Georgios Smaragdakis

https://gsmaragd.github.io/
g.smaragdakis@tudelft.nl

Research Interests

I develop data- and measurement-driven methods to study and improve Internet security, architecture, and performance, and enhance Web privacy and security.

Appointments

Delft University of Technology (TU Delft), Netherlands
Full Professor, Chair, and Section Head of Cybersecurity (CYS); Computer Science — July 2021 - present
Scientific Coordinator of AI for Peace, Justice, and Security initiative,
Department of Intelligent Systems, Faculty of Electrical Engineering, Mathematics, and Computer Science.
Research on Data-driven Cybersecurity: Internet Security, Internet Measurement, Web Privacy, Detection and Mitigation of Cyberattacks, Cyber Threats, Big Data Analytics, Content Delivery.

Max Planck Institute for Informatics (MPI-INF), Germany
Associated Researcher — December 2019 - present
Research on Internet Analytics.

Berlin Institute for the Foundations of Learning and Data (BIFOLD), Germany
Principal Investigator and Fellow — February 2017 - present
Research on Big Data Analytics for the Internet, the Web, and Cybersecurity.

Technical University of Berlin (TU Berlin), Germany
Professor and Chair, Internet Measurement and Analysis (IMA), Computer Science — Feb. 2017 - June 2021
Research in the areas of Internet Measurement, Internet Security, Internet Routing, Internet Traffic Management, Content Distribution, Internet Policy, Web Analytics, Web Privacy.
Acting Chair, Internet Network Architectures (INET) group — August 2019 - April 2021

Akamai Technologies, Cambridge, MA, USA
Research Collaborator, Custom Analytics group — August 2014 - June 2021
I collaborated with a group of researchers, interns, and engineers of Akamai to assess the state and health of the Internet by developing novel data analytics methods to process and extract knowledge from massive CDN server logs.

Massachusetts Institute of Technology (MIT), USA
Research Affiliate, Computer Science and Artificial Intelligence Laboratory — August 2017 - August 2018
Research Affiliate, MIT Internet Policy Research Initiative — October 2015 - August 2018
Marie Curie Fellow, Computer Science and Artificial Intelligence Laboratory — August 2014 - August 2017
I worked with an interdisciplinary team on measurement-driven Internet policymaking.

Deutsche Telekom Laboratories (T-Labs), Berlin, Germany
Senior Researcher, Strategic Research group — October 2008 - July 2014
(also Senior Researcher with the INET group at TU Berlin) *I helped in shaping Deustche Telekom's strategy in the area of Content Delivery Networks and co-founding a Deutsche Telekom spinoff (BENOCS GmbH) in the area of ISP-CDN Collaboration and Internet Analytics.*

Telefónica Research, Barcelona, Spain
Research Intern, Internet Systems and Networking group — January-May 2008
I worked on bulk data transfers and was one of the first team members that designed the Telefonica CDN.

Education

Ph.D. in Computer Science, **Boston University**, USA 2003-2008 (awarded Jan. 2009)
Dissertation Title: *"Overlay Network Creation and Maintenance with Selfish Users"*
Dissertation Committee: Azer Bestavros, Nikolaos Laoutaris, and John W. Byers.

Diploma in Computer Engineering, **Technical University of Crete**, Greece October 2002
Thesis Title: *"TCP Performance over the UMTS Network".*
Advisor: Michael Paterakis

University Teaching Qualification (DEVELOP Certificate), **TU Delft**, Netherlands July 2022

Honors and Awards

- 2022: **ACM Distinguished Member** "For Outstanding Scientific Contributions to Computing"
- 2022: **IETF/IRTF Applied Networking Research Prize** for [10]
- 2021: **Best paper award at ACM SIGCOMM** for [11]
- 2021: **Communications of the ACM Research Highlights** [12]
- 2021: **IEEE Senior Member**
- 2020: **ACM Senior Member**
- 2020: **IETF/IRTF Applied Networking Research Prize** for [27]
- 2019: **Best of ACM SIGCOMM Computer Communication Review (CCR)** for [31]
- 2019: **IETF/IRTF Applied Networking Research Prize** for [34]
- 2019: **Best paper award at ACM CoNEXT** for [27]
- 2018: **Best paper award at ACM Internet Measurement Conference (IMC)** for [33]
- 2017: **Best paper award at IEEE INFOCOM** for [38]
- 2016: **Best paper award at ACM Internet Measurement Conference (IMC)** for [41]
- 2015: **Best paper award at ACM CoNEXT** for [43]
- 2015: **European Research Council (ERC) Starting Grant Award**
- 2013: **Marie Curie International Outgoing Fellowship**
- 2011: **Best paper award at ACM Internet Measurement Conference (IMC)** for [63]
- 2006 and 2007: Honorable Mention Award from the Center for Information and Systems Engineering. **Boston University Science and Engineering Research Symposium**.
- 2006 and 2007: 2^{nd} place Research Award. **Boston University Computer Science Research Day**.
- 2003: 1^{st} **ERICSSON Award of Excellence in Telecommunications** for Best Diploma thesis.
- 1998-2001: Annual academic excellence awards from **Technical Chamber of Greece (TEE)**, **Greek State Fellowships Foundation (IKY)**, **Greek Ministry of Labor and Social Affairs**, **Paidia Foundation**.

Memberships

- Association for Computing Machinery (ACM)
- ACM Special Interest Group on Data Communications (SIGCOMM)
- ACM Special Interest Group on Security, Audit and Control (SIGSAC)
- ACM Special Interest Group on Hypertext and the Web (SIGWEB)
- ACM Special Interest Group on Knowledge Discovery and Data Mining (SIGKDD)
- Electronic Frontier Foundation (EFF)
- Internet Society (ISOC)
- Institute of Electrical and Electronics Engineers (IEEE)
- USENIX Association
- ACademic Cyber Security Society (ACCSS), the Netherlands.

Research Summary

Detection and Mitigation of Cyberattacks: We investigate and analyze cyber threats towards understanding the cybercrime economy [3] and mitigating cyberattacks [1]. We also develop algorithms and techniques to detect and analyze critical Internet infrastructure failures [36, 18] and the Internet's behavior under stress [12, 22, 6] towards understanding and mitigating evolving threats in an increasingly complex Internet ecosystem. We also infer attack mitigation strategies by Internet stakeholders [37] and efficiently mitigate Tbps-level attacks [10, 32]. In the process, we uncover vulnerabilities in the global routing system [34, 23, 14], investigate the propagation of software updates in end-user devices such as smartphones [20], and study security issues of deployed routers [13] and programmable networks [4, 16].

Online User Privacy: We perform a large-scale study to assess the compliance of ad and tracking services with the recently implemented European Union General Data Protection Regulation (GDPR), concerning the physical location of the servers and the sensitive topics that they track [33]. We also develop classifiers to identify sensitive Websites in the Web [19] and perform a large-scale study to assess what extent persistent cookies and trackers are present in governmental, international organizations, and COVID-19 information websites [8]. We also develop secure Federated Learning methods fot robust classification of GDPR-related sensitive and general topics [2]. In a parallel effort, we investigate privacy and security vulnerabilities of Internet of Things (IoT) [7, 21] and IPv6 [9].

Internet Sustainability: We perform a data-driven analysis and system design towards a more sustainable Internet in light of the ever-increasing traffic demand and competitiveness in the Internet ecosystem. We also develop and evaluate algorithms for incremental and sustainable upgrades of ISP networks [30, 38] and datacenters [17], and innovative utilization of in-network storage [40], as well as a multi-discipline analysis of the forces that shape Internet content delivery [11, 15, 39] and the Network Neutrality debate [26]. (see also: `http://www.smaragdakis.net/research/ResolutioNet`).

Internet and Content Delivery Analytics: We develop novel and scalable techniques to assess the state [41] and health of the Internet and to improve content delivery in a rapidly changing Internet [49, 46, 42]. We push the envelope in Internet measurement by relying on and analyzing massive datasets collected at both public and private vantage points [47, 50, 51, 52, 49, 24, 35] and introduce new techniques to map peering interconnections to the level of a single building [43]. We also exploit the distributed platform

of a large content delivery network, composed of thousands of servers around the globe, to assess the performance characteristics of the Internet's core [44]. We investigate the cost-performance tradeoffs the different interconnection service offerings that are available to networks in today's Internet in one and the same colocation facility would go a long way towards putting this debate on scientifically solid foundations [42, 45]. In the process, we designed a fully decentralized, open-source analytics system for network traffic data that relies on smart partitioning storage schemes to support fast join algorithms and efficient execution of filtering queries [48] and we develop techniques for geo-distributed analytics [5]. We report on the IPv4 active address space evolution during the last eight years and we provide new insights on the activity patterns at different time granularities for individual IPs that have the potential to have significant implications on Internet governance, measurement practice, network management and security, and content delivery alike [41]. We also summarize our experience and best practices for reproducibility [31]. (see also: http://www.smaragdakis.net/research/CDN-H)

ISP-CDN Collaboration: We develop and operate systems [27] to enable the collaboration between ISPs and CDNs. We design and evaluate a service provided by an ISP, called *PaDIS*, to improve end-users experience based on the network information and end-user location available to an ISP, as well as server and path diversity information gathered by an ISP [67, 66]. We also introduce *Content-aware Traffic Engineering* (CaTE) which dynamically adapts server selection for CDNized content by utilizing server and path diversity and without changing routing [62, 61]. Moreover, we show how to enable CDN and ISP collaboration, with our *NetPaaS* prototype, in light of recent CDN-ISP alliances and advances in network function virtualization. Our results show that CDN-ISP Collaboration leads to a win-win situation for both parties and improves end-user experience [46, 59, 56, 60] and has the potential to reduce energy consumption [69]. (see also: http://www.smaragdakis.net/research/Collaboration)

Content Cartography and DNS: We propose a lightweight and fully automated approach to discover hosting infrastructures based only on DNS measurements and BGP routing table snapshots [63]. Our classification enables us to derive content-centric AS rankings that complement existing AS rankings and sheds light on recent observations about shifts in interdomain traffic and the AS topology. We also show that recent DNS extensions unveil operational practices of their adopters and we develop an automated system to perform network and caching analytics based on collected measurements [55]. In a parallel effort we undertake a large scale study to assess DNS performance in the wild and we highlight the implications of DNS deployment to end-users, ISPs and applications [68]. We also show that a significant part of Internet traffic is back-office traffic to support the ever-increasing complexity of Web applications [51] and that traceroutes can be a proxy for network traffic estimation [52]. (see also: http://www.smaragdakis.net/research/Cartography)

IXP Data Analysis: Large Internet Exchange Points (IXPs) are responsible for exchanging tens of Petabytes of data daily but unfortunately have received very little attention from the research community. We have established a pioneer research project to assess the importance of IXPs for today's Internet ecosystem [58, 49]. Our measurement results show that large IXPs are unique vantage points to get an excellent visibility of the global Internet, observe trends in content delivery [54] and application mix [47]. We also shed light on the usage and operation of route servers at IXPs [50]. (see also: http://www.smaragdakis.net/research/IXP)

Bulk Transfers on the Internet: We design and evaluate scheduling algorithms, some assisted by network-attached storage, to transfer delay tolerant bulk data over the Internet with the most cost effective way [57, 71]. Moreover, we investigate the effect of in-node storage on end-to-end delay [64]. We also investigate the performance trade-offs between sending data to a central location for processing and in-situ data processing [25, 28, 29]. In an earlier study we evaluated the robustness of memory-reduced routers in the presence of aggressive high speed transport protocols for bulk data transfers [83]. (see also:

http://hermes.tid.es)

Selfish Neighbor Selection: We re-examine the problem of overlay network creation, taking into consideration the existence of selfish overlay nodes. We develop a general game-theoretic framework that provides a unified approach to modeling neighbor selection procedures on behalf of selfish nodes [65, 76]. To capitalize on the substantial performance improvement of best response wirings for overlay nodes, we design, deploy and evaluate, EGOIST, a selfish neighbor selection inspired prototype [73]. We also show the benefits selfish neighbor selection may offers to applications, e.g. swarming applications [70, 74]. (see also: http://www.smaragdakis.net/research/SNS).

Distributed Facility Location: We design and evaluate distributed algorithms for scalable and efficient service deployment and migration offered by network, application and cloud providers [53, 77]. This project was a collaboration with Telefonica Research and University of Athens. (2006-2013, see also: http://www.smaragdakis.net/research/DFL).

Distributed Selfish Caching: We studied resource allocation and sharing issues where the exposed resource is the storage of each (selfish) node, and the nodes cooperate using on-line caching algorithms. We identified the causes and implications of mistreatment in distributed caching groups [78, 80], and we designed a novel framework to mitigating mistreatment in such groups [79, 81].
(see also: http://www.smaragdakis.net/research/DSC).

A Stable Election Protocol for clustered heterogeneous wireless sensor networks: We designed and evaluated distributed leader election protocols to prolong the lifetime of heterogeneous wireless networks [84]. (see also: http://www.smaragdakis.net/research/SEP)

A Large Deviations approach to Statistical Traffic Anomaly Detection: We developed a Large Deviations framework to rigorously identify, in real-time, Network Anomalies by assessing deviations of empirical measures in computer networks [72, 82].

List of Publications

Bibliometrics: 5,800 citations, h-index: 38, i10-index: 62
Online copies of publications: https://gsmaragd.github.io/publications.html

[1] Kris Oosthoek, Jack Cable, and Georgios Smaragdakis. A Tale of Two Markets: Investigating the Ransomware Payments Economy. *Communications of the ACM*, 2023 [to appear].

[2] Tianyue Chu, Alvaro Garcia-Recuero, Costas Iordanou, Georgios Smaragdakis, and Nikolaos Laoutaris. Securing Federated Sensitive Topic Classification against Poisoning Attacks. In *Network and Distributed System Security (NDSS) Symposium 2023*, San Diego, USA, February 2023.

[3] Kris Oosthoek, Mark van Staalduinen, and Georgios Smaragdakis. Quantifying Dark Web Shops' Illicit Revenue. *IEEE Access*, 2023 [to appear].

[4] Apoorv Shukla, Kevin Hudemann, Zsolt Vági, Lily Hügerich, Georgios Smaragdakis, Artur Hecker, Stefan Schmid, and Anja Feldmann. Runtime Verification for Programmable Switches. *IEEE/ACM Transactions on Networking*, 2023 [to appear].

[5] Habib Mostafaei, Georgios Smaragdakis, Thomas Zinner, and Anja Feldmann. Delay-Resistant Geo-Distributed Analytics. *IEEE Transactions on Network and Service Management*, 2023 [to appear].

[6] Volker Stocker, William Lehr, and Georgios Smaragdakis. COVID-19 and the Internet: Lessons Learned. *Beyond the Pandemic?: Exploring the Impact of COVID-19 on Telecommunications and the Internet*, pages 17–69, 2023 [to appear].

[7] Said Jawad Saidi, Srdjan Matic, Oliver Gasser, Georgios Smaragdakis, and Anja Feldmann. Deep Dive into the IoT Backend Ecosystem. In *Proceedings of ACM Internet Measurement Conference (IMC) 2022*, Nice, France, October 2022.

[8] Matthias Götze, Srdjan Matic, Costas Iordanou, Georgios Smaragdakis, and Nikolaos Laoutaris. Measuring Web Cookies in Governmental Websites. In *Proceedings of ACM Web Science Conference (WebSci) 2022*, Barcelona, Spain, June 2022.

[9] Said Jawad Saidi, Oliver Gasser, and Georgios Smaragdakis. One Bad Apple Can Spoil Your IPv6 Privacy. *ACM SIGCOMM Computer Communication Review*, 52(2), April 2022.

[10] Daniel Wagner, Daniel Kopp, Matthias Wichtlhuber, Christoph Dietzel, Oliver Hohlfeld, Georgios Smaragdakis, and Anja Feldmann. United We Stand: Collaborative Detection and Mitigation of Amplification DDoS Attacks at Scale. In *Proceedings of ACM Conference on Computer and Communications Security (CCS) 2021*, Virtual Event, November 2021. 🏆 **[IETF/IRTF Applied Networking Research Prize 2022]**.

[11] Petros Gigis, Matt Calder, Lefteris Manassakis, George Nomikos, Vasileios Kotronis, Xenofontas Dimitropoulos, Ethan Katz-Bassett, and Georgios Smaragdakis. Seven Years in the Life of Hypergiants' Off-Nets. In *Proceedings of ACM SIGCOMM 2021*, Virtual Event, August 2021. 🏆 **[Best paper award]**.

[12] Anja Feldmann, Oliver Gasser, Franziska Lichtblau, Enric Pujol, Ingmar Poese, Christoph Dietzel, Daniel Wagner, Matthias Wichtlhuber, Juan Tapiador, Narseo Vallina-Rodriguez, Oliver Hohlfeld, and Georgios Smaragdakis. A Year in Lockdown: How the Waves of COVID-19 Impact Internet Traffic. *Communications of the ACM*, 64:101–108, July 2021. **[CACM Research Highlights]**.

[13] Taha Albakour, Oliver Gasser, Robert Beverly, and Georgios Smaragdakis. Third Time's Not a Charm: Exploiting SNMPv3 for Router Fingerprinting. In *Proceedings of ACM Internet Measurement Conference (IMC) 2021*, Virtual Event, November 2021.

[14] Thomas Krenc, Robert Beverly, and Georgios Smaragdakis. AS-Level BGP Community Usage Classification. In *Proceedings of ACM Internet Measurement Conference (IMC) 2021*, Virtual Event, November 2021.

[15] Thomas Koch, Weifan Jiang, Tao Luo, Petros Gigis, Yunfan Zhang, Kevin Vermeulen, Emile Aben, Matt Calder, Ethan Katz-Bassett, Lefteris Manassakis, Georgios Smaragdakis, and Narseo Vallina-Rodriguez. Towards an Internet Traffic Map: Connecting the dots between popular services and users. In *Proceedings of ACM HotNets 2021*, Virtual Event, November 2021.

[16] Apoorv Shukla, Kevin Hudemann, Zsolt Vági, Lily Hügerich, Georgios Smaragdakis, Artur Hecker, Stefan Schmid, and Anja Feldmann. Fix with P6: Verifying Programmable Switches at Runtime. In *Proceedings of IEEE INFOCOM 2021*, Virtual Event, May 2021.

[17] Lily Hügerich, Apoorv Shukla, and Georgios Smaragdakis. No-hop: In-network Distributed Hash Tables. In *Proceedings of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS) 2021*, Virtual Event, December 2021.

[18] Leonard Becker, Oliver Hohlfeld, and Georgios Smaragdakis. Large Scale Outage Visibility on the Control Plane". In *Proceedings of ACM CoNEXT 2021 Student Workshop*, Virtual Event, December 2021.

[19] Srdjan Matic, Costas Iordanou, Georgios Smaragdakis, and Nikolaos Laoutaris. Identifying Sensitive URLs at Web-Scale. In *Proceedings of ACM Internet Measurement Conference (IMC) 2020*, Virtual Event, October 2020.

[20] John P. Rula, Philipp Richter, Georgios Smaragdakis, and Arthur Berger. Who's left behind? Measuring Adoption of Application Updates at Scale. In *Proceedings of ACM Internet Measurement Conference (IMC) 2020*, Virtual Event, October 2020.

[21] Said Jawad Saidi, Anna Maria Mandalari, Roman Kolcun, Hamed Haddadi, Daniel J. Dubois, David Choffnes, Georgios Smaragdakis, and Anja Feldmann. A Haystack Full of Needles: Scalable Detection of IoT Devices in the Wild. In *Proceedings of ACM Internet Measurement Conference (IMC) 2020*, Virtual Event, October 2020.

[22] Anja Feldmann, Oliver Gasser, Franziska Lichtblau, Enric Pujol, Ingmar Poese, Christoph Dietzel, Daniel Wagner, Matthias Wichtlhuber, Juan Tapiador, Narseo Vallina-Rodriguez, Oliver Hohlfeld, and Georgios Smaragdakis. The Lockdown Effect: Implications of the COVID-19 Pandemic on Internet Traffic. In *Proceedings of ACM Internet Measurement Conference (IMC) 2020*, Virtual Event, October 2020.

[23] Thomas Krenc, Robert Beverly, and Georgios Smaragdakis. Keep your Communities Clean: Exploring the Routing Message Impact of BGP Communities. In *Proceedings of ACM CoNEXT 2020*, Virtual Event, December 2020.

[24] Said Jawad Saidi, Aniss Maghsoudlou, Damien Foucard, Georgios Smaragdakis, Ingmar Poese, and Anja Feldmann. Exploring Network-Wide Flow Data with Flowyager. *IEEE Transactions on Network and Service Management (Special issue on Data Analytics and Machine Learning for Network and Service Management)*, 17(4):1988–2006, 2020.

[25] Niklas Semmler, Matthias Rost, Georgios Smaragdakis, and Anja Feldmann. Edge Replication Strategies for Wide-Area Distributed Processing. In *Proceedings of ACM EdgeSys 2020*, Virtual Event, April 2020.

[26] Volker Stocker, Georgios Smaragdakis, and William Lehr. The State of Network Neutrality Regulation. *ACM SIGCOMM Computer Communication Review*, 50(1):45–59, January 2020.

[27] Enric Pujol, Ingmar Poese, Johannes Zerwas, Georgios Smaragdakis, and Anja Feldmann. Steering Hyper-Giants' Traffic at Scale. In *Proceedings of ACM CoNEXT 2019*, Orlando, Florida, December 2019. 🏆🏆 [**Best paper award and IETF/IRTF Applied Networking Research Prize 2020**].

[28] Niklas Semmler, Georgios Smaragdakis, and Anja Feldmann. Online Replication Strategies for Distributed Data Stores. In *Proceedings of Very Large Internet of Things (VLIoT 2019), in conjunction with VLDB 2019*, Los Angeles, California, August 2019.

[29] Niklas Semmler, Georgios Smaragdakis, and Anja Feldmann. Distributed Mega-Datasets: The Need for Novel Computing Primitives. In *Proceedings of IEEE ICDCS 2019 (vision paper)*, Dallas, Texas, July 2019.

[30] Konstantinos Poularakis, George Iosifidis, Georgios Smaragdakis, and Leandros Tassiulas. Optimizing Gradual SDN Upgrades in ISP Networks. *IEEE/ACM Transactions on Networking*, 27(1):288–301, February 2019. [**Invited from IEEE INFOCOM 2017**].

[31] Vaibhav Bajpai, Anna Brunstrom, Anja Feldmann, Wolfgang Kellerer, Aiko Pras, Georgios Smaragdakis Henning Schulzrinne, Matthias Wahlisch, and Klaus Wehrle. The Dagstuhl Beginners Guide to Reproducibility for Experimental Networking Research. *ACM SIGCOMM Computer Communication Review*, 49(1):24–30, January 2019. 🏆 **[Best of CCR in 2019]**.

[32] Christoph Dietzel, Matthias Wichtlhuber, Georgios Smaragdakis, and Anja Feldmann. Stellar: Network Attack Mitigation using Advanced Blackholing. In *Proceedings of ACM CoNEXT 2018*, Heraklion, Greece, December 2018.

[33] Costas Iordanou, Georgios Smaragdakis, Ingmar Poese, and Nikolaos Laoutaris. Tracing Cross Border Web Tracking. In *Proceedings of ACM Internet Measurement Conference (IMC) 2018*, Boston, MA, October 2018. 🏆 **[Distinguished paper award]**.

[34] Florian Streibelt, Franziska Lichtblau, Robert Beverly, Anja Feldmann, Cristel Pelsser, Georgios Smaragdakis, and Randy Bush. BGP Communities: Even more Worms in the Routing Can. In *Proceedings of ACM Internet Measurement Conference (IMC) 2018*, Boston, MA, October 2018. 🏆 **[IETF/IRTF Applied Networking Research Prize 2019]**.

[35] Said Jawad Saidi, Damien Foucard, Georgios Smaragdakis, and Anja Feldmann. Flowtree: Enabling Distributed Flow Summarization at Scale. In *Proceedings of ACM SIGCOMM 2018, Poster Session*, Budapest, Hungary, August 2018.

[36] Vasileios Giotsas, Christoph Dietzel, Georgios Smaragdakis, Anja Feldmann, Arthur Berger, and Emile Aben. Detecting Peering Infrastructure Outages in the Wild. In *Proceedings of ACM SIGCOMM 2017*, Los Angeles, CA, August 2017.

[37] Vasileios Giotsas, Georgios Smaragdakis, Christoph Dietzel, Philipp Richter, Anja Feldmann, and Arthur Berger. Inferring BGP Blackholing Activity in the Internet. In *Proceedings of ACM Internet Measurement Conference (IMC) 2017*, London, UK, November 2017.

[38] Konstantinos Poularakis, George Iosifidis, Georgios Smaragdakis, and Leandros Tassiulas. One Step at a Time: Optimizing SDN Upgrades in ISP Networks. In *Proceedings of IEEE INFOCOM 2017*, Atlanta, GA, May 2017. 🏆 **[Best paper award, Fast-track to IEEE/ACM Transactions on Networking]**.

[39] Volker Stocker, Georgios Smaragdakis, William Lehr, and Steven Bauer. The Growing Complexity of Content Delivery Networks: Challenges and Implications for the Internet Ecosystem. *Telecommunications Policy Journal*, 41(10):1003–1016, November 2017.

[40] George Iosifidis, Iordanis Koutsopoulos, and Georgios Smaragdakis. Distributed Storage Control Algorithms for Dynamic Networks. *IEEE/ACM Transactions on Networking*, 25(3):1359–1372, June 2017.

[41] Philipp Richter, Georgios Smaragdakis, David Plonka, and Arthur Berger. Beyond Counting: New Perspectives on the Active IPv4 Address Space. In *Proceedings of ACM Internet Measurement Conference (IMC) 2016*, Santa Monica, CA, November 2016. 🏆 **[Best paper award]**.

[42] Volker Stocker, Georgios Smaragdakis, William Lehr, and Steven Bauer. Content may be King, but (Peering) Location matters: A Progress Report on the Evolution of Content Delivery in the Internet. In *Proceedings of ITS 2016*, Cambridge, UK, September 2016.

[43] Vasileios Giotsas, Georgios Smaragdakis, Bradley Huffaker, Matthew Luckie, and kc claffy. Mapping Peering Interconnections at the Facility Level. In *Proceedings of ACM CoNEXT 2015*, Heidelberg, Germany, December 2015. 🏆 **[Best paper award]**.

[44] Balakrishnan Chandrasekaran, Georgios Smaragdakis, Arthur Berger, Matthew Luckie, and Keung-Chi Ng. A Server-to-Server View of the Internet. In *Proceedings of ACM CoNEXT 2015*, Heidelberg, Germany, December 2015.

[45] Walter Willinger, Anja Feldmann, Philipp Richter, Georgios Smaragdakis, and Fabian Bustamante. Express or Local Lanes: On Assessing QoE over Private vs. Public Peering Links. In *NSF/FCC Workshop on Tracking Quality of Experience in the Internet*, Princeton, NJ, October 2015. [**Invited paper**].

[46] Radu Stoenescu, Matei Popovici, Vladimir Olteanu, Joao Martins, Roberto Bifulco, Felipe Huici, Mohamed Ahmed, Georgios Smaragdakis, Mark Handley, and Costin Raiciu. In-NET: Enabling In-Network Processing for the Masses. In *Proceedings of ACM EuroSys 2015*, Bordeaux, France, April 2015.

[47] Philipp Richter, Nikolaos Chatzis, Georgios Smaragdakis, Anja Feldmann, and Walter Willinger. Distilling the Internet's Application Mix from Packet-Sampled Traffic. In *Proceedings of PAM 2015*, New York, NY, March 2015.

[48] Dimitrios Sarlis, Nikolaos Papailiou, Ioannis Konstantinou, Georgios Smaragdakis, and Nectarios Koziris. Datix: A System for Scalable Network Analytics. *ACM SIGCOMM Computer Communication Review*, 45(5), October 2015.

[49] Nikolaos Chatzis, Georgios Smaragdakis, Anja Feldmann, and Walter Willinger. Quo vadis Open-IX? Trying to boost public peering in the US. *ACM SIGCOMM Computer Communication Review*, 45(1), January 2015.

[50] Philipp Richter, Georgios Smaragdakis, Anja Feldmann, Nikolaos Chatzis, Jan Boettger, and Walter Willinger. Peering at Peerings: On the Role of IXP Route Servers. In *Proceedings of ACM Internet Measurement Conference (IMC) 2014*, Vancouver, Canada, November 2014.

[51] Enric Pujol, Philipp Richter, Balakrishnan Chandrasekaran, Georgios Smaragdakis, Anja Feldmann, Bruce Maggs, and K. C. Ng. Back-Office Web Traffic on The Internet. In *Proceedings of ACM Internet Measurement Conference (IMC) 2014*, Vancouver, Canada, November 2014.

[52] Mario Sanchez, Fabian Bustamante, Balachander Krishnamurthy, Walter Willinger, Georgios Smaragdakis, and Jeffrey Erman. Inter-Domain Traffic Estimation for the Outsider. In *Proceedings of ACM Internet Measurement Conference (IMC) 2014*, Vancouver, Canada, November 2014.

[53] Georgios Smaragdakis, Nikolaos Laoutaris, Konstantinos Oikonomou, Ioannis Stavrakakis, and Azer Bestavros. Distributed Server Migration for Scalable Internet Service Deployment. *IEEE/ACM Transactions on Networking*, 22(3):917–930, June 2014.

[54] Nikolaos Chatzis, Georgios Smaragdakis, Jan Boettger, Thomas Krenc, and Anja Feldmann. On the Benefits of Using a Large IXP as an Internet Vantage Point. In *Proceedings of ACM Internet Measurement Conference (IMC) 2013*, Barcelona, Spain, October 2013.

[55] Florian Streibelt, Jan Boettger, Nikolaos Chatzis, Georgios Smaragdakis, and Anja Feldmann. Exploring EDNS-Client-Subnet Adopters in your Free Time. In *Proceedings of ACM Internet Measurement Conference (IMC) 2013*, Barcelona, Spain, October 2013.

[56] Benjamin Frank, Ingmar Poese, Georgios Smaragdakis, Anja Feldmann, Steve Uhlig, Bruce Maggs, and Fabian Schneider. Collaboration Opportunities for Content Providers and Network Infrastructures. *ACM SIGCOMM ebook on Recent Advances in Networking*, 1(1):305–377, August 2013.

[57] Nikolaos Laoutaris, Georgios Smaragdakis, Rade Stanojevic, Pablo Rodriguez, and Ravi Sundaram. Delay Tolerant Bulk Data Transfers on the Internet. *IEEE/ACM Transactions on Networking*, 21(6):1852–1865, December 2013.

[58] Nikolaos Chatzis, Georgios Smaragdakis, Anja Feldmann, and Walter Willinger. There is More to IXPs than Meets the Eye. *ACM SIGCOMM Computer Communication Review*, 43(5):18–28, October 2013.

[59] Benjamin Frank, Ingmar Poese, Yin Lin, Georgios Smaragdakis, Anja Feldmann, Bruce Maggs, Jannis Rake, Steve Uhlig, and Rick Weber. Pushing CDN-ISP Collaboration to the Limit. *ACM SIGCOMM Computer Communication Review*, 43(3):34–44, July 2013.

[60] Ingmar Poese, Benjamin Frank, Simon Knight, Niklas Semmler, and Georgios Smaragdakis. PaDIS Emulator: An Emulator to Evaluate CDN-ISP Collaboration. In *Proceedings of ACM SIGCOMM 2012, Demo Session*, Helsinki, Finland, August 2012.

[61] Benjamin Frank, Ingmar Poese, Georgios Smaragdakis, Steve Uhlig, and Anja Feldmann. Content-aware Traffic Engineering. In *Proceedings of ACM SIGMETRICS 2012, Extended Abstract*, London, UK, June 2012.

[62] Ingmar Poese, Benjamin Frank, Georgios Smaragdakis, Steve Uhlig, Anja Feldmann, and Bruce Maggs. Enabling Content-aware Traffic Engineering. *ACM SIGCOMM Computer Communication Review*, 42(5):21–28, October 2012.

[63] Bernhard Ager, Wolfgang Mühlbauer, Georgios Smaragdakis, and Steve Uhlig. Web Content Cartography. In *Proceedings of ACM Internet Measurement Conference (IMC) 2011*, Berlin, Germany, November 2011. 🏆 [**Best paper award**].

[64] George Iosifidis, Iordanis Koutsopoulos, and Georgios Smaragdakis. The Impact of Storage Capacity on End-to-End Delay in Time Varying Networks. In *Proceedings of IEEE INFOCOM 2011*, Shanghai, China, April 2011.

[65] Georgios Smaragdakis, Nikolaos Laoutaris, Vassilis Lekakis, Azer Bestavros, John W. Byers, and Mema Roussopoulos. Selfish Overlay Network Creation and Maintenance. *IEEE/ACM Transactions on Networking*, 19(6):1624–1637, December 2011.

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[67] Ingmar Poese, Benjamin Frank, Bernhard Ager, Georgios Smaragdakis, and Anja Feldmann. Improving Content Delivery using Provider-aided Distance Information. In *Proceedings of ACM Internet Measurement Conference (IMC) 2010*, Melbourne, Australia, November 2010. [**Fast-track to IEEE Internet Computing**].

[68] Bernhard Ager, Wolfgang Mühlbauer, Georgios Smaragdakis, and Steve Uhlig. Comparing DNS Resolvers in the Wild. In *Proceedings of ACM Internet Measurement Conference (IMC) 2010*, Melbourne, Australia, November 2010.

[69] Anja Feldmann, Andreas Gladisch, Mario Kind, Christoph Lange, Georgios Smaragdakis, and Fritz-Joachim Westphal. Energy Trade-offs among Content Delivery Architectures. In *Proceedings of CTTE 2010*, Ghent, Belgium, June 2010.

[70] Georgios Smaragdakis, Nikolaos Laoutaris, Pietro Michiardi, Azer Bestavros, John W. Byers, and Mema Roussopoulos. Distributed Network Formation for n-way Broadcast Applications. *IEEE Transactions on Parallel and Distributed Systems*, 21(10):1427–1441, October 2010.

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[75] Georgios Smaragdakis. Overlay Network Creation and Maintenance with Selfish Users. *Ph.D Dissertation, Computer Science Department, Boston University*, September 2008.

[76] Nikolaos Laoutaris, Georgios Smaragdakis, Azer Bestavros, and John W. Byers. Implications of Selfish Neighbor Selection in Overlay Networks. In *Proceedings of IEEE INFOCOM 2007*, Anchorage, AK, May 2007.

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[81] Georgios Smaragdakis, Nikolaos Laoutaris, Ibrahim Matta, Azer Bestavros, and Ioannis Stavrakakis. A Feedback Control Approach to Mitigating Mistreatment in Distributed Caching Groups. In *Proceedings of IFIP Networking 2006*, Coimbra, Portugal, May 2006. [**Fast-track to Computer Networks journal**].

[82] Ioannis Ch. Paschalidis and Georgios Smaragdakis. A Large Deviations Approach to Statistical Traffic Anomaly Detection. In *Proceedings of IEEE CDC 2006*, San Diego, CA, December 2006.

[83] Dhiman Barman, Georgios Smaragdakis, and Ibrahim Matta. The Effect of Router Buffer Size on HighSpeed TCP Performance. In *Proceedings of IEEE Globecom 2004 - Global Internet and Next Generation Networks*, Dallas, TX, December 2004.

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[85] Georgios Smaragdakis. TCP Performance over UMTS Network. *Diploma Thesis, Electronic and Computer Engineering Department, Technical University of Crete*, October 2002.

List of Patents

Eight patents awarded; six transferred to Deutsche Telekom AG and one to Telefónica SA in chronological order; external link:

1. "Distributed and Timely Network Flow Summarization at Scale", A. Fedldmann, S. Saidi, G. Smaragdakis, and D. Foucard, (WO2019233567, US506520937, US20210211364A1)
2. *"Method and System for Controlling Data Communication within a Network", I. Poese, B. Frank, G. Smaragdakis, and A. Feldmann, (EP2385656, WO2011138033, CN102934396, US2013159509).
3. *"System and Method of Processing DNS Request and DNS Reply", I. Poese, B. Frank, G. Smaragdakis, and A. Feldmann, (EP2426894)
4. *"Collaboration Between an Internet Service Provider (ISP) and a Content Distribution System as well as Among Plural ISP", I. Poese, B. Frank, G. Smaragdakis, A. Feldmann, and S. Uhlig, (EP2495940, US2012226734)
5. *"Network Traffic Engineering", B. Frank, G. Smaragdakis, I. Poese, A. Feldmann, and S. Uhlig, (EP2512105, US2012314575)
6. "System for assigning an energy consumer to an energy provider", S. Schmid, A. Fedmann, and G. Smaragdakis, (EP2775446)
7. "System for Assigning a Goods Consumer to a Goods Provider", S. Schmid, A. Fedmann, and G. Smaragdakis, (EP2787471, WO2014161895, US2016034849)
8. "A Method for Transferring TByte Sized Delay Tolerant Bulk Data Using Unutilized but Already Paid for Capacity of Commercial Internet Service Providers", N. Laoutaris, P. P. Rodriguez, G. Smaragdakis, and R. Sundaram, (EP2315414, UY32962, AR078739).

*** Patents 2, 3, 4, and 5 used for the foundation of a Deutsche Telekom spin-off (BENOCS GmbH)**, for which I had an executive role from the initial idea to incubation to launching.

Research Funding

– *European Commission*: "SEPTON: SEcurity Protection TOols for Networked medical devices" (EU Horizon Europe grant agreement 101094901). Role: Co-Principal Investigator. Budget: €4,897,778; TU Delft Budget: €240,000. Duration: 2023-2026 (36 months).

– *European Commission*: "TANGO: Digital Technologies ActiNg as a Gatekeeper to information and data flOws" (EU Horizon Europe grant agreement 101070052). Role: Co-Principal Investigator. Budget: €10,999,984; TU Delft Budget: €717,000. Duration: 2022-2025 (36 months).

– *European Research Council (ERC)*: Starting Grant "ResolutioNet. Resolving the Tussle in the Internet: Mapping, Architecture, and Policy Making" (H2020-ERC-2015-StG-679158). Role: Sole Principal Investigator. Budget: €1,500,000. Duration: 2017-2023 (72 months).

– *German Federal Ministry of Education and Research (BMBF)* "Berlin Institute for the Foundations of Learning and Data (BIFOLD)" (1IS18025A and 01IS18037A). Role: Principal Investigator. Budget:
Phase II: €7,481,499, group's budget: €317,000, Duration: 2018-2022 (36 months).

– *Farsight Security, Inc.* "Research Grant". Role: Sole Principal Investigator. Contribution: $50,000. Duration: 2021-2022 (12 months).

– *TU Berlin Internal Stategic Funding.* Role: Sole Principal Investigator. Budget: €14,000. Duration: 2019-2020 (3 months).

– *European Commission - Marie Curie International Outgoing Fellowship for Career Development:* "CDN-H: Improving Performance and Cost of Content Delivery in a Hyperconnected World" (FP7-PEOPLE-2013-IOF-628441). Role: Sole Principal Investigator. Budget: €349,000. Duration: 2014-2017 (36 months). Hosts: David Clark (MIT) and Anja Feldmann (TUB).

– *European Commission*: "BigFoot: Big Data Analytics of Digital Footprints" (FP7-ICT-2011-8-317858). Role: Principal Investigator. Budget: €3,540,000; TUB Budget: €717,000. Duration: 2012-2015 (36 months). [🏆 **The project received the European Star Award**]

– *Germany-Greece Scholar Exchange Program Sponsored by DAAD and IKY (IKYDA):* "Optimal Management of Storage in Communication Networks and Cloud Systems". Role: Principal Investigator. Budget: €10,000. Duration: 2012-2013 (24 months).

– *Telekom Innovation Laboratories:* "Content Distribution Networks: Strategic Research Activites", support for PhD and MSc students, and research hardware. Role: Sole Principal Investigator. Budget: €150,000. Duration: 2010-2014 (48 months).

– *Deutsche Telekom Laboratories Strategic Research Project:* "Overclouds: Building Overlays on top of Clouds". Budget: €40,000. Role: Sole Principal Investigator. Duration: 2009-2010 (24 months).

– I participated in the US National Science Foundation (NSF) Project: "Mapping Interconnection in the Internet: Colocation, Connectivity and Congestion" (Networking Technology and Systems (NeTS): Large: Collaborative Research, #1413905), PIs: David Clark (MIT), kc Claffy (CAIDA/UCSD). Duration: 2014-2017 (36 months).

– I participated in the European Commission project "CHANGE: Enabling Innovation in the Internet Architecture through Flexible Flow-Processing Extensions" (Information and communication technologies, ICT-2009.1.1 - The Network of the Future, FP7-ICT-257422). PIs: Mark Handley (UCL, UK), Olivier Bonaventure (UCL, Belgium), Laurent Mathy (Lancaster University), Anja Feldmann (TU Berlin), Costin Raiciu (Politechnica University, Bucharest), Luigi Rizzo (University of Pisa), Peter Feil (Deutsche Telekom), Felipe Huici (NEC), Adam Kapovits (Eurescom). Duration: 2009-2013 (40 months).

Research Community Service

Organizing Committee

IEEE European Symposium on Security and Privacy (EuroS&P) 2023 (General Chair),
European Symposium on Research in Computer Security (ESORICS) 2023 (General Chair),
Passive and Active Measurement Conference (PAM) 2021 (Publication Chair),
Network Traffic Measurement and Analysis Conference (TMA) 2020 (General Chair),
ACM CoNEXT 2020 (Student Workshop Chair),
ACM SIGMETRICS 2018 (Publication Chair),
ACM CoNEXT 2016 (Publication Chair),
ACM SIGCOMM 2015 (Publication Chair),
ACM SIGCOMM 2011 (Registration Chair),
ACM IMC 2011 (General Chair),
IEEE AOC 2010 (Publicity Chair),
IEEE HotWeb 2006 (Publication Chair),
IEEE ICNP 2005 (Web Administrator),
PAM 2005 (Local Arrangements Chair),
IEEE ASWN 2004 (Publication Chair).

Technical Program Chair

Weizenbaum Institute workshop on Web and Internet Policy 2020
ACM SIGCOMM 2020 workshop on Network Application Integration/CoDesign (NAI) 2020; steering committee since 2021
ACM CoNEXT 2020 Student Workshop
ACM CoNEXT 2019
PAM 2018

Technical Program Committee Member

USENIX Symposium on Networked Systems Design and Implementation (NSDI) 2024.
ACM Web Conference (WWW) 2023 (Security, Privacy and Trust track).
Privacy Enhancing Technologies Symposium (PETS) 2023.
ACM Internet Measurement Conference (IMC) 2022, 2021, 2020, 2019, 2018, 2016, 2015, 2014, 2011.
ACM Web Science Conference (WebSci) 2023, 2022.
USENIX Annual Technical Conference (ATC) 2023, 2022.
ACM European Workshop on Systems Security (EuroSec) 2023, 2022.
Passive and Active Measurement (PAM) Conference 2023, 2022, 2021, 2020, 2019, 2017, 2016.
The 2nd International Cryptoasset Analytics Workshop (CAAW), in Conjuction with ACM WWW 2023.
ACM CoNEXT 2022, 2021, 2020, 2018.
ACM EdgeSys 2021.
IEEE INFOCOM 2019.
ACM HotNets 2018.
ACM SIGCOMM 2013.
Traffic Measurement and Analysis (TMA) Conference 2019, 2018, 2017, 2016, 2015, 2012.
IEEE LCN 2021.
Very Large Internet of Things (VLIoT) 2021
ACM SIGCOMM workshop on Secure and Programmable Network Infrastructure (SPIN) 2021, 2020,
ACM SIGCOMM workshop on Technologies, Applications, and Uses of a Responsible Internet (TAURIN) 2022, 2021
ACM SIGCOMM NAI 2022, 2021, 2020
ACM ICN 2019,
IEEE ICNP 2019, 2017, 2015,
ITC 2017,
SWFAN 2016,
ACM SIGCOMM 2016 posters and demos session,
ACM CoNEXT Student Workshop 2022, 2021, 2014, 2011, 2009,
EWSDN (2015, 2014, 2013),
IEEE P2P 2012,
IEEE IPDPS 2012 PhD forum,
DCPerf 2012,
ACM SIGMETRICS 2010 (Shadow),
IEEE Globecom 2009,
ACM Simplex 2010, 2009,
SSS 2009,
ACM CoNEXT 2008 (Shadow).

Invited/External Reviewer

Communications of the ACM (Contributed Articles),
IEEE/ACM Transactions on Networking,
ACM SIGCOMM Computer Communication Review,
ACM Computing Surveys,
IEEE Transactions on Services Computing,
IEEE Transactions on Parallel and Distributed Systems,
IEEE Transactions Network and Service Management,
IEEE Transactions on Wireless Communications,
IEEE Internet Computing,
IEEE Communications Magazine,
IEEE Network,
Elsevier Journal of Computer Networks,
Elsevier Information Processing Letters,
Elsevier Journal of Computer Communications,
Elsevier Ad Hoc Networks,
Telecommunication Systems Journal,
International Journal of Sensor Networks,
Journal of Communications and Networks,
ACM IMC 2013, 2010, 2009,
ACM CoNEXT 2009,
ACM SIGMETRICS 2012, 2008, 2007,
ACM PODC 2008,
ACM Multimedia 2004,
IEEE INFOCOM 2013, 2011, 2010, 2009, 2007, 2006, 2005,
IEEE ICNP 2005, 2004,
IEEE WCNC 2013,
IEEE e-Energy 2011,
IEEE IPDPS 2010,
IEEE Global Internet Symposium 2007,
IEEE ICDCS 2003,
IEEE ICC 2005, 2004,
IEEE RTSS 2004,
IEEE PIMRC 2005,
Euro-Par 2012.

Award Committees

- Best Paper Award committee member: ACM Internet Measurement Conference 2022
- Test-of-Time Award chair: ACM SIGCOMM 2021
- Best Paper Award committee member: ACM Internet Measurement Conference 2019

Funding Proposal Evaluation Committees

- Swiss National Science Foundation (SNSF)
- French National Research Agency (ANR)
- Greek National Fellowship Program ARISTEIA II
- Contributing Expert of the EU Roadmap for Advanced Cloud Technologies under Horizon 2020

Advisory Boards

- 2022–present: Member of the Evaluation and Advisory Board of the Institute of Informatics and Telecommunications (IIT), National Centre for Scientific Research "Demokritos", Athens, Greece.
- 2022–present: TU Delft representative at the ACademic Cyber Security Society (ACCSS), the Netherlands.
- 2019-2022: Advisory board member of the EU project INCOGNITO: IdeNtity verifiCatiOn with privacy-preservinG credeNtIals for anonymous access To Online services, H2020 (824015).
- 2019-2021: Administrative responsibility for research group Work and Cooperation in the Sharing Economy, Weizenbaum Institute for the Networked Society (Weizenbaum-Institut), Berlin, Germany

Invited Talks and Keynotes

"Measuring Web Cookies in Governmental Websites", BIFOLD Colloquium, October 10, 2022.

"Measuring Web Cookies in Governmental Websites", TU Munich Internet Research Retreat, September 13, 2022.

"Measuring and Protecting the Internet", Max Planck Institure for Informatics Internet Architecture Retreat, September 7, 2022.

"Measuring Web Cookies in Governmental Websites", Weizenbaum Institute, September 1, 2022.

Panelist: "Edge AI, IoT and Networking", FCN 2021, December 16, 2021.

"United We Stand: Collaborative Detection and Mitigation of Amplification DDoS Attacks at Scale", Dutch Anti-DDoS Coalition, December 9, 2021

"One Year in Lockdown: How the Waves of COVID-19 Impact Internet Traffic", GAIA Workshop, Simula, Oslo, Norway, October 13, 2021.

"One Year in Lockdown: COVID-19 and the Internet", UK Next Generation Network (NGN), May 21, 2021,

Panelist: "Communications Networks and the COVID-19 Pandemic" TPRC 48 (February 19, 2021),

"The Lockdown Effect: Implications of the COVID-19 Pandemic on the Internet Traffic", Weizenbaum Institute (November 25, 2020).

"Data-driven Cybersecurity", TU Delft (November 9, 2020)

"CONNECT 2.0: A Vision for CONNECT", Trinity College – CONNECT (October 15, 2020)

"The Fragile Internet: Assessing the Internet's Critical Infrastructure and Protocol Resilience", TU Delft (June 2, 2020).

"Loopholes For Circumventing Network Neutrality", 30th ITS European Conference – Panel on Network Neutrality (June 18, 2019).

"The Fragile Internet: Assessing the Internet's Critical Infrastructure and Protocol Resilience", TU Berlin (May 22, 2019).

"Networking and Policy: Mind the Gap", 11th IMDEA Networks Institute Annual Workshop (May 20, 2019).

"Networking + X", Keynote at CoNEXT 2018 PhD Student Workshop (December 4, 2018),

"Deep Dive into BGP Communities", Columbia University - Systems and Networks seminar (September 6, 2018), SIGCOMM 2018 ERC Networking Symposium (August 24, 2018).

"The Measurement Lens: How to Understand and Improve the Internet", ECE Summer School, Technical University of Crete, Chania (July 23, 2018).

"Shedding Light on the Internet's Critical Peering Infrastructure Outages", Network Traffic Measurement and Analysis Conference (TMA) 2018 Experts Summit (June 26, 2018).

"Inferring BGP Blackholing Activity in the Internet", Measurement and Analysis for Protocols Research Group (maprg) at IETF-101 (March 20, 2018).

"Understanding and Improving the Resilience of the Internet using the Measurement Lens", Max Planck Institute for Informatics, (December 18, 2017).

"Detecting Peering Infrastructure Outages in the Wild", Yale University, (October 5, 2017); Trinity College Dublin, (October 3, 2017).

"The Evolving Internet Market and the Role of Coordination", 50th Freiburger Verkehrsseminar: The Future of the Internet - Innovation, Integration and Sustainability, University of Freiburg (7/2017).

"Mapping Peering Interconnections to a Facility", The 6th Workshop on Internet Economics (WIE 2015), University of California San Diego/CAIDA (12/2015)

"Identifying and measuring points of congestion", MIT Communications Futures Program (10/2015).

"Internet Exchange Points and the Internet", Yale University (3/2015), Massachusetts Institute of Technology (10/2014); Akamai Technologies (10/2014).

"Improving Performance and Cost of Content Delivery in a Hyperconnected World", The 5th Workshop on Internet Economics (WIE 2014), University of California San Diego/CAIDA (12/2014).

"Enabling CDN-ISP Collaboration", Massachusetts Institute of Technology (09/2014); Plenary Talk at RIPE 67 (10/2013); University of Athens (06/2013); OTE Labs (06/2013).

"How to Explore a Few Thousand Middleboxes in Your Free Time" (09/2013), NEC Labs Europe.

"Pushing CDN-ISP Collaboration to the Limit", University of Wisconsin at Madison (04/2013).

"On-demand Service Deployment in Microdatacenters", Université catholique de Louvain (10/2012); LabsOpen workshop on Telekom Cloud, Berlin (05/2012); Technische Universität Berlin (04/2012).

"Big Data and Networks: Mind the Gap", Institut Eurécom (10/2012).

"NetPaaS: Network Platform as a Service", Telekom Innovation Laboratories, Berlin (08/2012).

"Web Content Cartography", King's College – University of London (06/2012); University College London (03/2012).

"Content-aware Traffic Engineering", Athens University of Economics and Business (05/2013); University College London (06/2012); Universitatea Politehnica Bucuresti (05/2012); Boston University (07/2011); LabsOpen workshop on Network Architecture and Optimization, Berlin (08/2010).

"ISP-Applications Collaboration", CloudS workshop, Sydney (11/2010).

"ORACLE: An ISP-P2P Collaboration System", University of Athens (03/2009).

"Selfish Overlay Network Formation: Resource Allocation Strategies and Implications to Protocol Design", Technische Universität München (12/2009), Centre Tecnològic de Telecomunicacions de Catalunya (04/2008); Deutsche Telekom Laboratories Berlin (03/2008); Telefónica Research Barcelona (03/2008); Boston University (12/2007).

"Resource Allocation Strategies for Scalable Content Delivery on the Internet", Boston University (10/2007).

"The Selfish Neighbor Selection Problem In Overlay Networks", University of Athens (07/2007).

"A Large Deviations Approach to statistical Traffic Anomaly Detection", Boston University (02/2006).

Teaching Experience

Spring 2023: Network Security, TU Delft
Spring 2023: Hacking Lab, TU Delft
Summer 2022: CSE3000 Research Project, TU Delft
Spring 2022: Network Security, TU Delft
Spring 2022: Hacking Lab, TU Delft
Fall 2020: Internet Routing Seminar, TU Berlin
Spring 2020: Internet Measurements, TU Berlin
Spring 2020: Internet Measurements Seminar, TU Berlin
Fall 2019: Internet Routing Seminar, TU Berlin
Spring 2019: Internet Measurements, TU Berlin
Fall 2018: Internet Routing Seminar, TU Berlin
Spring 2018: Internet Measurements, TU Berlin
Fall 2017: Network Algorithms, TU Berlin
Fall 2017: Internet Routing Seminar, TU Berlin
Spring 2014: Internet Measurements, TU Berlin
Spring 2013: Internet Measurements, TU Berlin
Spring 2007: Fundamentals of Computing Systems, Boston University
Spring 2006: Introduction to Computers, Boston University
Spring 2005: Introduction to Data Structures, Boston University
Summer 2005: Quantitative Methods for Information Systems, Boston University
Fall 2005: Introduction to Computers, Boston University
Spring 2004: Introduction to Computers, Boston University

Mentoring, Training and Advancement of Young Scientists

Post-doctoral Research Mentor:

Stefano Cecconello (PhD from University of Padova, Italy).

Harm Griffioen (PhD from TU Delft, Netherlands).

Volker Stocker (PhD from Freiburg University, Germany), Group Leader of the research group "Work and Cooperation in the Sharing Economy" at the Weizenbaum Institute for the Networked Society.

Habib Mostafaei (PhD from Roma Tre University, Italy), BIFOLD Postdoctoral Researcher → Assistant Professor at the Eindhoven University of Technology, the Netherlands.

Srdjan Matic (from University College London, UK; PhD from University of Milan, Italy) → Research Faculty at IMDEA Software Institute, Madrid, Spain.

Matthias Rost (PhD from TU Berlin) → Cloud Optimization Developer at SAP, Germany.

Vasileios Giotsas (from CAIDA/UC San Diego, US; PhD from UCL, UK) → Assistant Professor, Lancaster University, UK.

Nikolaos Chatzis (PhD from TU Berlin, Germany) → Senior Performance Engineer, Akamai, Germany.

PhD Research and Dissertation Mentor:

Kris Oosthoek (TU Delft, [expected 2023], "Quantifying Cybercriminal Bitcoin Abuse")

Said Jawad Saidi (Max Planck Institute for Informatics, [expected 2023], "Characterizing the IoT Ecosystem at Scale")

Florian Streibelt (Max Planck Institute for Informatics, [expected 2023]),

Daniel Wagner (Max Planck Institute for Informatics, [expected 2023]),

Taha Albakour (TU Berlin, [expected 2024]),

Bart Hermans (TU Delft, [expected 2025]),

Marwan Darwish Khabbaz (TU Delft, [expected 2025]),

Cristian Munteanu (Max Planck Institute for Informatics, [expected 2025]),

Selim Ozcan (Simula Norway and University of Oslo, [expected 2025]),

Niklas Semmler (TU Berlin, PhD 2021), "Data-driven Transfer Optimizations for Big Data in the Industrial Internet of Things" → SAP → Snowflake, Berlin, Germany.

Apoorv Shukla (TU Berlin, PhD 2019), "Runtime Verification of Programmable Networks" → Senior Networks Researcher, Huawei Munich Research Center, Germany.

Christoph Dietzel (TU Berlin, PhD 2019), "Improving the Resilience Capabilities of Internet Infrastructures" → Global Head of Products & Research, DE-CIX, Frankfurt, Germany.

Costas Iordanou (TU Berlin, PhD 2019), "Crowdsourcing as a Guardian of Transparency, Privacy, and Anti-Discrimination in a Personalized Web", → Researcher, Max Planck Institute for Informatics, Germany → Senior Researcher, Cyprus University of Technology.

Thomas Krenc (TU Berlin, PhD 2019), "Revisiting the Interplay of Inter-Domain Traffic and Routing Policies" → Post-doctoral researcher, Naval Postgraduate School, USA → Researcher, CAIDA/University of California San Diego, USA.

Obi Akonjang (TU Berlin, PhD 2018), "ISP Traffic Management via Flow Optimization"

Philipp Richter (TU Berlin, PhD 2017), "Empirical Analysis of the Effects and the Mitigation of IPv4 Address Exhaustion", → Postdoctoral Associate, MIT CSAIL → Senior Research Scientist, Akamai.

Samuel DeLaughter (MIT EECS PhD candidate, Summer 2017, MIT-Germany program).

Enric Pujol (TU Berlin, PhD 2016), "Web content delivery, monetization, and search: back-office and advertisement traffic on the Internet" → Data Scientist, BENOCS, Berlin, Germany.

Benjamin Frank (TU Berlin, PhD 2013), "Dynamic Deployment of Content Delivery Infrastructures using Network Cloud Resources" → SAP, Berlin, Germany.

Ingmar Poese (TU Berlin, PhD 2013), "Towards Informed and Collaborative Content Delivery" → CTO, BENOCS, Berlin, Germany.

George Iosifidis (University of Thessaly; primary advisor: Prof. Iordanis Koutsopoulos, PhD 2012), "Spectrum and Storage Capacity Management Using Network Economics and Optimization Methods" → Researcher, CERTH-Greece → Researcher, Yale University → Assistant Professor, Trinity College - University of Dublin → Assistant Professor, TU Delft.

Bernhard Ager (TU Berlin, PhD 2011), "Impact of Locality in Content Distribution" → Researcher, ETH Zürich → Google, Switzerland.

PhD Committees:

Lichao Wu (TU Delft, PhD 2023 [Expected]), "The Circle of DL-SCA: Improving Deep Learning-based Side-channel Analysis".

Belma Turkovic (TU Delft, PhD 2022), "Enabling Low-Latency Applications Using Programmable Networks" → Junior scientist innovator at Netherlands Organisation for Applied Scientific Research (TNO), the Netherlands.

Ahmad Alhilal (Hong Kong University of Science and Technology, PhD 2022), "Reliable and Real-time Content Streaming for Cloud and Edge Computing" → Postdoc Fellow, Hong Kong University of Science and Technology, Hong Kong.

Georgia Fragkouli (EPFL, Switzerland, PhD 2022), "Toward Internet Performance Transparency" → Postdoctoral Researcher, ETH Zurich.

Qasim Lone (TU Delft, the Netherlands, PhD 2022), "SAVing the Internet: Measuring the Adoption of Source Address Validation (SAV) By Network Providers" → Senior Research Engineer, RIPE NCC, the Netherlands.

Moritz Christian Müller (University of Twente, the Netherlands, PhD 2021), "Making DNSSEC Future Proof" → Data Scientist at SIDN, the Netherlands.

Mattijs Jonker (University of Twente, the Netherlands, PhD 2019), "DDoS Mitigation a Measurement-Based Approach" → Assistant Professor, University of Twente, the Netherlands .

Chair of PhD Committees:

Kashyap Thimmaraju (TU Berlin, PhD 2020), "From Threat to Solutions in Datacenter Networks" → Postdoctoral Researher at Humboldt University of Berlin, Germany.

Theresa Enghardt (TU Berlin, PhD 2019), "Informed Access Network Selection to Improve Application Performance" → Senior Software Enigineer at Netflix, USA.

Christian Donner (TU Berlin, PhD 2019), "Bayesian inference of inhomogeneous point process models: Methodological advances and modelling of neuronal spiking data" → Senior Data Scientist at Swiss Data Science Center, Switzerland.

Thomas Krenc (TU Berlin, PhD 2019), "Revisiting the Interplay of Inter-Domain Traffic and Routing Policies" → Postdoctoral Researcher at Naval Postgraduate School, USA → University of California San Diego/CAIDA, USA.

MSc Theses:

Boris van Groeningen (TU Delft, MSc 2023 [expected])

Paolo Arash Kazemi Koohbanani (TU Delft, MSc 2023 [expected])

Louise van der Peet (TU Delft, MSc 2023 [expected])

Mike van der Boon (TU Delft, MSc 2023 [expected]), "Looking at IoT-related risks for the Smart Grid"

Jean-Paul van Assche (TU Delft and Leiden University, Institute of Security and Global Affairs, Master in Cybersecurity, MSc [expected 2023]), "The development of cyber security standards for wireless IoT devices

in a multistakeholder environment"

Aleksandra Taneva (TU Delft, MSc [expected 2023], "Reverse Engineering Web Cookies")

Stijn Kramer (TU Delft, MSc 2022, "Hardening Cookies: Preventing Use of Stolen Cookies byThird Parties")

Rick Huisman (TU Delft, MSc 2022, "Securing BGP Communities")

Sven Thiessen (TU Delft, MSc 2022, "IoT Device Type Identification on Low-End Dedicated Hardware Devices")

Ahmet Güdec (TU Delft, MSc 2022, "RPL-based Passive OS Fingerprinting in Low- power and Lossy Wireless Sensor Networks")

Kamil Balitzki (TU Berlin, MSc 2022, "BGP Smalltalk: A Systematic Analysis of BGP Attribute Changes")

Max Franke (TU Berlin, MSc 2022, "Designing and Implementing an AnycastLoad Balancing System with HappyEyeballs")

Shafi Afridi (TU Berlin, MSc 2022, "Network-aware Placement for Geo-Distributed Stream Analytics")

Nikhil Singh (TU Berlin, MSc 2021, "End-to-end available bandwidth measurement in P4")

Sergiu-Adrian Lazar-Angelescu (EIT Digital Master, TU Eindhoven and TU Berlin, MSc 2020, "Optimizing Online Meeting Strategies in Social Environments", co-supervisor with Aristides Gionis, KTH, Sweden)

Taha Albakour (TU Berlin, MSc 2020, "Towards a Methodology for Router Fingerprinting", co-supervisor with Rob Beverly, NPS, USA)

Preethi Ramachandran (TU Berlin, MSc 2020, "A Longitudinal Study of the Robots Exclusion Standard")

Marcin Bosk (TU Berlin, MSc 2020, "Evaluating the Benefits of Network Slicing for QoE-awareness in 5G Networks")

Kevin Nico Hudemann (TU Berlin, MSc 2020, "P4 Verification with Machine Learning")

Bashar Otoum (TU Berlin, MSc 2020, "Investigating BGP Attribute-based Attacks")

Ferdows Shahryar (TU Berlin, MSc 2019, "Analysis and Vulnerability Assesment of Internet Registries")

Alexander Hardt (Naval Postgraduate School, US, MSc 2019, "Characterizing BGP Community Irregularities Towards an Anomaly Detection Engine", 2nd reader, co-supervisor with Rob Beverly, NPS, USA)

Siva Rajendran (TU Berlin, MSc 2019, "Measurement and Analysis of Web Traffic Interception by Man-in-the-Middle Attacks")

Zsolt Vagi (TU Berlin, MSc 2019, "Towards verifying P4 programs")

Lars Prehn (TU Berlin, MSc 2018, "Re-evaluating the AS-level Multi-Tier Model in the Era of Internet Flattening", 2nd reader)

Jinji Shen (TU Berlin, MSc 2014, "Measuring the Indirect Prefix Delegations using Public Routing Information")

Boxuan Li (TU Berlin, MSc 2014, "Measurement and Analysis of SoShare Hybrid Server-P2P System")

Florian Streibelt (TU Berlin, MSc 2013, "Evaluating EDNS-client-subnet Extension in the Wild")

Pinar Acar (TU Berlin, MSc 2013, "Comparing IPv4 and IPv6 Performance in the Wild")

Alexander Kordecki (TU Berlin, MSc 2013, "Network Traffic Measurement of Data-intensive Computing Architectures")

Jun Jiang (TU Berlin, MSc 2013, "Improving Video Streaming Applications with ISP-assisted Server Selec-

tion")

Thomas Krenc (TU Berlin, MSc 2012, "Measurement and Characterization of Content Distribution in BitTorrent")

Benjamin Frank (TU München, MSc 2009, "Developing Efficient Ranking Algorithms for the Oracle Service")

Ingmar Poese (TU Berlin, Diplom 2009, "The Oracle Server: Implementation and Performance Evaluation")

Vassilis Lekakis (FORTH-ICS/University of Crete, MSc 2009, "The EGOIST Overlay Routing System")

MSc Projects:

Klara Schmitt (TU Berlin 2018, "User Agent Measurement").

Thomas Krenc (TU Berlin 2012, "Measurement and Characterization of Video Streaming Architectures").

Thomas Krenc, Tobias Jacobowitz, Sebastian Garn (TU Berlin 2011, "Season: A Dynamic Load Balancer for Virtual Environment").

Bachelor Theses:

Felix Matthes (TU Berlin, BSc 2022, "Stress Test Evaluation of Home Network Equipment")

Leonard Becker (TU Berlin, BSc 2021, "Visibility of Large Scale Outages on the Control Plane")

Matthias Götze (TU Berlin, BSc 2021, "Measuring Web Cookies in Government Websites")

Stefan Wahl (TU Berlin, BSc, 2020, "Evaluation of Path Validation Towards BGP NEXT-HOP")

Lily Hügerich (TU Berlin, BSc 2020, "Characterizing P4 Programs for Patchability")

Jan Pommerening (TU Berlin, BSc 2018, "Measuring Authorized Digital Sellers of Popular Websites")

Thomas Krenc (TU Berlin, BSc 2010, "Demographic Measurement of Popular BitTorrent Swarms")

Junior Researcher Experience

– *Research and Teaching Fellow* September 2003 – September 2008
Boston University, Computer Science Department, Web and Internetworking Group.

– *Affiliated Researcher* July - August 2006
University of Athens, Department of Informatics and Telecommunications.

– *Affiliated Researcher* April - August 2003
Greek National Center for Scientific Research, Institute of Informatics and Telecommunications.

– *Undergraduate Affiliated Student* September 2001 - August 2002
Technical University of Crete, Electronic and Computer Engineering Department, Information and Computer Networks Laboratory.

– *Telecommunications Engineer internship* August - September 2002
Value Added Services, NOKIA Networks, NOKIA Hellas.

– *Software Developer internship* September 2001 - February 2002
Technical University of Crete, Electronic and Computer Engineering Department, Laboratory of Distributed Multimedia, Information Systems and Applications.

– *Programmer internship* August - September 1999, August 2001

Social Security Institute, Greece.

Current as of January 15, 2023