PathWave Test Sync Executive

KEYSIGHT

Contents

PathWave Test Sync Executive (KS2201A) Release Notes

For licensing information see:

- Chapter 3 (Installing Licenses) in the PathWave Test Sync Executive User Manual.
- Licensing Quick Start Guide.

Release 2023 version information

Build #	3.19.4
Released Date	May 31st, 2023
Operating Systems	Microsoft Windows 10 64-bit Pro and Enterprise
Supported PXIe Infrastructure [1]	M901x, M904x, M9032/3A
Supported Instruments [1]	M310x, M320x, M330x, M530x, M520x
File Name	PathWave-TestSyncExecutive-2023-winx64.exe

[1] For information on the specific instrument models supported and the software and firmware version requirements, see: Instrument Software and Firmware Requirements for KS2201A.

New Features

- TSE Service to automate system initialization and enable transparent multi-host operation.
- Clock Skew Monitoring based on M9032A/M9033A for robust instrument alignment on large-scale multi-chassis systems.
- Sync-Register and Sync-For statements for real-time sequencing. Speeds up synchronized multi-instrument real-time looping.
- Support for configurable read-latency in FDS ports in User IP in FPGA Sandboxes.
- User-defined PXIe-DSTAR trigger routing.

Breaking Changes:

- Renamed TSE libraries and namespaces to include "tse" instead of "hvi" in the name:
  - Python: keysight_hvi was renamed to keysight_tse
  - .NET: Keysight.Hvi was renamed to Keysight.Tse

Fixes

- Added instrument locking when running quick/optional alignment. This could have resulted in conflict and unexpected behavior when two different processes were running initialize, creating a sequencer, or calling loadToHw(), involving the same instruments concurrently.

Known Issues or Limitations

- In systems with a large number of M5xxxA instruments, some M5xxxAs may take too long to initialize, so that PXI Resource Manager may not discover all instruments in time and include them in the pxiesys.ini file. This results in TSE Service skipping some instruments if autodetect is used without any error or warning, for System Synchronization Modules, TSE Service will generate an error and retry.

  - If this issue is encountered, you must trigger the PXI Resource Manager to rescan the system once all M5xxxAs have completed initialization, and restart TSE Service to re-autodetect instruments. See M5xxxA documentation for more details on boot-up timing.

  - Note that if TSE Service is configured without autodetect and instead lists instruments explicitly, TSE Service will generate an error and retries until all PXI instruments are properly listed in pxiesys.ini

- Detection of real-time errors during Fast Data Sharing (FDS) transaction is not available in this release. This affects real-time data transactions performed using the SyncFpgaDataSharing statement. Because of this limitation, users will not be notified by TSE if there is an error in the User FPGA IP response during an FDS transaction.

- Resources stay locked if a user application crashes after the `loadToHw()` and before the `releaseHw()` while using TSE Service to manage local/remote resources. TSE Service exposes a command-line option to force the release of resources and recover from this situation, without having to restart the system. See the *PathWave Test Sync Executive System Setup Guide* for more details.

Release 2022 version information

Build #	2.7.7
Released Date	July 1st, 2022
Operating Systems	Microsoft Windows 10 64-bit Pro and Enterprise
Supported PXIe Infrastructure [2]	M901x, M904x [1], M9032/3A
Supported Instruments [2]	M310x, M320x, M330x, M530x [1], M520x [1]
File Name	PathWave-TestSyncExecutive-2022-winx64.exe

[1] New products supported from 2022 release.

[2] For information on the specific instrument models supported and the software and firmware version requirements, see: Instrument Software and Firmware Requirements for KS2201A.

New features

- Multi-process support, compatible with *Keysight Distributed Infrastructure* (KDI) and Instrument's Remote Drivers.
- Support for the new M904x PXIe chassis family including the optional *High Performance Reference Clock Source* (HPRCS) and the configuration of the clock outputs.
- Extended system definition and initialization to include analog reference clocking configuration and system calibration.
- *Fast data sharing* (FDS) across instruments' FPGA sandboxes using PXIe DSTARB/C and M903x SSM together with System Sync for multi-chassis.
- Support for user-defined trigger routing across instruments and chassis.
- Logging capability to simplify troubleshooting.

Fixes

- Fixed an issue loading the correct DLL for Keysight M9005A PXIe Chassis that is required to use simulated chassis instead.
- Improved system initialization and configuration timing.

Release 2021 version information

Build #	1.15.7
Released Date	December 13th, 2021
Operating systems	Microsoft Windows 10 64-bit Pro and Enterprise
Supported Hardware[1]	M9032A, M9033A, M3100A, M3102A, M3201A, M3202A, M3300A, M3302A, M5302A
File Name	PathWaveTSE_2021_winx64.exe

[1] For information on the specific product models supported and SW&FW version requirements refer to: Instrument Software and Firmware Requirements for KS2201A

New features

- New PXIe multi-chassis support based on the new M9032A/33A PXIe System Sync Modules, which deliver better scalability with faster Sync timing.

  - Support for M9031A has been discontinued. This release does not work with M9031A.

- Change in the SW licensing policy: -HVx instrument hardware options are no longer required and instead a KS2201A SW license is required per instrument or module used with Test Sync Executive.

  - For Instruments or modules that still use the -HVx hardware option, licensing will work as in previous releases. Both types of instruments or modules can work together in the same system. Test Sync Executive software will accommodate both situations and use the KS2201A software licenses for modules without the -HVx option and use the -HVx hardware option when that is available.

Fixes

- Extended the maximum number of instrument actions supported from 64 to 128. This was limiting the use of all actions in some M3xxxA products with more than 64 actions.

- Enhanced the sequence text output to display the instruction including parameter errors, instead of only the instruction label when not all parameters of the instruction are properly set.

Release 2020 Update 1.1 version information

Build #	1.4.15
Released Date	March 24th, 2021
Operating systems	Microsoft Windows 10 64-bit Pro and Enterprise
Supported Hardware [1]	M3100A, M3102A, M3201A, M3202A, M3300A, M3302A, M5302A
File Name	PathWaveTSE_2020Update1.1_winx64.exe

[1] For information on the specific product models supported and SW&FW version requirements refer to: Instrument Software and Firmware Requirements for KS2201A

New features

- Writing groups of triggers with multiple values synchronously in a single Trigger-Write instruction.

- Added support for new PXIe chassis with integrated high frequency reference clock (slot-19).

Fixes

- Solved timing skew (~20ns) between M5302A and M3xxxA product families.

- Added support for statement duration property in the text-mode sequence output.

- Improved sequence compilation to allow multiple consecutive Add-Delay statements.

- Improved trigger usage as sync resources to avoid wrong "not enough triggers" error message in some corner cases using multisequence block with triggered-synchronization.

- Improved trigger resources utilization and chassis configuration to solve resync timing issues on some corner cases using 3 or more PXIe chassis depending on the order HVI engine were added into the System-Definition.

- Fixed instability caused when using `Hvi.stop()` in sequences that contain *Wait-for-time* statements.

- Fixed temporary files left behind when using PathWave FPGA .K7z files.

Release 2020 Update 1 version information

Build #	1.4.7
Released Date	January 6th, 2021
Operating systems	Microsoft Windows 10 64-bit Pro and Enterprise
Supported Hardware [1]	M3100A, M3102A, M3201A, M3202A, M3300A, M3302A, M5302A
File Name	PathWaveTSE_2020Update1.0_winx64.exe

[1] For information on the specific product models supported and SW&FW version requirements refer to: Instrument Software and Firmware Requirements for KS2201A

New features

- Enhanced timing management and added a new Duration property for Sync and Local-flow-control statements.
- .Net API.
- Text-mode sequence export for troubleshooting and debugging.
- New PathWave License Manager 2.3 with support for transportable licenses.
- Improved Python API for consistency and full compliance with PEP-8 naming convention. See breaking changes below.
- Added support for M5302A Digital IO PXIe module.

Breaking changes

- Python API:

Before	Now
~~keysight_hvi. Condition.Or()~~	keysight_hvi. Condition.**logical_or()**
~~keysight_hvi. Condition.And()~~	keysight_hvi. Condition.**logical_and()**
~~keysight_hvi. Condition.Not()~~	keysight_hvi. Condition.**logical_not()**
~~keysight_hvi. InstructionSet.trigger_write.sync_mode.IMMEDIATE~~	keysight_hvi.InstructionSet.trigger_write.sync_mode.**immediate**
~~keysight_hvi. InstructionSet.trigger_write.sync_mode.SYNC~~	keysight_hvi.InstructionSet.trigger_write.sync_mode.**sync**
~~keysight_hvi. InstructionSet.trigger_write.sync_mode.ON~~	keysight_hvi.InstructionSet.trigger_write.sync_mode.**on**
~~keysight_hvi. InstructionSet.trigger_write.sync_mode.OFF~~	keysight_hvi.InstructionSet.trigger_write.sync_mode.**off**
~~keysight_hvi. RegisterBase.fullname()~~	keysight_hvi.RegisterBase.**full_name** ()
~~keysight_hvi. RegisterView.fullname()~~	keysight_hvi.RegisterView.**full_name** ()
~~keysight_hvi. InstructionContext.engine_uniqueid()~~	keysight_hvi. Condition.InstructionContext.**engine_unique_id()**
~~keysight_hvi.IfBranch.conditional_expression()~~	keysight_hvi.IfBranch.**condition**()

Fixes

- Synchronization issue when using 2+ PXIe chassis fully populated, that could result in 100ns / 200ns skew across modules in different chassis.

- IEvent::Occurred() and Wait() functionality in API that showed wrong behavior and dependency between Occurred() and Wait() calls.

Release 2020 Update 0.2 version information

Build #	1.0.18
Released Date	October 9th, 2020
Operating systems	Microsoft Windows 10 64-bit Pro and Enterprise
Supported Hardware [1]	M3100A, M3102A, M3201A, M3202A, M3300A, M3302A
File Name	PathWaveTSE_2020Update0.2_win_x64.exe

[1] For information on the specific product models supported and SW&FW version requirements refer to: Instrument Software and Firmware Requirements for KS2201A

Fixes

- Fixed issues in HVI *InstructionSet* definitions:

  - Improved documentation for Instruction parameters.

  - Added missing *id* property in instructions parameters.

  - Added list of possible parameter values for *Value* and *SyncMode* parameter in *TriggerWrite* instruction.

- Fixed issue acquiring PXI triggers in systems with 3 or more chassis (error "*HW trigger PxiTriggerX not acquired*").

- Improved simulated chassis support. Enabled by default the Enhanced-PXI-trigger functionality available on latest FWs for M9018B, M9019A and M9010A chassis. Improved also the User Manual section related to using simulated chassis.

Release 2020 Update 0.1 version information

Build #	1.0.14
Released Date	September 16th, 2020
Operating systems	Microsoft Windows 10 64-bit Pro and Enterprise
Supported Hardware [1]	M3100A, M3102A, M3201A, M3202A, M3300A, M3302A
File Name	PathWaveTSE_2020Update0.1_win_x64.exe

[1] For information on the specific product models supported and SW&FW version requirements refer to: Instrument Software and Firmware Requirements for KS2201A

Fixes

- Fix problem with licensing that caused trial and possibly other licenses to fail to be recognized correctly. Also updated license installation instructions.

- Moved HVI core library installation location to the common folder and unified it with M3xxxA SW drivers (SD1 software) installation. This requires updating SD1 software to version >= 3.00.95.

Release 2020 version information

Build #	1.0.11
Released Date	August 14th, 2020
Operating systems	Microsoft Windows 10 64-bit Pro and Enterprise
Supported Hardware [1]	M3100A, M3102A, M3201A, M3202A, M3300A, M3302A
File Name	PathWaveTestSyncExecutive_2020_shp_win_x64.exe

[1] For specific product model supported and SW and FW version requirements check: Instrument Software and Firmware Requirements for KS2201A
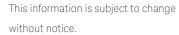
Features

PathWave Test Sync Executive 2020 is the first release of KS2201A software, it includes:

- Python API for Hard Virtual Instrument (HVI) technology to develop programmatically all phases of HVI technology deployment:
    - System Definition.
    - Sequence programming and compilation.
    - HVI execution.

- Support for up to 6 PXI chassis (actual number of chassis depends on PCIe bus enumeration capabilities which depend on the PC bios, check https://www.keysight.com/us/en/assets/7018-02925/technical-overviews/5990-7632.pdf for details)
- Support for M9031A for multi-chassis operation
- New structured programming API for synchronous (global) statements, including:
    - Sync While
    - Sync Multi-Sequence Block
    - Sync Register Sharing (limited to ~4bits given by available PXI trigger resources)

- New programming API for local (single HVI engine and module) statements, including:
    - HVI built-in (or Native) Instructions
        - ActionExecute, TriggerWrite, HVI register AssignAdd/Subtract, FPGA ArrayRead/ArrayWrite/RegisterRead/RegisterWrite

- Product-specific instructions (see product documentation for details)
- Local If
- Local while
- Wait for an event or trigger condition
- Wait for a Variable time given by a register or add a constant delay

- Support for 32 and 48 bits HVI registers (actual support depends on each product, please check product documentation for details)
- Integration with Pathwave FPGA
  - load custom bit files (.k7z) and automatically discover user FPGA resources connected to HVI engine (register and memory maps)

Known Issues or Limitations

- Autocomplete functionality or IntelliSense (in Visual Studio Code) does not work for objects of HVI defined-types when returned from a method. A work around is to explicitly define the type of the object (cast it) to get the autocomplete information. All API information is available in the Python help file installed with PathWave Test Sync Executive 2020.
- The HVI sequence memory in M3xxxA modules is limited to 1024 Instruction-Blocks. The exact number of instruction-blocks required per statement depends on the statement type and timing between statements. Native Instructions take between 1 and 2 Instruction-blocks while Sync and Flow-control statements require several instruction-blocks (between 5 and 10). For typical use cases the total number of statements is between 500 and 1000.

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