DNSSEC Activities In North America: Comcast

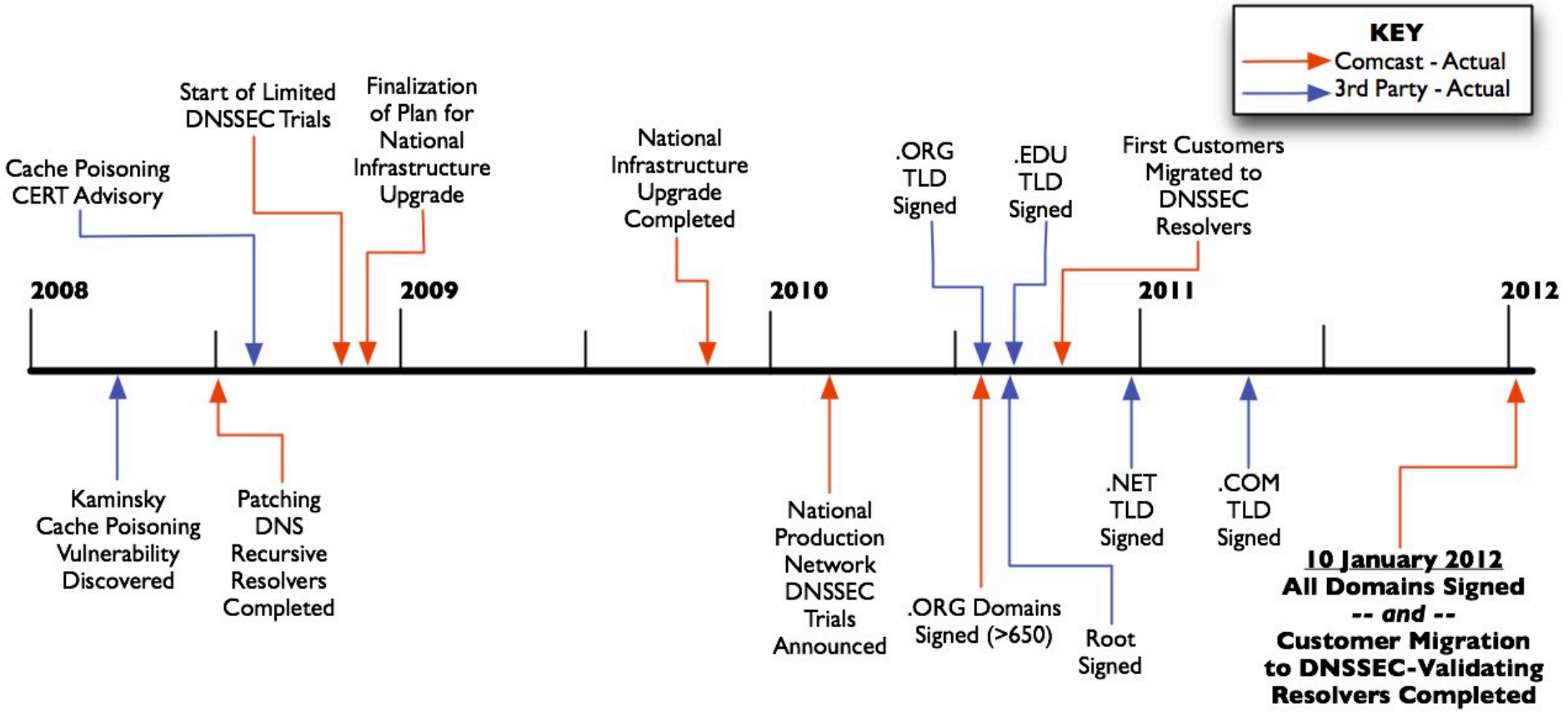
ICANN 45

October 17, 2012

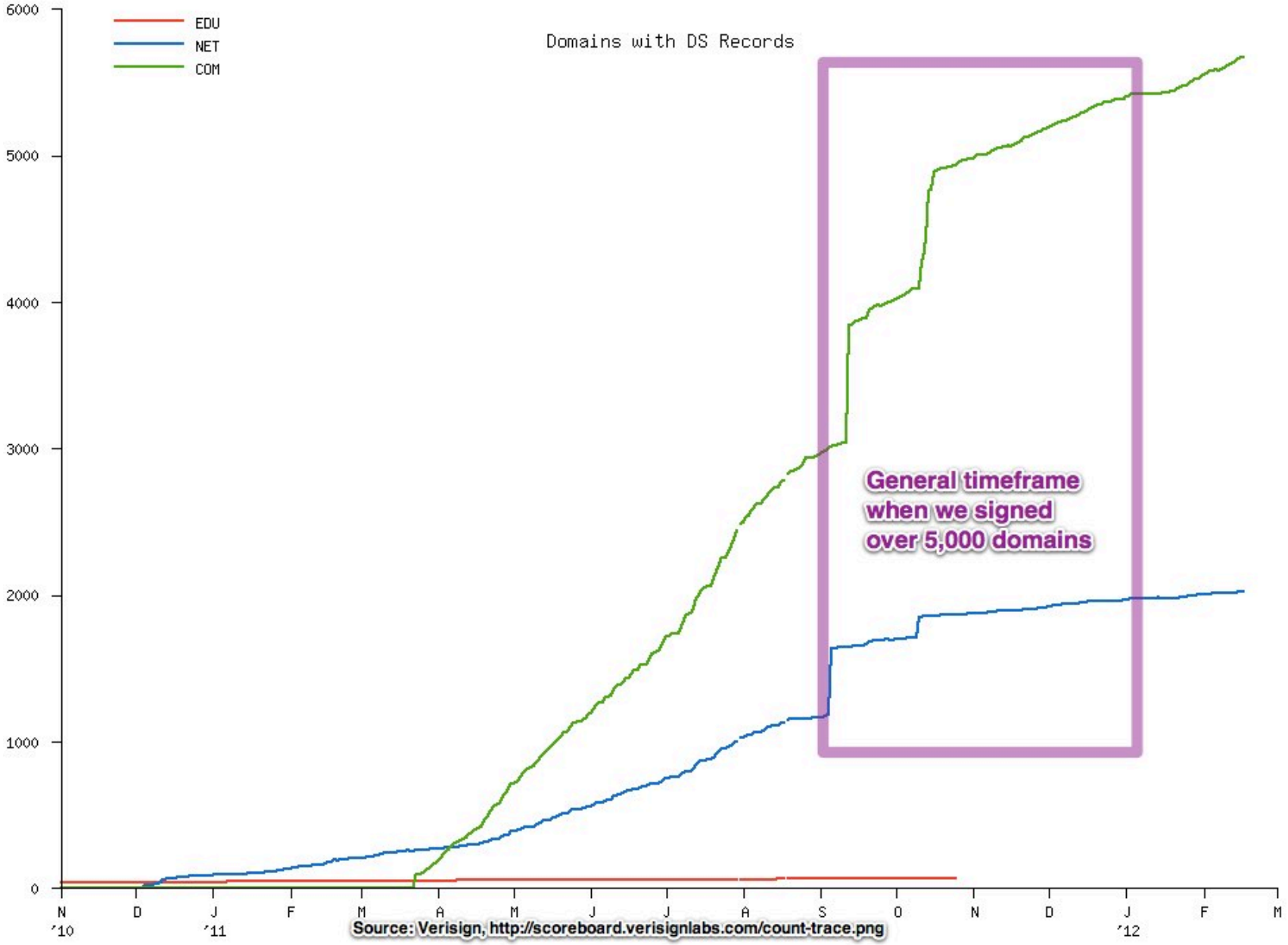
NATIONAL ENGINEERING & TECHNICAL OPERATIONS

DNSSEC Deployment Status

- We began working on this in 2008 (see timeline)
- We completed our DNSSEC deployment in January 2012
  - All customers use our validating resolvers (>18.5M homes)
  - All Comcast domain names signed (>6,000)



Some Measurement Data – January 2012



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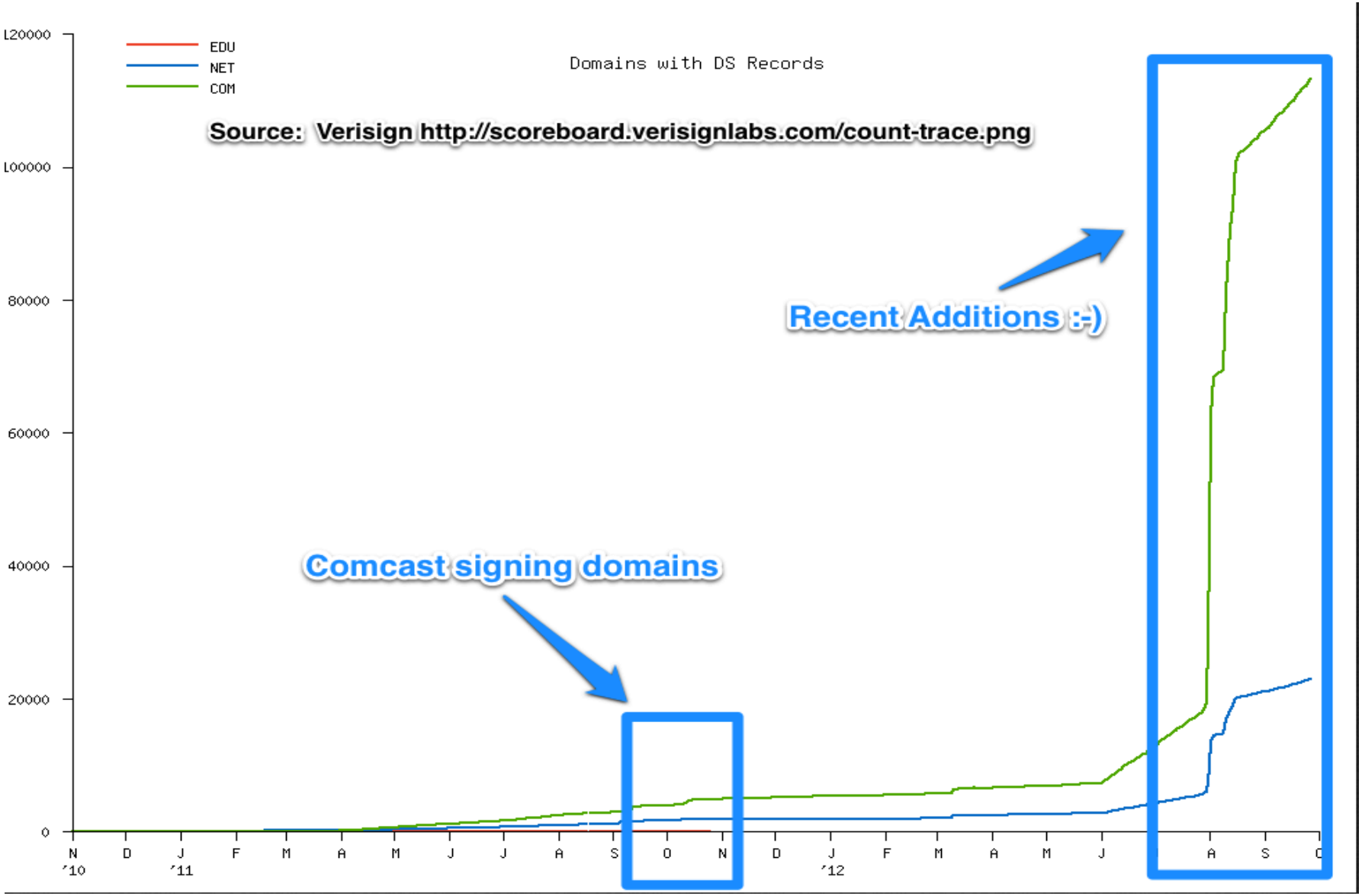
Some Measurement Data – September 2012



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Validation and Customer Perceptions

There is still much work needed to make validation for name resolution stable

- There have been several high profile sites in the .GOV TLD that have had operational issues reported recently.
  - See http://dns.comcast.net
- Many of which immediately cause people to claim that we are blocking access to services. We do not blocking access to sites and services.
- Customers are overtly aware when a site stops working…
  - Twitter, Facebook, Blogs are the new way of alerting that a website is down. Social media is the new alerting mechanism.
- How do we help customers identify when there is a site down due to DNSSEC validation?
  - Either because of error or maliciousness.
  - Should this be done in web browsers and applications?

Validation and Customer Perceptions

- In the end, customers are not going to have patience trying to decipher a DNS problem, DNSSEC signing problem, or just that they cannot get to a site due to any number of problems
  - We need better tools and alerting mechanisms for zone operators to know their zone is not operating.
  - There needs to be better coordination across all zone operators.
  - Could we use organizations like DNS-OARC or something else to help coordinate and provide tools for zone operators to assist with signing validation and operational deployment?

Lessons Learned in Testing & Early Deployment

- Is a software upgrade required?
- Can the servers handle incremental CPU load?
- Network equipment may need to be updated
  - Will they permit both UDP and TCP traffic on port 53?
  - Can they properly handle larger DNS responses? (with EDNS0, response may go from 512 bytes to 4,000 bytes)
  - Can they handle fragmentation?
- Authoritative infrastructure may need to be augmented to support signing your zones
  - Zone signing can be resource intensive.
  - This can be complex if you have many sub-zones.
  - Delegations to platforms like GLSB and CDN which are not yet supporting DNSSEC signing will stop validation and in some cases break.

Lessons Learned in Testing & Early Deployment

- Best way to figure this out is to test in the lab and validate with production traffic under close observation and measurement.

- If you plan this at the same time as your IPv6 upgrade, they incremental cost and work is more modest than it otherwise would be.

- Look for operational processes that may need to be adjusted to support DNSSEC validation. (i.e. troubleshooting, customer FAQs)

- Add new Key Performance Indicators (KPIs) or metrics, such as:
  - # of SERVFAILs. (set an alarm threshold)
  - SERVFAILs as a % of all RCODEs. (set an alarm threshold)
  - When top-10 domains sign, ad hoc temporary monitors?

- For signing your zones, be sure your registrar has an automated process for updating / inserting DS records.

Recent Lessons Learned at Scale

- On our authoritative servers, not many DNSSEC-related RR queries as of yet. (expected based on the state of validation)

- Of the top 2,000 domains:
  - 1.75% signed – which is oddly close to the % with AAAA RRs.

- As with any new technology or deployment there will be problems
  - Prepare in advance. (scripts, processes, testing, practice)

- Most common issue is incorrectly signed zones, usually related to key rollovers.

More Recent Lessons Learned at Scale

- One solution is a “Negative Trust Anchor” to temporarily skip validation for a given domain
  - Only when an engineer has personally verified the failure is due to DNSSEC misconfiguration and, preferably, communicated with the affected domain.
  - Can temporarily restore end user access while the domain fixes their problem.
  - Does NOT scale, but can be helpful for high traffic and other key domains.
  - Probably useful for the next 1 – 2 years as domains mature and master their signing and key rollover processes.
  - Ultimately, this is the responsibility of the domain owner or administrator to get right!

Increasing Adoption

There is still much work needed to make validation for name resolution stable

- More ISPs should move towards enabling DNSSEC validation on their resolvers in their network. They should also sign domains if they manage their authoritative zones.
  - Get started as soon as possible, there is a lot of planning needed to do it right.
  - Setting up a test bed and/or beta program is fairly low impact and will provide time to work through planning for eventual roll out.
  - Securing DNS answers is a value add for your customers.

- Enterprises should also look to trial DNSSEC validation in their network.
  - Setup for DNSSEC validation has become much easier with applications and tools.
  - Enterprises need security for the DNS as well.

Next Steps

- Managing customer escalations VS zone operator issues and how to we get in front of this problem

- We need to solve the current problems for DNS Global Load Balancing (GSLB) and Content Distribution Networks (CDN)
  - We are evaluating solutions now, but suggestions are welcome.
  - Multiple points points of presence for the same authoritative signed answers.

- Commercial Services
  - We have many commercial services customers who we would like to offer services like signed domains.
  - Legacy platforms that need to be upgraded to support signing.
  - Solve the DS key upload to many registrar problem.

Thank You!

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For more information on the Comcast DNSSEC and IPv6 deployments:

http://dns.comcast.net
http://www.comcast6.net

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