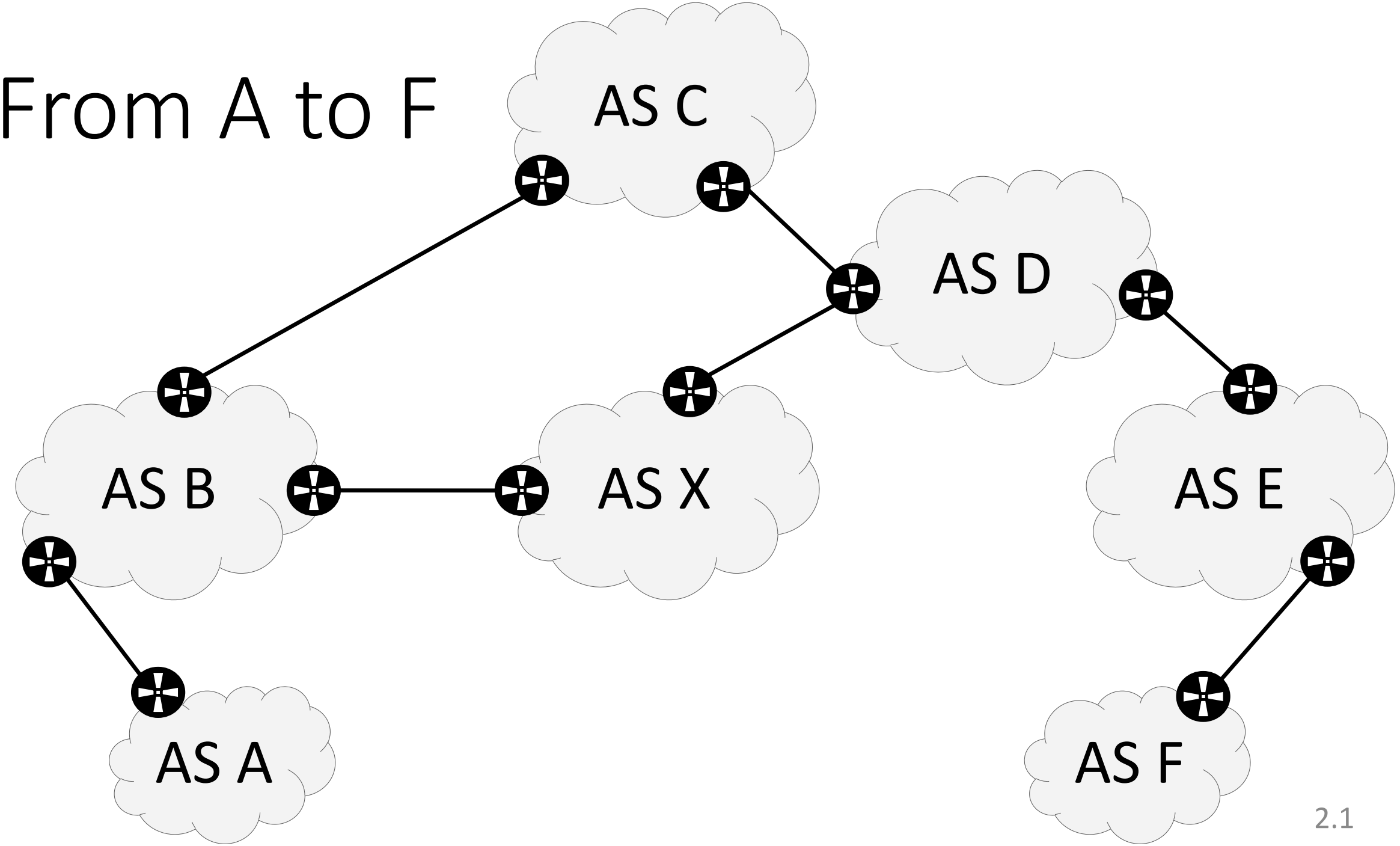
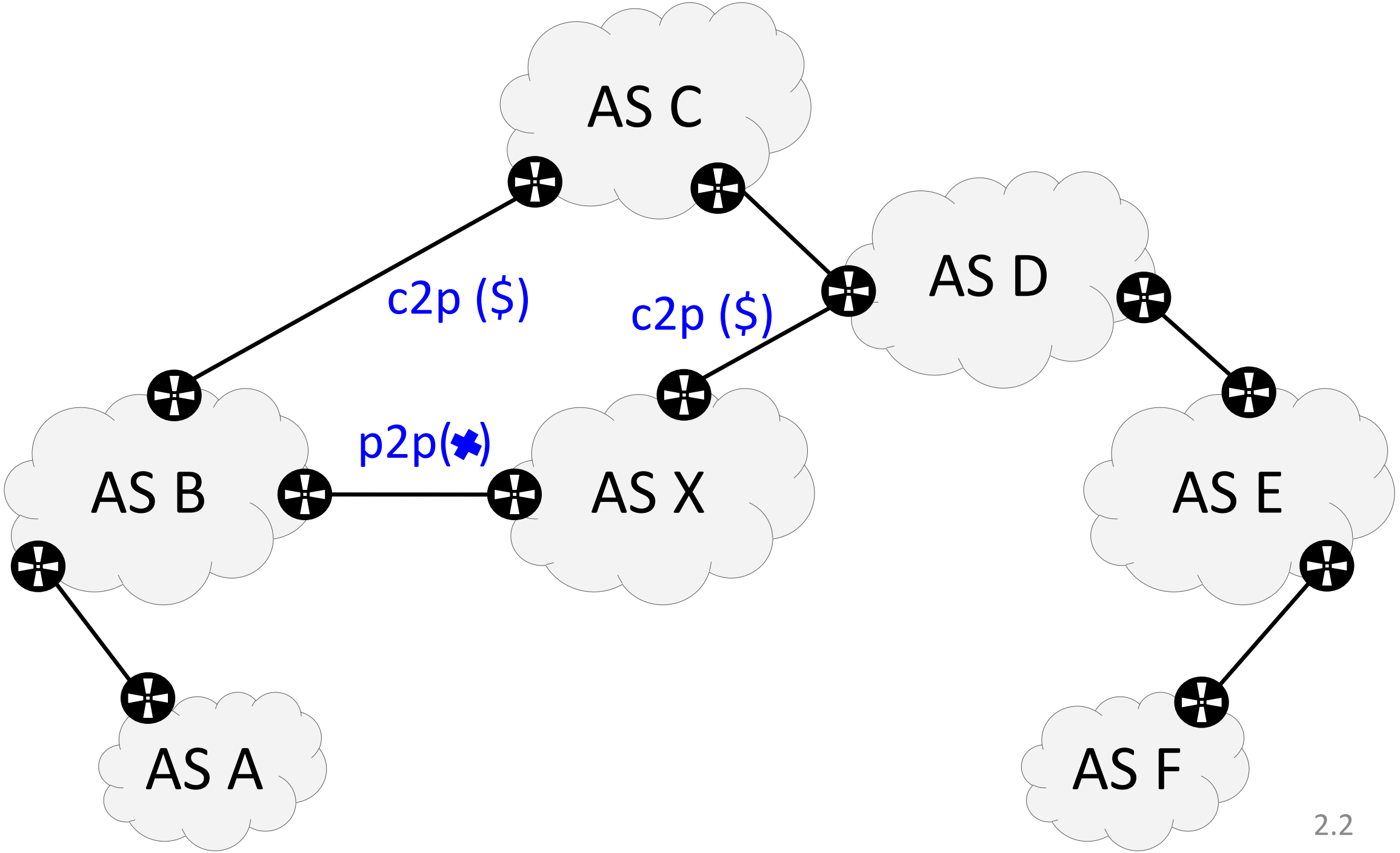
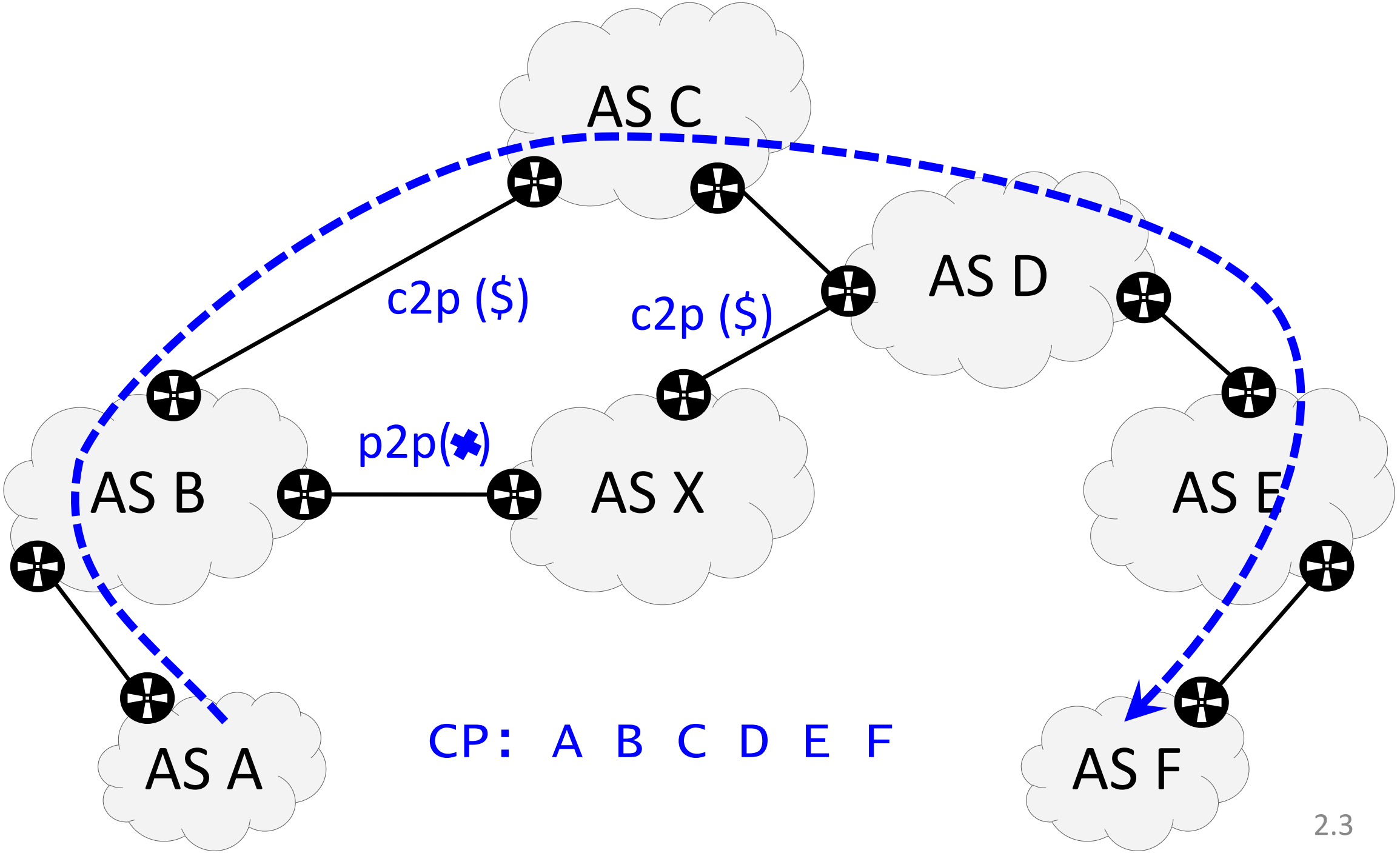
Filtering the Noise to Reveal Inter-Domain Lies

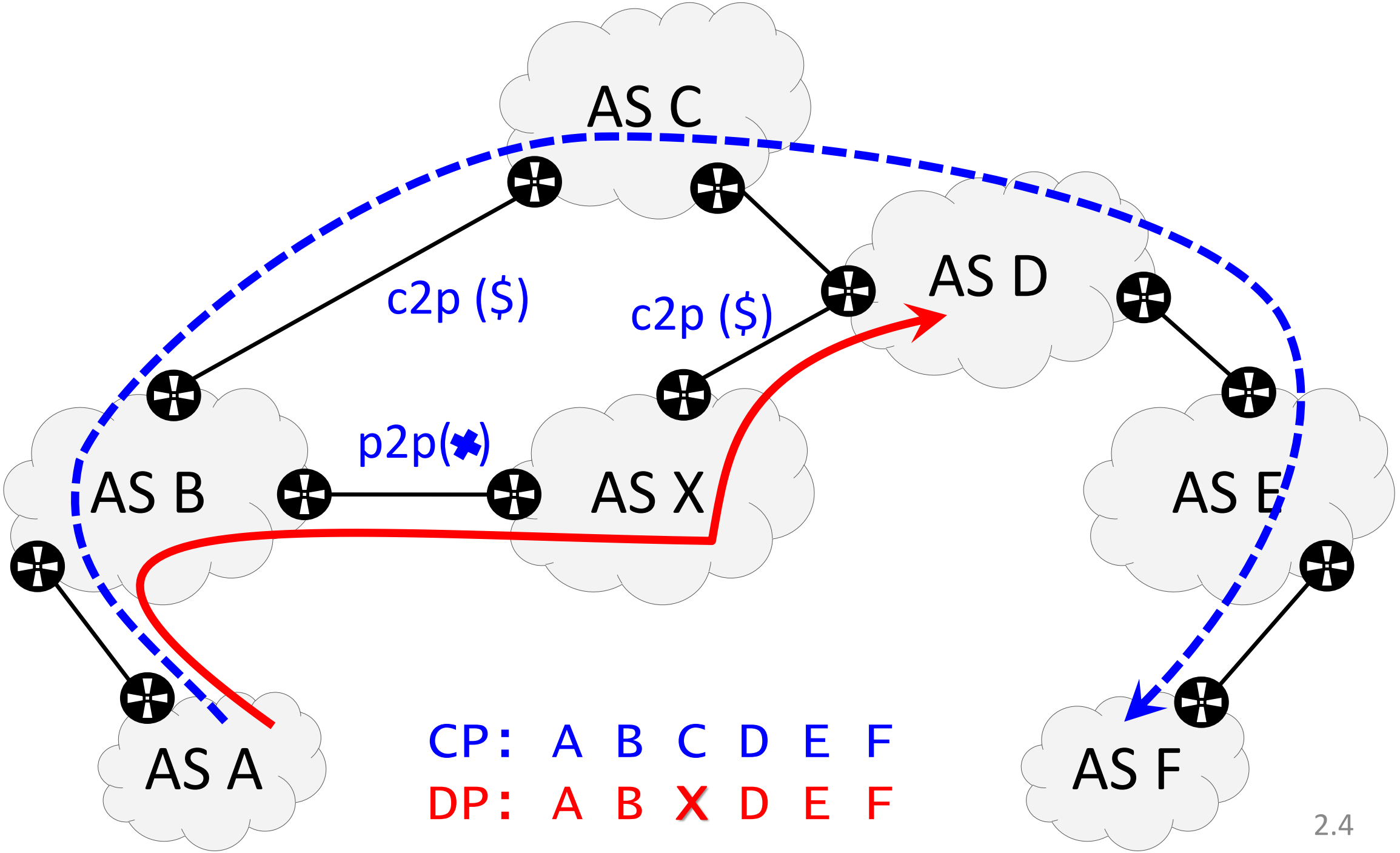
Julian M. Del Fiore, Pascal Merindol, Valerio Persico
Cristel Pelsser, Antonio Pescape

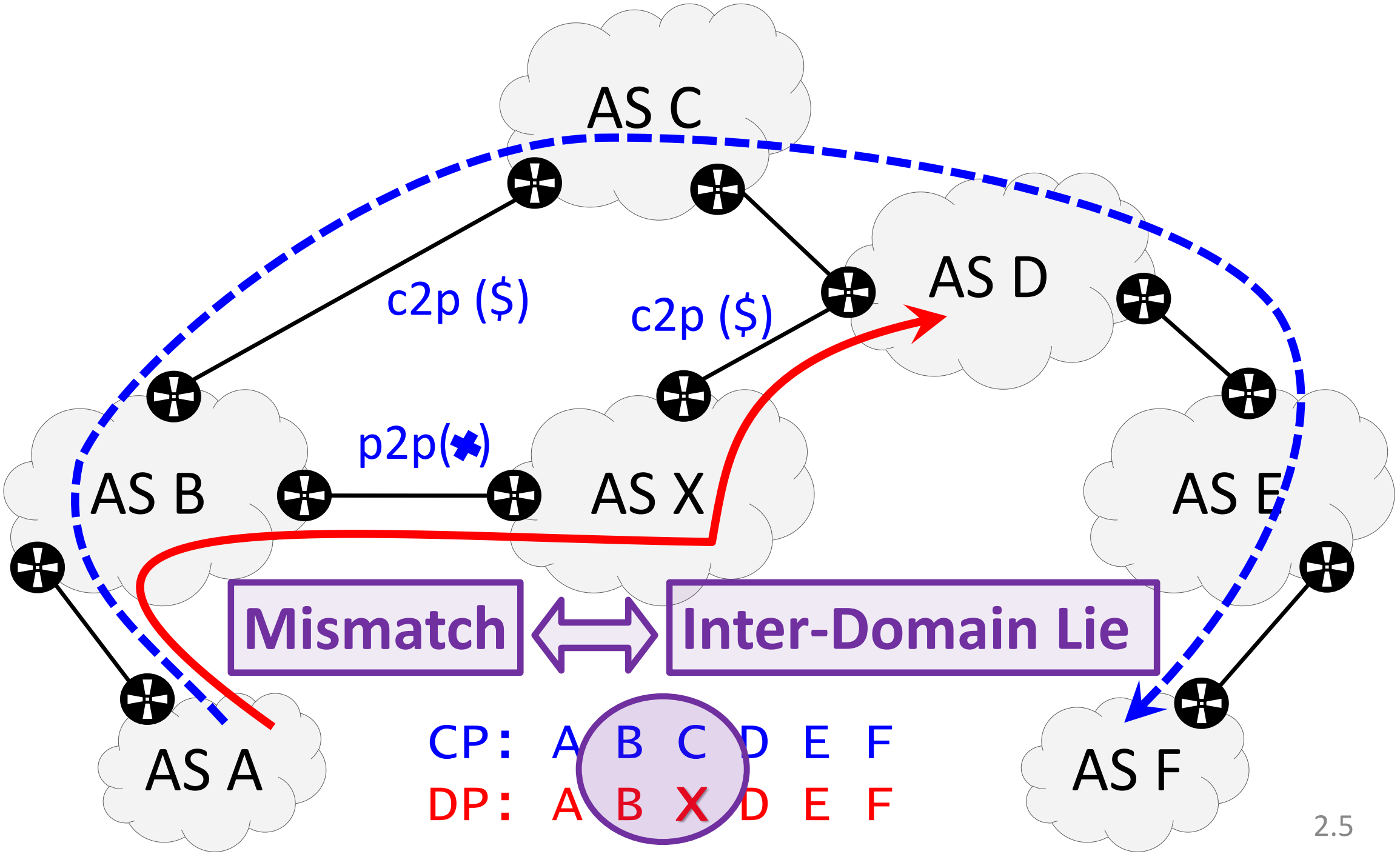
From A to F




AS C
AS D
c2p ($)
c2p ($)
AS B
p2p(✖)
AS X
AS E
AS A
AS F


AS C
AS D
AS B
AS X
AS E
AS A
AS F
c2p ($)
c2p ($)
p2p(✖)
CP: A B C D E F


AS C
AS D
AS B
AS X
AS E
AS A
AS F
c2p ($)
c2p ($)
p2p(✖)
CP: A B C D E F
DP: A B X D E F


AS C
AS D
AS B
AS X
AS E
AS A
AS F
c2p ($)
c2p ($)
p2p(✖)
Mismatch
Inter-Domain Lie
CP: A B C D E F
DP: A B X D E F

Internet Measurements

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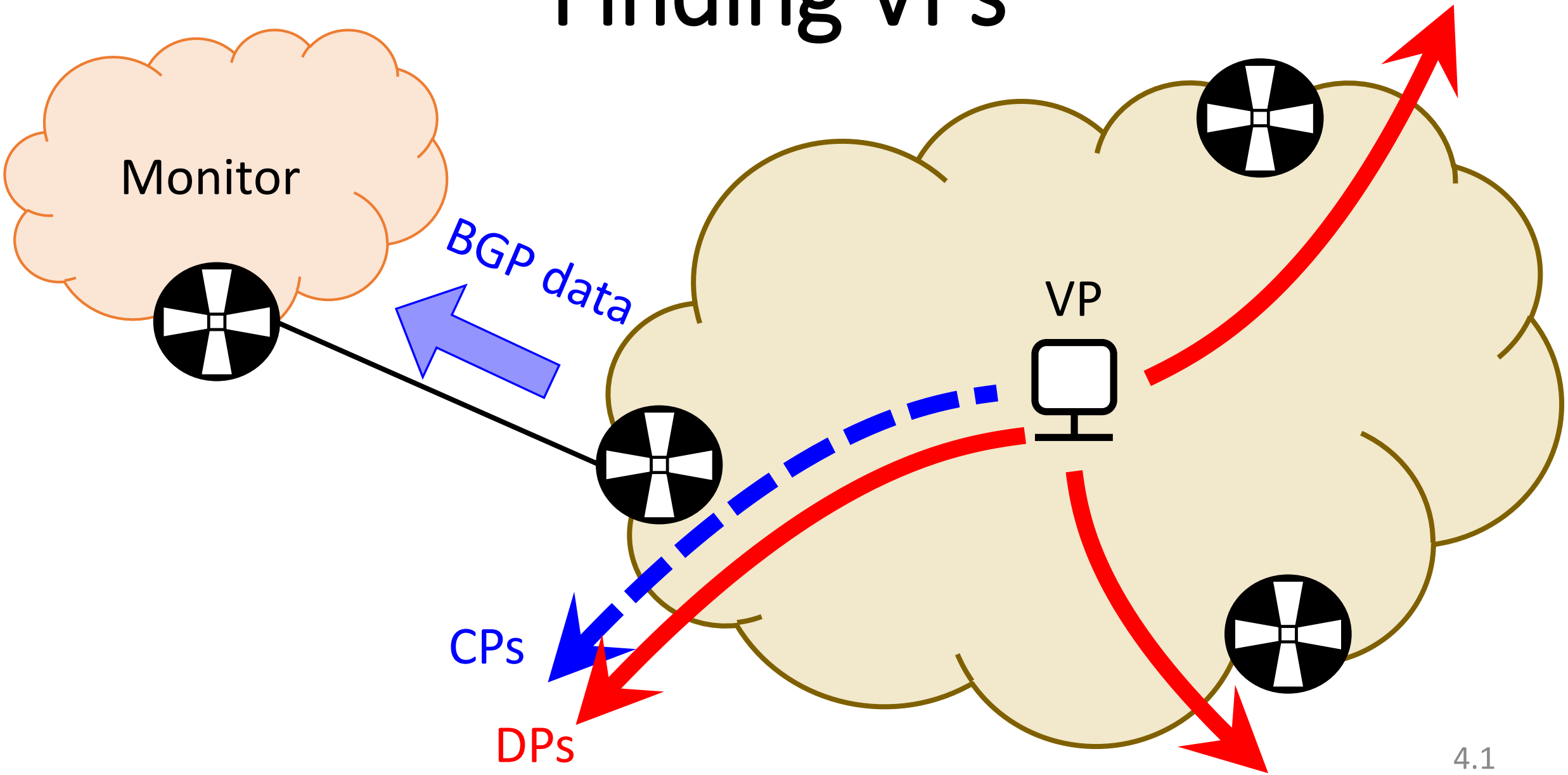
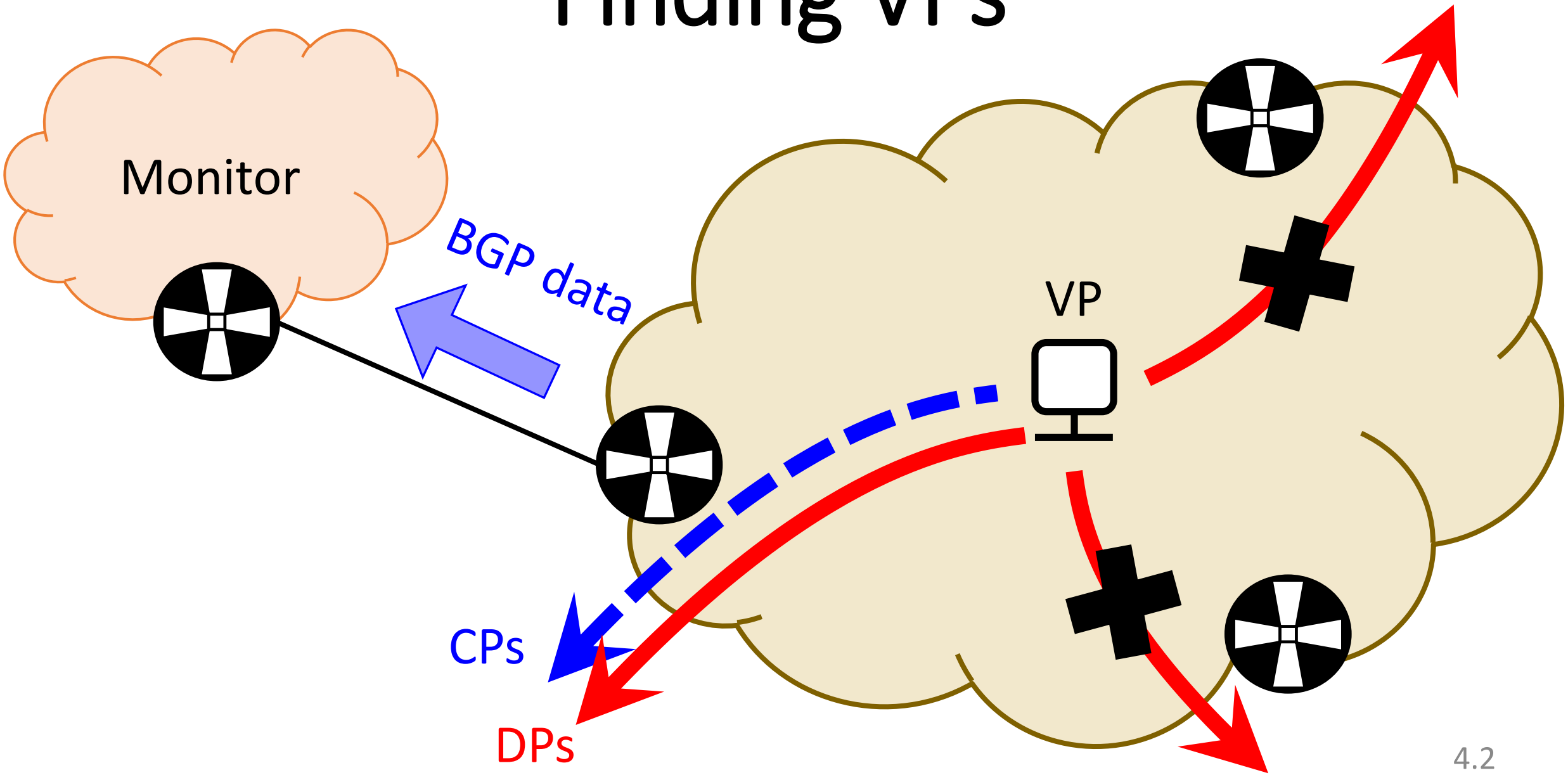
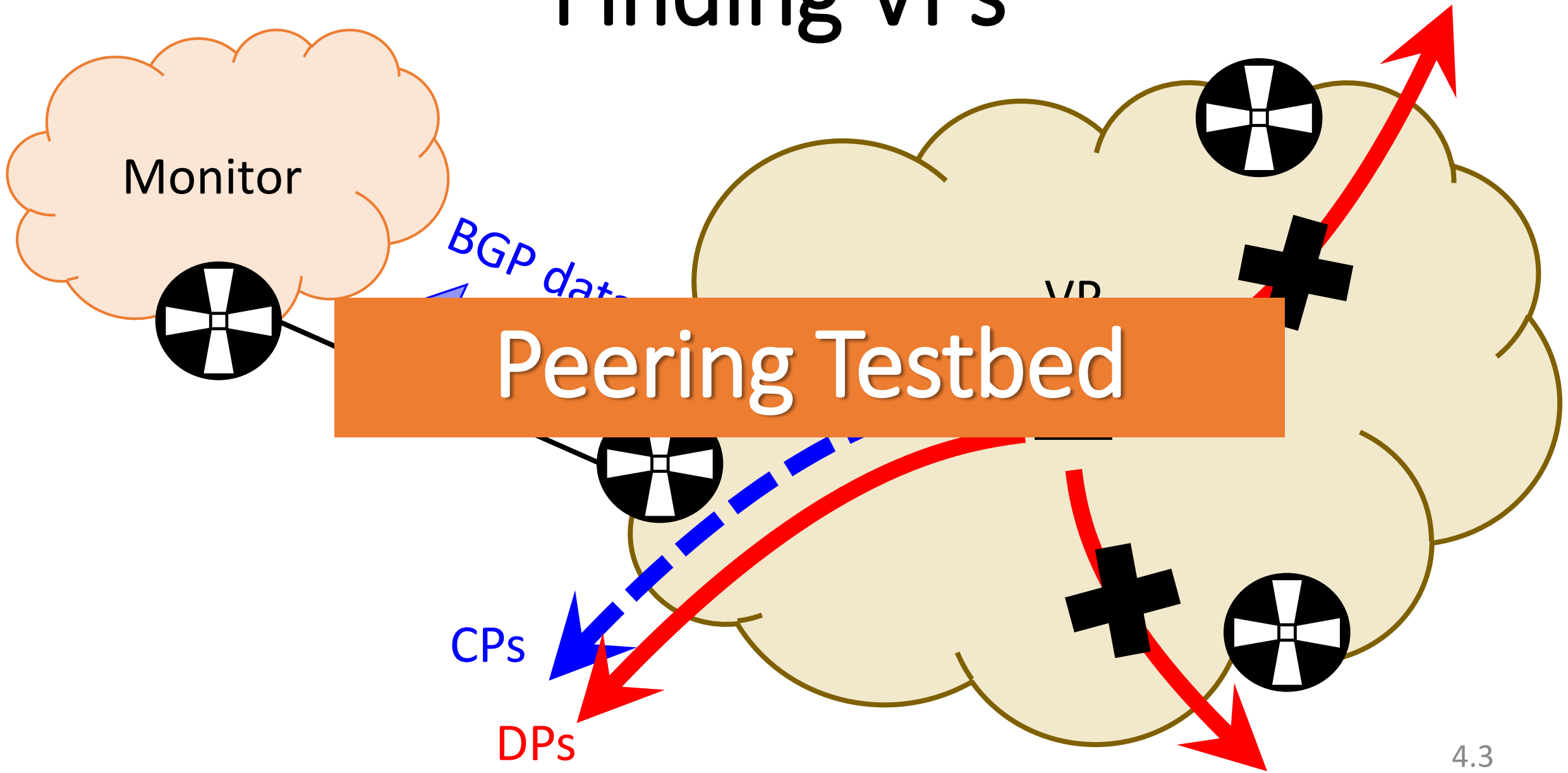
Finding VPs



Finding VPs



Finding VPs



Dataset

DPs: 80K IP List To Traceroute

1. Allocated and Assigned IP blocks

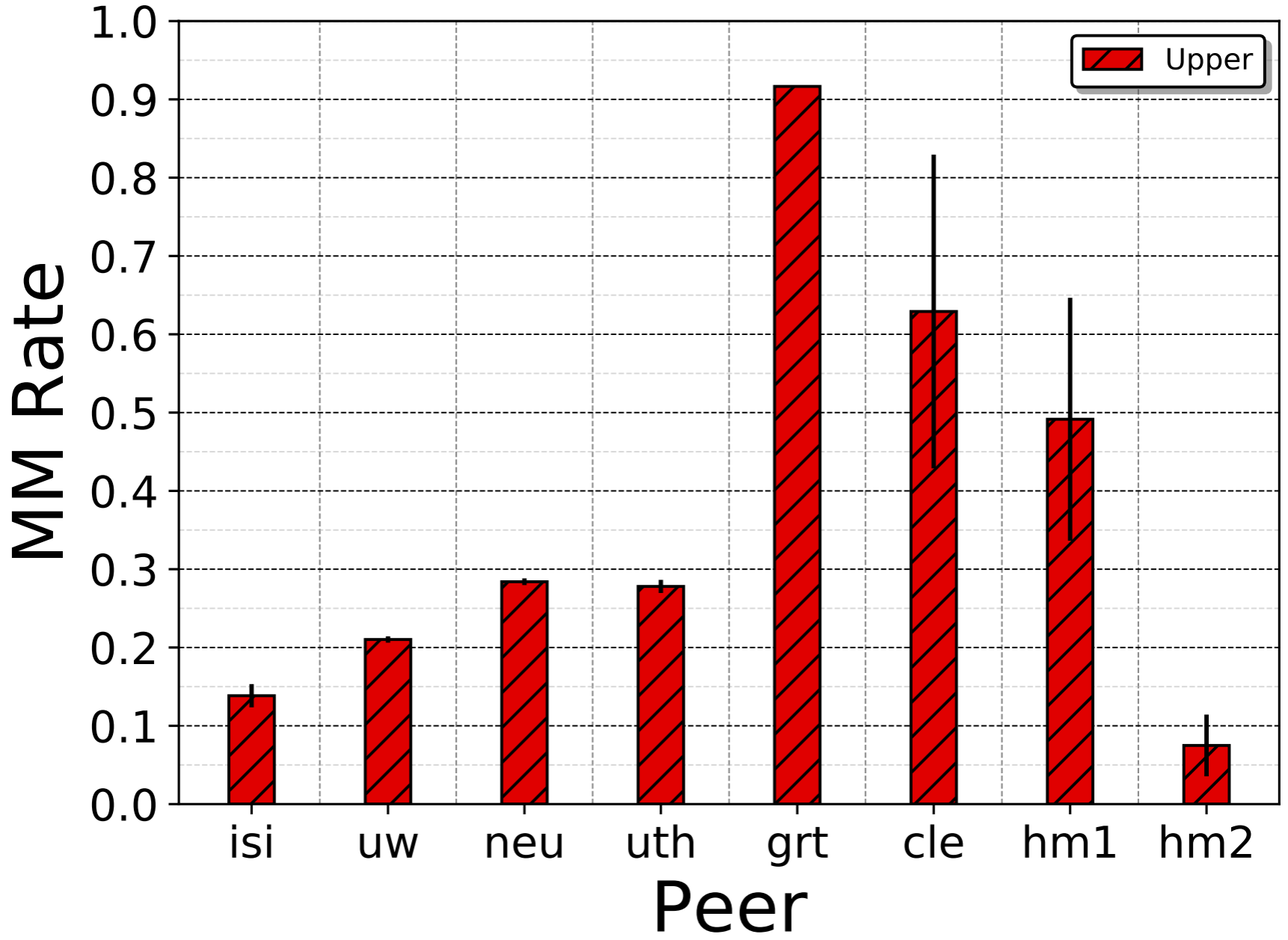
   ripencc|DE|ipv4|46.243.120.0|2048|…

2. Divide in /24s and pick one IP

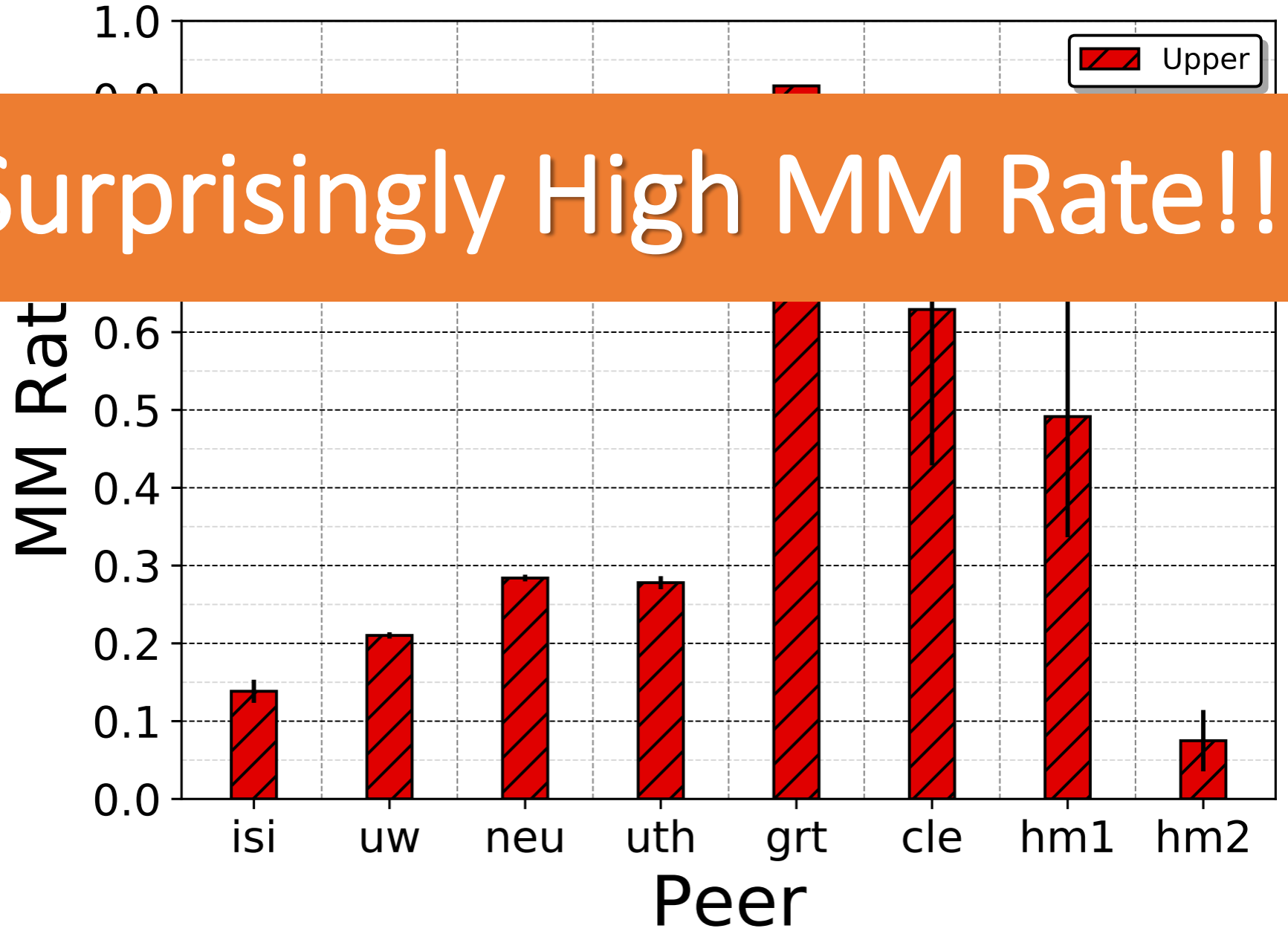
3. Uniformly Sample the Address Space

CPs: Download BGP Snapshots every 2hs

Mismatches (MMs) in the Wild

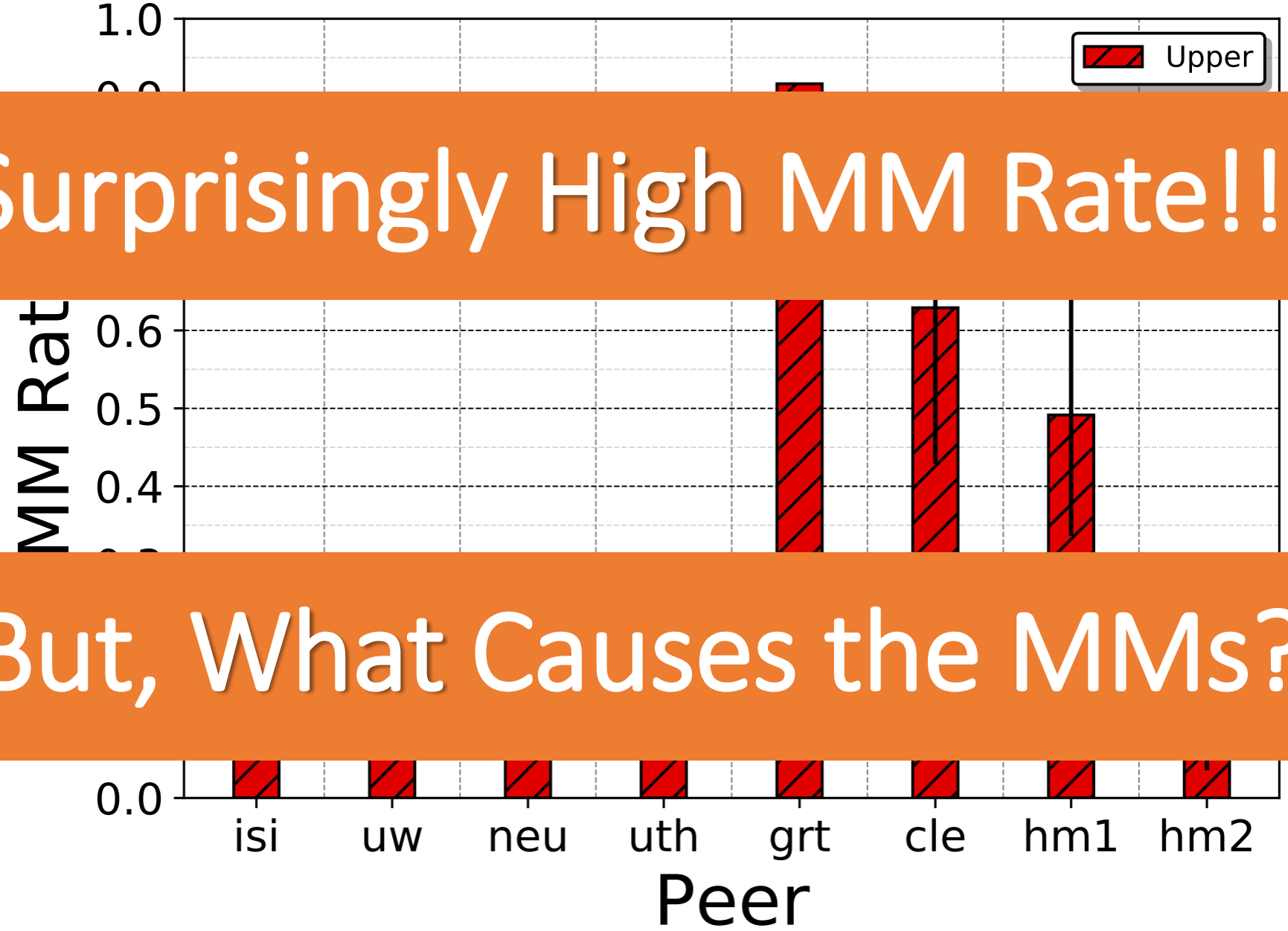


Mismatches (MMs) in the Wild



Surprisingly High MM Rate!! ☹

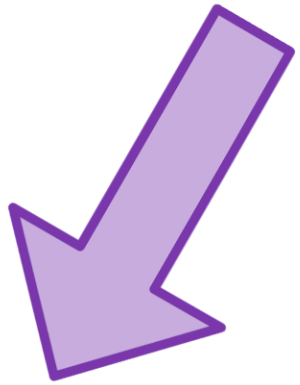
Mismatches (MMs) in the Wild



Surprisingly High MM Rate!! ☹

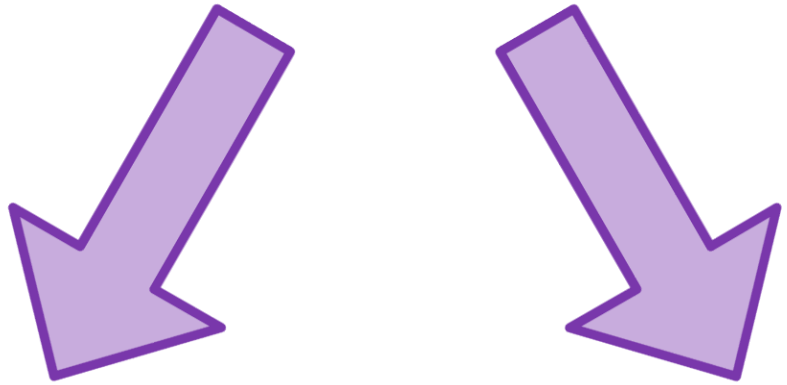
But, What Causes the MMs? :/

MMs Reasons



Lies

MMs Reasons



Lies

Noise

MMs Reasons

Are we Just Capturing Noise? :S

Lies

Noise

MMs Reasons

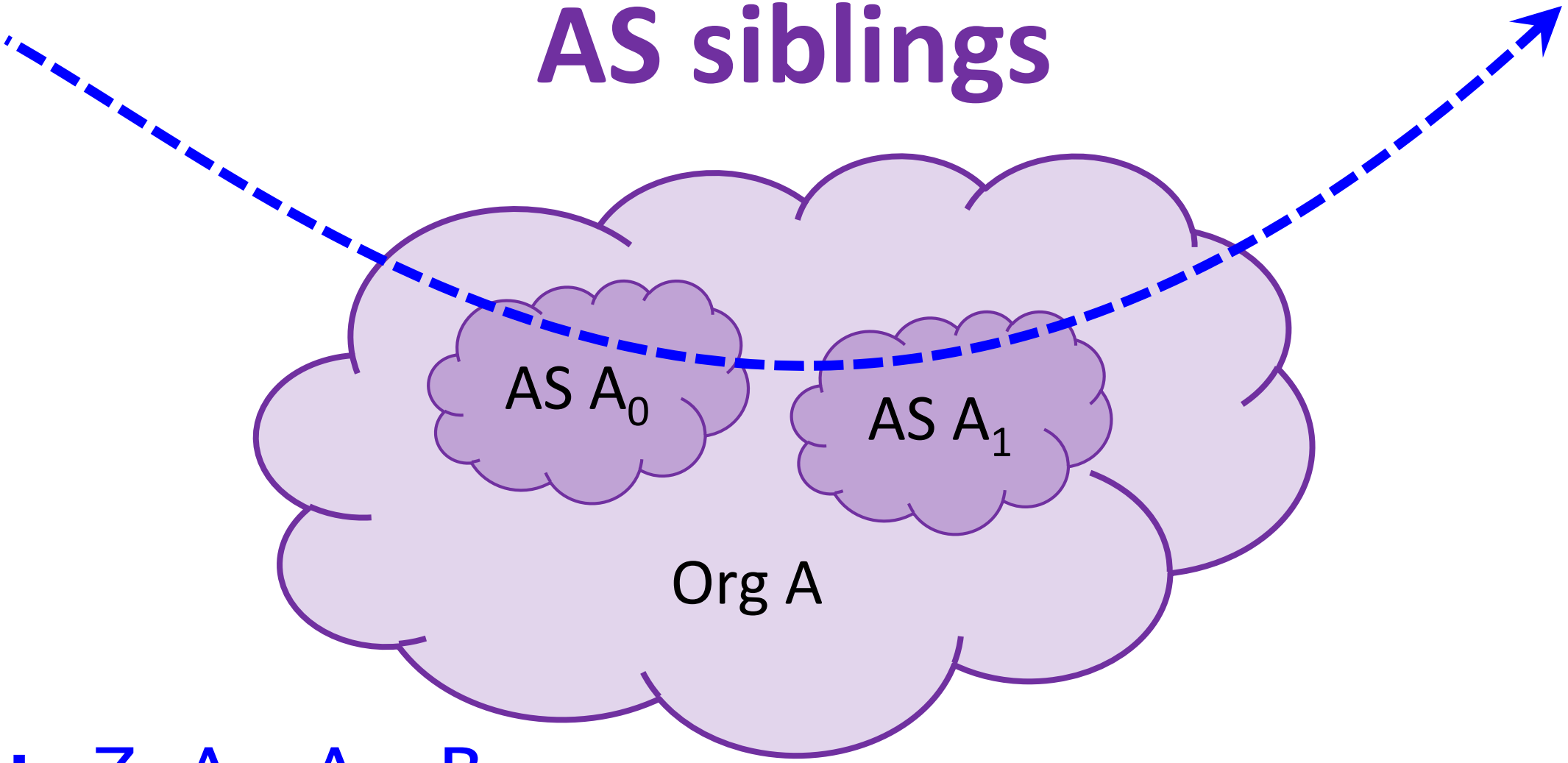
Are we Just Capturing Noise? :S

Lies **Noise**

Please, Define Noise ☺

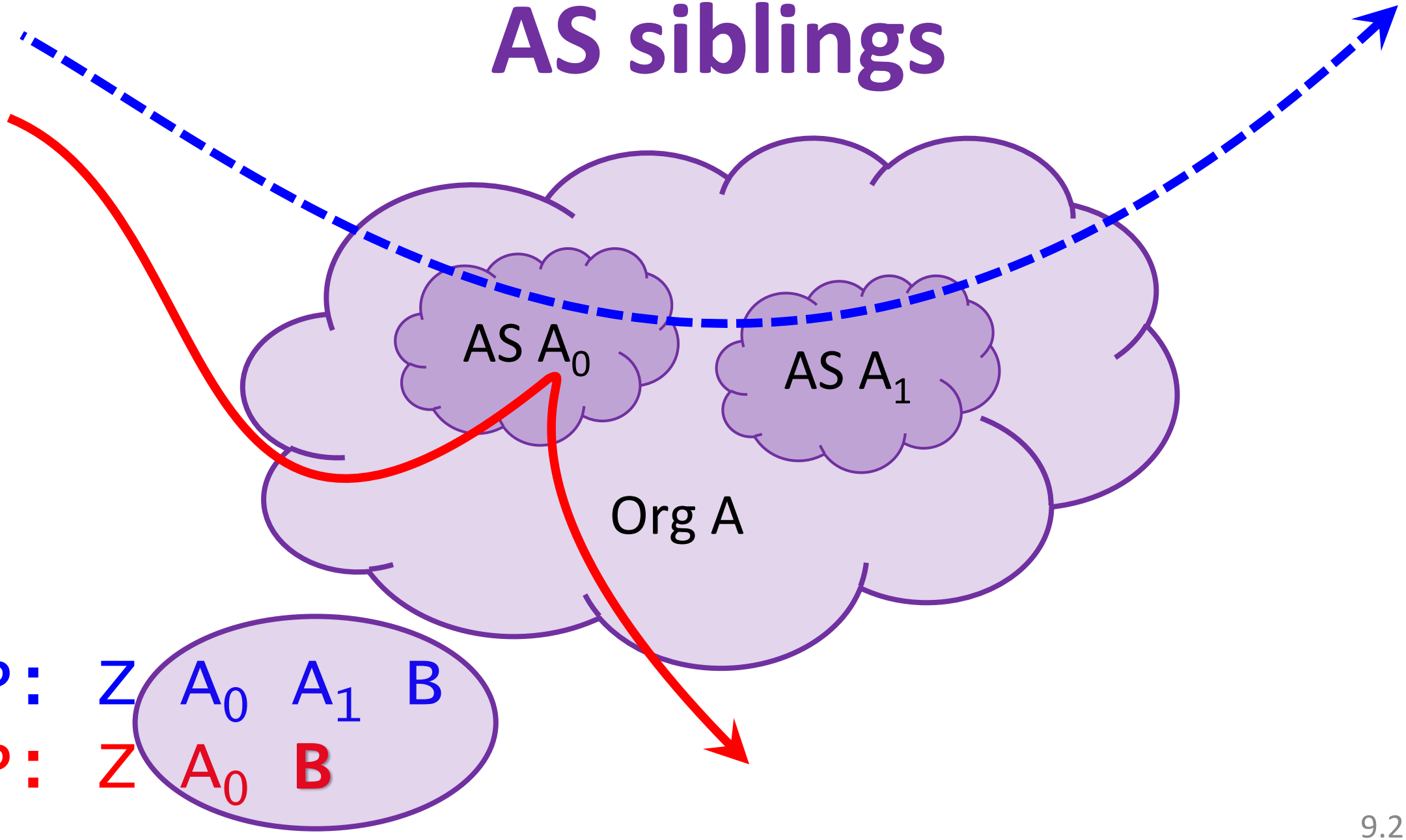

Noise
AS siblings
Third-Party Addresses (TPAs)
Wildcards (e.g. missing hops)

AS siblings

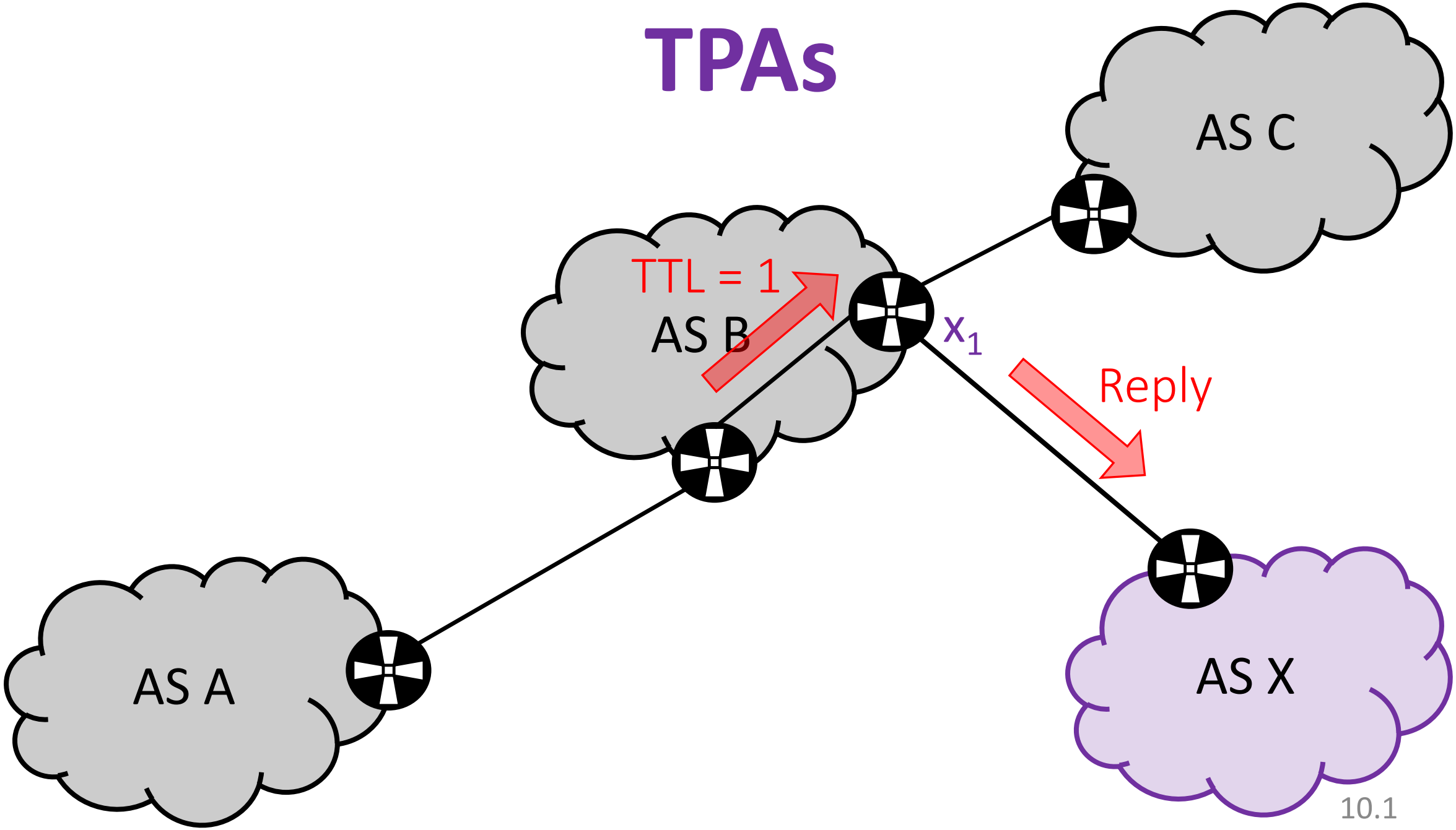


CP: Z A_0 A_1 B

AS siblings

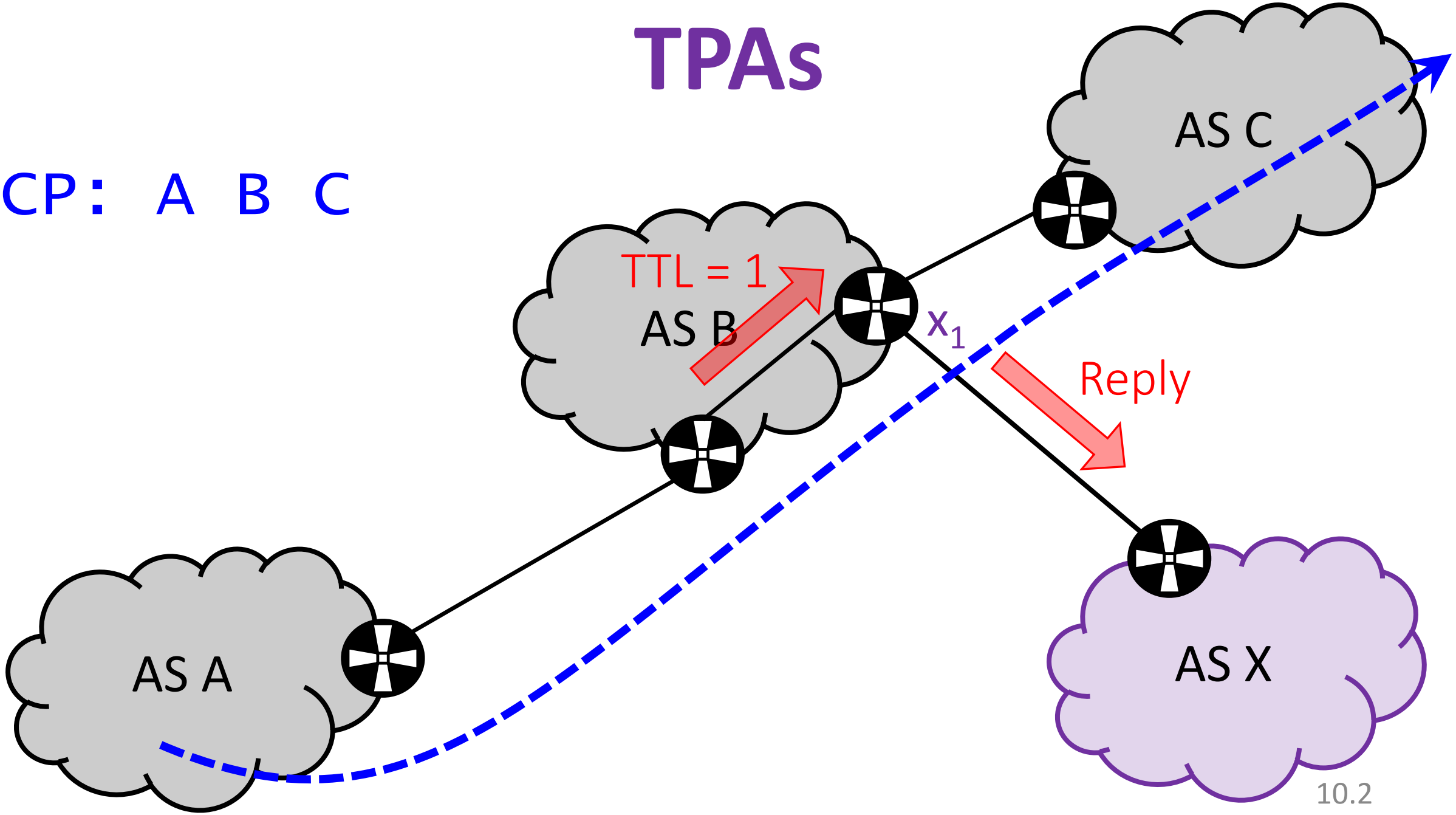


TPAs

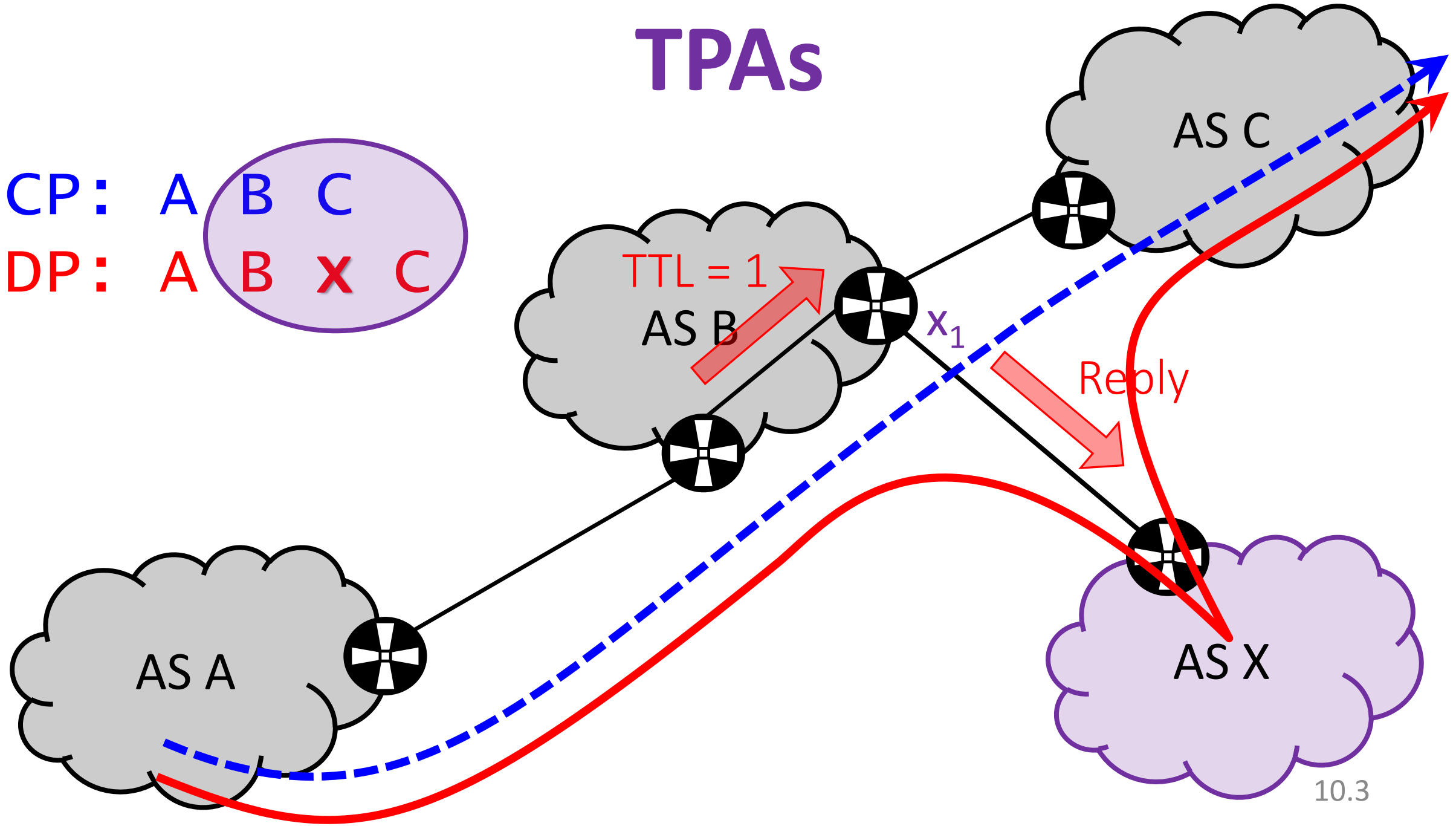


TPAs

CP: A B C



TPAs

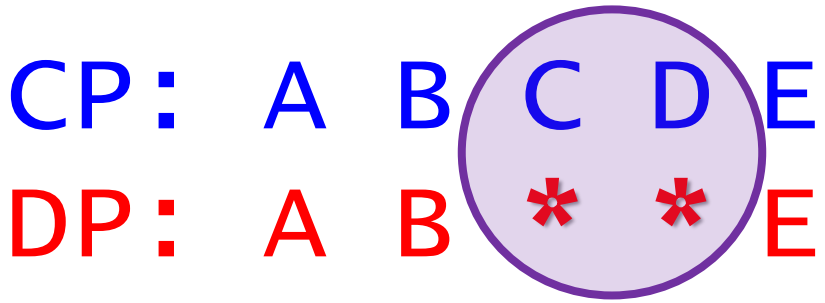


Wildcards

Missing hops

Private IP Addresses

IP-to-AS mapping undefined



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Filtering The Noise to Reveal Inter-Domain Lies

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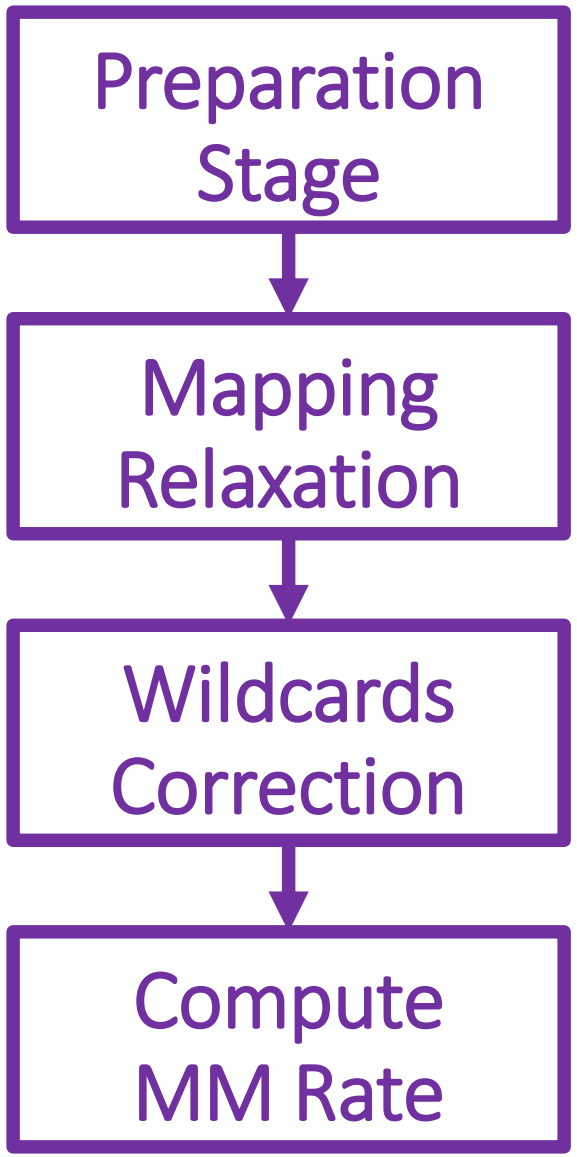
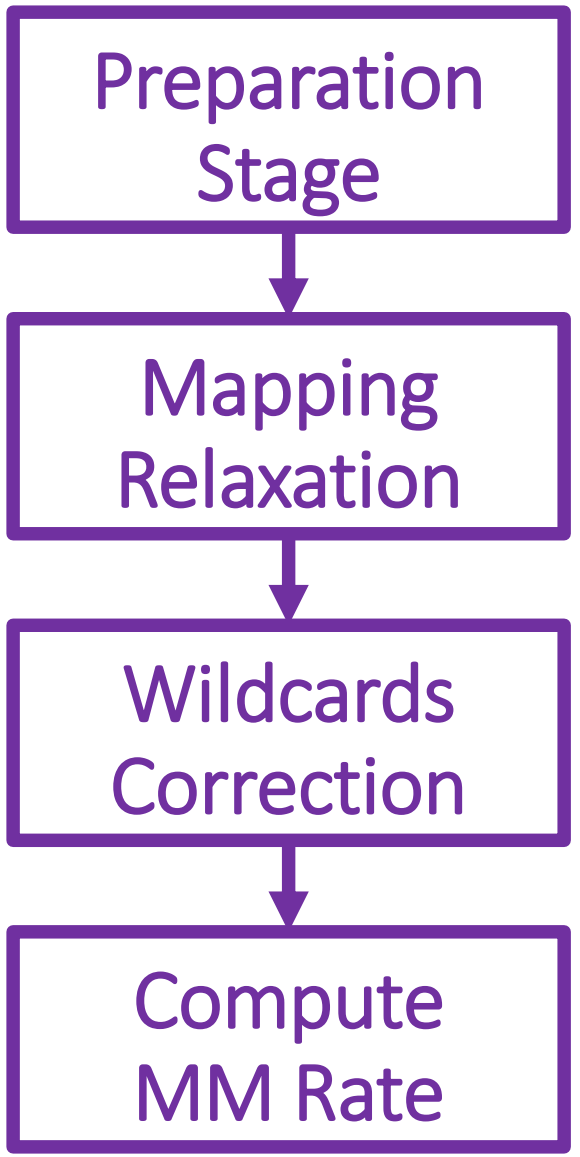
A Framework


Preparation Stage
Mapping Relaxation
Wildcards Correction
Compute MM Rate

A Framework

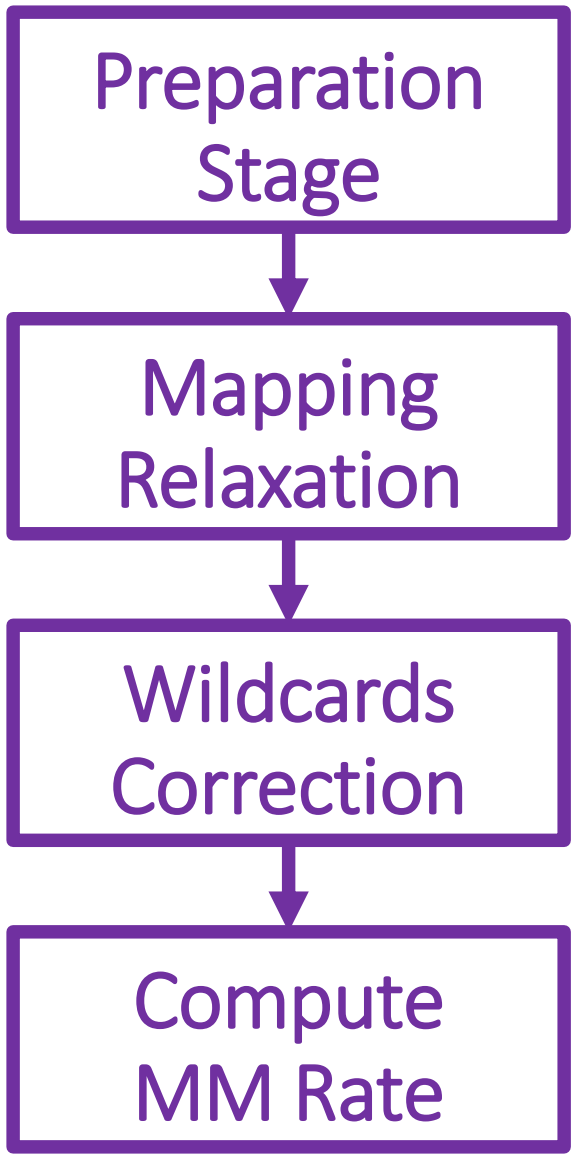


Mapping Relaxation

SIB: AS-to-ORG mapping

TPA: Remove candidate TPAs

A Framework



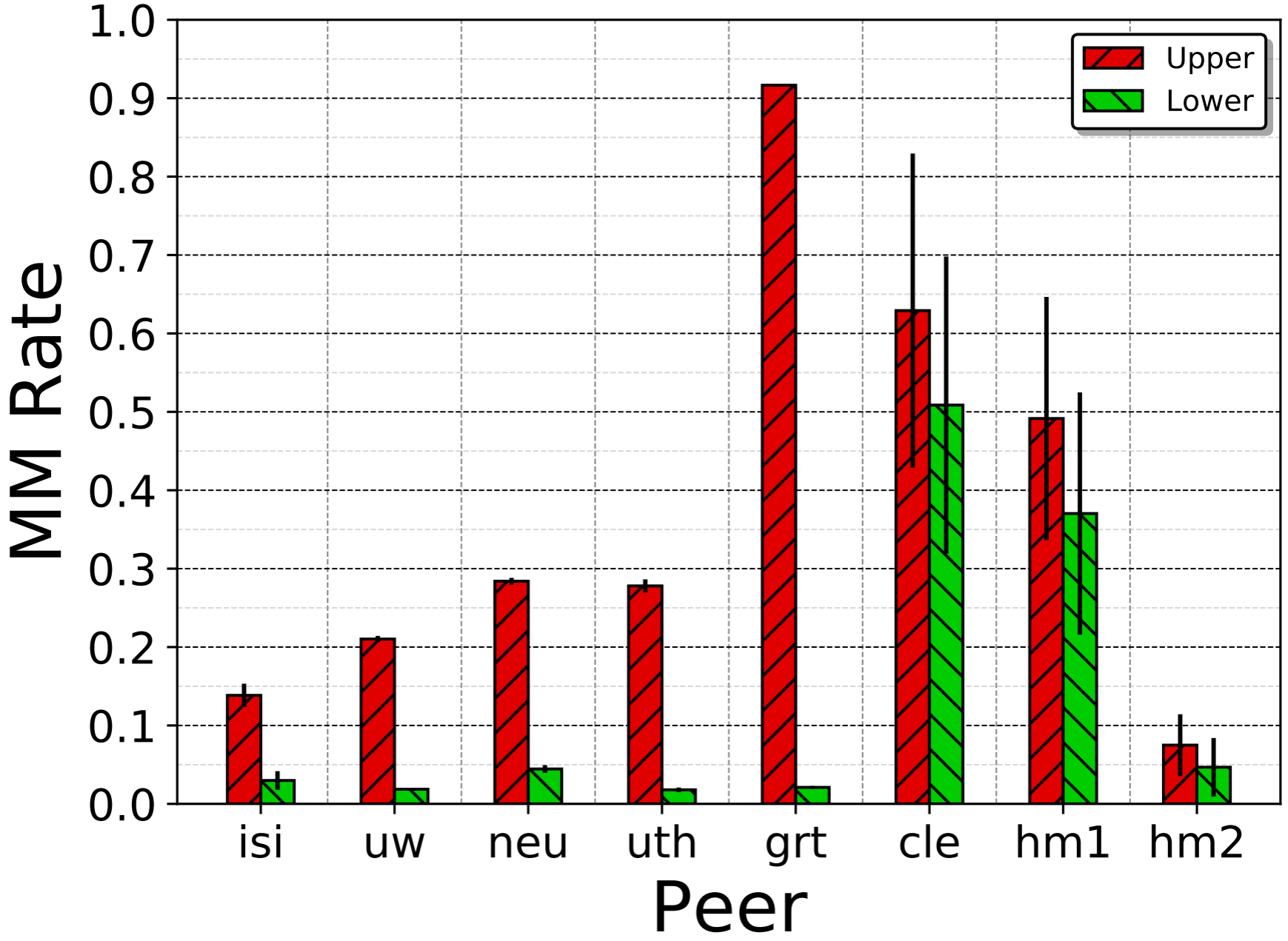
Mapping Relaxation

SIB: AS-to-ORG mapping
TPA: Remove candidate TPAs

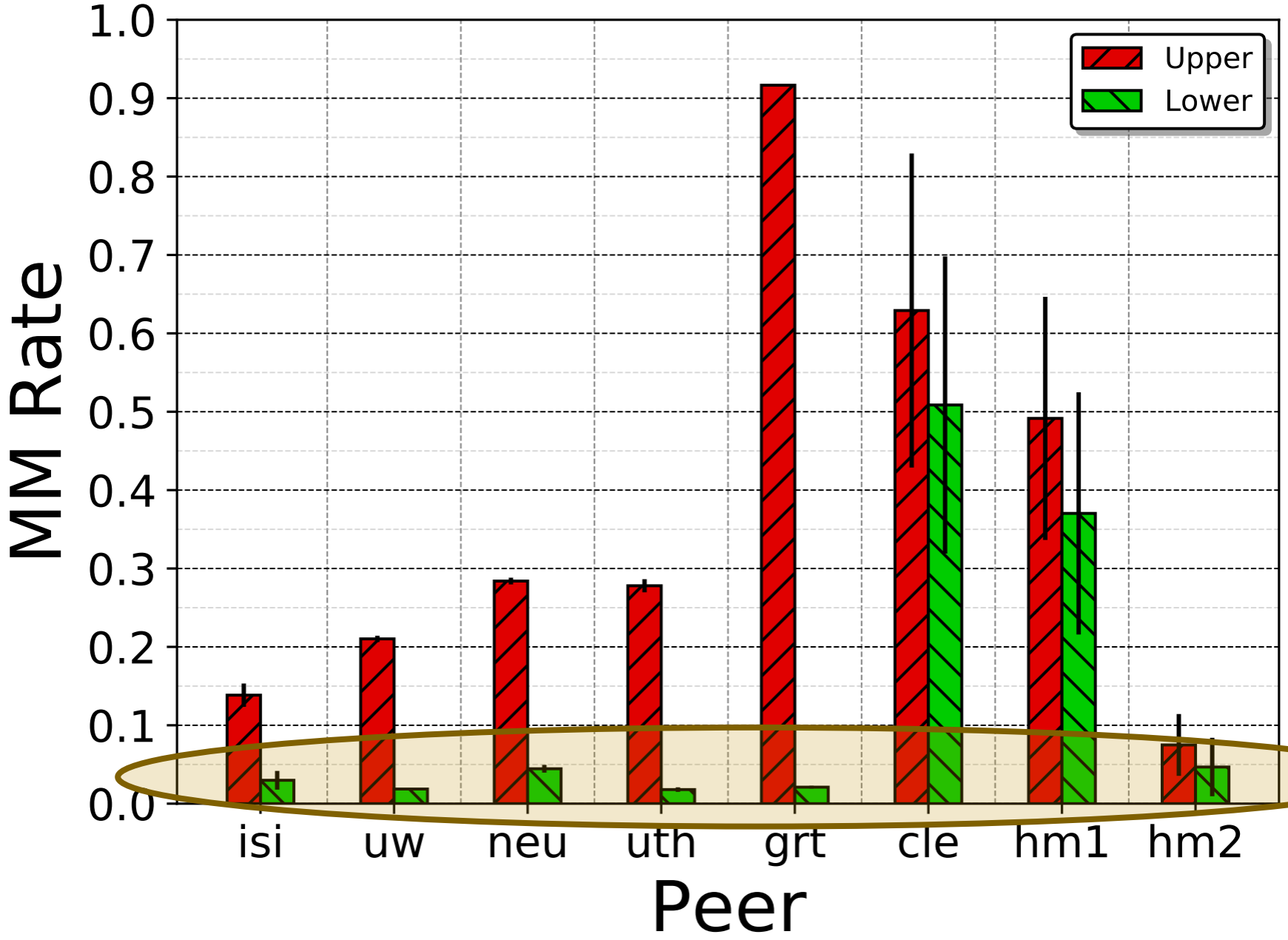
Wildcards Correction

match*: replace wildcards
nomatch*: remove wildcards

MMs Bounds in the Wild

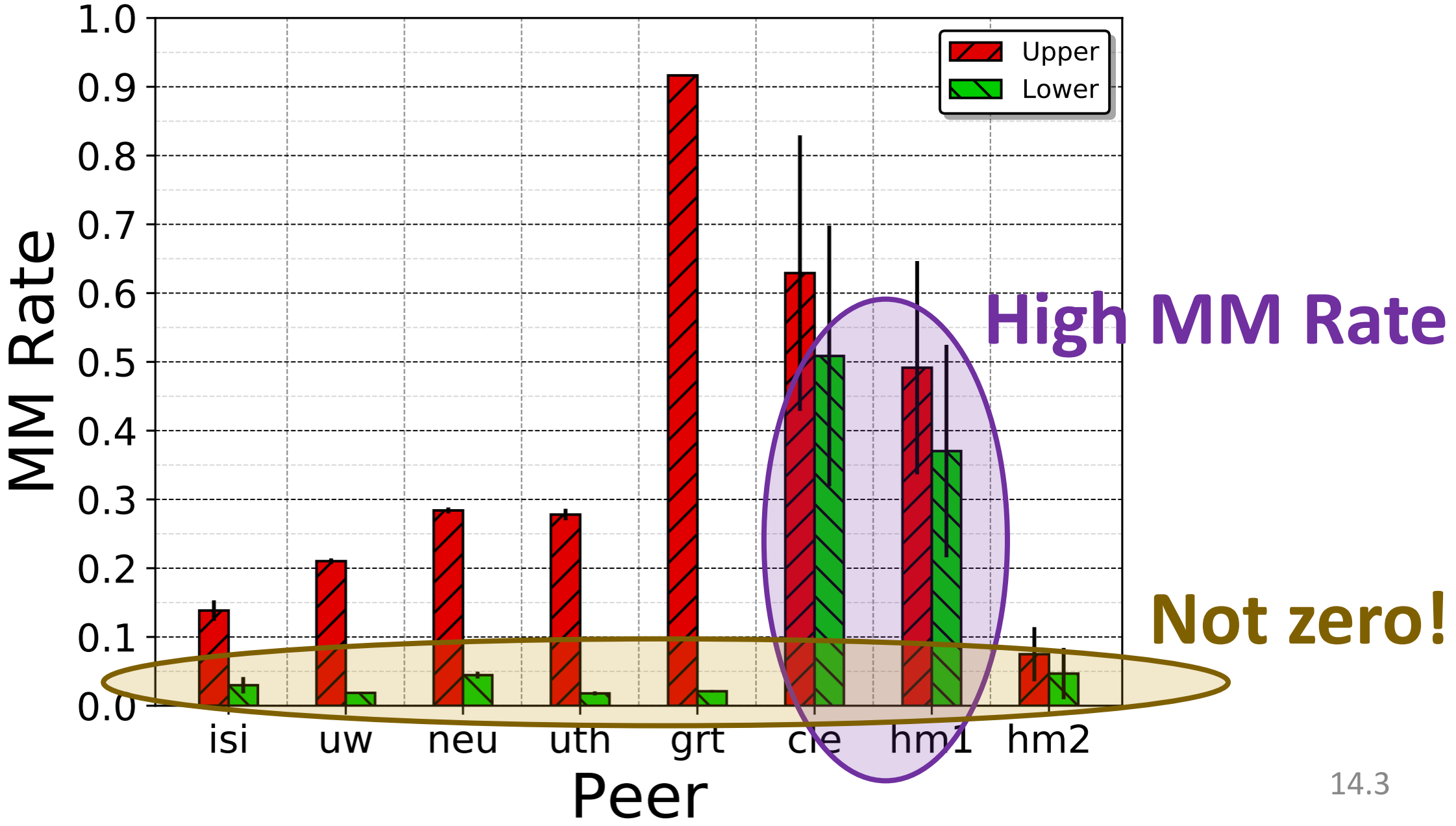


MMs Bounds in the Wild



Not zero!

MMs Bounds in the Wild



Conclusions

The Lower Bound of MMs
is not negligible

Noise usually **does not** include
AS siblings and TPAs
at the same time

Research Perspective

Studying Routing Inconsistencies

Understanding Better Mismatching Patterns

The End
Questions?