Songshi Dou

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

Songshi Dou's research focuses on computer and communication networking, including software-defined networking (SDN), LEO satellite networks, and network function virtualization (NFV). He has published 22 peer-reviewed 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
Advisor: Prof. Lawrence K. Yeung and Prof. Xianhao Chen

Beijing Institute of Technology (BIT), Beijing, China 2019 - 2022
M.S. in Control Engineering, June 2022
Field of Study: Computer Networking
Advisor: 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.S. in Automation, June 2019

Publications

(†Equal contribution, *Corresponding author)

Journal & Magazine Papers

[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**), Accepted.

[J9] Yuntian Zhang, Ning Han, Tengteng Zhu, Junjie Zhang, Minghao Ye, **Songshi Dou**, and Zehua Guo, "Prophet: Traffic Engineering-centric Traffic Matrix Prediction", *IEEE/ACM Transactions on Networking* (**TON**), Accepted.

[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**), Accepted.

[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] **Songshi 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: 20.2%**)

[C6] **Songshi 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] **Songshi 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†, **Songshi Dou**†, Zehua Guo, Changlin Li, Yang Li, and Tengteng Zhu, "Low Control Latency SD-WANs for Metaverse", *International Workshop on Social and Metaverse Computing and Networking 2022* (**SocialMeta'22**).

[C3] **Songshi 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, **Songshi 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, **Songshi 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**). (**Accept Ratio: 44/147=29.9%**)

Posters & Demos

[D2] **Songshi 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, **Songshi 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

[M4] **Songshi Dou**, Li Qi, and Zehua Guo, "Apollo: Important Path Programmability-aware Switch Upgrade and Controller Deployment for Hybrid SD-WANs", Under Review.

[M3] **Songshi 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.

[M2] **Songshi 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**), Under Review.

[M1] 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**), 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 Open Journal of the Communications Society (**OJCOMS**) *2024*
- Future Generation Computer Systems (**FGCS**) *2023*
- IEEE Transactions on Network Science and Engineering (**TNSE**) *2022*
- IEEE Systems Journal (**ISJ**) *2021 - 2024*
- EURASIP Journal on Wireless Communications and Networking (**JWCN**) *2021 - 2022*
- Telecommunication Systems *2024*

Reviewer for Conferences

- IEEE International Conference on Distributed Computing Systems (**ICDCS**) *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

- **Tutor**, 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*
- **Outstanding Model Master Student (Top 1%)**, Beijing Institute of Technology *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*
- **CNCC 2020 Student Registration Award**, China Computer Federation *2020*

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**), Online, 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**), Online, June 2020.