RING: Network debugging never was easier
SQA: Blazing fast partial outage detection

Job Snijders
job@ntt.net

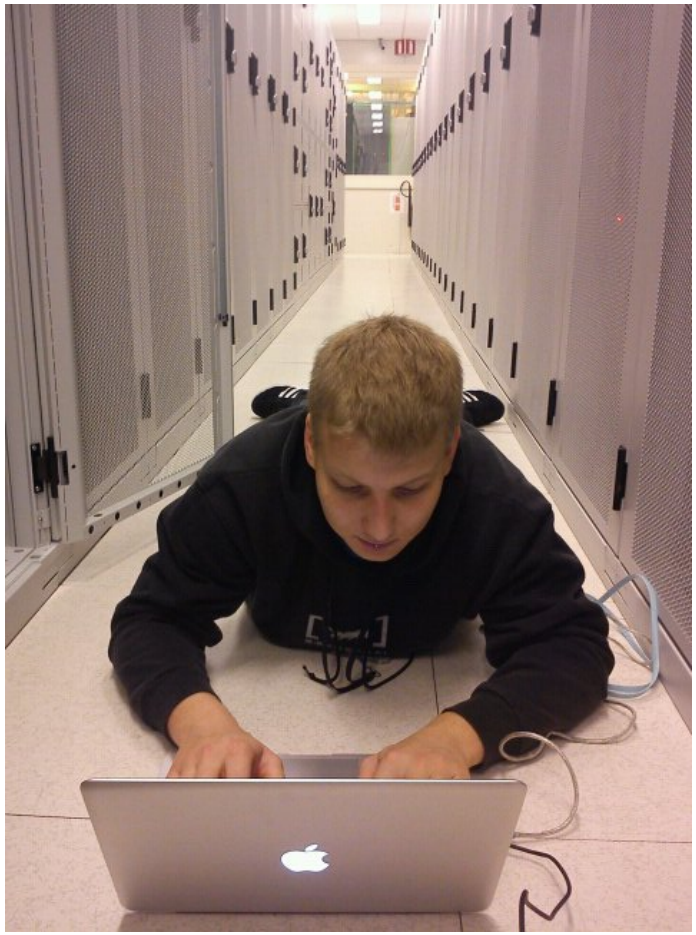
Who am I?

Job Snijders

Bla bla bla @ AS2914

Twitter: @JobSnijders
Email: job@ntt.net

Shoe size: 45/EU



So, what's this RING thing?

Metaphysical definition:

"Awesome network debugging platform"

Foundation:

Trust – I trust you with access to my resources, as you trust me with access to your resources

Agenda

- How the RING came to be
- Current state of the RING
- RING SQA
  - What is it?
  - How to use it?
- Invitation to join the RING


ONE DOES NOT SIMPLY
DEBUG NETWORKS
quickmeme.com

State of the RING – Nov ‘14

298 nodes	46 countries
265 Autonomous Systems	Still growing!

Participants from all walks of life, a random selection

Other CLI uses

- Use dig to check nameservers from ~ 250 ASNs
- Traceroute from 298 nodes to your target
- MTU testing between you and others
- Port scanning
- Debug L2/L3 load balancing issues
- Anything!

RING SQA

- A new partial outage detector dubbed “RING SQA” is available to all RING participants. The purpose of the tool is to detect outages as fast as possible that only affect a subset of all internet destinations.

- RING SQA pings all other nodes (v4 + v6) every 30 seconds to derive a baseline, this baseline is compared to the last 3 minutes of measurements. If the median of the baseline is tripped for three consecutives minutes, an alarm is raised.

Then what?

- When an alarm is raised, three MTRs are immediately launched towards destinations that previously were reachable, but suddenly not anymore. The purpose of these traces is to provide an investigation starting point for your NOC.

- All in all super fast outage detection. All participants are invited to use this system! Gratis! :-)

```
From: sqa@companyname01.ring.nlnog.net
To: noc@ring_participating_company.org
Subject: RING ALERT raising ipv4 alarm - 16 new nodes down
Body:

Regarding: companyname01.ring.nlnog.net ipv4

This is an automated alert from the distributed partial outage
monitoring system "RING SQA".

At 2014-07-27 10:18:05 UTC the following measurements were analysed
as indicating that there is a high probability your NLNOG RING node
cannot reach the entire internet. Possible causes could be an outage
in your upstream's or peer's network.

The following nodes previously were reachable, but became unreachable
over the course of the last 3 minutes:

- itps01.ring.nlnog.net            128.65.97.93 AS42010 GB
- fullsave01.ring.nlnog.net       141.0.202.201 AS39405 FR
- globalaxs01.ring.nlnog.net       176.10.80.10 AS 9009 GB
- kwaoo01.ring.nlnog.net         178.250.209.33 AS24904 CH
- suretec01.ring.nlnog.net          185.8.92.17 AS199659 GB
-  swisscom01.ring.nlnog.net     193.247.170.254 AS 3303 CH
-  <snip>
```

As a debug starting point 3 traceroutes were launched right after detecting the event, they might assist in pinpointing what broke:

```
trueinternet01.ring.nlnog.net  AS 7470 (TH)
mtr -i0.5 -c5 -r -w -n 203.144.167.57
  1.|-- 109.233.156.241        0.0%     6    0.5   0.5   0.5   0.6   0.0
  2.|-- 109.233.156.1          0.0%     5    0.8   0.9   0.8   1.1   0.1
  3.|-- 109.233.156.2          0.0%     5    0.8   0.8   0.8   0.9   0.0
  4.|-- 64.209.88.33           0.0%     5    0.9   1.0   0.9   1.5   0.3
  5.|-- 159.63.23.198         60.0%     5  265.1 264.9 264.7 265.1   0.3
  6.|-- ???                   100.0     5    0.0   0.0   0.0   0.0   0.0
  7.|-- ???                   100.0     5    0.0   0.0   0.0   0.0   0.0
  8.|-- ???                   100.0     5    0.0   0.0   0.0   0.0   0.0
  9.|-- ???                   100.0     5    0.0   0.0   0.0   0.0   0.0
 10.|-- ???                   100.0     5    0.0   0.0   0.0   0.0   0.0
 11.|-- 203.144.144.30        80.0%     5  297.4 297.4 297.4 297.4   0.0
 12.|-- ???                   100.0     4    0.0   0.0   0.0   0.0   0.0

globalaxs01.ring.nlnog.net     AS 9009 (GB)
mtr -i0.5 -c5 -r -w -n 176.10.80.10
  1.|-- 109.233.156.241        0.0%     6    0.4   0.5   0.4   0.5   0.0
  2.|-- 109.233.156.1          0.0%     5    0.9   1.8   0.7   5.3   1.9
  3.|-- 81.201.115.41          0.0%     5    0.9   0.9   0.8   1.0   0.1
  4.|-- 62.209.32.18           40.0%     5    1.3   1.2   1.2   1.3   0.1
  5.|-- 80.81.192.165          0.0%     5    1.3   9.3   1.2  41.5  18.0
  6.|-- 193.27.64.245          60.0%     5  191.9 108.1  24.3 191.9 118.5
  7.|-- 193.27.64.66           80.0%     5   43.6  43.6  43.6  43.6   0.0
  8.|-- ???                   100.0     5    0.0   0.0   0.0   0.0   0.0
```

An alarm is raised under the following conditions: every 30 seconds your node pings all other nodes. The amount of nodes that cannot be reached is stored in a circular buffer, with each element representing a minute of measurements. In the event that the last three minutes are 1.2 above the median of the previous 27 measurement slots, a partial outage is assumed. The ring buffer's output is as following:

```
<snip>
11 min ago  41 measurements failed (baseline)
10 min ago  41 measurements failed (baseline)
 9 min ago  41 measurements failed (baseline)
 8 min ago  41 measurements failed (baseline)
 7 min ago  41 measurements failed (baseline)
 6 min ago  41 measurements failed (baseline)
 5 min ago  41 measurements failed (baseline)
 4 min ago  41 measurements failed (baseline)
 3 min ago  45 measurements failed (baseline)
 2 min ago  66 measurements failed (raised alarm)
 1 min ago  65 measurements failed (raised alarm)
 0 min ago  65 measurements failed (raised alarm)
```

How to get SQA?

If you are already are a NLNOG RING participant:

- Edit **`/etc/ring-sqa/alarm.conf`**
- **`sudo restart ring-sqa4`**
- **`sudo restart ring-sqa6`**

When you aren't a NLNOG RING participant:

- Join the NLNOG RING!

How to use it?

- Intergrate RING SQA with your NOC workflow
- Investigate every alert, so far almost zero false positives
  - Transit provider outage
  - DDoS
  - Broken VM setups
- Put a NLNOG RING node in all your major hubs

RING governance

- Rough consensus
- Very active community (software dev, ideas)
- All equipment & hosting comes from Sponsors

The RING is a community effort, built by and for us, network engineers.

How to join?

- Requirements
  - 1 machine (virtual is fine)
  - 1 IPv4 and 1 IPv6 address
  - Fresh install of Ubuntu 12.04 (64 bit)
  - You must be present in the DFZ with own ASN
  - Fill in application form on **https://ring.nlnog.net/**

Mega easy!

Gratis!