

At the Core of Internet Timing

Abstract

Internet based synchronization of software clocks is a service relied upon by the global computer population. It is made possible by the existence of a forest of timeservers, the time distribution protocol NTP exchanging timestamps between hosts and their timeserver(s), and synchronization algorithms. At the roots of this forest are the Stratum-1 servers, those enjoying direct access to reference hardware such as an atomic clock, or a reliable GNSS receiver. The Stratum-1 servers act as independent systems, serving their respective trees. They are trusted, core infrastructure, but recent work has shown that many are inaccurate, creating timing errors that cannot be detected by client software, and that no-one is keeping track of. In this talk the fundamental difficulties in the Internet timing landscape will be described, and a new system design, the Network Timing Core (NTC), will be described to replace the independent Stratum-1 model, which addresses these fundamentals at their core.

Bio



Darryl Veitch is an IEEE Fellow who completed a BSc. Hons. at Monash University, Australia (1985) and a mathematics Ph.D. from DAMPT, Cambridge (1990). He worked at TRL (Telstra, Melbourne), CNET (France Telecom, Paris), KTH (Stockholm), INRIA (France), Bellcore (New Jersey), RMIT (Melbourne), Sprint Labs (San Francisco), Technicolor (Paris) and EMUlab and CUBIN at The University of Melbourne, where he was a Professorial Research Fellow until the end of 2014. He is now a Professor in the School of Electrical and Data Engineering at the University of Technology Sydney, and a member of the Global Big Data Technology Centre (GBDTC) where he runs the Timing Laboratory. His research interests are centered around computer networking and inference and include traffic modelling, parameter estimation, the theory and practice of active measurement, traffic sampling and sketching, information theoretic security, and clock synchronisation over networks. His involvement in the networking community has included multiple roles with the ACM Internet Measurement Conference (IMC) since its inception, including Steering Committee membership 2015-21 and hosting IMC2010 in Melbourne.