Large and Ultralarge Deviations of Poisson Telecom Processes

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We study large deviation probabilities of Telecom processes appearing as limits in a critical regime of the infinite source Poisson model for a workload on a service system elaborated by I.Kaj and M.Taqqu. We examine three different regimes of large deviations (LD) depending on the deviation level. A Telecom process $(Y_t)_{t \geq 0}$ itself scales as $t^{1/\gamma}$ where t denotes time and $\gamma \in (1, 2)$ is the key parameter of Y. One must distinguish moderate LD $\mathbb{P}(Y_t \geq y_t)$ with $t^{1/\gamma} \ll y_t \ll t$, intermediate LD with $y_t \approx t$, and ultralarge LD with $y_t \gg t$. The results we obtain essentially depend on another parameter of Y, namely resource distribution. We solve completely the cases of moderate and intermediate LD (the latter being the most technical one), whereas the ultralarge deviation asymptotics is found for the case of regularly varying distribution tails and in several other most interesting particular cases. The large deviation level is always essentially reached by the minimal necessary number of "service processes".

This is a joint work with S.E. Nikitin (SPbSU).

References

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