

Songshi Dou

Ph.D. Student
Department of Electrical and Electronic Engineering (EEE)
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Summary / Statement

Songshi Dou is a first-year Ph.D. student at the HKU. His research mainly focuses on computer and communication networking, including software-defined networking (SDN), LEO satellite networks, and network function virtualization (NFV). He has published 23 peer-reviewed research papers, including IEEE/ACN TON, IEEE TCOM, Elsevier JNCA, Elsevier COMNET, ACM WWW, IEEE ICDCS, and IEEE/ACM IWQoS, and owned 5 Chinese patents.

Education

The University of Hong Kong (HKU), Pokfulam, Hong Kong 2023 - 2027 (expc.)

Ph.D. student in Electrical and Electronic Engineering
Field of Study: Computer and Communication Networking
Supervisors: Prof. Lawrence K. Yeung and Prof. Xianhao Chen

Beijing Institute of Technology (BIT), Beijing, China 2019 - 2022

M.E. in Control Engineering, June 2022
Field of Study: Computer Networking
Supervisor: Prof. Zehua Guo
Dissertation: Maintaining the Path Programmability in Software-Defined Wide Area Networks

Outstanding Master's Thesis of Chinese Institute of Electronics

North China Electric Power University (NCEPU), Beijing, China 2015 - 2019

B.E. in Automation, June 2019

Publications

([†]Equal contribution, *Corresponding author)

Journal & Magazine Papers

[J13] Zehua Guo, Li Qi, **Songshi Dou**, Jiawei Weng, Xiaoyang Fu, and Yuanqing Xia, "Maintaining Control Resiliency

- for Traffic Engineering in SD-WANs”, *IEEE/ACM Transactions on Networking (TON)*, Accepted.
- [J12] **Songshi Dou** and Zehua Guo, “Path Programmability Recovery under Controller Failures for SD-WANs: Recent Advances and Future Research Challenges”, *IEEE Communications Magazine (COMMAG)*, Accepted.
 - [J11] **Songshi Dou**, Li Qi, and Zehua Guo, “Mitigating the Impact of Controller Failures on QoS Robustness for Software-Defined Wide Area Networks”, *Elsevier Computer Networks (COMNET)*, vol. 238, p. 110096, 2024.
 - [J10] Zehua Guo, Changlin Li, Yang Li, **Songshi Dou**, Bida Zhang, and Weichao Wu, “Maintaining the Network Performance of Software-Defined WANs with Efficient Critical Routing”, *IEEE Transactions on Network and Service Management (TNSM)*, vol. 21, no. 2, pp. 2240-2252, 2024.
 - [J9] Yuntian Zhang, Ning Han, Tengting Zhu, Junjie Zhang, Minghao Ye, **Songshi Dou**, and Zehua Guo, “Prophet: Traffic Engineering-centric Traffic Matrix Prediction”, *IEEE/ACM Transactions on Networking (TON)*, vol. 32, no. 1, pp. 822-832, 2024.
 - [J8] Zehua Guo, **Songshi Dou**, Wenchao Jiang, and Yuanqing Xia, “Toward Improved Path Programmability Recovery for Software-Defined WANs under Multiple Controller Failures”, *IEEE/ACM Transactions on Networking (TON)*, vol. 32, no. 1, pp. 143-158, 2024.
 - [J7] **Songshi Dou**[†], Li Qi[†], Chao Yao, and Zehua Guo, “Exploring the Impact of Critical Programmability on Controller Placement for Software-Defined Wide Area Networks”, *IEEE/ACM Transactions on Networking (TON)*, vol. 31, no. 6, pp. 2575-2588, 2023.
 - [J6] Zehua Guo, **Songshi Dou**^{*}, Wenfei Wu, and Yuanqing Xia, “Toward Flexible and Predictable Path Programmability Recovery under Multiple Controller Failures in Software-Defined WANs”, *IEEE/ACM Transactions on Networking (TON)*, vol. 31, no. 5, pp. 1965-1980, 2023.
 - [J5] Zehua Guo, **Songshi Dou**, Li Qi, and Julong Lan, “A Survey of Maintaining the Path Programmability in Software-Defined Wide Area Networks”, *Journal of Electronics & Information Technology (JEIT)*, 45(5): 1899-1910, 2023. (in Chinese)
 - [J4] Zehua Guo, **Songshi Dou**, Sen Liu, Wendi Feng, Wenchao Jiang, Yang Xu, and Zhi-Li Zhang, “Maintaining Control Resiliency and Flow Programmability in Software-Defined WANs During Controller Failures”, *IEEE/ACM Transactions on Networking (TON)*, vol. 30, no. 3, pp. 969-984, 2022.
 - [J3] Haoran Ni, Zehua Guo, Changlin Li, **Songshi Dou**, Chao Yao, and Thar Baker, “Network Coding-based Resilient Routing for Maintaining Data Security and Availability in Software-Defined Networks”, *Elsevier Journal of Network and Computer Applications (JNCA)*, vol. 205, p. 103372, 2022.
 - [J2] Zehua Guo, **Songshi Dou**, Yi Wang, Sen Liu, Wendi Feng, and Yang Xu, “HybridFlow: Achieving Load Balancing in Software-Defined WANs with Scalable Routing”, *IEEE Transactions on Communications (TCOM)*, vol. 69, no. 8, pp. 5255-5268, 2021.
 - [J1] **Songshi Dou**, Guochun Miao, Zehua Guo, Chao Yao, Weiran Wu, and Yuanqing Xia, “Matchmaker: Maintaining Network Programmability for Software-Defined WANs under Multiple Controller Failures”, *Elsevier Computer Networks (COMNET)*, vol. 192, p. 108045, 2021.

Conference & Workshop Papers

- [C8] **Songshi Dou**, Xianhao Chen, and Lawrence K. Yeung, “Enabling Practical and Pervasive Content Delivery from Emerging LEO Mega-Constellations”, *IEEE International Conference on Multimedia and Expo 2024 (ICME’24)*.

- [C7] **Songsbi Dou**, Li Qi, and Zehua Guo, “ARES: Predictable Traffic Engineering under Controller Failures in SD-WANs”, *ACM The Web Conference 2024 (WWW’24)*. (Accept Ratio: $\sim 20.2\%$)
- [C6] **Songsbi Dou**, Shengyu Zhang, and Lawrence K. Yeung, “Achieving Predictable and Scalable Load Balancing Performance in LEO Mega-Constellations”, *IEEE International Conference on Communications 2024 (ICC’24)*.
- [C5] **Songsbi Dou**, Yongchao He, Sen Liu, Wenfei Wu, and Zehua Guo, “RateSheriff: Multipath Flow-aware and Resource Efficient Rate Limiter Placement for Data Center Networks”, *IEEE/ACM International Symposium on Quality of Service 2023 (IWQoS’23)*. (Accept Ratio: $62/264=23.5\%$)
- [C4] Li Qi[†], **Songsbi Dou**[†], Zehua Guo, Changlin Li, Yang Li, and Tengpeng Zhu, “Low Control Latency SD-WANs for Metaverse”, *International Workshop on Social and Metaverse Computing and Networking 2022 (SocialMeta’22)*.
- [C3] **Songsbi Dou**, Zehua Guo, and Yuanqing Xia, “ProgrammabilityMedic: Predictable Path Programmability Recovery under Multiple Controller Failures in SD-WANs”, *IEEE International Conference on Distributed Computing Systems 2021 (ICDCS’21)*. (Accept Ratio: $97/489=19.8\%$)
- [C2] Yijun Sun, Zehua Guo, **Songsbi Dou**, and Yuanqing Xia, “Video Quality and Popularity-aware Video Caching in Content Delivery Networks”, *IEEE International Conference on Web Services 2021 (ICWS’21)*.
- [C1] Zehua Guo, **Songsbi Dou**, and Wenchao Jiang, “Improving the Path Programmability for Software-Defined WANs under Multiple Controller Failures”, *IEEE/ACM International Symposium on Quality of Service 2020 (IWQoS’20)*.

Posters & Demos

- [D2] **Songsbi Dou**, Li Qi, and Zehua Guo, “Maintaining QoS-aware and Resilient Path Programmability for Metaverse in SD-WANs”, *ACM Turing Award Celebration Conference 2023 (TURC’23)*.
- [D1] Yijun Sun, Zehua Guo, **Songsbi Dou**, Junjie Zhang, Changlin Li, and Xiang Ouyang, “Poster: Enabling Fast Forwarding in Hybrid Software-Defined Networks”, *IEEE International Conference on Network Protocols 2021 (ICNP’21)*.

Manuscripts

- [M5] **Songsbi Dou**, Zehua Guo, and Lawrence K. Yeung, “SPACEHELPER: Unleashing the Potential of LEO Constellations in Building Resilient and Low-Latency Control Plane for SD-WANs”, Under Review.
- [M4] Jinxian Wu, Li Dai, **Songsbi Dou**, and Yuanqing Xia, “Accelerated Successive Convex Approximation for Nonlinear Optimization-Based Control”, *IEEE Transactions on Automatic Control (TAC)*, Under Review.
- [M3] **Songsbi Dou**, Li Qi, and Zehua Guo, “APOLLO: Important Path Programmability-aware Switch Upgrade and Controller Deployment for Hybrid SD-WANs”, *IEEE/ACM Transactions on Networking (TON)*, Under Review.
- [M2] **Songsbi Dou**, Jinxian Wu, Shengyu Zhang, Xianhao Chen, and Lawrence K. Yeung, “Enabling Practical and Predictable Load Balancing for Low Earth Orbit Mega-Constellations with MATCHMAKER”, *IEEE Journal on Selected Areas in Communications (JSAC)*, Under Review.
- [M1] **Songsbi Dou**, Li Qi, and Zehua Guo, “EPIC: Traffic Engineering-centric Path Programmability Recovery under Controller Failures in SD-WANs”, *IEEE/ACM Transactions on Networking (TON)*, Major Revision.

Patents

- [P5] Zehua Guo, Yutian Zhang, Ning Han, and **Songshi Dou**, “A Traffic Engineering-centric Traffic Matrix Prediction Method”, Chinese Patent, ZL202110810615.0.
- [P4] Zehua Guo, **Songshi Dou**, and Yuanqing Xia “A Scalable Routing Method for Realizing Load Balancing in Software-Defined Wide Area Networks”, Chinese Patent, ZL202010974299.6.
- [P3] Zehua Guo, and **Songshi Dou**, “Optimizing Flow Programmability under Multiple Controller Failures in Software-Defined Networks”, Chinese Patent, ZL202010544094.4.
- [P2] Zehua Guo, Penghao Sun, **Songshi Dou**, Yutian Zhang, Ning Han, and Yuanqing Xia, “Deep Reinforcement Learning-based Data Center Network Energy Management and Quality of Service Optimization Method”, Chinese Patent, ZL202010308862.6.
- [P1] Zehua Guo, Penghao Sun, **Songshi Dou**, Yuanqing Xia, and Honghai Ji, “A Load Balancing Method for Multi-Controller in Software-Defined Networking”, Chinese Patent, ZL202010094237.6.

Academic Services

Reviewer for Journals

- IEEE Transactions on Network Science and Engineering (**TNSE**)
- Future Generation Computer Systems (**FGCS**)
- IEEE Open Journal of the Communications Society (**OJCOMS**)
- IEEE Systems Journal (**ISJ**)
- EURASIP Journal on Wireless Communications and Networking (**JWCN**)
- Telecommunication Systems

Reviewer for Conferences

- ACM Multimedia (**MM**) 2024
- IEEE International Conference on Distributed Computing Systems (**ICDCS**) 2024
- IEEE/ACM International Symposium on Quality of Service (**IWQoS**) 2024
- IEEE International Conference on Multimedia and Expo (**ICME**) 2024
- IEEE International Conference on Communications (**ICC**) 2023 - 2024
- IEEE Global Communications Conference (**GLOBECOM**) 2022
- International Teletraffic Congress (**ITC**) 2022
- International Conference on Knowledge Science, Engineering and Management (**KSEM**) 2022 - 2023

Teaching Experience

- **Tutorial Teacher**, Everyday Computing and the Internet (CCST9003) *Fall 2023*

Honors & Awards

- **Postgraduate Scholarships (PGS)**, The University of Hong Kong *2023-2027*
- **Certificate in Teaching and Learning in Higher Education**, The University of Hong Kong *2023*
- **Outstanding Master's Thesis**, Chinese Institute of Electronics *2022*
- **Outstanding Master's Thesis**, Beijing Institute of Technology *2022*
- **Outstanding Graduates**, Beijing Institute of Technology *2022*
- **National Scholarship Award (Top 1%)**, Chinese Ministry of Education *2021*
- **ICNP 2021 Student Registration Award**, IEEE Computer Society *2021*
- **OSDI 2021 Student Grant**, USENIX *2021*
- **ICDCS 2021 Student Registration Award**, IEEE Computer Society *2021*

Presentations

- “RateSheriff: Multipath Flow-aware and Resource Efficient Rate Limiter Placement for Data Center Networks”, *IEEE/ACM International Symposium on Quality of Service 2023 (IWQoS'23)*, Orlando, FL, USA, June 2023.
- “ProgrammabilityMedic: Predictable Path Programmability Recovery under Multiple Controller Failures in SD-WANs”, *IEEE International Conference on Distributed Computing Systems 2021 (ICDCS'21)*, Virtual, July 2021.
- “Improving the Path Programmability for Software-Defined WANs under Multiple Controller Failures”, *IEEE/ACM International Symposium on Quality of Service 2020 (IWQoS'20)*, Virtual, June 2020.