Rheintal IX

INTERNET EXCHANGE

Rheintal Internet Exchange

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Agenda

The Rheintal IX

How it started

Keep local traffic local

Further goals

How is it going in 2024
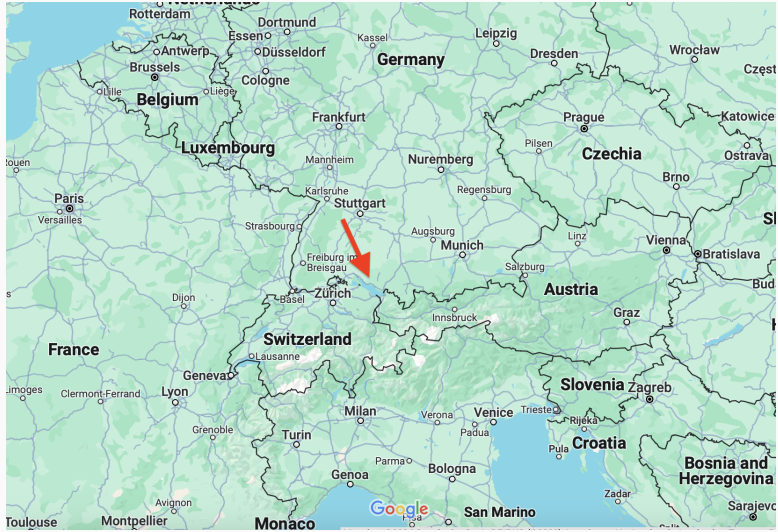
Some facts about the region

- Population 3 millions
- No big cities, numerous villages
- Cross border work migration on a daily basis
- Industry and agriculture in all regions
- Tourism in the Austrian part
- Financial sector in Liechtenstein

The Rheintal IX

- Founded in 2011
- Legal form is an Incorporated Association based in the Principality of Liechtenstein (LI)
- Non profit
- Hardware, links and rackspace are donated by sponsors
- Small member fees and recurring charges for 10G ports to pay the administrative expenses
- No recurring costs for 1G ports
- Peers are encouraged to become members
- Dedicated technicians running the network and services

How it started in 2011

- Four people from Austria and Liechtenstein
- Got the hands on three sponsored gigabit ethernet switches
- Two local power companies offered dark fiber for free
- We knew all the stakeholders personally
- Association was founded

Essential topics in the articles of the association

- Keep local traffic local
- Bring important internet infrastructure closer to the region
- Neutrality
- Support and empower the local ISP community
- High availability

Keep local traffic local

Problem: segmented Internet structures on national level.

- CH/LI: national and international traffic exchange in Zurich
- DE: regional traffic exchange in Stuttgart or Munich, national and international in Frankfurt
- AT: national and international traffic exchange in Vienna

Result is "scenic routing", accompanied by significant higher round trip times (RTT).

Scenic route of a packet between two cities in Vorarlberg

```
HOST: notebook.local            Loss%   Snt   Last   Avg  Best  Wrst StDev
  1.|-- 192.168.0.254            0.0%    100    1.9   2.1   1.5   4.2   0.4
  2.|-- customer.static.upcbusine 99.0%  100    3.4   3.4   3.4   3.4   0.0
  3.|-- ???                      100.0   100    0.0   0.0   0.0   0.0   0.0
  4.|-- line1234.static.upcbusine 0.0%   100   11.9  22.0   9.3  66.9  17.1
  5.|-- at-vbg-dorn-pe02-be-2-201 0.0%   100   21.9  30.7  20.1  62.8  13.4
  6.|-- at-vie05d-rc1-ae-27-2016. 1.0%   100   27.5  31.2  20.5  92.2  14.1
  7.|-- at-vie05d-ri1-ae-63-0.aor 2.0%   100   21.6  30.4  20.2  60.9  12.7
  8.|-- 213.46.184.99            0.0%    100   22.9  32.4  21.3  63.9  13.4
  9.|-- win-bb4-link.ip.twelve99. 1.0%   100   36.3  47.6  36.3  82.7  13.9
 10.|-- ffm-bb2-link.ip.twelve99. 3.0%   100   38.1  46.2  36.4  79.4  12.7
 11.|-- zch-b2-link.ip.twelve99.n 3.0%   100   39.0  49.6  36.2 190.9  20.7
 12.|-- russmedia-ic327614-zch-b2 2.0%   100   42.8  52.5  39.2 143.9  17.6
 13.|-- vl74-ls1-swz1.net.tele.ne 5.0%   100   34.4  49.0  33.7 158.2  19.8
 14.|-- aci-r1-as5385.net.tele.ne 11.0%  100   37.1  44.4  34.9  92.5  13.1
 15.|-- aci-leaf207-as65201.net.t 1.0%   100   43.9  44.7  34.1  87.1  13.2
 16.|-- 194-183-143-001.tele.net  1.0%   100   36.4  43.5  34.3  76.1  11.8
 17.|-- 194-183-143-025.tele.net  0.0%   100   35.0  41.6  32.5  73.0  11.1
```

Above is the path of a packet starting off in Vorarlberg, getting to
Vienna, Frankfurt, Zurich and then back to Vorarlberg again.
This took on average 41.6 ms.

Locally exchanged traffic at Rheintal IX

```
HOST: notebook.local          Loss%   Snt   Last    Avg  Best  Wrst StDev
  1.|-- ???                   100.0   100    0.0    0.0   0.0   0.0   0.0
  2.|-- v3161gw-vull.fknet.at   0.0%   100    7.6    7.2   6.6   8.9   0.4
  3.|-- gi0-0-runa-s1.fknet.at  0.0%   100    7.7    7.4   6.6   9.9   0.4
  4.|-- as5385.rheintal-ix.net  0.0%   100    7.5    8.0   7.2  12.3   0.5
  5.|-- vl75-ls1-swz1.net.tele.ne 0.0% 100    8.1   12.0   7.5  58.8  11.3
  6.|-- aci-r2-as5385.net.tele.ne 0.0% 100    9.1    8.7   7.9  10.8   0.4
  7.|-- aci-leaf208-as65201.net.t 0.0% 100    8.2    8.4   7.7  13.9   0.7
  8.|-- 194-183-143-001.tele.net  0.0% 100    8.8    8.7   7.6  19.4   1.5
  9.|-- 194-183-143-025.tele.net  0.0% 100    7.8    7.8   7.2   8.3   0.4
```

Same cities involved as before, but this time the involved ISPs peer at the Rheintal IX.

What makes an IXP attractive to peers?

Answer: Lower costs due to less traffic on expensive IP transit links

- Rheintal IX data rates are low, so our peers only save a small part of expensive IP transit traffic
- High quality improvement due to decreased RTT though
- But: Quality improvement can't easily be quantified in money
- So the peering costs at Rheintal IX should be as low as posssible
  - Non profit orientation allowed us to receive sponsoring
  - Almost zero cost combined with the associations neutrality attracted the regional ISPs to connect

# Bring important internet infrastructure closer to the region

- Essential stuff like DNS is easy
  - Many of the root DNS operators offer clones
  - Low hardware demands
  - Decreases the response time for DNS queries significantly
  - We host root DNS, ccTLD and Quad9 resolver clones
- Interesting stuff like CDN caches (Google, Netflix, …) is more complicated
  - Some of our sponsors don't want that we do that
  - We're too small for some of the big ones
  - Higher hardware demands, and more energy consumption

- Technical support for members
- Events for participants
- Online platform to discuss ISP related issues
  (we didn't succeed here)

High availability

- No 24/7 NOC
- Best Effort SLA
- High availability of the peering LAN is key
  - Select the sponsored hardware with great care
  - Keep it simple
  - Automate as much as possible
  - Do the documentation
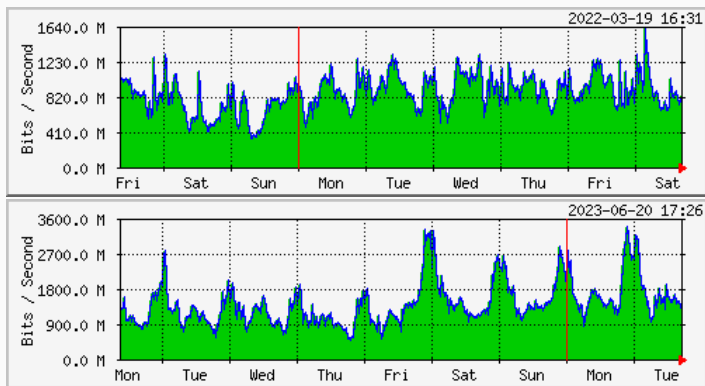 - Ring structure will finally bring topological redundancy

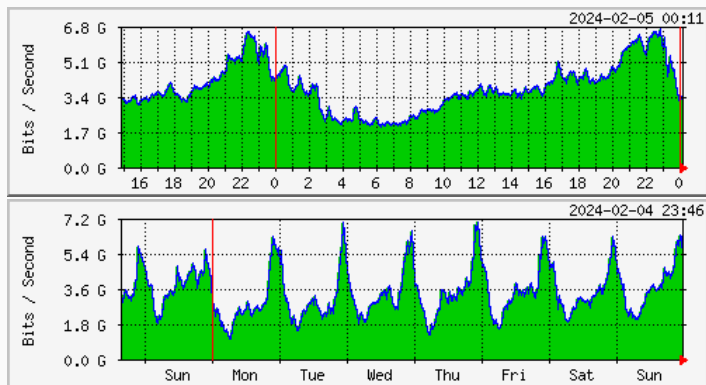# How is it going in 2024
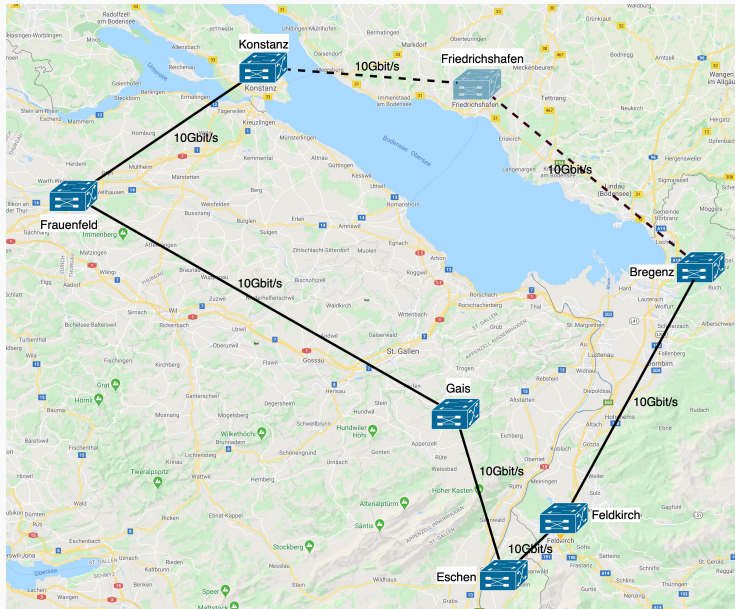
How is it going in 2024

- Peers:
  - 15 regional ISPs
  - 3 national ISPs
  - 1 academic network
  - 10 companies
- Own server infrastructure at 3 different sites
- 3 DNS root nodes
- Quad9 public DNS resolver
- DNS ccTLD anycast node

Outlook

- Finishing the ring around the lake this year
- New PoP in Friedrichshafen (DE)
- Starting to increase the backbone capacity

Any questions?