

Time is money: SIM time network has far-reaching benefits

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There are 16 member countries in the Sistema Interamericano de Metrologia (SIM) Time Network that contribute to the continuous, near real-time comparisons of their respective time standards. Credit: A. Novick, NIST

Clocks in the Americas and the Caribbean Islands are now ticking in unison thanks to the work of the Sistema Interamericano de Metrologia (SIM), a regional metrology organization that works to promote accurate measurements throughout the Americas. Since 2005, SIM has been building a time network, designed by the U.S. National Institute of Standards and Technology, that now extends to 16 nations.

The SIM [Time](#) Network allows each of these nations to continuously compare their clocks, with the time differences between the nations displayed on a SIM Web site. These time differences generally are very small, often less than 100 nanoseconds (100 billionths of a second).

It has been said that the world's most commonly asked question is "What time is it?" Nations that maintain accurate time standards benefit all of their residents. Accurate time and synchronization are crucial for much of our modern technology, enabling the efficient operation of telecommunications, computer networks, electric power distribution, and many other parts of the technology infrastructure that we use every day.

The SIM Time Network began in 2005 by adopting technology developed at NIST to more easily distribute accurate time and frequency information to remote locations. NIST developed a self-contained, user-friendly system about the size of a microwave oven that can be quickly installed in any laboratory. One or more [atomic clocks](#) then are connected to the automated system, which uses the Internet and the [Global Positioning System](#) (GPS) to compare the clocks' time with clocks at other laboratories on the network and report the results to the central servers of the SIM Time Network.

The SIM Time Network initially compared the national time standards among Canada, Mexico and the United States. The network has been rapidly expanding, and now includes time standards in Argentina, Brazil, Chile, Colombia, Costa Rica, Jamaica, Panama, Paraguay, Peru, St. Lucia, Uruguay, Guatemala, and Trinidad and Tobago as well. The time from each nation is measured every second, and the measurements are transferred across the network every 10 minutes and displayed on the Internet. The results are publicly available so that anyone can see in near real-time comparisons between the time standards for all the participating countries.

Michael Lombardi, the NIST scientist who designed the network, says that it has helped several laboratories gain status as the official timekeepers for their respective countries, and several of the SIM Time Network participants also have begun participating for the first time in the generation of official international time—Coordinated Universal Time (UTC)—a sort of weighted average of time kept by official clocks maintained by the International Bureau of Weights and Measures in France (French acronym BIPM).

The SIM Time Network has led to increased cooperation and scientific collaboration among its members. Mauricio Lopez of the Centro Nacional de Metrología (CENAM) of Mexico, who chairs the SIM Time and Frequency Working group, and his staff at CENAM led the development of a project that combines the time kept by all of the clocks in the network and produces an average timescale, called SIM Time (SIMT). The laboratories in the network can then compare their clocks to each other and to SIMT.

More information: o see the SIM Time Network in action, visit tf.nist.gov/sim/index.htm

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