



ROHDE & SCHWARZ

Test and Measurement
Division

Release Notes

WIBRO

Application Firmware R&S FSP-K93

Release 4.50

for R&S FSP Analyzer Firmware V4.5x

New Features:

- Improved DL-MAP auto demodulation. This includes automatic detection of the IDcell
- Physical Layer auto demodulation for a single UL burst
- Preamble Channel Frequency Response measurement results available
- Frame Length measurement available in the Capture Memory measurement window
- Support of estimated and predefined burst boosting

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History

Date	Rel Note Rev	Changes
20 November 2009	1	First revision for WIMAX Application Firmware 4.50
09 February 2010	2	New features list corrected

General Topics

Compatibility of the R&S FSP-K93 WIMAX Application Firmware with other Firmware Releases

The following table shows the compatible versions of the basic analyzer firmware and the WIMAX Application Firmware.

Table of compatible versions:

R&S FSP- K93 Application Firmware	R&S FSP Basic Firmware
4.50	4.50
4.40	4.40
4.30	4.30
4.20	4.20
4.10	4.10

Firmware Update of the R&S FSP-K93 WIMAX 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 R&S FSP FIRMWARE section 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 FSP-K93 WIMAX 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..

System Memory Requirements

For FSP-K93 WIMAX Application Firmware, an installed system memory of 512MByte/1GByte is essential (see table below). The FSP-K93 firmware will generate an error message during activation, if available system memory does not meet the requirements.



A memory extension is available if the installed system memory does not meet the requirements.

CPU board order number	Required system memory	Memory Extension / Order Number	
1091.2520	512 MB	FSQ-B512	1157.1590.02
1091.2808	512 MB	FSP-B512	1157.1590.04
1091.2814	512 MB	FSP-B512	1157.1590.04
1091.2895	1 GB	FSP-B1G	1164.5572.02

The system memory size can be easily checked by pressing SETUP – SYSTEM INFO – STATISTICS, item "Memory size". This item is available since version 3.2x of the base system firmware. The CPU board type can be checked by pressing SETUP – SYSTEM INFO – HARDWARE INFO, item "Order #".

Application Firmware WiBro TX Measurements

Literature:

- [1] IEEE Std 802.16-2004, 1 October 2004. Part 16: Air Interface for Fixed Broadband Wireless Access Systems.
- [2] ETSI EN 301 021 V1.6.1 (2003-07)
Fixed Radio Systems; Point-to-multipoint equipment; Time Division Multiple Access (TDMA);
Point-to-multipoint digital radio systems in frequency bands in the range 3 GHz to 11 GHz
- [3] IEEE P802.16-2004/Cor1/D5; 2005-09-12.
- [4] IEEE Std 802.16e-2005 and IEEE Std 802.16-2004/Cor1-2005, IEEE Standard for Local and metropolitan area networks Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems Amendment 2: Physical and Medium Access Control Layers for Combined Fixed and Mobile Operation in Licensed Bands

General issues of FSP-K93

Abbreviations and acronyms:

$P_{4 \times 64}$, P_{EVEN} , P_{ALL} , P_{AAS} , P_{ODD} , P_{SUB}	Different Preambles.
AAS	Adaptive Antenna System
CRS	Central Radio Station
DL	Down Link
FCH	Frame Control Header
FDD	Frequency Division Duplexing
H-FDD	Half-Duplex Frequency Division Duplex
LP	Long Preamble
RTG	Receive/Transmit Transition Gap
SP	Short Preamble
TDD	Time Division Duplexing
TS	Terminal Station
TTG	Transmit/Receive Transition Gap
UL	Up Link

New Functions in Version 4.50

- **Improved DL-MAP auto demodulation. I.e. automatic demodulation of the second or higher DL-zone according to the DL-MAP is now supported.**

Note the DL-MAP auto demod functionality requires a signal compounded of DL-zones as being available in the Frame Config | Zone / Segment List | Zone combo box! I.e. exclusively this DL-zones are supported in case of the DL-MAP auto demod functionality
This includes automatic detection of the IDcell

- **Physical Layer auto demodulation for a single UL burst**
- **Preamble Channel Frequency Response measurement results now available**
- **Frame Length measurement available in the Capture Memory measurement window**
- **Support of estimated and predefined burst boosting**

Improvements with option R&S FSP-K93 WIMAX Application Firmware

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

1. [V4.40] **Corrected minor drawing issues with various measurement traces.**
2. [V4.40] **Corrected FFT and CCDF not updating in cases where the signal did not analyse.**
3. [V4.40] **Appending sweep count sometimes resets itself before all frames are analysed.**

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. [V4.20] **Trace data now available via remote control in binary format for all traces.**
2. [V4.20] **Results display pages selectable via SCPI command.**
3. [V4.20] **Channel Estimation selection configurable by the user. Selections are either:**
 - user selected tracked signal
 - fully tracked signal
4. [V4.30] **Support for Application Recovery.**
5. [V4.30] **Added support for SEM filters - GAUSSIAN, EMI, 5POLE, FFT, CHANNEL and RRC.**
6. [V4.30] **The General Settings and Advanced Settings dialog changed to a Tabbed Dialog.**
7. [V4.30] **Support added for HARQ and Fast Feedback control bursts.**

8. [V4.30] With this release the 'Frame Global | UL Control Region Length' setting will be taken into account for the following measurement settings respective measurement results.

Measurement settings:

Frame Config | Burst Offset.

In example for a 3 symbol control region length, an UL-burst would have to be specified according to

:CONFigure:WIMax:ZONE1:BURSt1:CONTRol:DATA QPSK_1_2,0,0,45,0,3,0,DATA

The green highlighted three specifies the offset of the burst from the zone start.

Being three because of the control region.

Measurement Results:

Time to Capture Buffer Start, EVM vs Symbol, Constellation Diagram, Bit Stream.

9. [V4.40] EVM Preamble results added to statistical results.

10. [V4.40] Ability to display Time to Capture Buffer marker at frame or FFT start.

11. [V4.50] Improved DL-MAP auto demodulation. I.e. automatic demodulation of the second or higher DL-zone according to the DL-MAP is now supported.

Note the DL-MAP auto demod functionality requires a signal compounded of DL-zones as being available in the Frame Config | Zone / Segment List | Zone combo box! I.e. exclusively this DL-zones are supported in case of the DL-MAP auto demod functionality.

This includes automatic detection of the IDcell.

12. [V4.50] Physical Layer auto demodulation for a single UL burst.

13. [V4.50] Preamble Channel Frequency Response measurement results now available.

14. [V4.50] Frame Length measurement available in the Capture Memory measurement window.

15. [V4.50] Support of estimated and predefined burst boosting.

Known issues with option R&S FSP-K93 WIMAX Application Firmware

None

Modifications to the Operating Manual

The R&S FSP-K93 analyzer functions are included in a separate manual set. Please refer to the following order numbers:

- 1308.5523.42-01- (English)

Regarding restrictions of WiBro signals that can be measured, see section "IEEE 802.16e-2005 WiBro Measurements".

Modified Chapters for manual operation

Results Summary

Second WiBro results table. This table displays results that are related to the Zones/Segments of the analysed signal.

Frequency: 20 GHz

NFFT: 1024

Zone/Seg: DL-PUSC, ID=A, Seg=0

Signal Lvl. Setting: -30 dBm

Sweep Mode: Single

Modulation: ALL

Ref. Level / Ext. Att: -20 dBm / 0 dB

Trigger Mode / Offset: Free Run

Zone Offset / Len: 1 / 24 Symbols

IEEE 802.16e-2005 WiBro

GENERAL SETTINGS

DEMOD SETTINGS

DISPLAY GRAPH

PUT

EVM

SPECTRUM

CONSTELL

STATISTICS

FILE MANAGER

Result Summary of Analyzed Zone/Segment

No. of Zones/Segments	3					
	Min	Mean	Limit	Max	Limit	Unit
BER Pilots	0.00	0.00	0.00	0.00	0.00	%
EVM Data & Pilots	-48.53	-48.48	-30.00	-48.37	-30.00	dB
EVM Data	-48.02	-47.96	-30.00	-47.85	-30.00	dB
EVM Pilots	-51.47	-51.30		-51.20		dB
EVM Preamble	-47.92	-47.72		-47.57		dB
Unmod. Subcar. Err.	3.04	3.04		3.04		dB
IQ Offset	-58.09	-58.01	-15.00	-57.87	-15.00	dB
Gain Imbalance	0.07	0.07		0.07		dB
Quadrature Error	0.634	0.645		0.652		°
Power DL Preamble	4.80	4.80		4.80		dBm
Power Data & Pilots	3.49	3.49		3.49		dBm
Power Data	2.83	2.83		2.83		dBm
Power Pilots	5.34	5.34		5.34		dBm

Measurement Complete

SPECTRUM

WIMAX

AUTO LVL

RUN SGL

RUN CONT

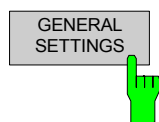
REFRESH

SCREEN A

Fig. 35 Zone/Segment Result Summary Table for WiBro

General Settings

This section of the user manual describes the General Settings view where all settings related to the overall measurement can be modified, that is the Signal Characteristics, Data Capture, Trigger IQ, Input and Advanced settings.



The *GENERAL SETTINGS* softkey brings up the General Settings view.

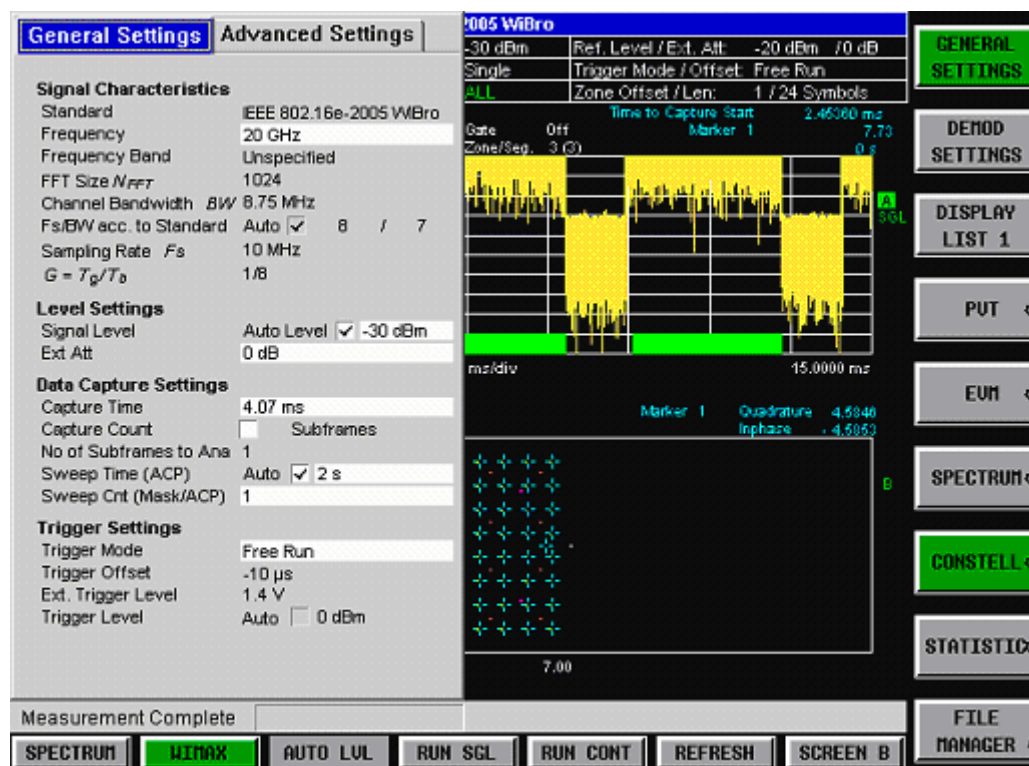


Fig. 37 General Settings view for WiBro standard

The parameters within the General settings view are logically grouped together into:

Signal Characteristics

Level Settings

Data Capture Settings

Trigger Settings

Any parameters that are not available for editing will have a grey background. This usually occurs when one parameter setting makes another parameter invalid, for example if the *Trigger Mode* is Free Run then none of the parameters below this (*Trigger Offset*, *Power Level* and *Auto Power Trigger Level*) have any meaning, so these parameters are greyed out.

When a particular parameter is selected within the General Settings view the status bar changes to display information about the valid settings for the selected parameter.

Advanced Settings

The Advanced Settings contains settings which control details of how the instrument operates and how measurements are performed.

The advanced settings are displayed when the Advanced Settings tab is selected.

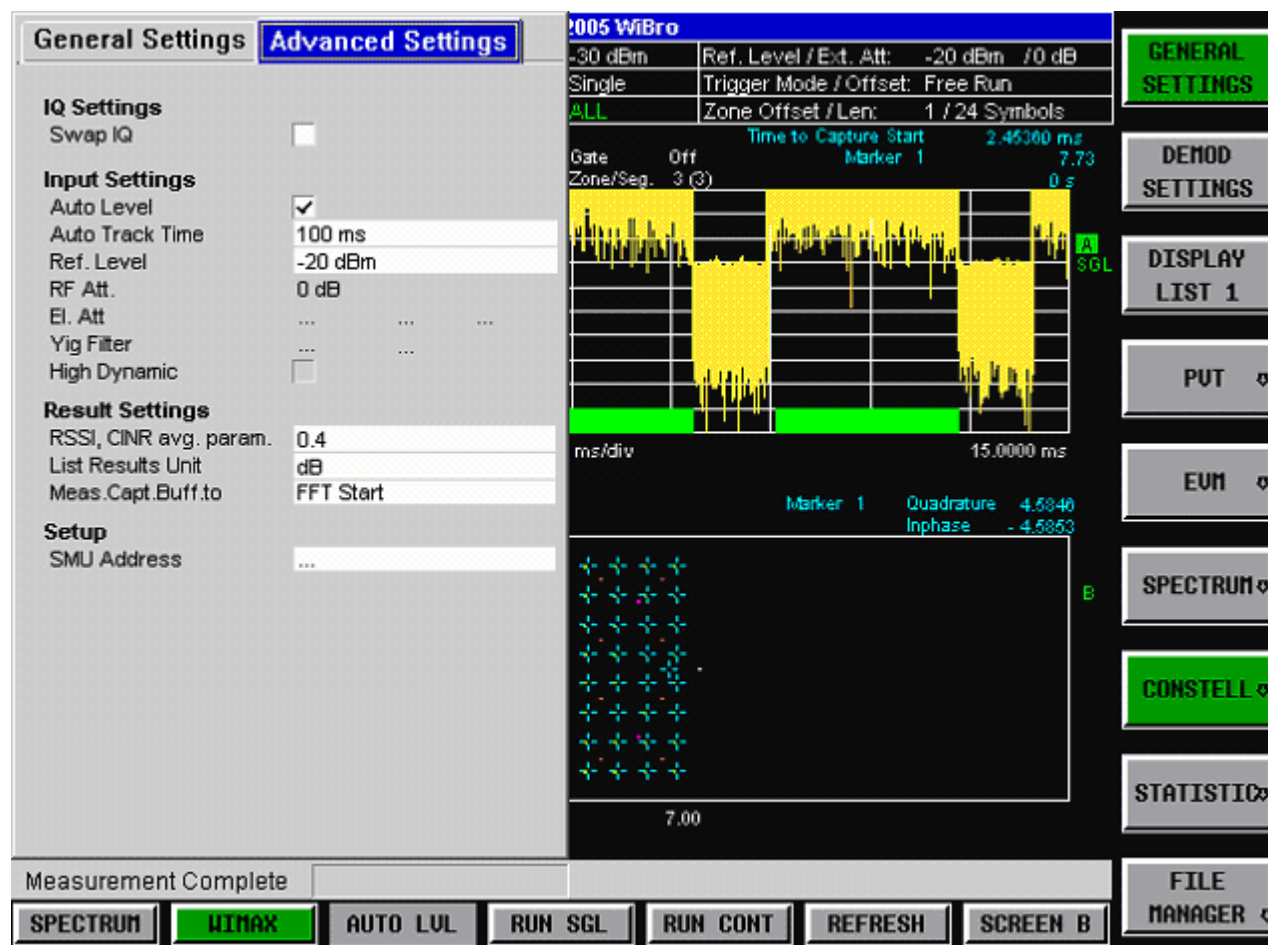


Fig. 31 Advanced Settings for WiBro

IQ Settings

The IQ settings contains settings related the Inphase and Quadrature phase of the input signal.

Swap IQ



Swap IQ allows selection between normal and inverted I/Q modulation. The settings for this parameter are:

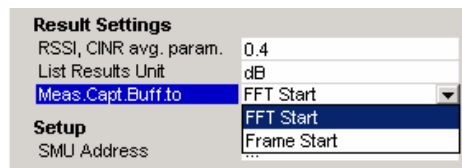
OFF Normal I/Q modulation.

ON I and Q signals are interchanged.

The *Swap IQ* parameter is editable only when *IQ Path* is set to $I + j*Q$.

IEC/IEEE-bus command: SWAP ON

Meas.Capt Buff.to



Meas.Capt.Buff.to allows selection for calculation of time to buffer capture to be FFT start or Frame start. The settings for this parameter are:

FFT Start to FFT start

Frame Start to Frame start

IEC/IEEE-bus command:

CALC:MARK:FUNC:TTC:STAR FFT

Modified Chapters for remote operation

CALCulate<1|2>:MARKer<1>:FUNCTION:TTCapture:STARt

This command sets the 'time to capture buffer' calculation to be with respect to either FFT or frame.

Example: "CALC:MARK:FUNC:TTC:STAR FFT"

Characteristics: *RST value: FFT
SCPI: device-specific

Mode: K92/K93/K94

FETCH:BURSt:ALL?

This command returns all the results. The results are output as a list of comma separated strings. The format of the results are as defined below:-

Uplink results:

<min BER pilots>, <average BER pilots>, <max BER pilots>,
<min EVM all bursts>, <average EVM all bursts>, <max EVM all bursts>,
<min EVM data carriers>, <average EVM data carriers>, <max EVM data carriers>,
<min EVM pilots>, <average EVM pilots>, <max EVM pilots>,
<min IQ offset>, <average IQ offset>, <maximum IQ offset>,
<min gain imbalance>, <average gain imbalance>, <max gain imbalance>,
<min quadrature offset>, <average quadrature offset>, <max quadrature offset>,
<min frequency error>, <average frequency error>, <max frequency error>,
<min symbol error>, <average symbol error>, <max symbol error>,
<min power all>, <average power all>, <max power all>,
<min power data>, <average power data>, <max power data>,
<min power pilots>, <average power pilots>, <max power pilots>,
<min crest factor>, <average crest factor>, <max crest factor>,
<min unmod. subcarrier error>, <average unmod. subcarrier error>, <max unmod. subcarrier error>

Downlink results:

<min BER pilots>, <average BER pilots>, <max BER pilots>,
 <min EVM all bursts>, <average EVM all bursts>, <max EVM all bursts>,
 <min EVM data carriers>, <average EVM data carriers>, <max EVM data carriers>,
 <min EVM pilots>, <average EVM pilots>, <max EVM pilots>,
 <min IQ offset>, <average IQ offset>, <maximum IQ offset>,
 <min gain imbalance>, <average gain imbalance>, <max gain imbalance>,
 <min quadrature offset>, <average quadrature offset>, <max quadrature offset>,
 <min frequency error>, <average frequency error>, <max frequency error>,
 <min symbol error>, <average symbol error>, <max symbol error>,
 <min power DL preamble>, <average power DL preamble>, <max power DL preamble>,
 <min power all>, <average power all>, <max power all>,
 <min power data>, <average power data>, <max power data>,
 <min power pilots>, <average power pilots>, <max power pilots>,
 <min crest factor>, <average crest factor>, <max crest factor>,
 <min RSSI>, <average RSSI>, <max RSSI>,
 <RSSI SD>,
 <min CINR>, <average CINR>, <max CINR>,
 <CINR SD>,
 <min unmod. subcarrier error>, <average unmod. subcarrier error>, <max unmod. subcarrier error>,
 <min EVM preamble>, <average EVM preamble>, <max EVM preamble>

Note that the units for the EVM results are specified with the UNITS:EVM command.

Example: "FETC:BURS:ALL?" All calculated results are returned.

Characteristics: *RST value: -
SCPI: device-specific

Mode: K93

FETCh:BURSt:EVM:PREAmble

This command returns the Error Vector Magnitude measurement results summary for the EVM preamble carrier (average, minimum or maximum value).

Note that the units for the results are specified with the DISPlay[:WINDow1]:TABLE:UNIT command.

Example: "FETC:BURS:EVM:PRE:MAX?" The maximum EVM recorded for the EVM preamble carrier is returned.

Characteristics: *RST value: -
SCPI: device-specific

Mode: K93

Appendix: Contacting our hotline

Any questions or ideas concerning the instrument are welcomed 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