



Testing Results

Leap Second Testing
Model Name: SyncServer® S200/S250
Release Version: 1.10 and 1.11
Date Tested: November 2008

The following leap second testing results provide time of year information across the boundary between December 31, 2008, and January 1, 2009 (UTC time). This includes, but is not limited to, handling of the time information provided via the unit's output ports. Note: since 2008 is a leap year the leap second will be added at the end of the 366th day.

All testing below has been done on an S200/S250 running firmware Release version 1.10 or 1.11. If you are running a version of firmware that is lower than 1.10 Symmetricom recommends that you download the latest version for your S200/S250 at:
<http://www.symmetricom.com/support/online-support/ttm-product-support/software-downloads/>

Symmetricom products that report time information will do so as described below. The system time and all of its related outputs should increment time monotonically except for the following discontinuity, which is expected:

1. December 31st, 2008 23:59:59
2. December 31st, 2008 23:59:60 (some clocks may display a repeated value of 59 sec)
3. January 1st, 2009 00:00:00

Testing was done on an S200/S250 that was synchronized to a single input source: GPS, IRIG or an NTP server.

S200/S250's locked to GPS:

For the below tests, the simulation time was started on December 31st, 2008 at 22:30 and allowed to run until January 1st, 2009 at 00:15, for a total simulation time of 1 hour and 45 minutes. The leap second is handled as follows on the S200/S250's IRIG output, serial output and NTP server ports:

Output on IRIG port with IEEE 1344 enabled or on Sysplex port:

366:23:59:58
366:23:59:59
366:23:59:60
001:00:00:00
001:00:00:01

Output on NTP server:

The NTP server correctly sets the Leap Indicator pending bits in packets served.

S250 locked to an IRIG source:

IEEE 1344 compliant IRIG source:

When the S250 is locked to an IEEE 1344 compliant IRIG source that correctly sets the leap second pending bit, the S250 will set the leap second pending bit on its IEEE 1344 compliant IRIG outputs and add the leap second to its IRIG output as shown above. The NTP server correctly sets the Leap Indicator pending bits in packets served.

For customers whose S250 is locked to an IEEE 1344 compliant IRIG source and who are using the S250's NTP server capability:

By definition the leap second pending bit in an IEEE 1344 compliant IRIG source is not set until one minute before the actual leap second insertion. Once the S250 receives this notice it will set the leap indicator pending field in all NTP packets it serves, notifying downstream clients of an upcoming leap second insertion. NTP does not respond well in general to such short notice of a leap event since the poll intervals of NTP and SNTP clients are generally longer than 60 seconds. If the poll interval of the NTP/SNTP clients is set to the minimum poll interval of 16 seconds it is likely the clients will all adjust/leap in sync to about three levels deep in the NTP Stratum hierarchy. Longer poll intervals will result in the clients seeing at least a 1 second offset from a previous poll. For NTP/SNTP clients that step the time or clients that synchronize with very long poll intervals the 1 second jump will not likely be a problem. For NTP clients that poll at intervals slightly greater than 60 seconds or just miss the leap indicator notification, there is a possibility those NTP clients may not sync to the S250 for several minutes if the S250 is the only source of time. For further information on setting your clients' poll interval, see your NTP clients' documentation.

Non-IEEE 1344 compliant IRIG source:

Assuming the incoming IRIG source abruptly adds a leap second at the end of the UTC day on Dec. 31st, 2008 the S200/S250 will update the time on its IRIG and Sysplex outputs correctly. It will take up to 15 minutes to insert the leap second into the NTP packets served by the S200/S250.

S200/S250 synchronized to an NTP server with the leap indicator bits set:

NTP response packets include a leap indicator field that warns networking elements that get their time via NTP that a leap second should be inserted at the end of the current day (UTC). Since the leap indicator field can only be set up to 24 hours in advance of the leap second event, Symmetricom recommends that the Maximum poll interval (Maxpoll) of SyncServers in this configuration be set to less than 24 hours. For further information on setting Maxpoll see the [SyncServer User Guide](#).

Assuming an S200/S250 is synchronized to another NTP server and that this S200/S250 has received an NTP time packet with the leap indicator field correctly set to indicate a pending leap second at least 10 minutes before the event, the S200/S250's IRIG and Sysplex outputs will add the leap second 3 seconds after midnight UTC as shown below. The time served by the S200/S250 as well as the leap indicator bits will be as follows:

Time on IRIG/Sysplex Ports	Time in NTP packets served	Leap Indicator Bits
366:23:59:58	23:59:58	10 (leap second pending)
366:23:59:59	23:59:59	10 (leap second pending)
001:00:00:00	23:59:59	10 (leap second pending)
001:00:00:01	00:00:00	00
001:00:00:02	00:00:01	00
001:00:00:03	00:00:02	00
001:00:00:03	00:00:03	00
001:00:00:04	00:00:04	00

Symmetricom is not responsible for the correct processing of this information by any external program or device, only the transition from the year 2008 to the year 2009 as provided by the unit's output ports.

Symmetricom, Inc. is making every effort to provide accurate and up-to-date information on the Leap Second readiness of its products. This information reflects the current results of compliance tests of standard products and may be updated or changed without notice as testing continues. This information is published for our customers' assistance only. An overall assessment and plan based on particular needs is our customers' responsibility. Symmetricom disclaims any implied warranties of merchantability and fitness for a particular purpose and makes no express warranties except as may be stated in its written agreement with its customers. In no event is Symmetricom liable for any indirect, special, or consequential damages. Liability is limited to the purchase price of the product.