Tight synchronization timing is expected to play a crucial role for the realization of high value applications such as smart transportation and smart grid. In this paper, we first overview the main synchronization protocols and improvement mechanisms recently proposed, which are based on configuration, software, and specific hardware improvements. Further, we next discuss the main network delay components, since delay asymmetry is one the most significant challenges for synchronization protocols over packet-switched networks. We next propose probing-based mechanisms in order to estimate asymmetry and evaluate the synchronization performance under several network conditions. Lastly we discuss open issues such as security.

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Professor Tipper’s research has been supported by grants from various government and corporate sources such as NSF, DARPA, NIST, IBM, ARO, and AT&T.