In the fall, our group went to Splügen (Graubünden) for a 2-day retreat (thanks to relaxed COVID rules). We used this time wisely, alternating between brainstorming sessions, table tennis tournaments, the tastings of local delicacies, and beautiful hikes. In the backdrop (right), the Surettahorn (3027 m).

2021
Networked Systems Group

Twenty twenty-one marked a transition year for us: *three* of our PhD students—a quarter of our group—graduated in the span of three months. And while I'm absolutely thrilled for Maria, Thomas, and Rüdiger, it also means that we need to renew our workforce: *We are hiring!* That said, our group fared well in 2021 and, like many, we embraced the partial return to in-person teaching/meetings.

Our group submitted no less than 16 research papers in 2021, six of which were accepted (including one SIGCOMM and one NSDI paper) or are under revision. I am also thrilled to report that we were crowned with four awards in 2021, including the ACM SIGCOMM "rising star" award, and two IETF ANRP prizes. To top it all off, I could give the opening keynote at CoNEXT.

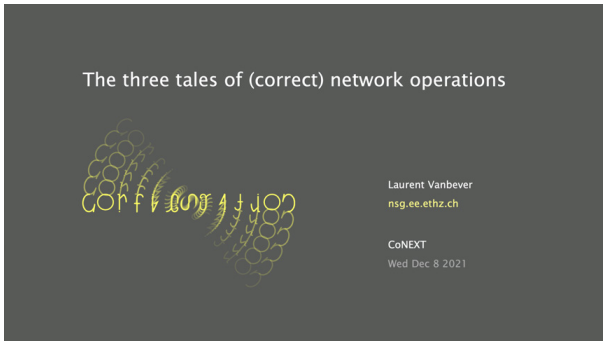
After 1.5 year of teaching online, I was looking forward to going back to the classroom. Yes, teaching with a mask ain't fun (besides the physical discomfort, it prevents reading facial expressions), but it felt good nonetheless. Besides, we kept improving our (open-source) project infrastructure, and Edgar was awarded the best teaching assistant award!

Our research pipeline for 2022 is quite full already: expect to hear from us soon! Two post-docs will also join our ranks: Muoi Tran (from NUS) and Georgia Fragkouli (from EPFL). We're looking forward to welcoming them! Finally, Roland Meier will graduate in the fall. Another exciting year ahead!

Laurent Vanbever
Professor, ETH Zurich

Research

In december I gave the opening keynote at CoNEXT. The talk summarizes my 10-year (and counting!) journey exploring the operational aspects behind routing algorithms, focusing on three aspects: config. verification, synthesis, and reconfiguration.



ACM CoNEXT opening keynote ▶ Grab the slides

Our overarching research goal in 2021 was (still) to improve the operational workflow of large network infrastructures. More precisely, we aimed at: improving network monitoring; increasing network programmability (considering both the data plane and the control plane); ensuring and maintaining network correctness; as well as increasing network security. We also aimed at improving the standards of reproducibility and performance evaluations in the networking community.

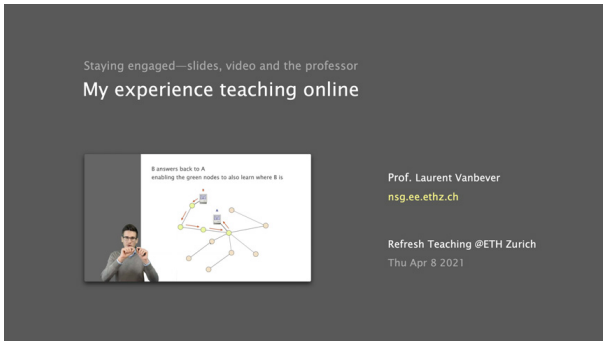
As in previous years, we managed to publish our papers in top venues such as ACM SIGCOMM, USENIX NSDI, and NDSS. In terms of research awards in 2021, I felt very privileged to receive the SIGCOMM "rising star" award in recognition of *"outstanding research contributions [...] toward improving the flexibility, correctness, and security of Internet routing"*. Tibor Schneider also won the ABB research award for his SIGCOMM paper on network updates. Finally, two of our publications were crowned with an IETF/IRTF ANRP prize: our xBGP HOTNETS paper and our CONFIG2SPEC NSDI paper.

2021 was *particularly* busy in terms of community service. I served on the program committee of both ACM SIGCOMM and USENIX NSDI, writing more than 40 reviews in total. I also served as co-PC chair for ACM HOTNETS together with Prof. Minlan Yu. While helping the academic community is always high on our priority list, maintaining this level of activity is not sustainable, and 2022 ought to see less of it.

We have plenty of exciting research in our pipeline and look forward to sharing it in 2022! We also plan to engage even more with network operators: papers are only the beginning.

Teaching

We worked hard on our online teaching offerings during the last two years. In this presentation, I reflect on my experiences, and how I improved my technical setup over time inspired by... YouTubers.



Refresh Teaching @ETH Zurich ▶ Watch online

We can split our teaching activities in 2021 in two phases: online, in the spring; and in-person, in the fall. In the spring, we taught "Communication Networks" and our seminar. After three semesters teaching online, I think we got the knack of it and could offer a decent learning experience. Our course evaluation confirms that: we got an average satisfaction rating of 4.7/5.0 and a median of 5.0/5.0. Plus, it is always fun to run our "mini-Internet" class-wide project.

We taught "Advanced Topics in Communication Networks" in the fall. Like last year, we offered a 6-week project in which our students had to optimize the performance of a programmable network. To spice things up, we framed the project as a competition, with prizes for the best performing solutions. The project went very well. I was really amazed by the creativity of our students and the sophistication of their solutions despite the relative short amount of time they had.

Another year, another teaching award! Edgar Costa Molero was crowned by one of ETH's student associations (AMIV) for the outstanding Teaching Assistant (TA) award. I've always felt that TAs should get more limelight: many are amazing. I'm happy that they can now be recognized. *Congrats, Edgar!*

For 2022, we intend to consolidate our teaching offerings, improving and updating our materials whenever possible. Given the burst of PhD graduations and the corresponding loss of TAs, we will also be working to ensure continuity. One new thing in 2022: Romain will run our seminar which will be about network measurements and reproducibility. Make sure to check it out as the number of places is limited.

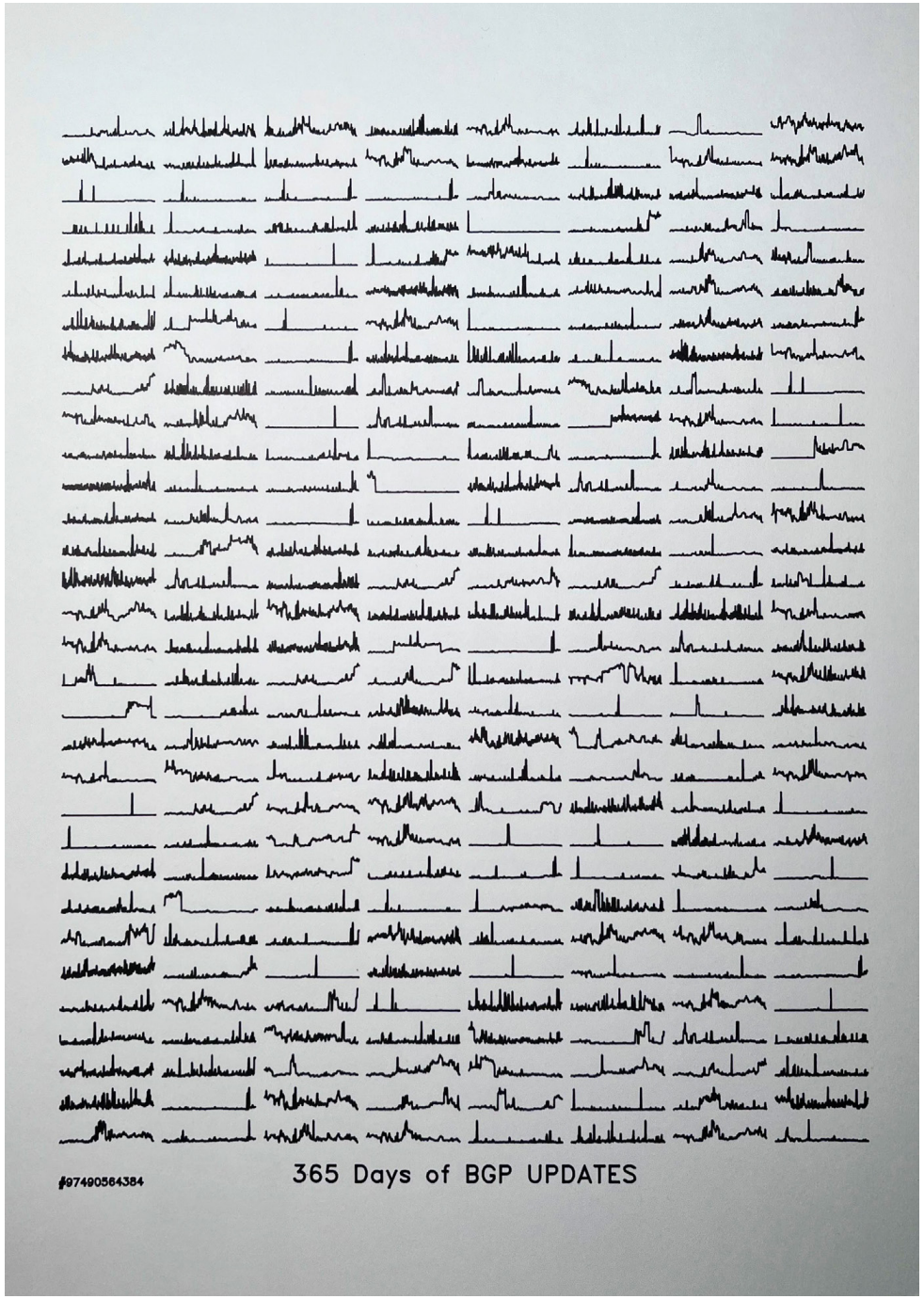
Visualizing Internet routing

As a visual person, I've grown frustrated by the lack of illustrations of the Internet infrastructure. I would like to change that in the future. As teaser, here is a small pet project I could work on lately.

What? The print depicts 1 year of routing announcements observed by 256 Internet (BGP) routers. Each line tracks the number of hourly BGP advertisements observed by each router. Throughout the year, these routers observed >97 billion announcements!

How? I collected the raw BGP data from 256 BGP sessions maintained by RIPE's Routing Information Service. I used an AxiDraw V3/A3 plotter for the drawing. It takes about 40 minutes to draw using a Staedler 0.5 pen on Bristol paper. (I was heavily inspired by Michael Fogleman's NES sparklines, check it out!)

► Watch the pen plotter in action!



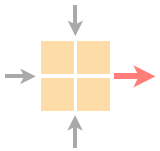
Activity report

Fri 7 Jan 2022

Prof. Laurent Vanbever

https://nsg.ee.ethz.ch

We are hiring! Please ping us.



Networked Systems

ETH Zürich — seit 2015