



ROHDE & SCHWARZ

Test and Measurement
Division

Release Notes

Wireless LAN Test

Application Firmware

R&S FSQ-K90/K91/K91n

Release 4.60

for R&S FSQ, FSG, FMU Analyzer Firmware V4.6x

New Features:

- **FETCH:BURSt:COUnT:ALL? Command added.**
- **CONFigure:WLAN:PVERror:MRANge Command added.**

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History

Date	Rel Note Rev	Changes
31 July 2010	1	First revision for Wireless LAN Application Firmware 4.60.

General Topics

Compatibility of the R&S FSQ-K90/K91 Wireless LAN Application Firmware with other Firmware Releases

The following table shows the compatible versions of the basic analyzer firmware and the Wireless LAN Application Firmware:

Table of compatible versions:

R&S FSQ-K90 Application Firmware	R&S FSQ-K91 Application Firmware	R&S FSQ-K91n Application Firmware	R&S FSQ Basic Firmware	R&S FMU Basic Firmware	R&S FSG Basic Firmware
4.60	4.60	4.60	4.65		4.69
4.51	4.51	4.51	4.55 SP2		4.59 SP1
4.50	4.50	4.50	4.55 SP1	-	4.59
4.40 SP1	4.40 SP1	4.40 SP1	4.45 SP1	-	4.49 SP1
4.40	4.40	4.40	4.45	-	4.49
4.30 SP1	4.30	4.30	4.35	4.38	4.39
4.30	4.30	4.30	4.35		4.39
4.21	4.21	-	4.25	-	4.29 SP2
4.20	4.20	-	-	-	4.29
4.10	4.10	-	4.15	-	-
4.00	4.00	-	4.05	-	-
3.90 SP1	3.90 SP1	-	3.95 SP1	-	-
3.90	3.90	-	3.95	-	-
3.80	3.80	-	3.85	-	-
3.70	3.70	-	3.75	-	-
3.60 SP1	3.60 SP1	-	3.65	-	-
3.60	3.60	-	3.65	-	-
3.52	3.52	-	3.55 SP1 3.55	-	-
3.50 SP1	3.50 SP1	-	3.55 SP1 3.55	-	-
3.50	3.50	-	3.55	-	-
3.42	3.42	-	3.45 SP4	-	-
3.40	3.40	-	3.45	-	-
3.31	3.31	-	3.35 SP1	-	-

R&S FSQ-K90 Application Firmware	R&S FSQ-K91 Application Firmware	R&S FSQ-K91n Application Firmware	R&S FSQ Basic Firmware	R&S FMU Basic Firmware	R&S FSG Basic Firmware
3.30	3.30	-	3.35	-	-
3.28	-	-	3.25	-	-
3.24	-	-	3.15	-	-
3.20	-	-	3.05	-	-

Firmware Update of the R&S FSQ-K90/K91/K91n Wireless LAN Application Firmware

Since basic firmware version 4.2x a ZIP file with the update sets of the basic system firmware and all available applications is provided. This ZIP file is available in the instruments FIRMWARE section, e.g. R&S FSQ of the Service Board on GLORIS.

Please follow the steps described in the instrument's basic firmware release note to perform a complete firmware update.

Enabling the Application Firmware via License Key Code Entry

This section can be skipped if the option key was entered once.

After installing the application firmware package a license key for validation must be entered. The license key is printed either on a label on the rear panel of the instrument or delivered as a part of the R&S FSQ-K90/K91/K91n Wireless LAN application firmware package.

The key sequence for entering the license key is:

SETUP - GENERAL SETUP – OPTIONS - INSTALL OPTION

Use the numeric keypad to input the license key number and press ENTER.

- On a successful validation the message 'option key valid' will appear. The instrument will perform an automatic reboot.
- If the validation failed, the application firmware is not installed.
The most probable reason will be that the instrument is not equipped with the correct basic firmware version. Therefore a messagebox will appear asking for installation of the correct basic firmware version.
If the application firmware package was not installed prior to entering the license key code, a message will appear asking for installation of the application firmware package.
In any case please make sure that the correct basic firmware version and the application firmware package is installed prior to entering the license key code.

If upgrading to FSQ-K91 from FSQ-K90 then an upgrade key is supplied. This key needs to be entered (as described above) in addition to the existing FSQ-K90 key-code. Similarly if upgrading FSQ-K91 to include IEEE 802.11n then an additional upgrade key is required

System Memory Requirements

For FSQ-K90 Wireless LAN Application Firmware, an installed system memory of 512MByte is recommended. For FSQ-K91 Wireless LAN Application Firmware, an installed system memory of 512MByte is essential. The FSQ-K90/K1 will generate an error message during activation, if available system memory does not meet the requirements. This may happen for FS-K90, if FS-K30 or FSQ-K70 was active before starting WLAN.



For instruments, shipped with 256MByte system memory, a memory extension FSQ-B512, order number 1157.1590.02, is available.

A reboot of the instrument after using NOISE (FS-K30) or VSA (FSQ-K70), will allow FSQ-K90 to be activated without memory extension.

The system memory size can be easily checked by pressing SETUP – SYSTEM INFO – STATISTICS, item "Memory size". This item is available since version 3.25 of the base system firmware.

New Functions in version 4.60

- **FETCh:BURSt:COUNT:ALL?** Command added to obtain complete number of analyzed bursts for a measurement, including bursts from multiple seeps.
- **CONFigure:WLAN:PVERror:MRANge** Command added. This command specifies whether the Peak Error Vector results are calculated over the complete burst or just over the PSDU.

Improvements with option R&S FSQ-K90/K91 Wireless LAN Application Firmware

The version numbers in brackets indicate the version in which the issue was observed for the first time.

1. (V4.50) Incorrect result due to B72 option not being used:

In some situations the B72 option would not be activated when required which would result in non-optimal results.

Note: This issue is already fixed in V4.51.

2. (V4.50) EVM Vs Symbol results occasionally missing:

In some cases the EVM Vs Symbol results would not be displayed after a sweep.

Note: This issue is already fixed in V4.51.

3. (V4.50) Wrong burst detection for some 802.11g signal:

In the case where the signal field length does not match the actual burst length then the burst would be incorrectly detected.

Note: This issue is already fixed in V4.51.

4. (V4.50) FSQ-B17: Correct LVDS status now reported:

Previously if an error occurred with the LVDS connection a pass status was reported. The correct status is now reported correctly.

Known Issues with option R&S FSQ-K90/K91 Wireless LAN Application Firmware

The version numbers in brackets indicate the version in which the error was observed for the first time. Unless otherwise stated all errors apply to be FSQ-K90 and FSQ-K91

Manual Operation and IEC/IEEE Bus

1. (K90 V3.40) Memory usage on instrument with 256 Mbytes of memory

Performing combinations of calibration, activating and using the VSA (K70) option and activating and using FSQ-K90 on an instrument with 256 Mbytes of memory may lead to the FSQ-K90 option no longer being able to be activated due to insufficient memory.

Workaround: Ensure no other applications are running. Restarting the firmware after performing calibration also improves memory usage. Using Preset also releases memory.

2. (K90/K91 V3.30) Save files for one option cannot be recalled in another option

A save file saved under FSQ-K90 cannot be recalled into the upgraded FSQ-K91 option.

Workaround: None

3. (K90/K91 V3.50) Gating and negative trigger offset values

With the FSQ gating and negative trigger offset values can not be used together. Any negative trigger offset will internally be set to 0s.

4. (K90/K91 V3.60) Analysis times

In some cases with low powered signals measurement can take a long time to complete.

Workaround: Use auto-level or adjust the reference level to improve analysis speed. Reducing the amount of data to analyze by reducing the capture time can also help.

5. (K91 V3.80) Values in table of results update correctly when number of bursts selected.

When the number of bursts parameter is selected and the number specified requires multiple sweeps then the table of results now updates to such that the min, mean and max value are calculated over all bursts and sweeps, not just the bursts contained in the last sweep.

6. (K90/K91 V3.80) External attenuation not correctly applied to Spectrum ACP results

The external attenuation is incorrectly applied to the relative channel power results in the Spectrum ACP (Relative) measurement. The external attenuation is correctly applied to the Spectrum ACP (Absolute) measurement results.

IEC/IEEE Bus only

1. (K90 V3.28) Selecting screen A/B

For selecting screen A or B, DISPlay:<WINDow[1|2]>:SElect command does not work correctly.

Workaround: Instead of this command, an alias command is provided, which is:
DISPlay:<WINDow[1|2]>:SSElect.

Modified Functions

The behaviour of the following functions changed compared to earlier versions (the number in brackets indicates the firmware version that introduced the individual change):

1. (V3.30) Limit values in table of results can now be modified whilst a measurement is running.
2. (V3.30) Spectrum Mask according to ETSI.
3. (V3.30) EVM Trace results can now be displayed in % of dB (User selectable).
4. (V3.40) Baseband board version VAR03 with baseband impedance of 1 MOhm supported
5. (V3.42) Single auto-level sequence can now be activated via SCPI (CONFigure:POWer:AUTO ONCE)
6. (V3.42) The STATus:QUESTionable:SYNC and STATus:QUESTionable:ACPLimit registers are provided.
7. (V3.42) Marker to peak and to minimum functions are supported for the Spectrum Flatness measurement.
8. (V3.42) EVM Vs Symbol display: The boundaries of bursts are now highlighted with vertical lines.
9. (V3.42) Support for wideband extension (B72).
10. (V3.42) Support for preamplifier B23 & B25 options.
11. (V3.42) Error Vs Preamble measurements are provided for all standards. The results can be displayed in Phase or Frequency error Vs preamble.
12. (V3.42) Advanced settings for mechanical and electronic attenuators, YIG filter and baseband settings.
13. (V3.42) Support for IEEE 802.11g and 802.11 OFDM Turbo Mode standards added.
14. (V3.42) Gating support for Spectrum Mask and Spectrum ACP measurements).
15. (V3.42) The sample rate can be modified for IEEE 802.11a measurements.
16. (V3.42) IF Power trigger disabled for Spectrum Mask (ETSI) measurement
17. (V3.42) Minimum and Maximum payload length can now also be specified in time
18. (V3.42) The calculation for the rise and fall time results for IEEE 802.11b signals has been changed
19. (V3.42) List mode results accessible from frequency sweep measurements
20. (V3.60) IQ Data Export & Import available.
21. (V3.60) Sample rates between 20.4 MHz and 40.8 MHz now supported without the use of option B72.
22. (V3.70) Bursts analyzed with errors now marked in yellow.
23. (V3.70) Number of analyzed bursts available via IEC/IEEE Bus (FETCh:BURSt:COUNT?).
24. (V3.70) Number of symbols in each analyzed burst available via IEC/IEEE Bus (FETCh:SYMBol:COUNT?).

- 25. (V3.70) Sweep time for auto-level can be specified using the Auto Level Time setting in the Advanced Settings of the General Settings view.
- 26. (V3.80) Digital Down Converter available for low carrier frequency with Baseband input.
- 27. (V3.80) External trigger level can now be specified.
- 28. (V3.80) REFRESH hot-key for recalculation of results after data capture.
- 29. (V3.80) The new SUPPORT softkey has been provided to allow detailed information about the FS-K90/91 option to be saved to file.
- 30. (V3.90) New SCPI command CONFigure:BURSt:PREamble:SElect PHASe | FREQuency.
- 31. (V4.10) The SEM measurement and SPECTRUM MASK softkey replaces the Spectrum ETSI / IEEE measurements.
- 32. (V4.20) Support for new instrument model R&S FSG.
- 33. (V4.20) Trace data now available via remote control in binary format for all traces.
- 34. (V4.30) The IEEE 802.11n standard is now supported
- 35. (V4.30) Option B17 is now supported.
- 36. (V4.30) Option FSU-B24 supported
- 37. (V4.30) Support for Application Recovery
- 38. (V4.50) Setting FFT Start Offset provided to allow improved EVM results.
- 39. (V4.60) FETCh:BURSt:COUNt:ALL? Command added to obtain complete number of analyzed bursts for a measurement, including bursts from multiple seeps.
- 40. (V4.60) CONFigure:WLAN:PVERror:MRANge Command added. This command specifies whether the Peak Error Vector results are calculated over the complete burst or just over the PSDU.

Modifications to the Operating Manual

The R&S FSQ-K90/K91/K91n analyzer functions are included in a separate manual set. Please refer to the following order numbers:

- 1157.3135.42-06 (English)

Modified Chapters for manual operation

None.

Modified Chapters for remote operation

Configure Subsystem

CONFigure:WLAN:PVERror:MRANge

This remote control command specifies whether the Peak Error Vector results are calculated over the complete burst or just over the PSDU. The values which can be specified are as follows:

ALL Peak Error Vector results are calculated over the complete burst

PSDU Peak Error Vector results are calculated over the PSDU only

This command is supported for 802.11b and 802.11g only

Example: "CONF:WLAN:PVER:MRANge PSDU" FS-K91 option is configured to measure Peak Error Vector only over the PSDU

Characteristics: *RST value: ALL-
 SCPI: Device Specific

Mode: K91

FETCh – Subsystem

FETCh:BURSt:COUNT?

This command returns the analyzed number of bursts from the current sweep. Where multiple sweeps are required for the current measurement because the bursts to analyze is greater than the number of bursts that can be captured in one sweep then this command only returns the number of captured bursts in the current sweep.

Example: "FETC:BURS:COUN?" The analyzed number of bursts are returned

Characteristics: *RST value: -
 SCPI: Device Specific

FETCh:BURSt:COUNT:ALL?

This command returns the total analyzed number of bursts. This count will be the total number of bursts analyzed for the current measurement. Where multiple sweeps are required for the current measurement because the bursts to analyze is greater than the number of bursts that can be captured in one sweep then this command returns the total number of captured bursts in the current measurement over all measured sweeps.

Example: "FETC:BURS:COUN?" The analyzed number of bursts are returned

Characteristics: *RST value: -
 SCPI: Device Specific

SENSe Subsystem

[SENSe:]DEMod:FORMat:BANalyze <string>

The remote control command sets the analysis modulation format that will be assumed when the measurement is performed. If the [SENSe:]DEMod:FORMat:SIGSymbol parameter has been set to ON then this command can be used to measure only certain burst types within a measurement sequence.

The supplied string can be one of the following:

'BPSK3' - IEEE 802.11j (10 MHz) - BI-Phase shift keying at 3 Mbps

'BPSK45'	- IEEE 802.11j (10 MHz) - BI-Phase shift keying at 6 Mbps
'BPSK6'	- IEEE 802.11a, g (OFDM), j (20 MHz) & Turbo- BI-Phase shift keying at 6 Mbps
'BPSK9'	- IEEE 802.11a, g (OFDM), j (20 MHz) & Turbo - BI-Phase shift keying at 9 Mbps
'BPSK'	- Alias for BI-Phase shift keying at higher data rate for selected standard
'QPSK6'	- IEEE 802.11j (10 MHz) - Quadrature phase shift keying at 6 Mbps
'QPSK9'	- IEEE 802.11j (10 MHz) - Quadrature phase shift keying at 9 Mbps
'QPSK12'	- IEEE 802.11a, g (OFDM), j (20 MHz) & Turbo - Quadrature phase shift keying at 12 Mbps
'QPSK18'	- IEEE 802.11a, g (OFDM), j (20 MHz) & Turbo - Quadrature phase shift keying at 18 Mbps
'QPSK'	- Alias for Quadrature phase shift keying at higher data rate for selected standard
'QAM1612'	- IEEE 802.11j (10 MHz) - Quadrature Amplitude Modulation at 12 Mbps
'QAM1618'	- IEEE 802.11j (10 MHz) - Quadrature Amplitude Modulation at 18 Mbps
'QAM1624'	- IEEE 802.11a, g (OFDM), j (20 MHz) & Turbo - Quadrature Amplitude Modulation at 24 Mbps
'QAM1636'	- IEEE 802.11a, g (OFDM), j (20 MHz) & Turbo - Quadrature Amplitude Modulation at 36 Mbps
'QAM16'	- Alias for Quadrature Amplitude Modulation at higher data rate for selected standard
'QAM6424'	- IEEE 802.11j (10 MHz) - Quadrature Amplitude Modulation at 24 Mbps
'QAM6427'	- IEEE 802.11j (10 MHz) - Quadrature Amplitude Modulation at 27 Mbps
'QAM6448'	- IEEE 802.11a, g (OFDM), j (20 MHz) & Turbo - Quadrature Amplitude Modulation at 48 Mbps
'QAM6454'	- IEEE 802.11a, g (OFDM), j (20 MHz) & Turbo - Quadrature Amplitude Modulation at 54 Mbps
'QAM64'	- Alias for Quadrature Amplitude Modulation at higher data rate for selected standard
'DBPSK1'	- IEEE 802.11b & g (Single Carrier) - Differential BI-Phase shift keying at 5.5 Mbps
'DQPSK2'	- IEEE 802.11b & g (Single Carrier) – Differential Quadrature phase shift keying at 11 Mbps
'CCK55'	- IEEE 802.11b & g (Single Carrier) - Complimentary Code Keying at 5.5 Mbps
'CCK11'	- IEEE 802.11b & g (Single Carrier) – Complimentary Code Keying at 11 Mbps
'PBCC55'	- IEEE 802.11b & g (Single Carrier) - PBCC at 5.5 Mbps
'PBCC11'	- IEEE 802.11b & g (Single Carrier) – PBCC at 11 Mbps
'PBCC22'	- IEEE 802.11g (Single Carrier) – PBCC at 11 Mbps
'BPSK65'	- IEEE 802.11n - BI-Phase shift keying at 6.5 Mbps
'BPSK72'	- IEEE 802.11n - BI-Phase shift keying at 7.2 Mbps
'BPSK135'	- IEEE 802.11n - BI-Phase shift keying at 13.5 Mbps
'BPSK15'	- IEEE 802.11n - BI-Phase shift keying at 15 Mbps
'QPSK13'	- IEEE 802.11n Quadrature phase shift keying at 13 Mbps
'QPSK144'	- IEEE 802.11n Quadrature phase shift keying at 14.4 Mbps
'QPSK195'	- IEEE 802.11n Quadrature phase shift keying at 19.5 Mbps
'QPSK217'	- IEEE 802.11n Quadrature phase shift keying at 21.7 Mbps
'QPSK27'	- IEEE 802.11n Quadrature phase shift keying at 27 Mbps
'QPSK30'	- IEEE 802.11n Quadrature phase shift keying at 30 Mbps
'QPSK405'	- IEEE 802.11n Quadrature phase shift keying at 40.5 Mbps
'QPSK45'	- IEEE 802.11n Quadrature phase shift keying at 45 Mbps
'QAM1626'	- IEEE 802.11n Quadrature Amplitude Modulation at 26 Mbps
'QAM16289'	- IEEE 802.11n Quadrature Amplitude Modulation at 28.9 Mbps
'QAM1639'	- IEEE 802.11n Quadrature Amplitude Modulation at 39 Mbps
'QAM16433'	- IEEE 802.11n Quadrature Amplitude Modulation at 43.3 Mbps

'QAM1654' - IEEE 802.11n Quadrature Amplitude Modulation at 54 Mbps
 'QAM1660' - IEEE 802.11n Quadrature Amplitude Modulation at 60 Mbps
 'QAM1681' - IEEE 802.11n Quadrature Amplitude Modulation at 81 Mbps
 'QAM1690' - IEEE 802.11n Quadrature Amplitude Modulation at 90 Mbps
 'QAM6452' - IEEE 802.11n Quadrature Amplitude Modulation at 52 Mbps
 'QAM64578' - IEEE 802.11n Quadrature Amplitude Modulation at 57.8 Mbps
 'QAM64585' - IEEE 802.11n Quadrature Amplitude Modulation at 58.5 Mbps
 'QAM6465' - IEEE 802.11n Quadrature Amplitude Modulation at 65 Mbps
 'QAM64722' - IEEE 802.11n Quadrature Amplitude Modulation at 72.2 Mbps
 'QAM64108' - IEEE 802.11n Quadrature Amplitude Modulation at 108 Mbps
 'QAM645120' - IEEE 802.11n Quadrature Amplitude Modulation at 120 Mbps
 'QAM641215' - IEEE 802.11n Quadrature Amplitude Modulation at 121.5 Mbps
 'QAM64135' - IEEE 802.11n Quadrature Amplitude Modulation at 135 Mbps
 'QAM64150' - IEEE 802.11n Quadrature Amplitude Modulation at 150 Mbps

Example: "SENS:DEMOD:FORM:BAN 'QAM16'" ' The R&S FSQ-K91 option will only analyze
' bursts that are of the QAM16 modulation format

Characteristics: *RST value: 'QAM64'
SCPI: device specific

Mode: K91

[SENSe:]DEMOD:FFT:OFFSet AUTO | GICenter

This command specifies the FFT start offset. The values which can be specified are as follows:

- AUTO - The FFT start offset is automatically chosen to minimize the intersymbol interference.
- GICenter - Guard Interval Center: The FFT start offset is placed to the center of the guard interval.

Appendix: Contact to our hotline

Any questions or ideas concerning the instrument are welcome by our hotline:

USA & Canada

Monday to Friday (except US public holidays)

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

Tel. from USA 888-test-rsa (888-837-8772) (opt 2)

From outside USA +1 410 910 7800 (opt 2)

Fax +1 410 910 7801

E-mail Customer.Support@rsa.rohde-schwarz.com

East Asia

Monday to Friday (except Singaporean public holidays)

8:30 AM – 6:00 PM Singapore Time (SGT)

Tel. +65 6 513 0488

Fax + 65 6 846 1090

E-mail Customersupport.asia@rohde-schwarz.com

Rest of the World

Monday to Friday (except German public holidays)

08:00 – 17:00 Central European Time (CET)

Tel. from Europe +49 (0) 180 512 42 42

From outside Europe +49 89 4129 13776

Fax +49 (0) 89 41 29 637 78

E-mail CustomerSupport@rohde-schwarz.com