UNIVERSIDAD COMPLUTENSE MADRID

Greening the Internet: Energy-Optimal File Distribution

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resumen:

The impact of the ICT sector in worldwide power consumption is an increasing concern, motivating the research community to devote an important effort to define novel energy efficient networking solutions. Despite file distribution is responsible for a major portion of the current Internet traffic, little effort has been dedicated to address the issue of its energy efficiency so far. Most of the previous literature focuses on optimizing the download time of file distribution schemes (e.g. centralized server-based or distributed peer-to-peer solutions) while it is yet unclear how to optimize file distribution schemes from the point of view of energy consumed. In this work, we present a general modelling framework to analyze the energy consumption of file distribution systems. First, we show that the general problem of minimizing energy consumption in file distribution is NP-hard. Then, for restricted versions of the problem, we establish theoretical bounds to minimal energy consumption. Furthermore, we define a set of optimal algorithms for a variety of system settings, which exploit the service capabilities of hosts in a P2P fashion. We show that our schemes are capable of reducing at least 50% of the energy consumed by traditional (yet largely used) centralized distribution schemes even when considering effects such as network congestion and heterogeneous access speed across nodes. To the best of the authors' knowledge, this work represents one of the first extensive and detailed analysis of the problem of energy efficiency in file distribution.

Sobre Antonio Fernández :

Antonio Fernández Anta is a Senior Researcher at Institute IMDEA Networks. Previously he was a Full Professor at the Universidad Rey Juan Carlos (URJC) in Madrid, where he has been on the Faculty since 1998. He was before on the Faculty of the Universidad Politécnica de Madrid, where he received an award for his research productivity. He has been a postdoc at the Massachusetts Institute of Technology from 1995 to 1997. He has almost 20 years of research experience, with a steady productivity of more than 5 papers per year on average. He has published in top conferences and journals like INFOCOM, STOC, FOCS, PODC, DISC, Journal of the ACM, SIAM Journal on Computing, or IEEE Transactions on Computers. He is vicechair of the Steering Committee of DISC and has served in the TPC of numerous conferences and workshops. He is a senior member of the IEEE since 2002 and of the ACM since 2007. Antonio Fernández Anta received his M.Sc. and Ph.D. degrees in Computer Science from the University of Louisiana in 1992 and 1994, respectively. He completed his undergraduate studies (Licenciado and Diplomado en Informática) at the Universidad Politécnica de Madrid, Spain, in 1988 and 1991 respectively, having received awards at the university and national level for his academic performance.