RIPENCC, Oregon Route Views & AMSIX

Comparative analysis of BGP update metrics

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Agenda

- Rationale
- Metric Taxonomy
- Methodology
- Results
- Conclusions
- Credits

Rationale

- Degree of similarity amongst collection points
- Effects of single/multi hop & keep alive on/off
- Geographic correlation

Metric Taxonomy

- # announcements
- # withdrawals
- # AS path changes (per peer prefix sum)

Methodology I

•Collection points:

- RIPENCC – multi hop, keep alive off
- Oregon Route Views – multi hop, keep alive on
- AMSIX – single hop, keep alive on

•Select time period with following characteristics:

- continuous collection at all three points
- small # of erroneous update packets (illegal attributes, type 14 usually)
- contains traffic originating in all three geographies
- daily prefix activity

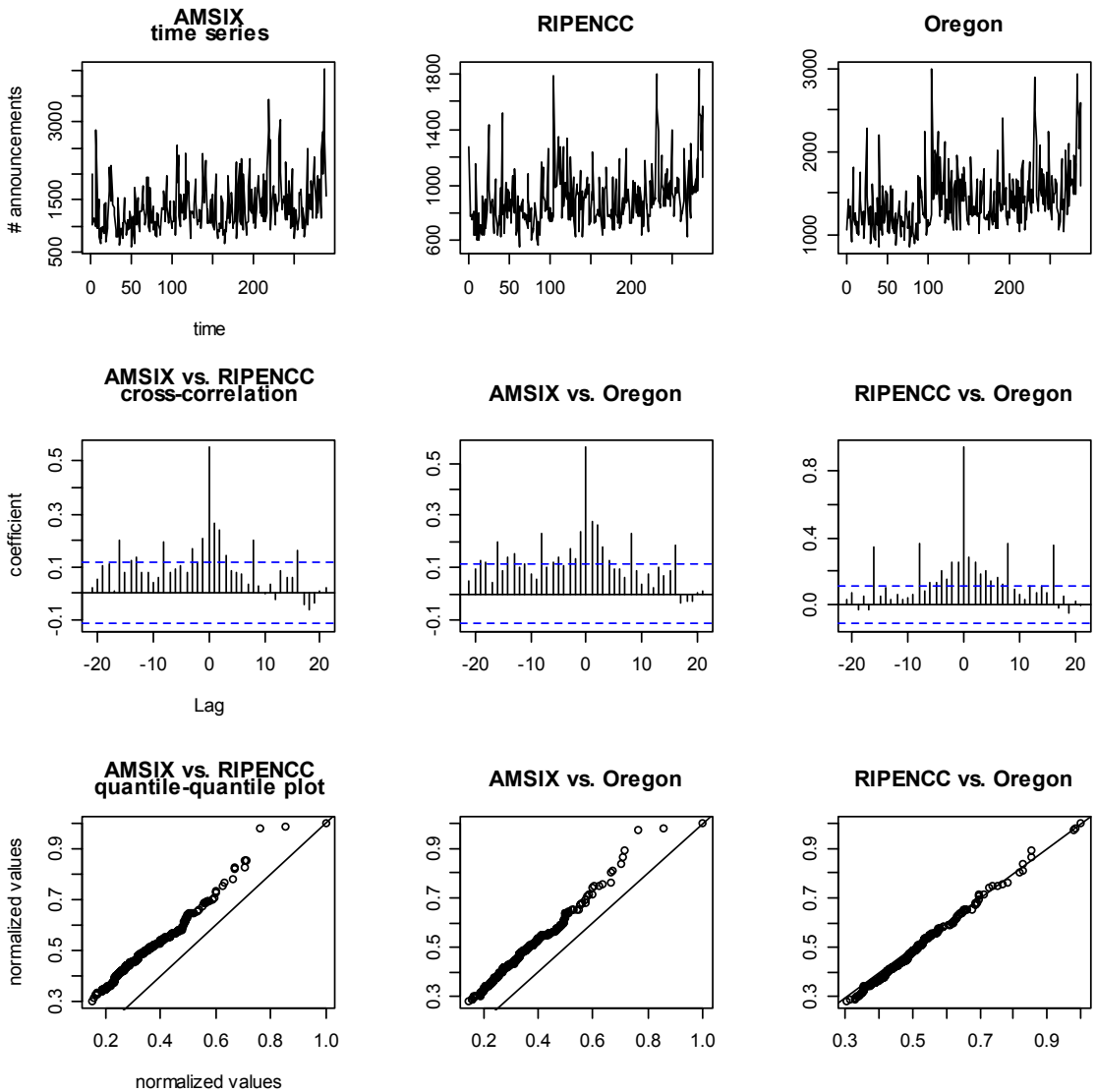
•Extract metrics data vectors (one measurement point every 15 minutes)

•Compute time cross-correlation & compare metric distributions

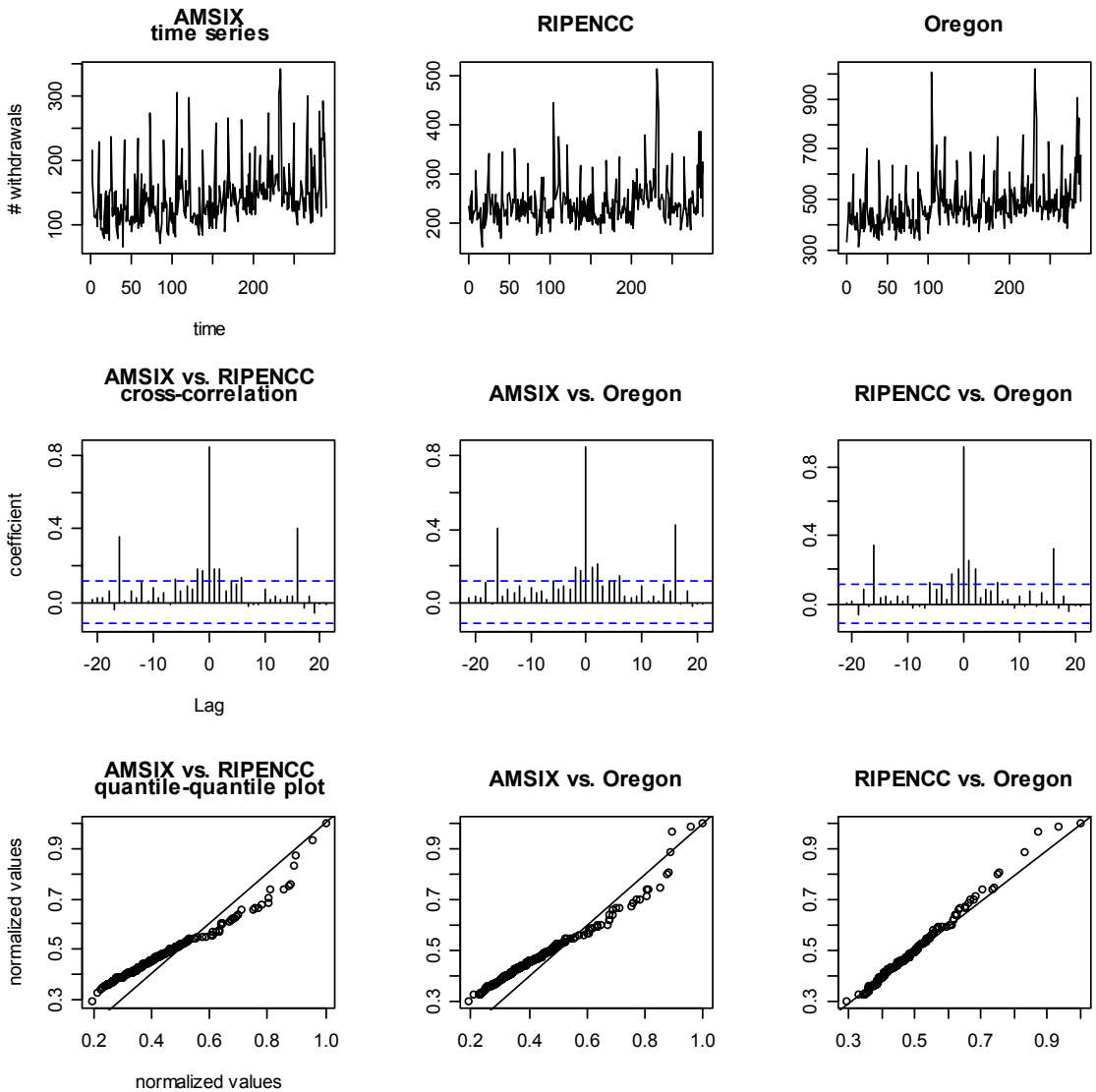
Methodology II

- Study period is April 3 through 5, 2003
- All peers included at each location
- < %0.1 updates lost due to illegal update attribute packets
- 132 prefixes were active daily (9 beacons)
- 7x/16, 2x/18, 4x/19, 3x/20, 4x/21, 5x/22, 7x/23, 100x/24
- 60x ARIN, 29x APNIC, 31x RIPE, 12x LACNIC

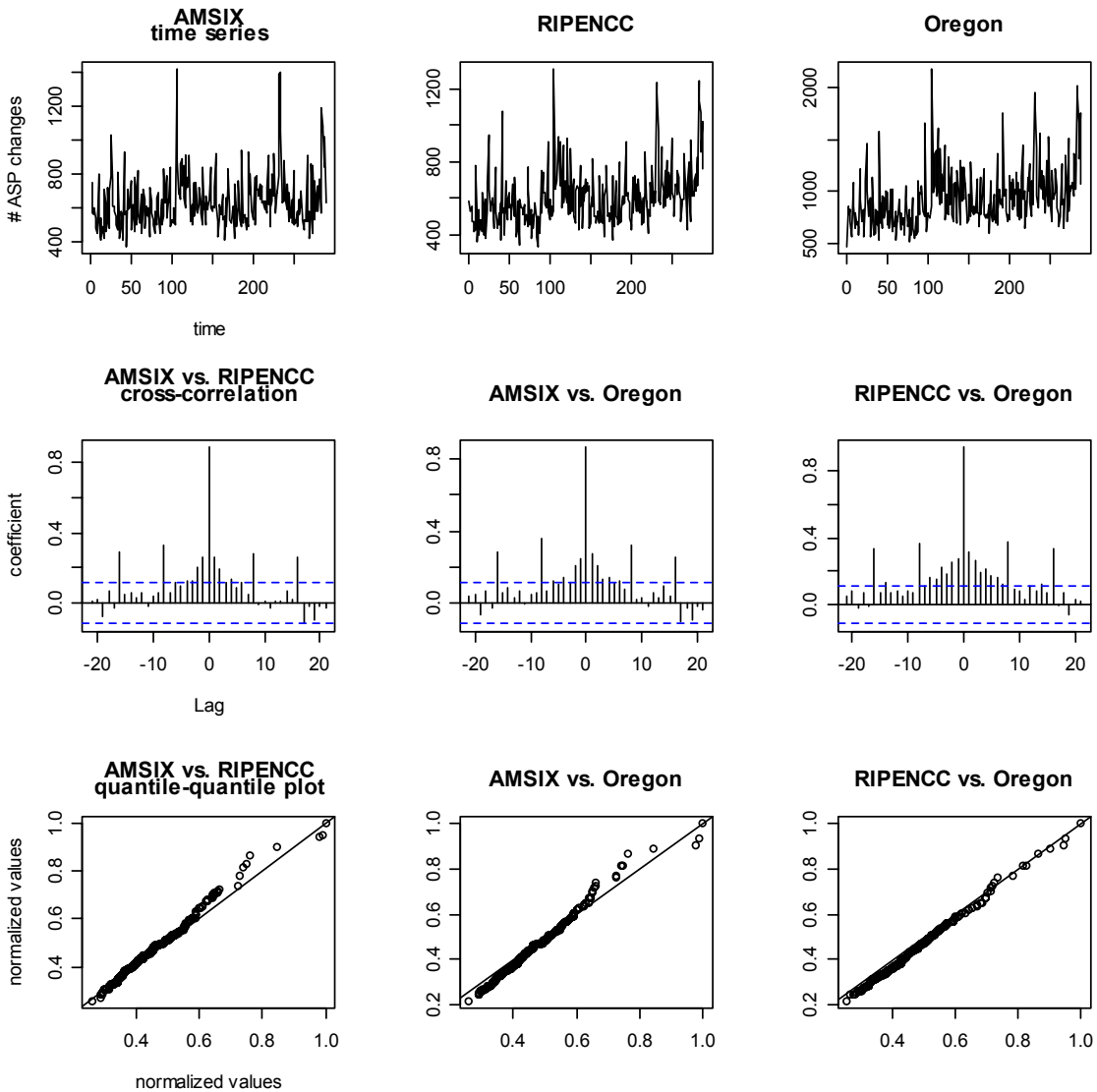
Results - Announcements



Results - Withdrawals



Results – AS path changes



Conclusions – I

- There is strong cross-correlation between the time series of all metrics at all three collection points
- The strongest cross-correlation occurs at zero lag (good metric synchronization within 15 minutes)
- Some metrics have better distribution similarity (withdrawals and AS path changes vs. announcements)
- Metrics are well synchronized independent of single/multi hop, keep alive on/off & geography
- Multi/single hop metric distributions similarities are weaker

Conclusions – II

•Announcements:

- are better time correlated between multi-hop collectors (0.9 vs. 0.6)
- AMSIX has higher median values than either RIPENCC or Oregon
- quantile-quantile plot shows high degree of similarity between multi-hop locations;weaker similarity between single/multi hop

•Withdrawals:

- time correlate well (0.9) in all cases
- quantile-quantile plot shows strong distribution similarity between multi-hop locations; weaker similarity between single/multi hop

•AS path changes:

- time correlate well (0.9) in all cases
- quantile-quantile plot shows strong distribution similarity in all cases

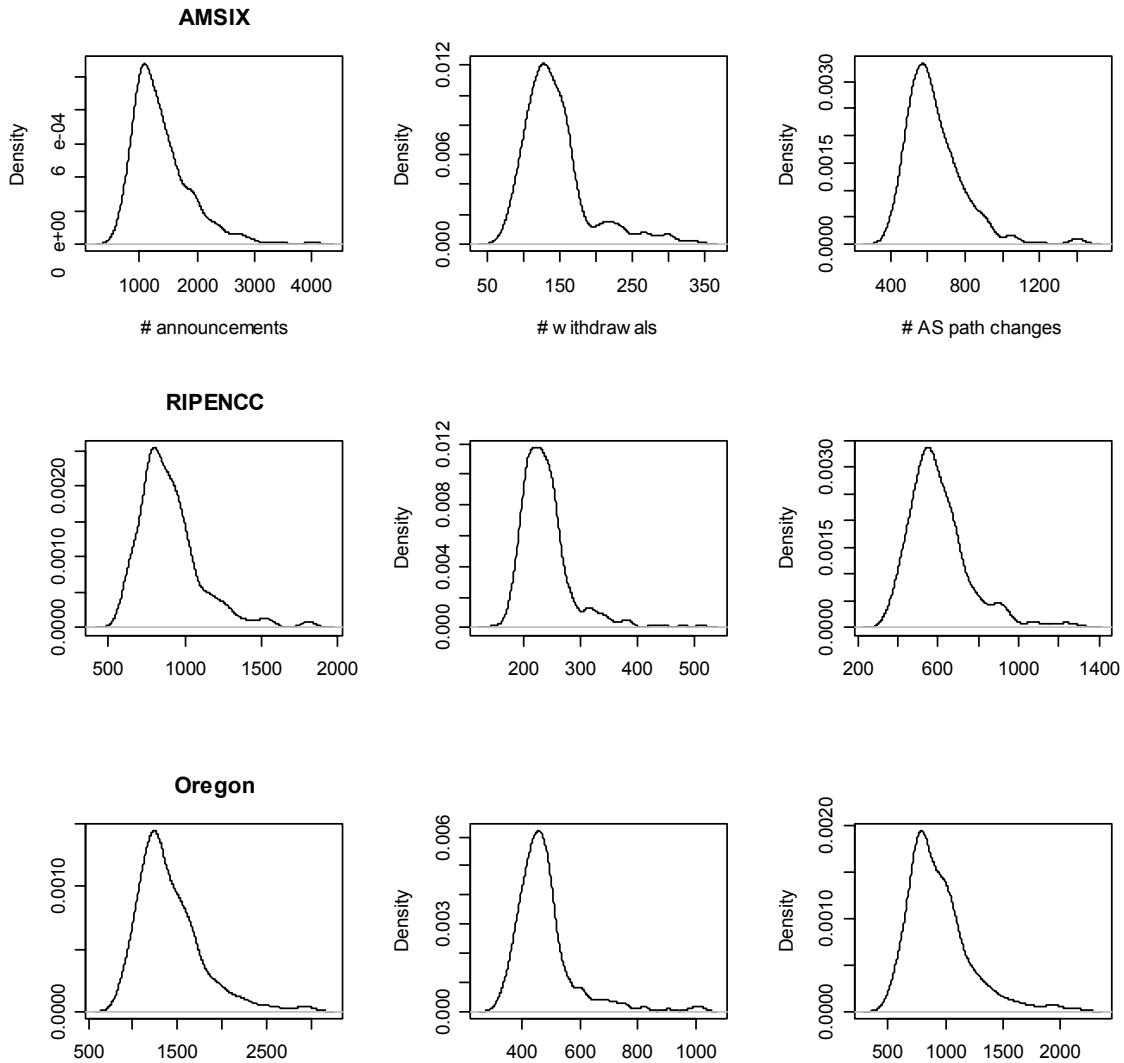
Conclusions III – So What ?

- Prefix metrics at all locations are interchangeable
- Metrics are independent of geography in 15 minute buckets
- Metrics are not sensitive to number of peers or their type (full-feed or partial)

Credits

- RIPENCC RIS team
- Oregon Route Views team
- Jonathan Li, Agilent Labs

Results – Distribution Densities



Results – Community changes