Measuring clock skews of remote devices via wireless communications

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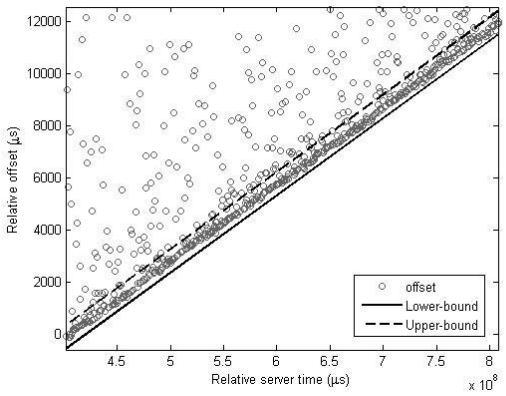
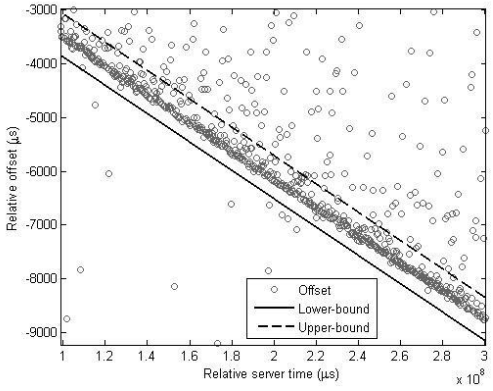
Abstracts:

It is well known that the clock skew of every physical device differs and thus is suitable for device identification in network communications. Several approaches are also proposed to derive a reasonably precise skew estimation, given a time offset sequence of any two devices. These approaches work under the assumption that the transmission time of most packets are close to the minimum delay such that offsets derived from timestamps of these packets flock to a parallelogram in the bottom, as shown in Figure 1. This is true when both devices and the communication channel have moderate or less overhead. However, it is recently observed that few outliers may appear below the parallelogram when at least one of the devices use wireless communication channel like WiFi or mobile communication. The existing methods might generate largely biased estimations to this type of cases. In this talk, I will introduce a new method based on Hough transform for this issue.





(a) (b)

Fig. 1 (a) a classic offset collection has most of points gathering in the bottom area bounded by two parallel lines (b) few outliers might appear below the crowding area when two devices communicate with wireless channels.