

# Songshi Dou

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## CORE COMPETENCE

- Songshi Dou's research interests cover Software-Defined Networking (SDN) and Traffic Engineering (TE). He has published 5 journal/conference papers and owned/applied 5 chinese patents.

## EDUCATION

- **Beijing Institute of Technology** Beijing, China  
Master of Control Engineering (Supervisor: [Prof. Zehua Guo](#)) Sept. 2019 - Present
- **North China Electric Power University** Beijing, China  
Bachelor of Automation Sept. 2015 - Jul. 2019

## RESEARCH EXPERIENCES

- **Path Programmability Recovery in SD-WANs under Multiple Controller Failures**
  - We propose to improve the path programmability in SD-WANs under multiple controller failures.
  - 1) For all circumstances, **Matchmaker** is proposed to adaptively adjust the control cost of offline switches based on the limited control resource by changing the paths of flows to realize proper offline switches remapping.
  - 2) If hybrid SDN/legacy mode is supported, **RetroFlow+** can be used to recover the path programmability and achieve low communication overhead by intelligently configuring a set of selected offline switches working under legacy routing mode; **ProgrammabilityMedic** recovers path programmability by fine-grainedly selecting routing mode for each offline flow at each offline switch to fit the given control resource from active controllers.
  - 3) If network slicing techniques (e.g., FlowVisor) are supported, **ProgrammabilityGuardian** is exhibited to recover offline flows with similar path programmability by realizing fine-grained flow-level mappings.
- **Traffic Engineering in SD-WANs with Scalable Routing**
  - We propose **HybridFlow** to achieve good load balancing performance using a single controller with low control overhead, which mainly employs hybrid routing and crucial flow rerouting to reduce the processing load of controller.

## JOURNAL PAPERS

- **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*, vol. 192, p. 108045, 2021. (SCI JCR: Q1, IF: 4.474) [\[pdf\]](#)
- 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*, vol. 69, no. 8, pp. 5255-5268, Aug. 2021. (SCI JCR: Q1, IF: 5.083) [\[pdf\]](#)

## CONFERENCE PAPERS

- **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%) [\[pdf\]](#) [\[slides\]](#)
- 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)*. [\[pdf\]](#) [\[slides\]](#)
- 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)*. [\[pdf\]](#)

## WORK IN PROGRESS

- 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*, Major Revision. (SCI JCR: Q1, IF: 3.560)
- **Songshi Dou**, Li Qi, Zehua Guo, Yang Li, and Chao Yao, "Critical Programmability-aware Controller Placement and Switch-Controller Mapping in SD-WANs", *IEEE Systems Journal*, Major Revision. (IF: 3.931)

## HONORS AND AWARDS

- **OSDI 2021 Student Grant**, USENIX 2021
- **Third Prize of China Post-Graduate Mathematical Contest in Modeling**, China 2020
- **Excellent Master Student Scholarship Award**, Beijing Institute of Technology 2019
- **Bachelor Student Scholarship Award**, North China Electric Power University 2015, 2016, 2017

## LANGUAGES

- IELTS: 7 (L: 7.5, R: 8.0, W: 6.5, S: 6.0)

## SKILLS

- Programming: Python, C-programming, Matlab, VB
- Tools: L<sup>A</sup>T<sub>E</sub>X, Linux, SDN theory