



# Internet Noise (1.1.1.0/24 and 1.0.0.0/24)

Louis Poinsignon

Cloudflare

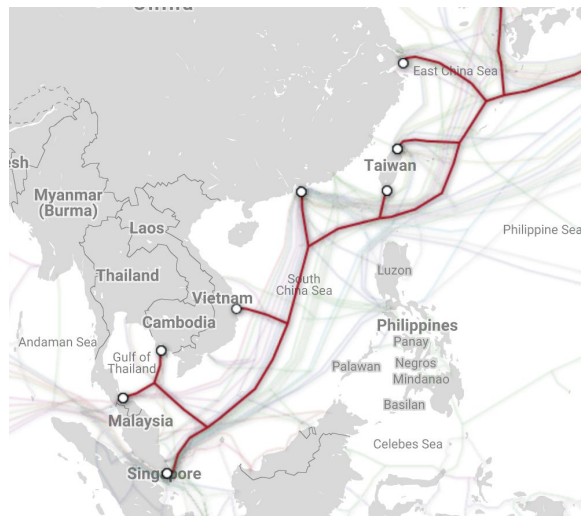
# Introduction to Cloudflare

## 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

# Cloudflare and Vietnam

- 6 major networks
- Served from Hong-Kong and Singapore
  - 6 submarines cable
- Plans on opening datacenters in the country

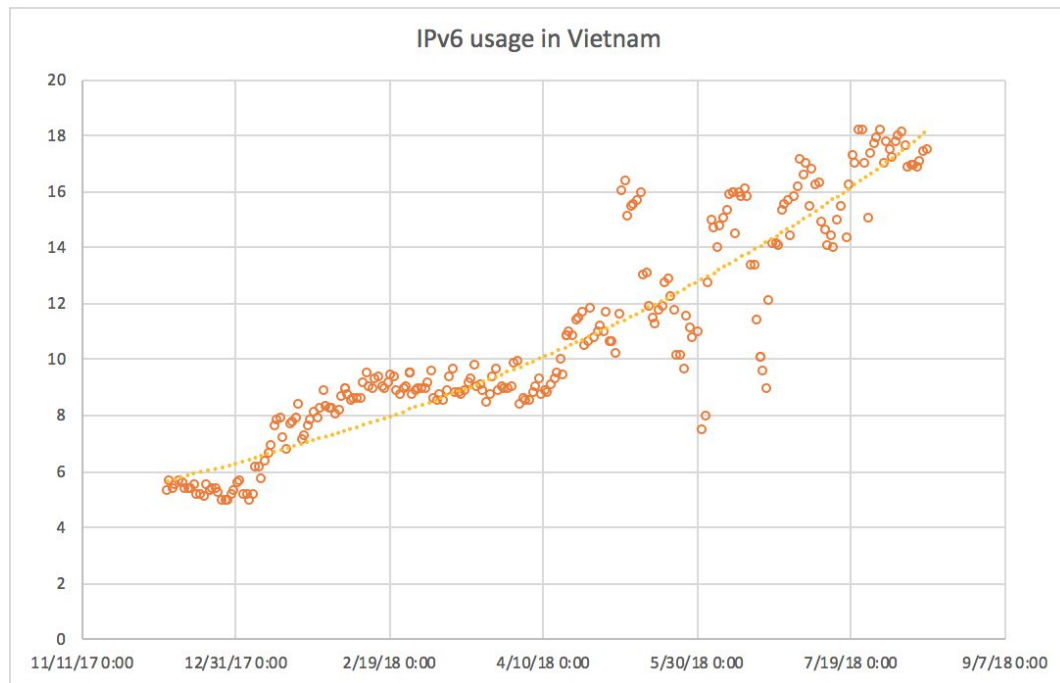


# Cloudflare and Vietnam

- Ranked
  - 14th in term of traffic globally
  - 4th in Asia

# More data!

- 18% IPv6 (2 major deployments).
- Doubled over the last 6 months.
- Ranked 40th in December now 17th



INTRODUCING

1.1.1.1

You're two minutes away from browsing a faster, more private internet.

INSTALL

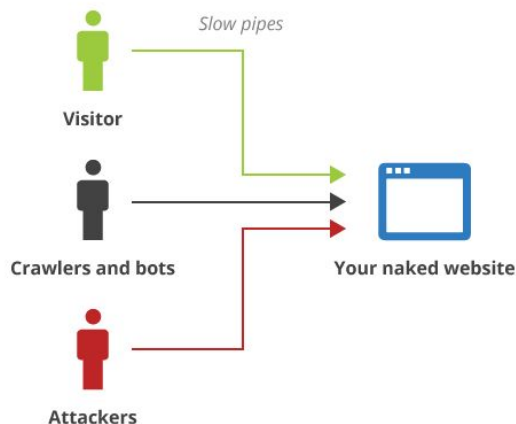
INFO

# About Cloudflare

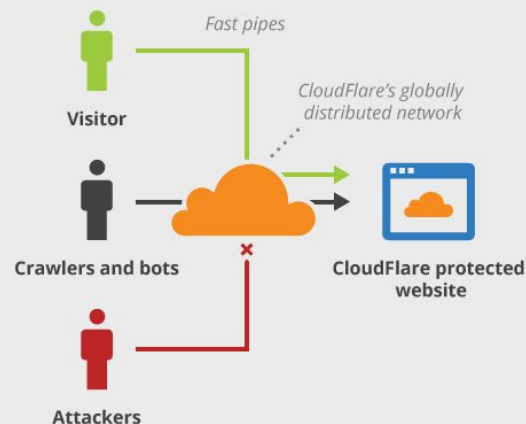
Cloudflare makes websites faster and safer using our globally distributed network to deliver essential services to any website

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

Without CloudFlare



With CloudFlare





You already use Cloudflare  
without knowing it.



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)

# 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.

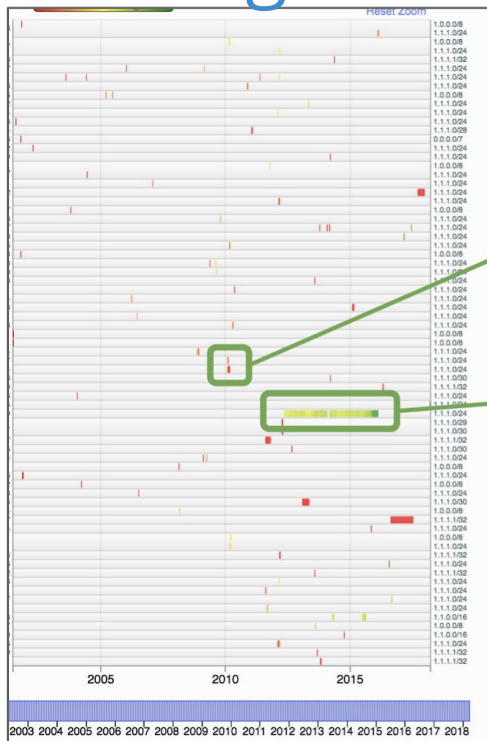
# The IP Blocks

Let's talk about **Internet noise**.

Known to receive unwanted traffic:

- Misconfigurations
- Misuse
  - Proxy
  - Internal use

# Routing History



RIPE, Merit

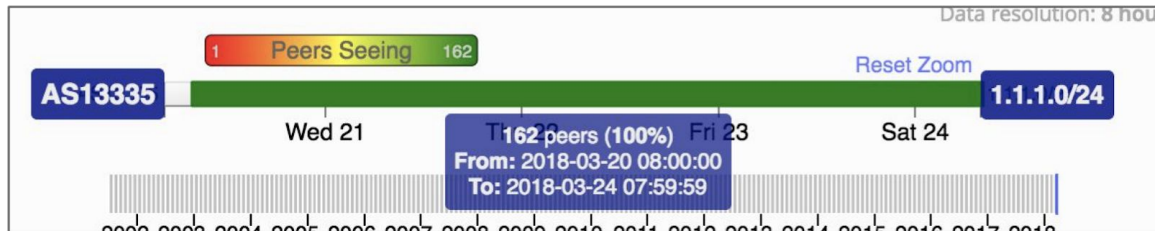
<https://labs.ripe.net/Members/franz/content-pollution-18>

- Franz Schwarzingner

<http://www.potaroo.net/studies/1slash8/1slash8.html>

- Geoff Huston

Google



What's the Noise / Junk?



# Traffic Levels

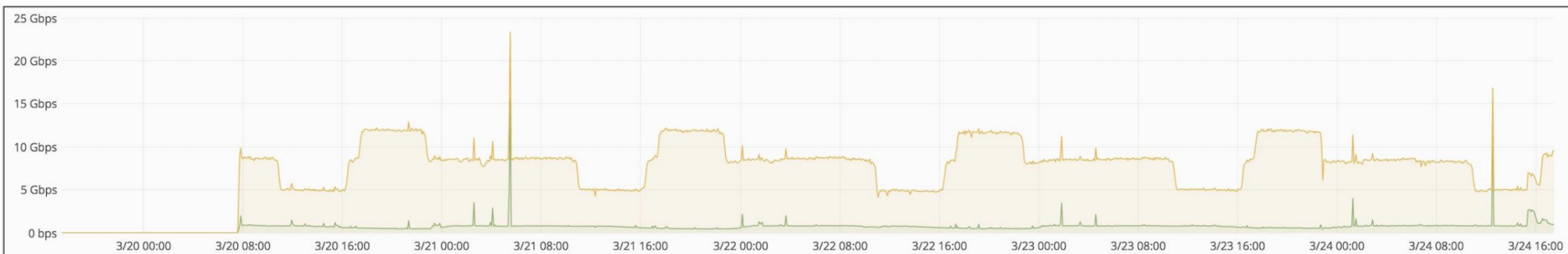
- Previous studies:

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

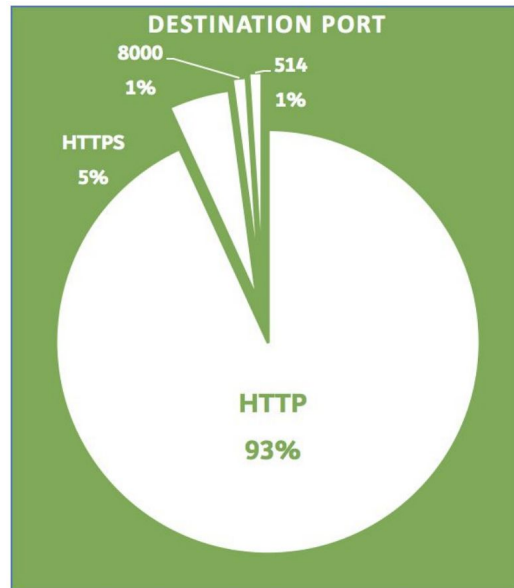
- 8-13 Gb/s in 2018

- 1 Gb/s solely on 1.1.1.1



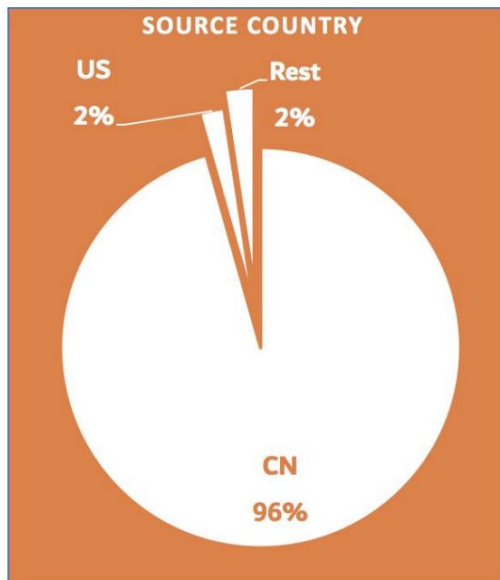
# Traffic Levels

- 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>



# Traffic source

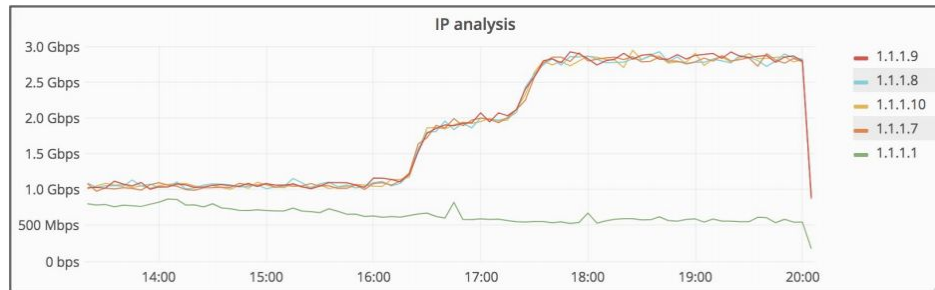
- Aligned with internet populations:
  - Heavily weighted to source from China
  - USA, Other large Internet populations.



# 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



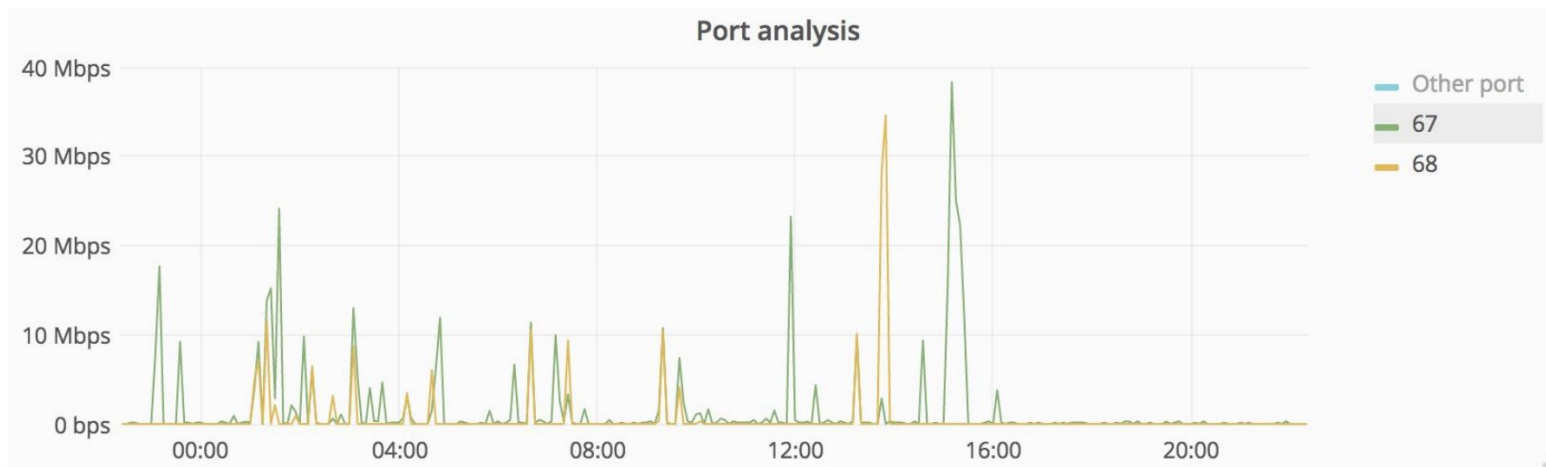
Short bursts:

- 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?



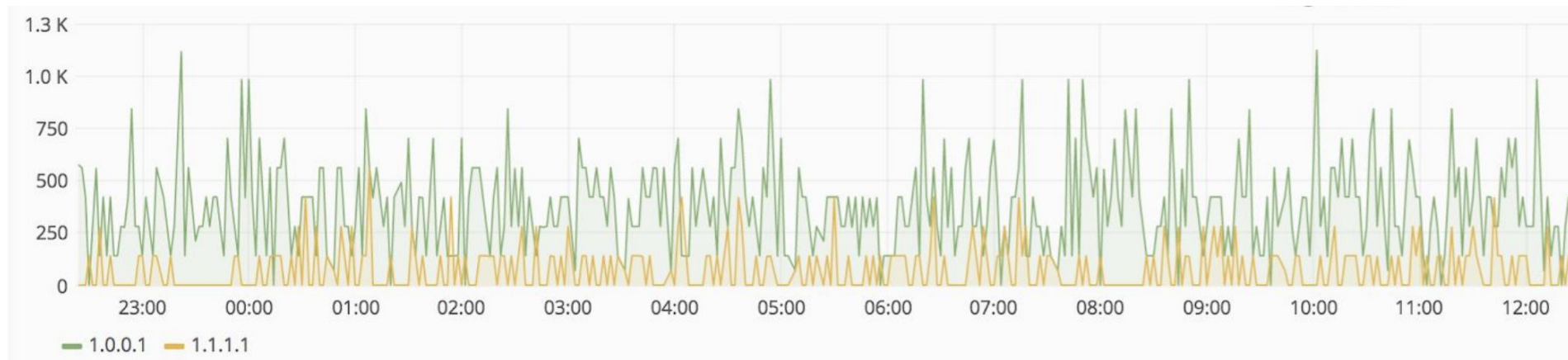
# Bursts and patterns

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



# Legitimate Traffic?

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



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%



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  | <div></div> | 11   | ✗       | <a href="#">i</a> |
| 2018-03-28 11:43 | 6.292  | <div></div> | 11   | ✗       | <a href="#">i</a> |
| 2018-03-28 11:43 | 6.260  | <div></div> | 11   | ✗       | <a href="#">i</a> |
| 2018-03-28 11:43 | 8.558  | <div></div> | 11   | ✗       | <a href="#">i</a> |
| 2018-03-28 11:43 | 7.308  | <div></div> | 11   | ✗       | <a href="#">i</a> |
| 2018-03-28 11:43 | 3.412  | <div></div> | 11   | ✗       | <a href="#">i</a> |
| 2018-03-28 11:43 | 33.123 | <div></div> | 11   | ✗       | <a href="#">i</a> |
| 2018-03-28 11:43 | 1.879  | <div></div> | 1    | ✓       | <a href="#">i</a> |
| 2018-03-28 11:43 | 21.928 | <div></div> | 7    | ✓       | <a href="#">i</a> |
| 2018-03-28 11:43 | 11.641 | <div></div> | 8    | ✗       | <a href="#">i</a> |
| 2018-03-28 11:43 | 26.318 | <div></div> | 4    | ✓       | <a href="#">i</a> |

Null-routes

CPE installed in ISP

...

Suddenly an open FTP server

# 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

Documentation

# Documentation

## RFC-5737

Internet Engineering Task Force (IETF)  
Request for Comments: 5737  
Updates: 1166  
Category: Informational  
ISSN: 2070-1721

J. Arkko  
Ericsson  
M. Cotton  
L. Vegoda  
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>

# Documentation

Per RFC-5737:

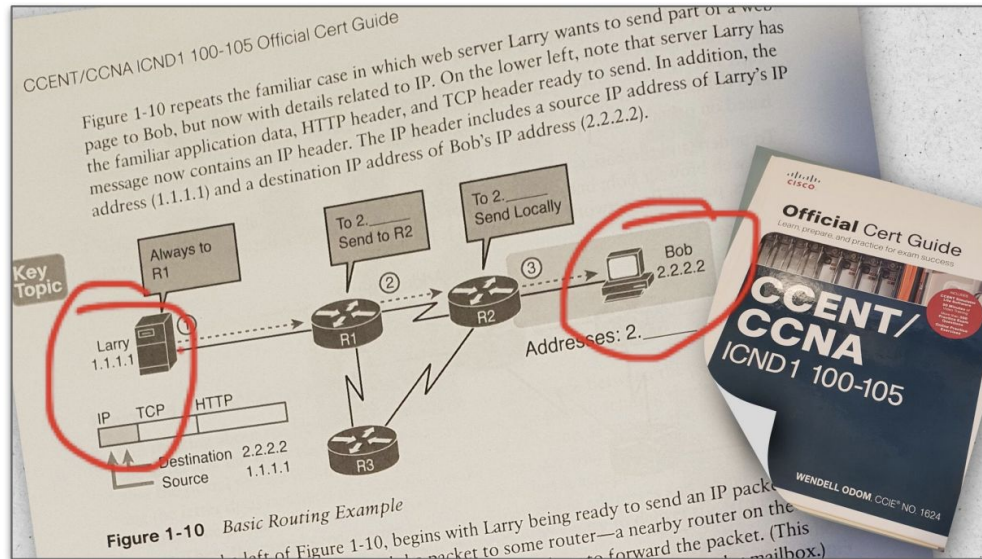
- 192.0.2.0/24
- 198.51.100.0/24
- 203.0.113.0/24

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

HOWEVER.....

# 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.



# 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?



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.

4



Has anyone else seen that happen?



domain-name-system



# Just doing it wrong

Not the first time:

- [https://en.wikipedia.org/wiki/NTP\\_server\\_misuse\\_and\\_abuse](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.<sup>[20]</sup> The excessive requests were misused to power an Internet connectivity check that displayed the device's connectivity status in their web administration interface.<sup>[20]</sup>

- Won't be the last...

# 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.

Questions?

Thank you!