RIS RIPENCC & Oregon Routeviews

A Comparative Analysis of Timing Characteristics of Global Prefix Attribute Changes

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Agenda

• Rationale
• Measurement taxonomy
• Methodology
• Results
• Conclusions
• Next steps
• References
• Credits
Measurement taxonomy
[LA99]

• Tup & Tdown: Fluctuations in the reachability for a given prefix. An announced route is withdrawn and transitions down (Tdown), or a currently unreachable prefix is announced as reachable and transitions up (Tup).

• WWDup: The repeated transmission of BGP withdrawals for a prefix that is currently unreachable.

• AADup: A route is implicitly withdrawn and replaced with a duplicate of the original route. [...] a duplicate route does not differ in any BGP path attribute information.

• AADiff: A route is implicitly withdrawn and replaced by an alternative route as the original route becomes unreachable, or a preferred alternative path becomes available.

• Flap: Tdown followed by Tup where the prefix has identical attributes when first announced and then re-announced after a withdrawal.
Rationale

• Determine the degree of similarity between measurements taken at RIPENCC and Oregon Routeviews as part of our related project that aims to identify BGP traffic patterns.

• Verify that Oregon Routeviews is a valid data collection point in light of the issues raised by [WA02] (multi-hop EBGP).
Methodology

- select all prefixes that show daily activity during 8/2002 at both RIPENCC & Oregon Routeviews (897)
- obtain:
  - hourly announcements, withdrawals, duplicate announcements, flaps, AS path & community changes
  - flap and duplicate announcement duration
- compute:
  - time series cross-correlation and distribution similarity for hourly measurements
  - distribution similarity for duration measurements
Conclusion I

• quantile-quantile plots demonstrates that Oregon Routeviews & RIPENCC distributions are similar to each other for several measurements

• such high level of similarity could not arise on account of chance alone

• we conclude that we are measuring the same object (a common set of prefixes)
Oregon Routeviews
hourly withdrawals density
8/2002

Oregon Routeviews Cumulative Distribution

Quantile-Quantile Plot

RIPENCC
hourly withdrawals density
8/2002

RIPENCC Cumulative Distribution

Quantile-Quantile Plot

RIPENCC scaled by 0.505

Oregon Routeviews
slope = 0.505 intercept = 29.6
Conclusion II

- there is a statistically significant cross-correlation between the time series of several measurements at Oregon Routeviews & RIPENCC
- the strongest cross-correlation occurred at a lag of -3 hours (shifting RIPENCC backward 3 hours)
- some measurements demonstrate higher cross-correlation than others
- we conclude that measurement pairs are dependent on the same underlying object (a common set of prefixes)
Conclusion III

• the distribution of AADup and flap durations are similar for Oregon Routeviews and RIPENCC within 70-80 percentile

• there is no clear relationship in the tail area
Next Steps

• attempt to identify spatial and temporal patterns using defined measurements

• is there a baseline?

• develop methodology to quantify performance cost of BGP processing
References

- MRTd http://www.mrtd.net/
- R http://www.r-project.org/
- Related work:
  - http://bgp.lcs.mit.edu/bgpview.cgi
Credits

• RIPENCC’s RIS Team
• Oregon Routeviews
• Jonathan Li
Oregon Routeviews flap duration (AS2914) density 8/2002

Oregon Routeviews Cumulative Distribution

Quantile-Quantile Plot

RIPENCC flap duration (AS2914) density 8/2002

RIPENCC Cumulative Distribution

Quantile-Quantile Plot

RIPENCC scaled by 0.994