

Keysight U5040B Open RAN Studio

Version 3.2.10060.0

Released Date:	May 12, 2025
Operating system:	Microsoft Windows 10, 64-bit
PathWave Signal Generation for 5G NR version:	2024 Update 1.0 or later
PathWave VSA 5G NR version:	2025*
Signal Studio for LTE FDD version:	2.8
Signal Studio for LTE TDD version:	2.8
Time Sync Analyzer	2.4*
Keysight PathWave License Manager	7.4 (included)
File Name:	U5040B_setup_full_3.2.10060.exe

* NOTE: Older versions must not be used with U5040B version 3.2

Enhancements and Bug Fixes

- This release requires Open RAN Studio Licenses to be version 2025.0300 or greater (under support as of March 1, 2025).
 - Note that N7046A_001 and N7046A_003 option licenses do not require a specific version.
- This release includes Keysight PathWave License Manager 7.4.0 and Keysight License Manager/Service 5.6.1.
- Support is added for Multiple O-RUs per link in the Load Balancing Tab of the C/U-Plane Configuration Tool.
- Support is added for High Power SFP(All levels) / QSFP(Class 1-7 <=5W)
- Support is added in the REST API for writing QSFP/SFP registers (WriteQsfpData API).
- Enhanced SFP/QSFP Module Details view to decode more parameters related to power classes and rate select.

- Added an option to specify maximum number of C-Plane sections per packet in Options tab.
- Support is added for the following compression modes: block floating point selective RE, and modulation compression selective RE
- Support is added for merging multiple stimulus files using the Stimulus Merging Tool in the Open RAN Studio application.
- Support is added for generating ST4 sleep / awake messages, and ST 8 sleep ACK/NACK and Wake/Ready messages.
- Support is added in the “Reconfigure” REST API to change port MAC Addresses.
- Support is added in the Explorer view in the Detected Flows pane to export RRM reports.
- Fixed an issue with number of ST6 PRBs being rounded up.
- Fixed encoding/decoding of ST9's numSinrPerPrb field.
- Fixed an issue with the eCPRI One-Way Delay measurement not working.
- Fixed an issue with incorrect SFN when replaying stimulus files.
- Fixed an issue with incorrect Trigger-Out offset when replaying stimulus with Trigger mode set to Trigger on Start Stimulus or Trigger on Start Stimulus, Repeat every 10ms. Trigger is now aligned to the 10ms radio frame boundary whereas before it was offset by the stimulus advance/delay in some cases.
- Fixed an issue with using the proper RB range when rbIndicator is enabled for UL Stock Data Definition D conformance test.
- Fixed an issue with the beam Id for Section Extension 19 when multiple CSI-RS are present on the same symbol.

Known Limitations

- The installer must be run from a writable directory. Log files are written in the same directory as the installer and the installation will fail if it is not able to create these logs.
- For BLER and EVM within U5040B on S5040A: BLER and EVM must not be run concurrently with the Capture/Recorder.
- eCPRI Delay -> Delay interval should be set to 500msec or higher. This is a coarse adjustment, and the GUI will be updated in the future to clarify the operation.
- Remote access to the REST API service does not work if the Windows Firewall is enabled.
- Rest API services require special configuration when using server based floating license.
- A PDF viewer will need to be installed, by the user, if they want to look at the M-Plane Reference Guide and Conformance Test Guide that have been added to the installation.

Version 3.1.11039.0

Released Date:	October 31st, 2024
Operating system:	Microsoft Windows 10, 64-bit
PathWave Signal Generation for 5G NR version:	2024 Update 1.0 or later
PathWave VSA 5G NR version:	2025*
Signal Studio for LTE FDD version:	2.8
Signal Studio for LTE TDD version:	2.8
Time Sync Analyzer	2.4*
File Name:	U5040B_setup_full_3.1.11039.exe

* NOTE: Older versions must not be used with U5040B version 3.1

Enhancements and Bug Fixes

- This release requires Open RAN Studio Licenses to be version 2024.1000 or greater (under support as of October 1st, 2024).
 - Note that N7046A_001 and N7046A_003 option licenses do not require a specific version.
- This release includes PathWave License Manager 7.4.0 and Keysight License Manager/Service 5.6.1.
- Support is added for handling low Signal to Noise Ratio (SNR) signals with the new Low SNR mode in BLER (using ErrorRatioAnalyzer or the REST API with 89601OR2C license).
- Support is added for measuring Channel Power (when calculating EVM using ErrorRatioAnalyzer or the REST API with the 89601OR1C VSA license).
- Enhanced support for Channel Information Based Beamforming (CIBF).
- Support is added for Uplink Performance Improvement (ULPI). This requires a U5040ULPB license which enables the DMRS-BF tab in the Beamforming configuration GUI.
- Support is added for generating stimulus with Energy Savings Section Type 4 (TRX Control) / Section Type 8 (Ack).
- Support is added for reading SFP/QSFP parameters using the REST API.
- The Time Sync Analyzer (TSA) Trigger Out configuration GUI and REST API has changed for this release.
- The TSA specific M-Plane command TSAMplaneClient.bat is obsolete and no longer supported. TSA M-Plane is supported in pass-through mode.
- Fixed an issue with IQ Extraction and BLER where extracted IQ floating point values were rounded to 8 decimal places.
- Fixed an issue with IQ Extraction failure when using a 400 MHz carrier.

- Fixed an issue with PTP timestamp errors on the S5040A that could cause PTP timing to jump unexpectedly and cause loss of sync.
- Fixed an issue with M-Plane pass-through not handling high throughput on the S5040A.
- Fixed an intermittent issue with packets not being captured in the uplink direction on the S5040A.

Known Limitations

- The installer must be run from a writable directory. Log files are written in the same directory as the installer and the install will fail if it is not able to create these logs.
- For BLER and EVM within U5040B on S5040A: BLER and EVM must not be run concurrently with the Capture/Recorder.
- eCPRI Delay -> Delay interval should be set to 500msec or higher. This is a coarse adjustment, and the GUI will be updated in the future to clarify the operation.
- Remote access to the REST API service does not work if the Windows Firewall is enabled.
- Rest API services require special configuration when using server based floating license.
- A PDF viewer will need to be installed, by the user, if they want to look at the M-Plane Reference Guide and Conformance Test Guide that have been added to the install.

Version 3.0.10018.0

Released Date:	April 30th, 2024
Operating system:	Microsoft Windows 10, 64-bit
PathWave Signal Generation for 5G NR version:	2024 Update 1.0
PathWave VSA 5G NR version:	2024 Update 1.0
Signal Studio for LTE FDD version:	2.8
Signal Studio for LTE TDD version:	2.8
Time Sync Analyzer	2.2
File Name:	U5040B_setup_full_3.0.10018.exe

Enhancements and Bug Fixes

- This release requires Open RAN Studio License Versions 2024.0400 or greater (under support as of April 1st, 2024). Your current license version can be checked in Keysight PathWave License Manager.

- Support is added in Analytics Delay Management for: IOT Profiles, DU/RU reference points, and Frame/Subframe/Slot/Symbol resolution, Alpha / Beta parameters, and PRACH.
- Support is added in Analytics S-Plane for PTP Delay Request/Response PDV measurement.
- Support is added on the S5040A for BLER & EVM within the Open RAN Studio application.

The following licenses are required:

- 89601BHNC and 89601200C, or
- 89601OR1C license for EVM, or
- 89601OR2C license for BLER.
- Support is added for UL U-plane packet for LTE-TDD carrier.
- Support is added for Section Type 3 with Extension Type 11.
- Support is added for M-Plane Pass-through on TSA with the TSA 2.2 release. Please see the TSA documentation for details.
- Fixed an issue where PPS Sync to Frame 0 was not working.
- Fixed an issue encountered when parsing LTE TDD input files in ErrorRatioAnalyzer processing.
- IQ Extraction is now limited to 2 seconds to avoid issues with very large IQ files.

Known Limitations

- For BLER and EVM within U5040B on S5040A: BLER and EVM must not be run concurrently with the Capture/Recorder.
- eCPRI Delay -> Delay interval should be set to 500msec or higher. This is a coarse adjustment, and the GUI will be updated in the future to clarify the operation.
- Remote access to the REST API service does not work if the Windows Firewall is enabled.
- Rest API services require special configuration when using server based floating license.
- A PDF viewer will need to be installed, by the user, if they want to look at the M-Plane Reference Guide and Conformance Test Guide that have been added to the install.

Version 2.8.10334.0

Released Date:	January 31st, 2024
Operating system:	Microsoft Windows 10, 64-bit
PathWave Signal Generation for 5G NR version:	2023 or newer
PathWave VSA 5G NR version:	2024 Update 1.0 or newer
Signal Studio for LTE FDD version:	2.4
Signal Studio for LTE TDD version:	2.4
Time Sync Analyzer	2.0

File Name:	U5040B_setup_full_2.8.10334.0.exe
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Enhancements and Bug Fixes

- Support is added for the U5040BLRB license to enable faster, hardware accelerated 5G NR BLER testing. Uncompressed IQ data and Block Floating Point compression are supported.
- Support is added for the U5040SC1B license to enable 802.1x support.
- Support is added for C-Plane fragmentation for flexible beamforming weights.
- Support is added for nonzero CP length in C-Plane Section Type 3 for non-PRACH carriers.
- Support is added for UL counters to compute on-time, early, and late packets with eAxC ID filtering.
- Support is added for configurable FFT index/size for Section Type 3.
- Fixed an issue impacting existing BLER measurements for low power signals
- Fixed an issue on beam index for the case of multiple LTE carriers.
- Fixed an issue with IQ recovery for FR2 cases where slot ID numbering is set to a non-default value.
- Fixed a symbol issue for TDD allocations when *Test Models -> Additional Test Patterns -> 1 Section Description per slot...* is selected.
- Fixed an issue for cases where “disableBFWs” is set for C-Plane Section Extension 19.
- Fixed an issue where Start stimulus on Trigger In was not working.
- Fixed an issue that prevented columns from being resized when the display scaling was set larger than 100%.
- Fixed an issue where the first iteration of stimulus replay could have some packets delayed.
- Fixed an issue with PTP asymmetric delay calibration that led to a large PPS offset when using 25G RS-FEC in PTP Master mode.

Known Limitations

- eCPRI Delay -> Delay interval should be set to 500msec or higher. This is a coarse adjustment, and the GUI will be updated in the future to clarify the operation.
- Remote access to the REST API service does not work if the Windows Firewall is enabled.
- Rest API services require special configuration when using server based floating license.
- A PDF viewer will need to be installed, by the user, if they want to look at the M-Plane Reference Guide and Conformance Test Guide that have been added to the install.

Version 2.7.10444.0

Released Date:	October 30, 2023
Operating system:	Microsoft Windows 10, 64-bit

PathWave Signal Generation for 5G NR version:	2023 or newer
PathWave VSA 5G NR version:	2024 or newer
Signal Studio for LTE FDD version:	2.4
Signal Studio for LTE TDD version:	2.4
Time Sync Analyzer	1.3
File Name:	U5040B_setup_full_2.7.10444.0.exe

Enhancements and Bug Fixes

- Support is added for the N7046A-003 license to enable 2 Port M-Plane and 2 Port S-Plane tests.
- Support is added to allow BLER, BER, and EVM measurements with the U5040MDLB license.
- Support is added for Oran Analytics Delay Management. This requires the U5040ORAB license. It shows timing of symbols and computes on-time, early, and late packets. It does not support multi-numerology in the same carrier.
- Fixed an issue where the S5040A Ethernet port may not establish link if the O-RU is rebooted.

Known Limitations

- eCPRI Delay -> Delay interval should be set to 500msec or higher. This is a coarse adjustment, and the GUI will be updated in the future to clarify the operation.
- Remote access to the REST API service does not work if the Windows Firewall is enabled.

Rest API services require special configuration when using server based floating license.

- A PDF viewer will need to be installed, by the user, if they want to look at the M-Plane Reference Guide and Conformance Test Guide that have been added to the install.

Version 2.6.10605.0

Released Date:	September 29, 2023
Operating system:	Microsoft Windows 10, 64-bit
PathWave Signal Generation for 5G NR version:	2023 or newer
PathWave VSA 5G NR version:	2024 or newer
Signal Studio for LTE FDD version:	2.4

Signal Studio for LTE TDD version:	2.4
Time Sync Analyzer	1.2
File Name:	U5040B_setup_full_2.6.10605.0.exe

Enhancements and Bug Fixes

- Fixed a 200ns late offset in PTP/PPS when in 25G RS-FEC mode on the S5040A. NOTE: Uplink tests using triggers may need to have the trigger timing recalibrated.
- Fixed a disk utilization problem during IQ extraction by limiting the extraction time to one second.
- Fixed an issue calculating BLER when the capture PCAP has empty subframes.
- Fixed an EVM calculation error when the same eAxC-id is used in both the uplink and downlink channels.
- Fixed an error on CRS in some LTE TDD special subframes.
- Made clarifications to API documentation.
- Fixed an error for FR2 carriers when PTRS is enabled.
- Fixed C-Plane SE-19 when disablBFWs is set.
- Fixed an error in filterIndex in C-Plane for NB-IoT.
- Fixed an issue in UL stimulus generation for LTE TDD Basic carrier.
- Fixed issues in Coupling via Frequency and Time with Priorities.
- Fixed an issue in generating Section Type 0 messages with PRACH carriers.
- Fixed an issue where LBM and eCPRI Delay were not included in REST API Statistics for S5040A.

Known Limitations

- eCPRI Delay -> Delay interval should be set to 500msec or higher. This is a coarse adjustment, and the GUI will be updated in the future to clarify the operation.
- Remote access to the REST API service does not work if the Windows Firewall is enabled.
- Rest API services require special configuration when using server based floating licenses.
- A PDF viewer will need to be installed, by the user, if they want to look at the M-Plane Reference Guide and Conformance Test Guide that have been added to the install.

Version 2.6.10336.0

Released Date:	10 July 2023
Operating system:	Microsoft Windows 10, 64-bit
PathWave Signal Generation for 5G NR version:	2023 or newer

PathWave VSA 5G NR version:	2023 or newer
Signal Studio for LTE FDD version:	2.4
Signal Studio for LTE TDD version:	2.4
Time Sync Analyzer	1.1
File Name:	U5040B_setup_full_2.6.10336.0.exe

Enhancements and Bug Fixes

- Added REST-API enhancements for Time Sync Analyzer (TSA) and relocated REST-API Service log files to *C:\Users\Public\Documents\Keysight\Open RAN Studio*.
- Added support for BLER calculation with the 89601OR2C license.
- Extended LTE support to include 1.4MHz and 3MHz bandwidths.
- Fixed PTP Issues related to slow Delay Responses, PTP v2.1 interoperability, PTP through switch ports, and corrected Priority1 to 128 instead of 0.
- Fixed an issue in BLER/BER measurements where partial captures in first and last frames led to inaccurate results.
- Fixed an issue in ErrorRatioAnalyzer when the input PCAP file contains multiple eAxCIDs.
- Fixed an issue in Beamforming Configuration that sometimes caused the application to exit when adding a Beam ID and then clicking on the Beam Weights tab.

Known Limitations

- eCPRI Delay -> Delay interval should be set to 500msec or higher. This is a coarse adjustment, and the GUI will be updated in the future to clarify the operation.
- Remote access to the REST API service does not work if the Windows Firewall is enabled.
- Rest API services require special configuration when using server based floating licenses.
- A PDF viewer will need to be installed, by the user, if they want to look at the M-Plane Reference Guide and Conformance Test Guide that have been added to the install.

Version 2.6.10409.0

Released Date:	July 31, 2023
Operating system:	Microsoft Windows 10, 64-bit
PathWave Signal Generation for 5G NR version:	2023 or newer
PathWave VSA 5G NR version:	2023 or newer
Signal Studio for LTE FDD version:	2.4
Signal Studio for LTE TDD version:	2.4

Time Sync Analyzer	1.2
File Name:	U5040B_setup_full_2.6.10409.0.exe

Enhancements and Bug Fixes

- Fixed M-Plane issues when used with Time Sync Analyzer version 1.2.
- Fixed an M-Plane issue where the DHCP server would listen on all interfaces instead of only the interface specified with --ip <address>.
- Fixed an issue on reMask for CSI-RS when Section Extension 19 is used with C-Plane and U-Plane coupling via sectionId value.
- Fixed an error observed with BLER measurements on captures with DC subcarrier.
- Fixed error messages when beam weights .csv file does not have sufficient bundles for flexible weight-based dynamic beamforming.
- Fixed an issue where BLER results with ErrorRatioAnalyzer sometimes included an empty eAxCID value.

Known Limitations

- eCPRI Delay -> Delay interval should be set to 500msec or higher. This is a coarse adjustment, and the GUI will be updated in the future to clarify the operation.
- Remote access to the REST API service does not work if the Windows Firewall is enabled.
- Rest API services require special configuration when using server based floating licenses.
- A PDF viewer will need to be installed, by the user, if they want to look at the M-Plane Reference Guide and Conformance Test Guide that have been added to the install.

Version 2.5.10319.0

Released Date:	21 April 2023
Operating system:	Microsoft Windows 10, 64-bit
PathWave Signal Generation for 5G NR version:	2023 or newer
PathWave VSA 5G NR version:	2023 or newer
Signal Studio for LTE FDD version:	2.4
Signal Studio for LTE TDD version:	2.4
Time Sync Analyzer	1.1.0
File Name:	U5040B_setup_full_2.5.10319.0.exe

Enhancements and Bug Fixes

- Fixed an issue causing the application GUI to close when stock data test mode was enabled.
- Fixed an issue to ensure the stimulus player starting System Frame Number (SFN) is aligned to a multiple of 16 radio frames.
- Fixed an issue where the U5040IQEB license was not properly recognized for BLER tests over REST API.
- Fixed an issue when a previously configured eAxC is deleted and then modified
- Fixed an issue on the C-Plane builder for FR2 SSB with 240 kHz SCS
- Fixed an issue preventing Beam Indexes from being displayed in the C-Plane Builder tab
- Fixed an issue where the SyncE icon failed to turn green in tests with S5040A.

Known Limitations

- eCPRI Delay -> Delay interval should be set to 500msec or higher. This is a coarse adjustment, and the GUI will be updated in the future to clarify the operation.
- Remote access to the REST API service does not work if the Windows Firewall is enabled.
- Rest API services require special configuration when using server based floating licenses
- A PDF viewer will need to be installed, by the user, if they want to look at the M-Plane Reference Guide and Conformance Test Guide that have been added to the install.

Version 2.5.10315.0

Released Date:	20 April 2023
Operating system:	Microsoft Windows 10, 64-bit
PathWave Signal Generation for 5G NR version:	2023 or newer
PathWave VSA 5G NR version:	2023 or newer
Signal Studio for LTE FDD version:	2.4
Signal Studio for LTE TDD version:	2.4
Time Sync Analyzer	1.1.0
File Name:	U5040B_setup_full_2.5.10315.0.exe

Enhancements and Bug Fixes

- Corrected digital power scaling for U-Plane data when FS_offset is set to a nonzero value.
- Fixed an issue on C-Plane timing for PRACH formats with prefix lengths longer than 1 symbol.

Known Limitations

- System Frame Number (SFN) may sometimes be misaligned in the stimulus player
- Enabling Stock data test mode in the GUI may cause the application to close
- Beam Indexes are not properly shown in the C-Plane Builder
- eCPRI Delay -> Delay interval should be set to 500msec or higher. This is a coarse adjustment, and the GUI will be updated in the future to clarify the operation.
- Remote access to the REST API service does not work if the Windows Firewall is enabled.
- Rest API services require special configuration when using server based floating licenses
- A PDF viewer will need to be installed, by the user, if they want to look at the M-Plane Reference Guide and Conformance Test Guide that have been added to the install.

Version 2.5.10263.0

Released Date:	30 March 2023
Operating system:	Microsoft Windows 10, 64-bit
PathWave Signal Generation for 5G NR version:	2023 or newer
PathWave VSA 5G NR version:	2023
Signal Studio for LTE FDD version:	2.4
Signal Studio for LTE TDD version:	2.4
Time Sync Analyzer	1.1.0
File Name:	U5040B_setup_full_2.5.10263.0.exe

Enhancements and Bug Fixes

- Added support for 100GbE for Keysight's Time Sync Analyzer appliance
- Added support for NPRACH for NB-IoT
- Added support for LTE PRACH formats 1-4
- Enhancements for section extension 11
- Added support for section extension 19 with normal coupling
- Added support for rate matching PDSCH with DCI
- Added support for disabling SyncE when PTP Mode is set to Master
- Added support for measuring UL BLER in presence of DL channel
- Added support for PN23 payload to 5GNR BER measurement
- Added support for EVM calculation over REST-API
- Updated REST-API documentation in new format, including new commands for checking Clock, PTP, and Ethernet status & statistics.

Known Limitations

- eCPRI Delay -> Delay interval should be set to 500msec or higher. This is a coarse adjustment, and the GUI will be updated in the future to clarify the operation.
- Remote access to the REST API service does not work if the Windows Firewall is enabled.
- Rest API services require special configuration when using server based floating licenses
- A PDF viewer will need to be installed, by the user, if they want to look at the M-Plane Reference Guide and Conformance Test Guide that have been added to the install.

Version 2.4.10404.0

Released Date:	21 February 2023
Operating system:	Microsoft Windows 10, 64-bit
PathWave Signal Generation for 5G NR version:	2023 (September 2022, version 4.0.0-2)
PathWave VSA 5G NR version:	2023
Signal Studio for LTE FDD version:	2.4
Signal Studio for LTE TDD version:	2.4
File Name:	U5040B_setup_full_2.4.10404.0.exe

Enhancements and Bug Fixes

- REST APIs updated to check Clock, PTP, and Ethernet link status & statistics. Please see Appendix II in the documentation/online help for details of the new commands.
- REST API Capture with U5040ORAB license is now allowed.
- Fixed issue to expand frequency error correction for BLER tests
- Fixed an issue preventing Downlink U-plane from being included in *.pcap files when Uplink channels were also present.
- Fixed an issue preventing *.setx file generation for Uplink carriers.
- NB-IoT tests may now include downlink and uplink. NPRACH is not yet supported.

Configurable delay added for eCPRI Delay Messages.

- eCPRI Delay -> Delay interval should be set to 500msec or higher. This is a coarse adjustment, and the GUI will be updated in the future to clarify the operation.
- New RestAPI commands for checking clock, PTP, and Ethernet are not yet documented in the RestAPI section on Help. For now, they are captured as Appendix II of the U5040B User Guide
- Remote access to the REST API service does not work if the Windows Firewall is enabled.
- Rest API services require special configuration when using server based floating licenses

- A PDF viewer will need to be installed, by the user, if they want to look at the M-Plane Reference Guide and Conformance Test Guide that have been added to the install.

Version 2.4.10336.0

Released Date:	30 January 2023
Operating system:	Microsoft Windows 10, 64-bit
PathWave Signal Generation for 5G NR version:	2023 (September 2022, version 4.0.0-2)
PathWave VSA 5G NR version:	2023
Signal Studio for LTE FDD version:	2.4
Signal Studio for LTE TDD version:	2.4
File Name:	U5040B_setup_full_2.4.10336.0.exe

Enhancements

- Added support for command line based EVM measurement, a manufacturing use case
- Added support for multiple beam methods in a slot
- Added support for PRACH FDM in NR
- Added support for single layer control channel along with multi-layer data channels
- Added support for section extension-12
- Added support for S5040A Trigger In feature
- Added support for reconfiguring PTP via REST-API without affecting Ethernet link

Bug Fixes

- Fixed an issue in static modulation compression
- Fixed an issue with segmentation of U-Plane messages
- Fixed an issue in IQ extraction for strong received signals
- Fixed an issue where a *.setx file generated by U5040B resulted in wrong frequency span being shown in VSA
- Fixed an issue to correct frequency offset for nonzero (the PRACH transmission occasion index in frequency domain)
- Fixed an issue for section type 0 C-Plane messages for idle symbols.

Known Limitations

- Remote access to the REST API service does not work if the Windows Firewall is enabled.

- Rest API services require special configuration when using server based floating licenses
- A PDF viewer will need to be installed, by the user, if they want to look at the M-Plane Reference Guide and Conformance Test Guide that have been added to the install.

Version 2.3.10944.0

Released Date:	26 October 2022
Operating system:	Microsoft Windows 10, 64-bit
PathWave Signal Generation for 5G NR version:	2023 (September 2022, version 4.0.0-2)
PathWave VSA 5G NR version:	2023
Signal Studio for LTE FDD version:	2.4
Signal Studio for LTE TDD version:	2.4
File Name:	U5040B_setup_full_2.3.10944.0.exe

Enhancements

- Added support for Keysight's new appliance, Time Sync Analyzer
- Added support for section extensions 7, 19, 20
- Added support for UL multi-antenna IQ extraction
- Added support for static modulation compression
- Added support for SSB-FDM

Bug Fixes

- Fixed a bug where IQ scaling was sometimes incorrect
- Fixed an error generating LTE TDD signals
- Fixed an issue where PTP Priority was not correctly set per the GUI
- Fixed an issue with extra PTP Delay Response messages
- Fixed an issue with PRACH where the frequency offset could be outside the configured bandwidth
- eCPRI One-Way Delay messages are now decoded.

Known Limitations

- Remote access to the REST API service does not work if the Windows Firewall is enabled.

- Rest API services require special configuration when using server based floating licenses
- A PDF viewer will need to be installed, by the user, if they want to look at the M-Plane Reference Guide and Conformance Test Guide that have been added to the install.

Version 2.2.10705.0

Released Date:	6 May 2022
Operating system:	Microsoft Windows 10, 64-bit
PathWave Signal Generation for 5G NR version:	2022 Update 1.0
PathWave VSA 5G NR version:	2022 Update 1.0
Signal Studio for LTE FDD version:	2.4
Signal Studio for LTE TDD version:	2.4
File Name:	U5040B_setup_full_2.2.10705.0.exe

Enhancements

- Added support for 1x50Gbps (PAM4)
- Added support for 2x25Gbps, using Lane1 and Lane2 from the QSFP slot 1. M/S-Plane only comes out of Lane1, C/U-Plane on both ports.
- Handle SCP projects with multiple downlink carriers for LTE or MIMO
- LTE BLER support
- LBM message support
- ORAN Wireless Link Analytics
- 1024QAM support
- Multi-IQ power scaling options
- Explorer detected flows sorting
- Measured Transport Method support – eCPRI One-Way Delay messages can measure the O-DU to O-RU delay.
- NB-IoT for LTE (Downlink only)
- Added FJT-0001 Clarification of bit interpretation of reMask, crsReMask and mcScaleReMask. Not backwards compatible.
- Changed the BFP rounding method.
- The U5040IQEB license enables the BLER/BER measurement, as well as the U5040MULB license.
- Updates to the REST API. Please see documentation for details.

Bug Fixes

- Fixed a bug where Play and Pause do not work properly the first time when capturing 1 frame.
- Fixed several cases where the BLER measurement reported 100% when it should have been 0%.
- Fixed a problem where the trigger on start of stimulus would come out later than expected.
- Fixed a problem where the Stock D in ORS for the TC “UC-Plane O-RU Scenario Class Extended using RB parameter 3GPP DL/UL – Resource Allocation”, did not having the correct test vector.
- Fixed a problem with IQ data handling error when using LTE TDD (Multi carriers) file.
- Fixed an issue with LTE TDD PCAP generation not adding both C/U Plane message to the file.
- Fixed several issues with loading PCAP files.
- Fixed a problem with iqBitWidth mismatch between U-Plane PRBs and C-Plane User Data Compression Header.

Known Limitations

- For the new bit interpretation change, a user will have to re-generate PCAP files if they have used this feature before.
- eCPRI One-Way Delay messages are not decoded, so they will have blank descriptions in the Explorer window.
- A PDF viewer will need to be installed, by the user, if they want to look at the M-Plane Reference Guide and Conformance Test Guide that have been added to the install.

Version 2.1.10901.0

Released Date:	7 March 2022
Operating system:	Microsoft Windows 10, 64-bit
PathWave Signal Generation for 5G NR version:	2.0
PathWave VSA 5G NR version:	2022 Update 0.2
Signal Studio for LTE FDD version:	2.4
Signal Studio for LTE TDD version:	2.4
File Name:	U5040B_setup_full_2.1.10901.0.exe

Enhancements

- Added new parameter to the BLER/BER JSON measurement file for more statistical information. This includes a REST API update.
- Added verifications and warning messages around file creation.

Bug Fixes

- Fixed an issue with NR UL 16-Layers.
- Fixed several defects in the CUS-Plane Analytics tab.

Known Limitations

- If using a floating license to enable the Keysight Open RAN Studio API Service, the floating license server must first be configured in PathWave License Manager under a user account (e.g., Administrator), and then the Keysight Open RAN Studio API Service must be configured to run under the same user account (e.g., Administrator) using the Services tool in Windows 10.
- If using a floating license with the Open RAN Studio Application, a customer might need to do the following for them to work:
 1. Start->Edit System Environment Variables
Or; Start -> Control Panel -> System and Security -> System -> under Computer name, domain, and workgroup settings, select Change Settings
 2. Go to the Advanced Tab and then Environment Variables...
 3. Under System variables, click "New"
 4. Add the following two SYSTEM environment variables:
 - i. OPENRANSTUDIO_LICENSE_FILE
C:\ProgramData\Keysight\Licensing\Licenses\Other;C:\ProgramData\Keysight\Licensing\Licenses\Server;27009@<license_server_host>
 - ii. SIGNALSTUDIO_LICENSE_FILE
C:\ProgramData\Keysight\Licensing\Licenses\Other;C:\ProgramData\Keysight\Licensing\Licenses\Server;27009@<license_server_host >

NOTE1: The <license_server_host> should be replaced with the license server host and 27009 is the default port but should be replaced with the appropriate port if a different port is being used.

NOTE2: If these system environment variables are set, they will override the settings for ALL USERS on the system.

5. Reboot the system

Version 2.1.10701.0

Released Date:	21 January 2022
Operating system:	Microsoft Windows 10, 64-bit
PathWave Signal Generation for 5G NR version:	2.0
PathWave VSA 5G NR version:	2022 Update 0.2
Signal Studio for LTE FDD version:	2.4
Signal Studio for LTE TDD version:	2.4
File Name:	U5040B_setup_full_2.1.10701.0.exe

Enhancements

- Added 2 Port Capture mode support, which is used with the U5040ORAB analytics tool

Bug fixes

- Fixed an issue where Resource Allocation block shows PRACH Format 0 for configuration Index 110 in place of Format A1B1.
- Fixed a problem with loading IQ data into VSA not working for PRACH Format 1 and Format B3.
- Fixed an issue with PRACH C0 test vector generation with 15kHz Single Carrier.
- IQ generation will now work if the OrsTmp directory does not exist.
- Display the correct time value in the Explorer tab, even if the value is negative.
- Fixed a memory leak when using the ComputeBLER() commend.
- Fixed an issue where SRS C-Plane message did not encode 256-272 PRB correctly.
- Fixes for Extension Type 11.
- Fixed a problem with Frame ID overrun with BLER measurements.
- Bug fixes in the Analytics tab.

Known Limitations

- For captures in 2 Port Capture mode, Lane 1 and Lane 2 packet timestamps can be out of order – the delta time can be negative.
- In 2 Port Capture mode with an optical tap, PTP Master Mode should not be used. PTP Slave mode can be used, but PTP will run in a “Passive Slave” mode where delay cannot be compensated for, because the PTP Tx messages (Delay Request) cannot be sent into the network as Rx fibers only are connected to the optical tap.

Version 2.1.10405.0

Released Date:	18 October 2021
Operating system:	Microsoft Windows 10, 64-bit
PathWave Signal Generation for 5G NR version:	2.0
PathWave VSA 5G NR version:	2022 Update 0.2
Signal Studio for LTE FDD version:	2.4
Signal Studio for LTE TDD version:	2.4
File Name:	U5040B_setup_full_2.1.10405.0.exe

Enhancements

- Added support for the U5040ORAB ORAN Protocol Analytics.
- Improvements made to the fan speed control so that the QSFPs stay below the max. temperature allowed. This will help to prevent damage to the hardware.
- Added SRS support.
- Extension Type 6: Additional features added.
- Extension Type 9: (DSS) support added.
- Extension Type 10: Support for different beam IDs and consecutive beam ID for Section Type 1, 3, 5.
- Extension Type 11: Added support for Section Type 1 and 3.
- Integrated the LTE apps into the application; so, no more pseudo scp files needed.
- reMask for PUSCH supported.
- Improvements to the Beamforming user interface.
- Added PRACH support for LTE.
- Added support for symbol-based timing.
- Changed the IQ extraction file format from .csv to .orb which can be imported into the latest version of VSA.
- Added SyncE ESMC message support.
- Support better floating license usage for Signal Studio LTE apps.
- Added support for 15MHz carrier frequency for LTE.
- Added coupling via frequency and time.
- Added support for M-Plane Hybrid Model and now support standard versions 1-6.
- Open RAN Studio still requires .scp files even with PathWave Signal Generation. This can be done by using the Export Signal Setup in the PathWave Signal Generation GUI.

- Added QSFP/SFP status in Port Configuration.

Bug Fixes

- Fixed a problem with the M-Plane port not working in some cases.
- Fixed an issue with CRC status not getting updated.
- Fixed a few SCP file loading errors.
- Fixed a problem when programmatically loading a PCAP file repeatedly eventually causing a failure.
- Fixed a problem where Firmware Update could not be performed from the GUI when only MDLB/MULB licenses are present.

Known Limitations

- This release requires the following versions of related software:
 - (required except MDLB/MULB) PathWave Signal Generation release 2.0.0
 - (optional) VSA 2022 Update 0.2
- If data is not present in all PRACH Frames, the Analysis Start Boundary must be set to 'Half-Frame' or 'Subframe' in VSA (after the ORS SETX file is loaded) to achieve a stable Constellation.
- 1G M-Plane Pass-Through Port (QSFP 3) will still forward packets when disabled (if a QSFP/SFP is inserted).
- It is recommended that customers using 10G data rates, should use 10G only (SFP+) modules, or if using SFP28 25G optics, verify that CRC errors are 0 for a sustained time on both ends of the link (this means inspecting O-RU statistics as well).
- When in DSS mode only DSS messages are handled.
- Due to changes to the way the application is dealing with CI IQ Bitwidth, PCAP files using channel-information based beamforming must be regenerated.
- It is recommended that the other link partner be up before running the "Configure" REST API. This API will bring up the Ethernet Links and may fail if the other end of the link is not ready.
- If running two S5040A systems together using the REST API, it is recommended that they both be configured in parallel so they can each bring up the Ethernet Link at the same time.
- If you see the following error during the installation process:
"Error 1316. The specified account already exists", do the following:
 - Open a command prompt as administrator
 - Run the same installer version as is currently installed as administrator
 - If prompted with a Yes/No option to uninstall, click Yes. (reboot if necessary)
 - Open a command prompt as administrator after reboot
 - Run the new installer in the Administrator command prompt
 - This should install successfully.

Version 2.0.10221.0

Released Date:	14 April 2021
Operating system:	Microsoft Windows 10, 64-bit
File Name:	U5040B_setup_full_2.0.10221.0.exe

Enhancements

- Initial release of the software.

Known Limitations

- The System Sync Up/Down connectors are not enabled. This feature will be enabled in a future release.
- The GPIO connectors are not enabled. This feature will be enabled in a future release.
- FPGA config connector is not intended for general use.
- The Trig 1 (Trig In) connectors are not enabled. This feature will be enabled in a future release.
- The Trig 3 (PPS In) connectors are not enabled. This feature will be enabled in a future release.
- When redeeming a license, use the MAC address of the Ethernet port that is least likely to be disabled. In most cases, this will be the second MAC address listed in PathWave License Manager's Host ID line.