New method developed for synchronizing clocks

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Maintaining the correct time is no longer just a matter of keeping your watch wound -- especially when it comes to computers, telecommunications, and other complex systems. The clocks in these devices must stay accurate to within nanoseconds because their oscillators -- objects, like quartz crystals, which repeat the same motion over and over again -- are synchronized to agree with the clocks on board Global Positioning System (GPS) satellites.

In the journal *Review of Scientific Instruments,* which is published by the American Institute of Physics, researchers report on a new way to accurately synchronize clocks. The new method uses both GPS and the Internet to set clocks within 10 nanoseconds of a reference clock located anywhere on Earth.

The method makes use of a common-view disciplined oscillator (CVDO) -- a device "whose frequency and time are tightly controlled to agree with a reference clock at another location, if both clocks are connected to the Internet and if both clocks are being compared to GPS satellites," says Michael Lombardi, a metrology engineer with the National Institute of Standards and Technology (NIST), and coauthor of the paper along with Aaron Dahlen of the United States Coast Guard.

The significance of the CVDO, says Lombardi, "is simply that you don't have to depend on GPS time." While there is no shortage of GPS disciplined oscillators -- "the telecommunications industry in North America probably owns several hundred thousand of them," Lombardi

says -- "a CVDO potentially provides more versatility. It would allow a telecommunications network to synchronize all of its clocks to a different reference than GPS, such as the NIST standard" -- the atomic clock that keeps the official time for the United States. "If GPS time is wrong, the CVDO will still be correct as long as its reference clock is right."

More information: The article, "A common-view disciplined oscillator" by Michael A. Lombardi and Aaron P. Dahlen was published online in the journal Review of Scientific Instruments on May 2, 2010. See: rsi.aip.org/rsinak/v81/i5/p055110_s1

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