



**SPG9000**

**Timing and Reference System**

**Release Notes**

This document supports firmware version 5.0

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# Release Notes

This document describes new features, fixes, and improvements of firmware version 5.0 for the SPG9000 Timing and Reference System.

## Product Updates

**Upgrades** All SPG9000 units are eligible for upgrading to version 5.0 using the standard upgrade process. If the SPG9000 is currently using version 4.1 or later, the remote upgrade process added in that release may be used to upgrade to version 5.0.

All customers with release 4.0 and earlier are very strongly recommended to upgrade to version 4.1 or later as soon as possible to take advantage of important bug fixes and stability improvements.

The upgrade process to version 5.0 requires two steps when performed from the File Manager of the web interface:

1. Upgrade to an intermediate version 4.9. This firmware is included in the same .zip package that is downloaded from the Telestream website.
2. Upgrade from version 4.9 to 5.0.

The upgrade process using the front-panel USB port can be performed in one step, directly to version 5.0.

**Downgrades** There are currently no downgrades possible from version 5.0 to 4.9, 4.2, or any earlier version.

## New Features

Version 5.0 is a major release that adds significant new features and enhancements plus several fixes and improvements. See the user manual for details about the following functions and their operation:

- The IP 1 and IP 2 ports (used for ST 2110 IP stream generation) now also support PTP, so the SPG9000 has a total of 4 independent PTP ports when the SPG9000-PTP license is enabled.
- Ancillary data generation has been greatly enhanced for both SDI outputs and ST 2110-40 streams, with the addition of user-defined static ANC packets (e.g. AFD) and user-defined dynamic ANC packets (e.g. captions/subtitles). The payload identifier (VPID) has also been added for ST 2110-40 streams.
- Cross-Reference is a new feature that measures the time offsets from GNSS and any PTP followers relative to the current system clock. Alarm thresholds may be set for large offsets, perhaps due to signal spoofing. Cross-Reference measurements can also be used to determine GNSS cable delay and PTP delay asymmetry adjustments.
- Enhancements to holdover operation, including a timer of how long the system has been in holdover mode and an estimate of recovery time when the system is adjusting phase. A new setting has been added to configure the maximum time offset allowed before the system will jam

the time (instead of a slow recovery), including an “Unlimited” option.

- Dual-Follower BMCA mode has been added for PTP reference. If the two followers are locked to separate grandmasters, or the same GM via different path lengths (steps removed), the Best Master Clock Algorithm will select the best follower instance that is used for the reference source.
- Acceptable Master Table (AMT) for PTP can be enabled to specify an inclusion list of grandmaster IDs of leaders that will be compared in the BMCA. This can be used for security to prevent rogue leaders, or to prevent synchronization loops when PTP leaders and followers are both configured on the same SPG9000.
- A Clock Quality Change Delay option is available for GNSS-locked PTP leaders. If there is a short disruption to the received GNSS signal, the leader can delay changing its Clock Class and Clock Accuracy values if the normal signal is restored quickly.
- The LTC outputs now support a format of 30 fps non-drop at 29.97 Hz.
- Support for partial preset files that are saved and recalled from the user interface. For example, you could save a preset file with test signal output settings only, so that when it was recalled the reference and synchronization settings would be undisturbed.
- The Power-On Default preset can be automatically updated so that you don't have to manually save the settings after making changes.
- SSH access can be blocked by the firewall if it isn't needed for technical support.
- The Reference section of the System Status on the web interface will show a warning if oscillator calibration is required, and a new button has been added to perform the calibration remotely.
- The ID Text overlay for test signal generation now supports both near-white and near-black text colors. If the optional border is enabled, its color will be the opposite of the text color.
- SPG9000 systems manufactured after July 2025 have an improved internal oscillator, which results in better performance in holdover mode.

## Resolved Issues and Improvements

This firmware release has resolved the following issues and makes the following improvements to the previous 4.2 release.

**Reference** When switching between GNSS primary reference source and PTP secondary reference source, there will no longer be small frame reset adjustments.

With the addition of new modes for Dual Follower when the reference source is PTP Follower, the “Port 2 Priority” mode is no longer available.

**GNSS** The GNSS receiver will no longer immediately respond to spurious drops in the Figure of Merit from a locked signal (FOM 7-9) to no signal (FOM 0) and back again within one second.

When the secondary reference is set to CW 10 MHz and the primary GNSS reference returns, the system will recover normally in all states.

The web interface status does not show Locked until the system has completed any necessary adjustments to Frame Resets.

Time jumps resulting from erroneous leap second values from the GNSS receiver will no longer occur.

The front-panel STATUS : GNSS menu now shows the same signal quality and satellites information as the web interface.

**PTP** The Steps Removed value of a follower instance is now reported alongside grandmaster values in the detailed Status section of the web interface.

The network interfaces for multiple PTP instances may now share the same IP subnet.

When two or more ports are configured as Ordinary Clocks and the reference source is PTP Follower, use the new Acceptable Master Table feature to prevent “synchronization loops” where the SPG9000 is locking to its own output.

Use the new Dynamic Priority Delay option for PTP to ensure that the desired port is the active leader when a complete system (with multiple SPG9000s and network switches) is powered on at the same time.

If the PTP instance is set to Ordinary Clock mode and the Sync message rate is high, the instance will no longer change to the leader state if it is not the best leader per the BMCA.

Improvements have been made to the system startup behavior to prevent PTP leaders from becoming active too early, before the system has fully locked to its reference source.

The `/ptp/{instance}/parent-ds` API endpoint will correctly return a response when the instance is disabled.

## Resolved Issues and Improvements

- Black** Changing the horizontal fine timing for outputs 4-6 will no longer cause the application to restart.
- Word Clock** The phase of the Word Clock output will be correctly set to the Power-On Default preset value when the system is powered on.
- The web interface menu for Word Clock Delay now correctly uses its resolution of 0.1  $\mu$ s steps.
- Test Signals** TIFF files used for the image file option for test signal outputs no longer need to have width or height values that are divisible by 4 pixels.
- A logo image with an odd number of lines in height will no longer show artifacts in the output image on the line below the logo overlay for interlaced formats.
- Multiburst test patterns now work correctly for UHD/4K image sizes.
- SDI** Unsupported 6G-SDI formats (1080-line image size, frame rates of 47.95, 48, 50, 59.94 and 60p, and sample structures other than 4:2:2 10-bit per ST 2081-10 Mode 2) cannot be inadvertently selected from the user interface or API.
- Sample values for blanking data are now correct for 12-bit formats, for both full-range and narrow-range.
- IP** The HTTP API endpoints for configuring ST 2110-40 streams have changed from `/ip/time-code/{stream}` to `/ip/data/{stream}` to reflect the additional ancillary data types now supported. This change also affects JSON preset files that may have been manually created.
- Sample values for 10-bit video formats can use the complete range from 0-1023 (0x000-0x3FF) for video sources 5 and 6. Video sources 1-4, which are used by both SDI outputs and IP video streams, must still avoid using the protected ranges of 0-3 and 1020-1023.
- Video streams using a source with the 720×486 SD image size will correctly generate 486 lines of video. A new Standard Definition menu has been added to select Extended Window Mode to generate 487 lines of active video.
- NMOS** NMOS no longer needs to be disabled and re-enabled if the system's domain name is changed.
- When the settings for a video source or IP stream are updated such that the SDP object and/or transport parameters change, the SPG9000 Node will re-register the appropriate resources with the NMOS registry.
- System** If the web interface is open in a browser window and the system is powered down and back on again, the web application will re-connect to the browser when it has finished restarting.

## Resolved Issues and Improvements

The SNMP `powerSupplyFaultClear` Trap message will now be sent when the fault condition is cleared (and `powerSupplyFault` Trap messages stop being sent.)

Installing an SSL Certificate Key file (with a filename extension of `.key`) now works correctly on Mac computers.

Downloading files from the File Manager or downloading the Service Report package will no longer cause the user to logout when using the Firefox browser.

Additional security has been added to prevent the “operator” user account from making configuration changes through the browser console.

## General Limitations

This firmware release has the following general limitations.

**Reference** 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.

**Genlock** The vertical (line) and horizontal coarse adjustments for genlock timing do not have an effect when the input format is a 10 MHz CW signal. The horizontal fine timing ( $\pm 10$  ns) adjustment works correctly.

When the reference source is changed to Genlock Input, it may take several seconds for the internal frame resets to fully adjust.

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

**PTP** When the Secondary reference source is set to PTP Follower and is currently active, changing the Holdover Recovery menu setting to Jam Phase will not immediately change the phase. The Stay Legal and Fast Slew settings operate as expected.

**Test Signals** 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.

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

**NMOS** 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.

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

## General Limitations

Front panel display updates may briefly show 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 cycle power to 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 the internal system time is intentionally set to a date far in the past or future, the web interface may be unavailable.