Dear Editors and Reviewers:

We would like to submit the manuscript "Maintaining Predictable Traffic Engineering Performance under Controller Failures for Software-Defined WANs" for consideration for publication in the IEEE Journal on Selected Areas in Communications - Advances in Internet Routing and Addressing. Part of this paper has been presented at the ACM The Web Conference (WWW) in 2024. The conference version can be found at https://dl.acm.org/doi/abs/10.1145/3589334.3645321.

We would like to emphasize that there are many differences between this submission and the conference version. The key differences are summarized as follows.

- We enriched Section I by discussing why the existing coarse-grained switch-controller reassignment works may lead to poor recovery performance.
- We enriched Section II-C by analyzing why multiple controller failures should be considered and why offline flows should be reassigned immediately after controller failures.
- We also discussed controller synchronization methods in SD-WANs in Section III-A to maintain a global network view for centralized control and better TE performance.
- In Section III-B, we emphasized that different failure scenarios (*e.g.*, simultaneous failures among controllers or sequential failures) would not affect the recovery performance of our proposed solution.
- We added Section V-A to provide a rigorous proof of the NP-hardness of the formulated TPFCRFR problem.
- We added Section V-C to give the time complexity analysis of the proposed heuristic algorithm.
- For better readability, we added Table 1 to introduce the table of notations used in this paper.
- We enriched Section VI-A to improve the simulation setup by introducing network topologies, SD-WAN settings, and pre-configured path-set in detail.
- To show the generalizability of our proposed solution, we further add extensive simulation results on a service provider network (*i.e.*, Sprintlink) in Section VI-C.
- Since no measured TMs are available for the service provider network for the Sprintlink network, we also used the Modulated Gravity Model (MGM) to create spatiotemporal TMs for the network.
- We also improved the background knowledge of our paper by introducing and analyzing the following recent works.

[1] S. Dou, L. Qi, and Z. Guo, "ARES: Predictable Traffic Engineering under Controller Failures in SD-WANs," in Proc. of the ACM Web Conference (WWW), 2024.

[28] K. Thompson, G. J. Miller, and R. Wilder, "Wide-area Internet traffic patterns and characteristics," IEEE Network, vol. 11, no. 6, pp. 10–23, 1997.

[37] D. Ongaro and J. Ousterhout, "In search of an understandable consensus algorithm," in Proc. of the USENIX Annual Technical Conference (ATC), 2014, pp. 305–319.

[38] E. Sakic and W. Kellerer, "Impact of adaptive consistency on distributed sdn applications: An empirical study," IEEE Journal on Selected Areas in Communications, vol. 36, no. 12, pp. 2702–2715, 2018.

[39] A. Panda, W. Zheng, X. Hu, A. Krishnamurthy, and S. Shenker, "SCL: Simplifying Distributed SDN Control Planes," in Proc. of the USENIX Symposium on Networked Systems Design and Implementation (NSDI), 2017, pp. 329–345.

[43] S. Even, A. Itai, and A. Shamir, "On the complexity of time table and multi-commodity flow problems," in Proc. of the IEEE Symposium on Foundations of Computer Science (SFCS). IEEE, 1975, pp. 184–193.

[44] J. Renegar, "A polynomial-time algorithm, based on Newton's method, for linear programming," Mathematical Programming, vol. 40, no. 1, pp. 59–93, 1988.

[46] L. A. Wolsey and G. L. Nemhauser, Integer and combinatorial optimization. John Wiley & Sons, 2014.

[47] T. L. Magnanti, P. Mirchandani, and R. Vachani, "Modeling and solving the two-facility capacitated network loading problem," Operations Research, vol. 43, no. 1, pp. 142–157, 1995.

[49] N. Spring, R. Mahajan, and D. Wetherall, "Measuring ISP topologies with Rocketfuel," ACM SIGCOMM Computer Communication Review, vol. 32, no. 4, pp. 133–145, 2002.

[51] P. Tune and M. Roughan, "Spatiotemporal traffic matrix synthesis," in Proc. of the Annual Conference on ACM Special Interest Group on Data Communication (SIGCOMM), 2015, pp. 579–592.

[58] Z. Xu, F. Y. Yan, R. Singh, J. T. Chiu, A. M. Rush, and M. Yu, "Teal: Learning-Accelerated Optimization of WAN Traffic Engineering," in Proc. of the Annual Conference on ACM Conference on Special Interest Group on Data Communication (SIGCOMM), 2023, pp. 378–393.

[63] S. Troia, F. Sapienza, L. Var´e, and G. Maier, "On deep reinforcement learning for traffic engineering in SD-WAN," IEEE Journal on Selected Areas in Communications, vol. 39, no. 7, pp. 2198–2212, 2020.

[67] F. Altheide, S. Buttgereit, and M. Rossberg, "Increasing Resilience of SD-WAN by Distributing the Control Plane [Extended Version]," IEEE Transactions on Network and Service Management, 2024.

[68] Y. Zhang, J. Tourrilhes, Z.-L. Zhang, and P. Sharma, "Improving SD-WAN resilience: From vertical handoff to WAN-aware MPTCP," IEEE Transactions on Network and Service Management, vol. 18, no. 1, pp. 347–361, 2021.

We hope that you will enjoy reading our new paper.

Sincerely,
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