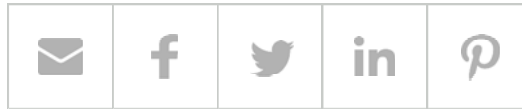




Office of Electricity

The April 2019 Global Positioning System (GPS) Week Number Rollover

FEBRUARY 7, 2019



[Home](#) » The April 2019 Global Positioning System (GPS) Week Number Rollover



 Artist Interpretation of GPS Satellite

Image Courtesy of NASA

On April 6, 2019, there will be an event affecting the electric transmission and distribution system that has industry concerned about the potential for a major disruption. During the [Week Number rollover of the Global Positioning System \(GPS\)](#), the week number that uses the 10-bit binary system will reach its limit of 1,024 weeks and will be forced to roll over and be reset to week 0.

It may seem odd that the stationary electric grid relies so heavily on GPS, but in fact, GPS supports a wide variety of critical grid functions that allow separate components on the electric system to work in unison. This is made possible because the GPS signal contains a running timestamp that identifies the current week and current second within that week, which is converted by the signal receiver to

the proper date and time which we recognize as day, month, year, and time of day.

The initial week 0 started on January 6, 1980, and the first week rollover occurred on August 21, 1999. However, a lot has changed on the electric grid since the last rollover such as the addition of Phasor Measurement Units (PMUs) and the North American Electric Reliability Corporation's (NERC) [requirements of synchronizing sequence of event, fault, and dynamic disturbance recording](#). Synchrophasors, which use systems of phasor measurement units (PMUs) to measure data and time-synchronize it using GPS satellites, provide system operators with a near real-time snapshot of the grid's operating status. These changes to grid technology and functions have brought tremendous new insights to manage and assess the bulk power system, but they also open the door to a concern in the industry that the GPS week rollover could impact an operator's ability to accurately assess grid reliability conditions in real-time.

Many signal receiver manufacturers understand the rollover well and have prepared for it. As a result, most equipment should operate without an issue. However, now is the time to make sure that equipment in the field has received the proper firmware updates.

Operators should also be taking extra care to address the core components where a prolonged GPS outage would have a significantly negative impact on the system.

So how should utilities prepare?



 U.S. Naval Observatory in Washington, DC

Photo Courtesy of U.S. Naval Observatory

The United States Naval Observatory, which maintains the Master Clock, Network Time Protocol (NTP) servers, web-based time synchronization, and GPS timing products and services highly [recommends](#) that all receiver owners contact the receiver manufacturer to see how their receivers may be impacted by this upcoming event. This [list of receiver manufacturers](#) maintained by GPS World can help with searching for contact information.

Utilities can also refer to ICS-CERT's [Best Practices for Improved Robustness of Time and Frequency Sources in Fixed Locations](#) for installing and maintaining time and frequency sources (TFS) in fixed infrastructure locations for Time & Frequency (T&F) operations.

MICHAEL PESIN, OE-10



MORE BY THIS AUTHOR

OFFICE of
ELECTRICITY

1000 Independence Avenue, SW
Washington, DC 20585
202-586-1411

An office of

ABOUT OE

Careers & Internships
Funding Opportunities
Contact Us

ENERGY.GOV RESOURCES

Budget & Performance
Directives, Delegations & Requirements
FOIA

[Inspector General](#)

[Privacy Program](#)

[Small Business](#)

[Staff & Contractor Resources](#)

FEDERAL GOVERNMENT

[The White House](#)

[USA.gov](#)

[Web Policies](#) • [Privacy](#) • [No Fear Act](#) • [Whistleblower Protection](#) •
[Information Quality](#) • [Open Gov](#) • [Accessibility](#)