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RIPE ATLAS

Analysis of network measurement data

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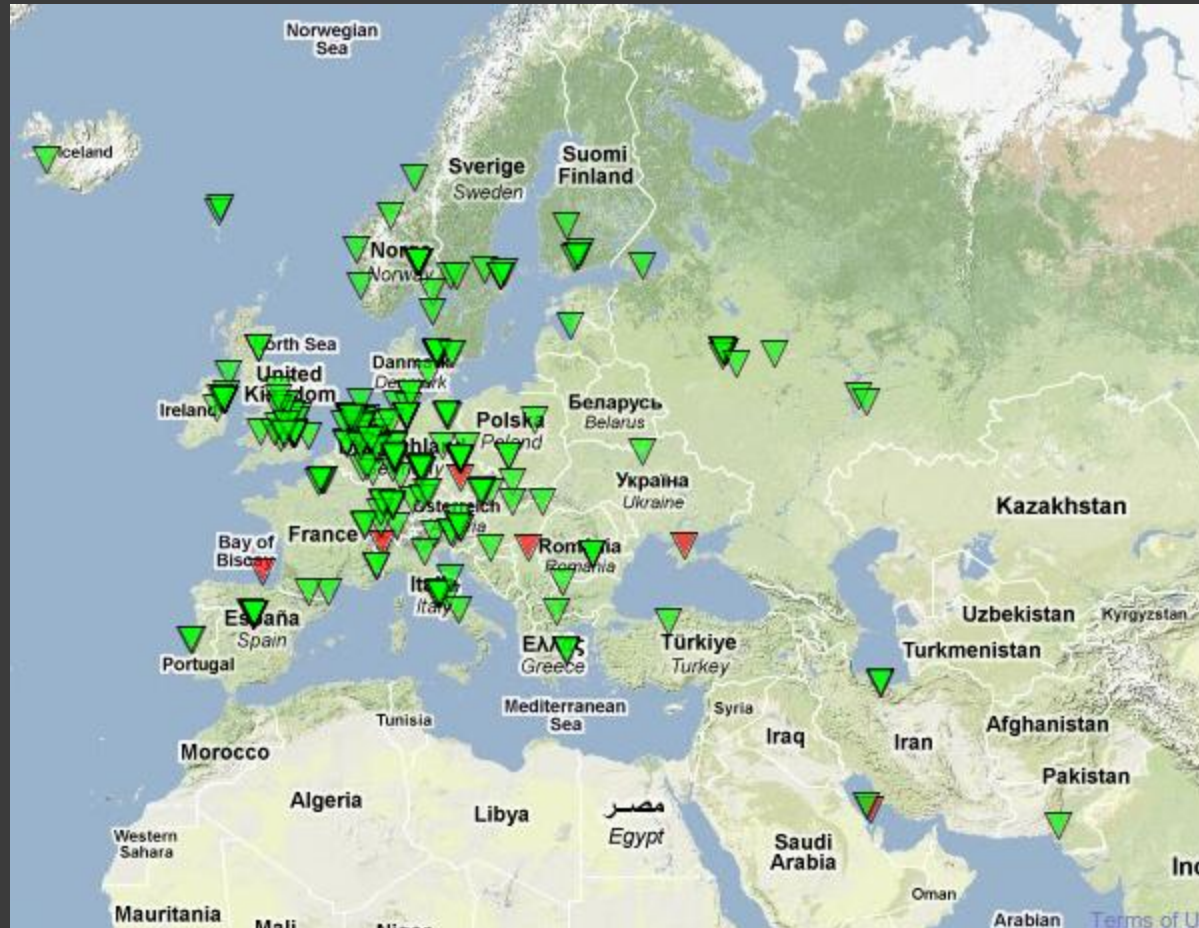
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Introduction to RIPE Atlas

- ⦿ *Active network monitoring*
 - *Probes*
 - *Scalability*
 - *In prototype stage*
 - *Compared to other network measurement systems*

- ⦿ *The purpose of RIPE Atlas*

Introduction to RIPE Atlas



Source: atlas.ripe.net

Research description

- ⦿ *A comparison between IPv4 and IPv6*
 - *Reliability*
 - *Performance*
 - *Detecting “interesting” events*

Research methodology [1/3]

⦿ *Research sample*

- *A total amount of 289 probes*
- *Analysis of 1 week of network monitoring*
 - *~ 1.5 million measurements*
- *Probes take measurements to a number of predefined locations*
 - *7 locations*
 - *7 IPv4*
 - *3 IPv6*

Research methodology [2/3]

- ⊙ *Measurement sample*
 - *Probe ID*
 - *Destination ID*
 - *Timestamp*
 - *Measurement values*
 - *Min/avg/max round trip time*
 - *Loss rate*
 - *“Duplicate rate”*

Research methodology [3/3]

⦿ *Data synthesis*

- *Removal of probes without dual stack connectivity*
- *Removal of probes without native IPv6 connectivity*
- *Removal of samples without measurement values*

⦿ *Correlation of measurement values*

- *“Geographical”*
- *“Topological”*

Comparing data

- *Comparison indexes*
 - *Calculated per timestamp over the entire data set*
 - *Calculated mean/median index per source/destination pair*
 - *Correlating source/destination pairs*
 - *Example formula:*
$$x = \frac{\text{IPv6 avg RTT}}{\text{IPv4 avg RTT}}$$

Results [1/5]

● *Reliability*

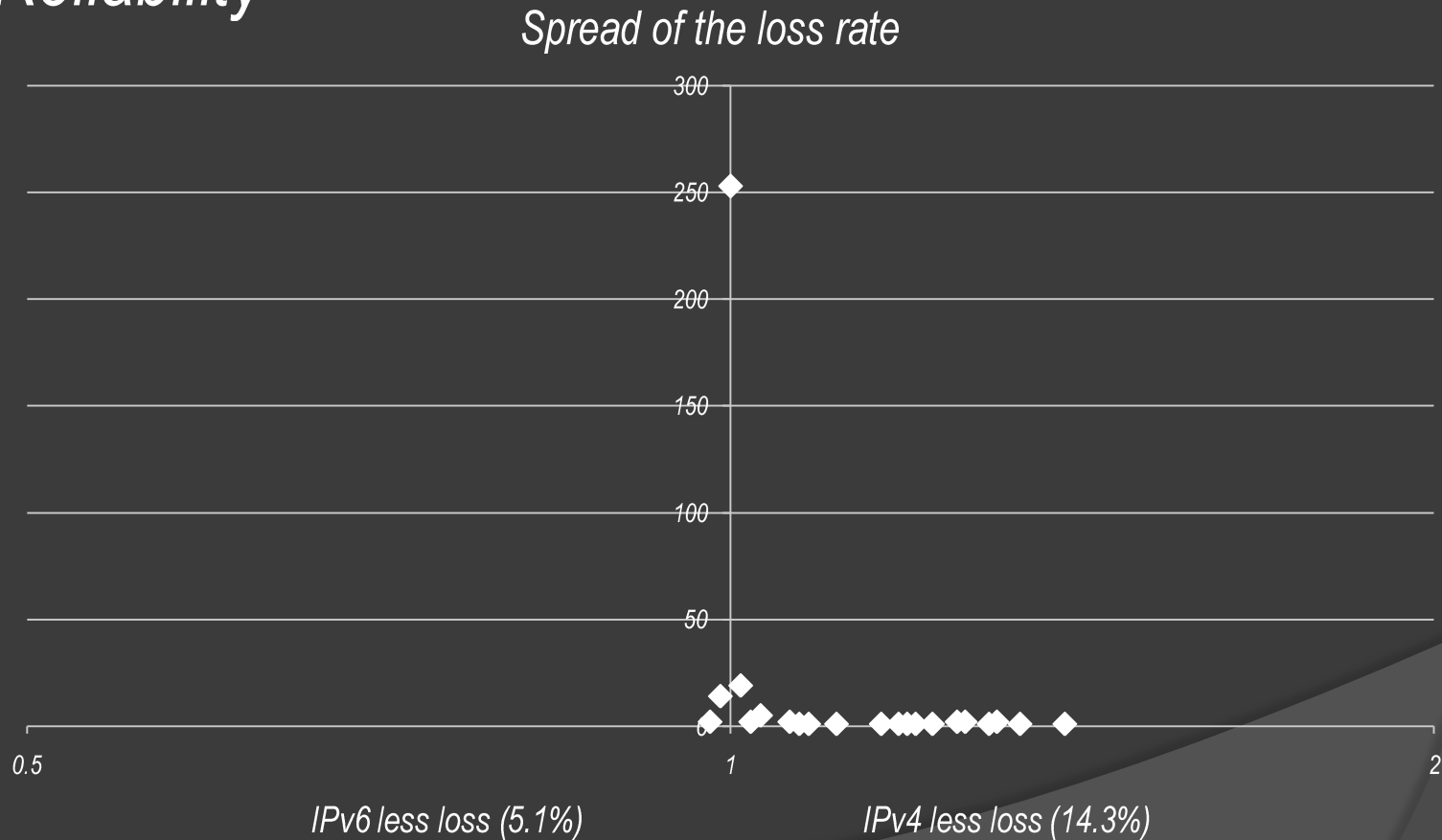
- *Generic comparison, based on loss rate*

<i>Destination</i>	<i>Mean reliability index</i>
<i>K-root</i>	<i>1.01829</i>
<i>M-root</i>	<i>1.00876</i>
<i>L-root</i>	<i>1.01297</i>
<i>Mean</i>	<i>1.01334</i>

- *“Geographical comparison”*
- *“Topological comparison”*

Results [2/5]

Reliability



Results [3/5]

⦿ Performance

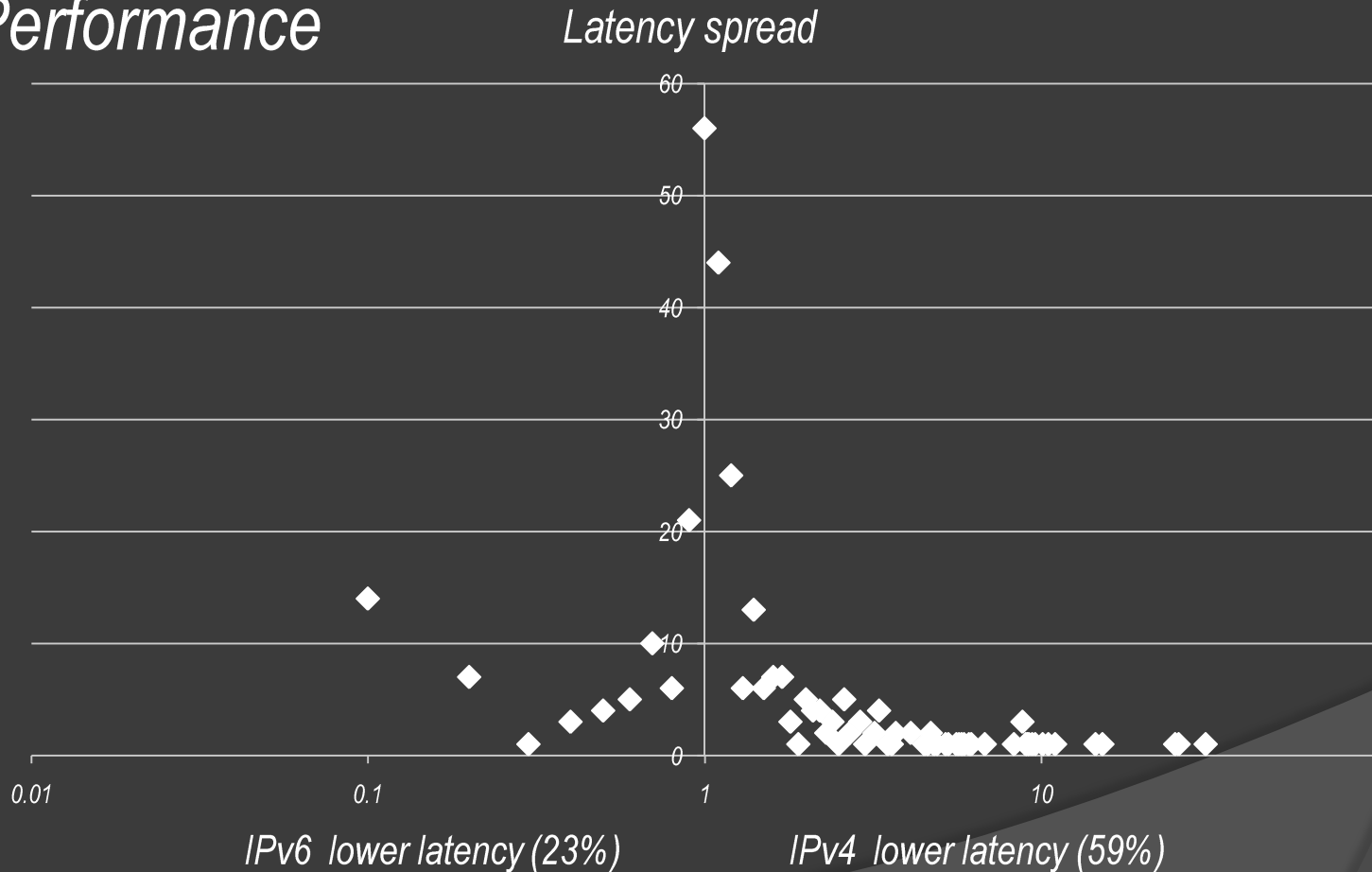
- *Generic comparison, based on latency*

<i>Destination</i>	<i>Mean perf. index</i>	<i>Median perf. index</i>
<i>K-root</i>	<i>1.72</i>	<i>1.08</i>
<i>M-root</i>	<i>1.68</i>	<i>1.02</i>
<i>L-root</i>	<i>2.89</i>	<i>1.25</i>
<i>Mean/median</i>	<i>2.10</i>	<i>1.08</i>

- *“Geographical comparison”*
- *“Topological comparison”*

Results [4/5]

● Performance



Results [5/5]

⦿ *Interesting events*

- *Definition of an interesting event*
- *Researched 10 events that affected the most probes*

- *Interesting event that affected the most probes*
 - *Highest impact on the k-root*
 - *Impacted both IPv4 and IPv6*
 - *Affected 31 probes in 15 different autonomous systems*
 - *Affected 8 countries*
 - *Duration of about 30 minutes*

Conclusion & recommendations

⦿ *Conclusion*

- *Overall IPv6 service slightly less in performance and reliability than IPv4 service*

⦿ *Recommendations*

- *Possibly add better functionality for detecting tunnels*
- *Possibly add IPv4 and IPv6 unicast destinations*
- *Possibly add traceroute functionality*
- *Spread probes more evenly*