

# R&S®AMS32

## Release Notes

**Software Version 11.70.00**

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The software makes use of several valuable open source software packages. For information, see the "Open Source Acknowledgment" provided with the product.

The following abbreviations are used throughout this document: R&S®AMS32 is abbreviated as R&SAMS32.

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# 1 Information on the current version

## 1.1 Version 11.70.00

### New functionality

Version	Functions
11.70	<p>Release of new option AMS32-K48D: Hardware Trigger to AUT</p> <p>This option implements the possibility of mutual triggering from the VNA to the AUT and vice-versa. An example application is testing an AUT with multiple beams, where the beams are switched through based on a trigger from the VNA after completing a sweep. Thus, multiple beams of the AUT can be tested in one single test.</p> <p>Pre-requisites: R&amp;S® ZNA with option ZNA-B91</p>
11.70	<p>Release of new option AMS32-K58M: Setup with multiple SMWs</p> <p>This option implements the possibility of controlling up to three additional R&amp;S® SMW200A for generating a test environment with multiple configurable RF signals.</p>
11.70	<p>AMS32-K58</p> <p>Added a new driver supporting the R&amp;S® CMP180, for radio technologies LTE, NR FR1, Bluetooth (plus BLE), W-LAN, and LP-IoT (LR-WPAN or ZigBee).</p> <p>Functional scope includes TX measurements (non-signaling), with quantities EIRP, EVM and ACLR, where applicable.</p> <p>Pre-requisite: R&amp;S® CMP180 BASE firmware 5.0.40</p>
11.70	<p>EMC32-K11</p> <p>Extended the Test Sequencer with the possibility of adding a TIS test to be performed as SPOM (Single Point Offset Measurement) test immediately after a previous TRP test.</p>
11.70	<p>Added the possibility of checking the power level measured in a non-signaling TRP test before starting the test. The purpose is to start the test only if a power level higher than a configurable threshold is measured.</p>

### Modified functionality

Version	General
11.70	R&S® ATS1800C firmware V2.0 is now supported.

Version	OTA Testing
11.70	<p>Updates for compliance with CTIA Test Plan</p> <ul style="list-style-type: none"> <li>The pole at 180° elevation is now extrapolated and considered for TRP calculation with Clenshaw-Curtis quadrature.</li> <li>Implemented the upcoming requirement for checking non-tested carriers during a CA test.</li> </ul>

11.70	<p>AMS32-K25, CMW-WLAN driver</p> <ul style="list-style-type: none"> <li>It is now possible to use two instances of the driver independently, for addressing two different R&amp;S® CMW500 instruments.</li> <li>The configured output trigger settings are now programmed also if the power is not measured with the R&amp;S® CMW500.</li> <li>Added control of the HB TE trigger and the FEC coding type (LDPC or BCC) for WLAN 11ax, in line with the requirements of CWG OTA Test Plan, V4.0.</li> </ul>
11.70	<p>AMS32-K28</p> <ul style="list-style-type: none"> <li>RF port combinations on the R&amp;S® CMW500 not supported by the driver cannot be configured any more.</li> <li>The default Response Time for GPS L1 tests with GSM has been reduced from 32 to 16 seconds.</li> </ul>
11.70	<p>AMS32-K29/-K30</p> <ul style="list-style-type: none"> <li>Added support for LTE band TDD53.</li> <li>When changing the channel bandwidth, RB allocations are now adapted automatically to the new bandwidth.</li> </ul>
11.70	<p>AMS32-K36</p> <ul style="list-style-type: none"> <li>Made the measurement timeout for BLE power measurements with the R&amp;S® CMW500 configurable up to 31 seconds.</li> <li>The R&amp;S® CMW500 now generates an output trigger signal in TRP tests for BLE.</li> </ul>
11.70	<p>AMS32-K37F, GPS L5 testing</p> <ul style="list-style-type: none"> <li>Corrected the satellite level setting on the R&amp;S® SMBV100B.</li> <li>Simplified the procedure for GPS L1 and L5 level equalization.</li> <li>Added a special test mode for evaluating DUTs reporting only L5 C/No values.</li> </ul> <p>An update of the GNSS-related tools on the R&amp;S® CMW500 is required:</p> <ul style="list-style-type: none"> <li>LBS Server V14.10.00</li> <li>SUPL Server V3.18.00</li> <li>A-GNSS handler V1.04.49</li> </ul>
11.70	<p>It is now possible to configure the User Defined Communication Tester as source for the interfering signal in W-LAN de-sense testing.</p>

Version	Antenna Measurements
11.70	<p>AMS32-K50 / -K53</p> <ul style="list-style-type: none"> <li>Creating NASTRAN and data input (*.nfd, *.snfd) files for the NF-FF transformation is now very much faster. Also, it is possible to generate NASTRAN grids with many more triangles (verified up to 10 million).</li> <li>FIAFTA *.nfd files names now do not reference Probe Correction anymore.</li> <li>Generalized applicability of Gain Calculation with Substitution Technique to all FIAFTA modes (Equivalent Currents and Spherical Harmonics).</li> <li>Generalized applicability of "Phase Center Calculation" post-processing function to all types of NF-FF transformation (FIAFTA and SWE).</li> <li>Both options now enable the "Export to text file" feature. Up to now, option AMS32-K49 was required for this.</li> </ul>
11.70	<p>AMS32-K81</p> <p>Added support for R&amp;S® SMA100B as Vector Signal Generator.</p>

11.70	AMS32-BST
	<ul style="list-style-type: none"> <li>Added possibility to skip the reset on the instruments at measurement start.</li> <li>The state of the phase compensation flag on the R&amp;S® FSW is kept constant when loading a setup file.</li> </ul>
11.70	<b>Device drivers</b> <ul style="list-style-type: none"> <li>R&amp;S® SMW200A: Support option SMW-B1056(N) extending the usable range up to 56 GHz.</li> <li>R&amp;S® SMW200A: Now supports the FE170ST external frontend.</li> <li>R&amp;S® FSW: Now supports the FE170SR external frontend.</li> <li>R&amp;S® FSW: Different external reference frequencies can now be configured.</li> <li>R&amp;S® ZNA: Different external reference frequencies can now be configured.</li> </ul>
11.70	<b>GUI enhancements:</b> <ul style="list-style-type: none"> <li>It is now possible to define angular step sizes which are not a divisor of 360, for stepped-continuous tests.</li> <li>The upper limit for the AUT dimensions in the “Auto Step Size” calculation has been increased to 10000 mm.</li> <li>It is now possible to configure RX mode in a VNA-based test also if option AMS32-K48 is not active.</li> <li>Added a warning message when the user configures a test template with potentially inconsistent settings (one axis moving continuously, while the hardware trigger is configured on the other axis).</li> </ul>

## Improvements

Version	General
11.70	<b>Signal Path driver</b> Signal Path calibration now works correctly in case of frequency conversion if a normalization table is used.
11.70	<b>Power meter drivers</b> <ul style="list-style-type: none"> <li>The frequency ranges for the NRPxS-USB power sensors are initialized correctly.</li> <li>Possible overflows in the NRP VXI driver are now avoided.</li> </ul>
Version	OTA Testing
11.70	SPOM tests using an LTE TRP test as reference are no working correctly.
Version	Antenna Measurements
11.70	Antenna measurements for frequency-converting AUTs were not working correctly with a R&S® ZNB.
11.70	In the case of tests with a single elevation cut, only the mid frequency result files for single polarizations were written. Consequently, only the mid frequency was selectable for NF-FF transformation.

11.70	<p>Antenna tests with R&amp;S® FSW in RX mode</p> <ul style="list-style-type: none"> <li>The attenuation of the generator path was accounted for twice, leading to wrong results.</li> <li>The level unit was stated as “dBm” instead of “dB”.</li> </ul>
11.70	<p>Antenna test with R&amp;S® FSW for active signals</p> <ul style="list-style-type: none"> <li>The applicable test model was not loaded if a user setup file was being loaded.</li> <li>ACLR testing for 5G was considering only the first two adjacent channels, but not the additional alternate channels.</li> <li>In a SPOM measurement at the end of a CW pattern, the EVM was reported to be 100%, and the OBW was reported to be 0 Hz.</li> <li>Also, when restarting the test after such a SPOM measurement, the 5G test model remained active on the R&amp;S® SMW200A.</li> </ul>
11.70	<p>Polarizations were not switched during an antenna test with a position file.</p>
11.70	<p>In some cases, the single polarization file of the mid frequency could remain empty after restarting an antenna test.</p>
11.70	<p>Result files are now read correctly for post-processing regardless of availability of option AMS32-K48.</p>
11.70	<p>AMS32-K81</p> <ul style="list-style-type: none"> <li>Clicking on the Stop button during the calibration sweep led to an endless loop of error messages.</li> <li>Frequency conversion checkbox was only visible in the Signal Path Calibration editor if option AMS32-K57 was active as well.</li> <li>GUI elements for loading a setup file were only visible in the settings for the SMW200A driver if option AMS32-K59 was active as well.</li> </ul>
11.70	<p>A ZVA with option ZVA-K8, but not having option ZVA-B8 installed, is now treated correctly.</p>

### Known issues

Version	Known Issues
11.70	-

## 2 Software update

### 2.1 Updating the software

Download and expand (unzip) the file “EMC32\_AMS32\_WMS32\_11V70.zip” to a temporary folder on your hard drive.

Run the “Setup.exe” program in order to update your AMS32 installation to V11.70.00.

#### **IMPORTANT**

**The Service and Maintenance option AMS32-K90 is mandatory for running AMS32 from V11.00 on, and entitles the user to receive upgrades during one year after the purchase. Therefore, do not install V11.xx if this option is not available. Please contact your R&S Sales Engineer for further information.**

## 3 Version History

### 3.1 Version 11.60.00

#### New functionality

Version	Functions
11.60	<p>Release of new option AMS32-BST: Base Station OTA testing</p> <p>This option implements a suite of test cases according to 3GPP TS 38.141-2 (5G Base Station OTA testing).</p> <p>Supported test environments: R&amp;S® PWC200 in a suitable anechoic chamber for FR1, and CATR chamber R&amp;S® ATS1800C for FR2.</p> <p>Supported instruments are the R&amp;S® FSW with firmware version <math>\geq 5.10</math> and option FSW-K144, and R&amp;S® SMW200A with firmware version <math>\geq 5.00.166.23</math> and option SMW-K144.</p> <p>Future extensions for additional test cases and O-RAN Radio Units instead of full base stations are planned.</p>
11.60	<p>Release of new option AMS32-K48E: Hardware Trigger for Elevation axis</p> <p>This option implements support for antenna tests with hardware trigger where the axis moving continuously is the elevation (theta) axis.</p> <p>Supported instruments for trigger generation are the maturo NCD (please contact maturo for an upgrade of an existing controller) and the R&amp;S® ATS1800C with firmware version <math>\geq 2.0.0</math>.</p>
11.60	<p>Added support for the Single-Point Offset Test method according to the recently released 5GAA Vehicle Antenna Test Methodology (VATM) Technical Report.</p> <p>This option implements the possibility of using a completed antenna test pattern as base for a test on active radio components, so the active pattern can be obtained with just measuring a small number of reference points.</p> <p>The technique is applicable to any environment, as long as the antenna pattern has been measured in far-field conditions.</p>
11.60	<p>AMS32-K34A</p> <p>Added measurements of GPS L5 signals to GNSS standalone testing.</p> <p>Pre-requisite: The DUT must be configured for sending NMEA messages in the format specified in NMEA V4.11, which adds the "signal ID" field to the \$GPGSV message.</p>
11.60	<p>AMS32-K49</p> <p>It is now possible to export the results of an antenna test to a format suitable for external post-processing. Possible formats are: *.cut and *.ffs (for direct import to CST). It is possible to export directivity or gain results, in both far-field or near-field.</p>



**Modified functionality**

Version	General
11.60	GUI optimizations
11.60	EVM unit is now configurable with a global setting in the OTA Options dialog. Possible selections: dB, %
11.60	Performing a recalculation of the OTA results, now also removes the *.nfd files used as input for the NF-FF transformation with FIAFTA. If transformation results exist, a warning message is generated as these are not consistent any more.
11.60	AMS32-ATS Plane rotation detection in CATR Verification has been removed.
11.60	The NRPxxS(N) driver now supports the 90 GHz models.

Version	OTA Testing
11.60	AMS32-K25 <ul style="list-style-type: none"> <li>CMW-WLAN driver: It is now possible to skip automatic link recovery during TIS tests in the driver. In this case, the settings in the "General" section of the Measurement Settings in the Test Template apply.</li> <li>Added the possibility of selecting channels in the 2.4 GHz band for WLAN 11ax.</li> </ul>
11.60	AMS32-K29, AMS32-K30 CMW-LTE driver: Add a checkbox to the Properties dialog for configuring whether the Advanced PRACH Settings shall be enabled or not.
11.60	AMS32-K34 Aligned the sensitivity search for NSS standalone testing with the CTIA test plan: There is no confidence testing phase as with A-GNSS testing. The Measurement Settings in the Test Template have been adapted correspondingly.
11.60	AMS32-K37L A-GNSS tests with a R&S® CMW500 with Windows 10 Operating System are working correctly now. This requires an update to LBS Server V13.60.

Version	Antenna Measurements
11.60	Automatic dual path calibration in RX mode (that is, with one polarization using primed quantities) does not save the results with frequency offset any more.
11.60	A result files with the total data (postfix "_tot") is now created in addition to file with the single polarization data, in case of antenna tests where the test positions are configured with a file instead of using a fixed grid.
11.60	AMS32-K50 <ul style="list-style-type: none"> <li>It is now possible to reduce the amount of files saved after FIAFTA transformation. A new global setting is available to that purpose in the OTA Options dialog.</li> <li>When stopping a running transformation, results for already transformed frequencies are now saved to the applicable output folders.</li> <li>Probe correction data re-normalization introduced with V11.50 has been removed again.</li> </ul>

11.60	AMS32-K57	<ul style="list-style-type: none"> <li>• Reworked the implementation for measurements on frequency-converting DUTs.</li> <li>• Reworked the GUI for frequency conversion with harmonic mixers.</li> </ul>
11.60	AMS32-K58	For measurements on 5G NR modulated signals, auto-levelling is now performed in any case before the measurement and not only after successful synchronization.
11.60	AMS32-K81	<ul style="list-style-type: none"> <li>• Added generating a final overview graphic and a pop-up message stating the average figure in case of EIRP Antenna Gain calibration.</li> <li>• Adapted the graphic labels</li> <li>• Added sensor mapping on the R&amp;S® AREG800A at measurement start</li> <li>• It is now possible to configure that RF port B of the R&amp;S® SMW200A shall be used.</li> </ul>
11.60	Device drivers	<ul style="list-style-type: none"> <li>• R&amp;S® SMW200A: Support option SMW-B1067(N) extending the usable range up to 67GHz.</li> <li>• R&amp;S® CMP200: Support the new CMPHEAD50 Remote Radio Head</li> <li>• R&amp;S® CMP200: Support the CMX OBT</li> </ul>

## Improvements

Version	General
11.60	<p>Signal Path driver</p> <p>The software behavior has been improved when loading a signal path to the Device List, in case a referenced attenuation table is not available.</p>
Version	OTA Testing
11.60	<p>Radiated Power tests</p> <p>Dual-channel R&amp;S® NRX is now supported correctly</p>
11.60	Test templates with user-defined Communication Tester are saved correctly again.
11.60	<p>Generic SPOM tests</p> <p>In case of different test methods, e.g. TIS SPOM test based on a TRP test, the SPOM offset is now calculated correctly.</p>
11.60	<p>AMS32-K22</p> <p>GPRS BLER measurements could run into a timeout too early under in certain conditions. This has been corrected.</p>
11.60	<p>AMS32-K29 / AMS32-K30</p> <p>2CC setups are now programmed correctly in all cases.</p>
11.60	<p>AMS32-K35</p> <ul style="list-style-type: none"> <li>• LTE Cat-M1 is now available in the conducted testing utility.</li> <li>• RSSI-based TIS tests for LTE Cat-M1 in band FDD13 are working correctly now.</li> </ul>

Version	Antenna Measurements
11.60	Loading a test and creating a total 3D graph now works correctly also in case of incomplete phi scanning (azimuth stop value < 360 deg).
11.60	Spiral scan with ZVA and HW trigger is working again.
11.60	RX Mode with R&S® ZNA measuring both pols simultaneously is now working correctly.
11.60	Loading a position file for antenna measurements is working correctly now, without unnecessarily removing some points.
11.60	<p>AMS32-K49</p> <ul style="list-style-type: none"> <li>NFFF transformed data are now always displayed correctly in case of great-circle cut systems.</li> <li>Ludwig3 components are now calculated correctly in case of great-circle cut systems.</li> <li>Frequency plots using the Peak general tables are now distinguishing correctly between spherical and Ludwig3 coordinates.</li> </ul>
11.60	<p>AMS32-K50</p> <p>AUT size settings for FIAFTA Spherical Harmonics are now saved correctly to the OTA Test Template.</p>
11.60	<p>AMS32-K53</p> <p>Selecting not transformed frequencies in the GUI works correctly now.</p>
11.60	<p>AMS32-K58</p> <p>Antenna tests in RX mode with FSW/SMW: Setup files for modulated signals on the R&amp;S® SMW200A are now loaded correctly.</p>
11.60	<p>AMS32-K60</p> <p>Pathloss values are now retrieved correctly from the PWC config file, also if the measurement frequency is different than the center frequency.</p> <p>All applications are now considering the LNA configuration item added in the previous version correctly.</p>

## 3.2 Version 11.50.00

### New functionality

Version	Functions
11.50	<p>Release of new option AMS32-K81: Path calibration with R&amp;S AREG800A</p> <p>This option implements signal path calibration with an AREG800A radar signal generator. Both EIRP calibration with a power sensor and calibration of the IF signal output path with a spectrum analyzer are supported.</p> <p>Pre-requisites: AREG800A firmware version 05.00.057 or later</p>
11.50	The VNA driver now supports ZNA setups using the direct access connectors with option ZNA-B16.

### Modified functionality

Version	General
11.50	GUI optimizations
11.50	The signal path calibration utility has been extended with the possibility of using frequency conversion, also if no external mixers are configured.
11.50	Maturo NCD driver: The "Extended Settings" tab for the configuration of high-precision positioners is now always available.
11.50	The NRPxxS(N) driver now supports the 67 GHz models.

Version	OTA Testing
11.50	<p>AMS32-K25</p> <p>When testing TRP on a Bluetooth DUT with an NRQ6, the Peak power measurement mode can now be activated on the NRQ6</p>
11.50	<p>AMS32-K37L</p> <ul style="list-style-type: none"> <li>Added a configuration item for the instrument's reference frequency source</li> <li>Added a configuration item for restarting the measurement system instead of just the GNSS scenario when applicable</li> <li>For conducted testing, the progress log is now saved to a log file</li> </ul>
11.50	<p>OTA Test Template</p> <ul style="list-style-type: none"> <li>Loop Settings: consider the upper limit for the Elevation positioner also when checking the box "Fix settings according to standard"</li> <li>TIS Measurement Settings: Changed the default value for "Start Level" in fine and final approach sections to 0 dB</li> <li>TIS Measurement Settings: Changed the default Error Rate target value when creating a new template to 95%.</li> </ul>
11.50	<p>CMW Drivers</p> <ul style="list-style-type: none"> <li>All drivers now support CMW500 firmware V4.0.x</li> <li>LTE: 2CC setups now are programmed more efficiently</li> </ul>

- WLAN: Removed the “Adapt Expected PEP” checkbox, functionality is not available anymore
- WLAN: When checking call state with a PER measurement, the driver is now using a lower number of packets
- Bluetooth: Optimized programming the signaling layer for Low Energy
- NB-IoT: ASEM can now be configured
- WCDMA: For HSDPA tests, the HSPA test mode procedure is set to “RMC+HSPA”
- GPRF drivers (generator and power meter): Reference Frequency source can now be configured

Version	Antenna Measurements
11.50	Step sizes down to 0.25 deg are now possible in stepped-continuous tests
11.50	AMS32-K49 <ul style="list-style-type: none"> <li>• Added radiation efficiency calculation for raw (not NF-FF transformed) measurement data, if the reflection loss coefficient is available</li> <li>• Option “Add ground effect” has been removed from post-processing</li> <li>• Polarization strings in the “Field Characteristic” selection box are now matching the configured system type (Great-Circle cut vs. Conical cut)</li> </ul>
11.50	AMS32-K58 <ul style="list-style-type: none"> <li>• For 5G NR signals measured with a spectrum analyzer, EVM and EIRP are retrieved from the same measurement, instead of performing two individual measurements</li> <li>• Added the possibility of loading a dfl setup file on the CMP200</li> </ul>
11.50	AMS32-K60 <ul style="list-style-type: none"> <li>• Added the possibility of looping the Power Factor calibration over LNA states</li> <li>• Harmonized positioner axis naming for PWC system</li> <li>• Adapted config file readout to new version 2.1 of the PWC software</li> <li>• Broadband path loss correction on spectrum analyzer with option FSW-K544 can now be disabled in the OTA Options</li> </ul>
11.50	VNA Driver: LO usage is not optimized anymore for frequency conversion with harmonic mixers
11.50	Spectrum Analyzer Driver: FSV3000 family is now supported

## Improvements

Version	OTA Testing
11.50	Radiated Power tests The test aborted with an error if no analyzer device was selected for horizontal polarization.
11.50	AMS32-K24 HSDPA throughput is displayed correctly in unit Mbps in case of constant power TIS testing

11.50	AMS32-K34
11.50	<ul style="list-style-type: none"> <li>Improved behavior for certain cases (extended NMEA format, C/N0=0 reports)</li> <li>Result of Sensitivity Threshold search was not saved correctly</li> </ul>
11.50	AMS32-K37
11.50	A-GNSS testing with OTA Enabler could abort with an error after GNSS scenario reset.
11.50	CMW drivers
11.50	<ul style="list-style-type: none"> <li>LTE: 3CC scenario setup was incorrect in case of a single CMW</li> <li>WLAN: External attenuations were set incorrectly for WiFi 6E under certain circumstances</li> </ul>

Version	Antenna Measurements
11.50	No results were saved if changing the order of polarizations in the Loop Settings
11.50	Efficiency-Peak Gain graph was not updated
11.50	Generator level was set incorrectly under certain circumstances in RX mode
11.50	Peak realized gain figure was wrong in CTIA-style reports for tests with a VNA
11.50	AMS32-K49
11.50	<ul style="list-style-type: none"> <li>Visualization is now working also if no NF-FF option is active</li> <li>Visualization of frequency plots in a single direction now works correctly</li> <li>When repeating a test, visualization data tables were not updated</li> <li>Far field gain calculation was not working</li> </ul>
11.50	AMS32-K50
11.50	Total transformation time calculation was wrong if the process ran over midnight
11.50	AMS32-K53
11.50	Corrected a parameter usage that could lead to wrong far-field patterns, with a dip on the top of the pattern
11.50	AMS32-K60
11.50	PWC reset was resetting the OSP and hence any active path. PWC reset is now shifted to an earlier moment in time.
11.50	AMS32-ATS
11.50	Phase unit in the result files is displayed to be "dB"
11.50	EMC32-K11
11.50	Erroneous behavior when executing a Test Sequence running NF-FF transformation with option "transformation acc. to template"
11.50	Displaying a Touchstone file in a graphic in the S-Parameter Measurement utility was crashing the software

### Known issues

Version	Known Issues
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11.50 Antenna measurements in RX mode measuring both polarizations simultaneously, using primed wave quantities, are not working correctly with a ZNA.  
Please either use a ZVA or measure both polarizations sequentially.

11.50 AMS-K37L  
Under certain circumstances, some UEs may show high position errors after GNSS scenario reset. Use the new possibility for restarting the whole measurement system in this case.

### 3.3 Version 11.40.00

#### New functionality

Version	Functions
11.40	<p>Release of new option AMS32-K34A: GPS standalone advanced</p> <p>This option implements GPS standalone testing for technologies other than GPS, namely Galileo, Glonass and Beidou. Supported GNSS scenarios are according to 3GPP TS 37.571-1, sub-clause 7, sub-tests 1, 5, 8, 9 and 10.</p> <p>Pre-requisites: The new scenarios are supported only for the SMBV100B. The applicable options for generating the named scenarios need to be active, please refer to the SMBV100B manual.</p>
11.40	<p>Release of new option AMS32-K37B: A-GNSS OTA Enabler extension for Beidou</p> <p>This option adds Beidou testing capabilities to the A-GNSS tests with OTA Enabler for LTE. Both GPS+Beidou mixed and Beidou-only scenarios can be generated.</p> <p>Also, Beidou is added for SPOM measurements in line with the CTIA test plan requirements for Glonass and Galileo.</p> <p>Pre-requisites: The new Beidou scenarios are supported only for the SMBV100B. The applicable options for generating Beidou scenarios need to be active, please refer to the SMBV100B manual.</p> <p>Option AMS32-K37 and AMS32-K37L must be active.</p>
11.40	<p>Release of new option AMS32-K38: OTA tests on C-V2X terminals</p> <p>This option implements OTA tests on C-V2X receivers using PC5 sidelink (LTE Band 47) signals. For TX tests, a CMW500 with option CMW-KM570 is required. RX tests are possible implementing a specific SCPI-like command protocol interface with some external application capable of measuring BER.</p> <p>For these tests, special figures of merit are calculated, considering partial azimuth regions in cuts near the horizon.</p>
11.40	<p>AMS32-K50</p> <p>A new NF-FF transformation mode "Spherical Harmonics" is now available. This uses the same tool as the "Equivalent Currents" mode, but requires a constant step grid. Therefore, no Nastran file is required, but also no arbitrary point distribution is possible.</p>
11.40	<p>AMS32-K58</p> <p>For demodulation tests with a spectrum analyzer, it is now possible to compensate the path attenuation directly on the analyzer, using the Frequency Response Correction option FSW-K544. AMS32 attenuation data are formatted into a *.fres file, which is then uploaded to the instrument.</p>
11.40	<p>AMS32-K60</p> <p>Introduced a new path calibration procedure for PWC200 based systems: The Signal Path is now calibrated in segments of a configurable bandwidth around each PWC200 center frequency. Results are not saved to AMS32 attenuation tables anymore, but to the PWC200 config file.</p> <p>As a consequence, tests with the PWC200 do not use normal attenuation tables anymore, but always the data from the config file.</p> <p>The SINR check has been adapted to the new paradigm as well.</p>



**Modified functionality**

Version	General
11.40	GUI optimizations

  

Version	OTA Testing
11.40	<p>AMS32-K25</p> <p>The PTW70 WLAN tester is not supported any more</p> <p>Added new elements to the CMW-WLAN driver for configuring security settings and RX frame trigger</p>
11.40	<p>AMS32-K34</p> <p>The SMBV100B is now supported for GPS standalone testing</p>
11.40	<p>AMS32-K35 LTE Cat-M1</p> <p>Added support for LTE Cat-M2</p>
11.40	<p>AMS32-K35, NB-IoT</p> <ul style="list-style-type: none"> <li>Added support for NB-IoT2</li> <li>Added RSSI TIS testing for NB-IoT</li> <li>Check box "Fix settings according to standard" is now available in the test template</li> <li>Channel BW correction for TIS levels is applied only if configured</li> <li>Channel BW is stated correctly in reports</li> </ul>
11.40	<p>AMS32-K80</p> <p>Adapted the MRR (Machine Readable Report) to CTIA test plan V4.0</p>
11.40	<p>CMW drivers</p> <ul style="list-style-type: none"> <li>LTE: Reworked logic for assigning TRXs in LTE 3CC/4CC setups</li> <li>WLAN: WiFi 6E setups with CMW-Z800A can now be configured using a single frontend</li> </ul>

  

Version	Antenna Measurements
11.40	<p>AMS32-K48</p> <p>Optimizations for Input HW Trigger:</p> <ul style="list-style-type: none"> <li>Improved VNA trace readout speed</li> <li>Optimized position file retrieval from the maturo NCD</li> <li>It is now possible to run the test with high speeds, creating less traces than nominally expected</li> </ul>
11.40	<p>AMS32-K49, Visualization</p> <ul style="list-style-type: none"> <li>TRP integration using algorithms Curtis-Clenshaw and Gauss-Legendre is also possible in case of negative theta values</li> <li>TRP integration with sin(theta) algorithm adds power levels corresponding to negative theta values, instead of subtracting them</li> </ul>
11.40	<p>AMS32-K50</p> <ul style="list-style-type: none"> <li>Executable files are not copied to the transformation folder anymore</li> <li>Increased max. dimensions for positioner step size calculation in Loop Params to 6x6x2 m</li> </ul>

11.40	<p>AMS32-K51</p> <p>Probe correction data need an additional phase shift of 180 deg on one polarization. This will lead to a new normalization of the probe data when starting AMS32 V11.40 for the first time.</p>
11.40	<p>AMS32-K56</p> <p>In the case of Antenna measurements with VNA and simple frequency conversion (no mixers), added the possibility of sweeping either the signal at the reference port or the additional "DUT IF Clock" signal</p>
11.40	<p>AMS32-K60</p> <p>AMS32 operation with PWC200</p> <ul style="list-style-type: none"> <li>Rotary axes are denominated "Roll" and "Azimuth" throughout the GUI and in all result tables</li> <li>It is possible to define negative values for the Roll axis scan.</li> <li>Optimized PWC config file readout: Sections with only one line are now allowed; if a problem is detected, the error message states how many lines have been read from the file.</li> </ul> <p>PWC200 Calibration utility</p> <ul style="list-style-type: none"> <li>Added a new parameter "Repetition Factor" for Power Density Measurement. PD Measurement procedure for all configured parameters is now executed sequentially this number of times.</li> <li>Showing progress during PWC Calibration procedure execution. This includes dynamic display of error and warning messages.</li> <li>Added a new entry to the main menu Extras entry, which opens a utility for visualizing the PWC Pathloss results saved to the config file.</li> </ul> <p>Antenna driver</p> <ul style="list-style-type: none"> <li>Extended the PWC tab in the driver Properties to a tool for manually controlling and setting up the PWC</li> <li>If no valid entry is found in the PWC config file for the given parameters, a path attenuation value of 0 dB is used instead of aborting the test.</li> </ul>
11.40	<p>VNA driver</p> <ul style="list-style-type: none"> <li>Check for K0 option</li> <li>Added a user configurable frequency band for Harmonic Mixer mode</li> <li>Made rear LO ports available always, no need to check for option ZNA-B8</li> <li>Added support for LNA hardware option ZNA-B302</li> </ul>
11.40	<p>Spectrum Analyzer driver</p> <ul style="list-style-type: none"> <li>Added support for FSVA3000 spectrum analyzer family</li> <li>Resolution bandwidth can now be configured down to 1 Hz</li> <li>The input attenuation is now programmed as configured in the Settings dialog. The value is not overridden with the default configuration in the Properties dialog</li> <li>The driver now repeats demodulation measurements if an overload condition is detected</li> </ul>
11.40	<p>NRQ6 driver</p> <ul style="list-style-type: none"> <li>Added possibility of configuring external reference in the driver's Properties dialog</li> <li>Changed noise level to -170 dBm</li> </ul>
11.40	<p>CMP200 drivers</p> <p>IF ports are now supported for both measurements and signal generation, in addition to RF ports with RRH</p>

## Improvements

Version	General
11.40	In a test configured with single polarization, the second polarization was measured too
11.40	<p>Maturo NCD turntable driver</p> <p>For certain versions of the NCD, the movement of the turntable (Phi axis) was not tracked correctly if option AMS32-K48 was not active.</p>
11.40	<p>Signal Path driver</p> <ul style="list-style-type: none"> <li>• Path calibration with VNA and many frequencies in the sweep led to VISA timeout</li> <li>• Frequency conversion in path calibration for a combination of RF generator and power meter is now available again</li> <li>• When calibrating with primed quantities, the applicable frequency offset is now considered</li> </ul>
Version	OTA Testing
11.40	<p>AMS32-K29, -K30, -K30A</p> <ul style="list-style-type: none"> <li>• Corrected default test channels for LTE TDD48</li> <li>• Corrected RSIC channel list for LTE FDD71 and TDD48</li> </ul>
11.40	<p>AMS32-K37F</p> <p>It was possible to select both GNSS frequencies (L1 and L5) in one test. This has been corrected.</p>
11.40	<p>CMW drivers</p> <ul style="list-style-type: none"> <li>• WLAN: take into account option CMW-KS658 for WLAN 11ax</li> <li>• WLAN: Support WiFi 6E correctly for CMW500 firmware 4.x</li> <li>• WLAN: Set correct input signal type for TxMeas for 11ac</li> <li>• Bluetooth: RF ports were inverted for BLE Advertiser testing</li> </ul>
Version	Antenna Measurements
11.40	Path attenuations are not compensated any more when measuring polarizations sequentially in RX mode with a VNA.
11.40	<p>AMS32-K49 OTA Visualization</p> <ul style="list-style-type: none"> <li>• Single polarization tables generated from raw tables in stepped-continuous mode were incorrect if start elevation was &gt; 0</li> <li>• Near E-field visualization on probe corrected data had an issue</li> </ul>
11.40	<p>AMS32-K50</p> <ul style="list-style-type: none"> <li>• NF-FF Gain calculation did not execute if the test template was configured with only a frequency list</li> <li>• NF-FF Gain calculation was not working in batch mode or from remote control if the dialog had not been used first</li> </ul>
11.40	<p>VNA driver</p> <ul style="list-style-type: none"> <li>• Measurements with primed quantities are now programmed correctly on the ZNA</li> <li>• Simple frequency conversion without mixers works correctly again</li> </ul>

11.40	Spectrum Analyzer driver 3D ACLR pattern measurements for 5G NR aborted with a timeout error.
11.40	SMW200A driver Instrument goes to physical mode reliably now
11.40	Generic generator driver Test frequency was not set correctly

### Known issues

Version	Known Issues
11.40	AMS32-K37 A-GNSS tests with OTA Enabler are not working correctly with CMW500 firmware V4.0. Please use firmware V3.8.
11.40	Antenna measurements in RX mode measuring both polarizations simultaneously, using primed wave quantities, are not working correctly with a ZNA. Please either use a ZVA or measure both polarizations sequentially.

## 3.4 Version 11.30.00

### New functionality

Version	Functions
11.30	<p>AMS32-K48</p> <p>Added a new hardware trigger mode for antenna measurements. In this mode, the VNA sweeps continuously and generates a "Ready for measurement" signal at the start of each sweep, triggering the positioner controller to record the current position of the positioner axes. At the end of the positioner scan, AMS32 retrieves the saved positions from the controller.</p> <p>Prerequisites: This new mode works only with a R&amp;S ZNA network analyzer and a maturo NCD positioner controller. The ZNA needs to have option ZNA-B91 installed. The maturo NCD needs a hardware upgrade; please contact your R&amp;S or maturo representative for more information.</p>
11.30	<p>AMS32-K50</p> <p>Added a new feature for improving the accuracy of the NF-FF transformation. It is now possible to use a position calibration file when generating the input data for the transformation algorithm. This file relates the polar coordinates (azimuth, elevation) with true Cartesian (X, Y, Z) coordinates as measured e.g. with a laser tracker during system commissioning. Until now, the Cartesian coordinates were calculated theoretically.</p> <p>New GUI control elements are available in the OTA Options for enabling this feature and selecting the applicable file.</p>
11.30	<p>AMS32-K59N</p> <p>Phase measurements with NRQ6 are now possible for digitally modulated signals like 4G or 5G. In the previous version, this was only working on MCCW (multi carrier CW) signals.</p>
11.30	<p>Added the possibility to stop a running test when breaching a limit, either by exceeding or by undershooting. Extended the "Graphics Extensions" sub-dialog of the OTA test template to that purpose.</p>
11.30	<p>Added bands 72, 73 and 74 for LTE and NB-IoT.</p>

### Modified functionality

Version	General
11.30	<p>Made sure that the temporary test folder is not a sub-folder of the normal Tests folder, as this could lead to loss of data in certain rare cases.</p>
11.30	<p>Drivers for R&amp;S ATS CATR chambers</p> <ul style="list-style-type: none"> <li>Adapted ATS800R driver to the new remote command syntax, identical to the ATS1800x.</li> <li>Added control of the Feed Switcher in the new generation of the ATS1800C.</li> </ul>

Version	OTA Testing
11.30	AMS32-K35, NB-IoT

- Added support for Confidence BLER testing for NB-IoT. CMW firmware V3.8.x is required.
- Nominal Uplink Power is configurable now.
- In case of scheduling type "User defined", the scheduling pattern is now programmed as configured and not fixed depending on the test type anymore.
- The possibility of correcting downlink power levels for the NRS EPRE offset, and thus referring them to the channel bandwidth, is now applied to NB-IoT as well.

11.30	AMS32-K37 Updated the OTA Enabler to version 13.0.1.357. New capabilities: Configure the SUPL FQDN and SUPL version from the AMS32 GUI; UE mode switching without the need of a new system initialization. Made SUPL traffic and OS discovery more robust.
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Version	Antenna Measurements
11.30	AMS32-K50, -K53 <ul style="list-style-type: none"> <li>• Added possibility to start the NF-FF transformation automatically after data acquisition.</li> <li>• Added possibility to use the latest selected folder when selecting the Reference Antenna folder for Gain Calculation</li> </ul>
11.30	AMS32-K60 Added polarization switching of the PWC200 with the maturo turntable driver.
11.30	Allow stopping and continuing an antenna measurement test not done with a VNA.
11.30	VNA driver Identify and support the ZNA50 model

## Improvements

Version	General
11.30	Made sure the "NF-FF Reference Files" folder is considered in the Backup/Restore functionality.
11.30	Maturo NCD turntable driver Made sure the turntable starts moving correctly for all firmware versions.

Version	OTA Testing
11.30	AMS32-K25, Bluetooth The Communication Settings dialog is now displayed correctly if BLE Advertiser mode is active.
11.30	AMS32-K30L SPOM measurements in LAA LUD testing now take the path attenuation into account correctly.
11.30	AMS32-K35, LTE Cat-M1 Made sure that the external frame trigger is generated for HD mode.

11.30	TRP tests with NRQ using the frame trigger from the CMW: Made sure that the external trigger on the NRQ6 is not de-activated by error.
11.30	Avoided an AMS32 hang-up when loading a test with the "User defined Comm Tester" if this is not enabled
Version	Antenna Measurements
11.30	AMS32-K53 Made sure that circular polarizations are not inverted.
11.30	AMS32-K54 Made sure the DUT Offset Correction results are correct if Probe Correction is used.
11.30	AMS32-K55 Phase Center Offset calculation now does not abort occasionally with a message about dongle detection.
11.30	AMS32-K60 <ul style="list-style-type: none"> <li>• Made sure to evaluate and update the path loss section of the PWC config file correctly.</li> <li>• Made sure to update all sections of the PWC config file correctly on starting a measurement.</li> </ul>
11.30	AMS32-ATS Made sure continuous measurements with HW Trigger and the CMP200 work correctly.
11.30	VNA driver Made sure phase data readout for continuous measurements with absolute wave quantities is correct.

### 3.5 Version 11.20.00

#### New Functionality

Release of options AMS32-K50G and AMS32-K50P (NF-FF Transformation considering arbitrary ground or PEC ground).

Both options add new capabilities to the NF-FF Transformation. AMS32-K50P adds PEC (Perfectly Conducting Ground), AMS32-K50G adds Arbitrary Ground. Both can either be corrected for during the transformation, or can be added in a second transformation step to the original free-space data.

The arbitrary ground shall be characterized by the ground material's dielectric permittivity factor  $\epsilon$ , which can be entered as a constant or as a function of frequency.

Pre-requisite: Option AMS32-K50 must be active.

Release of option AMS32-K59N (Phase measurements with NRQ6)

The option implements measuring relative phase in addition to signal level with one or more NRQ6, in the operating frequency range of the NRQ6, i.e. up to 6 GHz. The phase reference can either be one NRQ6 connected to a reference antenna turning with the DUT, or the measurement at the first position. This second case is only applicable if the phase of the DUT signal is highly stable and does not drift during the whole test.

This first release of AMS32-K59N supports measuring MCCW (multi-carrier CW) signals only.

Pre-requisite: NRQ6 firmware 02.20.20072802 or later, options NRQ6-K1 and NRQ6-K3 must be installed on each NRQ6 involved used for the test.

AMS32-K25

Added support for WiFi 6E testing, based on WLAN 802.11ax.

Pre-requisites: CMW500 with two TRX boards, firmware BASE V3.8.11, WLAN Signaling V3.8.20 or later; Frequency extender CMW-Z800A

AMS32-K37L

Added A-GALILEO testing.

The testing is implemented as SPOM (Single Point Offset Measurement), re-using the main A-GPS pattern, as required by the CTIA OTA test plan, version 4.0.

Minimum required version for the LBS-Server on the CMW500: 12.20.3

Driver for SMW200A

The driver now supports setups with a SMW200A and a frequency extender FE50TDR, up to 50 GHz.

Driver for ATS1800C positioner

Added support for the feed switcher, both automatic and manual. Feed switcher usage is to be configured in the Properties dialog of the corresponding antenna.

The driver now switches on the system power when setting to physical mode.

Added a new driver for the ATS800R positioning system.

Added a new driver for NSI-2000 positioning systems.

Pre-requisites: NSI-2000 software V4.14.40 must be installed on the PC. Option AMS32-K60 must be available.



### Modified Functionality, General

#### 3D Graphic

The default view angle can now be modified. This is possible in the OTA Options dialog, tab "3D Graphics", or directly from the 3D graphics' "User View Angle" dialog.

#### Reporting

TRP unit in the 3D graphic and in the OTA result section of the CTIA report now is consistent with the test setup: dBm for EIRP measurements, dB(i) for gain measurements.

#### Path Calibration

Path calibration with frequency conversion is now also working with mode "Attenuation".

### Modified Functionality, OTA Testing

#### AMS32-K25

Added the possibility of activating DirtyTx for Bluetooth LE in normal signaling mode (CMW-KS601).

WLAN TRP testing: the RX Frame Trigger is now programmed with the same bandwidth and data rate as configured for the signaling.

WLAN Power measurement timeout can now be programmed in the Properties of the CMW-WLAN driver.

#### AMS32-K29 / -K30

Extended the radio channel range for band LTE FDD66 when used as SCC in TIS tests, so that the DL-only part is available too now.

#### AMS32-K35

For TRP tests with a spectrum analyzer on LTE Cat. M1 half-duplex or NB-IoT, measurement mode "Zero-Span Trace Analysis" is now available.

The trigger offset on the spectrum analyzer can be configured in the Measurement Settings section of the Test Template.

The Video BW on the spectrum analyzer is now programmed to be 1 MHz for NB-IoT, in line with the CTIA OTA test plan.

#### User-defined Communication Tester

Can be used without calling an external application for every measurement. In that case, the customer needs to make sure to start an application continuously evaluating the sync file.

Supports testing several frequencies now.

Can now be used in TRP tests as well. Please note that in this case just the frequency information will be passed, the EIRP measurement will still be done by AMS32.

Evaluates error feedback now.

## Modified Functionality, Antenna Testing

### OTA Test Template, main dialog

Extended possibilities are available for configuring the graphical live display during tests with VNA:

- It is possible to select for which frequencies polar graphs shall appear during the test. All selected graphics will be added to a report created based on an AMS32 Report Setup.
- It is possible to display a constant limit line with a configurable value in the polar graphs.
- It is possible to show the average of all measured values at the end of the test.
- A dedicated button labelled "Graphic Extensions" has been added to the main template dialog. Clicking this button opens a sub-dialog for configuring the new parameters.

### OTA test Template, Loop Settings

In the case of tests with a VNA with a ZC90 frequency extender, the priority order of the single loops is more flexible, polarization can be configured with lowest priority.

When configuring a spiral scan with Hardware Trigger, the elevation step size is automatically set to the same value as the azimuth step size and cannot be modified.

### OTA Test Template, Measurement Settings

In a newly created template with VNA, phase measurements are enabled by default.

### Antenna Testing

In stepped-continuous tests the VNA is not re-initialized at the start of each azimuth turn any more.

Live polar graphs are now rescaled after every azimuth turn in stepped-continuous tests.

The "Efficiency-PeakGain" result table now includes columns with the peak gain for each polarization, as well as columns showing the position at which the peak gain was identified.

### OTA Visualization

Peak gain and peak realized gain can now be visualized for each single polarization.

Reflection Coefficients can now be visualized. This is the same functionality as clicking on the "Check Reflection Coefficients" button in the Gain calculation, but using the file saved to the test when performing the Gain calculation. This allows displaying these files, even if the original files are not available any more at their previous location.

Changing GUI control selections now re-initializes other controls, especially the frequency list, only when needed. This makes the GUI much more responsive.

Circular polarization and Luwig3 can now be selected only if phase data are available and both polarizations have been measured.

Visualizing a peak quantity over frequency takes some time because the all applicable measurement result files need to be scanned. In order to avoid the same delays for other peak quantities, all of them are evaluated at once, and the data written to dedicated result files. Visualizing other peak quantities then works without delay.

Removed the "NF Visualization" tab: Moved the GUI controls for visualizing the results of a near-field calculation to the "OTA Visualization" tab, and moved the GUI controls for configuring the near field E-field calculation to the "Post Processing" tab. Also, it is now possible to select more than one frequency at a time for performing the calculation.

### NF-FF Transformation

Folder selection for the "Reference Antenna" in the Gain Calculation now starts at the PC's root folder instead of the AMS32 "Tests" folder.

Aborting a file selection with Cancel now does not clear the existing file information.

Speed of Gain Calculation has been improved.

### S-Parameter utility

It is now possible to display the S parameters graphically. This applies to both the S parameters currently being measured, as well as to files (csv or Touchstone format) saved earlier.

**Pattern Aggregation utility**

It is now possible to select around which axis (X or Y) the DUT has been rotated between the tests for the two hemispheres. The rotation is considered when aggregating the partial patterns to a total one.

**AMS32-ATS**

ATS QZ Verification procedure now also displays graphics for the phase results.

The message box asking to position the reference antenna now contains graphical information showing the test positions and the polarizations, in order to assist the user.

It is now possible to create a new subfolder when saving the results.

The tabular result display now refreshes immediately after the measurement.

**New VNA test capabilities**

A new frequency converting mode "Harmonic Mixers" is available now.

It is now possible to use the rear IF input ports of the ZNA.

Setups with Active Frequency Multipliers are supported now.

The VNA driver's Properties dialog has been completely reworked, especially concerning the GUI controls for selecting and configuring setups for frequency converting measurements: A dedicated tab now contains these GUI controls; the frequency extender hardware in use can explicitly be selected where applicable, key parameters are then automatically configured to fixed values where applicable.

**Improvements, OTA Testing****AMS32-K25**

TIS tests on Bluetooth LE with Advertiser packets are starting correctly now.

Pattern type "Pseudo Random" is now programmed correctly to the CMW500 for WLAN TIS tests.

**AMS32-K35**

BLER measurements for NB-IoT with higher number of samples are now waiting long enough for the measurement to finish.

**AMS32-PK2x**

If any of the bundle options AMS32-PK2x and option AMS32-K35 are both active, the LTE radio band to test is not fixed to Cat. M1 anymore.

**SPOT testing**

Starting a TIS SPOT based on a TRP tests now always works correctly.

**Improvements, Antenna Testing****AMS32-K50**

TRP calculation on NF-FF transformed data is now using the positioning step sizes of the transformed data, and not the step size used for acquiring the raw measurement data.

The start of the transformation is now working reliably for all frequencies also on fast PCs.

**AMS32-K55**

Input data for the phase center evaluation are now retrieved from the correct folder in the case of existing tests which had previously been saved.

**Antenna testing**

The result files generated during the test for live display in a stepped-continuous test now are filled correctly, also in the case of starting at an elevation greater than 0 deg.

Attenuation values for the generator path are now saved to the test setup file correctly.

The Efficiency graph included in a report based on an AMS32 Report Setup now shows the correct data.

**Antenna testing with CMP200 in stepped-continuous mode**

The filter type and bandwidth now can be configured as planned in the Measurement Settings section of the Test Template, and the filters are programmed correctly on the instrument.

When the "Reset instrument at test start" box is checked in the Properties of the CMP200 power meter driver, the generator of the instrument is not switched off at test start anymore.

The measured data can now be correctly displayed in the OTA Visualization.

**OTA Visualization**

TRP is not calculated any more in case of single cut tests.

Fixed an issue with TRP calculation for Clenshaw-Curtis and Gauss-Legendre quadratures for small step sizes.

**VNA driver**

Data readout in case of spiral scan tests with small step sizes is now working.

Data readout speed has been improved for continuous measurements in general.

**Spectrum Analyzer driver**

LO Power control for frequency conversion with the FSW is now working.

**NRPM driver**

When testing with two NRPM-OTA units connected to the same base unit, the measurements are now done simultaneously if configured.

## 3.6 Version 11.10.00

### New Functionality

Release of option AMS32-ATS (CATR Quiet Zone Verification)

This option implements the necessary measurements and algorithms for verifying the Quiet Zone of a CATR (Compact Antenna Test Range) chamber, e.g. the R&S ATS1800C.

We recommend to do the verification with a VNA, as measured phase data are available which allow a better resolution for the validation. However, the verification can also be done with a CMP200.

AMS32-ATS can be used as standalone tool. In that case, AMS32 will start off normally, but no OTA tests can be created or loaded, the functionality will be limited to system configuration, path calibration and this CATR validation.

Release of option AMS32-K58D (Dual SMW support)

This option supports setups for antenna measurements with NR signals with two SMW200A. Two configurations are possible

- Master-slave: In this case both SMW200A are coupled and generate a NR multi-carrier signal over an aggregate bandwidth of > 1 GHz. Please refer to the SMW200A manual for details on master-slave operation

- Default: In this case, both SMW200As are driven individually, generating two NR signals at different frequencies.

Minimum required firmware for the SMW200A: 4.70.026.51

Pre-requisite: Option AMS32-K58 must be active.

The AMS32 implementation relies on loading setup files stored on the instruments configuring the NR signal(s) as required.

Tests with CMP200 in List Mode and with external Hardware Trigger are now supported. This allows to conduct tests in stepped-continuous mode, with the corresponding massive time saving.

Minimum required firmware for the CMP200: 2020.6.0.13

### Modified Functionality, General

Table Merge Tool

The default folder for the merged table now is the same folder where the source tables are located.

OTA Options

It is now possible to configure the string to be included in the report for unit "degree". This is for addressing the fact that the "°" character cannot be displayed correctly on PCs with Asian language, leading to missing line headers in the CTIA report.

### Modified Functionality, OTA Testing

AMS32-K29 / -K30

- Added band LTE FDD85

- During TRP tests, the TBSI was reverting to 6 by default. Now the TBSI configured for link setup is kept during the test.

AMS32-K37L

Uplink TBSI can now be configured for the LTE link setup for A-GNSS testing.

AMS32-K58
<ul style="list-style-type: none"> <li>- For tests with the CMP200 as CW power meter, the Gaussian bandwidth can now be seamlessly configured in the range from 1 kHz to 10 MHz</li> <li>- For tests with the CMP200 as measurement instrument for NR signal demodulation, the NR channel bandwidth can now be configured.</li> </ul>
TRP tests with NRQ6 on TDD signals
The Trigger-to-Noise parameter is now available for configuration in the test template. The NRQ6 trigger level is programmed accordingly.
OTA Options
Added possibility of using Clenshaw-Curtis weights for calculating integral quantities (TRP, NHPRP, etc.)

### Modified Functionality, Antenna Testing

AMS2-K49
"ffnormc" (normalization factor of the NF-FF transformation) can now be visualized as a function of frequency.
AMS32-K50
Mesh creation for the transformation has been enhanced, making the mesh smoother and allowing for finer intermediate scaling, based on the target length of the triangle sides.
EMC32-K11
When a running test sequence is aborted, results of NF-FF transformation completed during this sequence are not discarded any more.
OTA Options
Phase values can now be retrieved and saved unwrapped. A corresponding element has been added to the OTA Options dialog.
On reloading a test, the 2D polar plots documenting the measurement progress during a running test, are not loaded any more in order to save time.
VNA Driver
The time required for retrieving the data in tests with hardware trigger has been noticeably reduced.
NRQ6 Driver
Added the possibility of configuring attenuation and bandwidth from the Hardware Setup and the Path Calibration Setup
Limited the minimum aperture time to 10 ms
SMW200A Driver
When generating a NR 5G signal, the Phase Compensation frequency for the Test Model is now set.

**ATS1800C Driver**

Two new compatibility modes can now be activated in the driver's Properties dialog for the azimuth rotation axis:

- Compatibility to WPTC and ATS1000. If activated, the movement and position reference will be changed so that the coordinate system and the resulting pattern matches the one of the R&S WPTC and ATS1000 chambers.
- Alignment of the angles displayed in the ATS1800C WebGui to AMS32.

**Improvements, General****CTIA Report**

Date and time stamp of the report creation was missing.

**Improvements, OTA Testing****AMS32-K29 / -K30**

In LTE TIS tests in band FDD13, RB allocation schemes were wrong, and no attenuation values were stated in the CTIA report.

**AMS32-K37L**

- Duplex mode TDD was not set correctly.
- Conducted testing was missing the initialization of some parameters.

Directly loading Sim Card information data in the Test New dialog was not working.

**Improvements, Antenna Testing****AMS32-K48**

It was not possible to configure using the Hardware Trigger in the case of RX measurements with a FSW.

**AMS32-K49**

The weights for advanced integration schemes were wrongly calculated when the test was not executed up to the maximum elevation.

**AMS32-K50**

- The pre-inversion utility could get stuck due to timing effects.
- In Gain Calculation, the 1 Hz frequency shift for separating the frequency ranges of the reference antennas was not always taken into account correctly.

**EMC32-K11**

Configuring a Test Sequence Template for NF-FF transforming a series of tests could fail if the \Tests folder was located on another driver than the default data.

**OTA Test Template**

- Some parameters in the "NF-FF Transformation" settings section were not saved correctly to the test template.

- When creating a new test template for measurements with a VNA, clicking on the "NF-FF Transformation" button opened the "Additional Measurements" dialog. The effect was gone after saving the template once and re-opening.

Tests configured as single-point measurements at the pole could not be re-opened under certain circumstances.

Path Attenuation values for the generator path were not documented correctly.

#### OTA Reporting

- Efficiency and Peak Gain calculation was wrong for tests using the CMP200 as power meter.
- A wrong unit "dB" instead of "dBm" was displayed in the 3D graphic in case of active DUT tests with FSW, with no setup file being loaded on the FSW.

#### CMP200 Drivers

Default VISA identifier was empty when adding the driver to the Device List.



## 3.7 Version 11.00.10

### New Functionality

### Modified Functionality, Antenna Testing

When opening an existing antenna test, the default 2D polar graphs are not loaded any more.

#### AMS32-K50

- Changed a label in the GUI for Nastran file creation, showing the minimum suggested edge resolution.
- Step sizes in the mesh triangulation for spherical Nastran files are now rounded to the second decimal.

### Improvements, Antenna Testing

#### AMS32-K49

- Avoided the attempt to evaluate  $\log(0)$  in certain cases of TRP integration.
- Corrected weight factor calculations for different integration methods in case the elevation range stops before 180 deg.

#### AMS32-K50

- The values of some parameters in the OTA Test Template, NF-FF Transformation section, were not saved correctly.
- The pre-inversion utility could abort with a "File not found" error on slow PCs.
- Corrected the interpolation at the first frequency for reference antenna radiation efficiency calculation.

## 3.8 Version 11.00.00

### New Functionality

Release of option AMS32-K80.

This option supports the generation of machine-readable reports according to the current state of the draft for CTIA Test Plan 4.0.

Release of option AMS32-K90.

This option is the Service and Maintenance option for AMS32. It is required for running AMS32 from V11.00 on, and entitles the user to receive upgrades for free during one year after the purchase.

Please contact your R&S Sales Engineer for further information.

AMS32-K25

Added support for WLAN 802.11ax. Only SISO signaling mode is supported.

### Modified Functionality, General

OTA Options

The unit of the efficiency trace in the "Efficiency\_PeakGain" graph can now be configured. Possible values are dB or %. When selecting %, the peak gain cannot be displayed any more, as all traces in one graph need to have the same unit.

Driver for maturo antenna booms

Added the possibility of moving the boom in inverse direction, that is, to negative angles.

### Modified Functionality, OTA Testing

AMS32-K29 / -K30

Added the possibility of monitoring the DTX value during LTE Sensitivity tests. For each phase of the levelling, a DTX limit can be specified. If this limit is exceeded, the software gives the user the possibility of reacting accordingly.

AMS32-K37

Added a flag in the Properties dialog for configuring whether the basic initial configuration shall be performed each time at test start or only once after starting AMS32.

### Modified Functionality, Antenna Testing

AMS32-K48

In stepped-continuous test with hardware trigger, the measured data are now displayed in a 2D polar graph after each azimuth turn is completed.

AMS32-K49

Antenna visualization capabilities now include circular polarization gain.

**AMS32-K50**

- Enhanced performance of Nastran file creation. Triangle coverage is now smoother and the process is faster.
- Optimized test file management for tests with NF-FF transformed data. The data of previous transformations are not copied to the temporary test folder any more, and remain in the main \Tests folder. This makes test loading and saving much faster.
- Increased the speed of NF-FF transformation for certain configurations.

**AMS32-K53**

The final resolution of the SWE transformation can be configured down to 0.02 degree now. Attention! At step sizes below 0.1 degree, transformation time and file sizes increase fastly. Please expect major delays compared step sizes available until now.

**AMS32-K58**

Enhancements in ACLR measurements when testing antennas with modulated signals:

- The values measured in all four adjacent channels are saved to individual measurement files.
- TRP is calculated for each adjacent channel and printed to the CTIA report format.

**OTA Options**

Added the possibility of padding not measured parts of an antenna pattern with a configurable fixed value. This is useful especially for the case of directive patterns (beams), where major parts of the pattern may be of no or less interest.

**Path Calibration**

Enhanced path calibration with the CMP200. The intermediate frequency range not covered by the instrument is skipped during the calibration.

**Device Drivers**

- SMW200A driver: Option SMW-B144 is now identified, enabling operation up to 44 GHz.
- FSW driver: Loading setups was only working correctly for setups stored in a specific folder. Now the setups stored in the default folder can also be loaded.
- CMP200 drivers: The drivers now also support the CW and non-signaling capabilities of the CMX500, to the same extent as implemented for the CMP200.

**Improvements, OTA Testing**

TRP calculation could lead to wrong results for single cut pattern with constant phi and theta up to 360 degree.

The Additional Measurements section in the OTA Test Template was disabled in case of LTE tests, if only the bundle options AMS32-PK20 or AMS32-PK25 were active.

**Improvements, Antenna Testing****AMS32-K48**

- When measuring both polarizations with a VNA simultaneously in RX mode, with one polarization using primed measurement quantities, the path correction for this primed signal offset in frequency was done at the nominal base frequency. This could lead to not negligible offsets in phase results.
- Raw data were not saved in case of stepped-continuous tests with hardware trigger, if the flag "Save result files after every measurement" was not checked in the OTA Options.

**AMS32-K50**

Efficiency files obtained from Gain Calculation were sorted wrongly, not by increasing frequency values.

When checking the box "Define test positions with a file" in the Loop Settings of the OTA Test Template, display of the contents of the dialog could be wrong.

The data and the format of the export file for NF-FF transformed data in StarLab format were wrong. Additionally, the number of digits after the period for the data has been decreased to 2 to reduce the size of the files.

Improvements in the Remaining Time indication for spiral scan and when using a file for defining the test positions.

**VNA driver**

Test with harmonic mixers in D band (110-170 GHz) aborted with a "Frequency out of range" error.

## 4 Customer support

### Technical support – where and when you need it

For quick, expert help with any Rohde & Schwarz product, contact our customer support center. A team of highly qualified engineers provides support and works with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz products.

### Contact information

Contact our customer support center at [www.rohde-schwarz.com/support](http://www.rohde-schwarz.com/support) or follow this QR code:



Figure 4-1: QR code to the Rohde & Schwarz support page