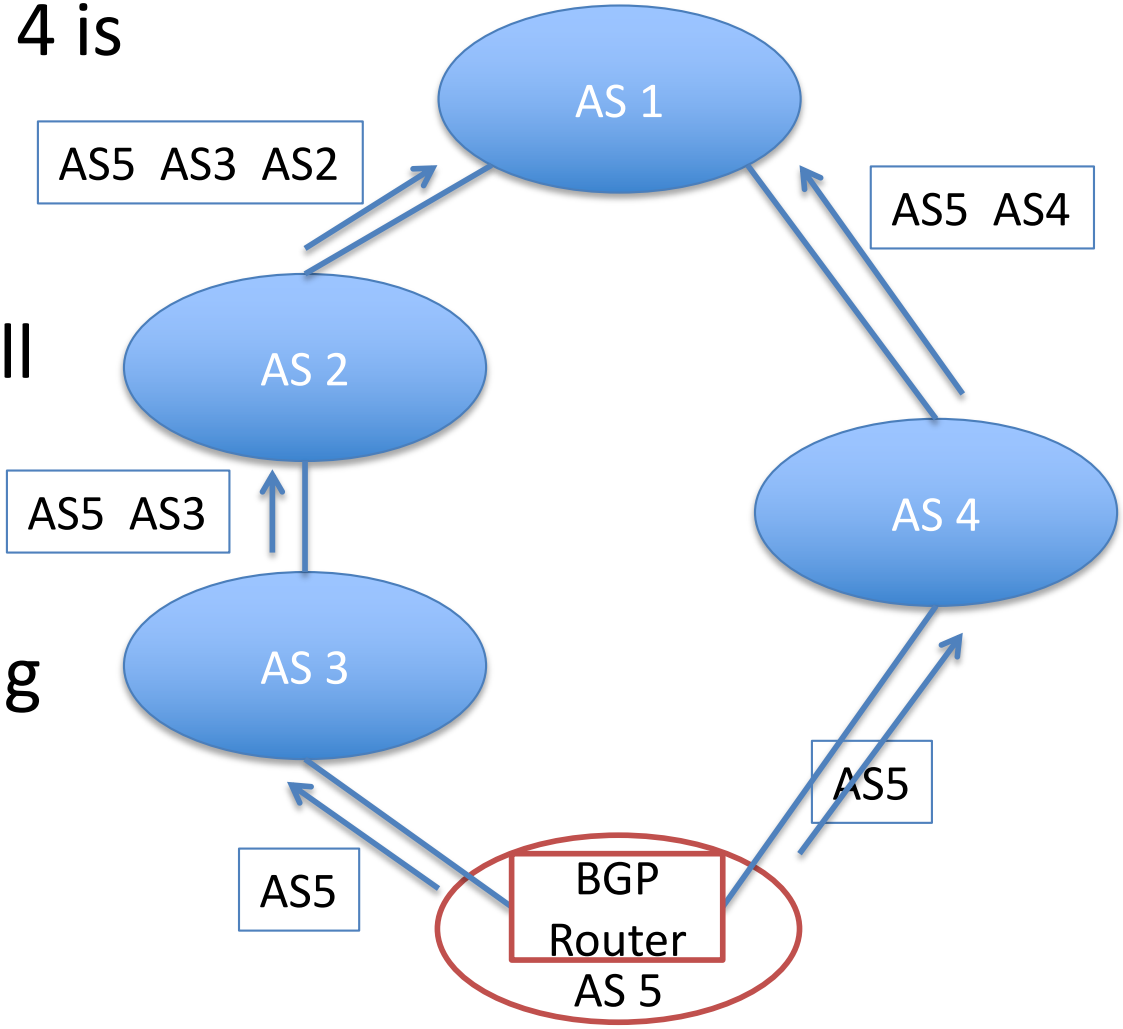
- How to control the path to be used in BGP?

- Incoming Traffic
  - AS_PATH Attribute
  - MED Attribute
  - Community
- Outgoing Traffic
  - LOCAL_PREF Attribute



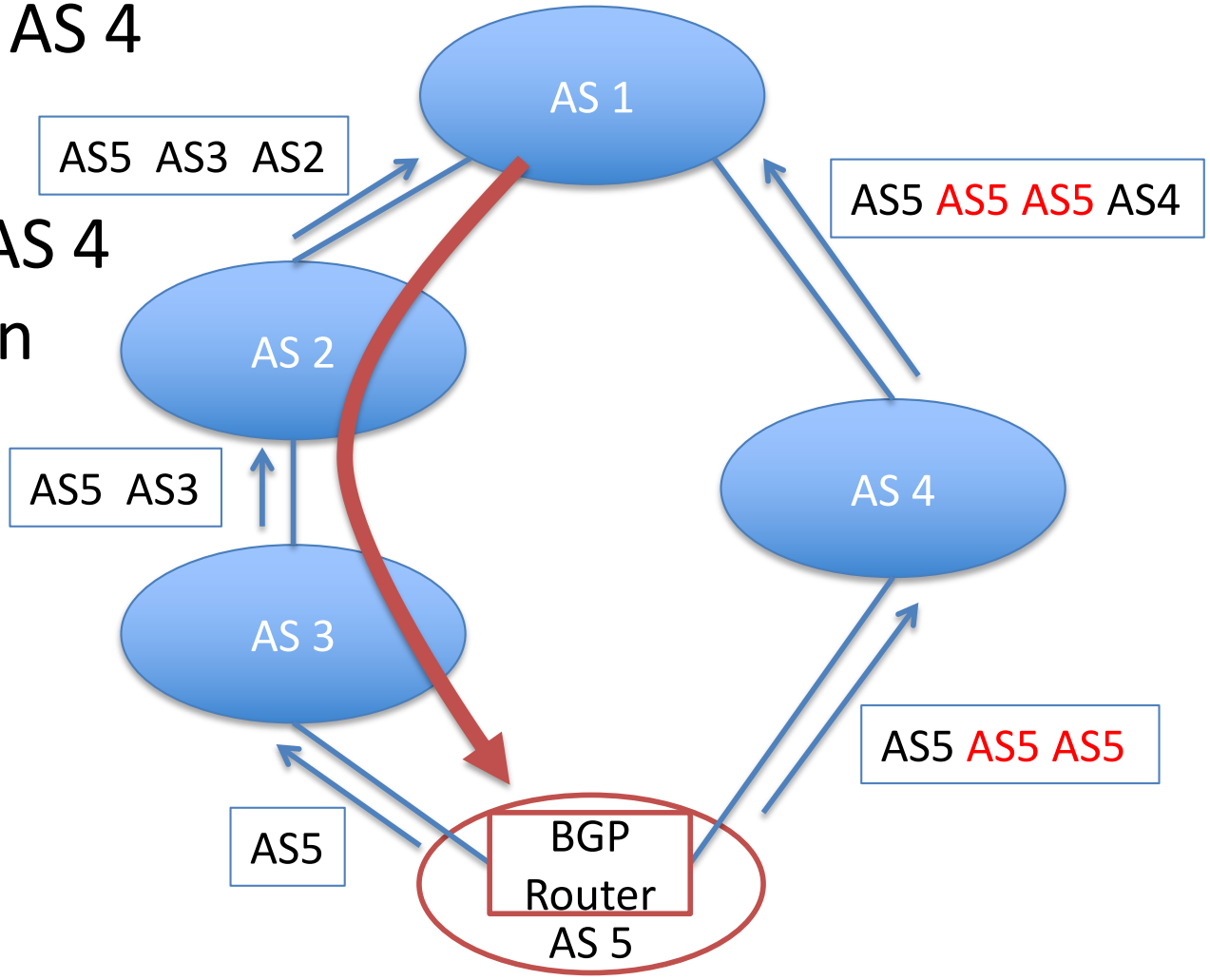
AS_PATH Attribute

- Between AS 1 and AS 1, AS Path through AS 4 is shorter
- Traffic from AS 5 will come through AS 4
- AS 5 wants incoming traffic through AS 3



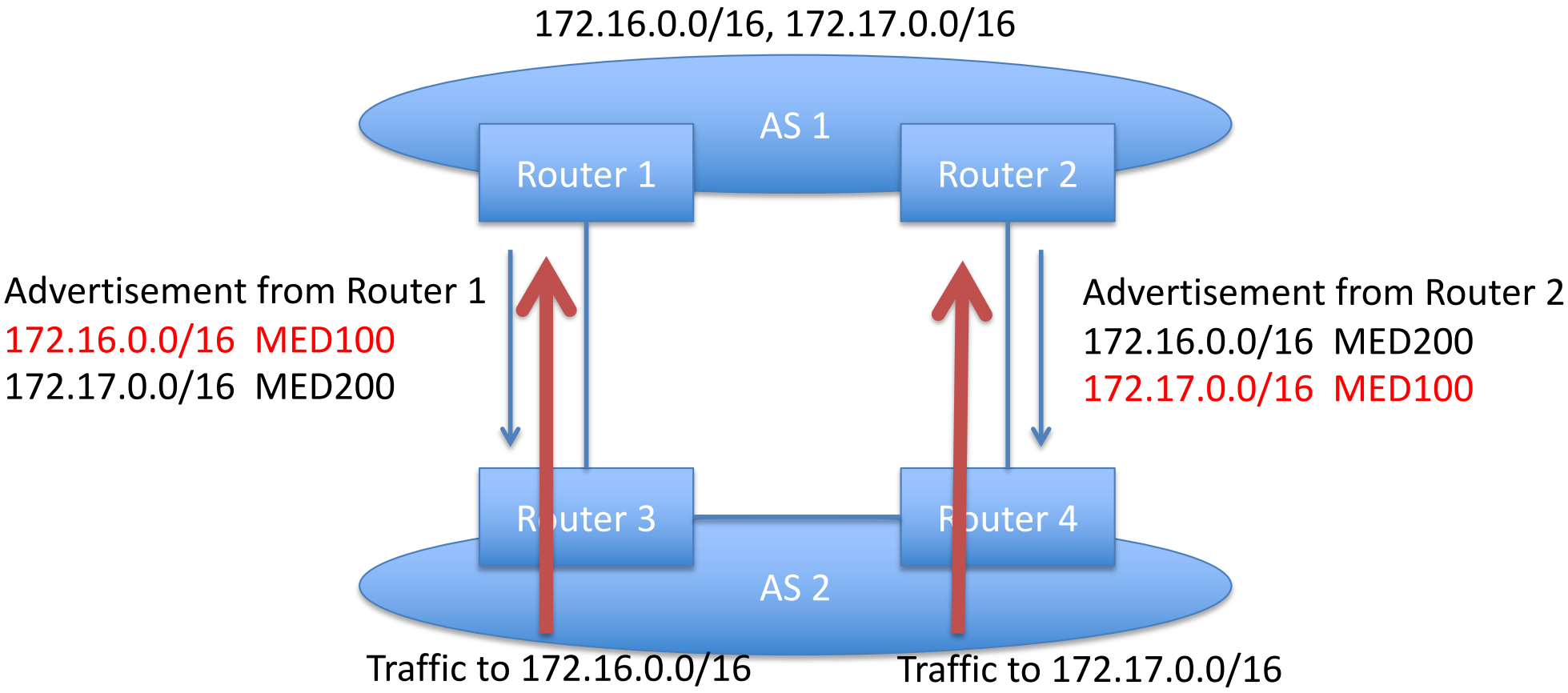
AS_PATH Prepend

- BGP Router advertise a longer AS Path to AS 4
- AS Path through AS 4 will be longer than the other path



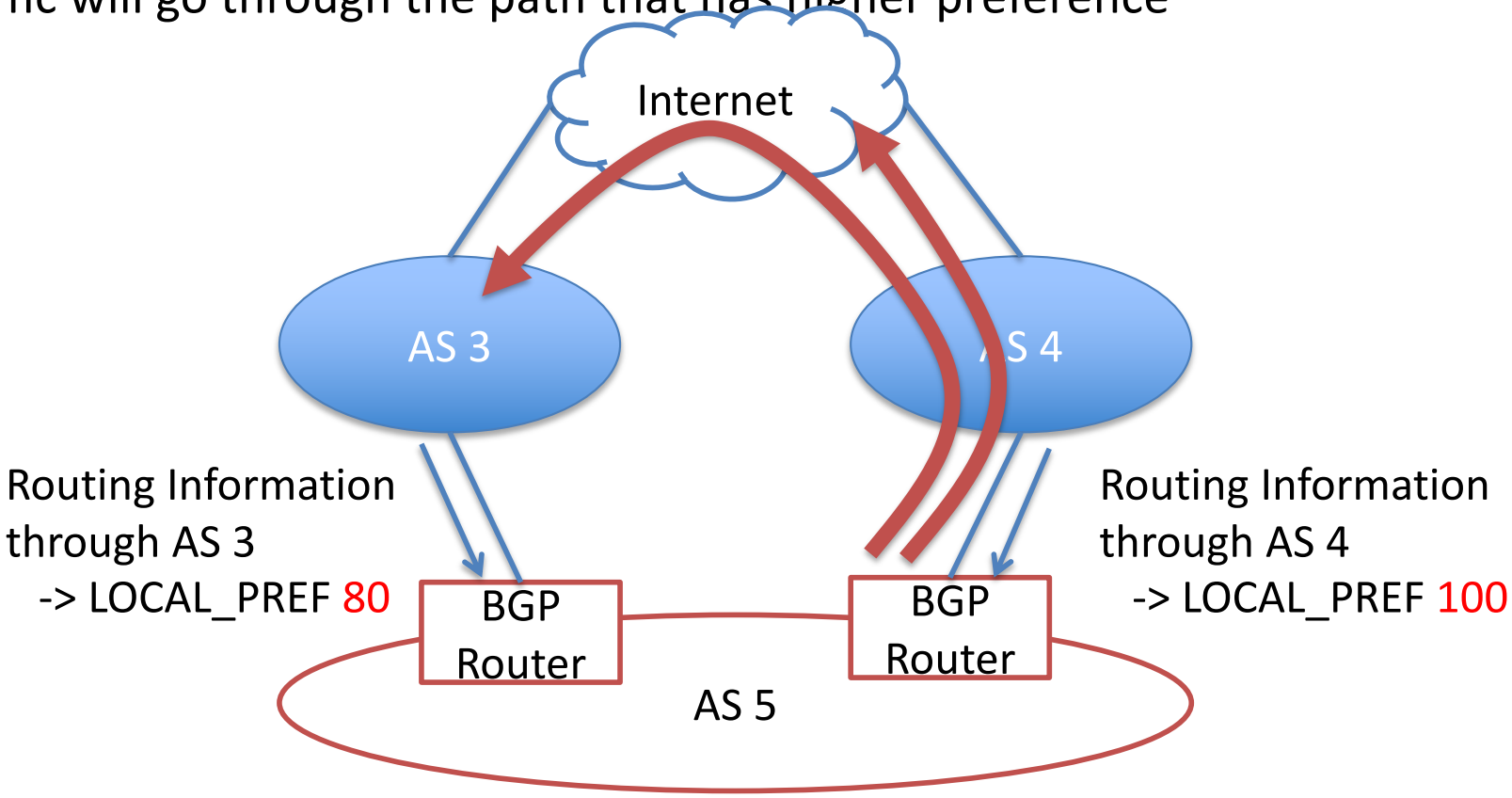
MED Attribute

- Controlling Paths used between Two ASes
  - AS_PATH determines only Shortest Path
  - What about multiple paths available between ASes?



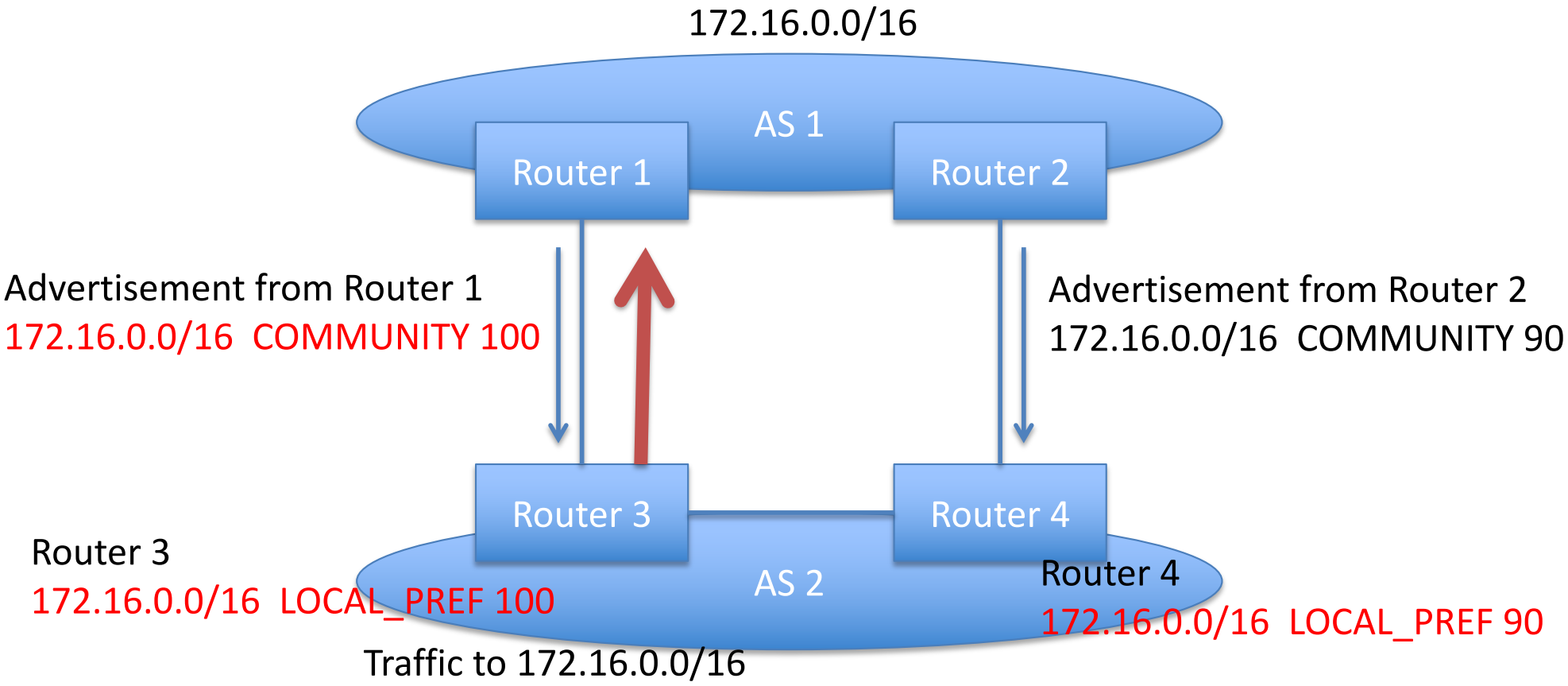
LOCAL_PREF

- How to control outgoing traffic if AS have multiple transits to the Internet?
  - Set LOCAL_PREF attribute to the incoming routing information
  - Traffic will go through the path that has higher preference



COMMUNITY

- Controlling Paths used between Two Ases
  - Injecting LOCAL_PREF to the routers in the neighboring AS



COMMUNITY

- Controlling incoming traffic between 2 ASes

- BGP router (A) advertises COMMUNITY along with the routing information

  Ex: AS3000, 100

- BGP router (B), receiving the routing information converts COMMUNITY to LOCAL_PREF

Route Filtering

- Each router can determine
  - Which route to accept?
  - Which route to advertise?

BGP Hijacking and Security

- AS X clamis that it's reachable to AS 5
  - Path Vector algorithm will take AS X as a nexthop AS
  - Traffics detour!!
- BGP Security
  - Authenticating peering routers
  - Filtering the BGP information to receive
  - Verifying if the advertised path is legitimate or not
  - etc.