Product: R&S CMU300

R&S®CMU300
Radio Communication Tester for 2G/3G Base Stations

GSM AMR Testing

Application Note

GSM Adaptive Multi-Rate (AMR) tests can be performed by using the R&S CMU as of software version V3.65. This document describes the scope of functions of the AMR Testing R&S CMU-K37 software expansion option.

ROHDE & SCHWARZ

Contents

1   Introduction

The existing GSM test method of the R&S CMU300 has been expanded by adding the AMR Testing R&S CMU-K37 option. This option allows you to perform bit error ratio tests (BERT) on the following AMR channels that are mentioned in the specification [1].
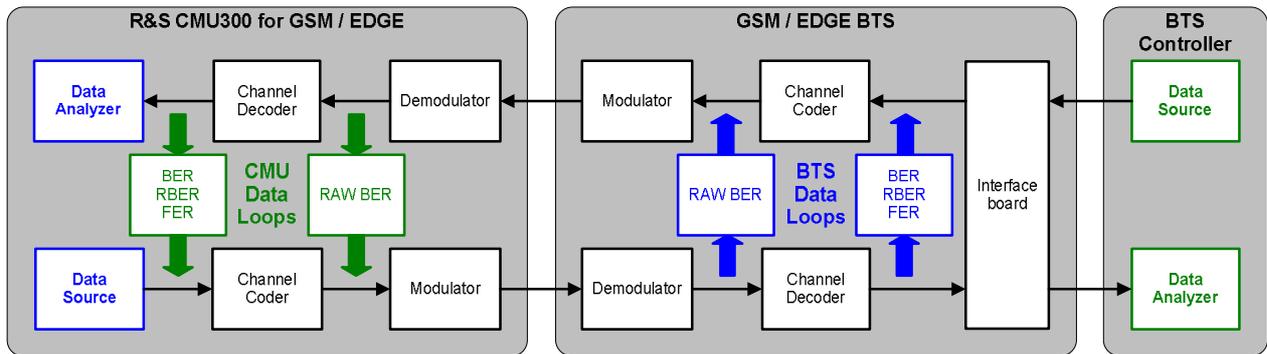
Full-rate channel coder	Half rate channel coder
TCH/AFS12.2	TCH/AHS7.95
TCH/AFS10.2	TCH/AHS7.40
TCH/AFS7.95	TCH/AHS6.70
TCH/AFS7.40	TCH/AHS5.90
TCH/AFS6.70	TCH/AHS5.15
TCH/AFS5.90	TCH/AHS4.75
TCH/AFS5.15	
TCH/AFS4.75	

Special features of the test setup:

- The R&S CMU300 synchronizes to the cell channel (BCCH). A registration procedure/location update is not performed.

- A forced AMR TCH channel setup without signalling procedure takes place.

- On uplink and downlink, the same codec modes have to be used (symmetric test setup).

- Static measurements are performed, e.g. the R&S CMU300 does not respond to AMR-specific inband signalling information while the BER test is running. The R&S CMU300 analyzes and displays the codec mode indication, which must be entered on the instrument manually before the BER test is started. RATSCCH information is neither analyzed nor taken into account.

- Main area of application: The R&S CMU300 provides a PRBS data-coded AMR uplink signal and analyzes the AMR downlink signal. For this purpose, the BTS or its controller must provide realtime data loops (see below: blue).Another possibility: The R&S CMU300 operates as realtime data loop and transmits data received on the uplink back to the BTS (see below: green).

- Signals with or without channel coding can be processed in both cases. The respective loops (BER/RBER/FER or RAW BER) have to be taken into account.


2 Test Procedure

Basic manual settings on the R&S CMU300

- Select the AMR channel coder type used by the BTS (Half Speech/HS or Full Speech/FS)

- Select the active rate set requested by the BTS that contains up to four codec modes, e.g. the channel coder of different data rates to be used (FS: four out of eight possible channel coder types/ HS: four out of six possible channel coder types)
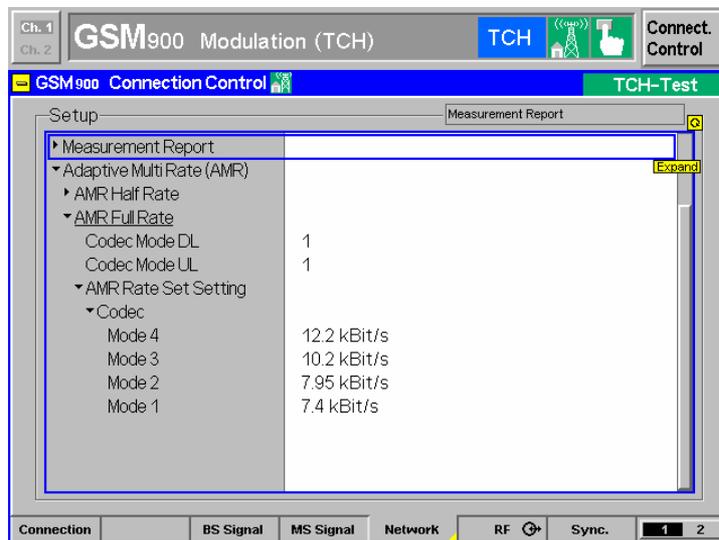
Preparation of the actual BER test

- BCCH synchronization procedure of the R&S CMU300

- Forced AMR TCH activation (R&S CMU300 and BTS)

- The R&S CMU300 registers the codec mode currently used by the BTS (DL) and the codec mode requested by the BTS (UL)

- The codec mode currently used by the R&S CMU300 (UL) and the codec mode requested by the R&S CMU300 (DL) must be set manually on the instrument
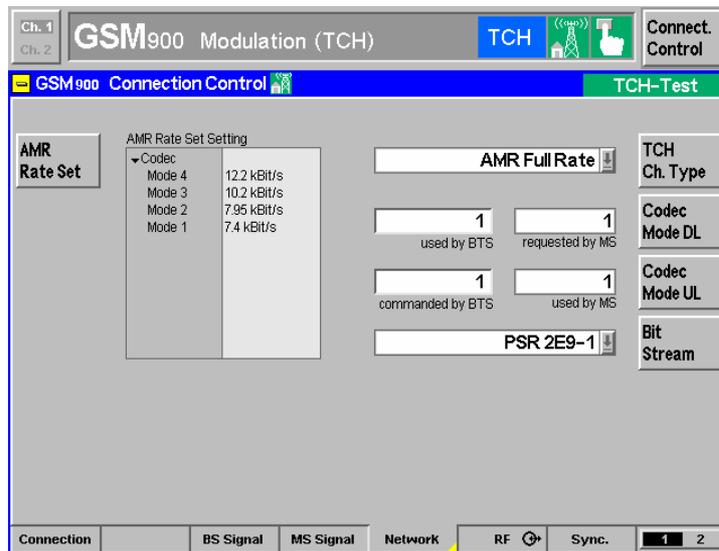
BER tests[1]:

1 Please check the R&S CMU300 specifications brochure for more detailed information.

UL Generator: MS simulation

- Six AMR HS and eight AMR FS channel coder types supported

- Data content: PRBS 9/11/15/16

- Output level accuracy <0.5 dB (in the level range -117 dBm to -10 dBm)

DL analyzer: BER evaluation

- Six AMR HS and eight AMR FS channel coder types supported

- Data content: PRBS 9/11/15/16

- Single-shot measurement with up to 50 000 frames

- Continuous measurement with running averaging via a window of up to 500 frames

BER analysis results (DL):

BER II[2]   Erroneous class II bits / total number of class II bits * 100%

BER Ib   Erroneous class Ib bits / total number of class Ib bits * 100%
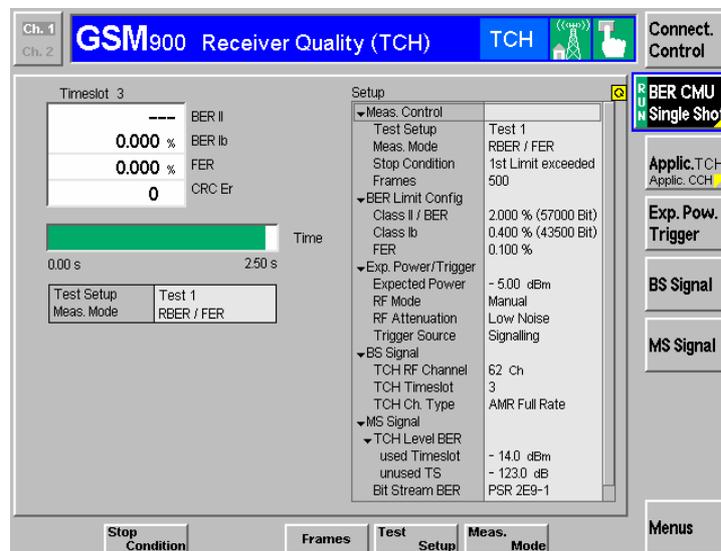
FER   Erroneous frames / total number of frames * 100%

RBER II[2]   Erroneous class II bits (RF) / total number of class II bits (RF) * 100%

RBER Ib   Erroneous class Ib bits (RF) / total number of class Ib bits (RF) * 100%

CRC Er   Detected downlink cyclic redundancy check error

2 The AMR full-rate codec does not provide any class II bits.

3 References

[1]   3GPP TS 51.021 Technical Specification, 3rd Generation Partnership Project; Technical Specification Group GSM/EDGE; Radio Access Network

4   Abbreviations

AMR	Adaptive Multi-Rate
BCCH	Broadcast Common Control Channel
BER	Bit Error Ratio
BERT	Bit Error Ratio Test
BTS	Base Transceiver Station
FS	Full Speech
HS	Half Speech
RATSCCH	Robust AMR Traffic Synchronized Control Channel
TCH/AFS	Traffic Channel / Adaptive Multirate Full Speech
TCH/AHS	Traffic Channel / Adaptive Multirate Half Speech
UL	Uplink
DL	Downlink

5   Ordering Information GSM AMR Testing

TYPE	Stock No.	Designation
R&S® CMU300	1100.0008.03	UNIVERSAL RADIO COMMUNICATION TESTER FOR BTS TEST
R&S® CMU-B21	1100.5200.02	HW OPTION FOR RCMU300: VERSATILE SIGNALING UNIT
R&S® CMU-PK30	1159.4100.02	SW OPTION PACKET FOR CMU300: All GSM BANDS FOR CMU-B21 INCLUDES CMU-K30 to CMU-K36
R&S® CMU-K30	1115.4004.02	SW OPTION FOR CMU300: GSM400 FOR CMU-B21
R&S® CMU-K31	1115.4104.02	SW OPTION FOR CMU300: GSM900 FOR CMU-B21
R&S® CMU-K32	1115.4204.02	SW OPTION FOR CMU300: GSM1800 FOR CMU-B21
R&S® CMU-K33	1115.4304.02	SW OPTION FOR CMU300: GSM1900 FOR CMU-B21
R&S® CMU-K34	1115.4404.02	SW OPTION FOR CMU300: GSM850 FOR CMU-B21
R&S® CMU-K36	1150.4207.02	SW OPTION FOR CMU300: GSM GT800 FOR CMU-B21
R&S® CMU-K37	1150.4307.02	SW OPTION FOR CMU300: AMR TESTING (GSM), CMU-K31 to CMU-K36 NECESSARY

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