Laurent VANBEVER

Assistant professor, PhD & MSc in computer science, MSc in management

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born on Dec 1985 (33 year), Belgian

Education

2008–2012

PhD in computer science, **University of Louvain** (Louvain-la-Neuve, Belgium)
Advised by Prof. Olivier Bonaventure.
Dissertation: *Methods and Techniques for Disruption-Free Network Reconfiguration.*

2008–2010

Master in management, **Solvay Brussels School** (Brussels, Belgium)
Graduated *magna cum laude*, ranked *1 out of 100* students.
Specialization: Finance. Master's thesis (advised by Prof. S. Peffer):
Liquidity analysis of the belgian non-regulated stock market. How to improve it?

2003–2008

Master in computer science (ingénieur civil), **University of Louvain** (Louvain-la-Neuve, Belgium)
Graduated *magna cum laude*, ranked *1 out of 30* students.
Specialization: Networks and security. Master's thesis (advised by Prof. O. Bonaventure):
Automatic generation and validation of network configurations.

Experience

2015–

Assistant professor, **ETH Zürich**, Switzerland
I lead the *Networked Systems Group* within the Information Technology and Electrical Engineering
department (D-ITET). I am also affiliated with the Computer Science department (D-INFK).

2018–

Scientific advisory board, **ChainSecurity**, Switzerland
The start-up builds upon our research results on blockchain systems security.

2017–

Scientific advisory board, **Exeon Analytics (ETH Spin-off)**, Switzerland
The start-up builds upon our research results on network traffic analysis and anomaly detection.

2012–2014

Postdoctoral research associate, **Princeton University**, New Jersey, USA
I collaborated with Prof. Jennifer Rexford on developing new abstractions on top of
Software Defined Networks (SDN) to enable better network management.

My projects included:
- Applying SDN design principles to cellular networks and Internet routing (BGP),
- Developing techniques and tools to upgrade SDN controllers in a disruption-free manner,
- Developing transition mechanisms to deploy SDN within traditional IP networks,
- Scaling Internet routing through filtering without requiring global coordination.

2012–2014

Research advisor, **Princeton University**, New Jersey, USA
I advised three graduate students working on cellular core networks and Internet Exchange Points,
as well as one undergraduate student working on SDN.

Oct–Nov 2011	Visiting researcher, **Roma Tre University**, Rome, Italy
	I implemented a reconfiguration framework and performed large-scale network analysis.
Feb–Mar 2011	Visiting researcher, **Internet Initiative Japan Innovation Institute**, Tokyo, Japan
	I developed and validated seamless reconfiguration mechanisms for both IGP and BGP.
2010–2012	Private tutor, **Université Libre de Bruxelles**, Belgium
	I provided support in statistics, computer science and game theory to master students in business management.
Summer 2007	Intern, **Belgian national research network** (BELNET), Brussels, Belgium
	I collaborated on the design and on the implementation of Quality of Service in the network. At the end of my internship, the project was successfully deployed.
2007–2015	Project leader, **Alain & Evelyne Morel de Westgaver Art Auctions**, Brussels, Belgium
	I designed and implemented a live auction management software. Between 2007 and 2015, I have provided customer support and extended the software which is still used daily. I have also actively collaborated in the organization and the operation of 3 to 4 art auctions per year.

Honors and awards

2018	IETF/IRTF Applied Networking Research Prize (for our work on routing attacks)
2017	Roland Meier CyCon Junior Scholar Award (as advisor)
2016	Golden Owl Teaching Award, ETH Zürich
	Usenix NSDI Community Award
	IETF/IRTF Applied Networking Research Prize (for our work on network programmability)
	Roland Meier ETH Silver Medal for outstanding master thesis (as advisor)
2015	ACM SIGCOMM Best Paper Award
	IETF/IRTF Applied Networking Research Prize (for our work on routing scalability)
2013	IEEE ICNP Best Paper Award
	IETF/IRTF Applied Networking Research Prize (for our work on network reconfiguration)
2012	ACM SIGCOMM Doctoral Dissertation Award (runner up)
	University of Louvain/ICTEAM Best PhD Thesis Award
2008–2012	PhD scholarship from the Belgian scientific research foundation (FNRS/FRIA grant)
2010	CeFiP Academic Award Belgium for my master's thesis on SMEs financing
2008	Alcatel-Lucent Innovation Award for my master's thesis on network configuration
2007	Winner of the Belgium BEST Engineering Competition (beBEC)

Languages

French	Mother tongue	
English	Fluent	
Dutch	Fair knowledge	CEFR level B2 (2008)
German	Basic knowledge	

Teaching

I only list the general student satisfaction for the lectures where I am the sole teacher (and when available)

2019
- Seminar in Communication Networks: *Learning, Reasoning and Control*
- Advanced Topics in Communication Networks
- Communication Networks
  General satisfaction: **4.6/5.0** (avg)   52 respondents out of 100 students
  5.0/5.0 (med)

2018
- Advanced Topics in Communication Networks
  General satisfaction: **4.6/5.0** (avg)   18 respondents out of 25 students
  5.0/5.0 (med)
- Discrete Event Systems   with Prof. Roger Wattenhofer & Prof. Lothar Thiele
- Communication Networks
  General satisfaction: **4.4/5.0** (avg)   37 respondents out of 88 students
  5.0/5.0 (med)

2017
- Discrete Event Systems   with Prof. Roger Wattenhofer & Prof. Lothar Thiele
- Communication Networks
  General satisfaction: **4.7/5.0** (avg)   31 respondents out of 79 students
  5.0/5.0 (med)

2016
- Discrete Event Systems   with Prof. Roger Wattenhofer & Prof. Lothar Thiele
- Communication Networks
  General satisfaction: **4.4/5.0** (avg)   43 respondents out of 99 students
  5.0/5.0 (med)

2015
- Discrete Event Systems   with Prof. Roger Wattenhofer & Prof. Lothar Thiele
- Communication Networks   with Prof. Bernhard Plattner

Research awards

2019–2022
Armasuisse & Zurich Information Security and Privacy Center (ZISC)
"Self-Securing Networks"

2017–2020
Swiss National Science Foundation (SNF)
"Data-Driven Internet Routing"

2017–2020
Armasuisse & Zurich Information Security and Privacy Center (ZISC)
"Improving network security through programmability"

2017–2018
Google Inc. (unrestricted gift)
"Transport protocol development and standardization"

2016–2018
European Project Horizon 2020, Principal Investigator
"MAMI: Measurement and Architecture for a Middleboxed Internet"

2016–2017
Armasuisse & Zurich Information Security and Privacy Center (ZISC)
"Context-aware Digital Incident Data Compression and Representation"

Research group at ETH Zurich

PhD			
	Albert Gran Alcoz	Mar 2019–	
	Alexander Dietmüller	Oct 2018–	
	Edgar Costa Molero	Mar 2017–	
	Roland Meier	Jan 2017–	
	Tobias Bühler	Nov 2016–	
	Rüdiger Birkner	July 2016–	co-supervised with Prof. Martin Vechev (D-INFK)
	Thomas Holterbach	Jan 2016–	
	Maria Apostolaki	Sep 2015–	
	Ahmed El-Hassany	June 2015–	expected graduation date: Sept 2019
Post-doc	Mirja Kühlewind	Oct 2015–Feb 2019	now at Ericsson Research
	David Gugelmann	Nov 2015–Nov 2016	now CEO at Exeon Analytics (ETH spin-off)
	Bernhard Ager	Aug–Dec 2015	now at Google
Researcher	Brian Trammel	Jan 2016–Dec 2018	now at Google
Intern	Albert Gran Alcoz	Sep 2018–Feb 2019	
	Tobias Bühler	Jan–Sept 2016	
	Roland Meier	Oct 2015–Feb 2016	
	Rüdiger Birkner	July–Aug 2015	
	Thomas Holterbach	Jan–Dec 2015	
Visitor	Albert Gran Alcoz	Jan–July 2019	from Universitat Politècnica de Catalunya
	Olivier Tilmans	September 2017	from University of Louvain
	Nick Shelly	Sep 2015–May 2016	from Stanford University
	Michael Alan Chang	Jan–Jun 2015	from Princeton University/UC Berkeley
	Shouxi Luo	Oct 2015–Sep 2016	from UESTC
	Olivier Tilmans	May–June 2016	from University of Louvain
	Liang Zhang	Jul–Aug 2015	from Hong Kong Polytechnic University

Master and semester theses

My group and I have supervised 37 master theses [M] and 40 semester theses [S] since 2015. The theses which lead to a peer-reviewed publication are indicated with a ●

2019   [M]   Jan Müller   (supervised jointly with A. Gran Alcoz and R. Meier)
"Traffic-analysis attacks over encrypted HTTP from the data plane"

[M]   Tomer Gidron   (supervised jointly with R. Meier)
"Developing a Dataset with Coordinated Network Attacks"

[M]   Stephan Keck   (supervised jointly with T. Holterbach)
"On Making Blink Deployable in Practice"

[S]   Tibor Schneider   (supervised jointly with E. Costa Molero and R. Meier)
"Automatic Generation of Adversarial Workload for Programmable Switches"

[S]   Matthias Stähli   (supervised jointly with R. Meier)
"Network Performance Obfuscation"

[S]   Tom Kuchler   (supervised jointly with T. Bühler)
"A test framework to verify end point implementations"

[S]   Tino Rellstab   (supervised jointly with T. Bühler and T. Holterbach)
"Network virtualization—creating arbitrary networks with one click"

[S]   Ege Cem Kirci   (supervised jointly with A. Singla)
"Securing the network against malicious programmable switches"

[M]   Nico Schottelius   (supervised jointly with T. Bühler)
"High speed NAT64 with P4"

[M]   Christelle Gloor   (supervised jointly with D. Desislava)
"Exploring data-centre topology structure for low-overhead active monitoring"

[S]   Hendrik Züllig   (supervised jointly with T. Bühler)
"P4 programming on the SUME NetFPGA board"

[S]   Ege Cem Kirci   (supervised jointly with R. Meier)
"P4-based Header Obfuscation"

[S]   Manuel Pulfer   (supervised jointly with M. Apostolaki)
"Multi-path Routing"

[S]   Hanjing Gao   (supervised jointly with R. Birkner)
"Automatic BGP Configuration Analysis and Summarization"

[S]   Tomer Gidron   (supervised jointly with R. Meier)
"Monitoring and Controlling Network Reconnaissance using Programmable Networks"

[S]   Stephan Keck   (supervised jointly with T. Holterbach)
"Securing data-plane-driven fast-reroute systems"

[M]   Coralie Busse-Grawitz   (supervised jointly with R. Meier, T. Bühler, A. Dietmüller)
"Leveraging Network Programmability for Machine Learning"

2018   [M]   Dimitra Azariadi (supervised jointly with R. Meier)
"Traffic Matrix Obfuscation"

[M]   Nicolas Känzig (supervised jointly with R. Meier, L. Gambazzi and V. Lenders)
"Network Monitoring and Attack Detection"

[S]   Noah Studach (supervised externally by M. Kühlewind and B. Trammell)
"Measuring support for Protocols on the Internet"

[S]   Rolf Scheuner (supervised externally by M. Kühlewind and B. Trammell)
"Representation of Internet Path Transparency"

[M]   Alexander Dietmüller (supervised jointly with T. Bühler)
"Next-generation network monitoring using programmable network devices"

[M]   Philipp Mao (supervised jointly with R. Birkner)
"Expanding Net2Text to analyze multiple time points"

[M]   Alberto Gran Alcoz (supervised jointly with E. Costa Molero)
"On Offloading Control Plane Applications to the Data Plane"

[M]   Pierre Dumont-dit-Voitel (externally supervised by A. Giner)
"Analytics System for Internet Security Dataset"

[M]   Fabian Schleiss (supervised jointly with T. Holterbach and E. C. Molero)
"Data-plane driven network convergence"

[M]   Samuel Steffen (supervised jointly with P. Tsankov, D. Drachsler-Cohen, T. Gehr, M. Vechev)
"Probabilistic Network Analysis and Synthesis"

[M]   Giorgio Tresoldi (externally supervised by V. Lenders and D. Moser)
"Verifying ADS-B Position Claims with Passive Radar"

[M]   Piet De Vaere (supervised jointly with M. Kuehlewind and B. Trammel)
●   "Adding measurability to QUIC"

[S]   Coralie Busse-Grawitz (supervised jointly with R. Meier)
"Data-driven classification and isolation of network devices"

[S]   Gian Marti (supervised jointly with M. Apostolaki)
●   "Safeguarding Bitcoin Against Active Routing Attack"

[M]   Ruggiero Dargenio (externally supervised by U. O'Reilly, MIT)
"Learning Defenses in Computer Networks: Neural Networks Approach"

[S]   Jan Müller (supervised with M. Apostolaki)
●   "Protecting Blockchain Applications with Programmable Networks"

[S]   Noa Melchior (externally supervised by P. Tsankov and M. Vechev)
"Data Privacy in Decentralized Networks"

[S]   Alexander Hedges (supervised with A. El-Hassany)
"Grigori: Does the network work as I expected?"

[S]   Jan-Philipp Schulze (externally supervised by M. Apostolaki and D. Guggelmann)
"Data-Driven Performance Correlation"

[S]   Norwin Schnyder (externally supervised by A. Jaggi)
"Building Threat Intelligence from Internet Background Noise"

2017 [M] Nicola Rustignoli (supervised jointly with D. Dimitrova and J. Liagouris)
"Constraint-based routing as a stream computation"

[M] Michael Walter (externally supervised by with B. Trammell and M. Kühlewind)
"Tracing Internet Path Transparency"

[S] Pierre Dumont-dit-Voitel (externally supervised by V. Lenders, R. Meier, and D. Guggelmann)
● "Detection of Malicious Remote Shell Sessions"

[S] Christof Gerber (externally supervised by D. Guggelmann)
"Passive Detection of Tor Domain Fronting"

[M] Cornelia Scherrer (externally supervised by D. Gugelmann, V. Lenders, and R. Meier)
"Analysis of Cyber Threat Intelligence Feeds"

[M] Andreas Germann (externally supervised by M. Kühlewind and B. Trammell)
"Evaluation of AQM schemes to support Low Latency in the Internet"

[M] Andreas Pantelopoulos (supervised jointly with M. Apostolaki and E. C. Molero)
"Towards accurate simulations of programmable dataplanes"

[M] Antonios Karkatsoulis (supervised jointly with Prof. A. Singla)
"Exploring the impact of TCP/IP parameter tuning on performance"

[S] Fabian Schleiss (supervised jointly with R. Meier)
"In-network Anomaly Detection with Programmable Switches"

[S] Giorgio Tresoldi (externally supervised by V. Lenders)
"A FLARM Receiver for Crowdsourced Air Traffic Monitoring"

[S] Christelle Gloor (supervised jointly with A. El-Hassany)
"Chronos: Finding the configurations recipe for fast convergence"

[S] Simon Miescher (supervised jointly with T. Holterbach)
"A Fast and Loop-Free Convergence upon Remote BGP Disruptions in Large IP Networks"

[S] Philipp Mao (supervised jointly with T. Holterbach and R. Birkner)
● "Boosting the convergence performance of SDX platforms"

[S] Piet De Vaere (externally supervised by M. Kühlewind and B. Trammell)
"Continuous Measurements of Internet Path Transparency"

[S] Floyd Basler (supervised jointly with M. Apostolaki)
"Detecting and mitigating network attacks on Bitcoin"

2016   [M]   Roman May (supervised jointly with A. El-Hassany)
- "Practical Concurrency Analysis for SDN"

[M]   Ferran Llamas Arroniz (supervised jointly with Prof. Dr. S. Vissicchio, UCL London)
"Improving Load-Balancing in IP-based Data Centers with Fibbing"

[S]   Stefan Rietmann
"Applying meaningful destruction in Software-Defined Networks"

[S]   Dominic Brütsch (externally supervised by M. Kühlewind and B. Trammell)
"Cooperating with Middleboxes in the Internet"

[M]   Pavlos Lamprakis (externally supervised by with D. Gugelmann and M. Happe)
- "Human or malware? Detection of malicious Web requests"

[M]   Edgar Costa Molero
"Improving Load-Balancing Decisions in Data Center Networks Using SDN"

[S]   Severin Amrein (externally supervised by M. Kühlewind and D. Gugelmann)
"Does your phone spy on you?"

[S]   Ruggiero Dargenio (externally supervised by D. Gugelmann)
- "Accurate classification of Web requests"

[M]   Elio Gubser (externally supervised by B. Trammell and M. Kühlewind)
- "Building a Path Transparency Observatory"

[M]   Rüdiger Birkner (supervised jointly with Prof. Dr. N. Feamster, Princeton University)
- "On the Correctness of Inter-Domain Deflections"

[M]   Stephan Dollberg (supervised jointly with Prof. Dr. J. L. Sobrinho, Instituto Superior Técnico)
"Implementation and validation of distributed route aggregation in the wild"

[S]   Pascal Sprenger (externally supervised by M. Kühlewind and B. Trammell)
"Design and Implementation of an ECN Proxy for Performance Improvements in the Internet"

[S]   Martin Müller (externally supervised by M. Kühlewind and B. Trammell)
"Integration of measurement probes into a distributed measurement plane"

[S]   Solène Buet (supervised jointly with T. Holterbach)
"On Leveraging Machine Learning techniques to predict the extent of Internet failures"

[S]   Andreas Germann (externally supervised by M. Kühlewind and B. Trammell)
"Measuring Internet Path Transparency for Transport Protocol Extensions"

[S]   Ferran Llamas Arroniz
"Traffic engineering in networks with central control"

2015   [M]   Tobias Bühler
- "Improving Network-Wide Troubleshooting with Few SDN Devices"

[M]   James Guthrie
"NetBursting: Network Infrastructure in the Cloud"

[M]   Roland Meier
- "SDN-based Network Obfuscation"   **ETH medal for best M.Sc. thesis**

[M]   Maciej Bednarek (externally supervised by M. Kühlewind and B. Trammell)
- "Multipath bonding at Layer 3"

[M]   Tabita Arn
Flexible SDN testing in production with Shadow Policies

[S]   Roman May
"Supercharging IP router memory with SDN"

[M]   Damian Scherrer (supervised jointly with M. Brunner, P. Georgopoulos, B. Ager, V. Kotronis)
"Self-Learning Enterprise Networks Via Software Defined Networking"

[S]   Rüdiger Birkner
- "Improving the scalability of Software-Defined Internet Exchange Points"

[M]   Jeremie Miserez (supervised jointly with P. Bielik and M. Vechev)
- "Detecting Concurrency Violations in Software-Defined Networks"

PhD Thesis committee

Christoph Dietzel, TU Berlin. Advisor: Prof. Anja Feldmann.
Olivier Tilmans, University of Louvain. Advisor: Prof. Olivier Bonaventure.
Der-Yeuan Yu, ETH Zürich. Advisor: Prof. Srdjan Capkun.
Maciej Kuzniar, EPFL. Advisor: Prof. Dejan Kostic.
Peter Peresini, EPFL. Advisor: Prof. Dejan Kostic.
Xuan-Nam Nguyen, INRIA Sophia Antipolis. Advisor: Dr. Thierry Turletti.
Olivier Tilmans, University of Louvain. Advisor: Prof. Olivier Bonaventure.
Ignacio de Castro Arribas, Universitat Oberta de Catalunya. Advisor: Dr. Sergey Gorinsky.

Professional services to the academic community

2019	TPC member	■ ACM SIGCOMM'19
		■ USENIX NSDI'20 (heavy)
		■ SIGPLAN PLDI'19 (External Review Committee)

2018	Program chair	■ ACM CoNEXT'18 (with Theophilus Benson)
		■ ACM SOSR'18 (with Dave Maltz)
	TPC member	■ ACM SIGCOMM'18
		■ ACM SIGCOMM Workshop on In-Network Computing

2017	TPC member	■ ACM SIGCOMM'17
		■ ACM CoNEXT'17
		■ ACM SOSR'17
	Reviewer	■ IEEE/ACM Transactions on Networking
		■ Elsevier Computer Networks

2016	Jury member	■ Swisscom's Call for Innovation: SDN and NFV startups
	Chair	■ ACM SIGCOMM Doctoral Dissertation Award Committee
		■ ACM CoNEXT'16 student workshop
		■ USENIX NSDI'16 poster session
	TPC member	■ SIGPLAN PLDI'16 (External Review Committee)
		■ ACM CoNEXT'16
	Reviewer	■ IEEE/ACM Transactions on Networking
		■ ACM SIGCOMM Computer Communication Review (CCR)

2015	Organizer	■ Summer School on Software-Defined Networks (SDNschool'15)
	Reviewer	■ Wiley's International Journal of Network Management (SDN issue)
		■ IWT (Flemish/Belgian government funding agency) project proposals
		■ ACM Computing Surveys
	TPC member	■ ACM SOSR'16 (Symposium on SDN Research)
		■ USENIX NSDI'16 (heavy)
		■ ACM CoNEXT Student Workshop
		■ ACM SIGCOMM AINTEC
		■ ACM Distributed Cloud Computing (DCC) Workshop
		■ IEEE International Conference on Network Protocols (ICNP'15)

2014	Reviewer	■ ACM Computing Surveys
	TPC member	■ ACM CoNEXT Student Workshop
		■ IEEE ICNP CoolSDN Workshop
		■ IEEE ICCCN
		■ IEEE INFOCOM SDP Workshop
		■ ONS Research Track
		■ IEEE NetSys SDNFlex Workshop

| 2008– | | Member: ACM SIGCOMM, USENIX, IEEE Computer Society |

Professional services to ETH Zürich

2019–	Committee	■ D-ITET MsC admission committee (Computers and Networks)
		■ Department faculty representative to the IT support group
2018	Committee	■ Search committee for a professor in Embedded Information Systems
	Speaker	■ ETH Industry Day (talk title: "Provably-correct network operations")
2017	Committee	■ ETH medals committee (D-ITET)
		■ Search committee for a professor in Embedded Information Systems
2016	Organizer	■ ETH Zürich programming challenge (100 participants)
		■ ETH Zürich meets California's Hackathon
	Panelist	■ "The Future of the Internet", ETH Zürich meets London
2016–	Sport	■ ETH Zürich Professoren Ruderteam

Summary of research impact

52 peer-reviewed publications (**36** conferences, **11** workshops, **5** journals).
Full list available online: https://vanbever.eu/publications.html

My publications have appeared at the flagship venues of several research communities including:

■ networking   SIGCOMM, NSDI, HotNets, CoNEXT, INFOCOM, ICNP
■ security   USENIX Security, IEEE Symposium on Security and Privacy, NDSS
■ programming languages   Programming Language Design and Implementation (PLDI)
■ verification   Computer-Aided Verification (CAV)

Google Scholar reports a total of **2030** citations—**85+%** of which have been obtained in the last three years—**20** publications cited **20** or more times (h-index), **30** cited at least **10** times (i10-index), and **6** cited more than 100 times (numbers as of June 2019).

Various awards in top networking venues including at ACM SIGCOMM and USENIX NSDI.
4 IETF/IRTF Applied Networking Research Prize for our research on routing attacks, network reconfiguration, network programmability, and routing scalability.

I regularly serve in top technical program committees (as a member and as chair) and help organizing workshops, technical panels, technical graduate schools, and sessions at conference venues.

My research is regularly covered by both the mainstream press, with articles in the Neue Zürcher Zeitung and Swissinfo.ch, and the technical press, with dozens of articles covering our results together with interviews for various podcasts. Details on: https://vanbever.eu/publications.html

Selected recent publications at ETH Zurich

Full-length and peer-reviewed (sorted by date)

Rüdiger Birkner, Dana Drachsler Cohen, Laurent Vanbever, Martin Vechev
Config2Spec: Mining Network Specifications from Network Configurations
USENIX NSDI'20. Santa Clara, CA, USA (February 2020)

Albert Gran Alcoz, Alexander Dietmüller, Laurent Vanbever
SP-PIFO: Approximating Push-In First-Out Behaviors using Strict Priority Queues
USENIX NSDI'20. Santa Clara, CA, USA (February 2020)

Thomas Holterbach, Edgar Costa Molero, Maria Apostolaki, Alberto Dainotti,
Stefano Vissicchio, Laurent Vanbever
Blink: Fast Connectivity Recovery Entirely in the Data Plane
USENIX NSDI'19. Boston, MA, USA (February 2019)

Roland Meier, Petar Tsankov, Vincent Lenders, Laurent Vanbever, Martin Vechev
NetHide: Secure and Practical Network Topology Obfuscation
USENIX Security'18. Baltimore, MD, USA (August 2018)

Olivier Tilmans, Tobias Bühler, Ingmar Poese, Stefano Vissicchio, Laurent Vanbever
Stroboscope: Declarative Traffic Mirroring on a Budget
USENIX NSDI'18. Washington, WA, USA (April 2018)

Ahmed El-Hassany, Petar Tsankov, Laurent Vanbever, Martin Vechev
NetComplete: Practical Network-Wide Configuration Synthesis with Autocompletion
USENIX NSDI'18. Washington, WA, USA (April 2018)

Rüdiger Birkner, Dana Drachsler Cohen, Laurent Vanbever, Martin Vechev
Net2Text: Interactive Summarization of Network Forwarding Behaviors
USENIX NSDI'18. Washington, WA, USA (April 2018)

Thomas Holterbach, Stefano Vissicchio, Alberto Dainotti, Laurent Vanbever
SWIFT: Predictive Fast Reroute
ACM SIGCOMM'17. Los Angeles, CA, USA (August 2017)

Maria Apostolaki, Aviv Zohar, Laurent Vanbever
Hijacking Bitcoin: Routing Attacks on Cryptocurrencies
IEEE Symposium on Security and Privacy (S&P'17). San Jose, CA, USA (May 2017)

Arpit Gupta, Robert MacDavid, Rudiger Birkner, Marco Canini, Nick Feamster
Jennifer Rexford, Laurent Vanbever
An Industrial-Scale Software Defined Internet Exchange Point
USENIX NSDI'16. Santa Clara, CA, USA (March 2016)

Stefano Vissicchio, Olivier Tilmans, Laurent Vanbever, Jennifer Rexford
Central Control Over Distributed Routing
ACM SIGCOMM'15. London, UK (August 2015)

Conference publications

Rüdiger Birkner, Dana Drachsler Cohen, **Laurent Vanbever**, Martin Vechev
Config2Spec: Mining Network Specifications from Network Configurations
USENIX NSDI'20. Santa Clara, CA, USA (February 2020)

Albert Gran Alcoz, Alexander Dietmüller, **Laurent Vanbever**
SP-PIFO: Approximating Push-In First-Out Behaviors using Strict Priority Queues
USENIX NSDI'20. Santa Clara, CA, USA (February 2020)

Thomas Holterbach, Edgar Costa Molero, Maria Apostolaki, Alberto Dainotti,
Stefano Vissicchio, **Laurent Vanbever**
Blink: Fast Connectivity Recovery Entirely in the Data Plane
USENIX NSDI'19. Boston, MA, USA (February 2019)

Maria Apostolaki, Gian Marti, Jan Müller, **Laurent Vanbever**
SABRE: Protecting Bitcoin against Routing Attacks
NDSS'19. San Diego, CA, USA (February 2019)

Roland Meier, Petar Tsankov, Vincent Lenders, **Laurent Vanbever**, Martin Vechev
NetHide: Secure and Practical Network Topology Obfuscation
USENIX Security'18. Baltimore, MD, USA (August 2018)
see https://nethide.ethz.ch

Timon Gehr, Sasa Misailovic, Petar Tsankov, **Laurent Vanbever**, Pascal Wiesman, Martin Vechev
Bayonet: Probabilistic Inference for Networks
PLDI'18. Philadelphia, PA, USA (June 2018)

Olivier Tilmans, Tobias Bühler, Ingmar Poese, Stefano Vissicchio, **Laurent Vanbever**
Stroboscope: Declarative Traffic Mirroring on a Budget
USENIX NSDI'18. Washington, WA, USA (April 2018)
see https://stroboscope.ethz.ch

Ahmed El-Hassany, Petar Tsankov, **Laurent Vanbever**, Martin Vechev
NetComplete: Practical Network-Wide Configuration Synthesis with Autocompletion
USENIX NSDI'18. Washington, WA, USA (April 2018)
see https://netcomplete.ethz.ch

Rüdiger Birkner, Dana Drachsler Cohen, **Laurent Vanbever**, Martin Vechev
Net2Text: Interactive Summarization of Network Forwarding Behaviors
USENIX NSDI'18. Washington, WA, USA (April 2018)
see http://net2text.ethz.ch

Thomas Holterbach, Stefano Vissicchio, Alberto Dainotti, **Laurent Vanbever**
Predictive Fast Reroute upon Remote BGP Outages
ACM SIGCOMM'17. Los Angeles, CA, USA (August 2017)
see https://swift.ethz.ch

Ahmed El-Hassany, Petar Tsankov, **Laurent Vanbever**, Martin Vechev

Network-wide Configuration Synthesis

CAV'17. Heidelberg, Germany (July 2017)

see http://synet.ethz.ch

Pavlos Lamprakis, Ruggiero Dargenio, David Gugelmann, Vincent Lenders, Markus Happe, **Laurent Vanbever**

Unsupervised Detection of APT C&C Channels using Web Request Graphs

DIMVA'17. Bonn, Germany (July 2017)

Maria Apostolaki, Aviv Zohar, **Laurent Vanbever**

[ANRP Prize]   Hijacking Bitcoin: Routing Attacks on Cryptocurrencies

IEEE Symposium on Security and Privacy (S&P'17). San Jose, CA, USA (May 2017)

see https://btc-hijack.ethz.ch

Roman May, Ahmed El-Hassany, **Laurent Vanbever**, Martin Vechev

BigBug: Practical Concurrency Analysis for SDN

ACM SOSR'17. Santa Clara, CA, USA (April 2017)

see http://sdnracer.ethz.ch

Roland Meier, David Gugelmann, **Laurent Vanbever**

[CyCON award]   iTAP: In-network Traffic Analysis Prevention using Software-Defined Networks

ACM SOSR'17. Santa Clara, CA, USA (April 2017)

see https://itap.ethz.ch

Rüdiger Birkner, Arpit Gupta, Nick Feamster, **Laurent Vanbever**

SDX-Based Flexibility or Internet Correctness? Pick Two!

ACM SOSR'17. Santa Clara, CA, USA (April 2017)

Shouxi Luo, Hongfang Yu, **Laurent Vanbever**

Swing State: Consistent Updates for Stateful and Programmable Data Planes

ACM SOSR'17. Santa Clara, CA, USA (April 2017)

Ahmed El-Hassany, Jeremie Miserez, Pavol Bielik, **Laurent Vanbever**, Martin Vechev

SDNRacer: Concurrency Analysis for Software-Defined Networks

ACM PLDI'16. Santa Barbara, CA, USA (June 2016)

see http://sdnracer.ethz.ch

Arpit Gupta, Robert MacDavid, Rudiger Birkner, Marco Canini, Nick Feamster

Jennifer Rexford, **Laurent Vanbever**

[NSDI community award]   An Industrial-Scale Software Defined Internet Exchange Point

USENIX NSDI'16. Santa Clara, CA, USA (March 2016)

see http://sdx.cs.princeton.edu

Arpit Gupta, Nick Feamster, **Laurent Vanbever**

FLANC: A Formal Logic for Authorizing Network Control

ACM SOSR'16. Santa Clara, CA, USA (March 2016)

Karla Saur, Joseph Collard, Nate Foster, Arjun Guha, **Laurent Vanbever**, Michael Hicks

Safe and Flexible Controller Upgrades for SDN

ACM SOSR'16. Santa Clara, CA (March 2016)

Thomas Holterbach, Cristel Pelsser, Randy Bush, **Laurent Vanbever**
Quantifying interference between measurements on the RIPE Atlas platform
ACM IMC'15. Tokyo, Japan (October 2015)

Yixin Sun, Anne Edmundson, **Laurent Vanbever**, Oscar Li, Jennifer Rexford, Mung Chiang, Prateek Mittal
RAPTOR: Routing Attacks on Privacy in Tor
USENIX Security'15. Washington, D.C., USA (August 2015)

[best paper]
[ANRP prize]

Stefano Vissicchio, Olivier Tilmans, **Laurent Vanbever**, Jennifer Rexford
Central Control Over Distributed Routing
ACM SIGCOMM'15. London, UK (August 2015)
see http://fibbing.net

Peng Sun, **Laurent Vanbever**, Jennifer Rexford
Scalable Programmable Inbound Traffic Engineering
ACM SOSR'15. Santa Clara, US (June 2015)

Jeremie Miserez, Pavol Bielik, Ahmed El-Hassany, **Laurent Vanbever**, Martin Vechev
SDNRacer: Detecting Concurrency Violations in Software-Defined Networks
ACM SOSR'15. Santa Clara, US (June 2015)

Stefano Vissicchio, Luca Cittadini, Olivier Bonaventure, Geoffrey Xie, **Laurent Vanbever**
On the Co-Existence of Distributed and Centralized Routing Control-Planes
IEEE INFOCOM'15. Hong Kong (April 2015)

[ANRP prize]

João Luis Sobrinho, **Laurent Vanbever**, Franck Le, Jennifer Rexford
DRAGON: Distributed Route Aggregation on the Global Network
ACM CoNEXT'14. Sydney, Australia (December 2014)
see http://route-aggregation.net

Shuyuan Zhang, Sharad Malik, Sanjai Narain, **Laurent Vanbever**
In-Band Update for Network Routing Policy Migration
IEEE ICNP'14 (Concise paper). Raleigh, NC, USA (October 2014).

Arpit Gupta, **Laurent Vanbever**, Muhammad Shahbaz, Sean Donovan, Brandon Schlinker,
Nick Feamster, Jennifer Rexford, Scott Shenker, Russ Clark, Ethan Katz-Bassett
SDX: A Software Defined Internet Exchange
ACM SIGCOMM'14. Chicago, IL, USA (August 2014)

Stefano Vissicchio, **Laurent Vanbever**, Luca Cittadini, Geoffrey Xie, Olivier Bonaventure
Safe Routing Reconfigurations with Route Redistribution
IEEE INFOCOM'14. Toronto, ON, Canada (April 2014)

Xin Jin, Li Erran Li, **Laurent Vanbever**, Jennifer Rexford
SoftCell: Scalable and Flexible Cellular Core Network Architecture
ACM CoNEXT'13. Santa Barbara, CA, USA (December 2013)

[best paper]

Marco Chiesa, Luca Cittadini, **Laurent Vanbever**, Stefano Vissicchio, Giuseppe Di Battista
Using Routers to Build Logic Circuits: How Powerful is BGP?
IEEE ICNP'13. Göttingen, Germany (October 2013)

Laurent Vanbever, Stefano Vissicchio, Luca Cittadini, Olivier Bonaventure

When the Cure is Worse than the Disease: the Impact of Graceful IGP Operations on BGP

IEEE INFOCOM'13. Turin, Italy (April 2013)

Stefano Vissicchio, Luca Cittadini, Laurent Vanbever, Olivier Bonaventure

iBGP Deceptions: More Sessions, Fewer Routes

IEEE INFOCOM'12. Orlando, FL, USA (March 2012)

Laurent Vanbever, Stefano Vissicchio, Cristel Pelsser, Pierre Francois, Olivier Bonaventure

Seamless Network-Wide IGP Migrations

ACM SIGCOMM'11. Toronto, ON, Canada (August 2011)

Journal publications

Stefano Vissicchio, Laurent Vanbever, Luca Cittadini, Geoffrey G. Xie, Olivier Bonaventure

Safe Update of Hybrid SDN Networks

IEEE/ACM Transactions on Networking, Volume 25, Issue 3, pp. 1649-1662 (June 2017)

João Luis Sobrinho, Laurent Vanbever, André Sousa, Franck Le, Jennifer Rexford

Scaling the Internet Routing System through Distributed Route Aggregation

IEEE/ACM Transactions on Networking, Volume 24, Issue 6, pp. 3462–3476 (December 2016)

see http://route-aggregation.net

Stefano Vissicchio, Laurent Vanbever, Olivier Bonaventure

Opportunities and Research Challenges of Hybrid Software Defined Networks

ACM SIGCOMM Computer Communications Review, Editorial Zone (April 2014)

Stefano Vissicchio, Laurent Vanbever, Cristel Pelsser, Luca Cittadini, Pierre Francois, Olivier Bonaventure

[ANRP prize]   Improving Network Agility with Seamless BGP Reconfigurations

IEEE/ACM Transactions on Networking, Volume 21, Issue 3, pp. 990–1002 (June 2013)

Laurent Vanbever, Stefano Vissicchio, Cristel Pelsser, Pierre Francois, Olivier Bonaventure

Lossless Migrations of Link-State IGPs

IEEE/ACM Transactions on Networking, Volume 20, Issue 6, pp. 1842–1855 (December 2012)

Workshop publications

Edga Costa Molero, Stefano Vissicchio, **Laurent Vanbever**
Hardware-Accelerated Network Control Planes
ACM HotNets'18. Redmond, WA, USA (November 2018)

Aaron Gember-Jacobson, Costin Raiciu, **Laurent Vanbever**
Integrating Verification and Repair into the Control Plane
ACM HotNets'17. Palo Alto, California, USA (November 2017)

Thomas Holterbach, Emile Aben, Cristel Pelsser, Randy Bush, **Laurent Vanbever**
Measurement Vantage Point Selection Using A Similarity Metric
ACM, IRTF & ISOC Applied Networking Research Workshop. Prague, Czech Republic (July 2017)

Olivier Tilmans, Tobias Bühler, Stefano Vissicchio, **Laurent Vanbever**
Mille-Feuille: Putting ISP traffic under the scalpel
ACM HotNets'16. Atlanta, Georgia, USA (November 2016)

Nick Shelly, Brendan Tschaen, Klaus-Tycho Forster, Michael Chang, Theophilus Benson, **Laurent Vanbever**
Destroying networks for fun (and profit)
ACM HotNets'15. Philadelphia, PA, USA (November 2015)

Laurent Vanbever, Oscar Li, Jennifer Rexford, Prateek Mittal
Anonymity on QuickSand: Using BGP to Compromise Tor
ACM HotNets'14. Los Angeles, CA, USA (October 2014)

Stefano Vissicchio, **Laurent Vanbever**, Jennifer Rexford
Sweet Little Lies: Fake Topologies for Flexible Routing
ACM HotNets'14. Los Angeles, CA, USA (October 2014)

Laurent Vanbever, Stefano Vissicchio
Enabling SDN in old school networks with Software-Controlled Routing Protocols
Open Network Summit (Research Track). Santa Clara, CA, USA (March 2014)

Laurent Vanbever, Joshua Reich, Theophilus Benson, Nate Foster, Jennifer Rexford
HotSwap: Correct and Efficient Controller Upgrades for Software-Defined Networks
ACM SIGCOMM HotSDN'13. Hong Kong, China (August 2013)

Xin Jin, Li Erran Li, **Laurent Vanbever**, Jennifer Rexford
CellSDN: Software-Defined Cellular Core Networks
Open Network Summit (Research Track). Santa Clara, CA, USA (April 2013)

Laurent Vanbever, Bruno Quoitin, Olivier Bonaventure
A Hierarchical Model for BGP Routing Policies
ACM SIGCOMM PRESTO. Barcelona, Spain (August 2009)

Laurent Vanbever, Grégory Pardoen, Olivier Bonaventure
Towards Validated Network Configurations with NCGuard
Internet Network Management. Orlando, FL, USA (October 2008)

Theses

[SIGCOMM & UCL prize] Methods and Techniques for Disruption-Free Network Reconfiguration
PhD thesis. University of Louvain, Louvain-la-Neuve, Belgium (October 2012)

[CeFiP prize] Liquidity analysis of the Belgian non-regulated stock market. How to improve it?
Master thesis. Solvay Brussels School of Economics & Management, Brussels, Belgium (June 2010)

[Alcatel prize] Design and implementation of a software enabling the validation and the generation of network configurations
Master thesis. University of Louvain, Louvain-la-Neuve, Belgium (June 2008)

Demos

Philipp Mao, Rüdiger Birkner, Thomas Holterbach, Laurent Vanbever
Boosting the BGP convergence in SDXes with SWIFT
ACM SIGCOMM'17. Los Angeles, CA, USA (August 2017)

Olivier Tilmans, Stefano Vissicchio, Laurent Vanbever, Jennifer Rexford
Fibbing in action: On-demand load-balancing for better video delivery
ACM SIGCOMM'16. Florianopolis, Brazil (August 2016)

Michael Alan Chang, Brendan Tschaen, Theophilus Benson, Laurent Vanbever
Chaos Monkey: Increasing SDN Reliability through Systematic Network Destruction
ACM SIGCOMM'15. London, UK (August 2015)

Arpit Gupta, Laurent Vanbever, Muhammad Shahbaz, Sean Donovan, Brandon Schlinker, Nick Feamster,
Jennifer Rexford, Scott Shenker, Russ Clark, Ethan Katz-Bassett
SDX: A Software Defined Internet Exchange
ACM SIGCOMM'14. Chicago, IL, USA (August 2014)

Technical reports

Maria Apostolaki, Gian Marti, Jan Müller, **Laurent Vanbever**
SABRE: Protecting Bitcoin against Routing Attacks
eprint arXiv:1808.06254 (Aug 2018)

Ahmed El-Hassany, Petar Tsankov, **Laurent Vanbever**, Martin Vechev
Network-wide Configuration Synthesis
eprint arXiv:1611.02537 (Nov 2016)

Maria Apostolaki, Aviv Zohar, **Laurent Vanbever**
Hijacking Bitcoin: Large-scale Network Attacks on Cryptocurrencies
eprint arXiv:1605.07524 (May 2016)

Michael Alan Chang, Thomas Holterbach, Markus Happe, **Laurent Vanbever**
Supercharge me: Boost Router Convergence with SDN
eprint arXiv:1505.06630 (May 2015)

Karla Saur, Joseph Collard, Nate Foster, Arjun Guha, **Laurent Vanbever**, Michael Hicks
Morpheus: Safe and Flexible Dynamic Updates for SDNs
University of Maryland (March 2015)

Yixin Sun, Anne Edmundson, **Laurent Vanbever**, Oscar Li, Jennifer Rexford, Mung Chiang, Prateek Mittal
RAPTOR: Routing Attacks on Privacy in Tor
eprint arXiv:1503.03940 (March 2015)

Arpit Gupta, Muhammad Shahbaz, **Laurent Vanbever**, Hyojoon Kim, Russ Clark,
Nick Feamster, Jennifer Rexford, Scott Shenker
SDX: A Software Defined Internet Exchange
Georgia Institute of Technology, GT-CS-13-06 (November 2013)

Stefano Vissicchio, **Laurent Vanbever**, Luca Cittadini, Geoffrey Xie, Olivier Bonaventure
Safe Updates of Hybrid SDN Networks
University of Louvain, TR-134360 (October 2013)

Xin Jin, Li Erran Li, **Laurent Vanbever**, Jennifer Rexford
SoftCell: Taking Control of Cellular Core Networks
Princeton University, TR-950-13 (May 2013)

Marco Chiesa, Luca Cittadini, Giuseppe Di Battista, **Laurent Vanbever**, Stefano Vissicchio
Computing with BGP: from Routing Configurations to Turing Machines
University of Louvain, TR-113003 (August 2012)

Olivier Bonaventure, Simon van der Linden, **Laurent Vanbever**
Towards a Modular Architecture for Future Internet Control Plane Protocols
University of Louvain, 2010

Patents

Michael Alan Chang, Thomas Holterbach, Laurent Vanbever

Speeding up the convergence of network devices using low-cost SDN switches

U.S. patent, Provisional Application 62/165,362 (May 2015)

Presentations and invited talks

Network monitoring in the age of "deep" network programmability

Keynote   Network Traffic Measurement and Analysis Conference (TMA), Paris (June 2019)

Self-Securing Networks

Industry   Armasuisse, Thun, Switzerland (June 2019)

Network Control Planes: What? How? Where?

Academia   Dagstuhl Seminar, Germany (April 2019)

Industry   Google Networking Summit, CA, California (March 2019)

Provably-Correct Network Operations

Industry   ETH Zürich Industry Day (September 2018)

NetComplete: Practical Network-Wide Configuration Synthesis with Autocompletion

Academia   Department of Computer Sciences, ETH Zürich (April 2018)

                   Princeton University (September 2018)

                   USENIX NSDI (April 2018)

Programming networks. Not your standard API.

Academia   NII Shonan Meeting (February 2018)

Improving network security through programmability

Industry   Armasuisse, Thun, Switzerland (August 2017)

Hijacking Bitcoin: Routing Attacks on Cryptocurrencies

Academia   Summer Research Institute 2017, EPFL, Lausanne, Switzerland (June 2017)

                   Dagstuhl Seminar, Germany (June 2018)

Industry   IBM Research, Zürich, Switzerland (May 2017)

Network programmability. A primer on routing synthesis

Academia   Dagstuhl Seminar, Germany (January 2017)

SWIFT: Predictive Fast Reroute upon Remote BGP Disruptions

Academia   Munich Internet Research Retreat, Germany (November 2016)

Improving the Internet. From Fragility to Resilience

Academia   World Web Forum, Zürich, Switzerland (January 2017)

                   ETH Zürich, Switzerland (December 2015)

The Future of the Internet

General   ETH Zürich, "Zürich meets London", London, UK (May 2016)

Boosting existing networks with Software-Defined Networking

Industry   ABB corporate research center, Baden-Dättwil, Switzerland (July 2016)

                Open Cloud Day 2016, Winterthur, Switzerland (June 2016)

                SWITCH, Zürich, Switzerland (November 2015)

                Swisscom AG, Ittigen, Switzerland (May 2015)

Academia   École polytechnique fédérale de Lausanne (EPFL), Switzerland (June 2016)

                Hebrew University, Jerusalem (June 2015)

                ETH Zürich, Switzerland (April 2015)

SIGCOMM preview session: SDN track

Academia   ACM SIGCOMM 2015, London, UK (August 2015)

SDN Research Directions: Promising problems to invest time on

Academia   Summer School on Software-Defined Networks (SDNschool 2015), Greece (July 2015)

Anonymity on QuickSand: Using BGP to Compromise Tor

Conference   ACM HotNets 2014 Workshop. Los Angeles, CA, USA (October 2014)

Academia   Columbia University, New York City, NY, USA (May 2015)

Making the Internet more scalable and manageable

Academia   ETH Zürich, Switzerland (June 2014)

Enabling SDN in old school networks with Software-Controlled Routing Protocols

Industry   Open Network Summit, Santa Clara, CA, USA (March 2014)

On integrating Software-Defined Networking within existing routing systems

Industry   Applied Communication Sciences (ACS), NJ, USA (August 2014)

                Facebook Inc., Menlo Park, CA, USA (November 2013)

                Google Inc., Mountain View, CA, USA (November 2013)

Academia   Stanford University, Stanford, CA, USA (November 2013)

                UC Berkeley, Berkeley, CA, USA (November 2013)

Novel Applications for an SDN-Enabled Internet Exchange Point

Industry   AT&T/ON.Lab/Intel SDN retreat, Stanford University, Stanford, CA (October 2014)

                Workshop on Prototyping and Deploying Experimental SDX, Washington DC, (June 2014)

                RIPE 67, Plenary Session, Athens, Greece (October 2013)

                Software Defined Networking Research Group, IETF 87, Berlin, Germany (July 2013)

Academia   Fed4FIRE/GENI Research Experiment Summit, FGRE 2014, Ghent, Belgium (July 2014)

HotSwap: Correct and Efficient Controller Upgrades for Software-Defined Networks

Conference   ACM SIGCOMM HotSDN 2013 Workshop (August 2013)

CellSDN: Taking control of cellular core networks

Industry   IBM Thomas J Watson Rearch Center, NY, USA (April 2013)

Improving Network Agility with Seamless BGP Reconfigurations

Industry   IRTF Open Meeting, IETF, Berlin, Germany (July 2013)
                  AT&T Labs Research, Florham Park, NJ, USA (March 2012)
Academia   Princeton University, Princeton, NJ, USA (March 2012)

iBGP Deceptions: More Sessions, Fewer Routes

Conference   IEEE INFOCOM 2012, Orlando, FL, USA (March 2012)

Seamless Network-Wide (IGP) Migrations

Conference   ACM SIGCOMM 2011, Toronto, ON, Canada (August 2011)
Industry   Network Automation, Upperside conferences, Paris, France (November 2011)
                  Internet Initiative Japan, Tokyo, Japan (February 2011)
Academia   Roma Tre University, Rome, Italy (May 2011)

Customized BGP Route Selection Using BGP/MPLS VPNs

Industry   Internet Initiative Japan, Tokyo, Japan (February 2010)
                  Routing Symposium, Cisco Systems, San Jose, CA, USA (October 2009)

A Hierarchical Model for BGP Routing Policies

Conference   ACM SIGCOMM PRESTO Workshop, Barcelona, Spain (August 2009)

Unleashing Network Testing and Troubleshooting

Academia   Trilogy Summer School, Louvain-la-Neuve, Belgium (August 2009)

Towards Validated Network Configurations with NCGuard

Conference   Internet Network Management Workshop, Orlando, FL, USA (October 2008)
                  Workshop on Data Networks as Formal Objects, Adelaide, Australia (February 2010)