BGP Policy violations in the data-plane

Pierre Francois, Institute IMDEA Networks
Paolo Lucente, PMACCT

pierre.francois@imdea.org
paolo@pmacct.net

Agenda

- Two well-known facts about routing...
- leading to policy violations...
- watch your network !

Observation 1

- Policy-constrained path selection in BGP...
  Flexible, per-prefix granularity

- *"A BGP-router's* ***route processor*** *will pick a path towards a given destination* ***prefix*** *by applying the following rules"*

  Weight
  Local-pref
  As Path Length
  IGP/Med
  ...

Observation 1

- ... dominated in the data-plane
- A **FIB** will pick a path towards a given destination **address** by applying the following rules

  Longest prefix match to get the prefix

  (
  Best path towards that prefix was picked based on
  Weight
  Local-pref
  As Path Length
  IGP/Med
  ...)

Observation 11

- Common to provide a lot of routing flexibility
- Route propagation control offered by Sprint
  - Have to be a customer of Sprint
  - 65000:XXX : Do not advertise to ASXXX
    can be AOL, NTT, BT, Level3, GBLX, Verizon, AT&T, ...

Powerful complementary means to limit path knowledge

- Selective advertisement, performed locally
- Selective advertisement, triggered remotely

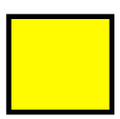
Control-plane/Data-plane can mismatch

- Paths for **overlapping** prefixes are controlled independently
  - By yourself
  - By your BGP neighborhood
- Forwarding plane dominated by the longest prefix match rule

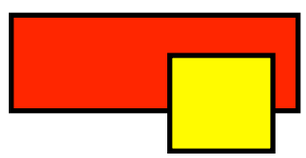
- What if your policy differs for overlapping prefixes ?

Toy case study

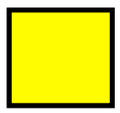
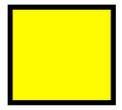
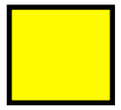
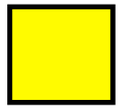
A BGP advertisement for NLRI P/p



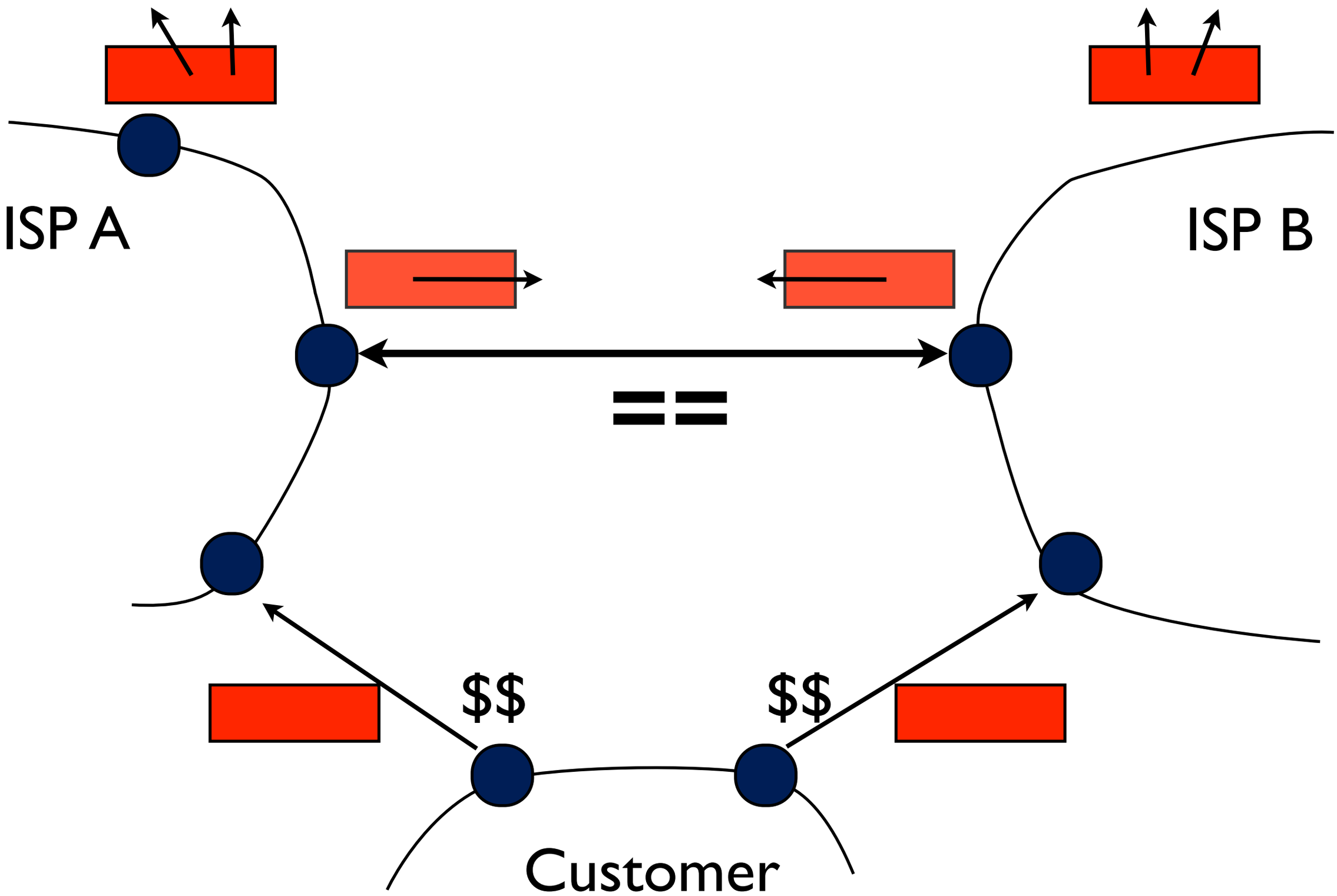
A BGP advertisement of a prefix more specific than P/p, say P/p+1



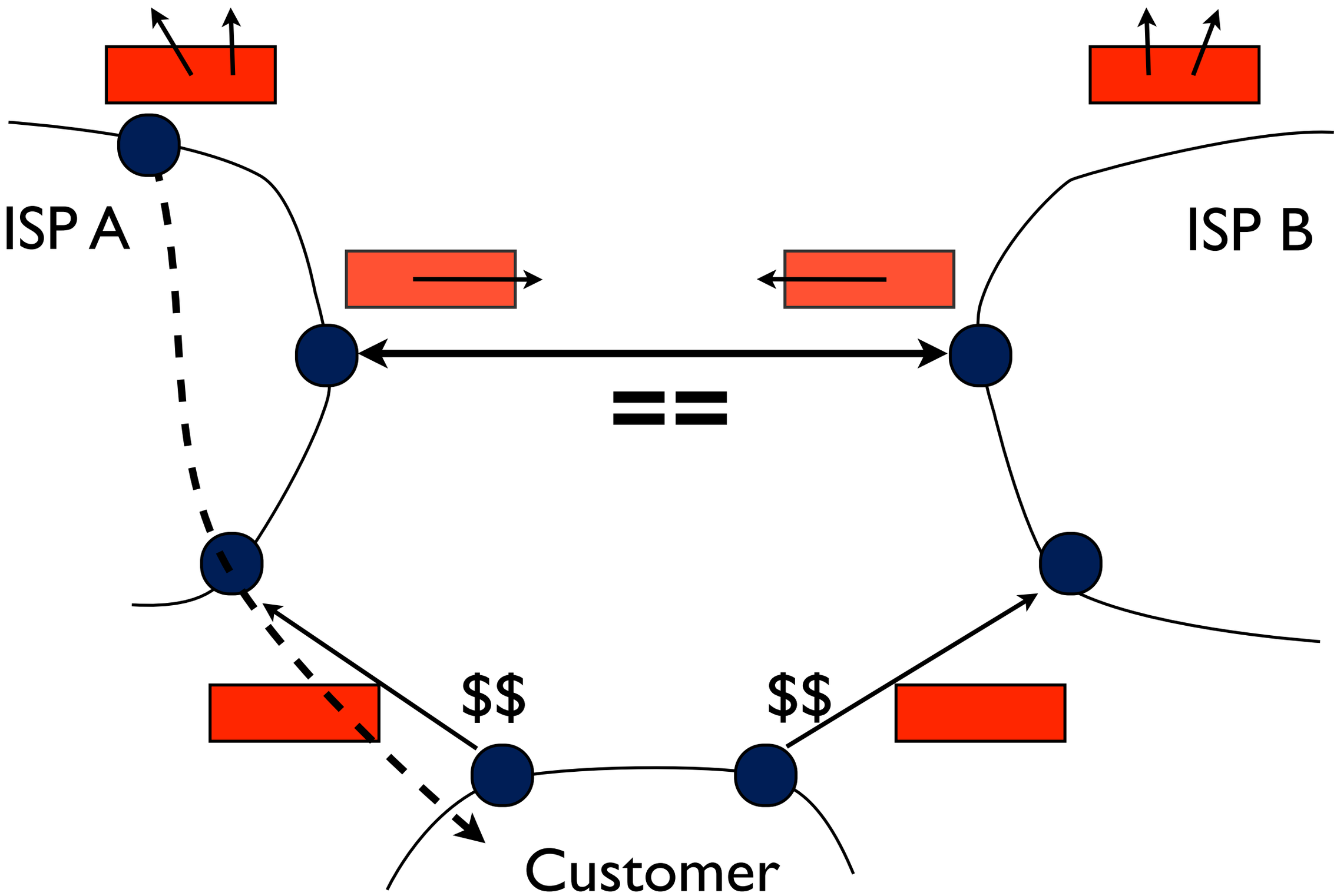
The BGP policy violation trick

- Play with  and communities
- Make  reach only a subset of the ASes
  - Some ASes forward  according to 
  - Until packet reaches an AS knowing 
  - Resulting data-plane not necessarily fitting everyone's policy...

Initial routing status



Initial routing status



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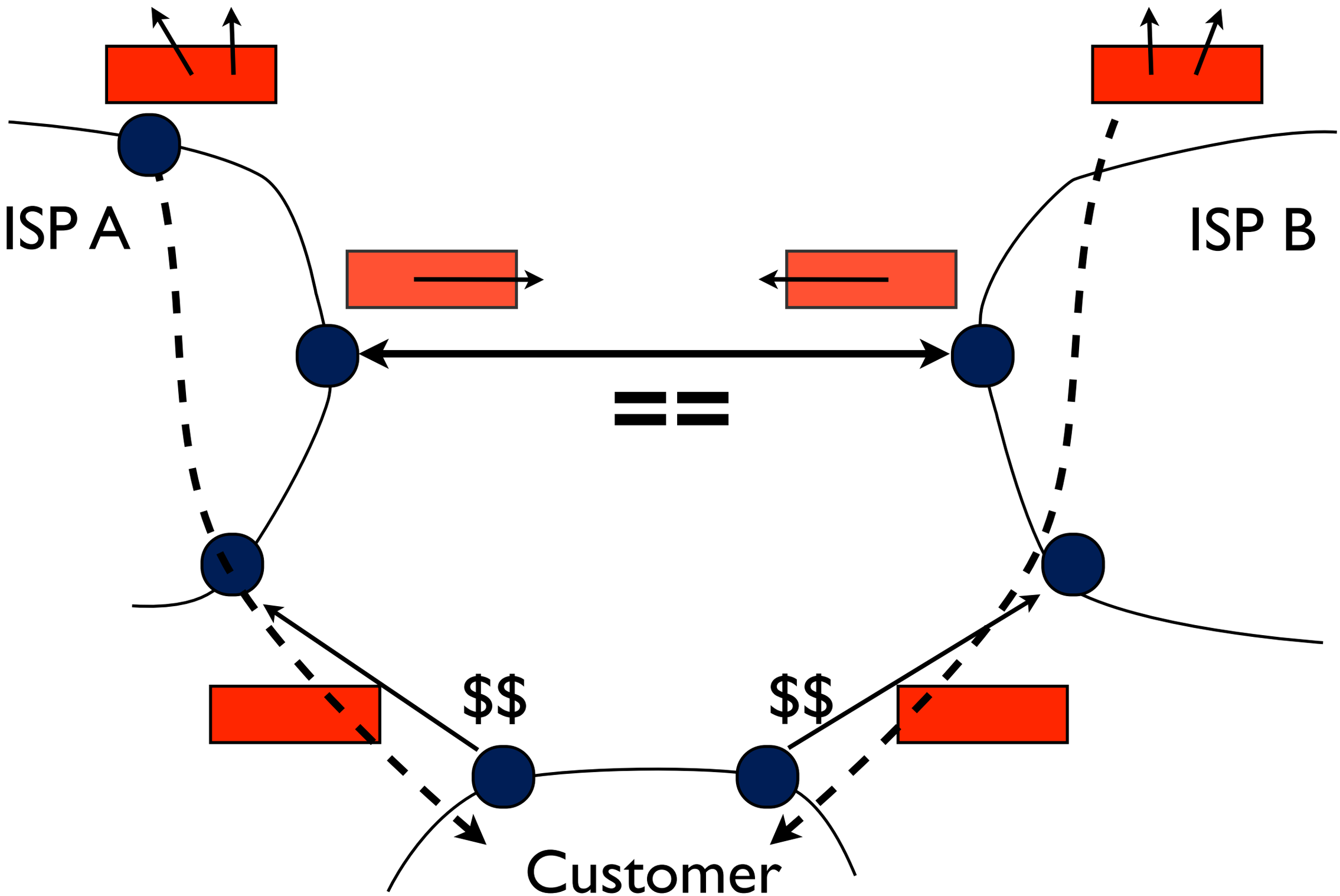
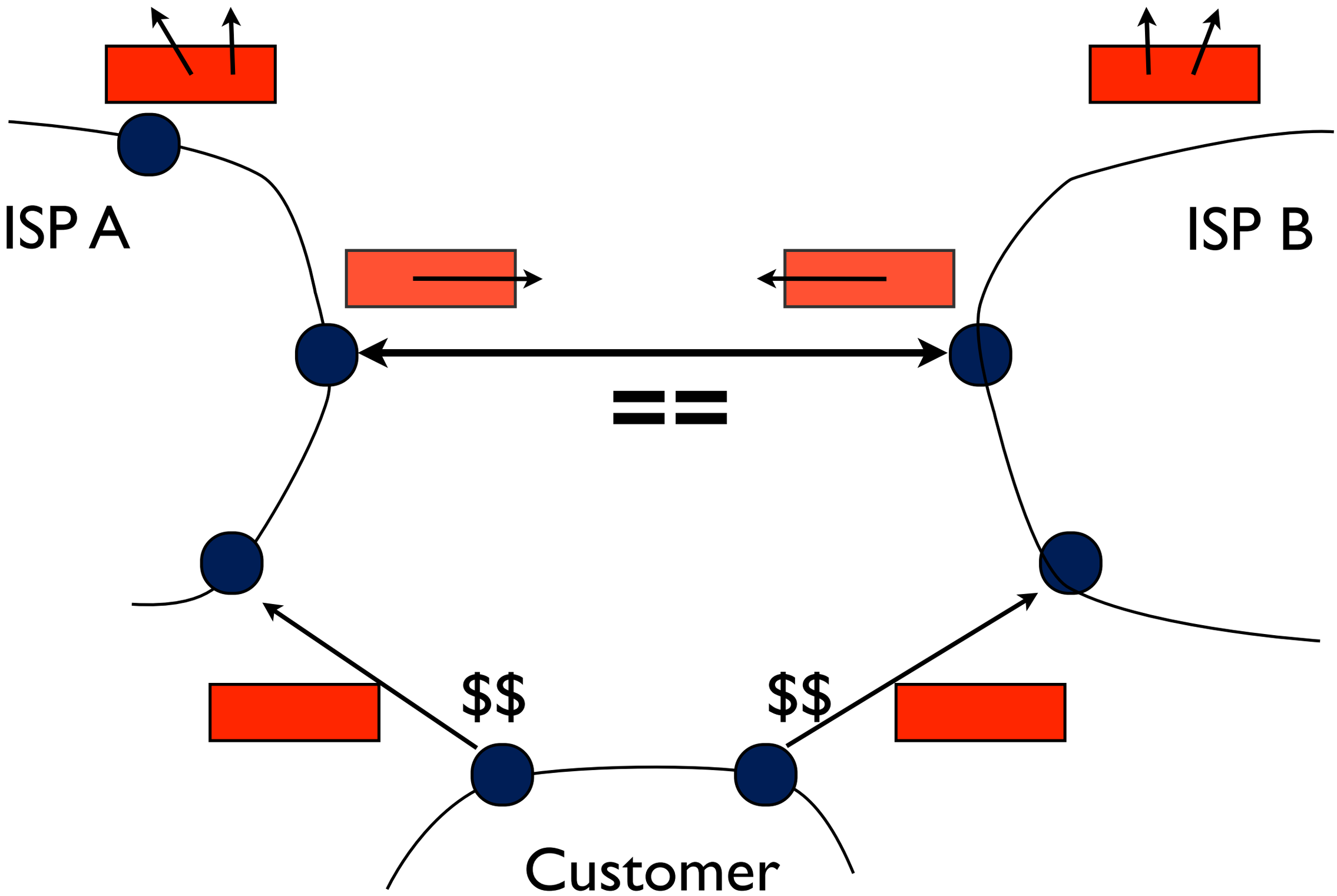


Inbound TE, selective advertisement of a more specific prefix



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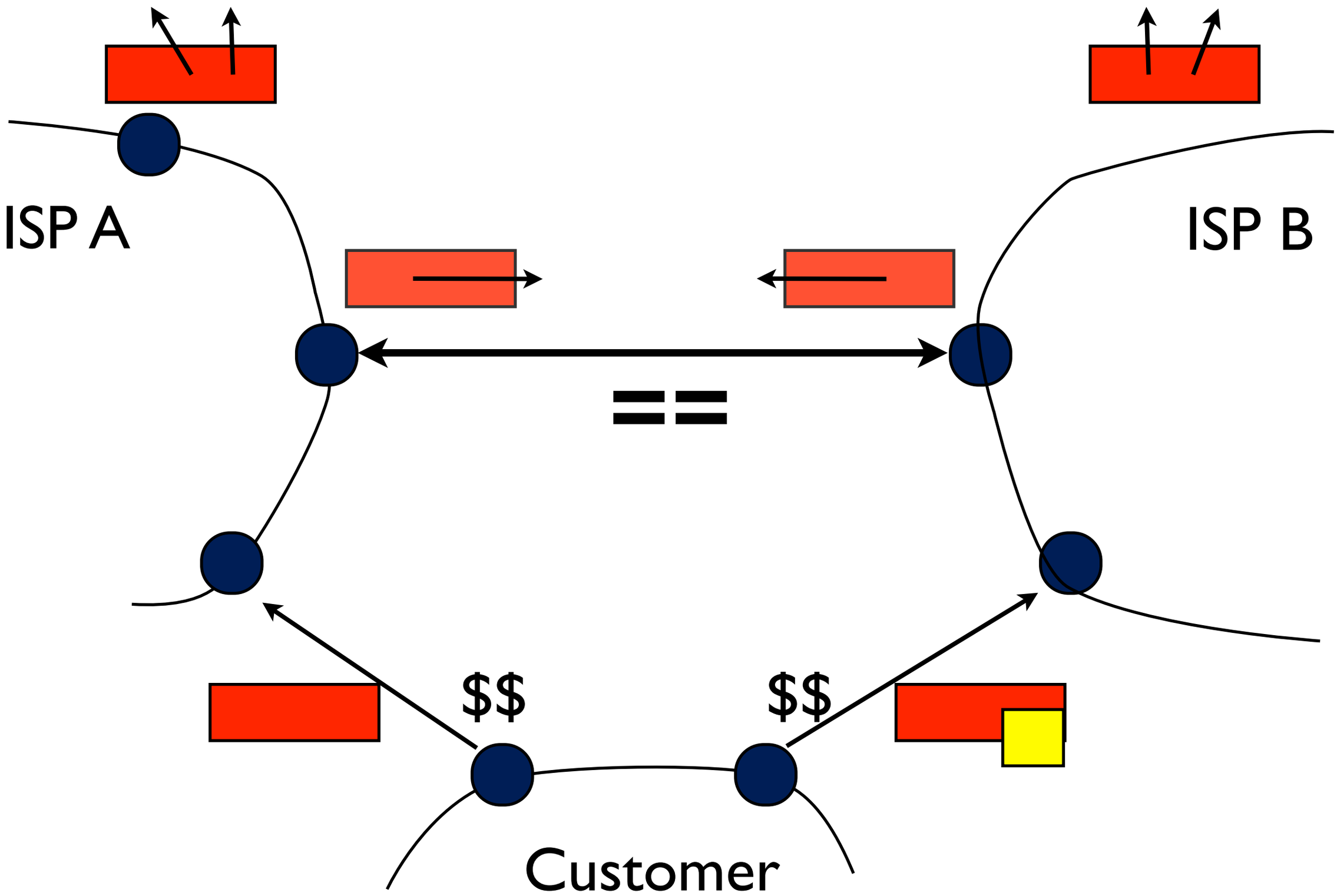

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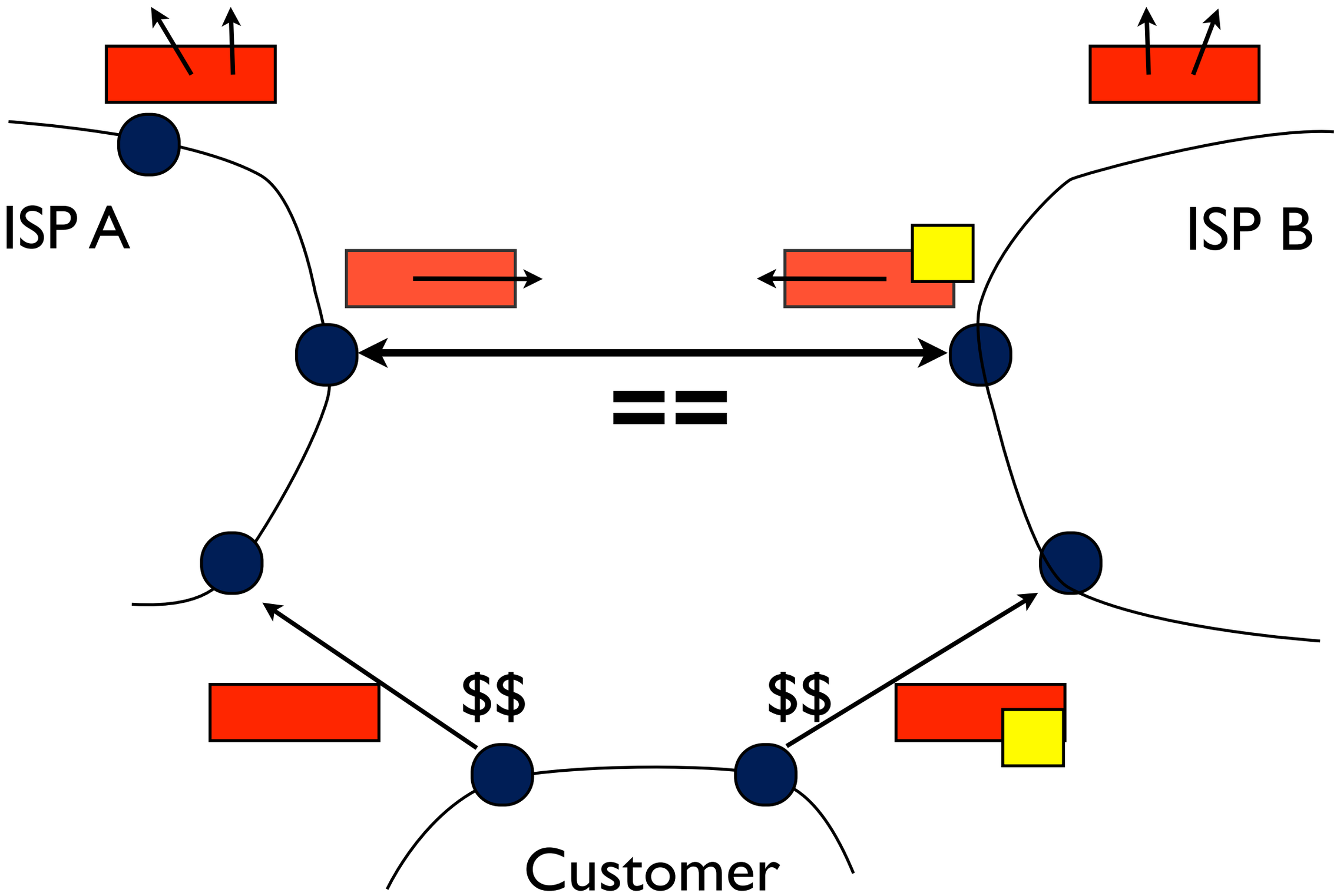

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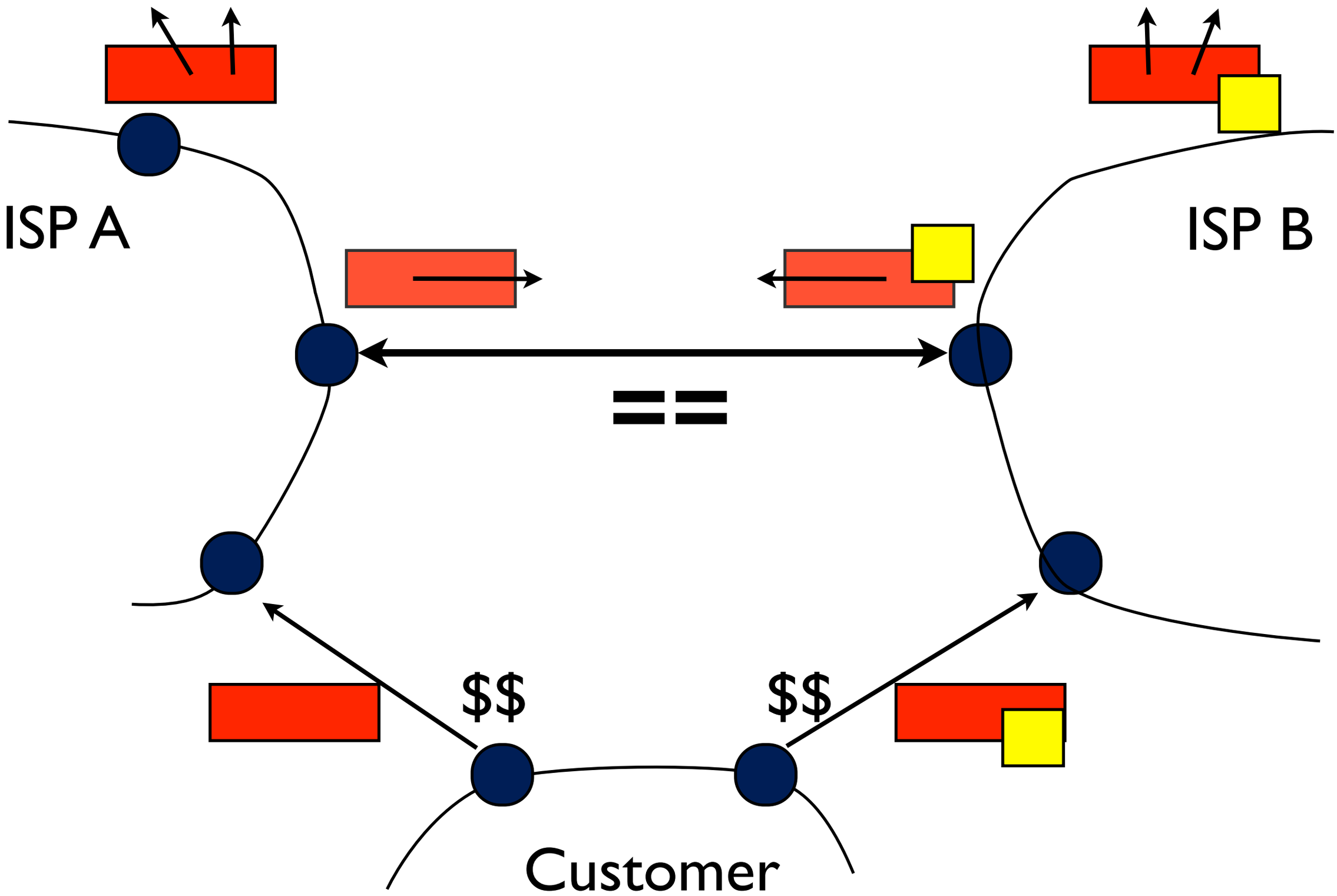

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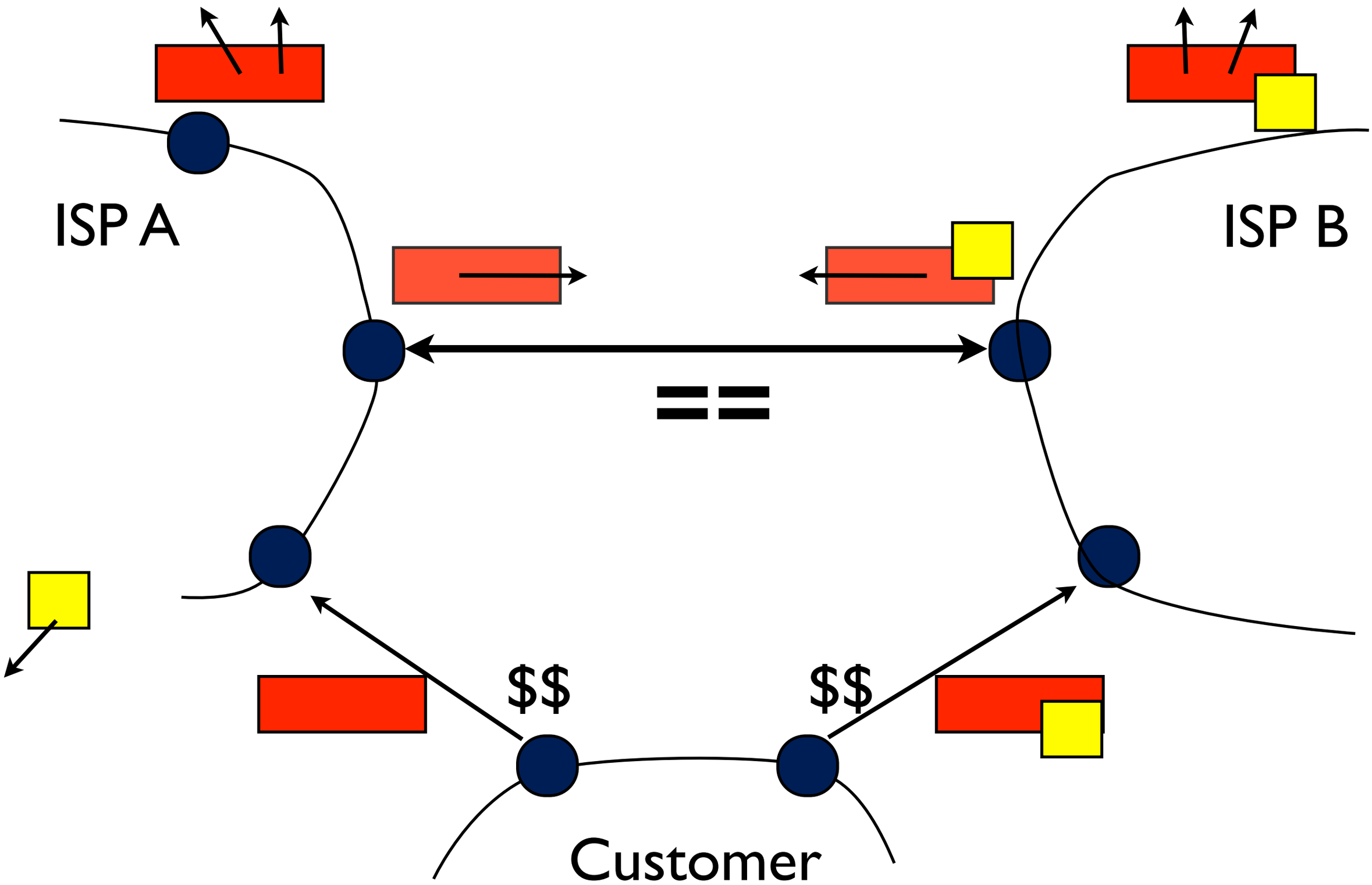

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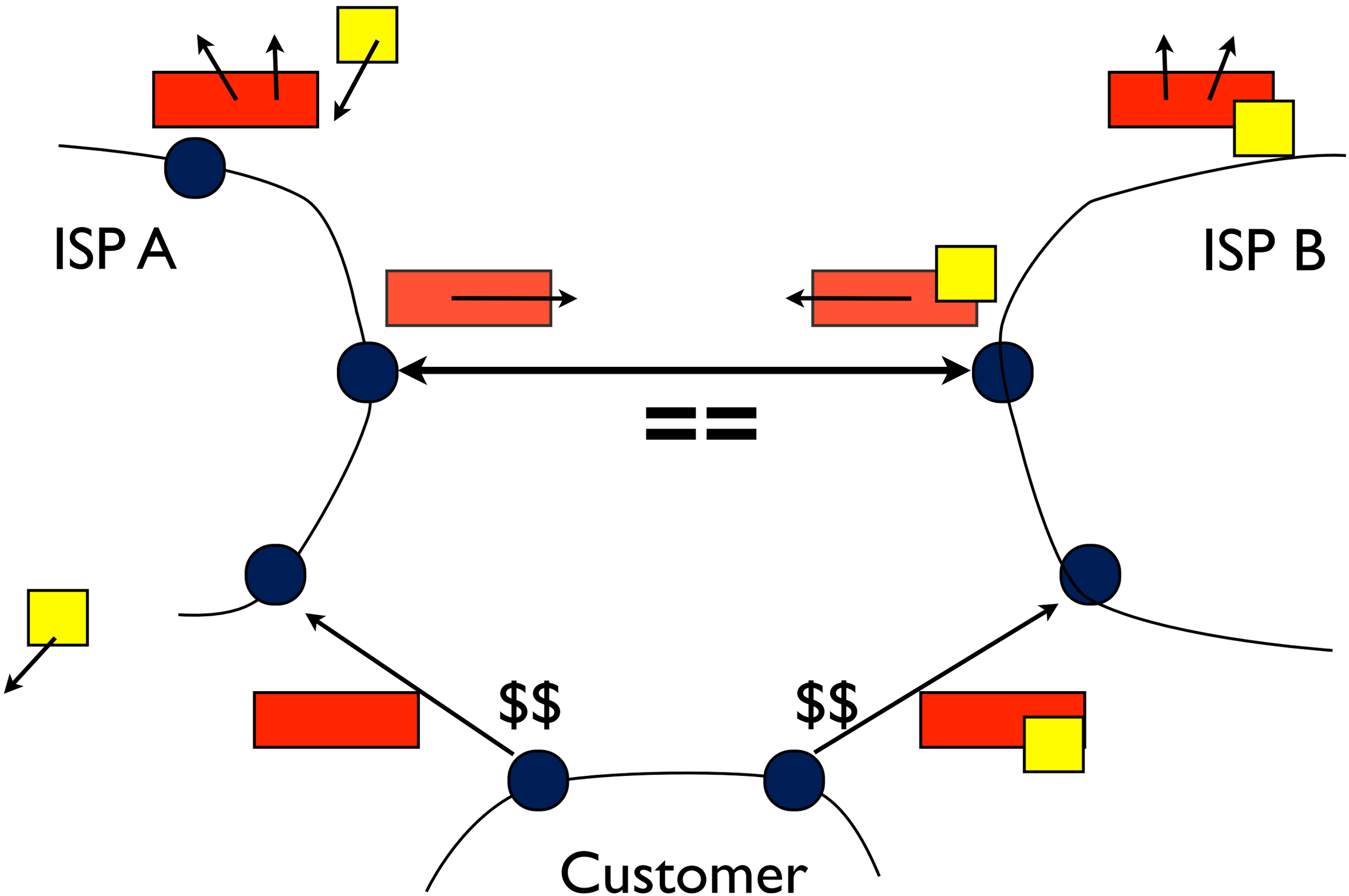

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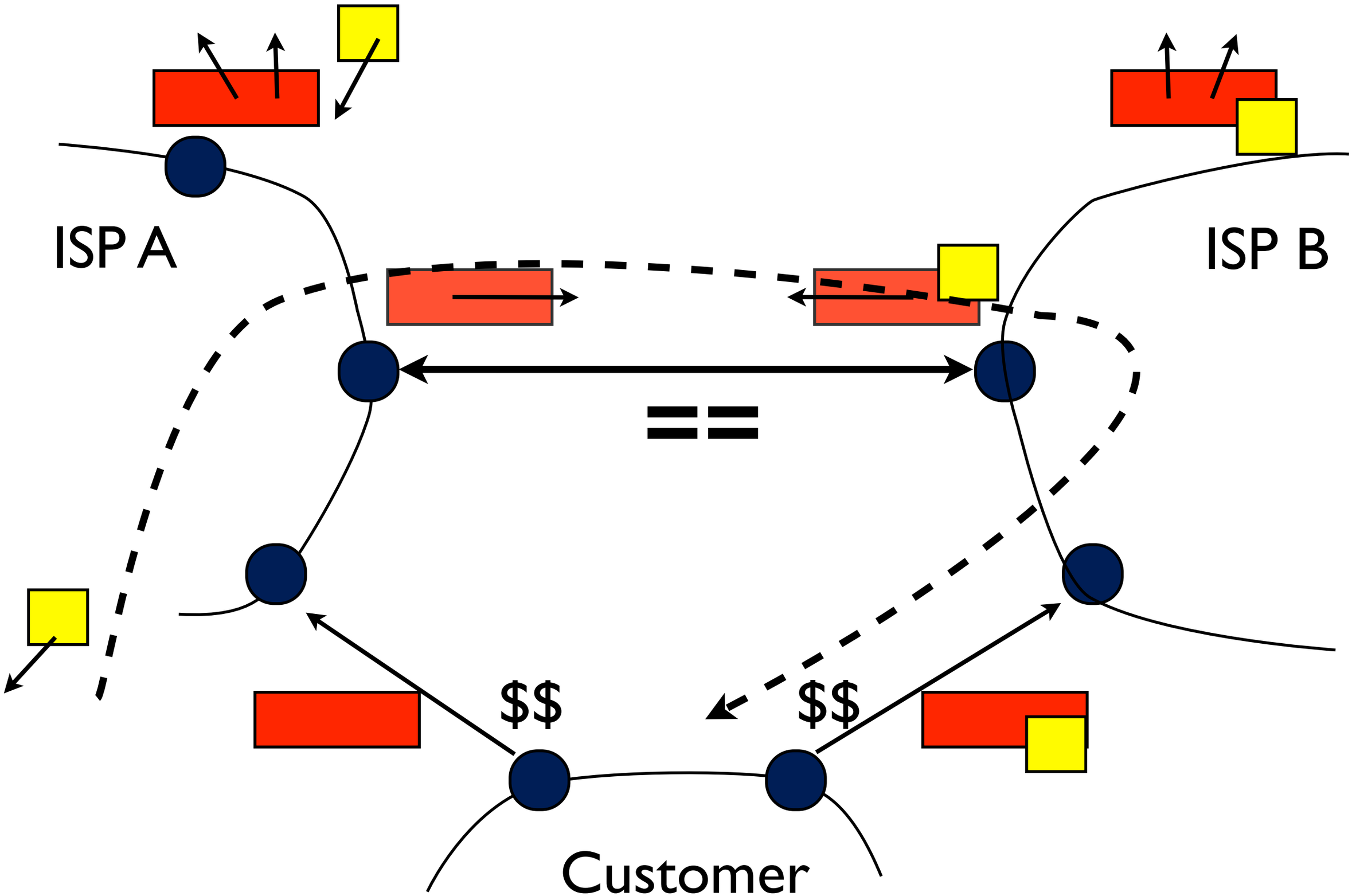

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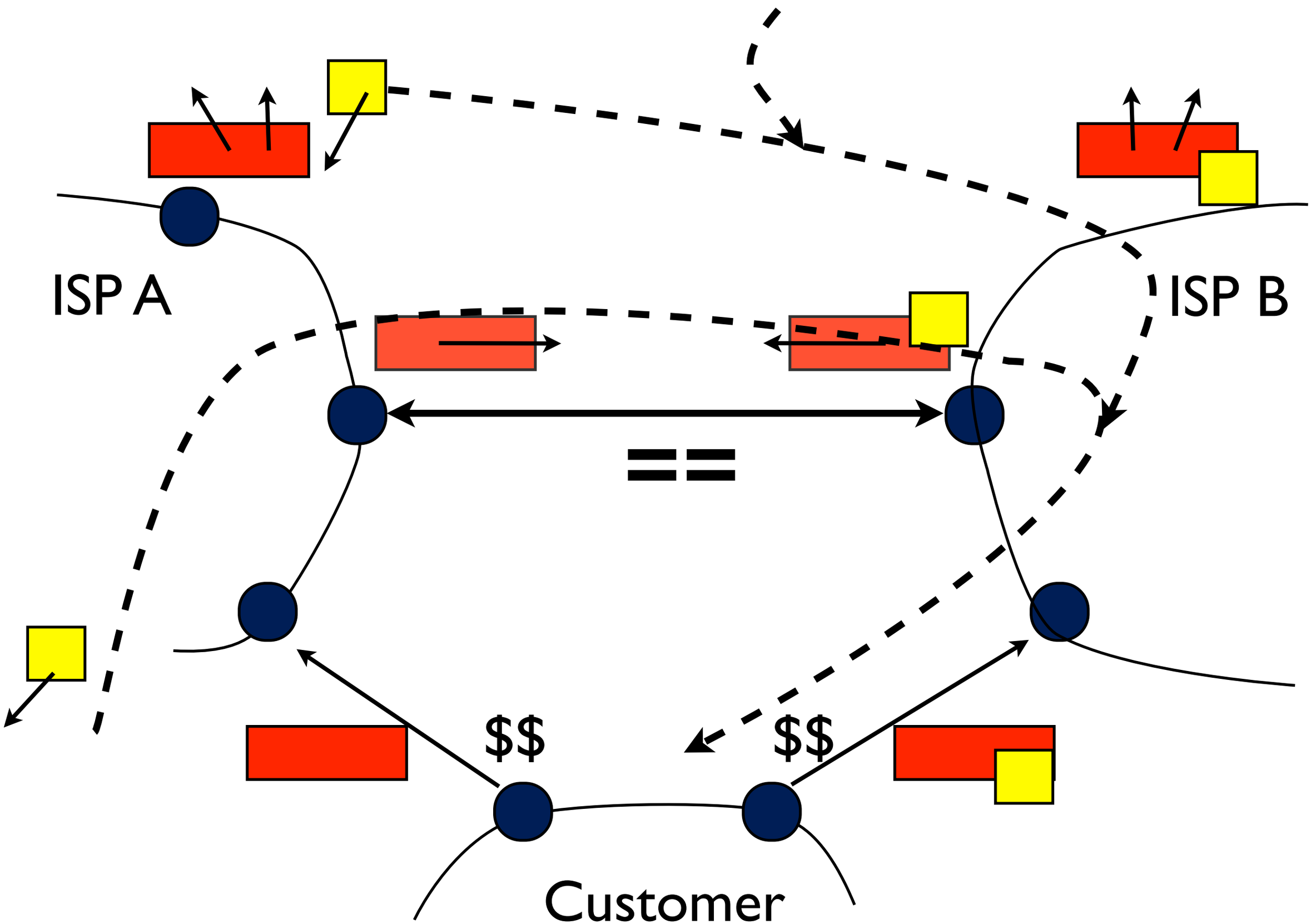
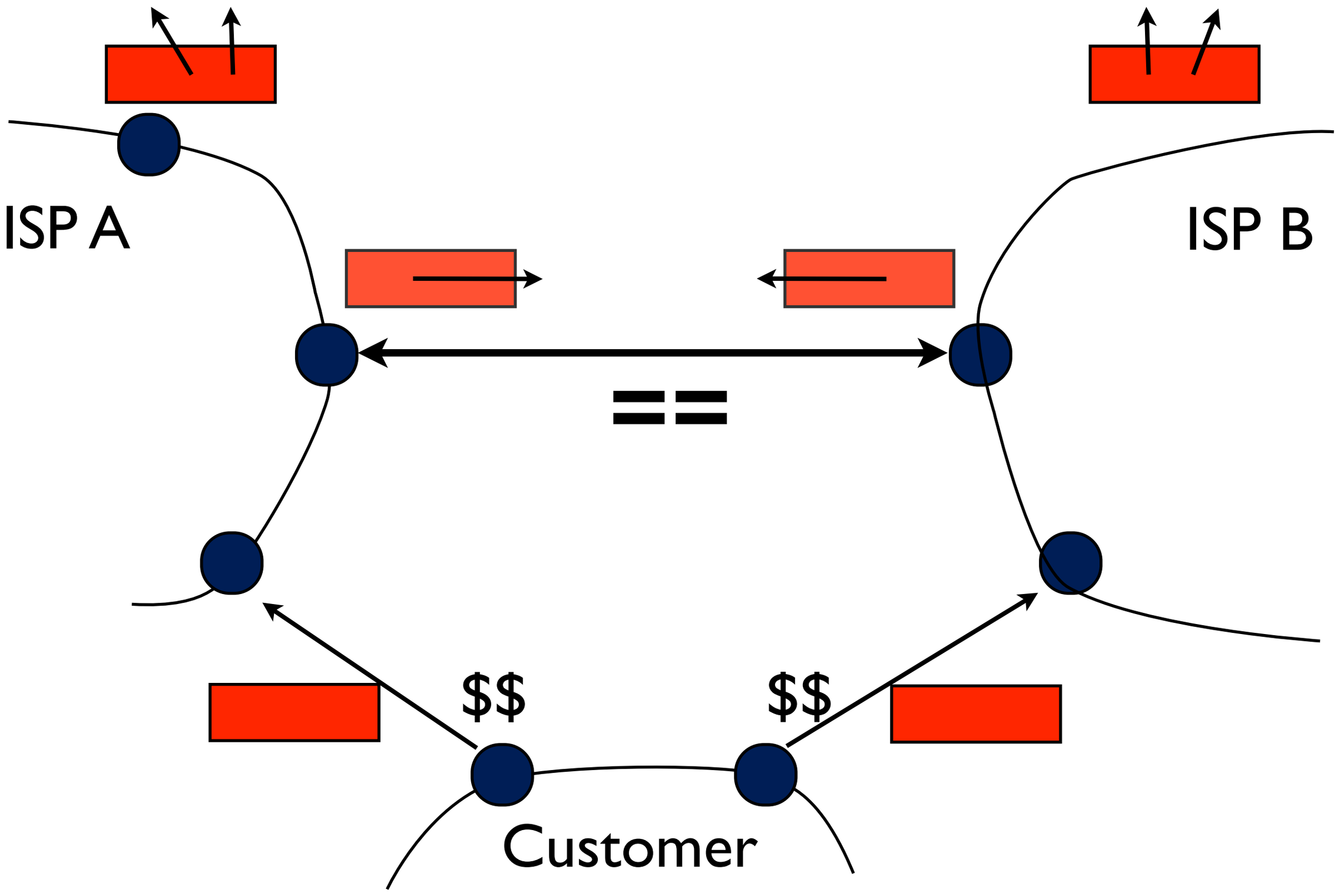


Scope the advertisement of the more specific



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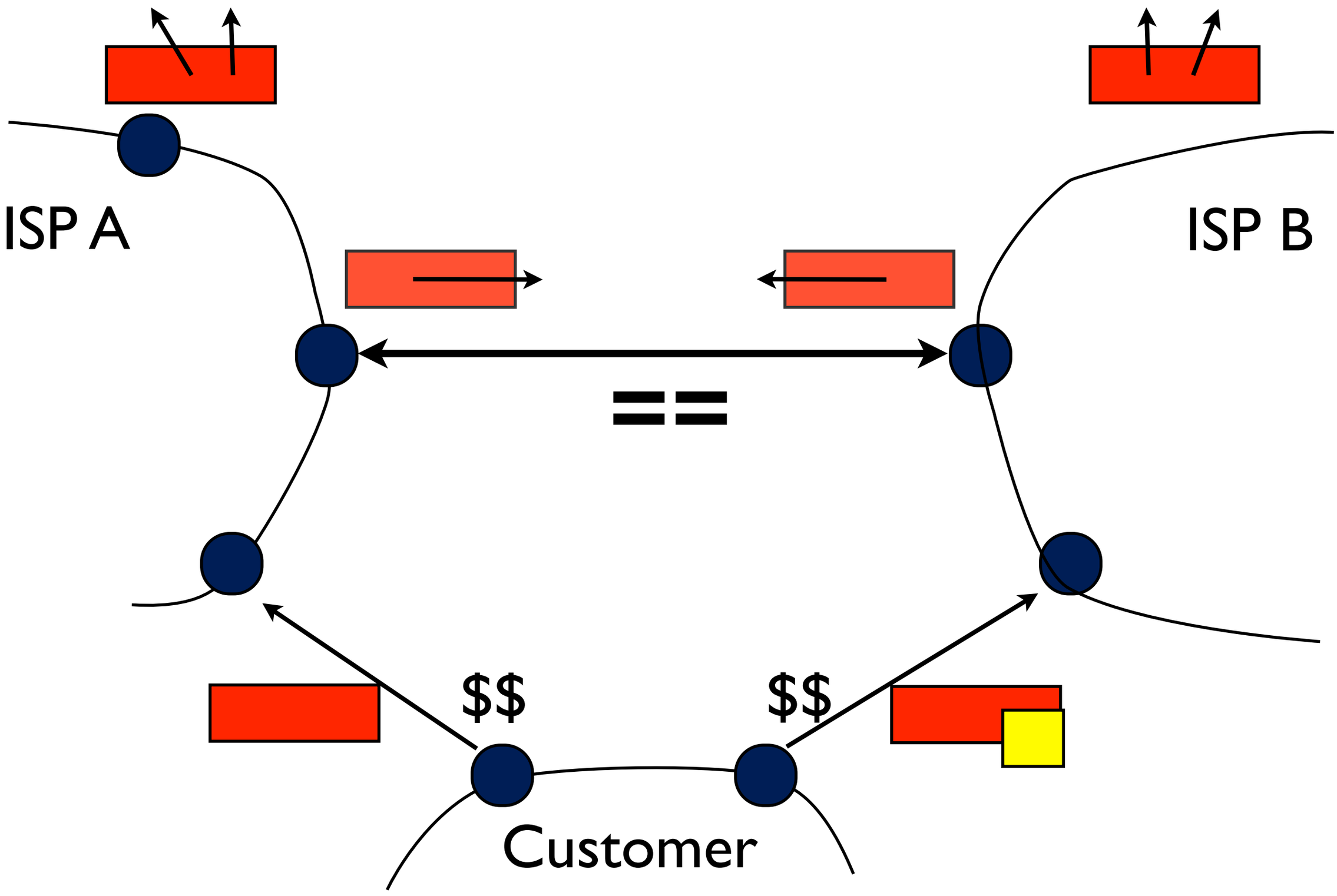

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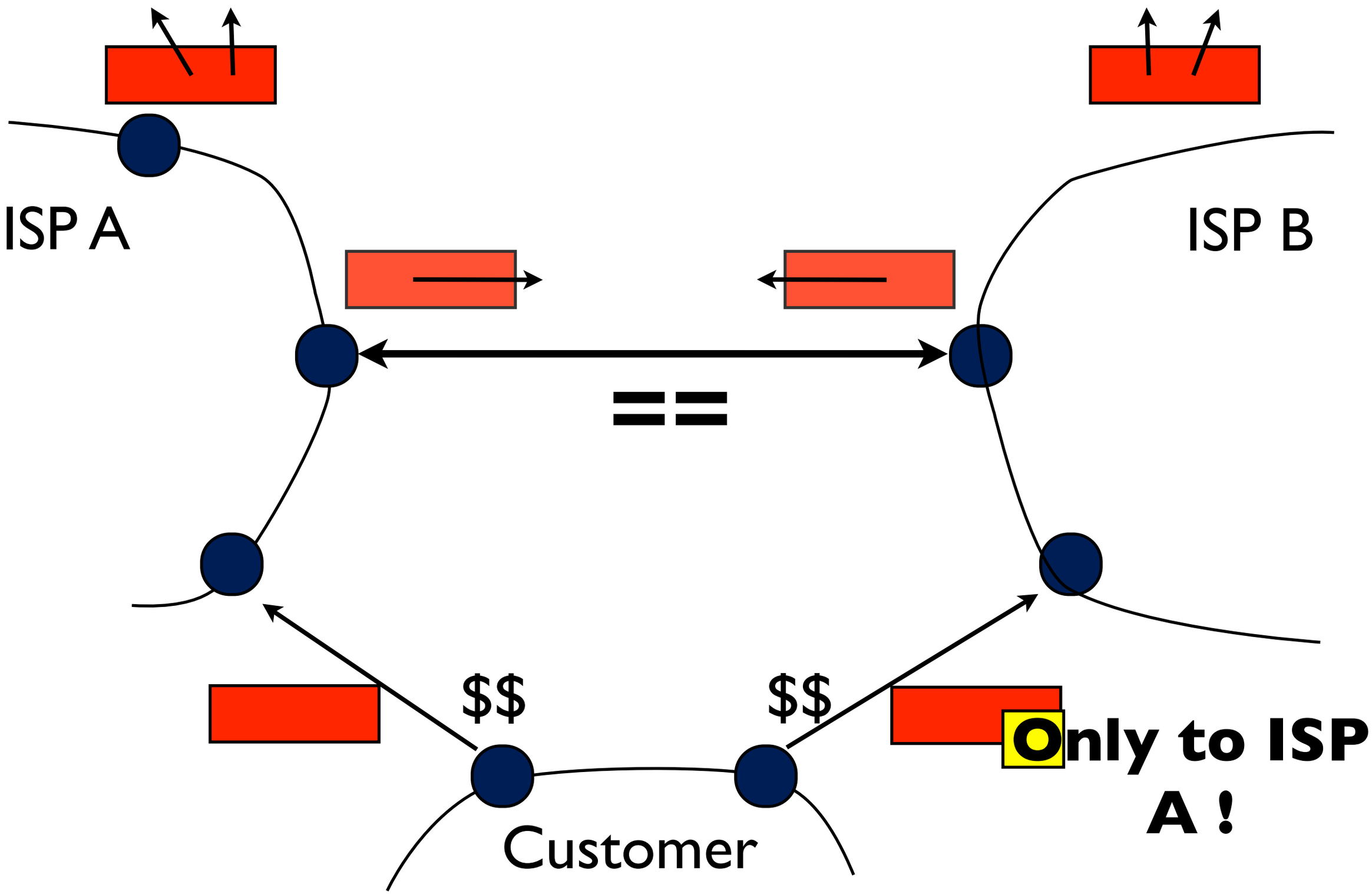

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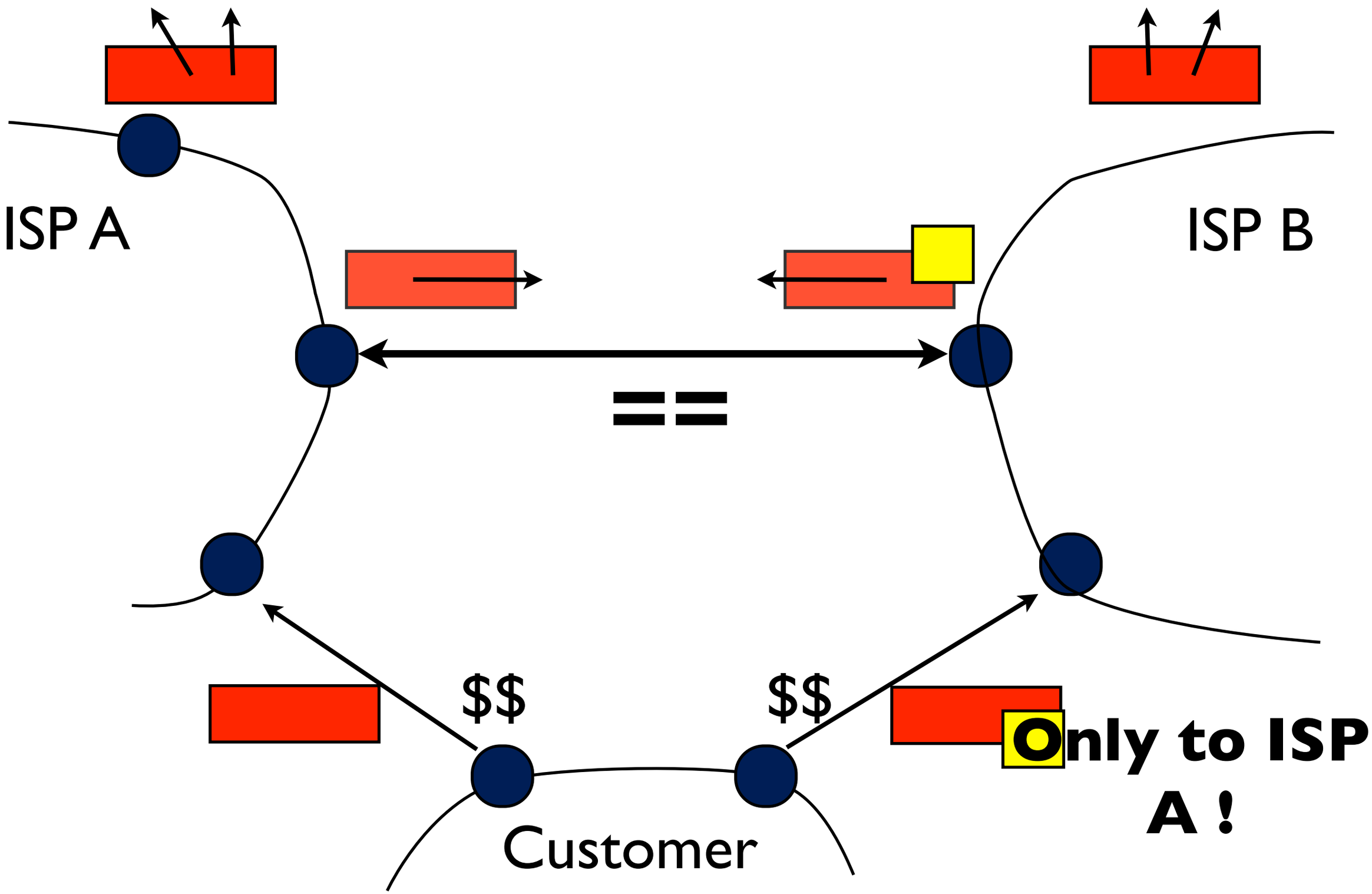

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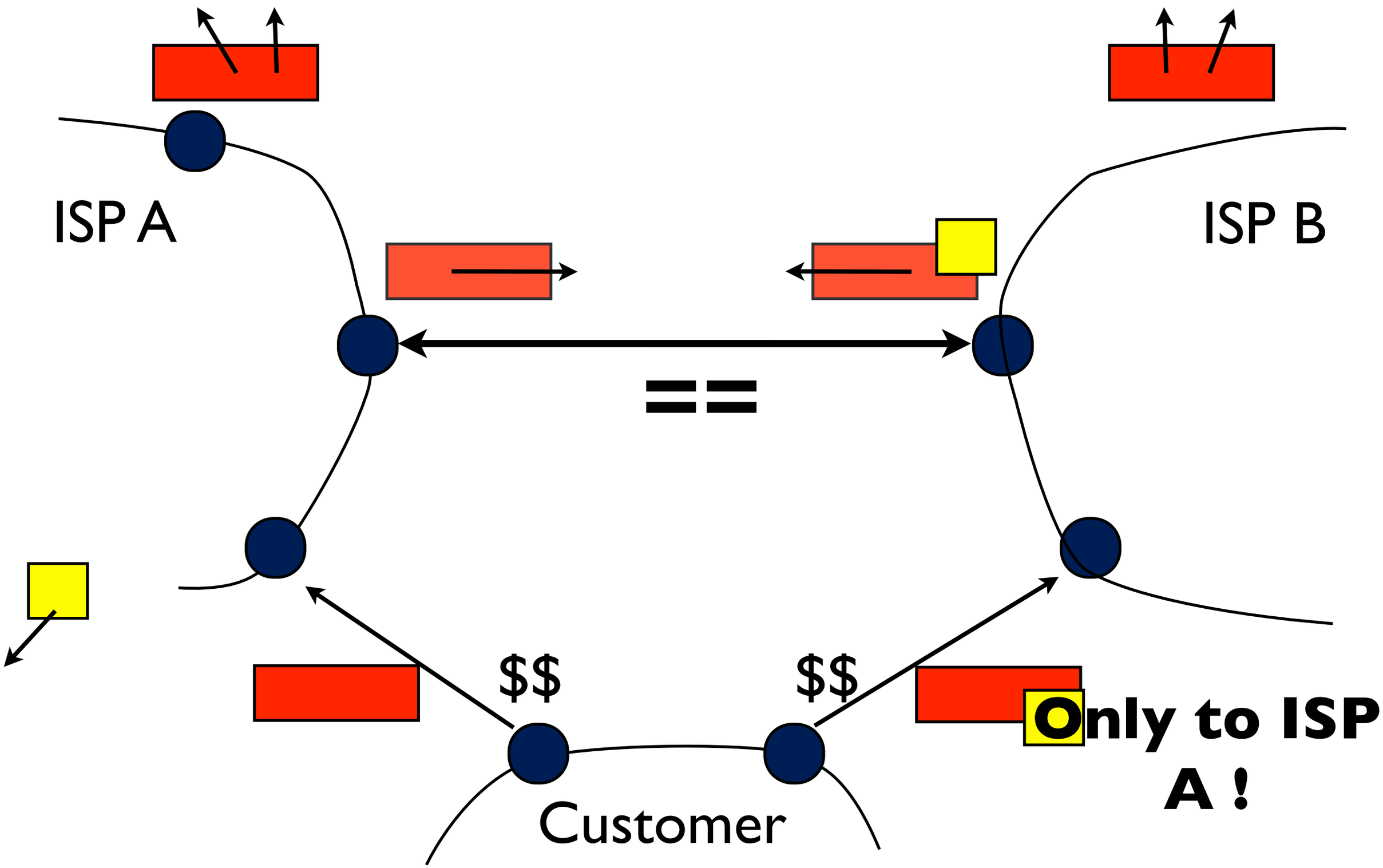

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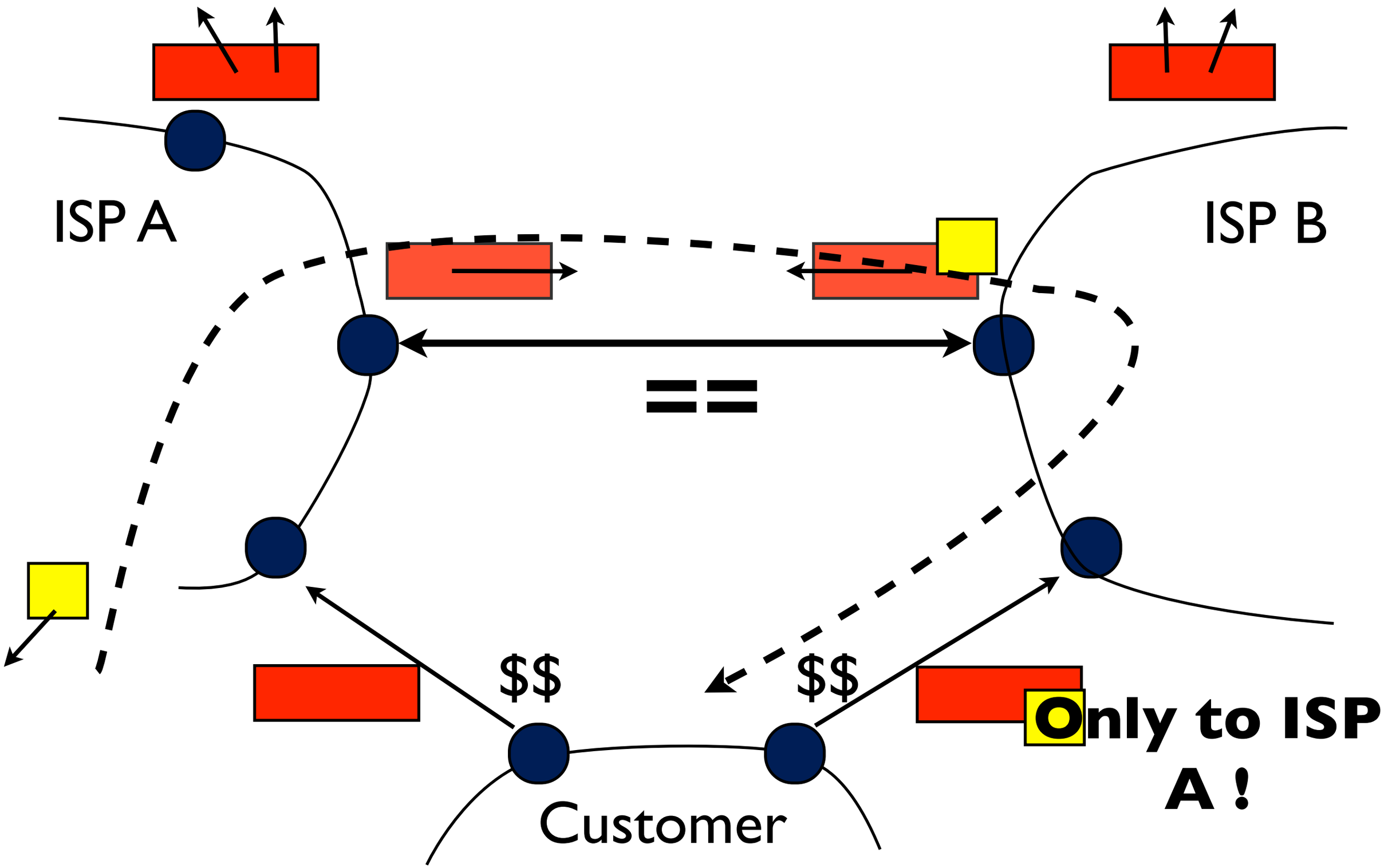
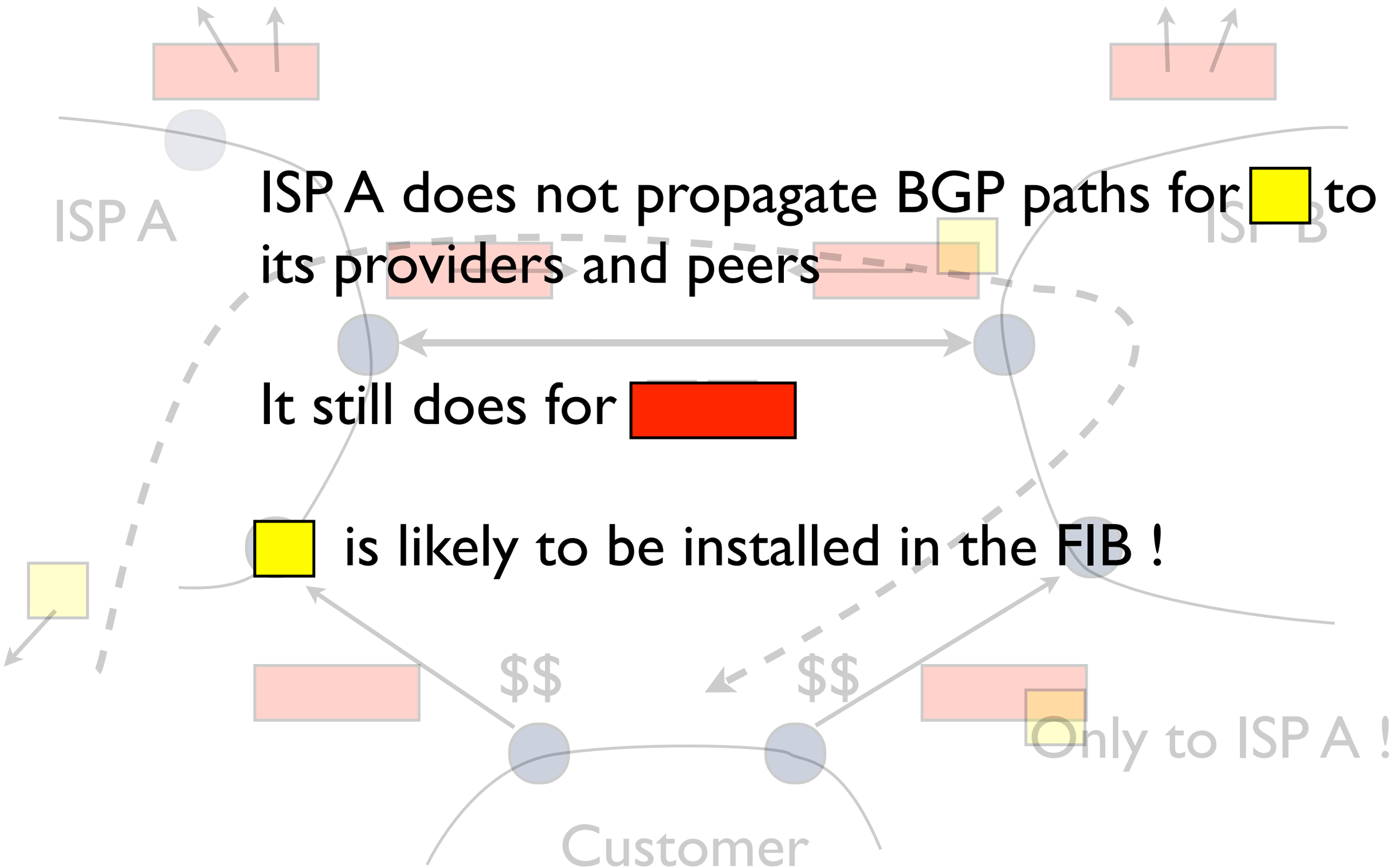


Let's start playing : Scope advertisement of the more specific

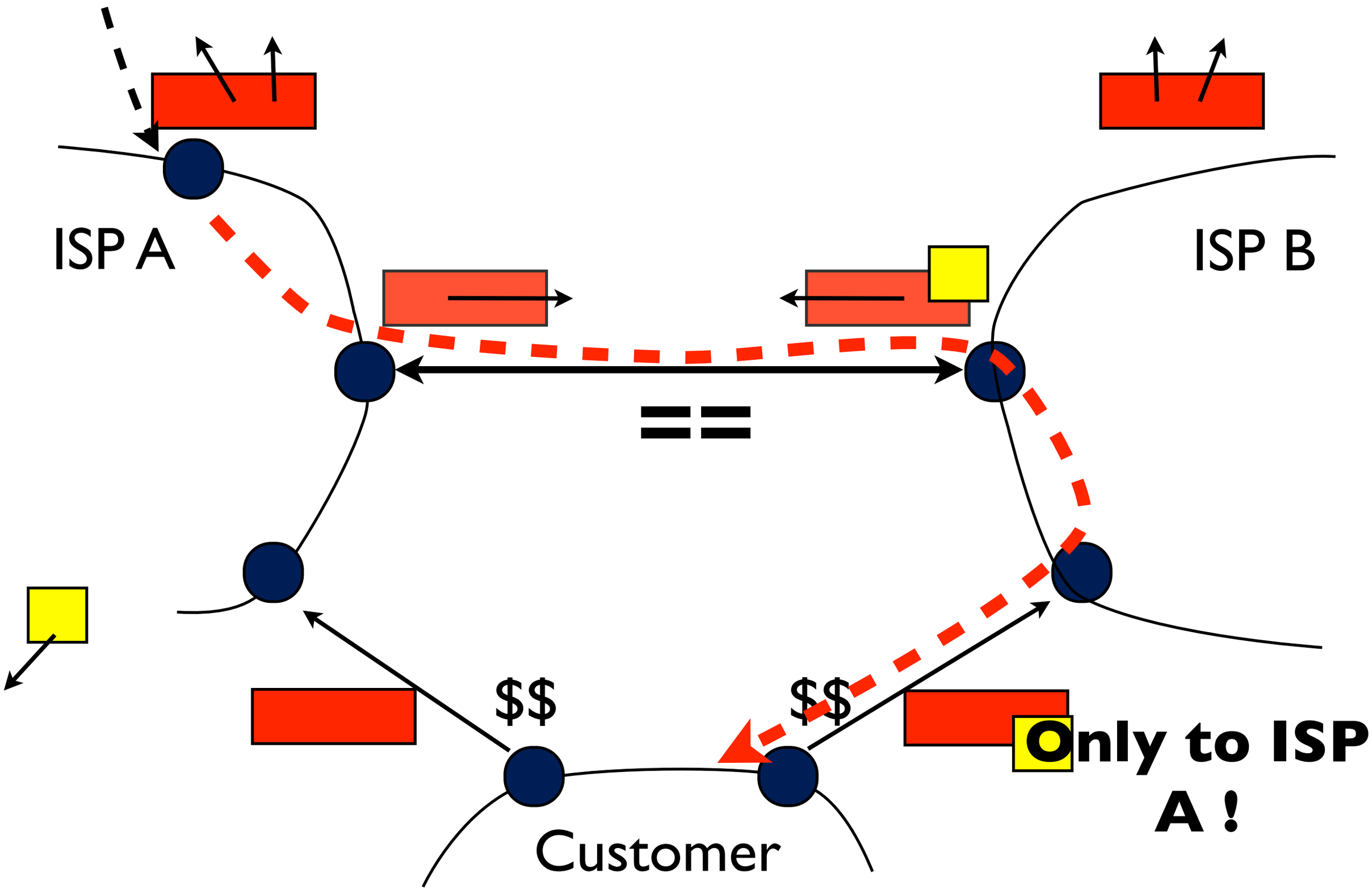


ISP A does not propagate BGP paths for to its providers and peers

It still does for

is likely to be installed in the FIB !

New path in the network



This is annoying

- Your policies can be violated
- Your flexible routing service can turn **you** into a transit thief when misused by **your** customers
- “Nothing breaks” when the violation takes place
- Ex. : Just consider the Tier-I clique...

So what can you do ?

- Forward differently
- Filter-out / Drop
- Monitor !

Forwarding differently

- Deploy BGP so as to have forwarding at an incoming interface solely based on policy fitting paths
  - Put the Internet in VRFs
  - Careful configuration of import rules
- Complex, Costly

Filtering out / Drop

- Drop packets, at ingress, for routes that are not supposed to be served there
  - Assume malicious behavior by default
  - Interrupts service from/to customers
- Filter out, at egress
  - Range served as if the msp did not exist

Monitor

- You got the means to monitor ingress-egress traffic demand to run your business, right ?
- “Just” check if counters for non-policy compliant transit
  - Pick the phone when counters are not at 0
  - Filter-out if the issue is not getting fixed early enough
- Seems like few operators run the check

PMACCT

- Tool developed by Paolo Lucente
  (See talk at RIPE 61 plenary)
- Policy violation check is a matter of a couple of lines

  http://wiki.pmacct.net/DetectingRoutingViolations
- Tools integrating with pmacct can benefit from this work
  (ie. Cariden)

Thanks !