

# Hardware Assisted IEEE 1588 Clock Synchronization for Linux Based Network Embedded Systems

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**Abstract**— The paper introduces the IEEE 1588 Clock Synchronization technology primarily developed for Ethernet based Network Embedded Systems and presents a hardware assisted PTP implementation for the Linux operating system (kernel version of 2.6.30 or later) on the x86 architecture. Our software is based on the standard PTPd available for UNIX like operating systems offering only software time stamping. The modified software uses the Linux standard SO\_TIMESTAMPING socket option to communicate with the Ethernet Network Interface Controller driver, so it is supposed to work with any other Ethernet Interface Controllers with proper driver support. Our test system utilizes selected Gigabit Ethernet Interface Controllers supporting hardware time stamping donated by Intel. The initial results show that clock accuracy (master-slave clock difference) less than one microsecond is achievable with our software even in the case of high network traffic and slave node (a node that synchronizes its clock to a master clock) load in standard Linux. The paper also investigates how the coefficients of the clock servo influence initial time convergence and tracking behavior in case of disturbance such as changing network traffic and slave node load.

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