



Products: R&S Spectrum Analyzer FSL

Resolving Security Issues When Working with the R&S[®] FSL in Secure Areas

Based upon the user's security requirements, this document describes the Rohde&Schwarz options available to address the user's spectrum analysis needs. It also covers the different memory types and locations where user information can be stored in the spectrum analyzer R&S[®] FSL.

For secure environments, it describes an approach to physically remove the user data from the spectrum analyzer.



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1 Overview

In many cases it is imperative that the R&S® FSL spectrum analyzer be used in a secured environment. Generally these highly secured environments will not allow any test equipment to leave the area unless it can be proven that no user information will leave with the test equipment. Security concerns can arise when spectrum analyzers need to leave a secured area to be calibrated or serviced.

This document describes the types of memory and their usage in the R&S® FSL spectrum analyzer. It also addresses methods of ensuring that no user data will leave the secured area should the product be removed for calibration or service needs.

2 Instrument Models Covered

R&S Spectrum Analyzers

R&S® FSL
FSL3
FSL6

3 Battery Information

There are no batteries in the R&S® FSL spectrum analyzer other than the one on the CPU board used to power the clock in the chipset.

4 Types of Memory in the R&S® FSL Spectrum Analyzer and Their Security Concerns

SDRAM

The R&S® FSL spectrum analyzer has 512 MByte of SDRAM on the CPU board. SDRAM is volatile memory and it loses its memory as soon as power is removed. The SDRAM will be unreadable within one minute after the power is removed from the instrument.

The SDRAM is not a security concern.

EEPROM

Each board assembly in the R&S® FSL spectrum analyzer has one serial EEPROM device. These devices hold 32 kBytes up to 1 MByte and contain information related to the installed hardware, such as board serial number, options, correction constants, etc. The EEPROM does not hold user data nor can the user access the EEPROM storage.

The EEPROM is not a security concern.

FLASH

The CPU board of the R&S® FSL spectrum analyzer has one 512 kByte flash memory device which contains the BIOS. The Flash memory does not hold user data nor can the user access the Flash memory.

The Flash memory is not a security concern.

Compact Flash Memory

The main non-volatile device is the Compact Flash Memory which is used like a mechanical hard drive. The size of the compact flash disk is 1 GByte. The compact flash disk is used to store:

- Instrument operating system (Windows® XP)
- Instrument firmware and firmware options (measurement personalities) with option license keys
- Instrument states and setups
- Trace data
- Limit Lines, Transducer tables
- Screen images

The compact flash disk content is non-volatile, so nothing is lost when power is removed from the instrument.

The compact flash disk is a security concern.

5 Information Storage in the R&S® FSL Spectrum Analyzer

	SDRAM	EEPROM	FLASH	COMPACT FLASH MEMORY
DATA	Not a security concern	Not a security concern	Not a security concern	
Temporary Information storage for the functioning of the CPU (CPU Cache, and Swap area)	X			X
Hardware Info, Serial Number Product Options and Calibration Correction Constants		X		
BIOS			X	
Operating System and Instrument Firmware				X
Instrument states, setups, Limit Lines and Transducer tables				X
Trace data, Measurement Results and Screen Images				X

6 Information Security in Highly Sensitive Areas

Since the SDRAM is erased when power is removed from the spectrum analyzer it does not pose a security risk. No user data is written to the EEPROM and FLASH memories; hence, it is deemed that they do not pose a risk either.

The COMPACT FLASH MEMORY is the only device that does not lose its memory when power is removed and can contain user data. The files containing user data have to be erased in conformance to the DoD-5220.22 specification (see below).

7 Performing Service, Calibration and Maintenance on the R&S® FSL Spectrum Analyzer

Clearing the different types of memory

Compact Flash Memory

All user specific data like

- Instrument states and setups
- Trace data
- Limit Lines, Transducer tables
- Screen images

are stored on the internal compact flash memory drive. Simply deleting these files is not sufficient from a security perspective.

For deleting files there are several Windows programs available to “shred” files according to the DoD 5220 standard which are working with the NSA approved algorithm. One example of these that has been tested by Rohde & Schwarz is “Wipe & Delete” from AEVITA Software (www.aevita.com). Refer to the operating manual for details on installing Windows software on the instrument.

 http://www.aevita.com/ftp/wipedetele_setup.exe

The file shredder program works by overwriting the file seven (7) times with an alternating pattern of bits which not only stops all software programs from retrieving data contents, but also helps to prevent physical magnetic data sensors from retrieving a proper image of the data. This is standard government regulation for secure data erasure and conforms to Department of Defense specification DOD-5220.22M.

SDRAM

This memory is volatile. To remove all data stored in the SDRAM turn-off the spectrum analyzer with the AC power supply switch on the rear panel.

The spectrum analyzer can now leave the secured area

Calibration and the validity of the spectrum analyzer's calibration after clearing the COMPACT FLASH MEMORY

The calibration ensures a user that their measurements are traceable to a government standard. Rohde & Schwarz highly recommends that users follow the calibration cycle suggested for their instrument.

The EEPROM is the only location used to hold permanent adjustment values required to maintain the validity of the spectrum analyzer's calibration.

After clearing the compact flash memory, the board assembly EEPROMs need to be registered. This operation has to be executed once:

- Turn the instrument Off
- Turn the instrument back On while holding down the decimal point key [.] on the number keypad on the front panel
- Continue to hold this key for 10 seconds after pressing the "On" button
- The instrument will now recognize the changes and then power up

After clearing the compact flash memory, the self-alignment function has to be executed once. This is done with the SETUP - ALIGNMENT function. This function uses the high-stability internal reference generator to produce the temporary adjustment values. Using the permanent and temporary values, the necessary adjustment information is then stored on the compact flash memory. Rohde & Schwarz recommends that users perform the self-alignment function on a weekly basis after the analyzer has had sufficient time to warm-up.

8 Performing Firmware Updates and Backing-Up User Data in Sensitive Areas

Rohde & Schwarz highly recommends, but does not require, the users of its products, to maintain their products with the latest updates and to regularly back-up important user data that can be erased. Firmware updates are available from the R&S website. How does a user perform firmware updates and back-up user data in sensitive areas? There are several options available for the user to safely perform these operations without compromising the security of the sensitive areas.

Via the USB port

Rohde & Schwarz spectrum analyzers are equipped with USB ports as standard equipment. The instrument firmware update can be performed directly from the USB stick. The USB stick can likewise hold or transport user data back-ups to an approved storage medium. As described below, users can disable the capability of the USB ports for saving data (set to "read only"). For users that have not elected to disable the USB ports for writing data a memory stick can be used for backing-up user data.

Via the LAN interface

The R&S® FSL spectrum analyzer is equipped with a LAN interface as standard interface. A user can transport the firmware update into the secure area via a CD or another medium that meets the security requirements. The update can then be placed on a system on the LAN within the secure area. The spectrum analyzer can be updated directly from the LAN. The LAN can likewise be used to back-up user data to an approved storage medium.

9 Special Considerations for USB ports

USB ports can pose a security threat in high-security locations. Generally, this threat comes from small USB pen drives (a.k.a. memory sticks, key drives, etc) which can be very easily concealed, yet can quickly read/write several GBytes of data.

Disable USB Ports for Writing User Data

The R&S® FSL spectrum analyzer can be updated with an utility to disable the write capability on any USB Port for storage devices. This utility is available from Rohde & Schwarz FSL web site w/o any charge. To disable the write capability copy the utility software to the spectrum analyzer and run it once. After reboot of the instrument the write capability on any USB memory device is disabled.

Additional Information

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