Songshi Dou

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Core Competence

- Songshi Dou' s research focuses on computer networks, including Software-Defined Networking (SDN), Network Function Virtualization (NFV), Data Center Network (DCN), and Content Delivery Network (CDN). He has published 6 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* (**COMNET**), vol. 192, p. 108045, 2021. [pdf]
- 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**).
- 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, Aug. 2021. [pdf] [slides]

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]

Posters and Demos

- 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 Poster* (**ICNP'21**). [pdf]

Honors and Awards

- **National Scholarship Award (Top 1%)**, Chinese Ministry of Education — *2021*
- **Outstanding Master Student Model (Top 1%)**, Beijing Institute of Technology — *2021*
- **Outstanding Master Student Scholarship Award**, Beijing Institute of Technology — *2021*
- **OSDI 2021 Student Grant**, USENIX — *2021*
- **Third Prize of China Post-Graduate Mathematical Contest in Modeling**, China — *2020*
- **First-class Master Student Scholarship Award**, Beijing Institute of Technology — *2020*
- **Bachelor Student Scholarship Award**, North China Electric Power University — *2015, 2016, 2017*