Identifying BGP Routing Table Transfer

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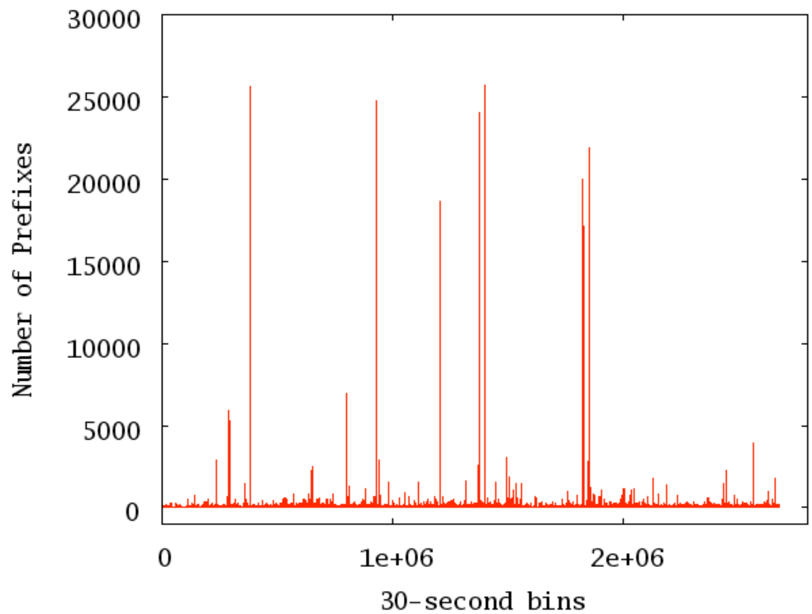
Tool URL: http://netsec.cs.colostate.edu

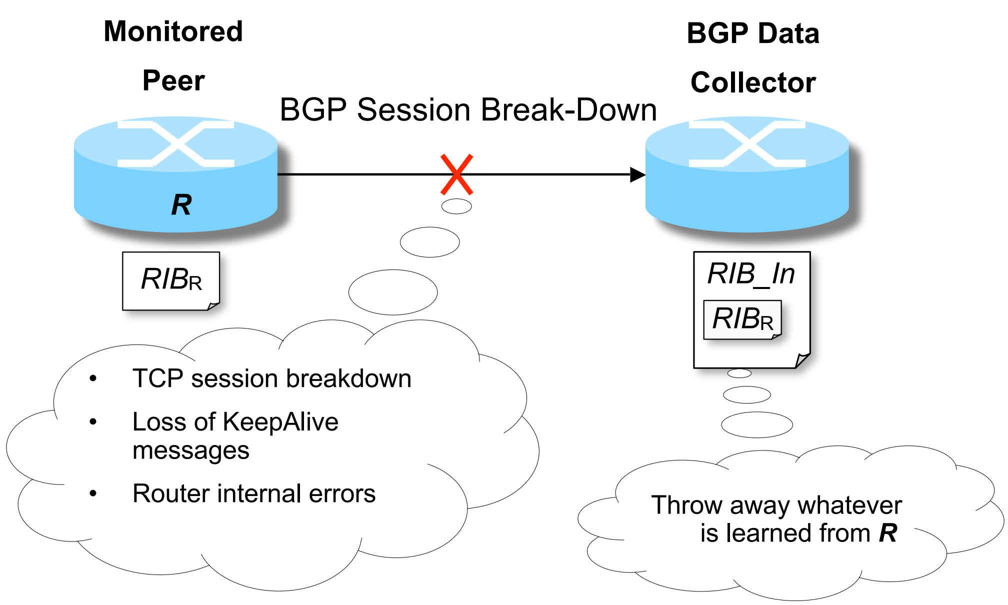
!Machu Picchu!

http://www.culturefocus.com/machu-picchu-1.htm

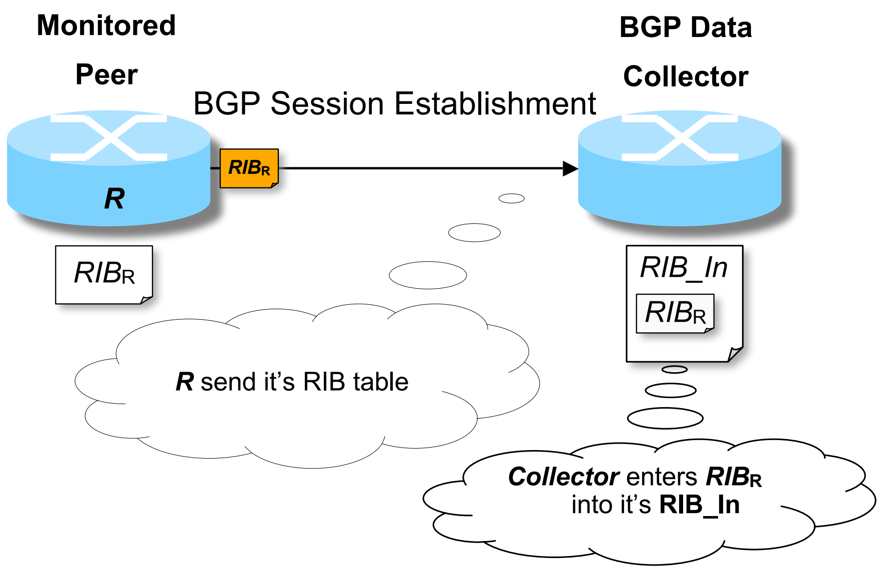
BGP Table Transfers



Session Resets & Table Transfers



Session Resets & Table Transfers



Why Identify Table Transfers?

- Remove Data Collection Artifacts
  - Table Transfers don't reflect routing dynamics
  - First stage of most BGP analysis
- Understand How Often Resets Occur
  - Nearly 15 - 20% of updates due to table transfers!
  - Optimize BGP differently if problem is frequent resets instead of frequent incremental updates
- Prior approaches relied on ad-hoc techniques
  - Delete updates if # of update > 1000 in 30 seconds
  - Delete all ***duplicate*** announcements

Our approach is show to be accurate

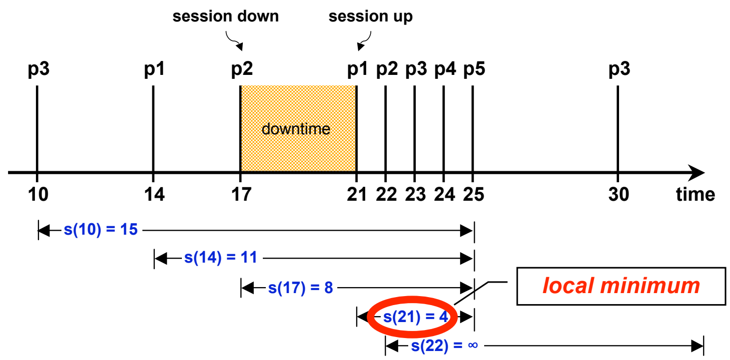
Table Transfer Problem

- Objective: Detect ***all*** table transfers
- For each table transfer, identify:
  - ***starting time***: timestamp of first table transfer update
  - ***duration***: how long the transfer lasted

Minimum Collection Time Algorithm

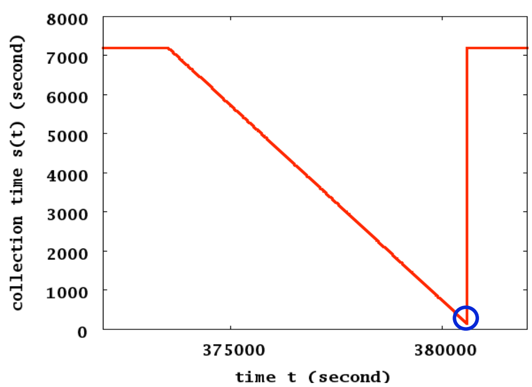
Collection Time

For an update received at time ***t***, define it's ***collection time***, ***s***(***t***), as the time it takes for *all* (*unique*) *prefixes to be announced*



Update Stream and Collection Time

Basic Approach



Sample $s(t) \sim t$

Basic MCT Algorithm:

1. For each update at time ***t***, calculate its collection time, ***s***(***t***)
2. Find all local minima of ***s***(***t***)
3. Each local minimum is considered as a table transfer.
    1. ***starting time*** is ***t*** (timestamp)
    2. ***duration*** is ***s***(***t***) (collection time)

Practical Tune-Ups

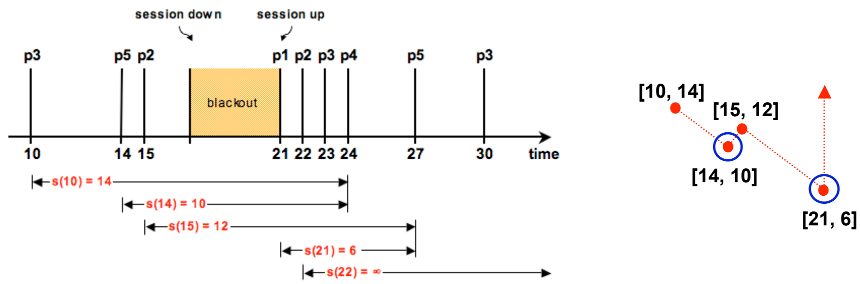
- Expected Table Size Estimation
- Conflicting Table Transfers
- Other practical tune-ups in paper

Expected Table Size

- Get Table Size from latest RIB snapshot
  - RIB as close as possible to updates
- Table Size may vary during downtime!
  - Incremental updates change table size too..
- Don't count all prefixes from table size
  - Instead, use a fraction ***N*** of last know table size
    - Where ***N*** = 0.99 (99%)

Conflicting Table Transfers

- Monotonicity breaks due to update timing!



- s(14), s(21) are two *conflicting* local minima!
  - A table transfer started (at t=21) when another table transfer is in progress (from t=14, to 14+10 = 24)

- Assume table transfers take short duration to complete
  - S(14) = 10 > 2(21) = 6, throw away s(14) and keep s(21)

Results

- Validation using RIPE Session Reset logs

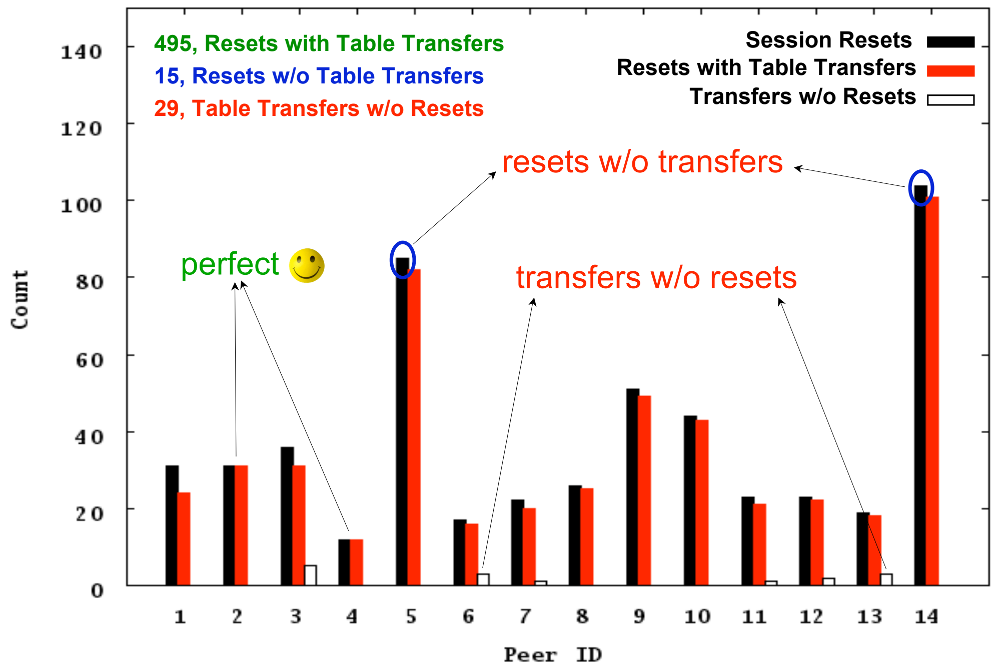
- Detection Accuracy
  - Does our approach find the exact starting time?

- Table Transfers in RouteViews Data
  Note: RouteViews does not provide session state logs

Tool Download URL:

http://netsec.cs.colostate.edu

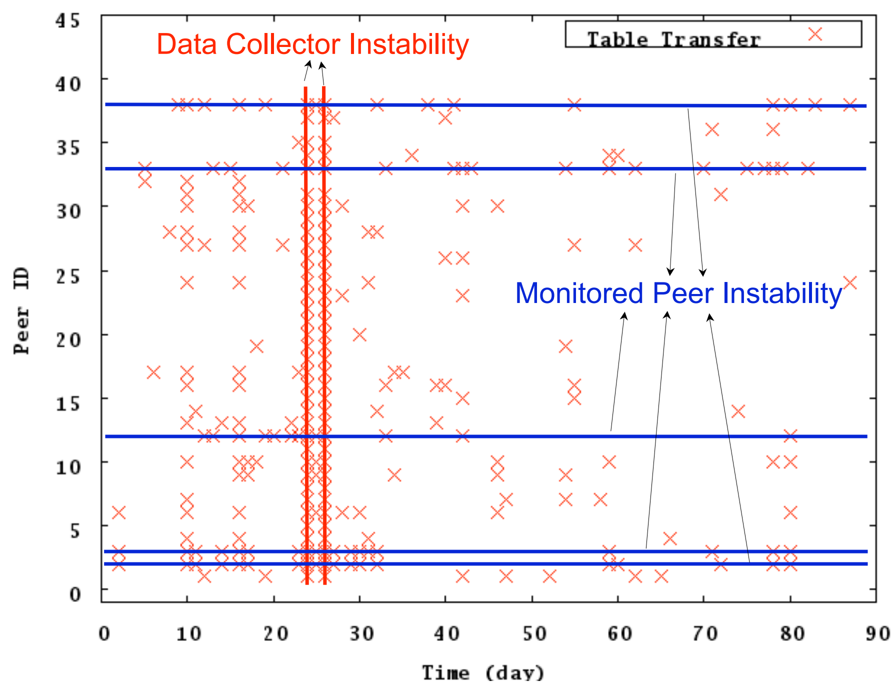
Validation Using RIPE Data



Detection Accuracy

- Inaccuracy (Offset)
  - Difference of:
    - Detected transfer start time
    - First update after reset log
- *Zero* Offset for 90% of Table Transfers
- For those with Non-Zero Offset
  - 50% are below 30 seconds
  - 50% have only 1 update (within offset time)

Table Transfers in RV Data



Comparison With Prior Approaches

- Duplicate removal approach
  - Remove ***all duplicate*** announcements
- 30 sec bin based approach
  - Remove if # of updates > 1000 in 30 seconds

- Both remove table transfer updates
- But .. both remove a lot of valid updates!

- Our Approach identifies table transfers accurately

Conclusion & Future Work

- Download our tool and see for yourself
  http://netsec.cs.colostate.edu 

- Future Work:
  - Identify table transfers due to remote resets

Questions?