Internet Noise (1.1.1.0/24 and 1.0.0.0/24)

Louis Poinsignon

Cloudflare

Introduction to Cloudflare

Some numbers...

- 155+ PoPs and growing
- 72+ countries
- 186+ Internet exchanges

- >600bn Web requests a day ~10% of all web requests
- Regular DDoS attacks larger than 500Gbps, 300M PPS
- Largest attack seen 942Gbps
- >100bn DNS requests a day

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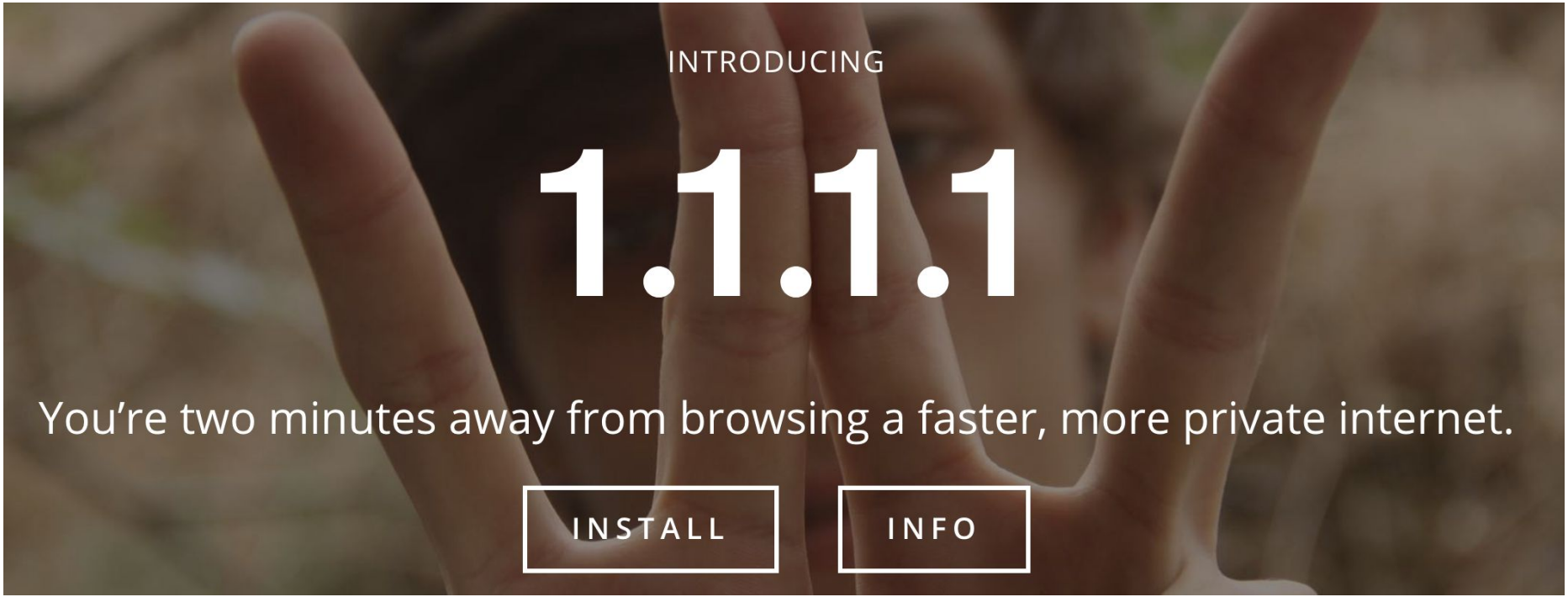
INTRODUCING
1.1.1.1
You're two minutes away from browsing a faster, more private internet.
INSTALL
INFO

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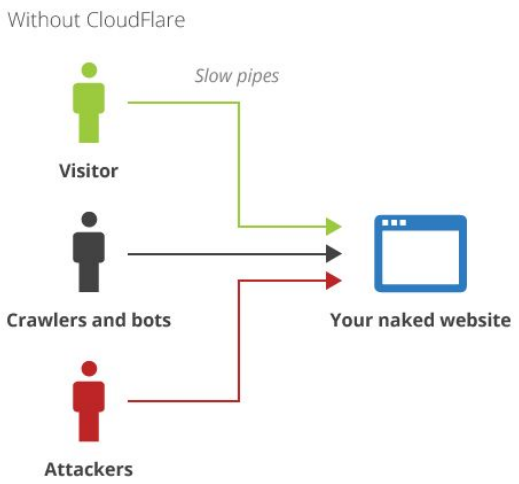
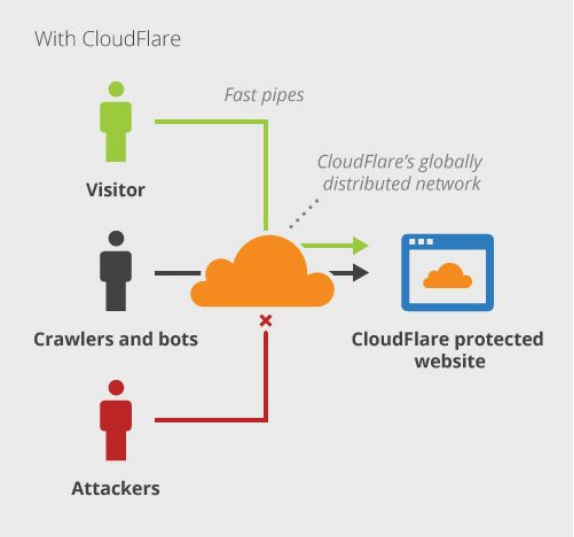
About Cloudflare

Cloudflare makes websites faster and safer using our globally distributed network to deliver essential services to any website

- Performance
- Content
- Optimisation
- Security
- 3rd party services
- Analytics
- Edge Computing





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You already use Cloudflare without knowing it.

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Who am I

Who am I?

- Louis Poinsignon
- Network, data and software @ Cloudflare London and SF
- Built a network data pipeline (flows and BGP) for Cloudflare scale, open-source:
  https://github.com/cloudflare/goflow
  https://github.com/cloudflare/fgbgp
  (most of the data in this presentation comes from those tools)

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The IP Blocks

The IP Blocks

- Interesting IP ranges:
  1.1.1.0/24 and
  1.0.0.0/24

APNIC

- Partnership with **APNIC Labs**

Get IP Manage IP Training Events Research Community

APNIC Labs enters into a research agreement with Cloudflare

By Geoff Huston on 2 Apr 2018

Category: Tech matters

APNIC Labs is partnering with Cloudflare for a joint research project relating to the operation of the DNS.

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The IP Blocks

Let’s talk about **Internet noise.**

Known to receive unwanted traffic:

- Misconfigurations
- Misuse
  - Proxy
  - Internal use

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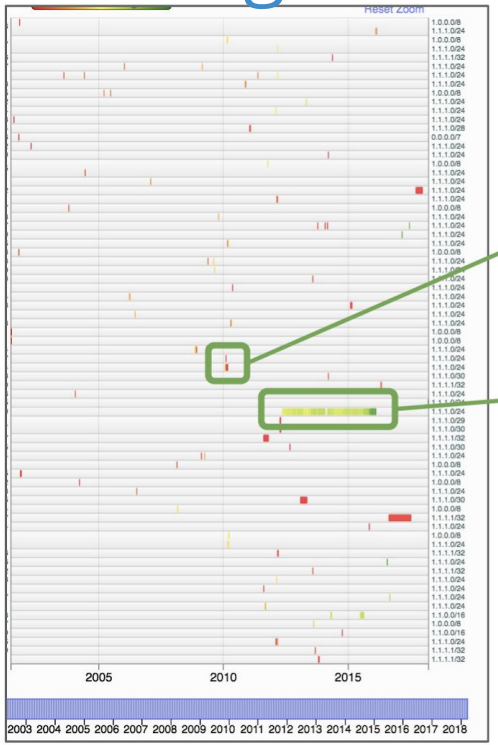
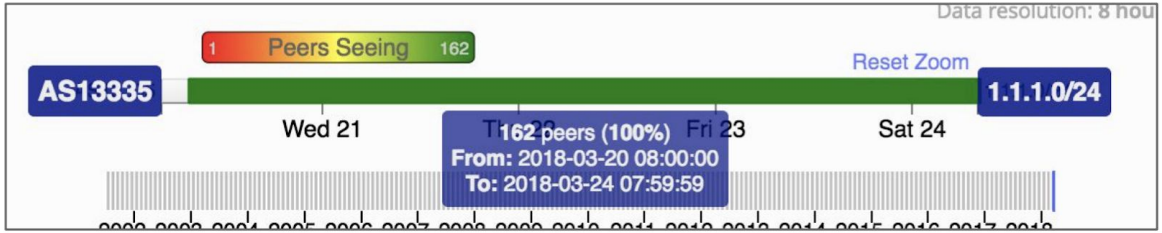
Routing History



RIPE, Merit

```
https://labs.ripe.net/Members/franz/content-pollution-18
- Franz Schwarzinger
http://www.potaroo.net/studies/1slash8/1slash8.html
- Geoff Huston
```

Google



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What’s the Noise / Junk?

Traffic Levels

- Previous studies:
  - >100 Mb/s on 1.1.1.0/24 in 2010
  - 100-1Gb/s on 1.0.0.0/8 in 2014

(https://conference.apnic.net/data/37/2014-02-27-prop-109_1393397866.pdf - Geoff Huston)

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Traffic Levels

10Gb/s

1 Gb/s solely on 1.1.1.1

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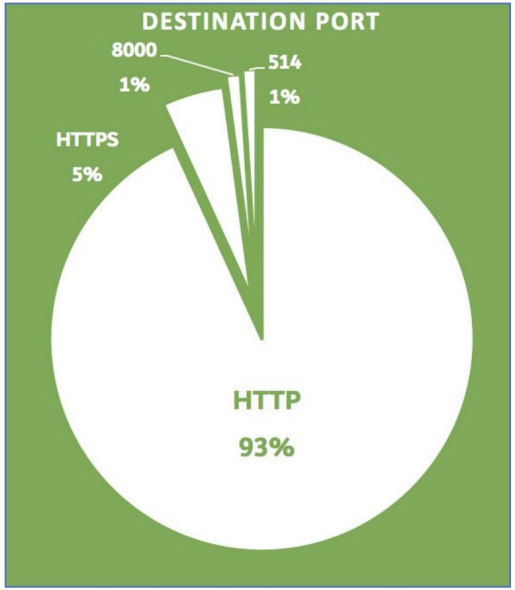
Traffic Levels

- TCP traffic (mostly HTTP proxy, services).
  - Ports 443, 80, 8000, 8080, 8090, 8765
- UDP traffic (some DNS, syslogs).
  - Ports 53, 514, 8000, 80, 8090
- TP-Link DNS 1.0.0.19
  - https://serverfault.com/questions/365613/tp-link-routers-send-dns-queries-to-1-0-0-19-what-is-that/365630



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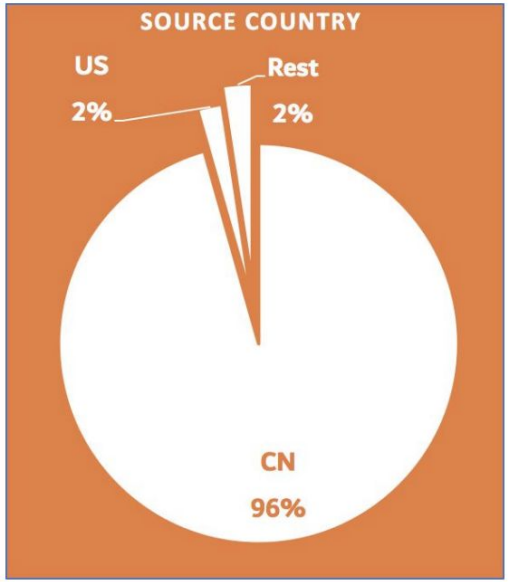
Traffic source

- Aligned with internet populations:
  - Heavily weighted to source from China
  - USA, Other large Internet populations.



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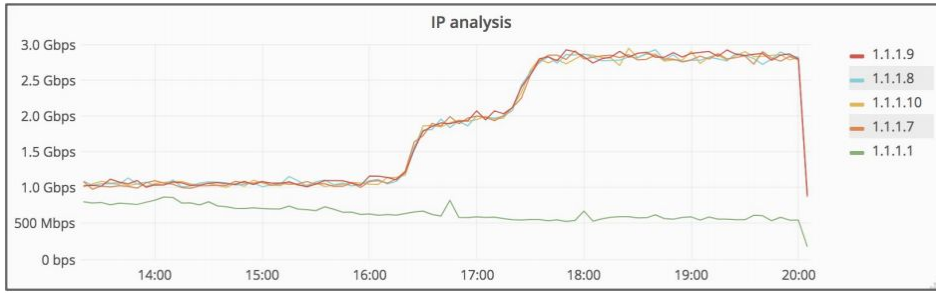
Bursts and patterns

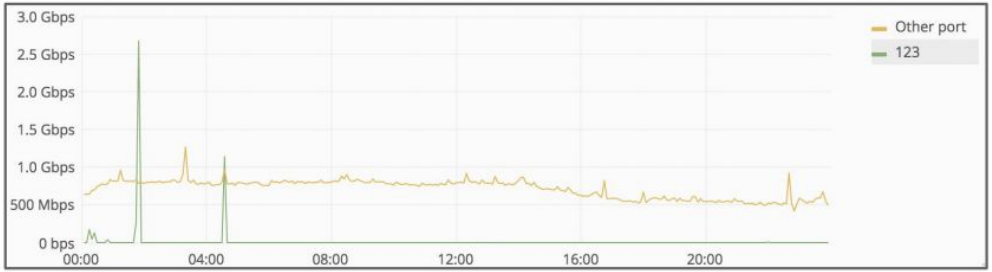


Two increases:

- 5 Gb/s → 8 Gb/s between 1600 and 1715 UTC
- 8 Gb/s → 12.5 Gb/s between 1715 and 2300 UTC
- Mostly on 1.1.1.7, 1.1.1.8, 1.1.1.9 and 1.1.1.10
    - Destination 80
    - Increase from China
    - No particular difference on source IP/net

Short bursts:

- Only on 1.1.1.1 between 0100 and 0200 UTC for a few minutes
- 1-10 gigabits/sec
- UDP traffic source 123 (NTP) and 11211 (memcached)
    - Misconfigured network devices?



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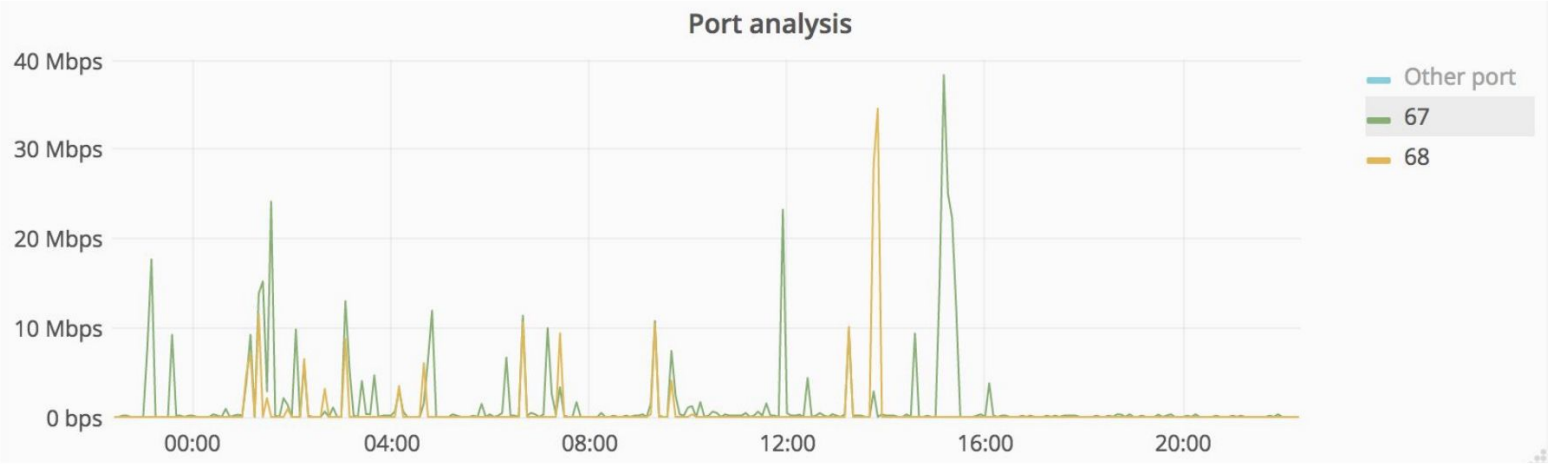
Bursts and patterns

Also **DHCP** spikes. From **Macau**.



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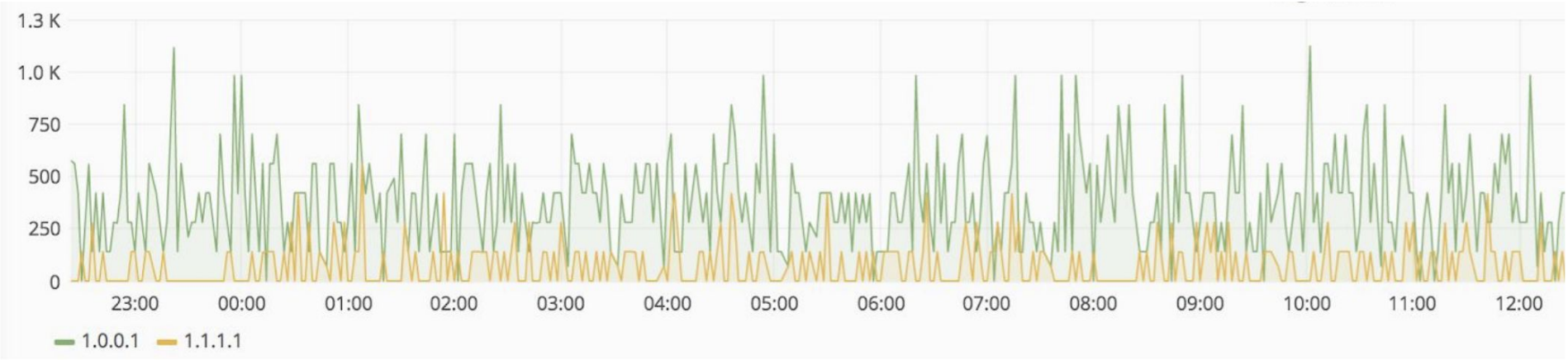
Legitimate Traffic?

Filtering to only UDP/TCP 53, receiving a substantial amount of DNS traffic even before launch.



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What’s Changed?

What's Changed?

Lots of previous studies into traffic profiles:

Presentation from 10 years ago at NANOG49
(https://www.nanog.org/meetings/nanog49/presentations/Monday/karir-1slash8.pdf - Merit, APNIC & UMich)

We still see iperf traffic (port 5000/5001).

Around **10-20 times more** traffic than previous studies.

We estimate legitimate traffic to be around 7-13%

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Availability?

Availability

Thanks to the Atlas probes, we've run thousands of tests

Time (UTC)	RTT		Hops	Success	
2018-03-28 11:43	7.504		11	✗	ℹ
2018-03-28 11:43	6.292		11	✗	ℹ
2018-03-28 11:43	6.260		11	✗	ℹ
2018-03-28 11:43	8.558		11	✗	ℹ
2018-03-28 11:43	7.308		11	✗	ℹ
2018-03-28 11:43	3.412		11	✗	ℹ
2018-03-28 11:43	33.123		11	✗	ℹ
2018-03-28 11:43	1.879		1	✓	ℹ
2018-03-28 11:43	21.928		7	✓	ℹ
2018-03-28 11:43	11.641		8	✗	ℹ
2018-03-28 11:43	26.318		4	✓	ℹ

Null-routes

CPE installed in ISP

…

Suddenly an open FTP server

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Availability

More than **30** major Internet Service Providers all around the world having issues.

- Many null-routing 1.1.1.1/32
- 1.1.1.1/30 is a favorite point-to-point address
- But also using 1.0.0.0/24 for internal purposes (finding devices)
- Most of the ISPs are cleaning their configurations (more than a dozen fixed in less than a week).
- Few non-responses

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Documentation

Documentation

RFC-5737

```
Internet Engineering Task Force (IETF)                          J. Arkko
Request for Comments: 5737                                       Ericsson
Updates: 1166                                                   M. Cotton
Category: Informational                                         L. Vegoda
ISSN: 2070-1721                                                     ICANN
                                                             January 2010


              IPv4 Address Blocks Reserved for Documentation

Abstract

   Three IPv4 unicast address blocks are reserved for use in examples in
   specifications and other documents.  This document describes the use
   of these blocks.
```

https://tools.ietf.org/rfc/rfc5737.txt

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Documentation

Per RFC-5737:

- 192.0.2.0/24
- 198.51.100.0/24
- 203.0.113.0/24

Exist for the soul purpose of documentation, diagrams, etc.

HOWEVER.....

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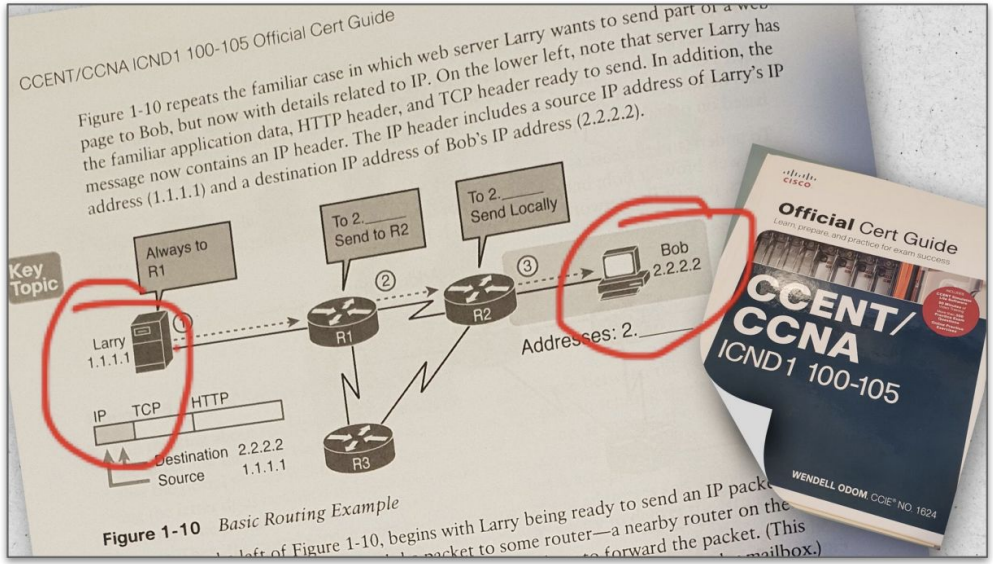
Documentation

Step 32 In the IP Address text box, enter the IP address of the controller's virtual interface. You should enter a fictitious, unassigned IP address such as 1.1.1.1.



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Just doing it wrong

01-13-2017, 03:44 PM #8

Quote:

Getting tired of typing 192.168. Why doesn't everybody use something simple like 1.1.1.x in a small LAN? What about 0.0.0.x?

I have been using 1.1.1.0/24 subnet for 15+ years on my home LAN and have never found a single instance where any computer in my house ever tried connecting to any address inside the 1.1.1.0-255 range outside my house.

Yes, I realize these are 'publically allocated addresses' but I too got very sick and tired of typing 192.168.blah.blah all the time. I do extensive lab stuff for work where I have servers I build and test in my LAN and am constantly typing IPs all the time.

I still have no regrets about using this subnet. In fact, today in my lab work, I also use 1.1.2.0/24, 1.1.3.0/24, 1.1.4.0/24, 1.1.5.0/24, 1.1.6.0/24, 1.1.7.0/24, 1.1.8.0/24, 1.1.9.0/24 and for the 1.1.2. to 1.1.9. range those are only for lab equipment (have no gateways) for things like iSCSI, vMotion, VSAN and stuff like that so I don't care about them anyway.

You know, if everyone in the world started using 1.1.x.x addresses for home and private LAN use then maybe the industry would change their standard and re-allocate these for official private LAN use, since if someone put a web server on those nobody would ever find their way there. They would be unpopular. Or I guess they are already unpopular because I don't see anyone really using them anyway.

TP-Link routers send DNS queries to 1.0.0.19. What is that?

4

I've got a problem with TP-Link soho routers. The DNS forwarder of those routers tends to ignore the DNS servers obtained by DHCP and instead tries sending all DNS requests to this strange IP: 1.0.0.19? That IP doesn't respond.

Has anyone else seen that happen?

domain-name-system

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Just doing it wrong

Not the first time:

- https://en.wikipedia.org/wiki/NTP_server_misuse_and_abuse

Connectivity testing on TP-Link WiFi extenders [edit]

Firmware for TP-Link WiFi extenders in 2016 and 2017 hardcoded five NTP servers, including Fukuoka University in Japan and the Australia and New Zealand NTP server pools, and would repeatedly issue one NTP request and five DNS requests every five seconds consuming 0,72 GB per month per device.[20] The excessive requests were misused to power an Internet connectivity check that displayed the device's connectivity status in their web administration interface.[20]

- Won't be the last...

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Conclusions

Conclusions

Many different types of misconfiguration

Companies possibly leak their private data:

- Syslog
- DHCP data
- Other unknown

We throw away all data, maintain privacy, but not everyone else is nice.

Be vigilant about your own network and follow the best common practices.

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Questions?

Thank you!

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@lspgn