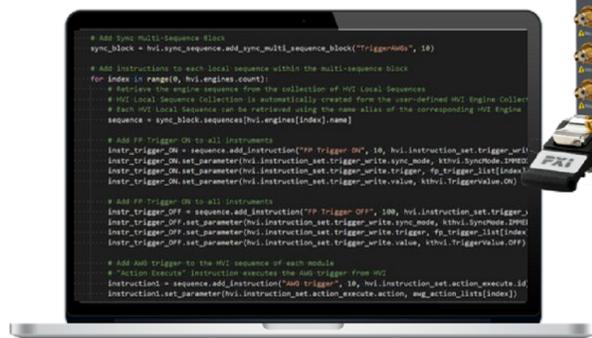# PathWave Test Sync Executive

(KS2201A) 2020 Release Notes

PathWave Test Sync Executive, KS2201A, software is used for precise timing and synchronization of multi-channel measurement systems for quantum computing, MIMO, beamforming, and other applications. Release 2020 Update 1 provides Python and C# APIs for Hard Virtual Instrument (HVI) technology and goes beyond the HVI technology implementation of M3601A software. KS2201A is not compatible with M3601A.

In addition to software licensing, note that hardware support is also required for operation of the KS2201A. For Keysight M3xxx-series PXI modules, this typically includes the -HV1 firmware option, along with the most recent firmware updates to each PXI module being controlled by the KS2201A.

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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 Modules	M3100A, M3102A, M3201A, M3202A, M3300A, M3302A, M5302A
File Name	PathWaveTSE_2020Update1.0_winx64.exe

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 Modules	M3100A, M3102A, M3201A, M3202A, M3300A, M3302A
File Name	PathWaveTSE_2020Update0.2_win_x64.exe

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 Modules   M3100A, M3102A, M3201A, M3202A, M3300A, M3302A
File Name   PathWaveTSE_2020Update0.1_win_x64.exe

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 Modules   M3100A, M3102A, M3201A, M3202A, M3300A, M3302A
File Name   PathWaveTestSyncExecutive_2020_shp_win_x64.exe

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.