GPS “rollover” event on April 6 could have some side-effects



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On April 6, the Global Positioning System will reach the end of an era—or more correctly, an epoch. That’s when the Coordinated Universal Time (UTC) clock used by the satellite navigation system will reach the limit for its 10-bit “week number” (WN) counter and flip back to 0000000000.

GPS time is linked to the official UTC clock time provided by

the US Naval Observatory. But the GPS version of the clock tracks the date by counting the number of weeks since the beginning of the current GPS "epoch"—August 21, 1999. So as the clock reaches midnight tonight on the prime meridian, the GPS calendar will suddenly become 20 years out of date.

This should not come as a surprise for most newer GPS navigation systems. There has been plenty of warning—GPS went through a similar flip once before. And the Department of Homeland Security's National Cybersecurity & Communications Integration Center issued a warning in April 2018 that this rollover was coming, as it will every 1,024 weeks—until the modernization of the GPS constellation is complete, and then the WN counter will be increased in size to 13 bits.

Most newer GPS receivers will shrug off the rollover because they've been programmed to accommodate the epoch change. But older systems won't—and this may prove to have some interesting side-effects, as timing data suddenly jumps by 19.7 years. The clock change won't directly affect location calculations. But if GPS receivers don't properly account for the rollover, the time tags in the location data could corrupt navigation data in other ways.

But navigation isn't the only concern. There are many systems that use the time for other purposes—cellular networks, electrical utilities, and other industrial systems use GPS receivers for timing and control functions. Since many of these systems have extremely long lifecycles, they're the ones most likely to have not been updated.

The rollover issue isn't limited to one day. Because of the way some manufacturers accounted for the rollover date in the past—by hard-coding a date correction into receivers' firmware—their systems might fail at some arbitrary future date. Some have already succumbed: in July of 2017, an older NovAtel GPS system failed, and while the company issued a notice months earlier warning users to upgrade firmware, many

remained ignorant of the notice until it happened. Motorola OncoreUT+ systems and some receivers using Trimble’s GPS engines also have failed over the past three years for similar reasons.

If you have a GPS receiver embedded in anything you own that has been around for a few years, do yourself a favor today and check for a firmware update.

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