SLA Monitoring System (SLAM)

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SLA Monitoring System (SLAM) - Agenda

1 Contractual Provisions

2 SLAM

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4 Statistics

Contractual Provisions

Why ICANN is monitoring gTLDs?

- Specification 10 of the new gTLDs Registry Agreement specifies the Service Level Requirements for Registry Operators.

- A monitoring system called SLAM (Service Level Agreement Monitoring) System was developed by ICANN as a tool to measure the compliance with these requirements.

What are the Service Level Requirements?

	Parameter	SLR (monthly basis)
DNS	DNS service availability	0 min downtime = 100% availability
	DNS name server availability	≤ 432 min of downtime (≈99%)
	TCP DNS resolution RTT	≤ 1500 ms, for at least 95% of queries
	UDP DNS resolution RTT	≤ 500 ms, for at least 95% of queries
	DNS update time	≤ 60 min, for at least 95% of probes
RDDS	RDDS availability	≤ 864 min of downtime (≈98%)
	RDDS query RTT	≤ 2000 ms, for at least 95% of queries
	RDDS update time	≤ 60 min, for at least 95% of probes
EPP	EPP service availability	≤ 864 min of downtime (≈98%)
	EPP session-command RTT	≤ 4000 ms, for at least 95% of commands
	EPP query-command RTT	≤ 2000 ms, for at least 95% of commands
	EPP transform-command RTT	≤ 4000 ms, for at least 95% of commands

What are the Emergency Thresholds?

- ICANN can designate an interim EBERO (Emergency Backend Registry Operator) to take over the operation of a gTLD when an emergency threshold is reached.

- SLAM system alerts and Compliance notices are sent to Registry Operators when certain percentages of the specified Emergency Thresholds are met.

What are the Emergency Thresholds?

| Critical Function	Emergency Threshold
DNS Service (all servers)	4-hour total downtime / week
DNSSEC proper resolution	4-hour total downtime / week
EPP	24-hour total downtime / week
RDDS (WHOIS / Web-based WHOIS)	24-hour total downtime / week

SLAM

What is the SLAM?

- Zabbix as the primary monitoring platform. Custom plugins and code to support ICANN monitoring were developed by Zabbix.

- Probe node network
  - Consists of 40 probe nodes covering all ICANN regions.

- A Network Operations Center operating 24/7

- ICANN-staff is on-call 24/7

Design principles of the system

- Avoid false positives

- Avoid false positives

- Avoid false positives

- Reach the affected Registry Operator as soon as possible

- Provide general guidance regarding the potential issue

How it works?
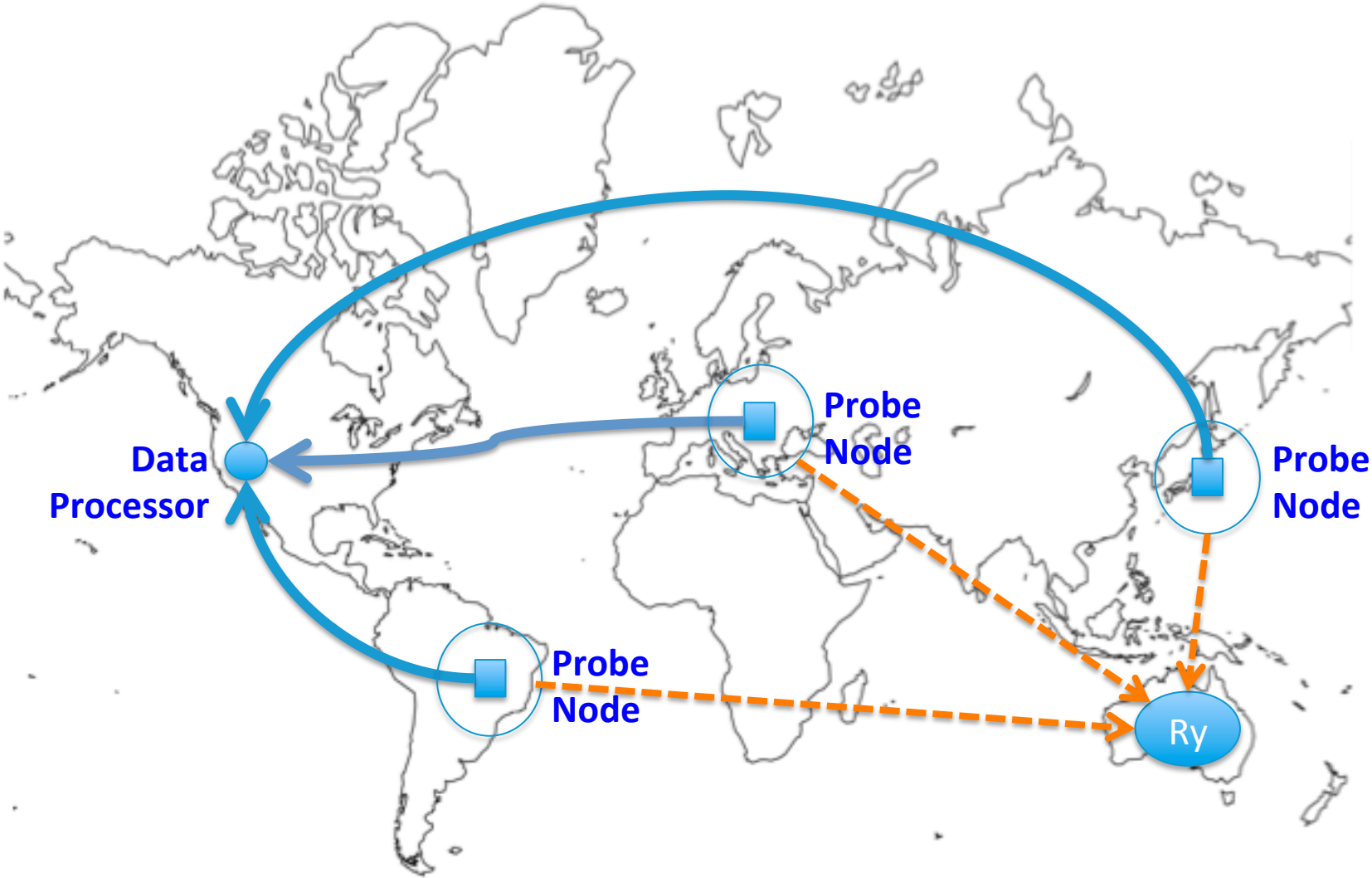
DNS test

- One non-recursive DNS query sent every minute from all probe nodes
  - Query is sent to every IP address, NS pair
  - Query is for the FQDN zz--icann-monitoring.<TLD>

- If DNSSEC is offered, NSEC/NSEC3 and the signatures are verified.

- The chain of trust is validated against the root zone KSK.

DNS test

- Examples of failure criteria

  – No reply

  – Invalid reply (e.g., RCODE/SERVFAIL)

  – Malformed or invalid responses

  – Broken chain of trust

  – NSEC and NSEC3 errors

RDDS test

- One Whois (port 43) transaction initiated every 5 minutes from all probe nodes.

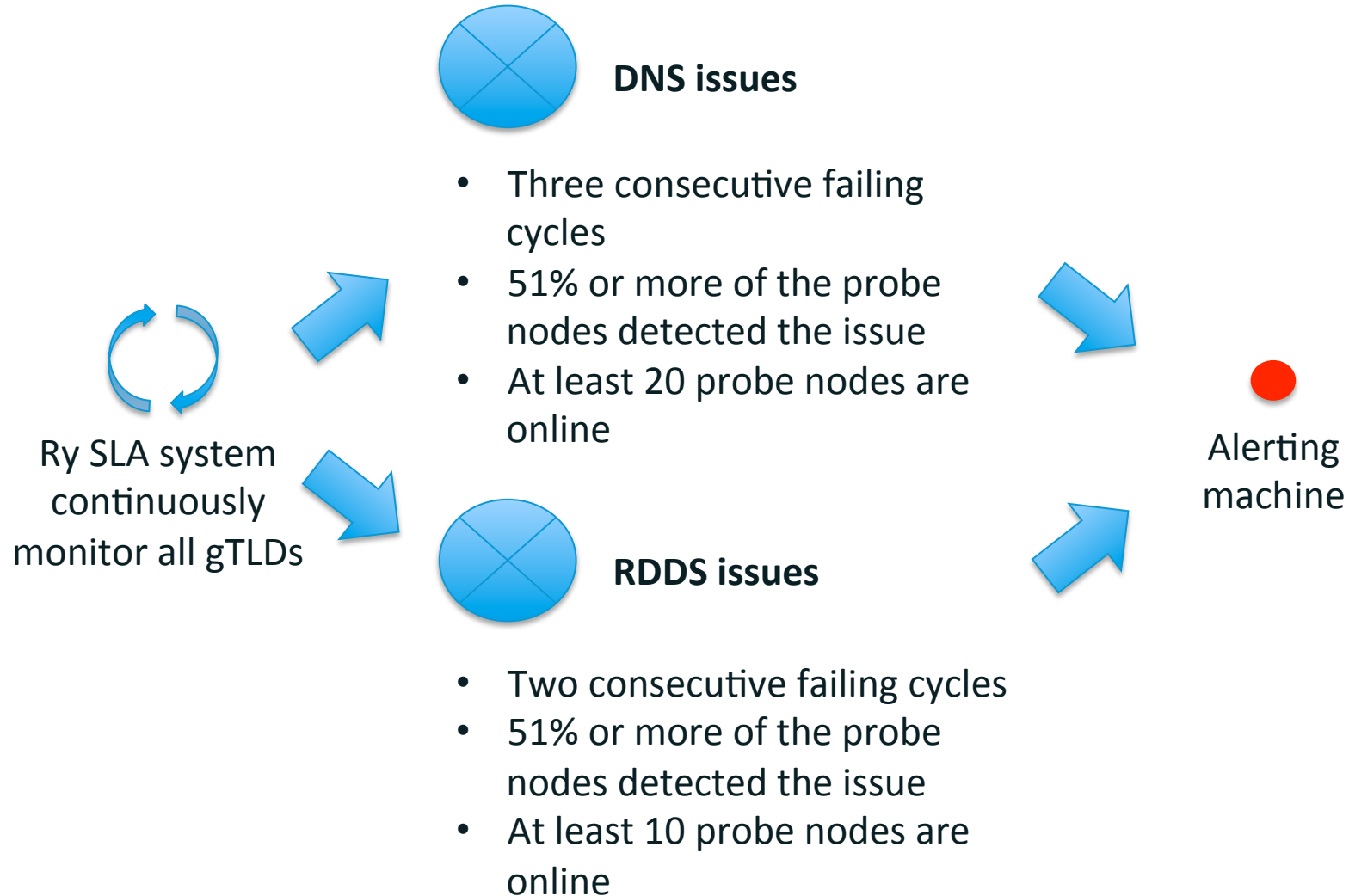- One HTTP (web-Whois) connection test every 5 minutes. The system will follow HTTP redirects.

RDDS test

- Examples of failure criteria

  – DNS/DNSSEC failures when resolving whois.nic.<TLD>

  – Malformed or invalid Whois (port 43) responses

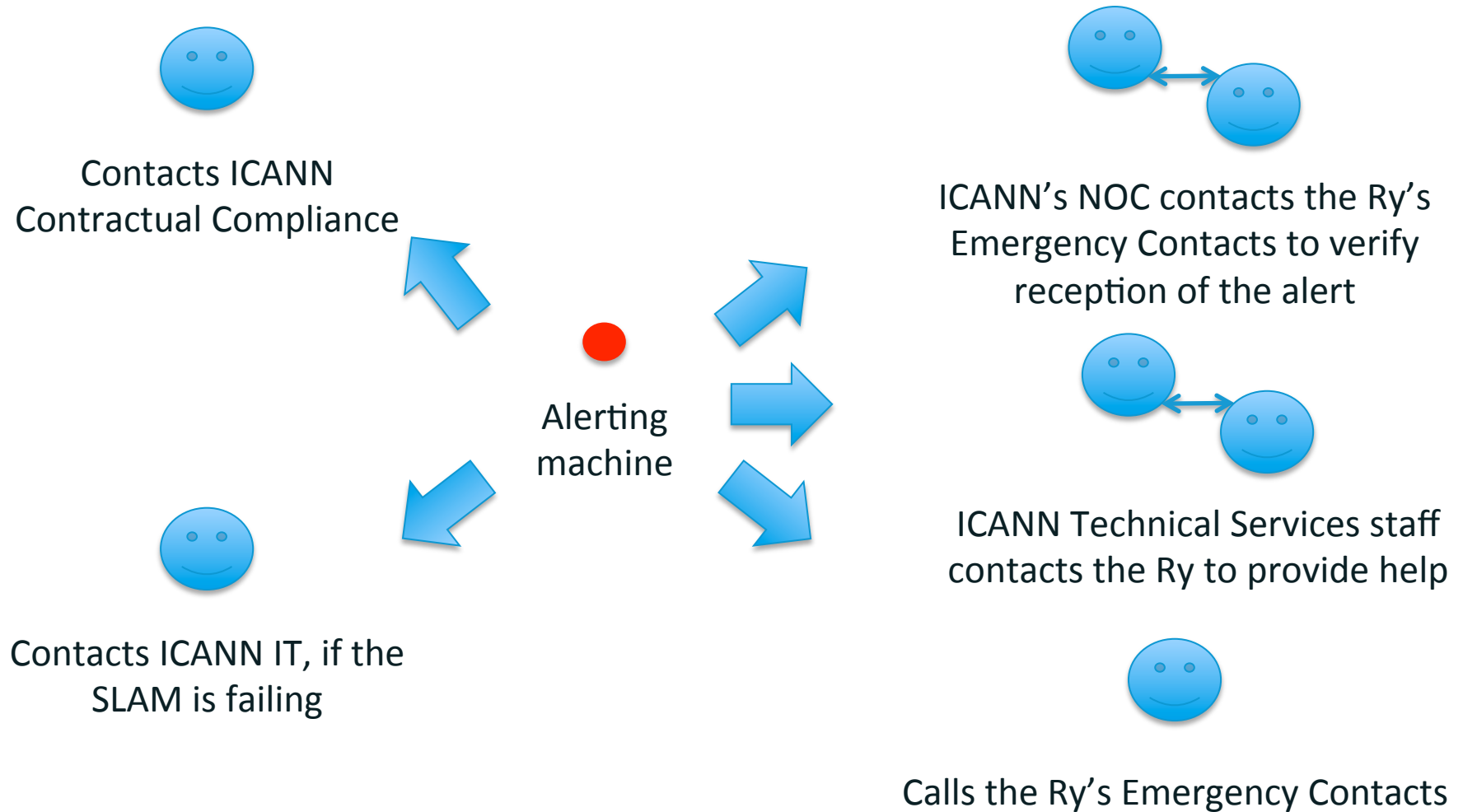 – HTTP 500 error code in case of web-Whois

Recursive DNS servers

- Recursive DNS servers are used during the tests (e.g. resolving whois.nic.<TLD>)

- DNSSEC is enabled in the recursive DNS servers

- If DNSSEC is failing when resolving whois.nic.<TLD>, the RDDS is considered to be failing

- The maximum TTL allowed in the cache and negative cache is 15 minutes

What happens when a failure is detected?

DNS issues

- Three consecutive failing cycles
- 51% or more of the probe nodes detected the issue
- At least 20 probe nodes are online

Ry SLA system continuously monitor all gTLDs

RDDS issues

- Two consecutive failing cycles
- 51% or more of the probe nodes detected the issue
- At least 10 probe nodes are online

Alerting machine

What happens when a failure is detected? – cont.

Contacts ICANN
Contractual Compliance

ICANN's NOC contacts the Ry's
Emergency Contacts to verify
reception of the alert

Alerting
machine

ICANN Technical Services staff
contacts the Ry to provide help

Contacts ICANN IT, if the
SLAM is failing

Calls the Ry's Emergency Contacts

Monitoring the quality of IPv4 and IPv6

- Every probe node monitors the quality of its IPv4 and IPv6 connectivity.

- If the quality of its IPv4 and IPv6 connectivity is determined to be insufficient, the probe node goes offline automatically.

- In order to monitor the quality of IPv4 and IPv6 connectivity, the node:

  – Sends a DNS query to every root-server every minute
  – If 5 or more responses are received per IP protocol within 250ms, the quality of connectivity is considered to be sufficient

MoSAPI

MoSAPI

- The monitoring system API is in pilot mode at the moment.

- The API allows the Registry to access the information collected by the SLAM.

- The production version is going to support defining a maintenance window programmatically. At the moment, this is a manual process.
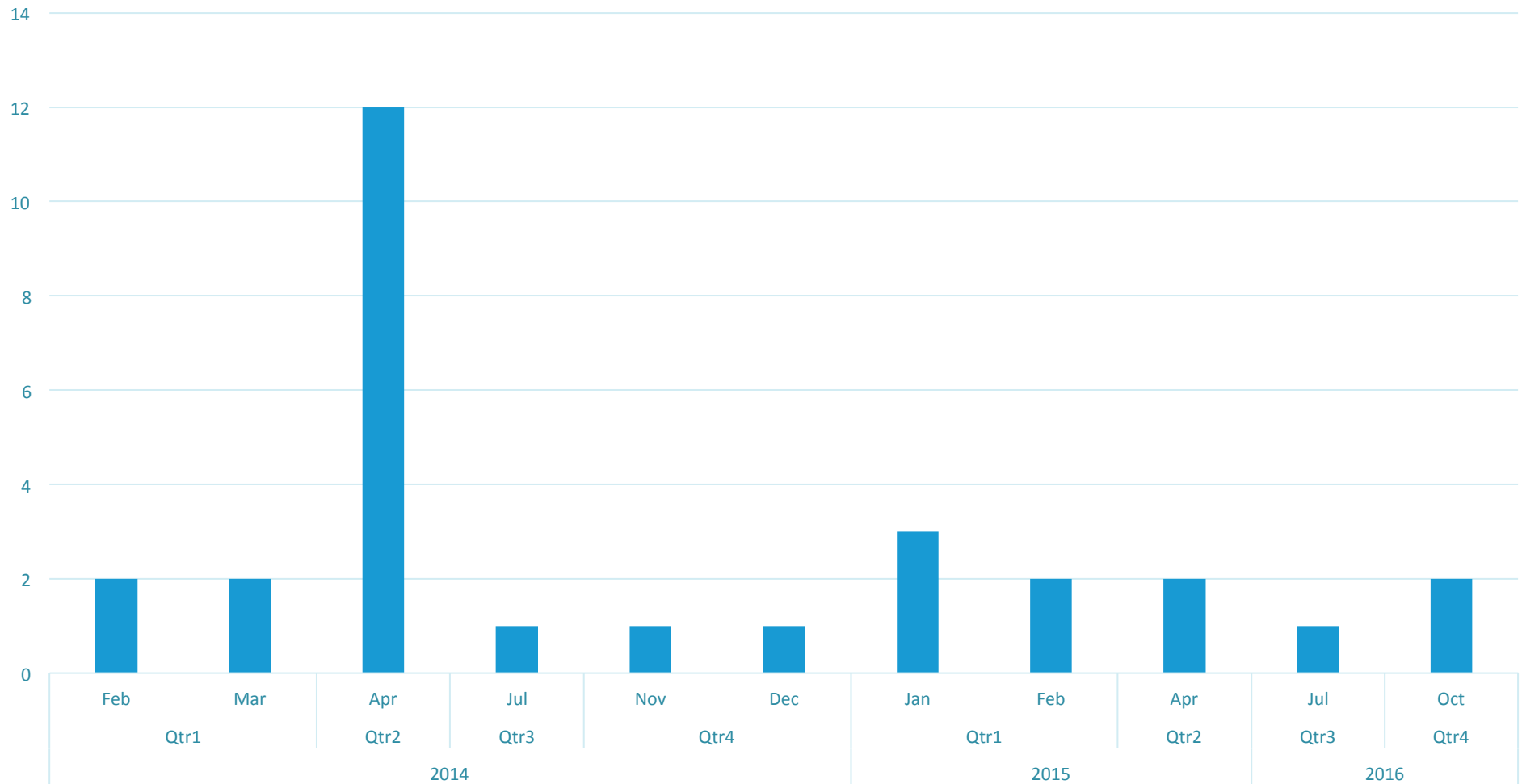
Statistics

Statistics – Interesting data points

- 11 out of 37 RSPs have had at least one TLD that reached the EBERO threshold in at least one service

- 27 (DNS or RDDS) service failures reached the EBERO threshold (we haven't declared one EBERO event yet)

- 1.7% (21 out 1,211) of the new gTLDs have reached the EBERO threshold in at least one service (DNS or RDDS)

- 32 out of 37 RSPs have had at least one DNS service failure since 25-Sep-2014
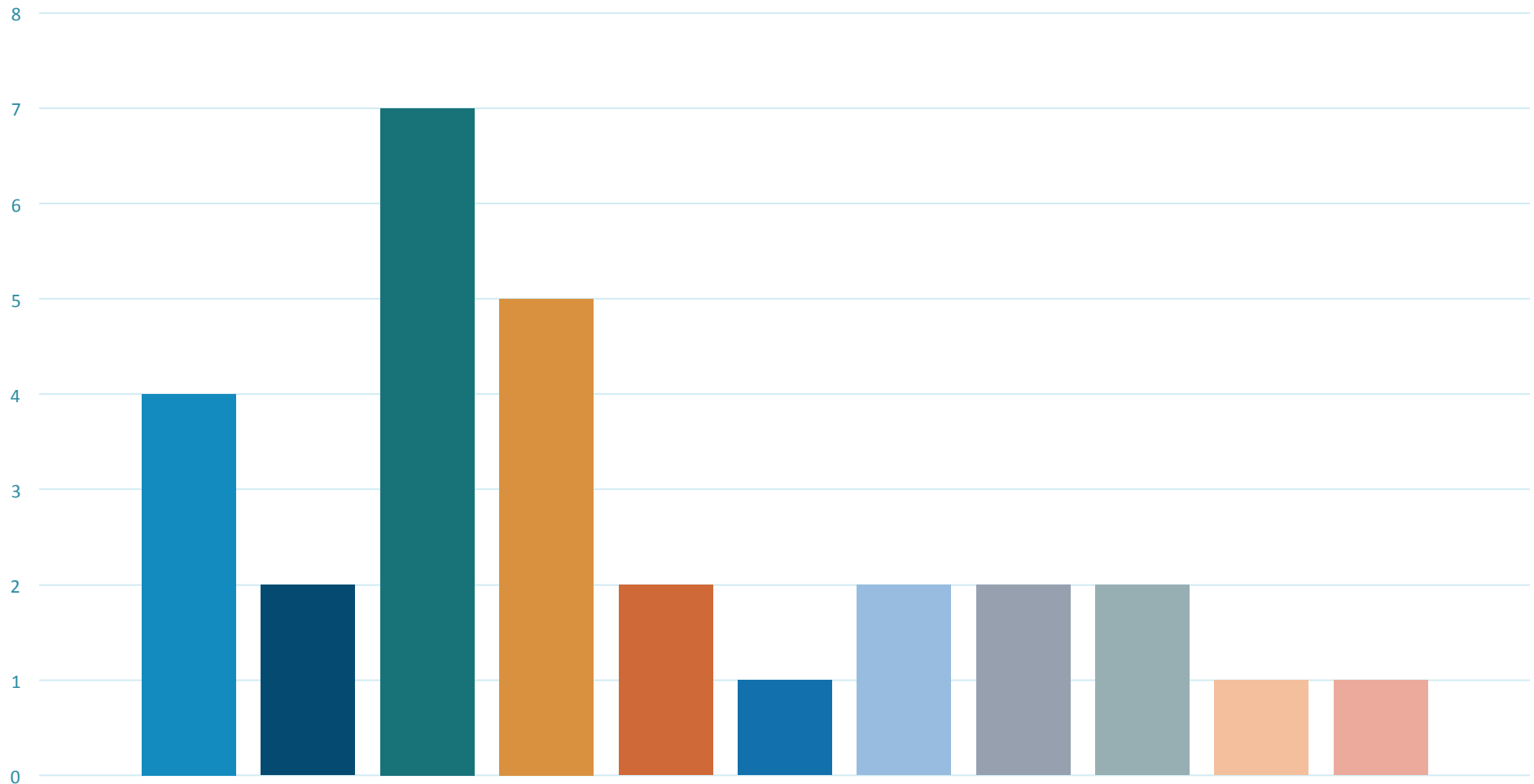
Note: data as of 1-Jan-2017.

Statistics – Potential EBERO events
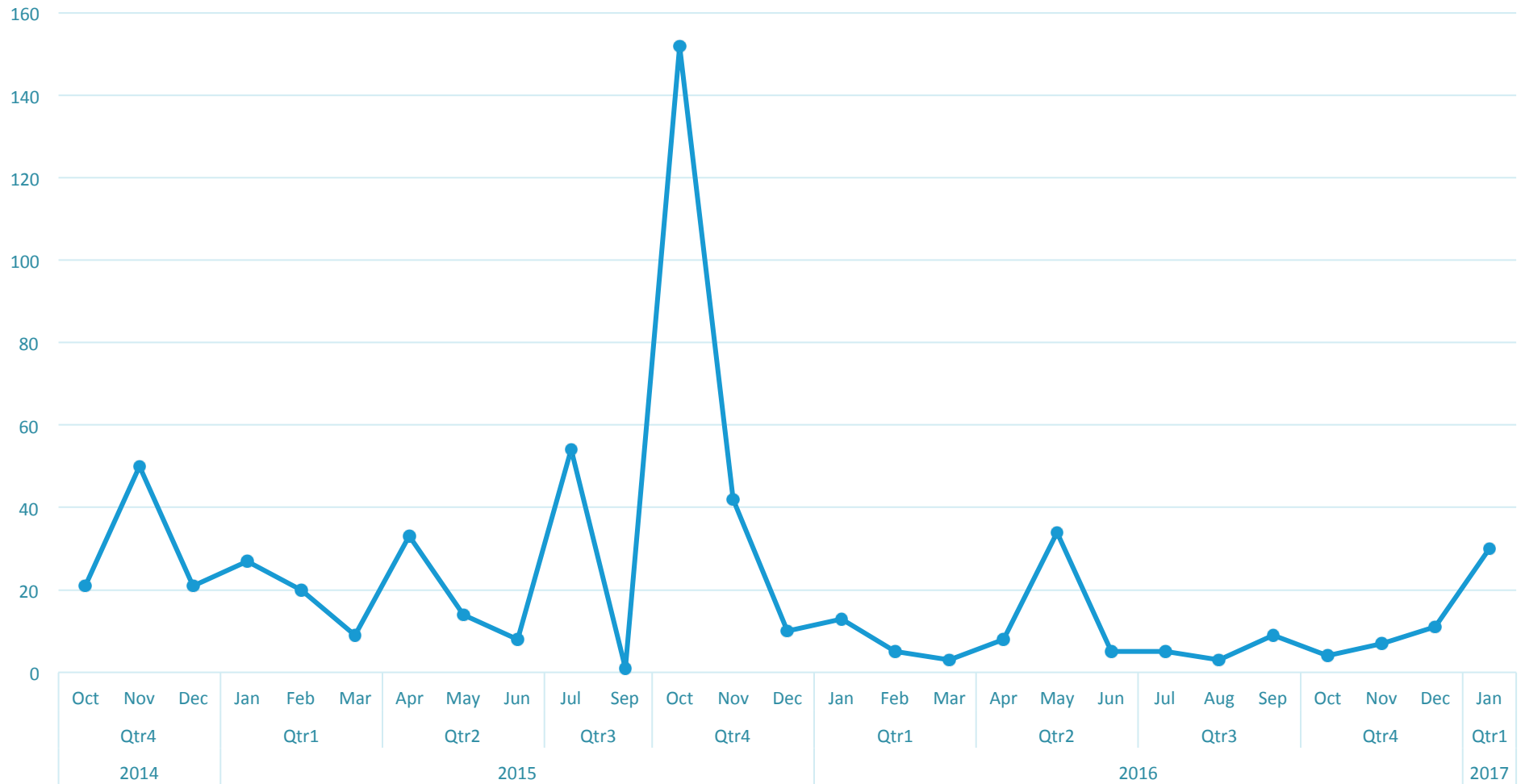

Failures that reached the EBERO threshold

Statistics – Potential EBERO events

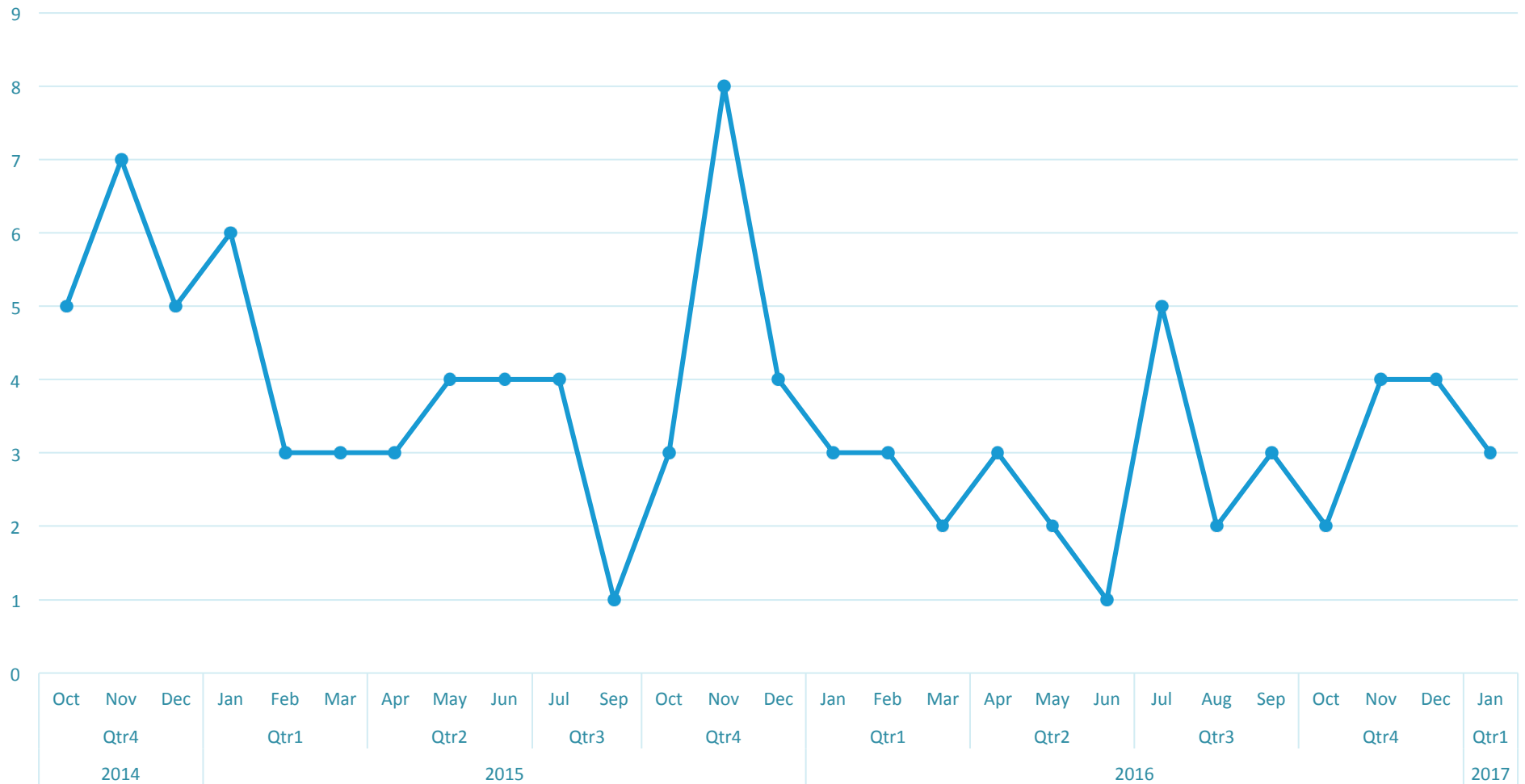Failures that reached the EBERO threshold per RSP

Statistics – DNS failures

DNS failures

Statistics – Unique-RSP DNS failures

Unique-RSP DNS failures

Engage with ICANN

Thank You and Questions

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