

Heavy tail analysis and network modeling

Sidney Resnick
Cornell University

Data networks can be analyzed at large time scales (Mikosch et al., 2002; Resnick, 2006) or small time scales (D'Auria and Resnick, 2006, 2007) with time scaling either approaching infinity or 0. One can try to characterize multi-user input traffic or single user inputs (Mikosch and Resnick, 2006). Tails of payload per session can be heavy with Pareto parameter in the interval (1, 2) as in Mikosch et al. (2002) or D'Auria and Resnick (2006, 2007) or even so heavy that the mean is infinite as in Mikosch and Resnick (2006) and Resnick and Rootzen (2000). One sees the impact of stable and Levy processes in various ways in all these circumstances depending on interaction of heavy tails and input rates.

References

- [1] B. D'Auria and S. I. Resnick (2006). Data network models of burstiness. *Adv. in Appl. Probab.* **38**, 373-404.
- [2] B. D'Auria and S. I. Resnick (2007). The influence of dependence on data network models. Technical report, Cornell University. Report #1449. Available at legacy.orie.cornell.edu/sid.
- [3] T. Mikosch and S. I. Resnick (2006). Activity rates with very heavy tails. *Stochastic Process. Appl.* **116**, 131-155.
- [4] T. Mikosch, S. I. Resnick, H. Rootzen and A. W. Stegeman (2002). Is network traffic approximated by stable Levy motion or fractional Brownian motion? *Ann. Appl. Probab.* **12**, 23-68.
- [5] S. I. Resnick (2006). *Heavy Tail Phenomena: Probabilistic and Statistical Modeling*. Springer Series in Operations Research and Financial Engineering. Springer-Verlag, New York, ISBN: 0-387-24272-4.
- [6] S. I. Resnick and H. Rootzen (2000). Self-similar communication models and very heavy tails. *Ann. Appl. Probab.* **10**, 753-778.