

This is the collaborative tool for working on the RIPE NCC's IPv6 Hackathon

This Pad URL: https://pad.riseup.net/p/ripe_ncc-ipv6-hackathon

Info: <https://labs.ripe.net/Members/becha/join-the-ripe-ncc-hackathon-version-6>

& <https://atlas.ripe.net/hackathon/version6/#!the-event>

Apply: <https://atlas.ripe.net/hackathon/version6/#!application-form>

GitHub collection of SW tools from previous hackathons:

<https://github.com/RIPE-Atlas-Community/ripe-atlas-community-contrib/blob/master/README.md>

Focus on IPv6 Tools and Measurements

As we announced on 6.6., this time around we have decided to combine the efforts for encouraging IPv6 deployment: we are organising Danish IPv6 Week, with three parts: hackathon, IPv6 Day and multiple-day training course.

It's been 20 years since the "new" Internet Protocol addressing has been introduced by IETF. In the meantime, many networks have deployed IPv6, but some organisations are still struggling. What are the challenges that we could help with resolving? How much progress has been made over the years? During the hackathon, we want to come up with new and creative ways to visualise IPv6 measurements, and hack together the tools helpful for IPv6 deployment.

To find out more, please read this RIPE Labs article: <https://labs.ripe.net/Members/becha/join-the-ripe-ncc-hackathon-version-6>

VENUE:

IT-Universitetet i København

Rued Langgaards Vej 7

2300 København S

<https://www.itu.dk/om-itu/kontakt>

Communication:

* Mailing List: <https://www.ripe.net/ripe/mail/archives/ipv6-hackathon/>

* IRC:

#ipv6hackathon on OFTC, <https://webchat.oftc.net/?channels=#ipv6hackathon>

https://riot.im/app/#/room/#oftc_ipv6hackathon:matrix.org

Nicks:

- o BEGIN
- o comzeradd Nikos Roussos
- o det-5607 Richard Patterson
- o drk Luuk Hendriks
- o ebal Evaggelos Balaskas
- o ente Moritz Wilhelmy
- o ex Nico Heßler
- o flummer Thomas Flummer
- o hlkv6-2603 Henrik Kramshøj
- o insomniac Andrea Barberio
- o natha Nathalie Trenaman
- o netravnen Christoffer Dam Hansen
- o pgigis Petros Gigis
- o quite Daniel Lublin
- o samerlahoud Samer Lahoud
- o sds Stephen Strowes
- o thrb Harry Reeder
- o tripk0 Miroslav Mandrino
- o wenqin Wenqin SHAO
- o zorun Baptiste Jonglez
- o END

Recommended hotel:

> I recommend Cabinn Ørestad, which is down the Metro line from ITU,

> and also two stations from the airport

<https://www.cabinn.com/hotel/metro-lufthavn-hotel-koebenhavn>

> The small rooms 67EUR are quite nice, but would go with the 87 EUR for more space.

> They also have apartments. Same company also has hotels in city center near central station.

Detailed Projects Ideas:

1. Improve IPv6 Address Space Activity visualizations

For some years, we have been employing prototype visualizations of the IPv6 address space both as Treemaps and Hilbert Curve [Heat] maps.

Examples here: (toward the end of the slide presentation):

<http://conferences.sigcomm.org/imc/2016/wips/imc16-wip-paper24.pdf>

Thus far, these have employed D3 javascript tools written by others.

The community would benefit from having such tools be improved, for instance, in their performance, interactivity, and ability to drill-down and pivot (e.g., between treemap and Hilbert curve viz).

Note that Akamai has released data sets about active WWW client IPv6 addresses used for both those visualizations:

<https://content.akamai.com/PG3184-IPv6-Active-Address-Data.html>

Please contact <dave@plonka.us> for more information or to share ideas.

Etherpad for this project:

https://pad.riseup.net/p/ripe_ncc-ipv6-hackathon-ipv6map

2. Integrate or implement enhancements to IPv6 address filter tool(s)

We've written a patch to the addr6 tool (part of the SI6 Network's IPv6 Toolkit: <https://www.si6networks.com/tools/ipv6toolkit/>) that adds new options for IPv6 address formatting useful for sorting and for big data analysis. The community would benefit from this patch being integrated and/or extended in that package (wh/has a public git repository) or separately as a another filter.

A description and details of the patch are here: <http://pages.cs.wisc.edu/~plonka/ipv6toolkit/>

It would also be interesting to extend addr6 or another tool to perform stateful and/or temporal analysis, for instance, to improve it's detection of plausibly random values in IPv6 address interface identifiers (IIDs), as described in our paper linked here: <https://arxiv.org/abs/1707.03900>

Please contact <dave@plonka.us> for more information or to share ideas.

3. Develop a "Powers of IPv6" video or visualization

We have conceived of an IPv6 advocacy and teaching aid in the form of a video or animated visualization about the enormous IPv6 address space and its unusual features, perhaps based on this well known short film: <https://www.youtube.com/watch?v=0fKBhVDjuy0>

For instance, using the aforementioned Treemap or Hilbert curve D3 visualizations ("Improve IPv6 Address Space Activity visualizations") to take a tour at the highest level, e.g., the whole IPv6 address space down to the lowest "sub-atomic" level of active privacy address' interface addresses.

In parallel with the short film, one could imagine a person holding an IPv6-capable smartphone, e.g., at an IETF meeting, that could be used as the bases for traveling through the "powers" from whole address space level, to the BGP prefix, to the structure in an ISP, down to the "structure" by address policy within a /64 prefix.
In part, this project could involve developing the storyboard to teach how IPv6 is vast and how the addresses are used differently (than IPv4).
Please contact <dave@plonka.us> for more information or to share ideas.

4. Measure IPv6 deployment at IXPs

PLEASE add a name of the person suggesting this project :) <- Vesna's comment

Use active or passive measurement to infer the number of IPv6 participants at various IXPs, and compare it with IPv4 participants.
We could build a scoreboard of IXPs by IPv6 readiness of its participants :)

Possible data and vantage points:

- BGP routes from <http://lg.ring.nlnoq.net/>
- BGP routes from Routeviews and RIS
- NDP tables from machines connected to an IXP (looking glass ? NLNOG ring ?)
- related: some IXPs publish v6 ratios on PCH: <https://www.pch.net/ixp/dir>, but not many of them. (I'd like more to do so). I have archives of the PCH stats only as far back as 2017-05-08.

5a. Comparing IPv4 and IPv6 traceroute paths

by Petros Gigis

Create a visualization to compare IPv4 and IPv6 traceroute paths, highlighting the differences between these paths. For example, it would be interesting to observe differences in IP-level/AS-level paths in terms of traffic locality; e.g., IPv4 paths from ASX to ASY staying inside a country while IPv6 paths are leaving it. Moreover, this visualization would help the network operators and the academic community understand the differences in IPv4 vs. IPv6 routing, on the data plane. Furthermore, some kind of statistics could be created based on the visualization (similar to the EyeBall Jedi approach (sg-pub.ripe.net/petros/eyeball-jedi) to compare country ecosystems at a larger scale. Finally, comparing the IPv4 ASN of the endpoint probes (as given by the RIPE Atlas platform) with their IPv6 ASNs, would potentially reveal native IPv6 support on the AS vs. support from IPv6 providers.

Other Potential Projects

- IPv6 Measurements, such as IPv6 RIPEness: <http://ipv6ripeness.ripe.net/>
- Tools and software to advance IPv6 deployment
- Improving the IXP Country Jedi tool, which gives the difference between traceroute paths in IPv6 and * IPv4 (for example, for Denmark)
- Improving work done at previous RIPE NCC hackathons, with specific focus on IPv6
- address some IPv6 related shortcomings in pcap-filter/tcpdump which are mentioned in the pcap-filter(7) manpage if this isn't too off-topic for this hackathon. I (ente) will look at the code for the next couple of days before the hackathon and verify whether or not this is doable, otherwise join one of the other projects (always wanted to mess around with bpf but never found a good excuse to do so)

5b. Who can route IPv6 with me

Added by HLK

Research from an ASN, like AS2603, who are they peering with now on IPv4 and IPv6.

Find the IPv4 peer ASNs with IPv6 allocated, but not peering with IPv6 now.

- so they can get in contact with each other

Maybe option to only list those that are active with at least one other IPv6, or -all which include those that are not active yet, but could be.

IPv6-dating made easier

Data source?

Perhaps some python, reporting to HTML, JSON, maybe even graphs - how many can be IPv6 enabled, with how little effort

Reason:

Just finding those that are active which can meet up may be hard when people are overworked.

6. (because there needed to be a *6* here)

Is IPv6 more sustainable than IPv4? Is this a silly question, or can we push IPv6 deployment by making the case that it uses less resources (it being more energy efficient?)

7. Rapidly deploying an IPv6 testing platform for education (proposed by Samer Lahoud)

In a typical student lab, we would like to analyse the transition from IPv4 to IPv6, the coexistence of the two versions, and also the interaction with different applications. Let us take for example an IPv4/IPv6 dual stack HTTP server, a dual stack DNS server, an IPv4 only HTTP server, and an IPv6 only HTTP server. Playing with such servers will enable students to understand different challenges related to the transition from IPv4 to IPv6. For instance, when I type www.example.com in my browser, what will be the formulated DNS queries? When my PC receives two DNS replies, what HTTP/TCP connection will it try first? etc.

My proposed idea is to use Mininet to automatically deploy the IPv4 and/or IPv6 servers (Mininet <http://mininet.org> creates a realistic virtual network, running real kernel, switch and application code, on a single machine). Then, this (virtual) server platform can be bridged with any hardware platform (for example student PCs, quagga routers, etc.) to obtain a full Lab workbench.

Some additional outcomes of the proposed project can consist of writing a basic lab (with questions and answers) to promote the platform, and also exploring some SDN functionalities enabled by the use of Mininet.

7'. Pocket Internet - Lab environment for teaching how the Internet really works (proposed by Cristian Sirbu)

The idea is called Pocket Internet (<https://github.com/inognet/pocketinternet>) and what it aims to do is bring up an infinitely scalable topology that interconnects small pods (ISPs) into an organically grown network (the Internet). Each pod design would be based on a blueprint inspired from real life ISPs and be as lightweight as possible while still allowing for enough policy/complexity to be built in. The goal of it is to provide labs for teaching BGP and Automation tools, but it could also be a test-bed for new BGP features or anycast type applications.

Initially the project idea was focused on BGP and routing (both v4 and v6 of course), but Samer's proposal actually opened my eyes: the Internet is not only about routing, at a minimum the Pocket Internet would need some clients + DNS and Web servers (e.g. simple websites with CDN content)! And being able to also simulate some delay/loss in transit would be great for showcasing what happens in browsers with dual-stack connectivity for example.

The project would need some way to visualize the topology as it grows/shrinks - one of the ideas was that by using templated pods you could scale it to any number of participants (students or trainees) or complexity in a dynamic way as long as you had the resources to run additional containers (or money in the case of IaaS :)) .

Ultimately, the goal is to provide a dynamic lab setup that can be used to teach people how the Internet works (individual protocols, policy, scaling challenges etc.). For the purposes of this hackathon, modularity and reusability of any IPv6 related functions will be the goal.

8. Drivers for IPv6 Deployment (proposed by Christian)

From organizations that successfully implemented IPv6 we know that IPv6 is technical feasible and practically nobody questions that IPv6 is going to be

the future of the Internet. Yet, today's Internet is run on IPv4 and companies seem to be reluctant to do the transition.

In this project I suggest to take a data-driven approach to identify the factors that encourage (respectively discourage) companies to use IPv6.

Since we will have only a limited time to work on it, I'd like to bootstrap this project with the recent work I did on this topic.

In a nutshell, I introduced a metric that measures the IPv6 readiness of a company based on routing (BGP) data. The data crunching has been carried out for all ~80,000 global ASNs for the past 10 years and is readily available for the team. The analysis was done on global, regional (RIR), national and industry level.

The project offers multiple, interdisciplinary items to work on but the main ones are:

a) Produce reports based on the data:

Analyze and interpret global, regional and/or national developments. This involves finding correlations with corresponding events. No programming skills required.

b) Improve the metric

The current metric associates IPv4 addresses with /48 in IPv6. This is very simple and does not take the specific requirements of an organization into account.

c) Improve and extend ASN/organization to industry mapping

The analysis on an industry level required a data set that mapped an organization to an industry type, which was done through the parsing and analysis of 22,000 company webpages for the RIPE NCC region. The scraping of webpages as well as the parsing require improving as the current precision is

roughly 30%. The outcome would not only be useful for this topic but publishing this data set would benefit a whole group of Internet researchers. (Your

name will be of course published along with the data set :)

This item would benefit of a multidisciplinary team: analytical, natural language, web development and data mining skills.

9. DHCPv6 server rust library (proposed by Asbjørn)

As Dan Luedtke put it in this ratools talk at 31c3, we need better tools for IPv6.

A lot of ISP's are developing their own DHCP servers, since they need more flexibility, than ISC tools can offer. Providing a good Rust library for DHCPv6 including Prefix Delegation, would make it easier for multiple ISP platform specific DHCPv6 servers to share protocol specific code.

For this hackathon the goal would just be getting a simple DHCPv6 exchange going, but as a basis for a future full-fledged DHCPv6 library.

Prior work:

<https://github.com/krolaw/dhcp4r> (v4 only library)

<https://github.com/mackwic/dhcpp> (described as v4 + v6 server, but only v4 implemented)

List of participants (updated on 4.11.)

1. Luuk Hendriks
2. Nikos Roussos
3. Andrea Barberio
4. Asbjørn Sloth Tønnesen
5. Evangelos Balaskas
6. Henrik Kramshøj
7. Richard Patterson
8. Nico Heßler
9. Daniel Lublin
10. Samer Lahoud
11. Igor Rinkovec
12. Shahin Gharghi
13. Kristina Hakobyan
14. Ioana Livadariu
15. sebastian büttrich / ITU (Jury)
16. Nathalie Trenaman (Jury)
17. Jan Zorz (Jury)
18. Vesna Manojlovic (Jury)
19. Steve (RIPE NCC)
20. Jasper (RIPE NCC)
21. Pedro da Silva Vaz (RIPE NCC)
22. Christian Teuschel (RIPE NCC)
23. Matthias Hannig
24. Andy Mindnich
25. Harry Reeder
26. Cristian Sirbu
27. Vasileios Glotsas
28. Thomas Flummer
29. Petros Gigis
30. Baptiste Jonglez
31. Christian Johannesen (Jury)
32. Moritz Wilhelm
33. Christoffer Hansen

No-show:

Svenne Krap (said on Friday evening he will not have time)
Jinan Chehab

(not confirmed yet, as of 29.9.) (updated 26.10.)

1. Ozgur Karatas
2. Christopher De la Cruz
3. Nicolas Fiumarelli (did not confirm)

Canceled: (updated on 30.10.)

Vanush Ghamaryan
WENQIN SHAO
Nick Feamster
Brzozowski, John
Miroslav Mandrino

Remote participants:

<dave@plonka.us> !! :)

Daily TIME Schedule

Schedule SATURDAY :

09:00 Welcome
09:30 Presentations by RIPE NCC: Logistics, thanks to sponsors, timeline; Data Sources etc (Vesna, NCC staff)
09:40 Round of introductions (All)

- * Round of personal introductions (1 minute per person)
- * Ideas suggestion (2 minutes per person/team/idea)

10:30 Brainstorm & teams-forming

- * RE-ARRANGE THE TABLES!!

11:00 - 13:00 WORK on projects (2 hours)

13:00 LUNCH break

14:00 - 19:00 WORK (5 hours)

18:00 dinner -> first pizzas arriving!!

~18:30 -> second round of pizzas

21:00 - midnight: OPTIONAL - continue working! (3 hours, OPTIONAL)

Schedule Sunday:

9:00 arrive & start working

09:00 - 11:00 WORK (2 hours)

11:00 (15 minutes) all: Presenting progress

11:15 - 13:15 WORK (2 hours)

13:15 LUNCH break

14:00 - 17:00 WORK (3 hours)

17:00 wrap-up: presenting final results & planning follow-up steps

- * 5 minutes per team!!

17:45 - JURY gathers in a smoke-filled room & comes up with feedback & a "winner" of stroopwafels!

18:00 - closing ceremony

19:00 - LEAVE FOR DINNER

20:00 dinner

Sunday Dinner venue:

<http://mikkeller.dk/location/hyggestund/>

Optional social on Friday:

Visiting a local hackerspace:

Labitat: https://labitat.dk/wiki/RIPE_Atlas_IPv6_Hackathon

map: <https://www.openstreetmap.org/node/582281835>

Location: [geo:55.67629,12.545591?z=13](https://www.openstreetmap.org/node/582281835)

<https://osmand.net/go?lat=55.67629&lon=12.545591&z=13>

Invitation to the IPv6 day: <https://www.ripe.net/participate/meetings/regional-meetings/ipv6-day-denmark>

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ping keepalive

pong

ping