Products: Vector Signal Generator SMIQ

PC Software SetupAccelerator:
High speed save / restore for 3GPP Signals
(for SMIQ option SMIQB48)

Application Note

This software provides quick save and restore for SMIQ 3GPP/W-CDMA setups, including channel coding scenarios with different parameters and varying data rates. Parameter changes in 3GPP/W-CDMA menus often require a lengthy re-computation of the signal to generate: use **SetupAccelerator** to save up to eight precomputed data sequences with all characteristic SMIQ system parameters to a PC and upload these signals back to the signal generator within about two minutes, when needed.

ROHDE & SCHWARZ

Contents

1   Overview

This application note describes the software SetupAccelerator, a support tool for the SMIQ 3GPP options SMIQB45 and SMIQB48. Section 2 contains a short overview (or repetition for the experienced SMIQ user) of SMIQB45 and B48 features and applications. For more information about these options, see reference [1]. Section 3 describes how to use the SetupAccelerator software with SMIQB45 and B48.

2 3GPP Signals with SMIQB45 and SMIQB48

SMIQB45

SMIQB45 is the basic option for generating 3GPP signals with the SMIQ Vector Signal Generator. (Note that hardware options SMIQB20 and SMIQB11 are prerequisite.) SMIQB45 generates downlink signals with up to 512 code channels and uplink signals consisting of up to 4 mobiles. However, the duration of a signal is limited to a maximum of 13 frames. Furthermore, channel coding is not supported in SMIQB45. Therefore SMIQB45 is mainly used for measurements where the spectral and statistical properties of the signal are more of interest than the data content, i.e. tests of components like amplifiers.

SMIQB45 features overview:

For more details see references [1] and [3].

- 3GPP Test Models (as defined in the standard)

- Three different uplink modes such as „PRACH_ONLY", „PCPCH_ONLY" and „DPCCH+DPDCH"

- Simulation of up to 4 different base or mobile stations

- Up to 512 Code Channels

- Easy and fast settings menu „PARA. PREDEF SETTING..."

- Synchronization of mobile via P-SCH, S-SCH, PCCPCH

- Graphical display of CCDF (up to 3), Constellation Diagram, Code Domain Power, Channel Graph and Domain Conflicts.

SMIQB48

SMIQB48 provides extended 3GPP functionality and is designed especially for receiver tests where full channel coding is required. ***SMIQB45 is prerequisite for installing SMIQB48!***

SMIQB48 features overview:

For more details see references [1] and [3].

- Sequences with a length of up to 1022 frames for one channel

- Data lists for data fields and TPC

- Reference measurement channels including channel coding for up and downlink:
  12.2 kbps, 64 kbps, 144 kbps, 384 kbps (TS 25.101/104/141), AMR speech 12.2 kbps (TS 25.944)

- Insertion of bit errors (for verification of internal BER tester)

- Insertion of block errors (for verification of internal BLER tester)

- Simulation of Orthogonal Channel Noise (OCNS)

- Simulation of up to 64 additional mobile stations

- External control of code channel power in real time

Typically, SMIQB48 will be used to generate a Reference Measurement Channel (RMC) [2] or a similar setup. For receiver and performance tests,

where bit error or block error rates are measured, the sequence usually will consist of many frames. For a 12.2 kbps RMC, 1022 frames are required, when the user data shall consist of non-truncated PRBS 9 sequences [1].

SMIQB45 and B48 working together

Broadly, SMIQB45 and B48 can be distinguished by their applications. SMIQB45 is mainly designed for component tests, SMIQB48 for receiver and performance tests. However, there are some test scenarios in 3GPP receiver and performance tests, where not only the code channel to be measured is present, but additional channels simulating a "real" environment.

In this case, SMIQB45 can be used to generate an appropriate background signal for the Enhanced Channels. In downlink, OCNS would be a typical example. In uplink, up to 64 additional mobiles can be simulated.

The interplay of SMIQB45 and SMIQB48 can be seen in the following block diagram.
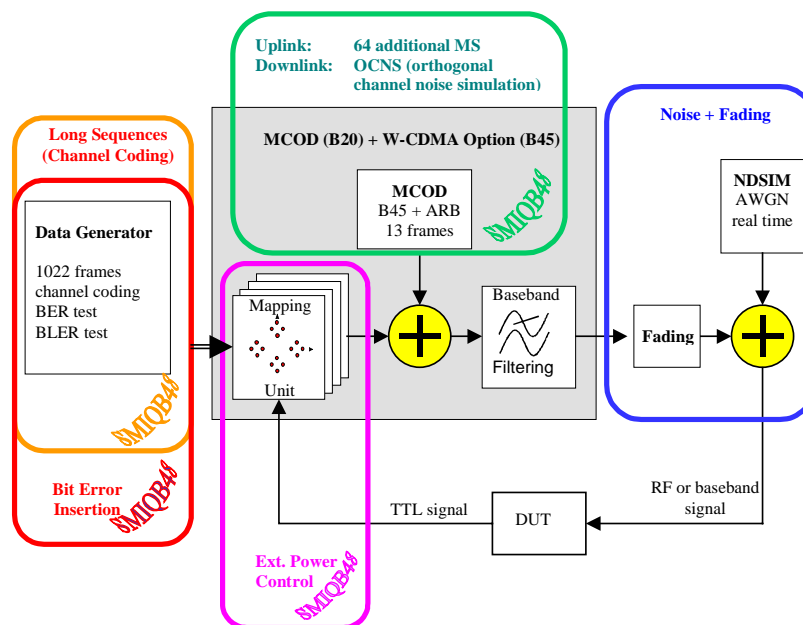
So a typical signal will consist of:

- One Enhanced Channel (RMC or similar) of a few hundred frames generated by SMIQB48.

- If necessary, a background signal (OCNS or additional mobiles) of a few frames, generated by SMIQB45.

The calculation of the background signal typically takes several seconds, the Enhanced Channel signal may take up to half an hour. To avoid such long calculation times for every new signal scenario, a PC software called **SetupAccelerator** has been written.

3   PC Software SetupAccelerator

What does the software do?

This software provides quick save and restore of SMIQ setups for 3GPP/W-CDMA, including channel coding scenarios with different parameters and varying data rates. The development of this program was motivated by the fact that parameter changes in 3GPP/W-CDMA menus often require a lengthy re-computation of the signal to generate. Use **SetupAccelerator** to save up to eight precomputed data sequences with all characteristic SMIQ system parameters to a PC and upload these signals back to the signal generator within about two minutes, when needed.

Important general remarks:

- **SetupAccelerator** only works when both SMIQB45 and SMIQB48 are installed.

- **SetupAccelerator** can only download 3GPP configurations that use SMIQB48: at least one Enhanced Channel has to be active. Standard Channels can be active, but are not mandatory.

- **SetupAccelerator** is used to avoid recalculation of the Enhanced Channel (SMIQB48) part of the setup which could take up to half an hour. The background signal (SMIQB45) still has to be recalculated after an upload with **SetupAccelerator**. This only takes a few seconds for typical background signals.

- Do not try to upload data to an SMIQ that has been downloaded from a different unit.

Program Start

After installing the software on your PC, start **SetupAccelerator** from the program group generated in your Windows "Start" menu.

Since the software requires up to eight internal hard-key SMIQ save/recall states to secure a maximum of eight different machine setups, the following message is displayed at each startup:
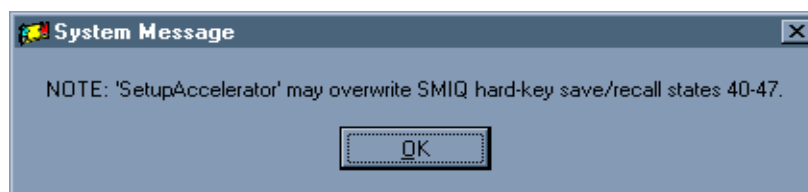
SetupAccelerator uses and overwrites the hard-key save/recall states 40 to 47 and additionally requires up to eight free software 3GPP/W-CDMA save/recall states. The overall SMIQ 3GPP/W-CDMA state is stored by saving general parameters to a hard-key save/recall state and special 3GPP/W-CDMA settings to a software state. The data of the 3GPP signal is internally stored in data and control lists (DLIST and CLIST).The currently valid DLIST and CLIST are transferred to the PC via the IEC bus.

A warning will be displayed if not enough software 3GPP/W-CDMA states are available at data download. In this case, you have to manually delete an existing 3GPP/W-CDMA state and restart the download process.

Note: *Please do not alter the hardkey save/recall states 40 to 47 and the 3GPP/W-CDMA states named "B48_#", where # stands for a number from 0 to 7. If these states are changed, the up- and download of data between PC and SMIQ may not work correctly.*

Main Panel

SetupAccelerator is controlled from the main panel described below:
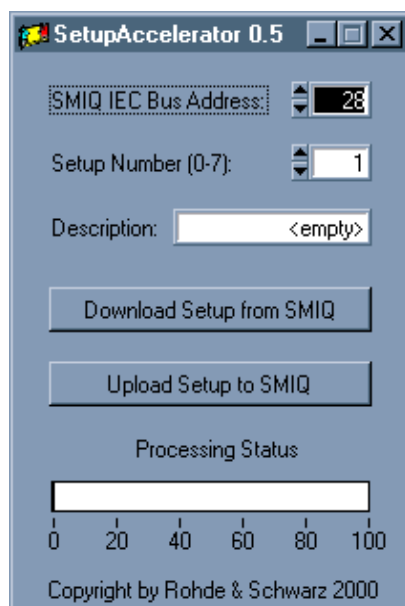
SMIQ IEC Bus Address

The IEC bus address of the SMIQ signal generator can be adjusted. The default address for communications with SMIQ via the IEC bus is 28.

Setup Number (0-7)

Eight different setups can be stored on the PC. The setup you want to download from SMIQ or upload to SMIQ is selected here. If you download a new setup to your PC, an already existing setup with the selected number will be overwritten.

Description

A short description for the selected setup (0-7) can be entered here. If the setup number is not yet allocated, "<empty>" is displayed. If you download a new setup without giving a description, a default description text is used. You can change the description of an existing setup at any time.

Download Setup from SMIQ to PC

When a valid 3GPP/W-CDMA signal is available in SMIQ, you can store the complete SMIQ state including this signal on your PC by pressing the download button. Main SMIQ parameters are stored in the signal generator under its save/recall states (see above). The precomputed signal is transferred to the PC where it is stored under a default name ("B48_#.dta" and "B48_#.dsc"). Data transfer from SMIQ comprises the DLISTs "B48_DL", "B48_DB" and the CLIST "B48_CL".

To make sure that a valid signal exists in SMIQ, both the 3GPP/W-CDMA state and the 3GPP/W-CDMA enhanced channel state must be switched ON prior to download. In downlink, base-station 1 must be activated and one enhanced channel (11-14) must be ON. In uplink, mobile-station 1 must be active and either the overall symbol rate or the enhanced DPCCH must be used.

Note: *To store eight full setups you may need as much as 80Mbytes of free hard-disk space. Please do not modify the generated files in any way.*

Upload Setup to SMIQ from PC

Downloaded setups on your PC may be restored to SMIQ by pressing the upload button. SMIQ will recall the saved state corresponding to the selected setup number. The stored 3GPP/W-CDMA signal (DLISTs "B48_DL", "B48_DB" and CLIST "B48_CL") will be transferred from the PC to the signal generator.

Warning: *Do not try to upload data to your SMIQ that have been previously downloaded from a different SMIQ. This may give erroneous results even if no error message is displayed by the PC software, since the SMIQ's internal save/recall states can be different.*

Processing Status

The processing status of the signal download and upload is displayed in this bar. During data transfer the mouse pointer shows an hourglass.

Note: *The signal download to the PC takes about four times longer than uploading the data to SMIQ. Once you have downloaded all setups you require, you can transfer them back to SMIQ within about two minutes.*

Error Handling

All recognized errors are reported by means of an error window. If an error occurs the data transfer is interrupted and aborted, restart the data transfer once you have resolved the error.

Possible error sources are for example:

- No connection between PC and SMIQ or wrong IEC bus address.

- Required SMIQ options B45 and B48 not available.

- SMIQ states (3GPP/W-CDMA or enhanced channels) OFF at download.

- Base-station 1 inactive or no activated enhanced channel (11-14) for downlink direction.

- Mobile-station 1 OFF or overall symbol rate and enhanced DPCCH OFF for uplink direction.

- Not enough 3GPP/W-CDMA software save/recall states available in SMIQ.

- Setup files on PC are corrupt or have been modified manually.

4   IEEE Commands for Download and Upload of 3GPP Setups

The text file "1GP44 IEEE Commands.txt" delivered with this application note contains the necessary IEEE commands for performing the download and upload procedure. This document is an aid for integrating the procedures in other control software, such as C/C++ or Labwindows CVI.

It is very important to maintain the order of the IEEE commands as it is in "1GP44 IEEE Commands.txt". Otherwise errors will arise. The correct orders for download and upload are described below (see "1GP44 IEEE Commands.txt" for details).

Downloading setups:

Before download, make sure that an appropriate 3GPP signal (with at least one Enhanced Channel) is active, i.e. W-CDMA 3GPP state is ON and Enhanced Channels state is ON.

1. Get length of lists to be downloaded, save hardware and software states.

2. Switch off W-CDMA 3GPP state.

3. Download the lists corresponding to the hardware and software states.

4. Restore SMIQ to 3GPP signal active, by recalling the hardware and software states saved in 1).

5. Store the lists on the harddisk of your PC or any other suitable memory device.

Uploading 3GPP setups:

1. Get the lists from the PCs harddisk. The lists must contain their valid headers for "PACKED" format (See SMIQ operating manual [4], vol.2, section 3.5.13.5).

2. Switch off W-CDMA 3GPP state.

3. Delete the lists in SMIQ (if existing) to speed up upload. Please make sure that there is enough free memory to upload the lists.

4. Upload the lists to SMIQ.

5. Recall the hardware and software states corresponding to the lists.

5   References

[1]   W-CDMA Signal Generator Solutions by Rohde & Schwarz, Application Note 1GP39_1E, Rohde & Schwarz, 2000 (also available as brochure, PD 757.6327.21)

[2]   3GPP specifications: TS 25.104 v3.5.0, TS 25.141 v3.4.1

[3]   Vector Signal Generator SMIQ, Data Sheet, Rohde & Schwarz, 2000, PD 757.2438.25

[4]   Vector Signal Generator SMIQ, Operating Manual, Rohde & Schwarz, 2000, PD 1125.5610.12

6   Ordering information

Vector Signal Generator:

SMIQ02B	300 kHz to 2.2 GHz	1125.5555.02
SMIQ03B	300 kHz to 3.3 GHz	1125.5555.03
SMIQ04B	300 kHz to 4.4 GHz	1125.5555.04
SMIQ06B	300 kHz to 6.4 GHz	1125.5555.06

Options:

SMIQB11	Data Generator	1085.4502.04
SMIQB12	Memory Extension	1085.2800.04
SMIQB20	Modulation Coder	1125.5190.02
SMIQB45	Digital Standard W-CDMA (3GPP)	1104.8232.02
SMIQB48	Extended Functions for W-CDMA (3GPP)	1105.0587.02

ROHDE & SCHWARZ