GPS Week Number Rollover Event Notification

March 29, 2019

Products

SEL-2401, SEL-2404, and SEL-2407® Satellite-Synchronized Clocks

SEL-2488 Satellite-Synchronized Network Clocks

ICON® Integrated Communications Optical Networks

Summary

On April 6, 2019, at 23:59:42 UTC, GPS will experience a week number rollover event. This may cause any date-reporting devices that use GPS receivers to reset the date to August 1999 if the devices lack the functionality to address this event. All SEL clocks and ICONs will correctly address the April 6 event.

SEL-2401, SEL-2404, and SEL-2407 clocks with Version 1 hardware will experience an internal rollover event in September 2024 if they have not been updated to the latest firmware release for Version 1 hardware prior to September 2024.

Background Information

GPS uses a counter to determine the number of weeks that have passed from a specific date. It uses this and another counter, the number of seconds elapsed since the last week number change, to determine the current date and time. The week number counter has a maximum value of 1,023, after which it rolls over to 0 and starts again. This results in 1,024 weeks, or approximately 19.6 years, between rollover events. This issue only affects the date presented by the clock; time is not affected.

The starting date for GPS is January 6, 1980. The first rollover event was August 22, 1999. The next event is April 6, 2019. Because GPS signals do not provide information on the number of rollover periods that have occurred, clocks need to maintain the number of rollovers to set the current origin (latest rollover) date. The clocks add the GPS week number to the origin date to present the correct current date to the user.

Learn more at ics-cert.us-cert.gov/sites/default/files/documents/Memorandum_on_GPS_2019.pdf.

SEL Analysis

The current firmware in SEL satellite-synchronized clocks and ICON devices address this event.

SEL has tested future GPS rollover event dates to confirm that SEL satellite-synchronized products (i.e., clocks and ICON) will correctly maintain time through these events. SEL uses equipment that simulates actual GPS signals to confirm that the products will work with live GPS signals when future rollover events occur.

SEL-2401, SEL-2404, and SEL-2407 Version 1 hardware clocks without current firmware will experience an internal rollover event in September 2024 (the current firmware versions are R112 for the SEL-2401 and SEL-2404 clocks and R116 for the SEL-2407 clock). The 2024 event can be addressed by upgrading the clocks to the current firmware for Version 1 hardware. SEL provided notification of this event and the resolution as part of Service Bulletin 2013.25. Version 2 hardware is not affected.

ICONs with SEL-8030-01 Server Module firmware versions earlier than R117.0 will experience a similar internal rollover event either in February 2027 or January 2028, depending on the hardware version. Upgrading to R117.0 or later firmware addresses both of these events.

SEL Recommendation

If you are using the following SEL clocks, confirm that they are using the latest firmware. The following firmware versions address all known future rollover events:

- SEL-2401 Version 1 hardware—firmware Version R112
- SEL-2401 Version 2 hardware—firmware Version R200
- SEL-2404 with SEL-2401 Version 1 hardware—firmware Version R112
- SEL-2404 with SEL-2401 Version 2 hardware—firmware Version R200
- SEL-2407 Version 1 hardware—firmware Version R116
- SEL-2407 Version 2 hardware—firmware Version R200
- SEL-2488: all firmware versions

If you are using the ICON, confirm that the SEL-8030-01 Server Module has firmware Version R117.0 or later.

How to Determine if a Clock Requires a Firmware Upgrade

Use the following steps to confirm that your SEL clock has firmware that is compatible with the rollover event.

Step 1. Access the clock through a terminal application such as ACSELERATOR SEL-5030 QuickSet® Software or Tera Term software.

Step 2. Change to Level 2 access by using the 2AC command (issue **2AC** and press **<Enter>**).

Step 3. Issue **STA** and press **<Enter>**.

Step 4. Observe lines 2–4 of the response.

Line 2 shows the current firmware installed (**FID=**).

Line 3 shows the current FPGA firmware installed (**RFID=**).

Line 4 shows details on the current GPS receiver (**RXFID=**).

Update Required

Clocks that require an upgrade will have the following details in lines 2–4:

- SEL-2401 (SEL-2404) Version 1 hardware:
  - **FID=SEL-2401-R111** (or lower version number).
  - **RFID=SEL-2401-R101**.
  - The RXFID line will *not* contain the text **HW-1001** or **HW-3017**.

- SEL-2407 Version 1 hardware:
  - **FID=SEL-2407-R115** (or lower version number).
  - **RFID=SEL-2407-R105** (or lower version number). Clocks with a lower RFID version number than R105 will also require an FPGA firmware update. See the SEL-2407 Instruction Manual for instructions to upgrade the FPGA firmware.
  - The RXFID line will *not* contain the text **HW-1001** or **HW-3017**.

No Update Required

Clocks that do *not* require an upgrade will have the following details in lines 2–4:

- SEL-2401 (SEL-2404) Version 1 hardware:
  - **FID=SEL-2401-R112**.
  - **RFID=SEL-2401-R101**.
  - The RXFID line contains the text **HW-1001**.
- SEL-2401 (SEL-2404) Version 2 hardware:
  - **FID=SEL-2401-R200**.
  - **RFID=SEL-2401-R103**.
  - The RXFID line contains the text **HW-3017**.
- SEL-2407 Version 1 hardware:
  - **FID=SEL-2407-R116**.
  - **RFID=SEL-2407-R105**.
  - The RXFID line contains the text **HW-1001**.
- SEL-2407 Version 2 hardware:
  - **FID=SEL-2407-R200**.
  - **RFID=SEL-2407-R106**.
  - The RXFID line contains the text **HW-3017**.

Contact

For further questions, concerns, or upgrade support, please contact your SEL customer service representative or application engineer or contact SEL Customer Service at +1.509.332.1890.

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