

A photograph of the Charminar in Hyderabad, India, at night. The monument is illuminated with warm yellow lights, highlighting its intricate architectural details, including its four tall, ornate minarets and the central archway. The sky is a deep, dark blue. In the foreground, there are blurred lights from a street, suggesting a busy urban environment. The overall mood is serene and majestic.

ICANN|57 HYDERABAD



Root Stability Study Workshop

8 November 2016

Study Background

- ⦿ ICANN commissioned security and stability review of New gTLD Program per previous commitments.
- ⦿ Board committed to postpone any additional rounds of new gTLDs until there is evidence that the current round has not jeopardized the root system's security or stability.

1 Request for proposals issued June 2015

2 Contract signed with TNO October 2015

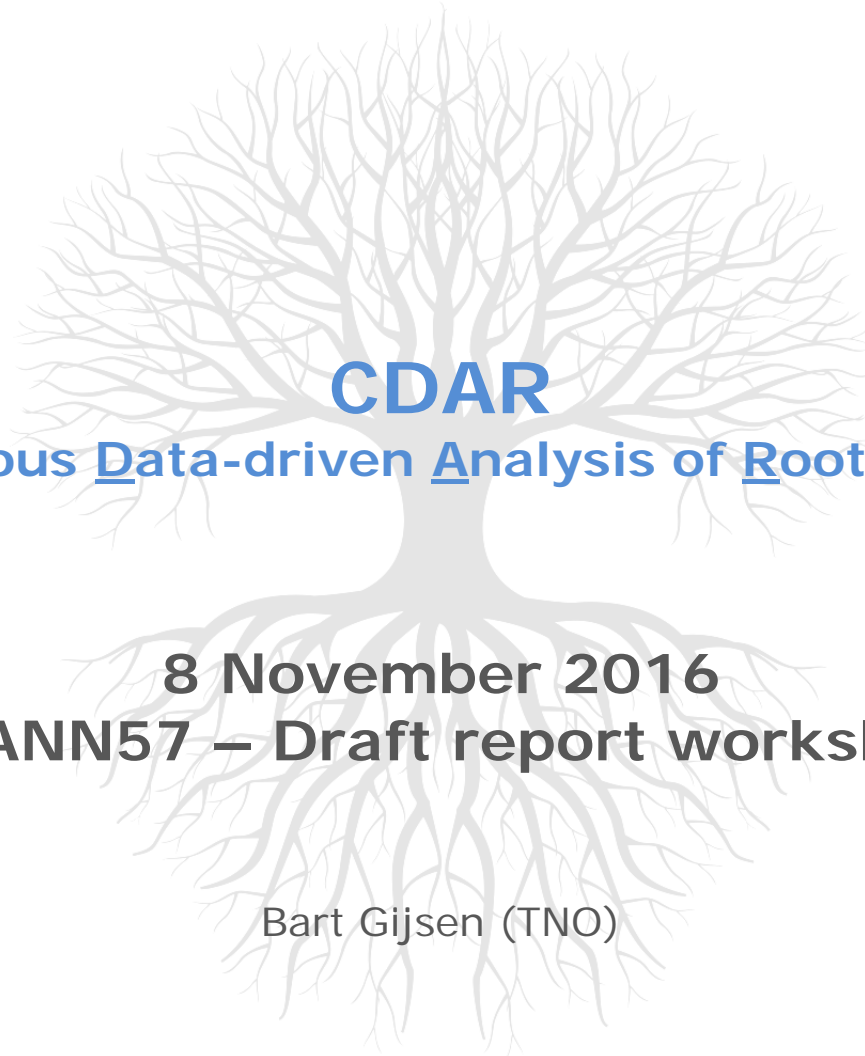
3 Continuous Data-Driven Analysis of Root Server System Stability (CDAR) conducted in consortium with SIDN and NLnet Labs.

Next Steps

Draft report now available for comment through 22 December 2016:

<https://www.icann.org/public-comments/cdar-draft-2016-10-27-en>

Final report expected April 2017



CDAR

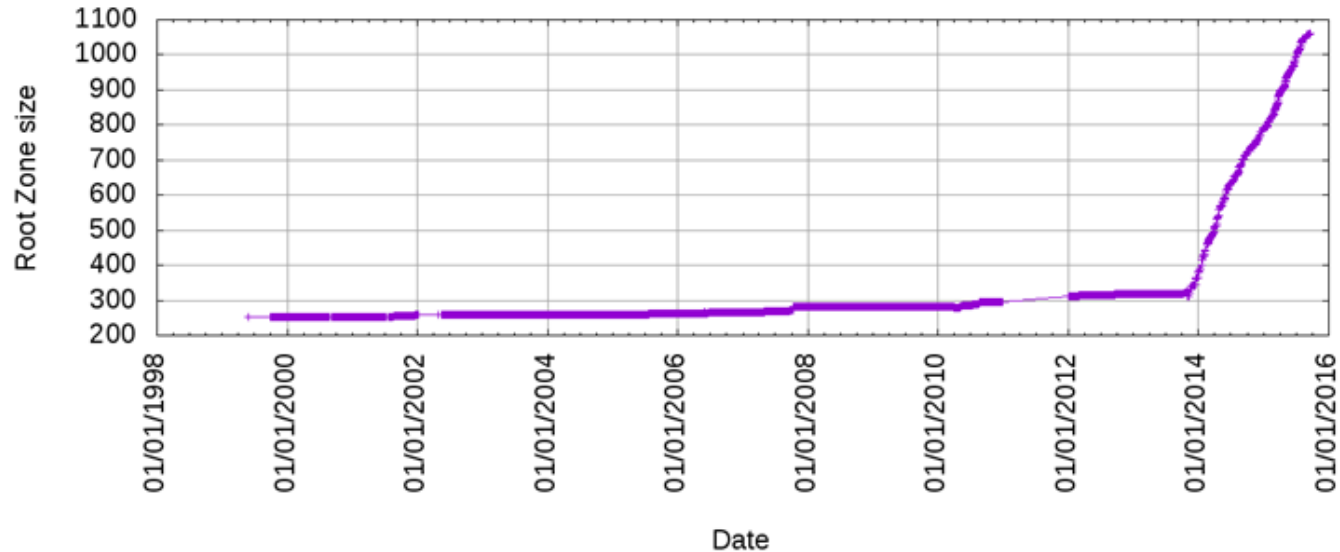
Continuous Data-driven Analysis of Root Stability

8 November 2016
ICANN57 – Draft report workshop

Bart Gijsen (TNO)

CDAR Study

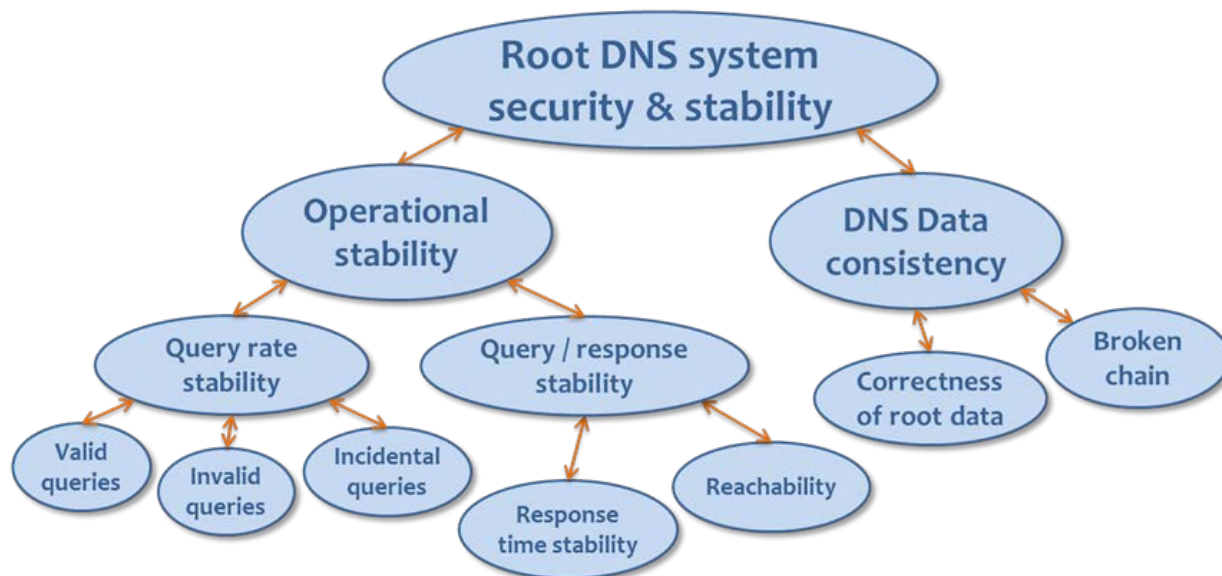
- Context:



- Primary research question: *did delegation of new gTLDs degrade the stability or security of the root DNS system?*
 - Secondary: can we expect a degradation in the near future?

Analyses

- Large amount of historical data sets analyzed:
 - RSSAC002 (since October 2013)
 - DITL (yearly 2-day data collections from 2012 thru 2016)
 - RIPE Atlas (selected intervals in period of new gTLD delegations)
 - Other: ZFR, Registry reports, 'Renumbering', DNSSEC validator
- Analyzed metrics:

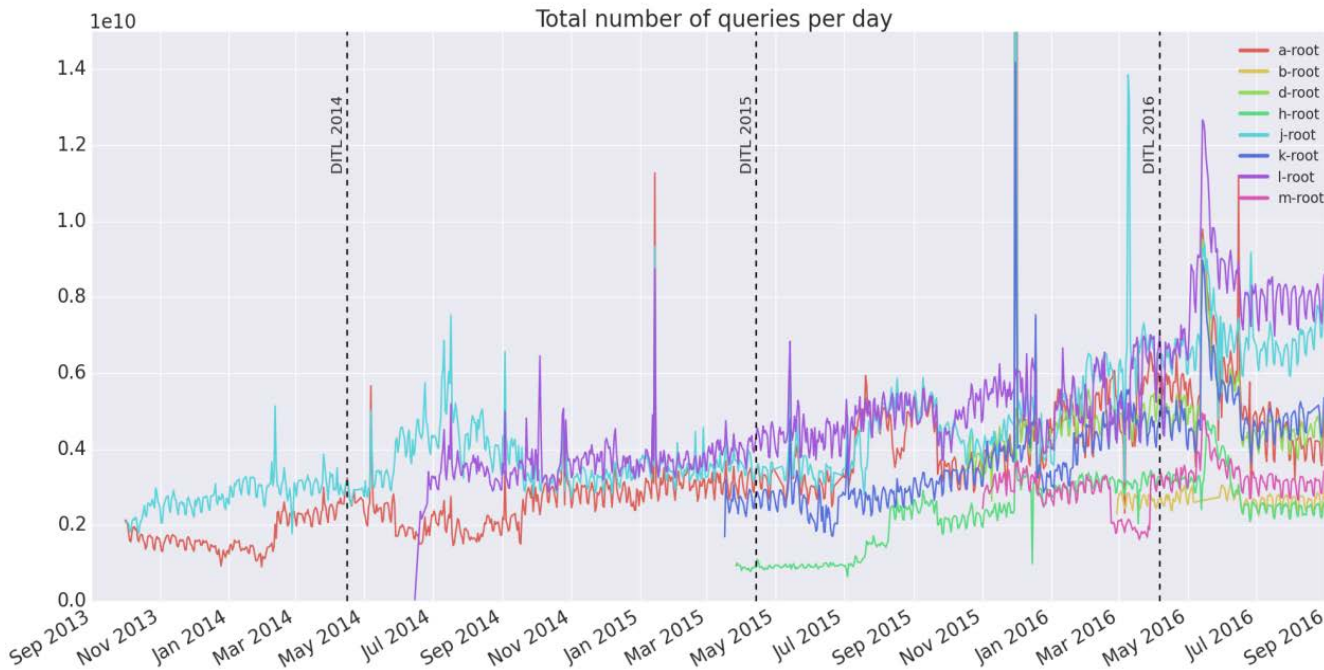


Primary Conclusion

- Has the delegation of new gTLDs degraded the stability or security of the root DNS system?

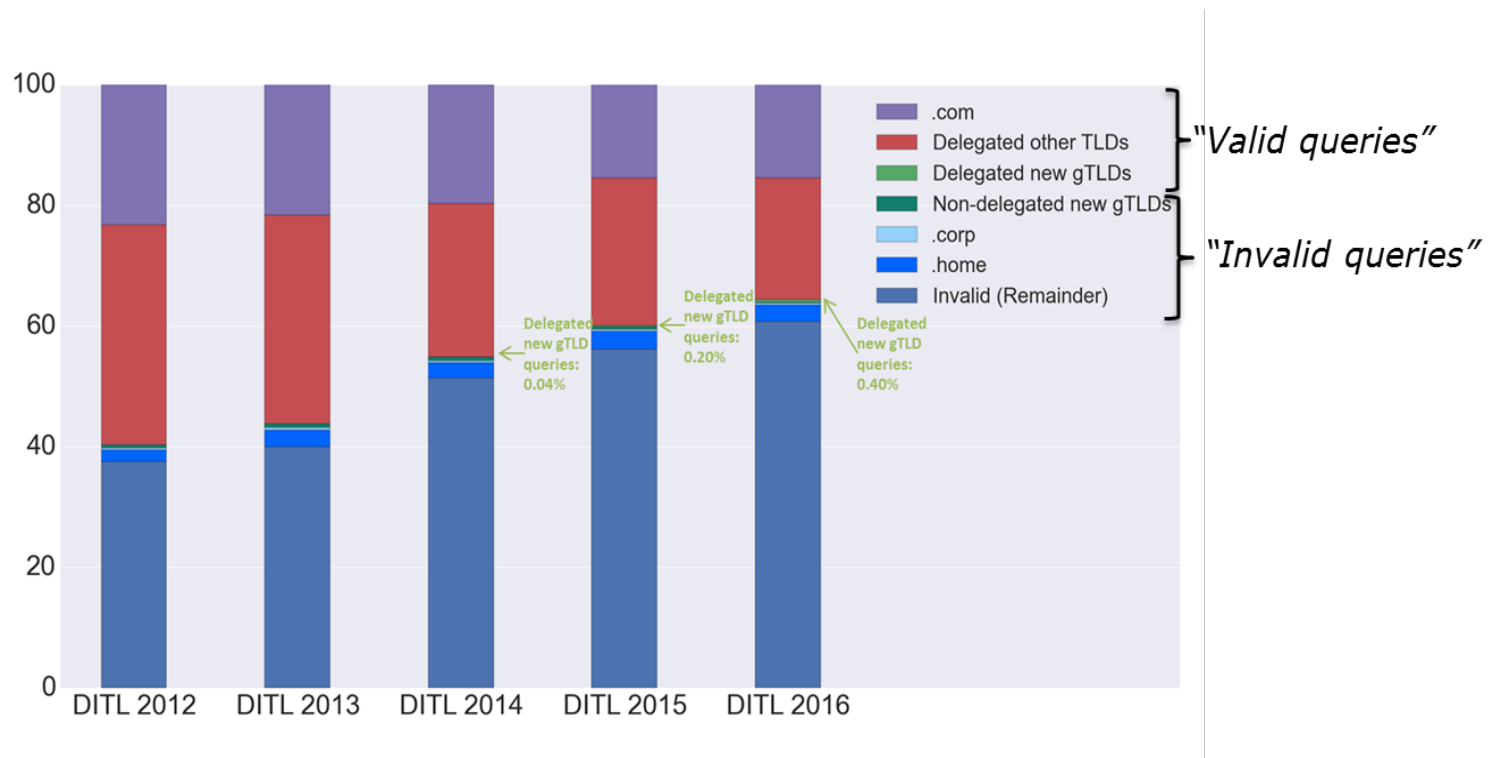
Investigated data sets show no degradation of the stability or security of the root DNS system that can be attributed to delegation of new gTLDs

Finding: Traffic is Increasing



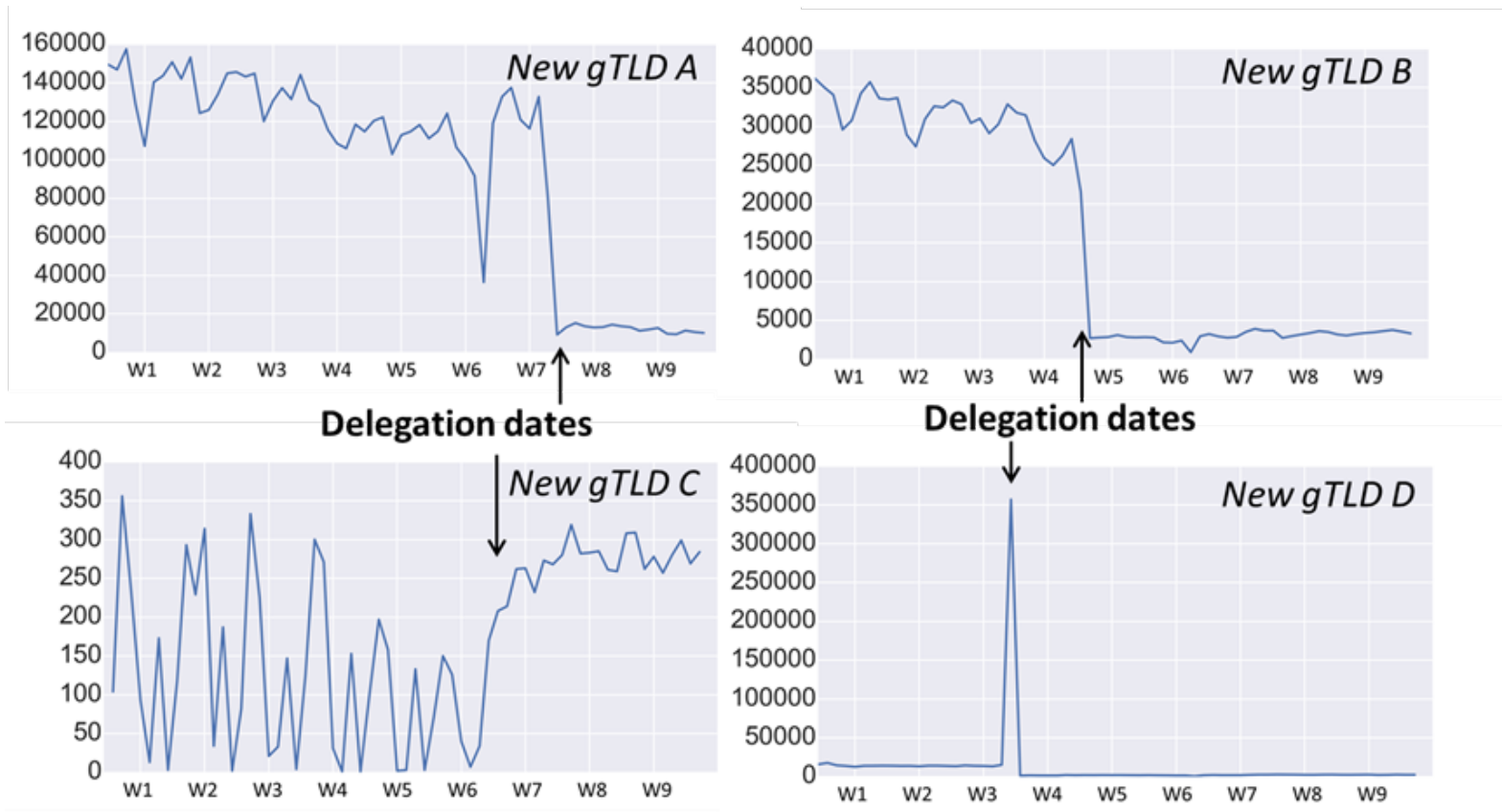
- Both query rate to the root DNS system as well as the size of the root DNS system is growing
 - Apparently, root DNS system has been able to grow along with the increase in root server traffic over the past years
- Total query volume consists of:
 - queries for valid and invalid TLDs +
 - incidental peaks of query volumes during rare events (e.g. November 30, 2015 and June 25, 2016)

Finding: Fraction of Valid / Invalid



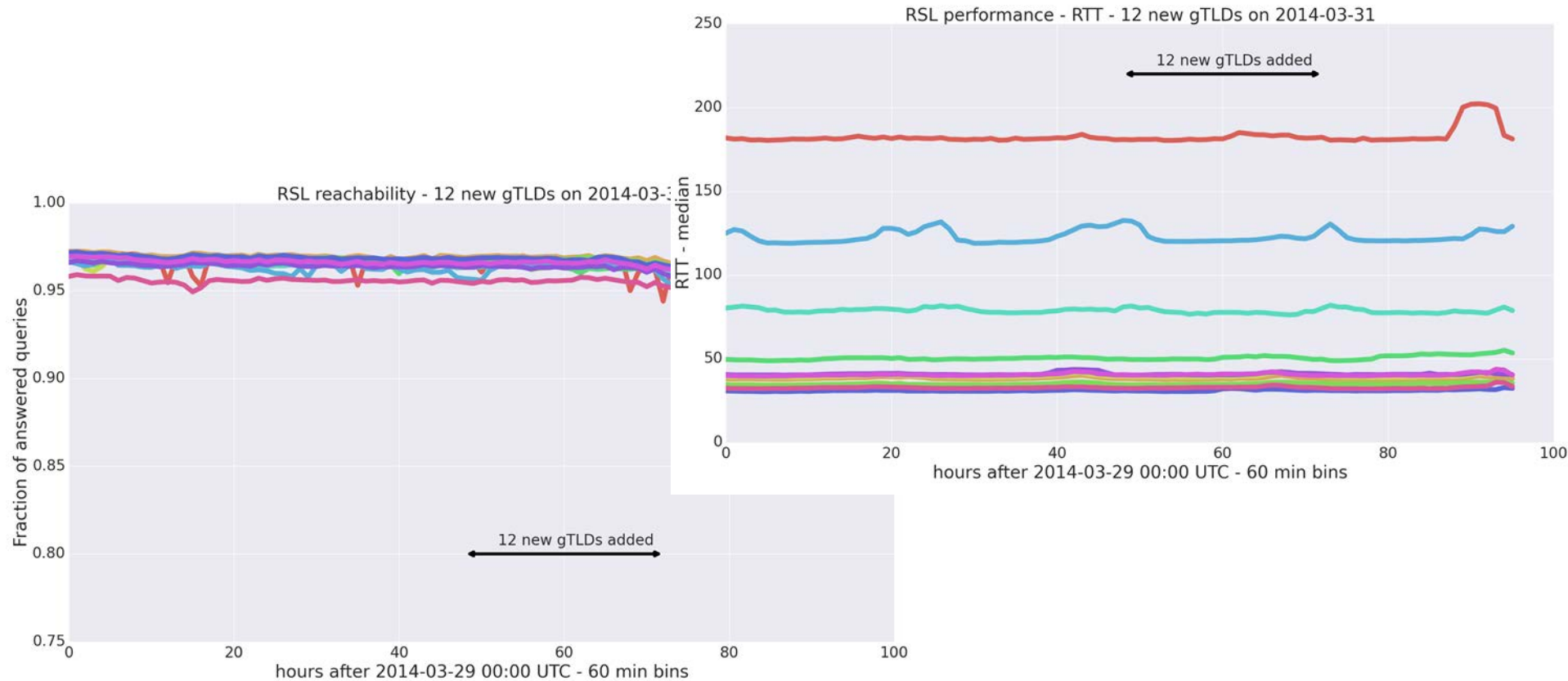
- Fraction of queries for invalid TLD names increases over time
 - No indication that the delegation of new gTLDs has contributed to this trend
- New gTLD queries do contribute to the valid query volume although this contribution is very small
 - During DITL 2016: only 1.1% of the total valid query volume (only 0.4% of the total valid+invalid query volume)
 - Slightly increasing fraction, but insignificant so far

Finding: Microscopic Effects



- Fluctuations in query rates visible around initial new gTLD delegation
 - But at low volume and converges to new steady state fast

Finding: No Visible Impact From the Outside



- RIPE Atlas measurements: fluctuations have no visible impact on RTT performance or reachability of root DNS system

Finding: DNS Data Consistency

- Scan for data errors that might be introduced:

(Different) errors as a result of changes in the root zone file due to delegations of new gTLDs?

– *No errors slip through the zone file verification steps*

DNSSEC validation errors due to non-matching cryptographic data?

– *No significant errors observed for delegated new gTLDs*

Conclusion of CDAR Data Analysis

- We did not observe a degradation of the stability or security of the root DNS system due to new gTLDs
- We recognize that this conclusion is ...
 - Confined by the imperfections of the available measurement data and
 - Limited to the results of the analyses that we designed and executed
 - Interactions with technical DNS community revealed no additional, possible negative effects

Future Impact?

- What impact can we expect in the near future?
 - Presuming that:
 - Evolution of new gTLD delegations continues current pattern and
 - Observed time-invariant correlations remain invariant
 - Then, we see no signs that more new gTLD delegations will degrade the stability or security of the root DNS system in the near future
- Risk factors (disruptive new gTLD developments)
 - Non-exhaustive list ...
 - Possible impact of future new gTLD delegations:
 - Fast popularity increase of new gTLDs (.com-like)
 - Unbounded growth of the number of new gTLDs
 - Leaking queries (.home-like), due to removal new gTLDs from root zone
 - Possible impact that is not new gTLD related
 - Increase in the amount of processing on root name servers due to other (use of) DNS protocols
 - Unusual large query volume events (DDoS)

Recommendations

- Remain enforcement of current measures to preserve current evolution pattern, in particular:
 - Gradual rate of delegating new gTLDs
 - Monitor impact of new gTLD delegations ⇔ more continuously
- Monitor risk factors
 - Detect disruptive growth of heavy queried new gTLDs (.com-like or other heavily leaking non-DNS name spaces like .home)
 - (Detect changes in use of DNS protocols that may increase traffic / processing)

Next Steps

- Collecting feedback
 - Public comment period, ending 22 December

- Final report in April 2017

Acknowledgement

- Providers of relevant data sets
 - DNS-OARC, RIPE NCC, amongst others
- Community interactions

Questions and Discussion

Acknowledgements

DNS-OARC, RSSAC002 data providers, RIPE NCC, ICANN

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Thank You and Questions

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