



SPG9000

Timing and Reference System

Release Notes

This document supports firmware version 4.1

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Release Notes

This document describes the new features, fixes, improvements, and limitations of firmware version 4.1 for the SPG9000 Timing and Reference System.

Product Updates

- Upgrades** All SPG9000 products are eligible for upgrading to 4.1 using the standard upgrade process. All customers with earlier releases are strongly encouraged to upgrade as soon as possible to take advantage of the bug fixes and stability improvements.
- Downgrades** There are currently no downgrades possible from version 4.1 to 4.0 or earlier.

New Features

Version 4.1 is a minor release that adds a new feature for Secondary Reference plus several other fixes and improvements. See the user manual for details about the following functions and their operation:

- When the reference source is GNSS, a secondary reference source can be configured to either a 10 MHz signal on the genlock input (such as an external rubidium or cesium clock) or a PTP follower to another grandmaster. This provides an extra layer of resiliency when the GNSS signal is lost instead of going directly to holdover mode using the internal oscillator.
- Controls have been added to the PTP (1G or 10G) and IP (10G or 25G) port configuration to manually force the interface speed when it cannot be automatically detected from the SFP module.
- The front panel STATUS : FAULT and STATUS : ALERT menus are now dynamic and update to the current real-time status, rather than maintaining the history of a previous event that has since cleared.
- When the time-of-day reference is internal (including using NTP client to an external server) or time code (LTC input or VITC on genlock input), you can now configure the leap second offset between UTC and TAI time, which is necessary for PTP leader operation. The offset can be manually set or an external service can be automatically queried when the system powers on.
- A new API endpoint (/system/health) has been added for monitoring the SPG9000's CPU and memory usage
- For future firmware upgrades, the File Manager on the web interface can be used to upload the firmware package and perform the upgrade remotely.

Resolved Issues and Improvements

This firmware release has resolved the following issues and makes the following improvements to the previous 4.0 release.

- PTP** In rare instances, the PTP processes stopped running at indeterminate times or did not initialize correctly when the system was restarted. The user interface showed that the domain was set to 120, but it could not be changed. This error state could also happen when unexpected packets were received on the PTP and IP ports.

The issue has been fixed by updating the network drivers of the PTP and IP ports to catch I/O operations that had been waiting indefinitely. Additional logging messages have been added, and the user interface will no longer report placeholder values like PTP domain 120. The Status tab of the user interface has a new TSG CPU section in the System diagnostics panel, to show the current operational status of the internal processor.

Holdover operation for a PTP follower reference source has been significantly improved.

1000BASE-T SFP modules from some vendors may report a speed of 2 Gbps, which will appear as an error in the Network Settings on the web interface. The error indication is strictly cosmetic, and the SFP will correctly operate at 1 Gbps.

After upgrading from an earlier firmware version, the default value for the new Header Version parameter may be set to 2.1 in the Power-On Default preset. You may need to change this to 2.0 for interoperability with other devices in your PTP network.

The timeOfPreviousJam value in the SMPTE ST 2059 synchronization metadata TLV is correctly updated after a scheduled or manual Jam Sync.

When using Internal time, the PTP leader will now report the currentUtcOffsetValid flag as true when the TAI-UTC offset is confirmed either manually or automatically. The ptpTimescale flag is also now set to true for Internal time.

- IP** The IP ports may incorrectly report a link down condition. To clear the error, disable and re-enable the ports from the Network Settings menu.

The “a=ptime” statement in the SDP object for ST 2110-30 audio streams will now use “1” instead of “1.0” when the packet time is set to 1 millisecond, per AES67 requirements.

If an SFP module for the IP 1 or IP 2 port is removed and replaced by a different speed module (e.g. from 10G to 25G or vice versa) while the system is operating, the IP streams may stop working. A power cycle is required to resume operation with the new port speed.

If the fiber link is disconnected from one of the IP ports, there may be a momentary disruption to the IP streams transmitted from the other port.

Resolved Issues and Improvements

For UHD and 4K formats using the default values, the IP streams may slightly exceed the upper limits for the ST 2110-21 virtual receiver buffer model. This can be corrected by adjusting the source timing to delay the video one or two lines, or by decreasing the TR_{OFFSET} value in the receiver by a few microseconds.

NMOS The labels used by NMOS sender, source and flow objects will now use the System Name (configured in the System Information section of the System tab of the web interface) as a prefix to the sender-specific labels.

Test Signals Logo overlay will be displayed if the Y position would extend above the visible image. The logo will be flush to the top edge of the background test pattern.

Text overlay will be rendered correctly for interlaced and segmented formats, instead of swapping field order.

NTP The Update on Restart will retry if the query to the remote server fails when the SPG9000 is powered up. This could happen if the SPG9000 restarts faster than the local router or NTP server.

If the time reference is Internal, the NTP Server query operation will no longer cause the system clock to drift apart from real time on some systems.

LTC The LTC time is correctly synchronized when the time-of-day source is set to PTP Follower. Previously, the seconds digits were off by 1.

Genlock The fine horizontal delay control on the web interface correctly makes adjustments in nanosecond units.

General Limitations

This firmware release has the following general limitations.

GNSS When using the Secondary Reference, first obtain a valid lock with the GNSS primary reference before switching to a CW 10 MHz or PTP follower secondary reference.

If the secondary reference is set to CW 10 MHz and the input signal is not stable, the system may take a long time to return to the primary reference source.

GNSS does not lock while system is in mobile mode and moving.

The web interface reports that GNSS is locked 10-15 seconds too soon when in Jam Phase holdover recovery mode.

General Limitations

If the GNSS signal quality is low, especially if multipath is present, then the UTC offset may shift and not recover for 12.5 minutes. This was more prevalent in the 1.0.1 release and can be detected by monitoring the syslog output. Software changes in the 2.0 release reduce the probability of this happening. To avoid this, first ensure the GNSS signal is strong. Secondly, configure the SPG9000 to defer leap second changes to a local time at least one hour after UTC midnight.

PTP Do not configure the reference source as PTP Follower such that the follower can track a leader on the other port of the same SPG9000. For example, you cannot configure both ports to Ordinary Clock mode on the same network and same domain because one OC in follower state could lock to the other OC in the leader state. This is an unstable configuration.

When using Dynamic Priority with multiple SPG9000s that are powered-on at the same time, the preferred GM (as determined by the configured Priority 1 and Priority 2 values) may not start as the active leader, although GM changes are minimized on system startup. Use the Restore function if you wish to reset the active leader to the preferred GM.

Genlock If the expected Genlock Input format is set to CW 10 MHz, but the actual input signal is a different format (such as NTSC, PAL or HD Tri-level), the reported status may be incorrect.

SDI SDI timing adjustment is scaled wrong for some formats, so the amount requested is not equal to the actual offset of the signal.

SDI 3G Level B 47.95 and 48Hz signals are not fully correct.

6G-SDI outputs with 1080-line image size, frame rates of 47.95, 48, 50, 59.94 or 60 fps, and sample structures other than 4:2:2 10-bit are not fully tested due to equipment limitations. These are provided on a best effort basis only. Pathological signals are not correct.

IP If a video source (1-4) is configured for Level B 3G-SDI, that source will not appear correct if it is also used for an IP video stream. Use Level A 3G-SDI or use source 5-6 for the IP stream.

Test Signals When loading a TIFF image for UHD and 4K formats, ensure that the source file has an image width and height that is divisible by 4 pixels, such as 3840 or 3836 but not 3838.

If TIFF image files (especially UHD or 4K size) are set for the test pattern output on one or more video sources in the Power-On Default preset, the system boot time will be noticeably longer. We recommend using a standard test pattern for the Power-On Default preset and then load the image file after the system is running.

NMOS NMOS should be disabled and re-enabled if the system's domain name is changed.

General Limitations

The SPG9000 may briefly stop sending IS-04 “health” messages to the registry after several weeks of continuous operation. If this happens, the NMOS process will restart and the SPG9000 will re-register its node, device and sender resources.

LTC When the time-of-day source is set to PTP Follower, LTC outputs may not be synchronized for a few moments, until the PTP instance is tracking closely.

System USB memory devices may erroneously report being damaged after removal from the SPG9000 and mounting on another computer.

Front panel display updates may briefly change to an intermediate setting before displaying the correct setting.

The system may not function properly immediately after a firmware upgrade when a new PLD is loaded. Always power-cycle the system after performing a firmware upgrade.

If the system time is incorrect (perhaps because the Internal time source is intentionally set to another time), files uploaded with the File Manager will show that incorrect date and time instead of the creation time of the source file.

If a preset file is saved from the web interface, the yellow “Save in progress” message may disappear before the save operation has actually completed. Please wait a few seconds after the message disappears before powering-down the SPG9000.