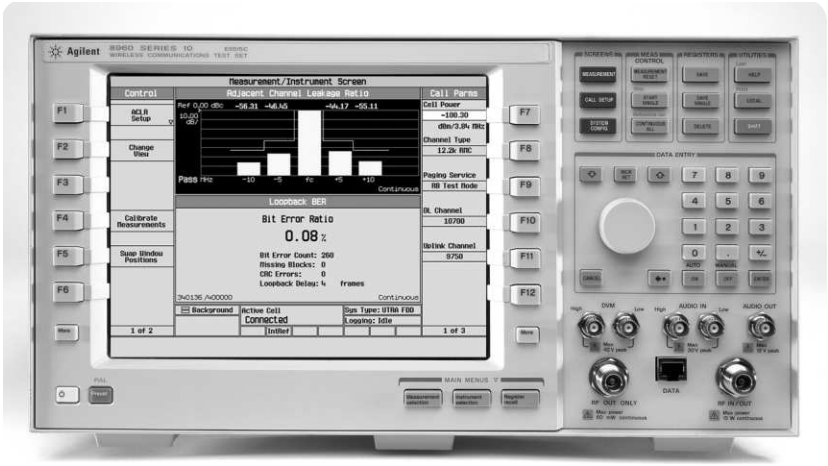
Agilent
E6703A W-CDMA Lab Application

Data Sheet

For the E5515B/C/T (8960) wireless communication test set and the E6785A GSM/GPRS/W-CDMA lab application

The Agilent E6703A W-CDMA lab application gives the R&D engineer a bench top tool to design, measure, debug, verify and tune mobile performance. This inexpensive one-box test solution provides a toolbox of features for W-CDMA: network simulation, RF measurements, protocol analysis, UE integration and debug, and RF-to-IP data connections.



Features:

- Four types of WCDMA calls supported:
  - Packet Switched data at 64 k DL/UL and lightning-fast 384 k DL / 64 k UL
  - Circuit Switched data at 64k
  - AMR Voice Echo
  - Test Control using 12.2 k, 64 k, and 384 k symmetric Reference Measurement Channels
- 64 kbps UMTS/GPRS IP data connection for data transfer between a device under test and a network
- Soft handoff including partially configurable second cell and configurable event reporting

A network simulator at your fingertips helps speed your product's design and development

- Data channels connect to LAN for Real-Life testing
  - Check Web browsing, data throughput, video conferencing, streaming audio, etc.
- 2nd Cell Soft Handoff capability for all supported Radio Bearers
  - Does your service stay up as the mobile moves through the network?
- "Point-and-Click" simple Protocol Analysis
- Advanced Physical Layer diagnostics for PRACH process
- W-CDMA to GSM system handover or Fast Switch to our GSM/GPRS lab application
- Features from the E1963A W-CDMA test application
  - PRACH tx on/off and inner loop power measurements
  - 384 kbps DL RMC
  - in-call spectrum analysis

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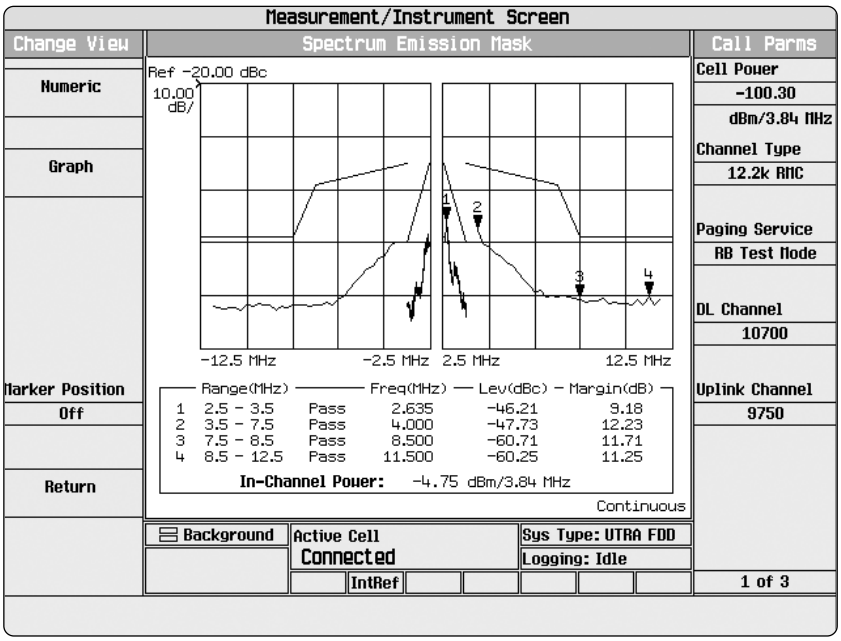
System Simulation

The UTRA FDD system simulator is so fast, most devices transition from Power-On to Call Connected in less than 15 seconds; the majority of time taken by device boot-up. In addition, since the E6703A is 3GPP March 2002 compliant and device independent, one application is all that is needed for any compliant W-CDMA device.

Agilent Wireless Protocol Advisor

Agilent's popular Signaling Advisor software, brings proven protocol logging and analysis capability to the wireless-device developer. Features such as filtering; triggering; real-time logging; raw data in decimal, binary, and hex; and a Windows® user interface enhance the ability to collect and interpret data and quickly verify functionality or uncover problem areas. This software is available through new PC software which is shipped with the lab application.



W-CDMA Wireless Protocol Advisor (WPA) Logging Software

WPA operating modes: real time or post capture

Demonstration mode: unlicensed, post-capture operation with viewing and analysis of demonstration log files provided with WPA

Traffic overview: single-line display of individual protocol messages in sequential order as received

- **configurable display columns:** message number, message direction, system time, time-stamp (based on PC's realtime clock), message name, protocol, repeat count and more based on individual field parameters

Decode view: display of detailed message contents

- **display choices:** individual octets of message or line per field of each parameter in the message
- **configurable display columns:** octet number, decimal value, binary value, hexadecimal value, field description (English)

Measurement setup view: graphical block diagram of logging software with indication of which triggers and filters are currently selected

Filters: three types, all individually configurable by the user. Configurations can be saved and recalled for later use.

- **test set filters:** pass filters that limit the amount of information sent over the LAN with choices of MAC, RLC, RRC, PDCP, GMM/SM, LAPDm, GSM Layer 3, MTAL and TCP/IP
- **log filters:** pass filters that limit the amount of information contained in the log. Extremely flexible user configurations based on individual field parameters of all layers. Filters can be combined using AND and OR operations.
- **view filters:** pass filters that limit the amount of information displayed, but do not affect the amount of information actually logged. Extremely flexible user configurations based on individual field parameters of all layers. Filters can be combined using AND and OR operations for each view used.

Triggers: user-configurable conditions that define when to start and stop logging. Triggers can be configured to pre-capture or post-capture a specific number of messages. Configurations can be saved and recalled for later use. Four types of trigger configurations are available:

- **event trigger:** start or stop logging when message dropped, message received or received message overflow event occurs
- **message match trigger:** start or stop logging when received message matches or does not match user-selected message or message parameter(s)
- **time trigger**: start logging on specific timestamp and day based on PC's real-time clock
- **trigger counts:** number of start trigger occurrences before log capture begins

Requirements for optimal performance

Hardware requirements: at least a Pentium® III 700 MHz PC with 128 Mbytes of memory, 500 Mbytes of free disk space and a TCP/IP LAN port

Supported operating systems: Windows 98®, Windows NT® 4.0 (with at least service pack four), Windows 2000®, Windows XP®

Connection requirements: 10 Mbit/sec 10 base T Ethernet (RJ-45 connector) using a crossover cable for direct connection to the PC or a standard cable through a switch or hub

W-CDMA Services

- radio bearer (RB) test mode (TC connection)
- AMR voice service
- UMTS/GPRS packet-switched data service
- CS data service

AMR voice

- establish a voice call using call processing
- **AMR radio access bearer:** 12.2 kbps
- **voice echo:** fixed one-second delay

Radio bearer test mode

- **channels:** 12.2, 64, and 384 kbps reference measurement channels (RMC)
- loopback type 1
- **settable DL DTCH data contents:** all zeros, all ones, PRBS-9, PRBS-15, incrementing count

64 kbps UMTS/GPRS packet-switched data service

- **Packet-switched (PS) transfer of IP data between a device under test and a network with full PDP context activation.**
- **test your device's IP data functionality:** WAP or web browsing, FTP throughput rates with local or remote servers, serial or USB modem functionality, e-mail and data downloads to PC via data port
- **GPRS radio access bearer:** 64 kbps UL and DL DPCH
- **ping**: test set ping of device under test or other device on a network or network ping of test set or device, with settable number of pings, timeout and packet size
- **data counters:** Tx and Rx counts of packets and bytes transferred

Circuit-switched data service

- **network connectivity:** IP traffic to UE using PPP
- **radio access bearer configuration:** UDI 64 kbps (UDI 1B)
- **PPP mode:** settable as asynchronous, synchronous with octet stuffing or synchronous with bit stuffing

W-CDMA Call Processing

- BS origination to W-CDMA from camp on W-CDMA cell for RB test mode, UMTS/GPRS packet data and AMR voice paging services
- BS release from W-CDMA call to W-CDMA cell
- location update
- GPRS attach and detach
- **hard handoffs:** intra-cell DL and UL UARFCNs, W-CDMA TC to GSM voice
- soft handoff
- inter-system handoff from W-CDMA to GSM

Soft handoff

second cell: CPICH, DPCH, P-CCPCH/SCH with settable power level, primary scrambling code, time offset and power control mode

UE measurement events: set and trigger six independent events with settable state, reporting range, hysteresis and 'W' value

UE analysis: perform loopback BER measurements during soft handoff

UE reports: event number, CPICH Ec/No, CPICH RSCP and pathloss for cells 1 and 2 and DTCH BLER

Inter-system handoff

W-CDMA to GSM system handoff: hand down from a W-CDMA TC connection to a GSM voice call

W-CDMA Signalling

resident format: W-CDMA FDD, R99, June 2001 release

CDMA modulation type: QPSK per 3GPP standard

Downlink signalling

DL frequency ranges:

- U.S. cellular band (869 to 894 MHz)
- GSM/E-GSM band (925 to 960 MHz)
- DCS1800/PCS band (1805 to 1880 MHz)
- U.S. PCS band (1930 to 1990 MHz)
- IMT-2000 band (2110 to 2170 MHz)

Cell parameters in active cell operating mode

- BCCH update page inhibit or automatically send
- settable MCC, MNC, LAC, RAC
- ATT (IMSI attach) flag set or not set
- repeat paging on or off
- primary CPICH Tx power of −10 to +50 dBm
- uplink interference of −110 to −70 dBm
- constant value of −35 to −10 dBm

Uplink signalling

UL frequency ranges:

- U.S. cellular band (824 to 849 MHz)
- GSM/E-GSM band (880 to 915 MHz)
- DCS1800/PCS band (1710 to 1785 MHz)
- U.S. PCS band (1850 to 1910 MHz)
- IMT-2000 band (1920 to 1980 MHz)

MS Tx power: settable and maintained by closed-loop power control

UL scrambling code: 0 to 38399

Radio Link and Cell Configuration

radio access bearers (channel types): 12.2 kbps AMR RAB, 12.2 kbps symmetrical RMC, 64 kbps symmetrical RMC, 384 kbps RMC, 64 kbps UL/DL PS RAB, 64 kbps UL/DL CS RAB

DL PICH contents: all indications set to 1 (page) or all indications set to 0 (no page)

DL PICH data in FDD test operating mode: all zeros, all ones

primary scrambling code: settable as 0 to 511 in 64 groups (secondary sync code pattern is linked to the scrambling code group and all channels use the same scrambling code)

SRB configurations in active cell operating mode: 2.2 kbps DCCH, 3.4 kbps DCCH, 13.6 kbps DCCH

BLER repetition intervals in active cell operating mode: 250, 500, 1000, 2000, 3000, 4000, 6000, 8000, 12000, 16000, 20000, 24000, 28000, 32000, 64000 msec

DL TFCI in FDD test operating mode: settable pattern

AWGN interference source: settable power level

OCNS interference source: composed of 16 channels per table C.6 in appendix C of 3GPP TS 25.101 or table E.3.6 in annex E of 3GPP TS 34.121

re-establish RLC in active cell operating mode: automatically decide or off

call limit state in active cell operating mode: on or off

call drop timer in active cell operating mode: on or off

CDMA channels

Channel	Default assgnmt	Alternate choices
CPICH	256, 0	
P-CCPCH	256, 1	
S-CCPCH	64, 7	6, 9, 16, 17, 26, 57
AICH	256, 10	6 to 9, 11
PICH	256, 16	14, 15, 17
DPCH, 12.2K RMC	128, 9	6, 10, 20, 29, 37, 45, 54, 60, 63, 70, 76, 87, 93, 112, 118
DPCH, 64K RMC	64, 6	10, 12, 14, 16, 18 20, 22, 24 to 27
DPCH, 3.4K SRB	256, 12	13, 20, 21, 40, 43, 58, 126, 127, 142, 153, 174, 235, 255
OCNS (test model 1)	Spreading factor of 128 at fixed OVSF codes of 2, 11, 17, 23, 31, 38, 47, 55, 62, 69, 78, 85, 94, 113, 119, 125	

Overhead channels

common pilot: fixed at OVSF 256, 0

primary sync: fixed to primary sync code

secondary sync: code pattern determined by cell primary scrambling code (one of 64 patterns to indicate long code set)

primary CCPCH: valid SIBs (1, 2, 3, 4, 7 and 11) and MIB in active cell operating mode, carries broadcast channel with valid SFN where broadcast channel data consists of 2^9-1 PRBS in FDD test operating mode

Security settings in active cell operating mode

- **security operations:** none, authentication and integrity, authentication only
- **authentication algorithm:** test 34.108, Rijndael
- settable authentication key, operator variant authentication algorithm, RAND and AMF values
- **operator variant parameter type:** OPc, OP
- user-initiated reset of authentication SQN

Security results in active cell operating mode

- authentication results of MM and GMM
- MS reported failure cause

SIB11 cell information list in active cell operating mode

- SIB11 cell information list absent or present
- intra-frequency second cell scrambling code of 0 to 511
- intra-frequency third cell scrambling code of 0 to 511
- inter-frequency first cell scrambling code of 0 to 511
- inter-frequency first cell UL channel
- inter-frequency first cell DL channel

Generator information reported

- current and desired levels of cell 1 power, AWGN power and total RF power
- current and desired levels of cell 2 power in active cell operating mode
- primary scrambling code in FDD test operating mode
- current and desired levels, spreading factor and channel code for cell 1 CPICH, P-CCPCH/SCH, PICH, DPCH and composite OCNS
- current and desired levels, spreading factor and channel code for cell 1 S-CCPCH and AICH in active cell operating mode
- current and desired levels, spreading factor and channel code for cell 2 CPICH, P-CCPCH/SCH, DPCH and composite OCNS in active cell operating mode

Uplink closed-loop power control parameters

- modes of active bits, alternating bits, all up bits, all down bits and 10 up/down bits for both cell 1 and cell 2
- algorithm 1 or 2 with settable step size in algorithm 1 in active cell operating mode
- user-initiated sending of step up or step down TPC bit pattern in active cell operating mode

Uplink parameter settings in active cell operating mode

- PRACH power step of 1 to 8 dB
- Settable upper and lower PRACH signature bit masks
- PRACH scrambling codeword of 0 to 15
- PRACH ß$_c$/ß$_d$ automatically set or manually set with ß$_c$ of 2 to 15 and ß$_d$ of 0 to 15
- UL timing offset of –256 to +256 chips
- PRACH preambles of 1 to 64
- PRACH rampling cycles of 1 to 32
- PRACH preamble step size
- 0 to 12 available subchannels
- UL dummy DCCH data on or off
- UL DPCH scrambling code of 0 to 38399
- UL DPCH ß$_c$/ß$_d$ automatically set or manually set with ß$_c$ of 2 to 15 and ß$_d$ of 0 to 15

Mobile station information reported in active cell operating mode

- IMSI
- IMEI
- power class
- Tx/Rx frequency separation
- GMM state
- initial PRACH open-loop Tx power
- PRACH preamble step size
- initial DPCCH open-loop Tx power
- CPICH Ec/No
- CPICH RSCP
- pathloss
- DTCH BLER
- Current service type
- Detected PRACH signature

Technical Specifications

Specifications apply to the following hardware and software.

- E5515B mainframes with Option 003
- E5515C mainframes with Option 003
- E5515T mainframes with Option 003
- E6703A W-CDMA lab applications with firmware revision A.02
- E6785A GSM/GPRS/W-CDMA lab applications with firmware revision A.02

For More Information

All technical specifications are included in the E1963A W-CDMA mobile test application data sheet on the web at:

www.agilent.com/find/e1963a

Ordering Information

For the most up-to-date ordering information, please visit the Agilent site at:

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(fax) (65) 6836 0252
Email:
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