

R&S®AMU200A

Baseband Signal Generator and Fading Simulator

Release Notes

Firmware Version 2.20.360.142

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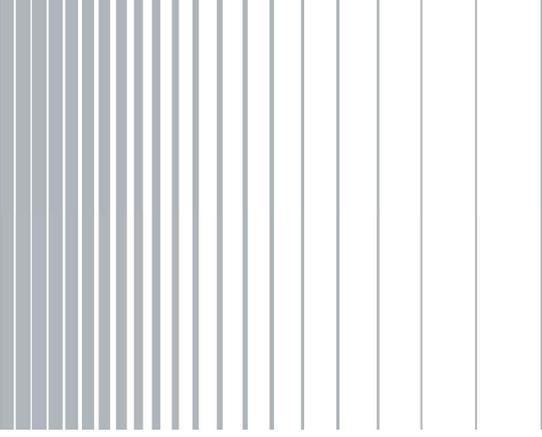
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The following abbreviations are used throughout this document:

R&S®AMU200A is abbreviated as R&S AMU200A.



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Test and Measurement

Release Notes

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1 Information on the Current Version and History

1.1 Version 2.20.360.142

Released : July 2012

Fixed Issues

Fading: Insertion Loss in path B doesn't work (only V2.20.xx); fixed	10281
ARB: problems with "corrupt" data lists; fixed	10225
Fading: Hopping doesn't work in path B (only V2.20.xx); fixed	10184
W3gpp: GUI problems with DLIST in downlink channel table; fixed	10171
AWGN: correlation between path A and B in MIMO cases; fixed	

Release Notes for 3GPP-FDD

- The PCPCH message part was incorrect for user equipments 2 to 4. Fixed.
- The "Scheduling List" dialog could make the user interface freeze for up to a minute if a large number of frames was displayed. Fixed.

1.2 Version 2.20.360.68

Released : March 2012

Fixed Issues

ARB : Memory overflow when loading > 100 different waveforms	10069
General : instruments without AWGN option K62 may have wrong RF level	10060
BBIN : output level may be wrong when switching sample rate between 100 MHz and user defined	9742

1.3 Version 2.20.360.54

Released : February 2012

New Functionality

- AMU-K77 A&D Fading
- AMU-K85 LTE Release 10 (Advanced)
- AMU-K87 1xEV-DO Rev. B
- AMU-K266 Galileo waveforms (generated with WinIQSIM2)

- AMU-K294 Glonass waveforms (generated with WinIQSIM2)

Modified Functionality (general)

- GSM : slot attenuation extended to 70 dB
- Fading: External trigger possibility without modulation coder implemented

Fixed Issues

Command SOUR:IQ:OUTP:EXT:LOG:TYPE SSI28 not working	10033
Fading : Knonecker parameter not correctly implemented for 2x3 and 3x2	10027
Command BB:C2K:LINK Forward/Reverse not working	10013
Chinese online help shows some strange characters	9992

Release Notes for LTE/EUTRA can be found in the separate document SMx_K55_K69_K81_K84_K85_Release_Notes.pdf

Release Notes for 3GPP-FDD

General : Increased the dynamic range for dynamic power control to 60 dB if the power step size is at least 1 dB.

HSUPA Uplink: Selection between LEVATT and USER 1 connectors for HARQ Feedback.

1.4 Version 2.20.325

Released : Dez 2011 only for system TS8980

New Functionality

- Fading: Restart functionality improved (CR9757 prerelease version)

1.5 Version 2.20.230.58

Released : July 2011

New Functionality

- SMU-K84 (LTE Release 9)
- SMU-K86 (IEEE 802.11 AC)

Modified Functionality

- LXI-Webserver : VNC viewer integrated
- Remote : Emulation of other instruments possible changing *IDN? and *OPT? responses

- GSM : Support of VAMOS (AQPSK) modulation
- ARB/multi carrier : arbitrary carrier spacing possible
- Custom DigMod : support of APCO25(8PSK)
- GSM : extended range for trigger delay

Modified Functionality for Fading Simulator (SMU-B14/B15)

- Support of SCM Fading (AoA, AoD)
- New Fading Profile (Standard TI5) for GSM
- New Fading Profiles for 3GPP
- New Fading Profiles for LTE (MBSFN)
- Extended HST Fading (double speed)
- Correlation Matrix now also available with static path fading profile and extended resolution
- GSM : Support of VA

Fixed Issues

Changing slope for baseband trigger and clock without effect	9265
All remote commands starting with :sour:iq:outp:ext: or :sour:bbin: not working properly	9284
Some help issues	9465
Digital I/Q Interface : transmission of sample rate to receiver missing after soft reboot	9599
K48 (WLAN) : problems setting duration in Single Trigger mode	9673
Instruments with 2xB13 and B14 but no B15 show strange block diagram	9679

Release Notes for LTE/EUTRA can be found in the separate document [SMx_K55_K69_K81_K84_Release_Notes.pdf](#)

Release Notes for 3GPP-FDD

New Features

- General Uplink:
 - Instead of specifying the level of the total signal (i.e. the average power), it is possible now to specify the level during specific parts of the signal, like e.g. during the PRACH message part or during the first slot with active DPCCCH by specifying a "level reference".
 - The scheduling of uplink signals now can be visualized in a "scheduling list".
- HSDPA Downlink:
 - The leveling for H-Set fixed reference channels was simplified by introducing the possibility of configuring the total HS-PDSCH power.
- HSPA+ Downlink:
 - The modulation and number of HS-PDSCH channelization codes in H-Set fixed reference channels now can be randomly varied over time, as needed for type 3i enhanced performance requirements tests.
 - The generation of the "other user's channels" (OCNS) for type 3i enhanced

performance requirements tests is possible now.

Changed Features

- General Uplink:
 - The 1024 chips delay of the uplink signal can be switched off now, if needed.
- HSDPA Uplink:
 - The scheduling of HS-DPCCH transmissions now is possible in a more flexible way.
 - Real time generation of the HS-DPCCH channel now is possible also in case the HS-DPCCH is scheduled by the HS-DPCCH scheduling table.
- HSUPA Uplink:
 - The generation of E-DPDCH channels now can be restricted to the I or Q branch, if needed.
 - The scheduling of E-DCH packets now is possible in a more flexible way. The former DTX patterns have been replaced by an E-DCH scheduling table. This does not apply for E-DCH fixed reference channels (FRCs) with enabled HARQ Simulation.
 - The E-DPCCH and E-DPDCH channels now are generated in real time if UL-DTX or dynamic power control is activated.
- HSPA+ Uplink:
 - UL-DTX now is possible also for other channels than DPCCH. The configuration of two UL-DTX cycles is possible and all dependencies between the transmissions of the channels are taken into account, in line with 3GPP TS 25.214.
 - Now dynamic power control is possible also in combination with UL-DTX. The application of externally received power control commands is made in compliance with 3GPP TS 25.214; UL-DPCCH gaps are taken into account.
 - Real time generation of the HS-DPCCH channel now is possible also if the HS-DPCCH contains HSPA+ content.

Fixed Issues

- General
 - The code allocation for compressed mode method SF/2 was incorrect.
- General Uplink
 - The PCPCH Channel Coding was not working correctly.
 - Data sources were read out at the wrong positions in case of uplink compressed mode method SF/2.
- General Downlink:
 - In certain cases the TFCI state of DPCH channels was configured to be off (DTX) after selecting a reference measurement channel.
 - The generation of AICH and AP-AICH channels was incorrect.

1.6 Version 2.10.111.189

Released : Feb 2011

New Functionality

- Support of new processor board FMR9

Modified Functionality

- A complete list of changed for LTE can be found in the separate document SMx_K55_K69_Release_Notes.pdf
- 3GPP-FDD: Updated test model "TS34121_R8_Table_C_11_1_3_Subtest5" according to the changes in 3GPP TS 34.121 version 8.8.0.
- Frequency offset is now also available for instruments with BBINs only

Fixed Issues

LTE : only one out of two installed options K81 used	9920
Drive C:\ is filling up due to internal debug trace files	9202
3GPP-FDD: Closed loop HARQ feedback	9123
- The feedback timing was corrected. This can cause the need of recalibration of the additional user delay.	
- Sometimes the packets were sent with the wrong redundancy version in case of RSN 3 (only for 2 ms TTI length)	
3GPP-FDD: Bugfix for the uplink FRC transport block size (only for "User" FRCs with 2ms TTI size and an E-TFCI of 127)	9124
APCO Coding could be combined with 8FSK and 16FSK	9138
Fading: Restart of statistical process not working	9087
BBIN/BBOUT: have be reinitialized too often	9070
Fading : moving-profiles may simulate wrong output level	9068
AWGN: noise only mode not working with digital baseband output	9066

1.7 Version 2.10.111.153

Released : Nov 2010

New Functionality

- AMU-K81 (LTE logfile generation)
- AMU-K253 (Playing of DAB/TDMB waveforms)

Modified Functionality

- A complete list of changed for LTE can be found in the separate document SMx_K55_K69_Release_Notes.pdf
- Fading: fading HST now available in MIMO2x2
- Module support : newest release 7 of B9/B10/B11 supported
- New icon at desktop and tray bar to ease returning from remote desktop
- ARB sequencing : several improvements
- 3GPP-FDD : all supported features are in line with release 9 of the 3GPP specifications.
- Fading : new profile "watterson" available

Fixed Issues

Fading : Remote commands for Kronecker parameters not working for higher MIMO modes	8991
1xEVDO : sporadic overdriving in base band domain (spectral regrowth)	8903
Fading : HST profile not working reliably at very high speeds (1500 km/h)	8859
Blockdiagram : AWGN block not displayed correctly if no B9/B10/B11 is installed	8855
3GPP-FDD (HARQ feedback) : The feedback timing was corrected. This can cause the need of recalibration of the additional user delay. Sometimes the packets were sent with the wrong redundancy version in case of RSN 3 (only for 2 ms TTI length)	8888
Fading : optimized handling of conflicts changing the correlation matrix	8730
FM-Stereo : instabilities using audio source LFGEN	8695
Fading : summation ratio (adding both fader outputs) based on peak instead RMS levels	8688
LTE : preset causes memory leak which may lead to crash	8565
Analog outputs have wrong level after software update w/o adjustment	8604

1.8 Version 2.10.111.116**Released : May 2010****Modified Functionality**

Fading: fading HST now available in MIMO2x2

Fixed Issues

Multi segment info file: creating file via SCPI results in empty MARKER tags and file is not loadable; fixed	8264
Multi segment / playlist: several improvements	
WLanN: Armed trigger not working in coupled mode; fixed	8279
1xEVDO:DL table not editable; fixed	8280
GSM/EDGE: data and control list not selectable; fixed	8286
Multi segment waveforms: marker not considered; fixed	8296
ARB: Create Test Signal creates error message "file not found"; fixed	8297
Fading: Sometimes error message "DSP don't get enough data"; fixed	8306
I/Q settings: parameter Baseband Gain not in save/recall; fixed	8307
TETRA: filter selection not correct and can cause a system hang up; fixed	8341
Baseband connection test failed with fading type FineDelay30	8390
1xEVDO: crest factor not reproduceable when switch state on; fixed	8488
1xEVDO: memory leak when switching state to off; fixed	8493

1.9 Version 2.10.111.53

Released : Feb 2010

New Functionality

- AMU-K68 (Tetra Release 2)
- AMU-K69 (LTE closed loop BS test)
- NRP-Z power sensors : Info and update dialog (from Setup)
- ARB : Sequencing with play lists

Modified Functionality

- *RST / **PRESET** key has been speeded up
- ARB/multi segment mode : several improvements (single trigger with different clock rates)
- ARB/multi carrier mode : support of clipping
- External triggering: choice between "sync to external trigger" (with skipping first samples, default) and outputting from first sample (new).
- All digital standards: setups can now be saved in differential format
- Optimized file dialog (tree view)
- Custom Dig Mod : new modulation AQPSK
- AWGN : C/N range extended to +40 dB
- Internal Graphics can be controlled remotely (eg. SOUR:BB:GRAP:SMAR:STAT ON;SOUR:BB:GRAP:STAT ON)
- 3GPP-FDD: Uplink Signaling (in HS-DPCCH channel) for DC-HSDPA.
- Bluetooth : Upgraded to Core Specification 4.0 and added Low Energy Enhancements
- Several enhancements for LTE/EUTRA (see separate release notes)
- AMU-K80 (BERT/BLERT) : timeout introduced
- ExBox : Default for word alignment changed from MSB to LSB

Fixed Issues

*RST during manual PRESET or vice versa may lead to crash	6487
Search function in online help improved	6637
Leading "0" in network addresses removed (LXI- and Ethernet dialog)	6692
Lost focus in edit field validates entry	7383
Setting range for I/Q impairments limited to 10% (formerly 50%)	7796
Custom Dig Mod : Formula for calculating modulation index has been corrected to $m = \frac{\max - \min}{\max + \min}$.	7952
BBOUT : output level has been too low when internal driving was below -6dbfs	7958

Marker info missing when generating waveform from digital modulation signal	7971
Fading : level correction due to asymmetric correlation matrix was not referring to RMS but to Peak value	7980
Recursive trigger dependencies between basebands A and B eliminated	7983
Fading : MIMO modes 4x2 and 3x2 not working correctly for subset 2	7994
Fading : dynamic scenarios like "high speed train" can now be combined with Mimo 1x2	7997
BBIN : overload and auto level set not working reliably	8018
Custom Dig Mod : several minor problems with CList editor and documentation	8022
Fading: Remote read function for frequency ratio (:FSIM:DEL:GRO1:PATH2:FRAT?) did not consider fading mode	8106
I/Q impairments/Optimization mode: changed I/Q bandwidth ignored	8121
TD-SCDMA: remote commands	8123
BB:TDSCdma:UP:CELL1:SLOT1:PRAC:MSG:DATA:PATT and BB:TDSCdma:UP:CELL:ENH:DCH:HSUPA:BPAYload? Not working	8124
SCPI: octal pattern (eg. Using with data sources) not working	8129
Wimax : IE "TLV Encoded information for the overall channel" ("Frame Duration Code", "Frame Number") missing	8233

1.10 Version 2.05.269.101

Released : Oct 2009

Fixed Issues

Sometimes an error message "DSP: unknown command" appears at first switching on a digital standard: fixed	7920
Sometimes error messages occurs from modulation coder DSP and at last "Zero signal measured" -> "Modulation coder output deactivated.." and no output signal is available (more often with GPS); fixed	7919
AWGN doesn't work correctly in V2.05.269.xx (with DacBoard 1141.8090.xx only); fixed	7918
3GPP Test Case Wizard: frequency offset CW with TC 7.6 does not accept negative values via IEEE; fixed	7857
Fading Mimo2x3 and 2x4: Displayed value for "MIMO Fading Power Correction" with MIMO subset = 2 wrong (subset = 1 is ok); fixed	7820
ARB: Same Segment + Single Trigger: Sequence Length Unit = Samples does not work correctly; fixed	7816

1.11 Version 2.05.269.83

Released : Jul 2009

Fixed Issues

*tst? returns always 1 (=error): fixed 7760

1.12 Version 2.05.269.77

Released : May 2009

Modified Functionality

- Accelerated operation of LTE and Wimax
- Factory preset resets computer name
- Phase offset : extension of range (-999.99 deg to 999.99 deg)
- Adjustment uses external reference if activated
- Instrument can be shut down remotely using SYSTEM:SHUTDOWN
- Booting speeded up by typ. 20 s
- New filter Lowpass (EVM optimized) useful for WLAN and other OFDM standards

Fixed Issues

Possible hangup after fast changing digital standards remotely : fixed	7681
GSM : some parameters missing after recalling a setup : fixed	7520
SRQ handling over VXI11 delayed by 200 ms : fixed	7423
Signal of Marker 4 (output at User connector) corrupt : fixed	7566
Fading : Sour:fsim:path<nr> - commands did not all work properly : fixed	7463
Fading : Fading Mimo Correlation Matrix not completely saved (modes 4x2 and 2x4) : fixed	7455
Fading : :SOURce<1/2>:PRESet did not preset fading parameters : fixed	7440

EUTRA/LTE

Downlink

- TDD special subframes: automatic adjustment of parameters is now fully supported

Uplink

- PUSCH allocations are now displayed correctly in the time plan for frequency hopping type.
- PUCCH allocations and PUCCH region is displayed in the time plan.
- PRACH is displayed in the time plan.

Fading

- New fading profiles for 1x2, 4x2 und 4x4, ETU300 and HST

3GPP-FDD

New Features

- HSUPA / HSPA+ Uplink
 - Fixed reference channels (FRC): Transport block size and channel allocation now is user configurable (User-FRC).
 - Uplink test models according to TS34.121 tables C.10.1.4, C.11.1.3, C.11.1.4
- HSPA+ Uplink
 - Uplink DPCCH slot format 4
 - UL-DTX mode for CPC simulation ("DPCCH Gating")
- HSPA+ Downlink
 - F-DPCH slot formats 1 to 9 ("Enhanced F-DPCH")
 - Fixed reference channel H-Set 12 for Dual Cell HSDPA tests ("DC-HSDPA")
 - Downlink test models for Home base station tests ("Home NodeB")

Changes

- Support for old release 4 uplink DPCCH slot formats 4 and 5 is discontinued.

Problems eliminated

- Uplink compressed mode: The configuration of TG pattern 2 was not recognized correctly.

Wimax

New features

- 2 Antenna STC modes (Matrix A and B) for AMC2x3
- Power offset of Baseband B
- MIMO UL Basic IE added to UL-MAP

Bugfixes

- Fixed bug in HARQ CRC
- Fixed pilot carrier bug for 4 Antenna STC modes
- Fixed dedicated pilot flag in DL-MAP for PUSC

GPS

- Unlimited Play-Time.
- Satellite Elevation Mask made configurable (2.5, 5, 7.5 and 10°).
- Satellite Handover (Based on Optimal Availability Algorithms) in AUTO SV UPDATE Mode.
- Ephemeris Projection in (AUTO SV Modes) overcoming the 2 hours Ephemeris validity Problem.
- 3GPP2 (CDMA2000) Test Scenarios available.
- Sensitivity Assistance Data (CDMA2000) available.
- SPOT view (Satellite/Receiver View, HDOP, PDOP, Next Handover Query...).

1.13 Version 2.05.222.34

Released : Jan 2009

New Functionality

- AMU-K41 (GSM EDGE +)
- AMU-K60 (Bluetooth)

Modified Functionality

- Fading Simulator : AMU-K74 now also supports 2x3,3x2,2x4 and 4x2 MIMO scenarios
- Fading Simulator : When 2x2 MIMO fading is active, the definition of RF level has been changed
 older versions : the level is the effective level like it would be without fading
 current version : the level is the nominal level, the effective level may be below due to impairments caused by the correlation matrix.
- Chinese online help now available
- Internal adjustment uses external reference oscillator if selected and connected
- 1xEVDO (SMx-K47) : Forward/Downlink is now generated in realtime with immediate signal update and uninterrupted output at parameter changes.

Fixed Issues

WiMax: Restore settings from a two channel device to a one channel device causes a crash if coupled mode was switched on; fixed	7328
Marker signals are delayed to the IQ signals (only V2.05.222.24 affected): fixed	7373
Menu SETUP: entry "Reference oscillator" missing (only V2.05.222.24 affected): fixed	7389
Fading: correlation is lost when changing speed parameter; fixed	7401

EUTRA/LTE

Compatibility

- All supported features are in line with the following official 3GPP specifications:
 - TS36.211 v.8.3.0
 - TS36.212 v.8.3.0
 - TS36.213 v.8.3.0
- This version of the SMx-K55 is compatible with R&S FSV-K100/-K101/-K102 and R&S FSQ-K100/-K101/-K102/-K104/K105 EUTRA PC-Software.

General Features

- New specific LTE filter for enhanced ACLR performance. Depending on the user's requirement, the filter can be selected as optimized for EVM (Default) or optimized for ACP.
- Time Domain Windowing for uplink and downlink is supported. Note that Time Domain Windowing in the downlink will degrade EVM substantially, due to the definition of the EVM in 3GPP.
- Enhanced Test Models (36.141) are supported by means of setup files

Downlink

- Support of TDD
- PHICH: The configurable ACK/NACK pattern (8 bits for normal CP, 4 bits for extended CP) for one PHICH group now consists of '1','0' and '-' (DTX).

Uplink

- Update to 3GPP version 8.3.0 (PUCCH, PUSCH).
- n_PRS updated to version 8.3.0
- Support of PRACH

Changes and Bug fixes

Downlink

- Initialization of PRS generator (X2) is selectable between v.8.2.0 and v.8.3.0 (default). This has an effect on the reference signals, scrambling and PHICH mapping. N_c will be fixed to 1600 as defined in 3GPP in case of v.8.3.0.
- Control region for PDCCH extended to 4 symbols in case of small channel bandwidths (< 10RBs).
- Scrambling can be activated individually for PCFICH and PDCCH
- Power levels can be set individually for PCFICH, PHICH and PDCCH. Power setting for PHICH is applied to every single ACK/NACK BPSK symbol. Normalization of a PHICH group (not yet defined in 3GPP) can be achieved herewith.
- Bug fix: PHICH mapping in case of extended cyclic prefix.
- Normalization for transmit diversity as defined in 36.211 added.
- Added dependencies for "User"-PDSCH allocations: all user allocations use the same settings for modulation, pre-coding, scrambling and channel coding.
- Bug fix: scrambling for PBCH

Uplink

- PUSCH frequency hopping type 2 adjusted to v.8.3.0.
- DRS group and sequence hopping adjusted to v.8.3.0.
- Position of PUSCH DRS in case of extended cyclic prefix changed from 4th symbol to 3rd symbol in slot.
- Bug fix: PUCCH mapping to resource blocks.

- Bug fix: scrambling for PUSCH in case channel coding is activated.

3GPP-FDD

New Features

- HSPA+ Downlink
 - fixed reference channel H-Set 11
- HSPA+ Uplink
 - 4PAM modulation for E-DPDCH channels
 - fixed reference channel FRC 8
 - HS-DPCCH signaling for UEs in MIMO mode

Changes

- H-Sets: Now up to 8 HARQ processes are possible (up to 16 for MIMO).
- H-Sets: Now longer redundancy version sequences for HARQ simulation are possible.

Problems eliminated

- H-Sets with HARQ simulation: Now the transport block size is signaled only at initial transmissions (in HS-SCCH types 1 and 3).
- The TPC bits in the F-DPCH channel were always 0 – fixed.

Wimax

New features

- Moving Offset mode for Chase HARQ (RCT test 9.1.24)
- Sub-DL-UL Maps
- Included Ack Disable flag for HARQ subbursts

Bugfixes

- Fixed available modulation and coding selections for Chase HARQ
- Fixed incorrect sounding carrier allocations

1.14 Version 2.05.222.24

Released : Nov 2008

Fixed Issues

Phase Offset was set to 0° after triggering : fixed	5746
2x2MIMO: Imbalance between both carriers due to correlation matrix fails : fixed	6650
ARB Multi Segment: Marker signal faulty with trigger mode Single/Next Trigger: fixed	6660
GPS : Baseband B always triggered with baseband A : fixed	6856
Custom Digital Modulation : bits of data editor are hard to read : fixed	6965
GPS : critical database error occurred after loading setup : fixed	7025

1.15 Version 2.05.104.56

Released : Aug 2008

Fixed Issues

Under rare conditions the guaranteed maximum level could not be reached: fixed

6899

1.16 Version 2.05.104.54

Released : Aug 2008

New Functionality

- AMU-K57 (FM stereo)
- AMU-K59 (HSPA+)

Modified Functionality

- XM-Radio : frame counter implemented
- Software update in one file and over LAN
- LXI Class C including web server
- Sophisticated hardcopy function
- Factory preset, standard Preset/*RST does not reset reference oscillator or power on state (level)
- Several layouts of external keyboards supported
- All windows can be resized in height using <REARR> button
- Busy display for Preset/Save/Recall and switching digital standards
- Fading Simulator : new profiles 3GPP "high speed train" and 1xEVDO
- Custom Digital Modulation : support of QAM128, several improvements of data list editor
- Display of NRP-Z81 peak power
- AMU B17 (BBIN) : Extended setting range for PEP and crest factor

Fixed Issues

Custom Digital modulation : bit clock now used falling slope with external data and symbol clock	6627
GSM : Instrument crashes using external retrigger mode : fixed	6754
Remote control : transfer fails if character 0x0A is in first block of binary data : fixed	6783
BBIN : selftest fails : fixed	7695
Fading : settings cannot be exchanged between SMU and AMU : fixed	6804

Several hyperlinks in online help not working : fixed	5323
Construction of multi segment waveform in path B erroneous	5366
Out of memory calculating dynamic fading scenarios : fixed	5961
Fading standard 3GPP VA30 (UE) does not set all parameters (speed) : fixed	6269
Level sweep without dropouts : fixed	6533
Trigger not stored in multisegment waveform : fixed	6589
Several bugs with multi segment waveform : fixed	5205
ARB file selection dialog improved (tool tipp with all comments) : fixed	5884
DigMod: Pure Gauss parameter not accessible from SCPI : fixed	6168
Several small changes in user manual / online help : fixed	6334
DigMod: 16QAM Edge not properly working : fixed	6434

EUTRA/LTE

Compatibility

- All supported features are in line with the following official 3GPP specifications unless not revised by the according CRs listed below:
 - TS36.211 v.8.2.0
 - TS36.212 v.8.2.0
 - TS36.213 v.8.2.0
- The following CRs are implemented:
 - R1-081248: PRS sequence generation for downlink reference signal
 - R1-081518: Draft CR on Correction of the number of subcarriers in PUSCH transform precoding
 - R1-081520: Draft CR on Correction of PUCCH resource index for PUCCH format 2
 - R1-081576: Correction of the number of subcarriers in PUSCH precoding
 - R1-081577: Correction of PHICH mapping
 - R1-081578: Correction of PUCCH resource index for PUCCH format 2
- The Downlink of this version of the SMx-K55 is compatible with FSQ-SW LTE K100/K101/K102 Version 2.2 BETA 3

General Features

- Updated bandwidth definitions 1.4MHz and 3MHz (previously supported by user defined settings)
- Support of User Filter: user-defined TX-filter can be generated (e.g. by means of R&S FiltWiz) and then uploaded to the SMx-K55.

Downlink

- Full support of P-SYNC, S_SYNC and DL Reference Signal derived from CELL ID
- Supports channel coding for PDSCH
- Support channel coding for PBCH
- Supports scrambling for PDSCH and PBCH
- Full MIMO and Transmit Diversity support (all precoding and CDD formats)
- Support of PCFICH
- Support of PHICH
- Support of PDCCH: An arbitrary bit stream (PN9, data list, pattern...) is used by the SMx-K55 (can be uploaded from external if needed), and PDCCH processing starts with "scrambling" (see 36.211, 6.8.2). The next steps of

PDCCH are performed as defined in 36.211. The user is responsible for the content of the several PDCCHs (see 36.212, 5.3.3.1 DCI Formats) and the multiplexing of them. SMx-K55 does the scrambling, layer mapping, precoding and RE mapping including permutation and cyclic shifting.

Uplink

- Support of new definitions of reference signal sequences
- Update on demodulation and sounding reference signals
- Support of group and sequence hopping
- Supports channel coding for PUSCH including multiplexing of data and control information
- Supports scrambling of PUSCH
- Support of all PUCCH formats

3GPP-FDD

New Features

- HSPA+
 - higher order modulation: downlink 64QAM
 - CPC: HS-SCCH less operation
 - MIMO support
 - new H-Sets 7-9 (3GPP Rel.7)
- new H-Set 10 (3GPP Rel. 8)
- more flexibility in the H-Set configuration („User“ – H-Set)
- The user gets support by the user interface for selecting the right ARB sequence length when generating H-Set signals.
- For H-Sets, the (least necessary) UE-category is displayed.
- third OCNS-Mode „HSDPA 2“ (according to TS 25.101)
- E-AGCH: now with user coding

Bugfixes / Changes

- Computationally expensive realtime-signals (e.g. RMC384 or H-Set3) were sporadically shifted in time after retrigger: fixed.
- Conflicts between H-Sets and OCNS in the channel configuration are avoided now.
- When switching off the OCNS-Mode, the OCNS-Channel state is switched off now (in previous releases the channels were only converted to normal DPCHs, but with state on).
- When generating H-Set 6, the database was read out at the wrong positions: fixed.
- HARQ-Feedback:
 - Immediately after retrigger, the packets were sent with random retransmission sequence number (RSN): fixed.
 - When changing from one RSN to another, the last 1024 chips of the old packet were sent already with the new RSN: fixed.

Wimax

- CSTD (Cyclic Delay Diversity)
- Coupled Baseband Modes (Baseband B is controlled from Baseband A for STC configurations)
- Transmit Diversity with 4 antennas
- Band AMC modes for 2x3 AMC

- Band bitmap for sounding
- Additional user definable power boosting for each zone
- Time Plan displays inactive zones in grey (such as SISO zones on Antenna 1)
- Multiple PDUs per burst
- DCD and UCD added for OFMD mode
- UL-MAP and DL-MAP in one burst for OFDM mode

1.17 Version 2.04.303.32

Released : April 2008

Fixed Issues

Sometimes the device does not shut down correctly : fixed 6424
 AMU with BBOU (AMU-B18) but without BBIN (AMU-B17): some problems with ExBox fixed
 Sporadic bit errors in GSM and 3GPP FDD signal generation (problem was observed only in combination with UNICOD version > 6.00): fixed

1.18 Version 2.04.303.31

Released : Feb 2008

New Functionality

- AMU-K65 : Assisted GPS

Fixed Issues

Wrong display of AWGN values in display mode baseband : fixed 6290

1.19 Version 2.04.303.16

Released : Oct 2007

New Functionality

- AMU-K47 : 1xEVDO Rev. A
- AMU-K53 : T-DMB / DAB

Modified Functionality

- Support of BB Input mode "Digital Input" with BBINS Rev 5.01 and BBINR Rev 3.00 or higher
- Support of R&S EX-IQ-Box 1409.5505.02

Fixed Issues

XM-Radio. No markers in physical layer mode "Terrestrial A" and "Terrestrial B"	5834
IEEE 802.16 WiMAX: system crash possible when changing from uplink to downlink, standard is active and predefined settings are used	6000
IEEE 802.11 n: Indikator „MOD OFF“ does not disappear when this standard is activated	6042

1.20 Version 2.04.303.03**Released : Aug 2007****New Functionality**

- AMU-K54 : IEEE 802.11n (WlanN)
- AMU-K74 : MIMO-Fading

Fixed Issues

CDMA2000: new default setting (one channel switch to ON to avoid error messages when setting state to ON)	5263
Sometimes a system crash occurs when toggling LEVEL/DIAGRAM buttons very often	5353
WiMax:	
- Subchannel rotation fixed for uplink PUSC zones including FastFeedback and Ranging bursts	
- Fix in uplink AMC2x3 mode	
- STC Matrix B mode fixed	5355
ARB: sine generator: error message when using sine generator immediately after switching on EUTRA (AMU-K55)	5356
Custom Digital Modulation: List editor: system crash when using "goto"-command	5385
W3GPP: Enhanced channel 11: selecting "config data" shows no reaction (menu don't open)	5542
ARB: Loading AMIQ/SMIQ waveforms sometimes causes an error message	5597
SCPI: all return values of "...:stat?" is OFF/ON instead of 0/1 (bug in V2.04.202 only)	5610
Custom Digital Modulation: "user filter" doesn't work in path B	5655
CDMA2000: "Set To Default" resets settings in path A and B (not the selected path only!)	5751
W3GPP: error message when selecting "PRACH Preamble only" with trigger mode "Armed Auto external"	5801
W3GPP: copy BS1 to BS2 doesn't copy all relevant parameters	5802
WLAN: when setting state to ON the filter settings are always the default one, not the displayed one!	5816
AWGN: Doesn't work if no option B9/10/11 or B17 is installed (bug in V2.04.202 only)	5833
GSM: Recall doesn't set the frames	5882
WLAN: sequence length not limited correctly	5894
Fading: system crash when copying a path group to an other one	5905

CDMA2000: unknown exception when using predefined settings RC4 with frame length = 80 ms

5930

WiMAX

- Corrigendum2/D4 compatibility
- Uplink Sounding
- Added Zone_Switch_IE in DL-MAP
- Mixed STC Matrix A and B configuration within the same zone
- CID_Switch_IE inclusion in DL-MAP can be toggled
- Added Collaborative Spacial Multiplexing in uplink
- Fading: ITU profiles now available without option AMU-K72

1.21 Version 2.04.202.01

Released : March 2007

Fixed Issues

- Signal summation of two pathes after fader: in some cases baseband level error

1.22 Version 2.04.202

Released : March 2007

New Functionality

- AMU-K55 : EUTRA/LTE
- AMU-K56 : XM-Radio
- AMU-K72 : new fading profiles for WiMAX/Gauss
- AMU-K6 : Support of external Pulse Sequencer Software

Modified Functionality

- TD-SCDMA : Predefined Settings / Testmodels
- NRP power sensors : persistent power display in block diagram
- List mode : level setting without interruption/blanking
- ARB Multi segment : several improvements / bugfixes
- Armed/Triggered state visible in block diagram
- Security Menu : possibility to switch off USB port and LAN for file transfer
- New optimization mode "high quality" to reduce modulation frequency response

3GPP

- 3GPP HSDPA H-SET6 Extensions

- 3GPP HSUPA Extensions (E-DPDCH with new symbol rates 15ksps and 30 kps, separate channel powers possible, HARQ State)

WiMAX

- HARQ
- Offline Filter
- AMC 2x3
- Fast Feedback Bursts
- Dedicated Pilots for AMC 2x3 and PUSC
- Switchable Subchannel Rotation for Uplink PUSC
- DCD and UCD Bursts
- New modulation QAM 5/6
- Extension of DL-MAP (CID-SWITCH-IE, bursts of all zones, MAC Header and CRC on, ...)

Enhancements of fading and noise

- TETRA Fading DR50/DU50
- AWGN : Extended S/N Range -50 dB to +30 dB

Fixed Issues

ARB test sine signals : some remote commands not working	4376
CustomDigMod/FSK : envelope not constant with root cosine filter and some roll-off factors	4763
ARB sequence length : maximum depending on ARB size	4815
3GPP FDD : Save waveform not working for uplink	4850
WLAN : predefined frames not working correctly	4903
WiMax/3GPP : clipping not working correctly	4907
WiMax : output power not correct when using more than 15 frames	4913
Save/Recall : "exclude frequency" and "exclude level" without impact	5109
Data lists exceeding 256 Mbyte cannot be loaded to B9	5161

1.23 Version 2.04.182

Released : Feb 2007

First release

2 Firmware Update

ATTENTION

It is strongly recommended to do **no firmware downgrade** below the version the device was delivered originally (this is the version you can see if you select "Factory Default" starting with Backup/Recovery).

This R&S AMU firmware revision consists of only one file:

AMU200A_2.20.360.142.exe

There are two possible ways to update your instrument:

Local Firmware Update

The firmware update is performed directly on the instrument, typically using a USB memory stick. Mouse and keyboard have to be connected to the instrument. For instruments without front panel display (like the SMATE) an external monitor is required too. The appropriate VGA plug is located on the rear panel.

The front panel keys like **PRESET** or **SETUP** can be emulated performing a right-click on the block diagram.

See Chapter 2.1 for details.

Remote Firmware Update

Alternatively the firmware update can be performed over LAN or SCPI from an external PC (running Windows XP). Connect the instrument via LAN or SCPI to the PC and run the firmware update from the PC.

See Chapter 2.2 for details.

ATTENTION**Important Note for updating without SP2:**

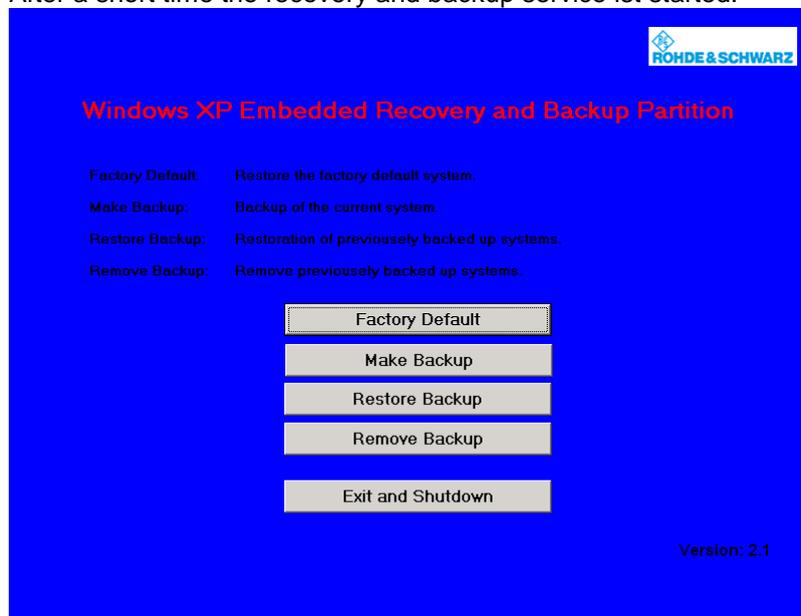
Please contact your local R&S service department in order to update your instrument. Alternatively the needed files and packages can be installed manually. In this case download the file SystemSetup4SignalGenerators.zip and follow the instructions given in readme.txt.

2.1 Local Firmware Update

1. Save the current version

It is recommended to save the current/running version. This can be done very easily and completely intuitive with an USB keyboard and an USB mouse.

- Switch off the device and switch it on again. When the device is starting now you see the Bootmanager window (blue background, white field inside and a red selection line) after a short time. If you see this window press the cursor key  under the rotary knob, select **Backup/Recovery** and confirm this with pressing the key **BACKSPACE** on the device or **Enter** on the USB keyboard..
- After a short time the recovery and backup service ist started.



Select **Make Backup** via mouse or keyboard. The menu disappears and the device shows you the versions of what will be stored.



Select **Make Backup**, follow the instructions and the device starts working. The backup process takes some minutes. Please do not switch off the device, otherwise your backup may be corrupt. It's safe to switch off the device with the **Exit and Shutdown** button, when the menu is shown again.

If you want to restore a previously saved version select **Restore Backup** in the

same way.

2. Install the new firmware version on the R&S AMU200A

- Switch off the instrument.
- Connect the external mouse and keyboard to the USB interface.
- Switch on the instrument.
- **Access Windows XP desktop**
 - Operating with the mouse
 - Wait until R&S AMU firmware boot window with the progress bars appears.
 - Click on the **Abort** button in the boot window. Booting of the instrument firmware is aborted and the Windows XP desktop is displayed.

Operation with the keyboard

- Wait until R&S instrument firmware has booted and the application has started.
- Press **Alt** + **F4** to close the application. The Windows XP desktop is displayed.
- **Install new firmware version**
 - Plug in the USB memory stick which contains the update file.
 - Double-click the item **AMU200A_2.20.360.142.exe**
 - Select Next / Install and wait until installation has finished.
 - Confirm that you want to reboot the instrument in order to activate the firmware update (the instrument then restarts automatically, the USB memory stick has to be removed)

3. Execute Internal Adjustments

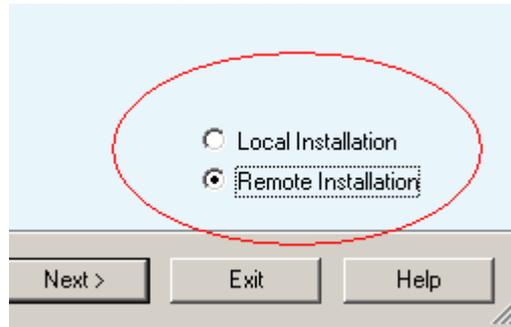
- Press the **PRESET** key on the instrument front panel.
- Press the **SETUP** key, select **Internal Adjustments** and execute **Adjust All**.
This process updates internal instrument adjustments and will take several minutes. Adjustments requiring external measurement equipment are not affected by the firmware update and need not to be performed.

The firmware has been updated and the installation is completed.

2.2 Remote Firmware Update

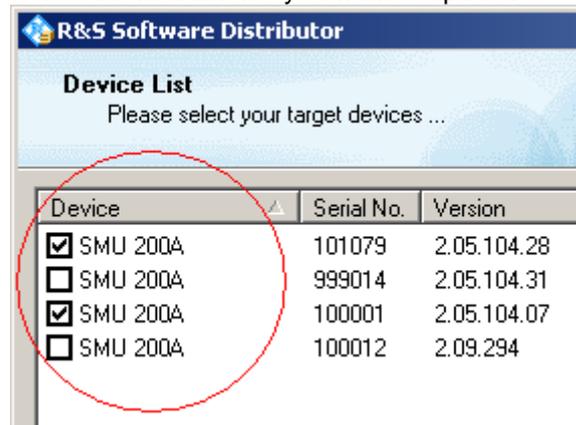
1. Install firmware

- Run **AMU200A_2.20.360.142.exe** on your PC
- Select “Remote Installation”



and click the button “Next>”

- After scanning SCPI and your LAN subnet all found instruments are listed. Select the instruments you want to update:



ATTENTION



Please be careful and check twice if you have selected the correct instruments. Depending on your company’s network structure also instruments of other departments will show up!

- Additional help will be displayed after clicking the button “Help”
- Start installation by selecting “Install”
- Confirm that you want to reboot the instrument in order to activate the firmware update (the instrument then restarts automatically)

2. Execute internal adjustments

- Press the **PRESET** key on the instrument front panel

Press the **SETUP** key, select **Internal Adjustments** and execute **Adjust All**.

This process updates internal instrument adjustments and will take several minutes.

Adjustments requiring external measurement equipment are not affected by the firmware update and need not to be performed.

3 Open Source Acknowledgement

This instrument firmware makes use of valuable open source software packages. The most important of them are listed together with their corresponding open source license information in a separate Open Source Acknowledgement document. This document also contains the verbatim license texts and can be downloaded from www.rohde-schwarz.com.

The OpenSSL Project for use in the OpenSSL Toolkit (<http://www.openssl.org/>) includes cryptographic software written by Eric Young (eay@cryptsoft.com) and software written by Tim Hudson (tjh@cryptsoft.com).
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Rohde & Schwarz would like to thank the open source community for their valuable contribution to embedded computing.

4 Customer Support

Technical support – where and when you need it

For quick, expert help with any Rohde & Schwarz equipment, contact one of our Customer Support Centers. A team of highly qualified engineers provides telephone support and will work with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz equipment.

Up-to-date information and upgrades

To keep your instrument up-to-date and to be informed about new application notes related to your instrument, please send an e-mail to the Customer Support Center stating your instrument and your wish. We will take care that you will get the right information.

USA & Canada

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8:00 AM – 8:00 PM	Eastern Standard Time (EST)
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