National Timing Infrastructure

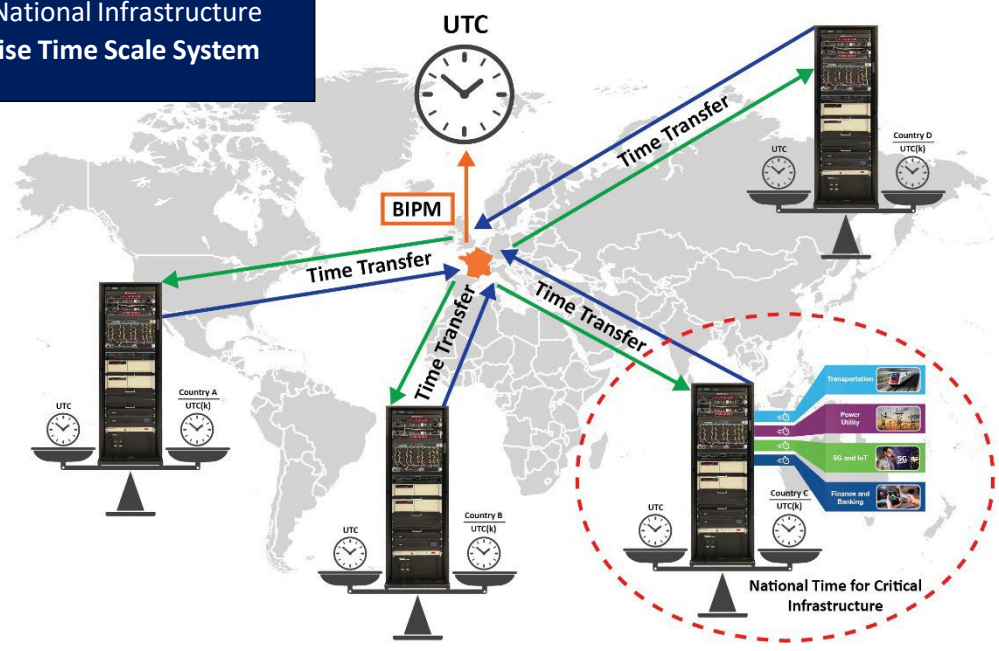
Fully Integrated Independent Time Scale System Back-Up to GNSS

Our Precise Time Scale System (PTSS) combines multiple high-performance clocks to provide a secure, robust and resilient solution to serve as the backbone and primary source of UTC-class time for national timing of critical infrastructure.

Secure UTC Traceable Time to Protect Against Cybersecurity Threats

The strength of a nation's infrastructure depends on the accuracy of time, and with pervasive cybersecurity threats disrupting Global Navigation Satellite Systems (GNSS), an alternative time system is a matter of national security. To protect and defend against GNSS vulnerabilities, the role of a country's national time scale is changing from being a scientific measurement instrument to a vital part of its critical infrastructure. Especially for countries that cannot afford to launch their own GNSS systems, owning and operating time scale systems that align with Coordinated Universal Time (UTC) and are located within their borders is now a matter of national security and part of their cybersecurity strategies.

Protect your National Infrastructure with our **Precise Time Scale System**



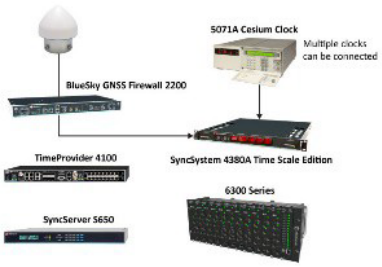
National Timing Infrastructure

UTC is the international timing standard that forms the basis for the coordinated dissemination of standard frequencies and timing signals. UTC is based on International Atomic Time (TAI), an international time scale that is computed by taking the weighted average of more than 300 atomic clocks located at laboratories around the world. Our 5071A Cesium Frequency Standard is the most widely used clock deployed in laboratories contributing to TAI.

UTC is based on TAI, but it adjusts to account for the difference between the definition of the SI second and the rotation of Earth. This correction keeps UTC in synchronization with various astronomical events and it is the standard used for all general timekeeping applications.

The Bureau International des Poids et Mesures (BIPM) is the international organization that is responsible for the realization and dissemination of UTC and it works with laboratories around the world that help contribute to UTC. A laboratory's local/physical realization of UTC is known as UTC(k), where the letter "k" represents the laboratory, typically a country's nationally recognized metrology laboratory. BIPM works with each laboratory to compare UTC with a country's UTC(k) and publishes these differences on a monthly and weekly basis. Using the data that BIPM publishes, laboratories can balance and align their local time with UTC with the goal that UTC and UTC(k) are just a few nanoseconds apart from each other.

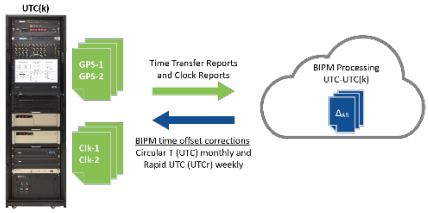
Key Features



- Multi-channel measurement system to provide clock time differences
- Ensemble and time scale algorithms to combine the clocks into one output
- Local realization of UTC and contribution to worldwide UTC calculated by the Bureau International des Poids et Mesures (BIPM)
- Distribution of 5 MHz, 10 MHz, 1 PPS, TOD and IRIG clock signals and packet timing, including Network Time Protocol (NTP) and Precision Time Protocol (PTP)
- Measurements can be archived in a database for analytics
- User interface to provide integrated system command and control
- Automatic generation of BIPM reports (clock, common view and TAIPPP)

National Timing Infrastructure

Use Cases



National Metrology Labs

Contributing to UTC and Realizing UTC(k)

National metrology laboratories establish physical standards for a nation with timekeeping as a fundamental element. Time scale systems have traditionally been reserved for scientific measurements performed by metrology labs and many countries strive to be contributing sources of UTC as managed by BIPM. A country's local time scale is known as UTC(k) and time offset corrections are provided by BIPM to the metrology labs to align UTC(k) with UTC. Additionally, BIPM can access the performance measurements of member clocks that are part of a local time scale in the form of clock reports for inclusion in the international time scale that is computed by taking the weighted average of more than 300 atomic clocks located in laboratories around the world.

Protection from Timing Cybersecurity Threats

National Time Scale for Critical Infrastructure

Few countries in the world can afford to own and operate a GNSS constellation for timing services that critical infrastructure depends on. By deploying a Precise Time Scale System (PTSS) on their own soil, countries can have complete control over the time sources that their critical infrastructure depends on, eliminating timing-related cybersecurity threats. A properly constructed time scale can serve as the primary source of time for critical infrastructure that needs state-of-the-art frequency stability, excellent phase noise and maximal operational availability.