Abstract Submitted
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Cascading Failures in Flow-Driven Networks Induced by Multiple Initiators[1] ALAA MOUSSAWI, NOEMI DERZSY, XIN LIN, BOLESLAW SZYMANSKI, GYORGY KORNISS, Rensselaer Polytechnic Institute — Flow-driven networks are particularly prone to cascading failures. These failures are non self-averaging and this makes them very difficult to predict or subdue [1, 2]. Previous work has suggested that uniformly increasing edge or node capacities may lead to larger failures [1]. This suggests that some nodes/edges may act as fuses and mitigate cascading failures. We investigate this idea, and analyze how properties of the initiators of the cascade influence its outcome. We also discuss how stochastic node capacity allocation can be utilized to mitigate cascades induced by multiple initiators. We demonstrate the efficacy of these strategies on random geometric graphs (RGG) and the UCTE European electrical power transmission network, with capacities allocated in a fashion similar to the industry standard. [1] A. Asztalos, S. Sreenivasan, B.K. Szymanski, and G. Korniss, "Cascading Failures in Spatially_Embedded Random Networks", PLOS ONE 9(1): e84563 (2014). [2] Bernstein et al., ACM SIGMETRICS Performance Eval. Rev. 40, 33-37 (2012).

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