R&S®Signal Generator Generating an uplink Dual Cell HSDPA Test Signal
Application Sheet

ROHDE&SCHWARZ

The following abbreviations are used throughout this document: R&S®AMU200A is abbreviated as R&S AMU, R&S®SMATE200A is abbreviated as R&S SMATE, R&S®SMBV100A is abbreviated as R&S SMBV, R&S®SMJ100A is abbreviated as R&S SMJ, R&S®SMU200A is abbreviated as R&S SMU. The options R&S®AMU-Kxx, R&S®SMATE-Kxx, R&S®SMBV-Kxx, R&S®SMJ-Kxx and R&S®SMU-Kxx are abreviated as R&S SMx/AMU-Kxx. R&S AMU, R&S SMATE, R&S SMBV, R&S SMJ and R&S SMU are designated as R&S Signal Generator.

1 Uplink Dual Cell HSDPA Test Signal Generation

The R&S Signal Generator supports the generation of feedback messages for HSDPA data acknowledgment and channel quality indication as defined in the 3GPP TS 25.212 release 8 and release 9.

This application sheet describes how to configure the R&S Signal Generator to generate an uplink test signal for basic tests on Dual Cell HSDPA (DC-HSDPA) operation.

1.1 Options and Equipment Required

The following equipment is required:

- Vector Signal Generator R&S SMU, R&S AMU, R&S SMJ, R&S SMATE or R&S SMBV, equipped with:
  - Firmware version 2.15.085.47 (R&S SMBV) and 2.10.111.53 (other instruments) or later. Latest firmware version recommended.
  - one of the baseband options, e.g. R&S SMx/AMU-B10
  - one of the frequency options, e.g. R&S SMx-B103
- Option R&S SMx/AMU-K42, "Digital Standard 3GPP FDD"
- Option R&S SMx/AMU-K43, "3GPP FDD enhanced MS/BS tests incl. HSDPA"
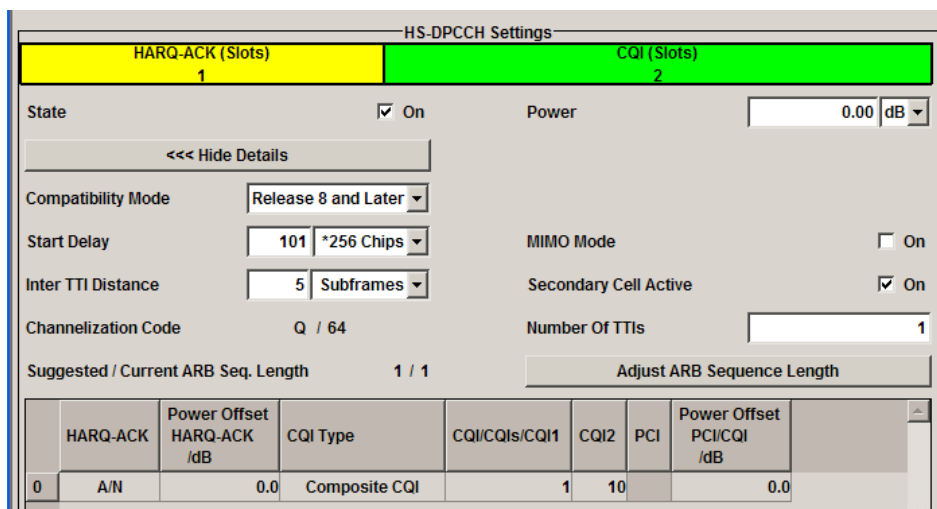- Option R&S SMx/AMU-K59, "Digital Standard HSPA+"

1.2 Test Setup

Fig. 1-1: Test Setup (example with R&S SMU)

1.3 Generating an uplink DC-HSDPA Test Signal (Non MIMO Mode)

To generate an uplink test signal corresponding to the signal of a UE configured to work in DC-HSDPA non MIMO mode, configure the uplink HS-DPCCH as follows:

1. Preset the R&S Signal Generator to ensure a defined instrument state.

2. Open the 3GPP FDD main dialog (e.g. "Baseband Block > 3GPP FDD") and select an Uplink "Link Direction".

3. Select "UE1" and open the corresponding "User Equipment" dialog.

4. Set the "Scrambling Code" as required.

5. Navigate to the "HS-DPCCH Settings" section and expand the display of detailed settings.

   a) Ensure that the "Compatibility Mode" is set to "Release 8 and Later".
   b) Enable the "Secondary Cell Active" parameter to configure dual cell HSDPA mode for the selected UE.
   c) Set the parameter "HARQ-ACK" as required to adjust the information transmitted during the HARQ-ACK slot of the corresponding TTI.
      For example, an *A/N* feedback means that an ACK is sent to the serving cell and a NACK to the secondary serving cell.
   d) To include composite CQI messages in the signal as specified in 3GPP TS 25.212, set the parameter "CQI Type" to *Composite CQI* and adjust the values of the parameters "CQI1" and "CQI2".
   e) Adjust the power settings and configure the HS-DPCCH structure with the parameters "Inter TTI Distance" and "Number of TTIs", as well as by configuring the HARQ-ACK and CQI/PCI information per TTI by means of the parameters in the table.
   f) Press "Adjust ARB Sequence Length".
   g) Set the "State" of the channel to On and close the dialog.

6. In the "3GPP FDD > Trigger/Marker/Clock" dialog, adjust the settings as required.
   For example, to synchronize the R&S Signal Generator to the frame timing of the DUT, feed the frame marker signal of the DUT (if available) to the instrument, enable trigger mode "Armed Auto" and select an "External Source".

7. In the "3GPP FDD main dialog", set the "State" to On to enable the generation of the 3GPP FDD uplink (UL) signal.

8. In the "RF > RF Frequency > Reference Frequency" dialog, adjust the settings as required.
   For example, if a common reference signal is used or if the DUT provides the reference frequency, connect the reference signal source to the R&S Signal Generator, select "Source External" and adjust the "External Reference Frequency".

9. Press the FREQ key and select the desired RF frequency, e.g. 1950 MHz.

10. Adjust the output signal level as required and press the RF ON/OFF key to activate the RF output.

1.4 Generating an Uplink Test Signal for Simultaneous Dual Cell and MIMO Operation

► Perform the steps described above and enable the parameter "3GPP FDD > UE1 > HS-DPCCH Settings > MIMO Mode".

You are enabled to configure the HARQ-ACK feedback messages for up to four simultaneously transmitted downlink transport blocks.

For background information about the dual cell operation and processing of HARQ-ACK feedback messages, refer to operating manual "RS_SigGen_3GPP-FDD_Operating.pdf", chapter "Dual Cell HSDPA (DC-HSDPA)".

1.5 Additional Information

For a comprehensive description of the R&S Signal Generator capabilities and the features provided with the 3GPP FDD options including the remote control refer to the signal generator help system or to the printable operating manual "RS_SigGen_3GPP-FDD_Operating.pdf" which is available for download on the instrument's internet page.