

Anomaly Detection on DNS Auths

Root DNS, ccTLDs and DNS providers

Team ~~Schabertier~~ Anomalizers



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Main Problem

Auth DNS Anomaly Detection

- ▶ *How can we use Ripe Atlas data to automatically detect failures (anomalies) on Auth DNS (Roots, ccTLDs, etc...)?*

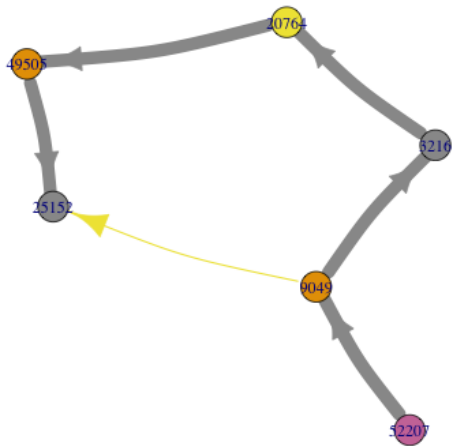
Step-by-step - CHAOS/RTT

1. Download Ripe datasets and parse them
 - ▶ <https://github.com/ripe-dns-anomaly/chaos>
 - ▶ `parse-json.sh $startTime $endTime bins $mid`
 - ▶ start and end = timestamps
 - ▶ bins= 600 (10minutes)
 - ▶ mid = Ripe measurement ID
2. Then, run anomaly detection per letter and site:
 - ▶ <https://github.com/ripe-dns-anomaly/anomalyDetector>
 - ▶ `python letter-level-detector.py
data/k-root-ddos-20151130.csv
output/k-root-ddos-20151130-ad-hoc.csv`
3. Then, it outputs anomalies per class type:
 - ▶ <https://github.com/ripe-dns-anomaly/anomalyDetector/blob/master/README.md>

Step-by-step - Path

1. Download Ripe datasets and parse them
 - ▶ <https://github.com/ripe-dns-anomaly/traceroute>
 - ▶ `python traceget.py --start $startTime --end $endTime --msmid $msmid`
 - ▶ start and end = timestamps
 - ▶ msmid = atlas measurement id (5001 for K-root)
2. Then, convert to AS Path (plus IXPs):
 - ▶ <https://github.com/ripe-dns-anomaly/traceroute>
 - ▶ `java -jar`
3. Last step: anomaly detection and conversion to webformat (JSON)

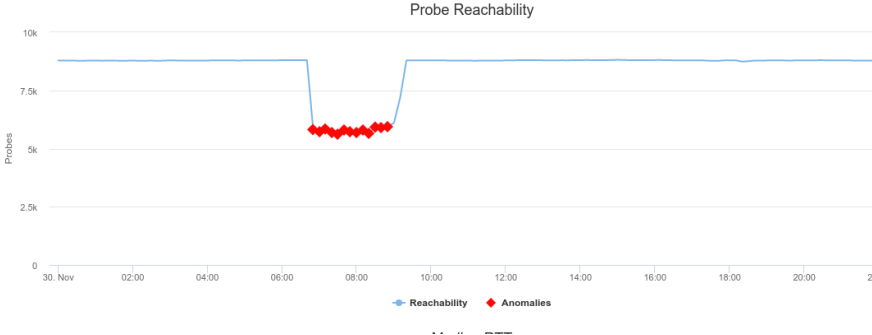
AS Graph - Path change during Nov 30 2015 Root DNS Attack



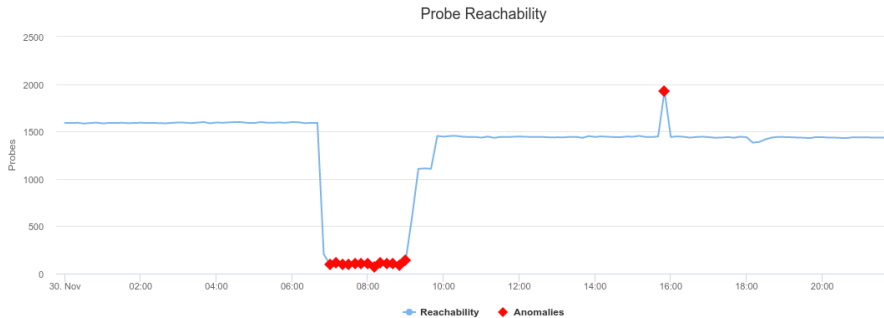
Algorithms for Anomaly Detection

- ▶ See discussion on <https://github.com/ripe-dns-anomaly/anomalyDetector/blob/master/README.md>
- ▶ Twitter's robust TS analysis, ARIMA, ad-hoc
- ▶ We chose ad-hoc (ours)
- ▶ We need more time to evaluate the best one

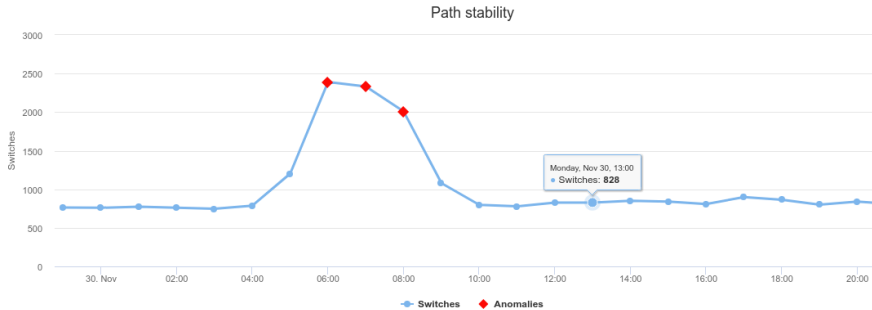
Overall reachability (K-root)



Reachability London site (K-root)



Path stability (K-root)



”Ready” to be used by others

- ▶ Others being: ccTLDs, Roots, etc.
- ▶ Requirement: Ripe Atlas measurements with **chaos.id** support and traceroute measurements
- ▶ Next: automate it to continuously probe it, detect and notify

Resources

- ▶ GitHub: <https://github.com/orgs/ripe-dns-anomaly/>
- ▶ Demo: <https://ripe-dns-anomaly.github.io>