SNTPings

Abusing IPv6 for “Art”

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What is SNTPings

- Studenten Net Twente is an association at the University of Twente
- Since 1994 for internet on campus -> 30 years!
- Something Nerdy, Public. Inspired by r/place, pixelflut

- 1920x1080 Canvas where people can draw by writing code!

Just letting people send TCP is boring…

IPv4 is boring!

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An IPv6 address sure does have a nice amount of bits…. ;)

```
ping6 2001:610:1908:a000:0019:0019:00d1:ffff
```

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IPv4 is boring!

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```
ping6 2001:610:1908:a000:0019:0019:00d1:ffff
```

So let's use them!

```
ping6 2001:610:1908:a000:<X>:<Y>:<B><G>:<R><A>
```

We need to go fast!

Network

- Mostly pps limited
- We picked a 40G NIC, we will probably not go over that
- 40G external tap, 10G internal. All filled up
- UTwente upgraded to 2x100G to provide some headspace

DPDK

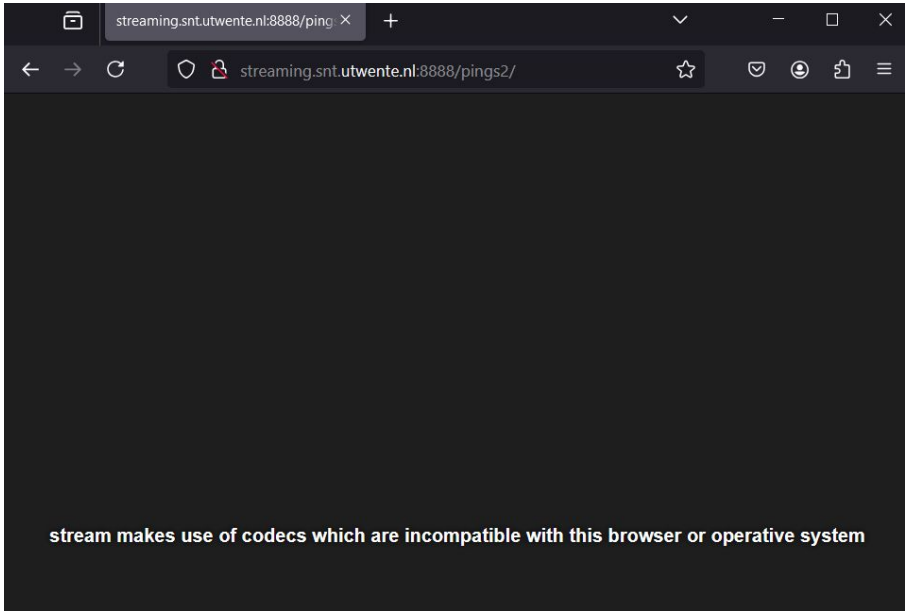
- Library for fast packet processing
- Does not involve kernel,
  Hijacks network device
- Allows getting line rate send/receive speeds
- Components for common processing tasks

Video processing

- memcpy bits to image!
- OpenCV + Gstreamer to generate x264 stream
- Frames per second? Seconds per frame!

Codecs are hell: Firefox linux supported ∩ Chrome windows supported = ∅

```
            auto src = packet->saddr.__in6_u;
            auto dst = packet->daddr.__in6_u;
            uint16_t x = ntohs(dst.__u6_addr16[4]);
            uint16_t y = ntohs(dst.__u6_addr16[5]);
            uint32_t color = dst.__u6_addr32[3];
            unsigned long sid = (uint64_t)ntohl(src.__u6_addr32[0]) << 32u | ntohl(src.__u6_addr32[1]
#if DO_LOG
            printf("Setpixel %u %u %u\n", x, y, color);
#endif
            controller->drawPixel(sid, y, x, color);
```


streaming.snt.utwente.nl:8888/ping
streaming.snt.utwente.nl:8888/pings2/
stream makes use of codecs which are incompatible with this browser or operative system


ONWIJS
vck
vereniging campus
Primer Aesop

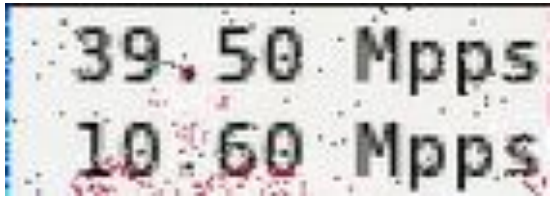
Showcase

https://cdn.ferox.host/s.mp4

Showcase


anti-piracy.nl
Onderweg
HERMITCRAFT
SEIZOEN

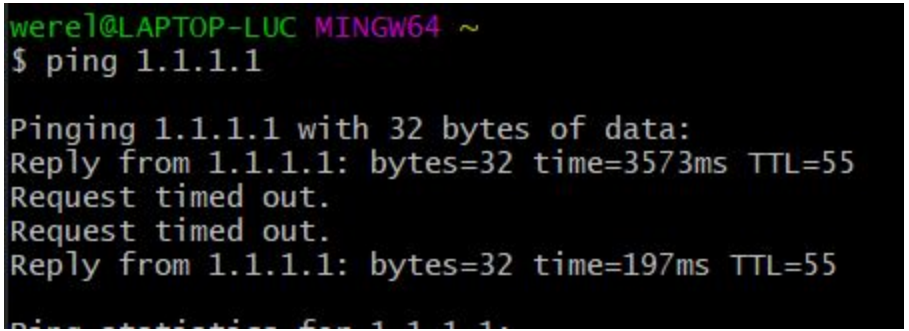

21.5 °C


39.50 Mpps
10.60 Mpps


DVD

Uhh… My wifi is slow

- Not what you want to hear



Long live fortinet

- Newly installed stateful firewall
- At least they support IPv6
- 1920 * 1080 * color destination IPs

Statistics

Participants: >100

Total packet count: IDK, hardware counter wrapped around a few times

Highest persistent packet rate: >72MPPS

> Saturated 40G network card

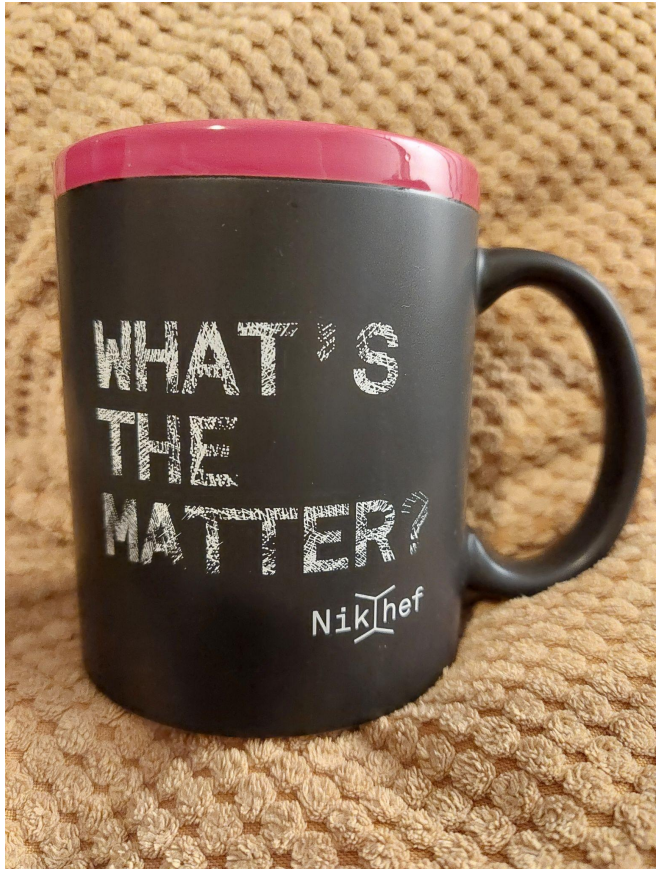
> Saturated Fortinet Firewall

> Saturated upstream infrastructure

Future plans

- 40G NIC was a bit limited…

- Bottleneck on video encoding, How much processing can be done on GPU w/ RDMA? FPGA? Multiple servers?



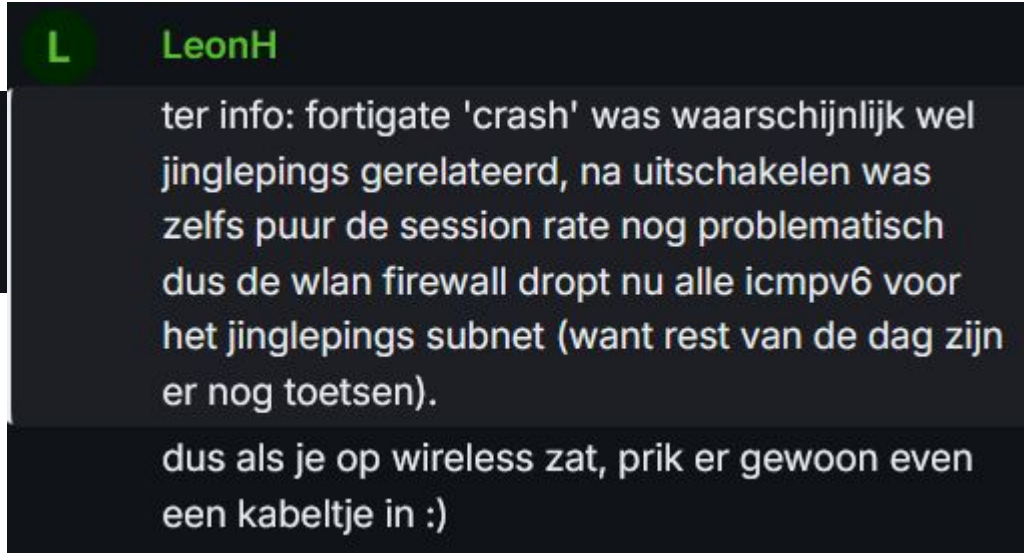
Thank you

A big thanks to the UTwente IT team for all their help

https://gitlab.snt.utwente.nl/snt/pings/server2024

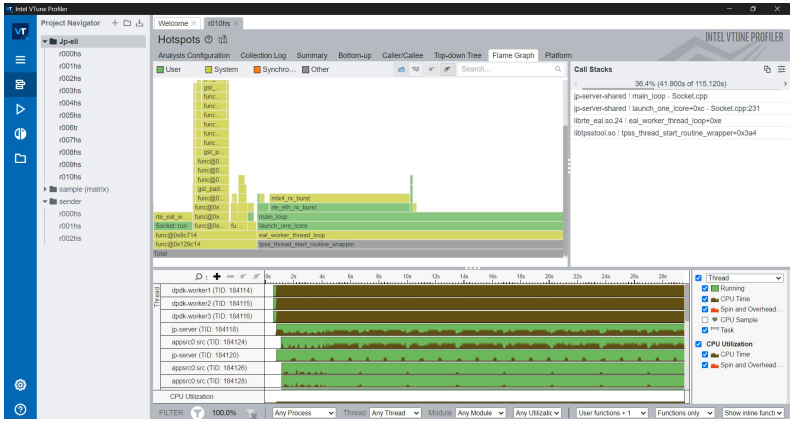
Uhh… My internet is slow

Fortinets



Packet processing

- Target: At least 40Gbps
- P4 tap, BGP.
- DPDK does userspace network processing, talks directly to hardware
- The university only had 40G…. but more overkill never hurt anyone



Intel VTune profiler