

Active Measurement of the AS-Path Prepending Method

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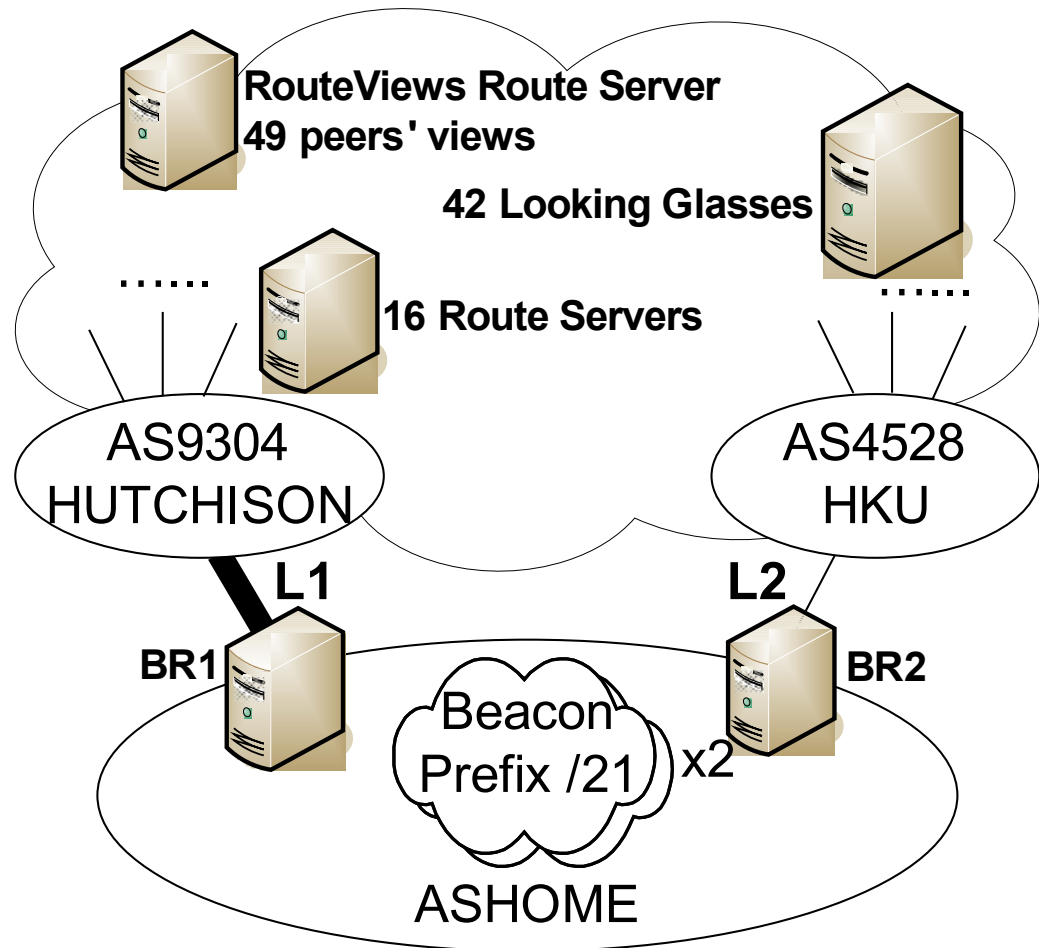
Motivations

- Apply AS-Path prepending on a **trial-and-error** basis to control the inbound traffic
- How effective can the AS-Path prepending method be?
- What would happen to the routes after prepending a link?
- What would happen to the Internet if a lot of ASes prepended their routes?

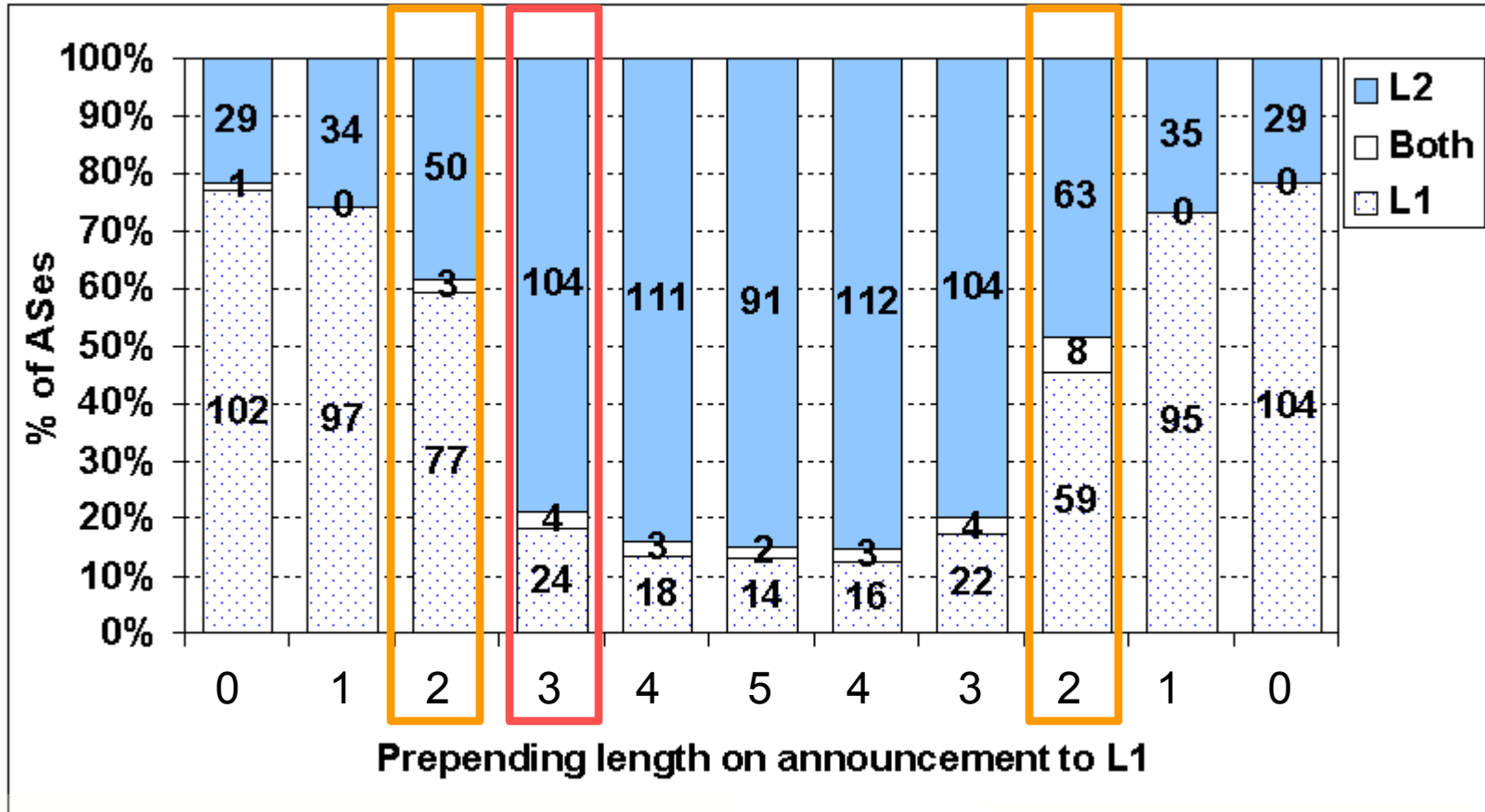
The Measurement Setup

2. Collect **routes** from different vantage points

1. Announce **beacon prefix** to both links with prepending on L1



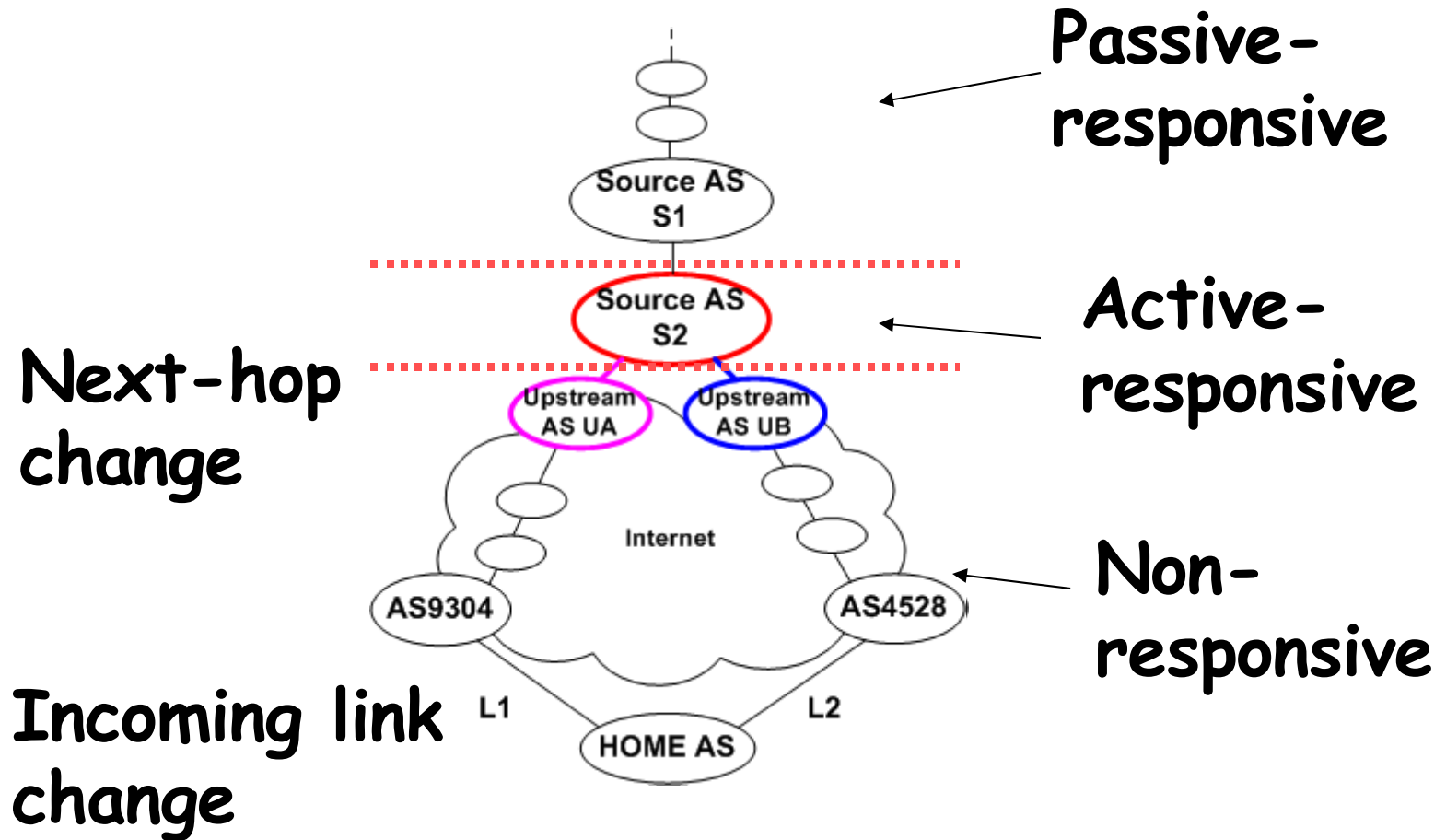
Results



**Greatest route change
on prepending length 2
→3**

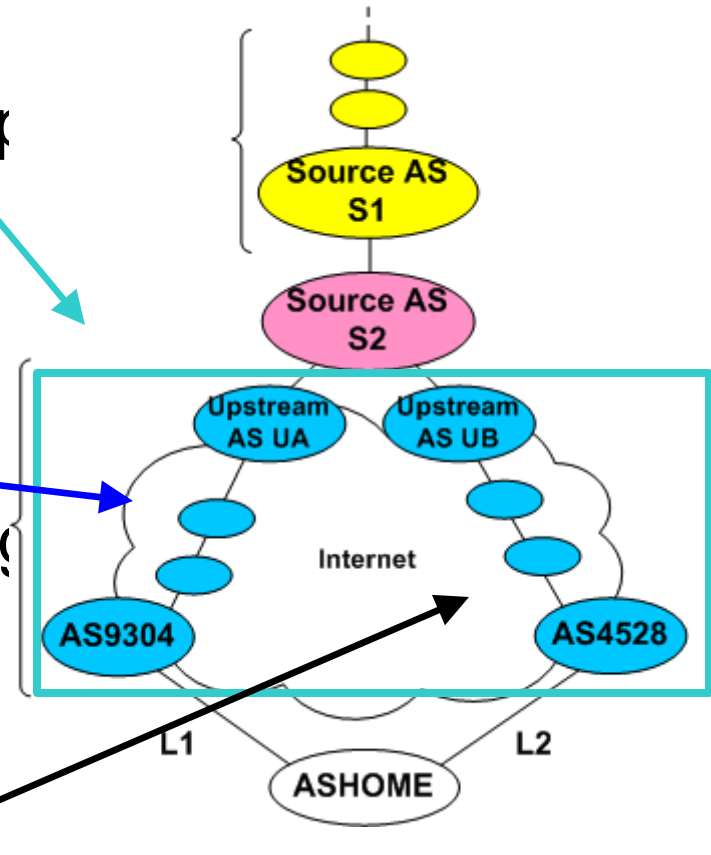
**Unbalanced
phenomenon**

Who was responsive to prepending???



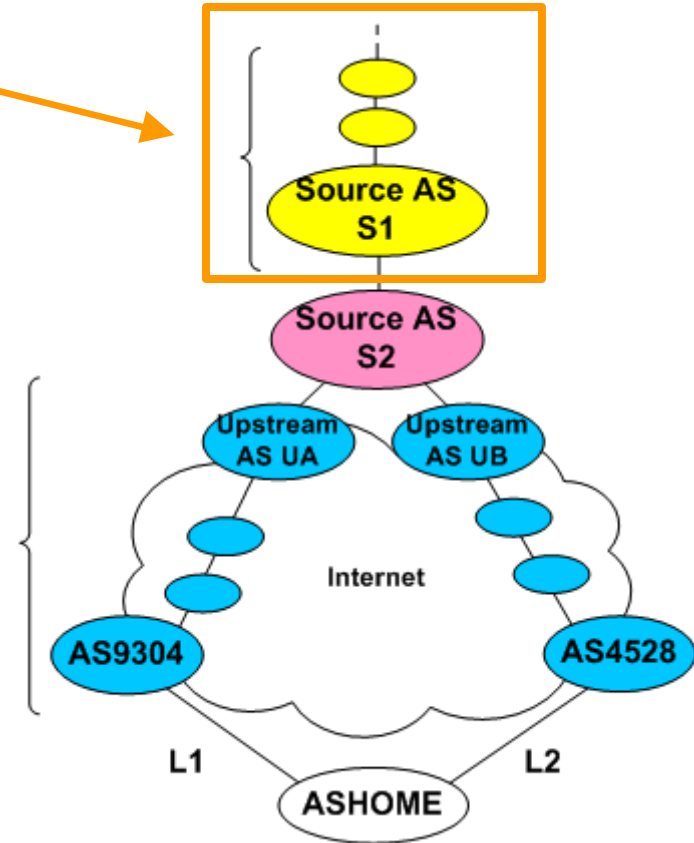
Non-responsive ASes

- 43 ASes
 - No change in either Incoming link and next-hop
- On L1 (14 ASes):
 - Use one next-hop only
- On L2 (29 ASes):
 - Not affected by prepending on L1



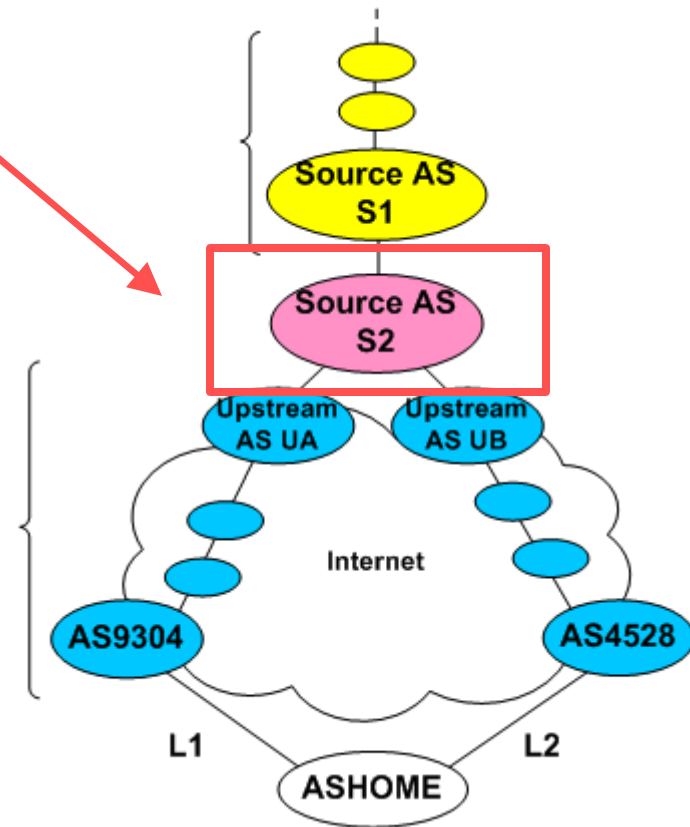
Passive-responsive ASes

- 26 ASes
 - Incoming link change
 - No change in next-hop
- Possible reasons:
 - No other possible routes
 - A higher LOCAL-PREF for that next-hop



Active-responsive ASes

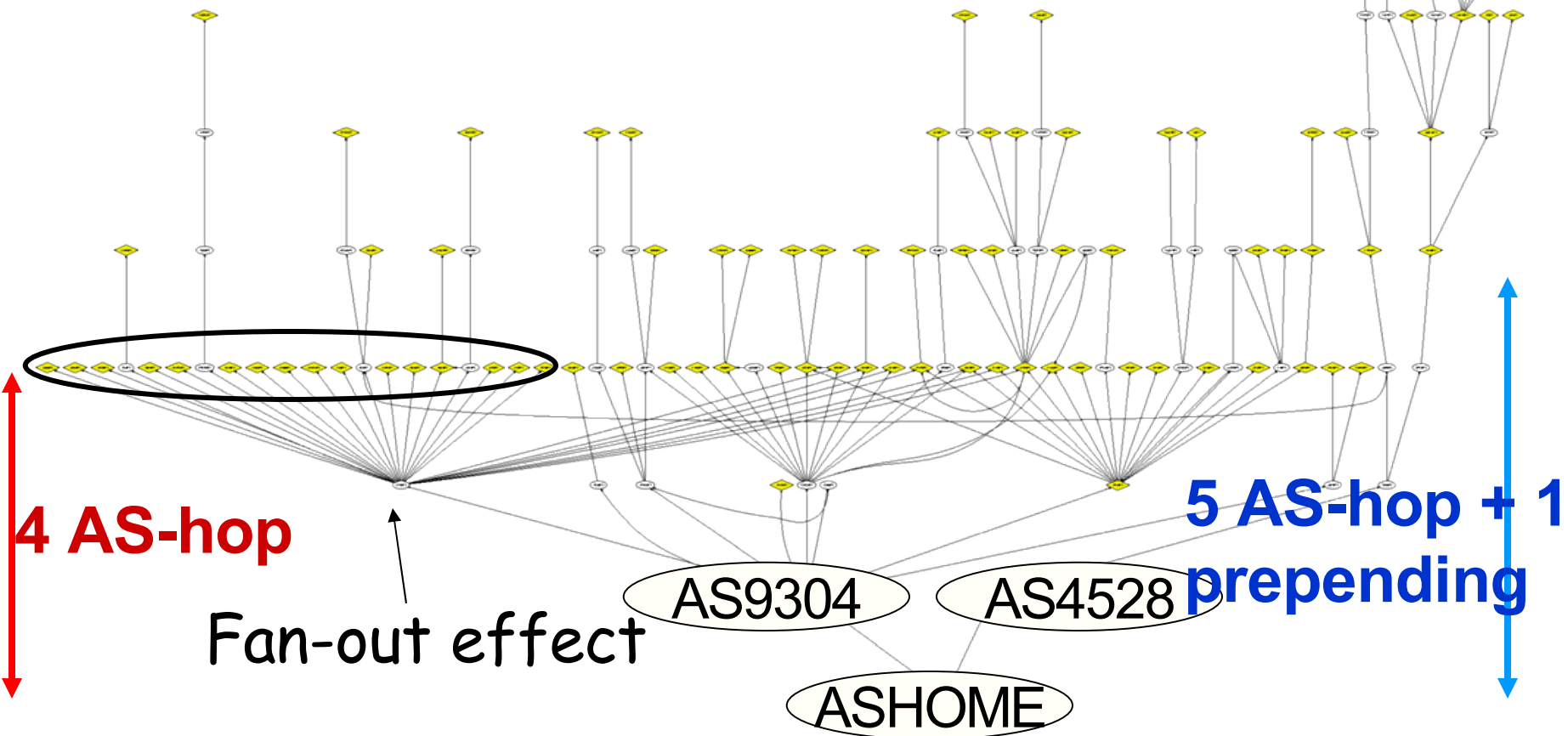
- 47 ASes
 - Both Incoming link and next-hop change
- Possible reasons:
 - Apply shortest-path policy
 - No higher LOCAL-PREF to a particular next-hop



Where are they???

Before prepending

After prepending



Where are those Active-responsive ASes?

Number of Active-responsive ASes	AS-Path length to L1		
	4	5	6
AS-Path length to L2			
5	1		
6	32		1
7	5	3	
8	1		2
9	1		1

"=" or ">" policy ?

AS-Path length: 5

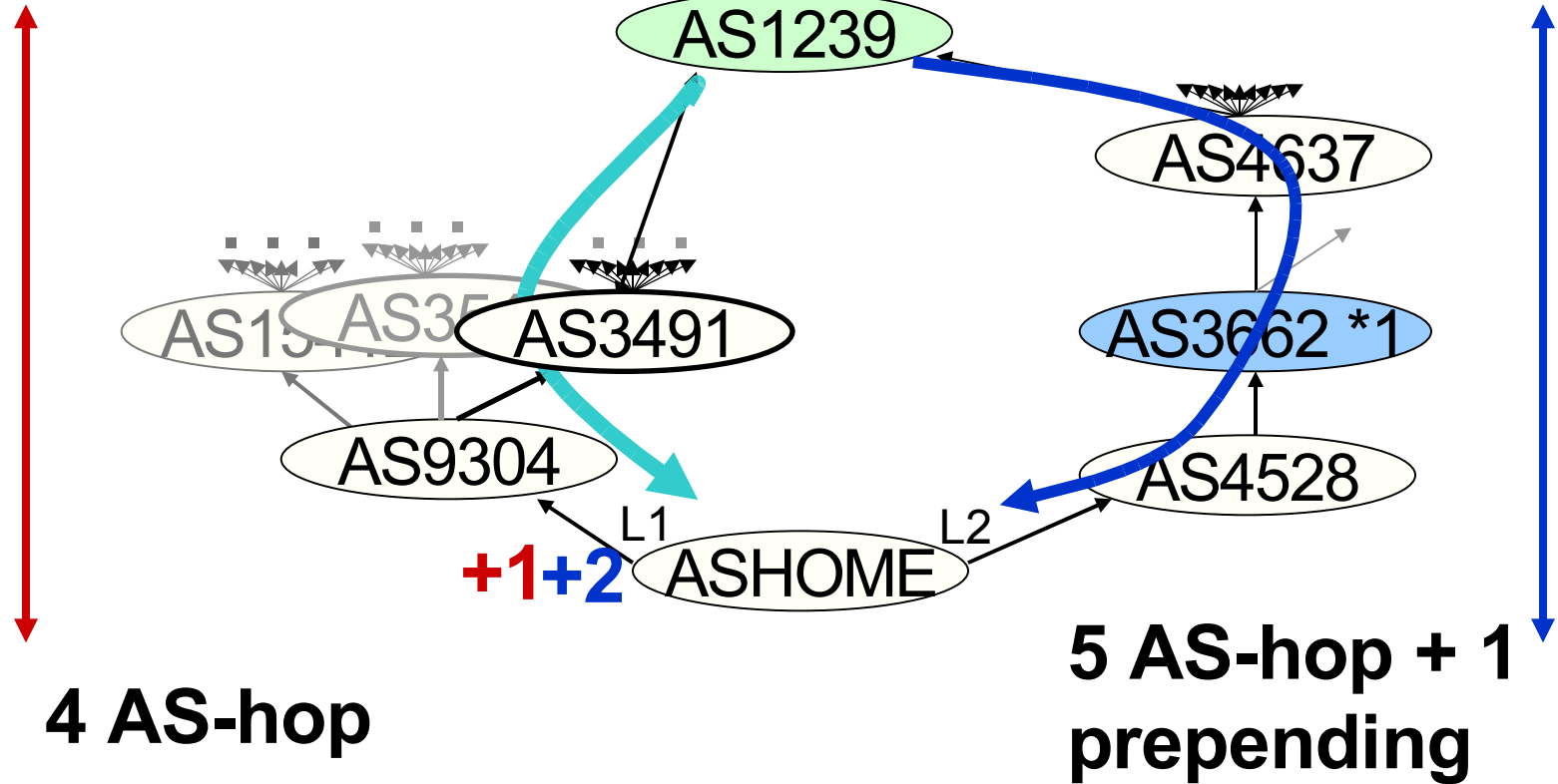
<

6

6

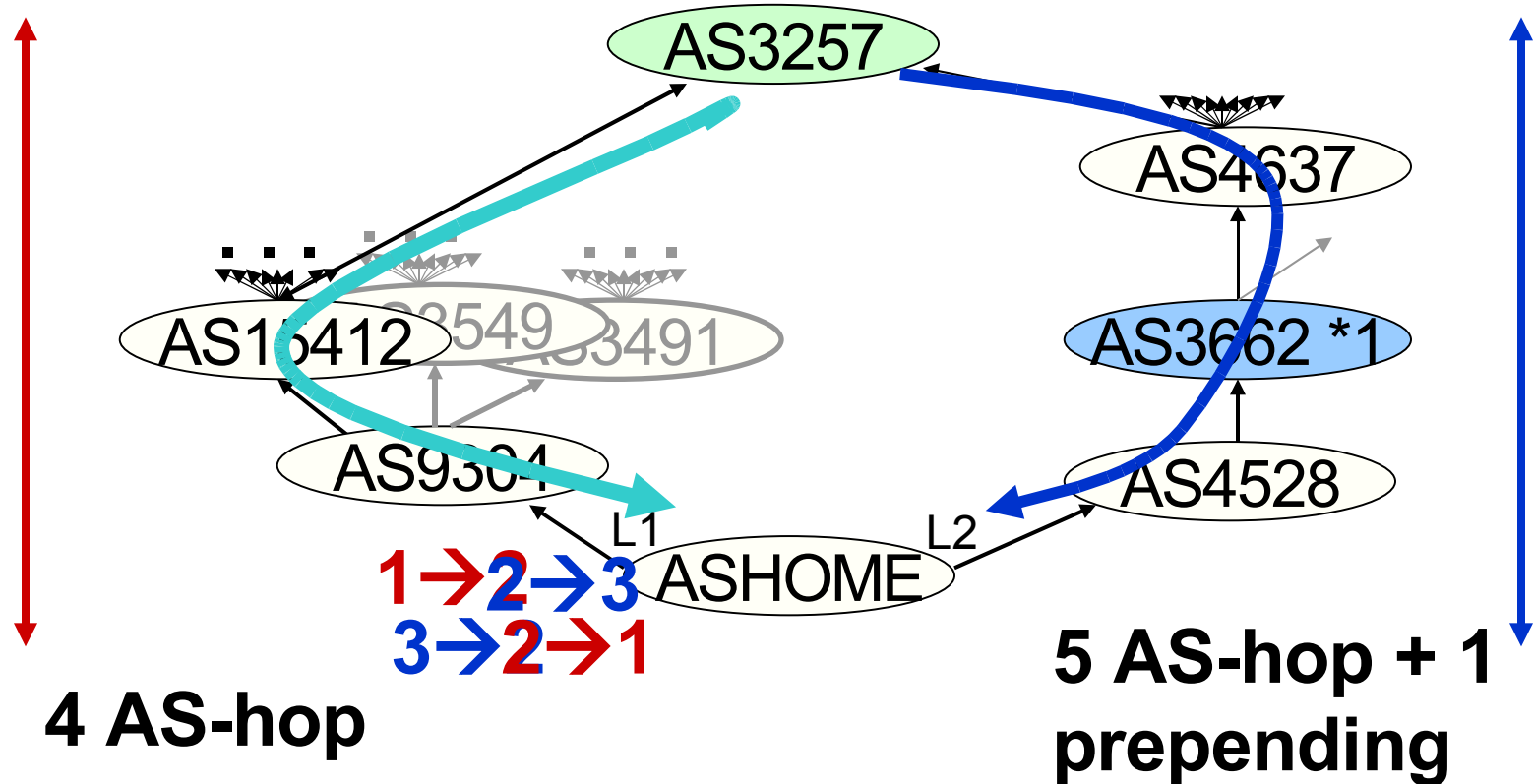
=

6



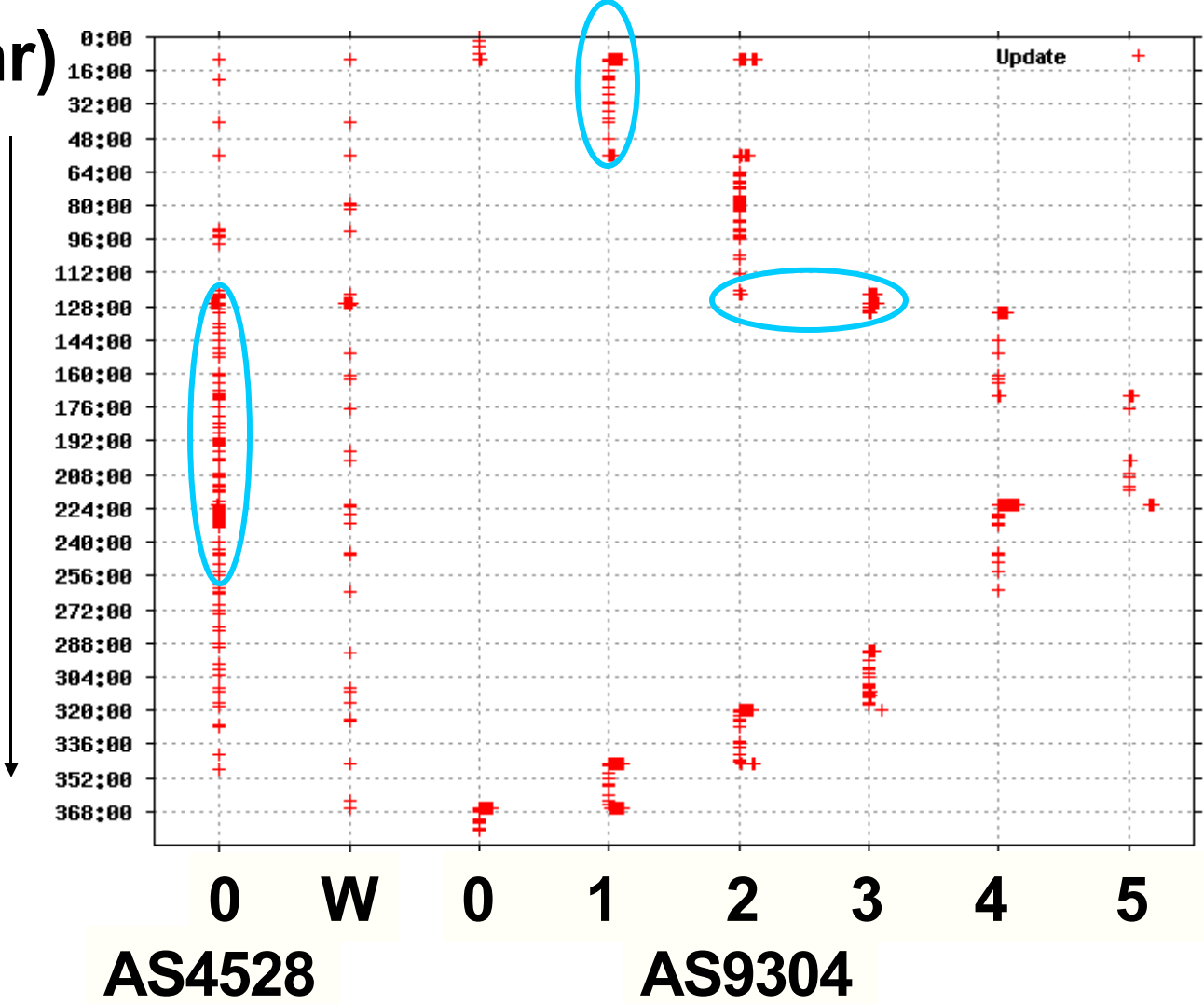
"=" or ">" policy ?

AS-Path length: 6	=	6	6	=	6
7	>	6	5	<	6



BGP Updates

Time (hr)



Conclusions & Future Work

- Route changes are introduced by active-responsive ASes
 - Shortest-path policies
 - Topology -> when they will change?
- Possible applications:
 - Predict the amount of traffic shift?
 - Discover the upstream ASes' policies.
- Replicate the measurement experiments in other sites
 - With longer prepending lengths
 - Prepend on both links
 - > 2 links

Acknowledgements

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- Michael Lo for setting up the active measurement facility.
- Lorenzo Colitti for generating the graphs of the AS topology and BGP updates.

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Q&A