REMEDI3S-TLD: Reputation Metrics Design to Improve Intermediary Incentives for Security of TLDs

A project in collaboration with SIDN and NCSC

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REMEDI3S-TLD

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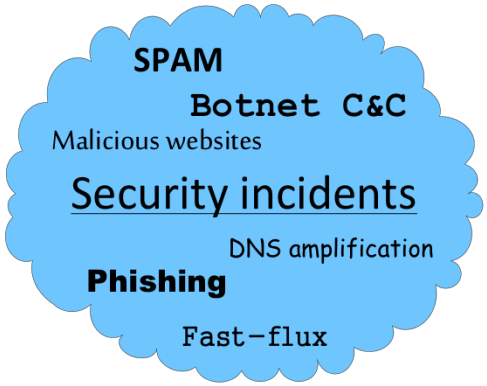
REMEDI3S-TLD



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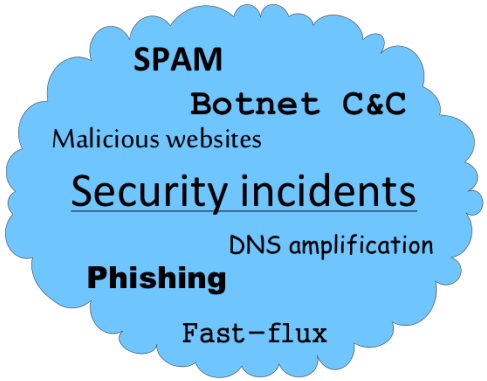

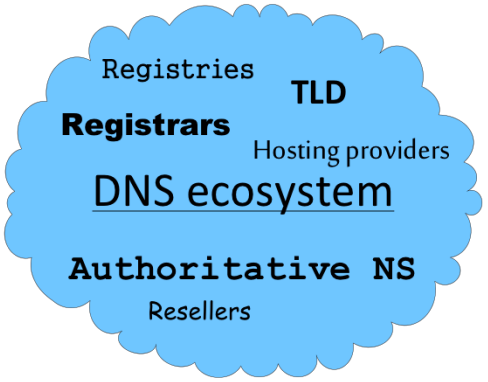

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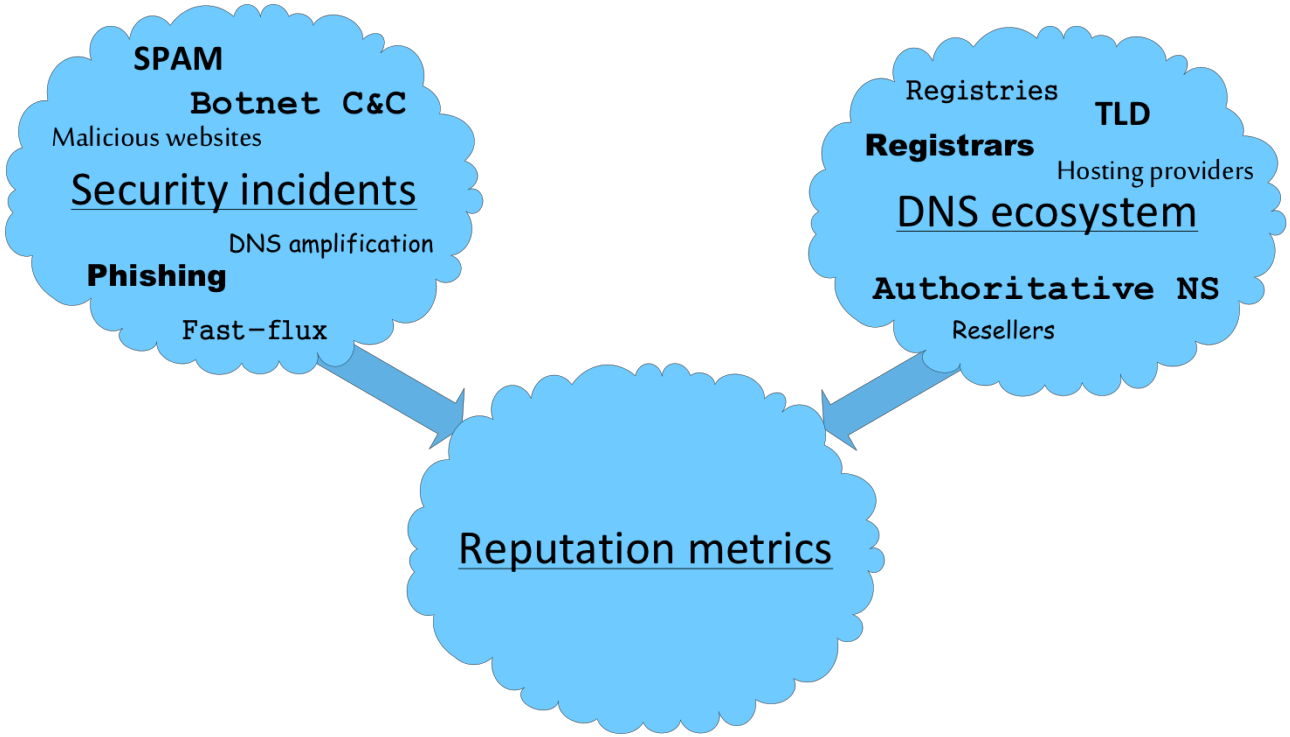

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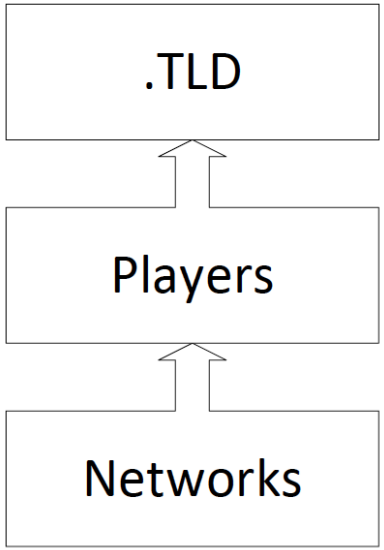
Agenda

- Types of security metrics
- Security metrics for TLDs
- Security metrics for hosting providers
- Discussion

Types of security metrics

- Different layers of security metrics:
  - Top Level Domains (TLDs)
  - Market players related to the TLD (infrastructure providers): registrars, hosting providers, DNS service providers
  - Network resources managed by each of the players, such as resolvers, name servers



Security metrics for TLDs

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Security metrics for TLDs

- Type of reputation metrics
  - Concentration of malicious content:
    a) Number of unique domains
    b) Number of FQDN
    c) Number of URLs

Security metrics for TLDs

- Type of reputation metrics
  - Concentration of malicious content:
    a) Number of unique domains
    b) Number of FQDN
    c) Number of URLs
  - Size matters!

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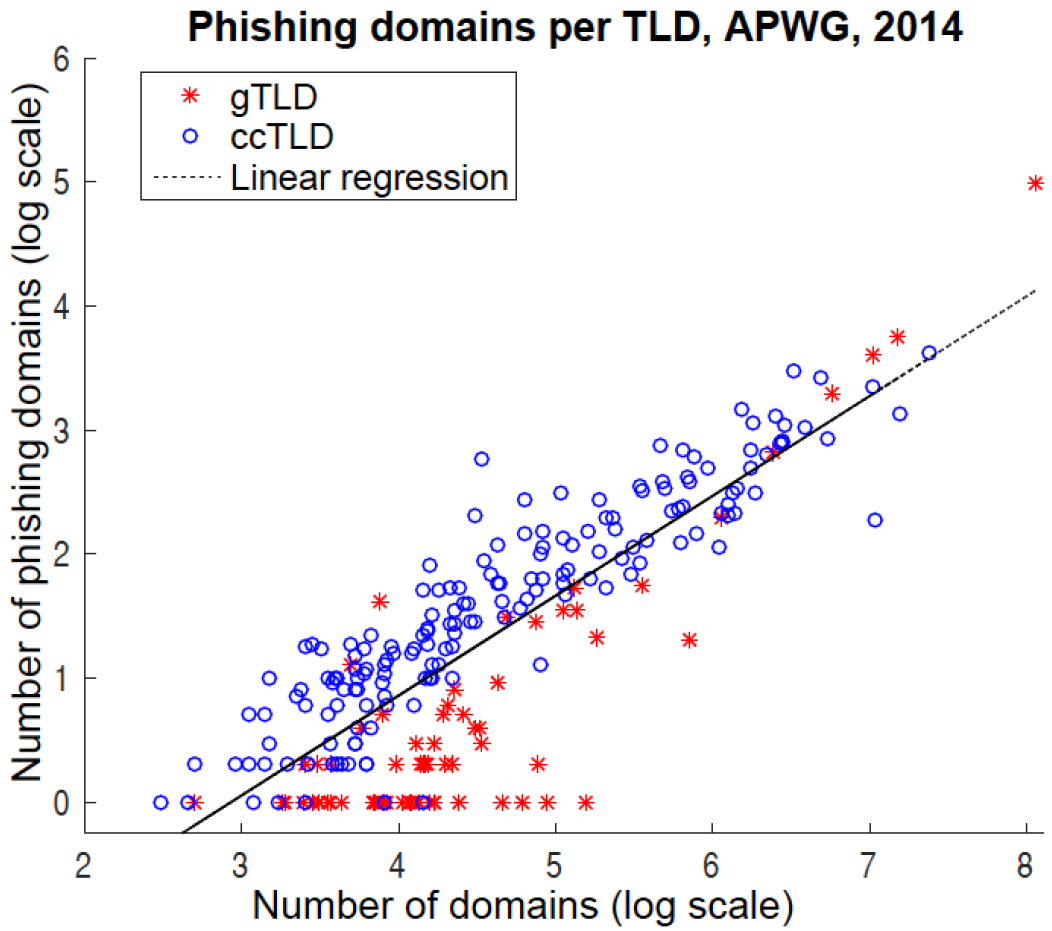
Security metrics for TLDs

- Type of reputation metrics (example)



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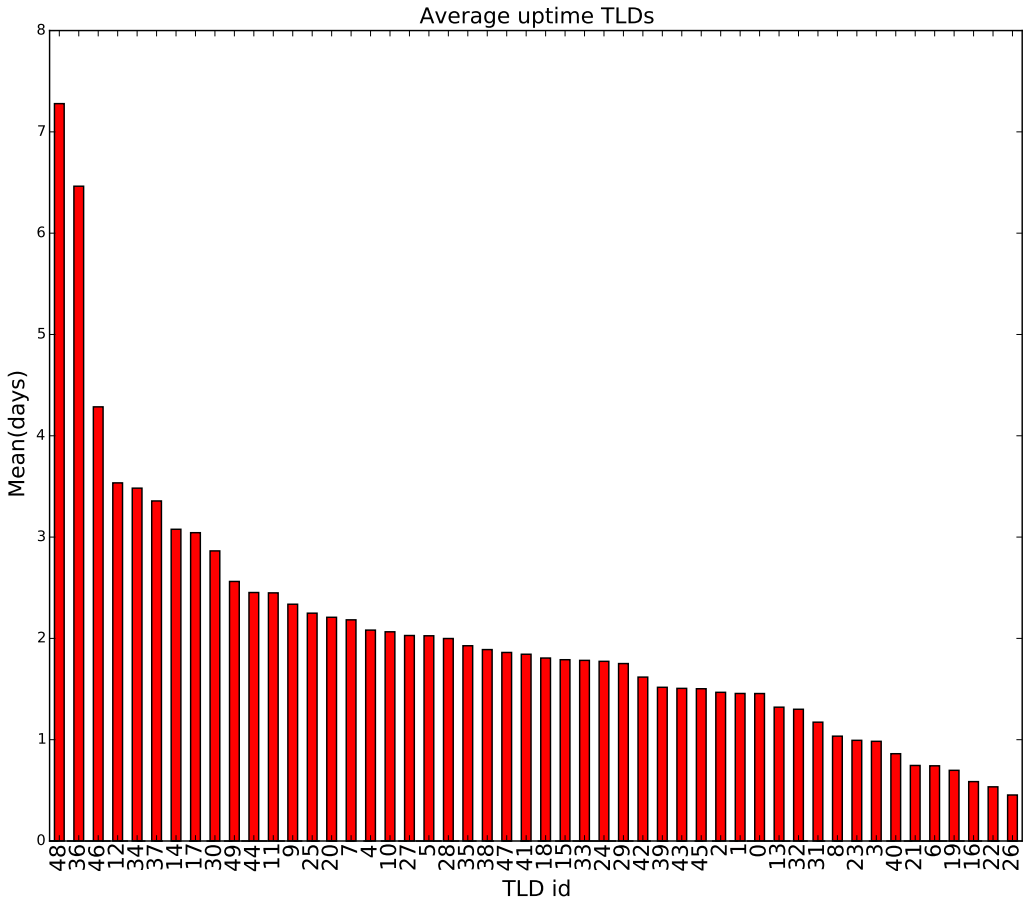
Security metrics for TLDs

- Type of reputation metrics
  - Up-times of maliciously registered/compromised domains



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Security metrics for hosting providers

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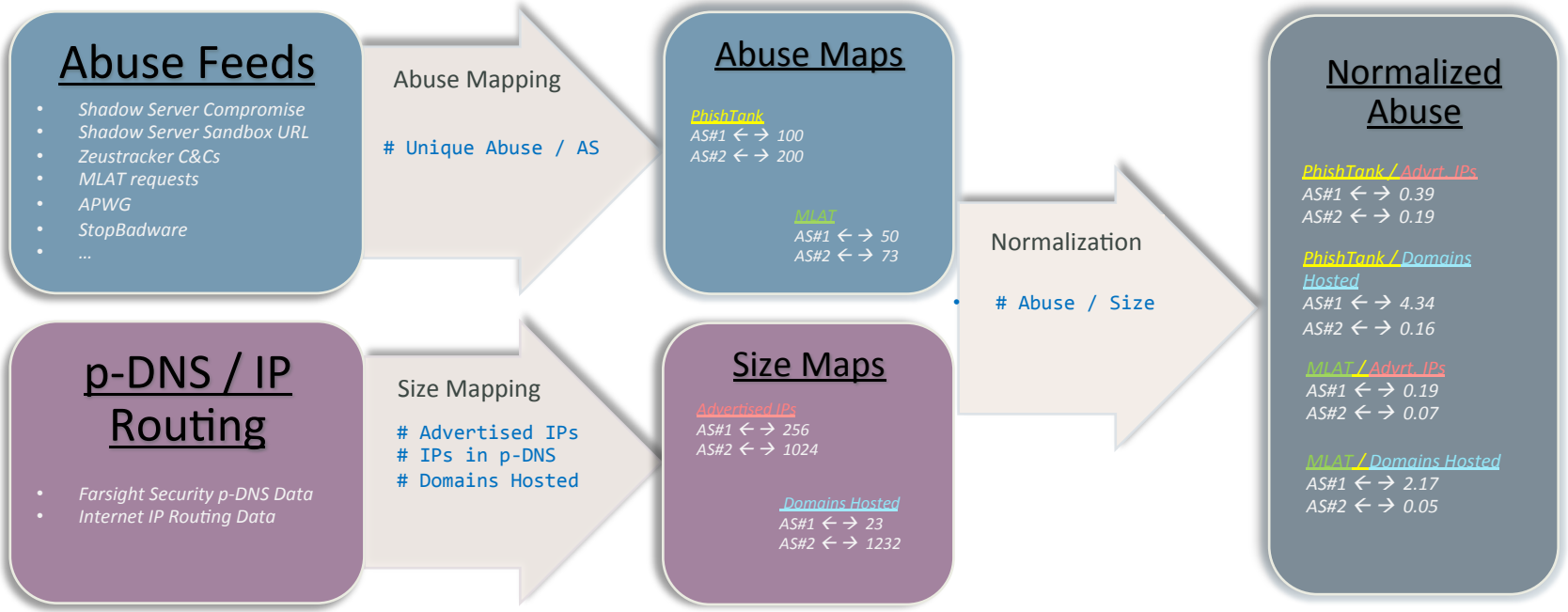
Security metrics for hosting providers

1. Count badness per AS across different data sources
2. Normalize for the size of the AS (in 3 ways)



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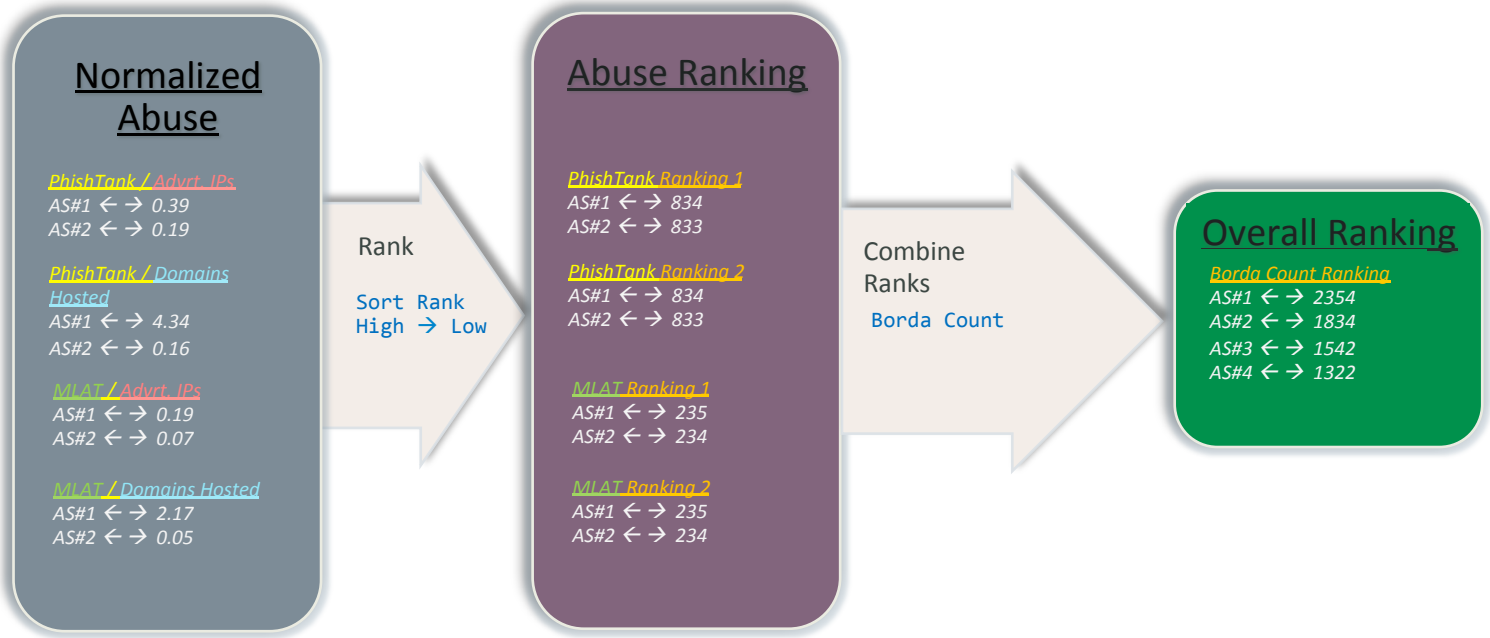
Security metrics for hosting providers

3. Rank ASes on amount of badness
4. Aggregate rankings
5. Identify ASes with consistently high concentrations of badness



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Practical application

- "Clean Netherlands": Enhance self cleansing ability of the Dutch hosting market by
  - promoting best practices and awareness
  - pressuring the rotten apples

Discussion

- Compare your TLD against the market
- Driving factors (why the attackers are more interested in certain types of domains?)
- Let us know about policy changes, pricing

Discussion

- Limitations: metrics for smaller TLDs are more sensitive to individual security incidents
- Abuse handling initiatives

Discussion

- Limited access to:
  - Domain WHOIS (classifier between maliciously registered and legitimate domains, metrics for registrars)
  - Datasets, e.g. shadow server reports
- Feedback

ACKNOWLEDGEMENTS

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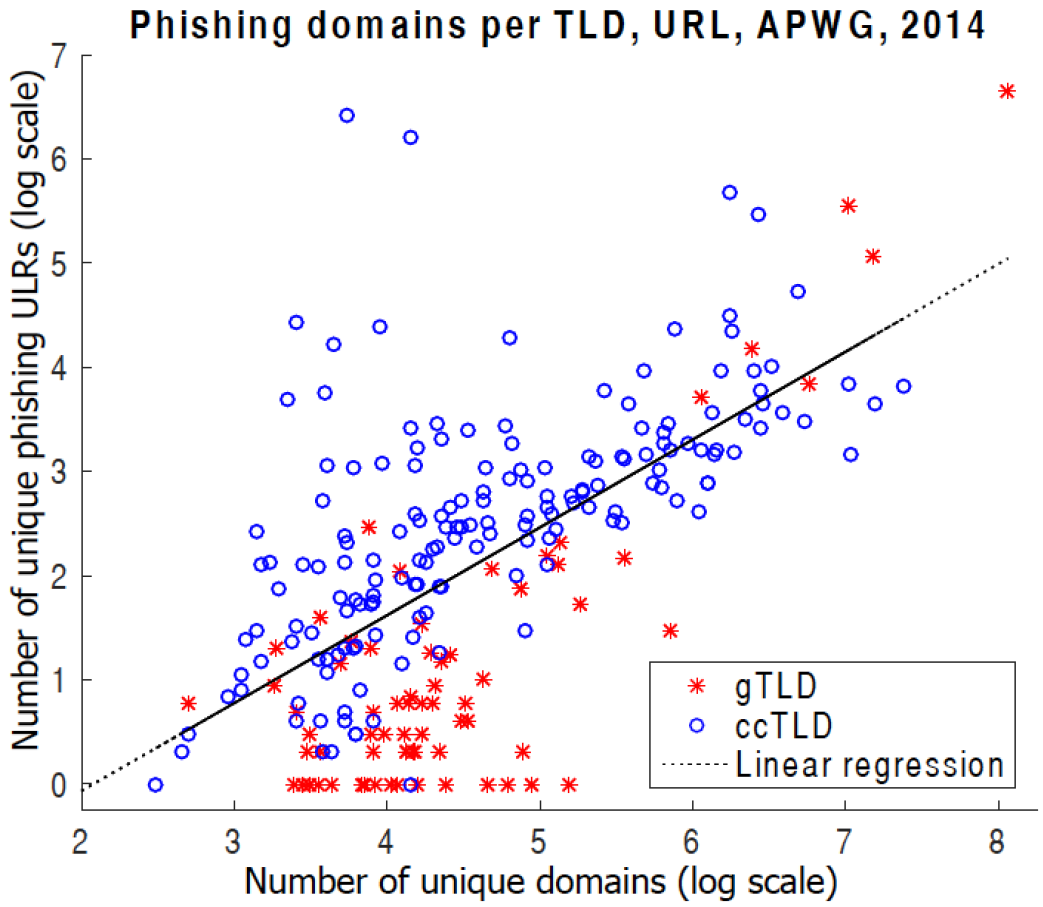
Security metrics for TLDs

- Type of reputation metrics



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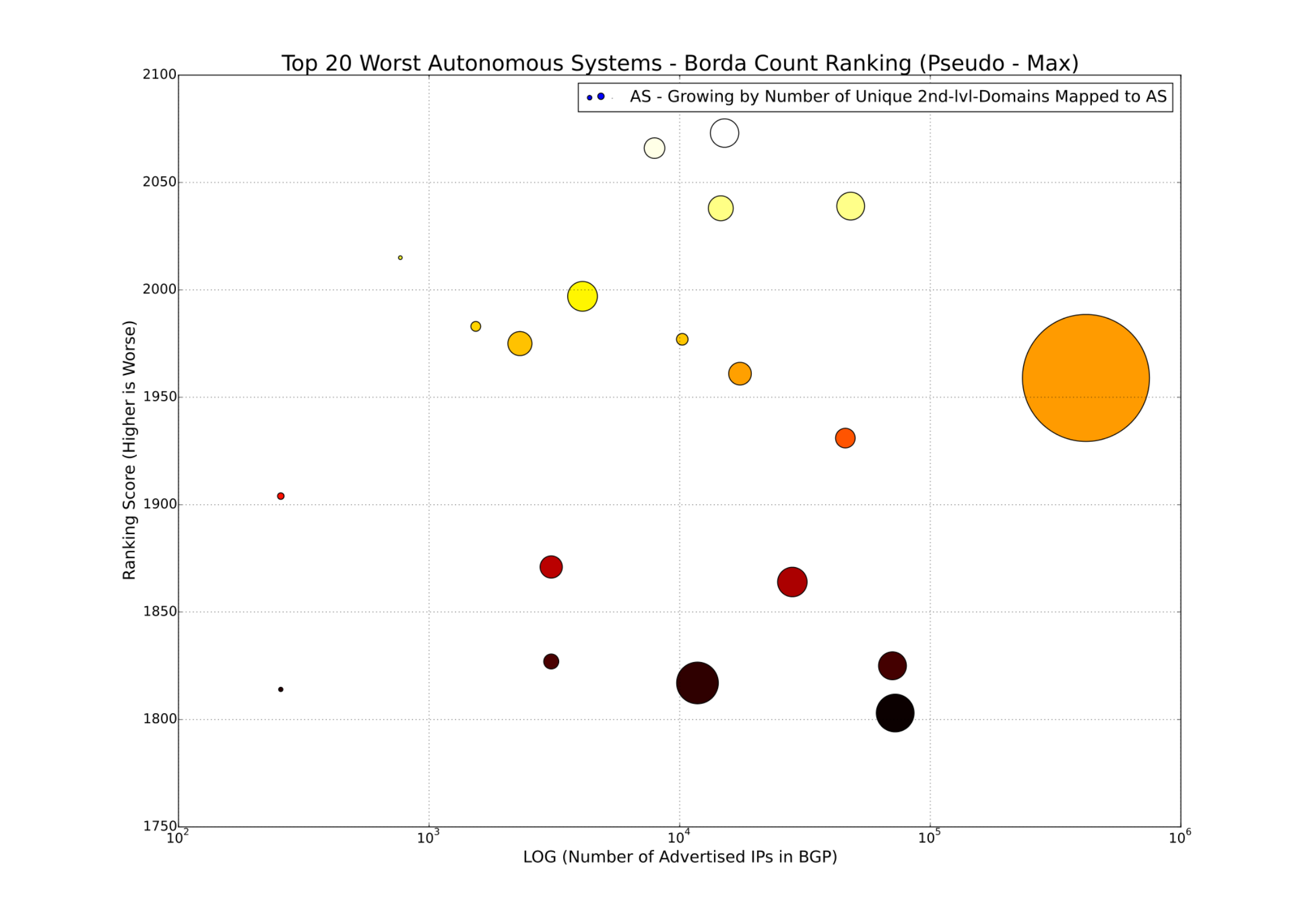
Top 20 Worst Autonomous Systems - Borda Count Ranking (Pseudo - Max)
AS - Growing by Number of Unique 2nd-lvl-Domains Mapped to AS
Ranking Score (Higher is Worse)
LOG (Number of Advertised IPs in BGP)
2100
2050
2000
1950
1900
1850
1800
1750
10^2
10^3
10^4
10^5
10^6