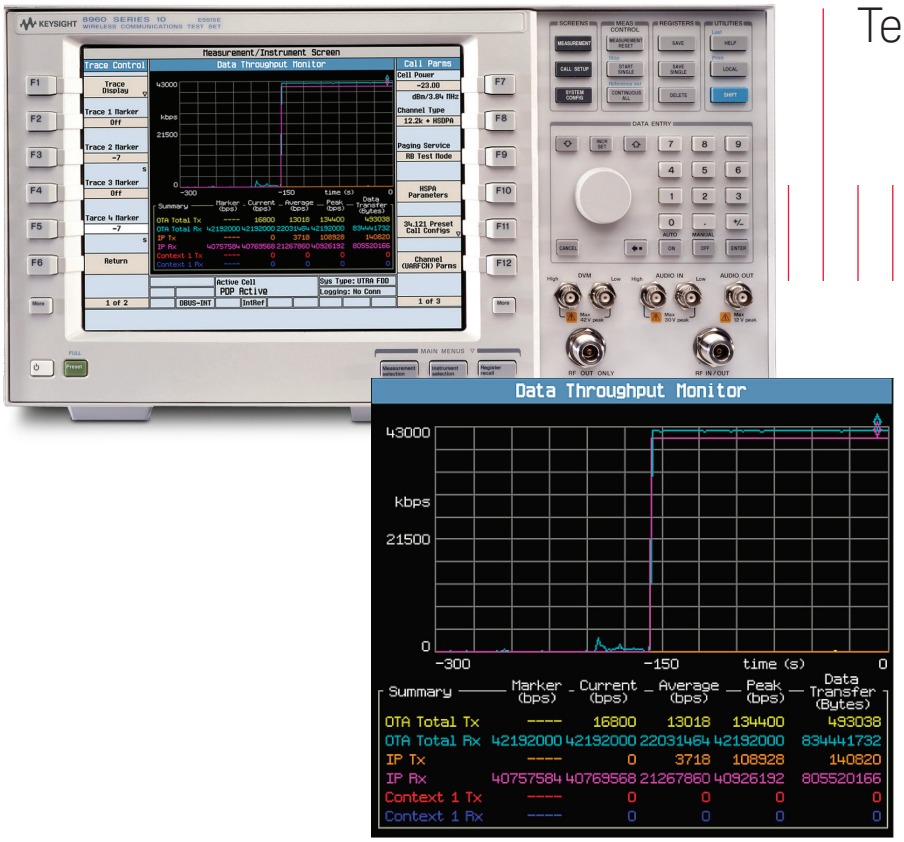
Keysight Technologies

E6703l W-CDMA/HSPA Lab Application

For the E5515C/E Wireless Communications Test Set



Technical Overview

KEYSIGHT TECHNOLOGIES

Introduction

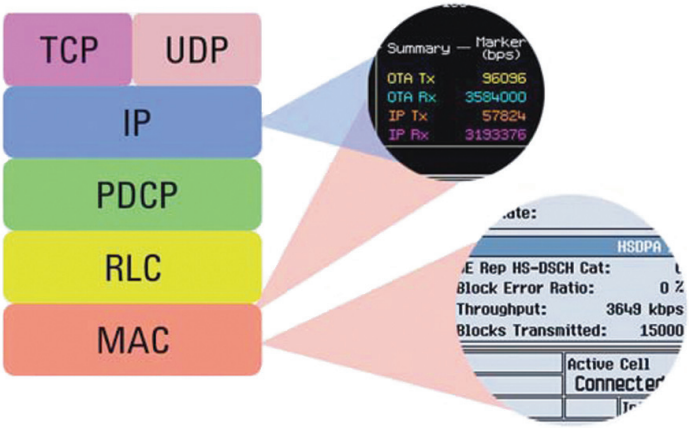
Combining the benefits of W-CDMA/HSPA network emulation with the global leadership of Keysight Technologies, Inc. in analysis technologies, the E5515C/E wireless communications test set and the E6703I lab application provide mobile development engineers with a single desktop instrument–helping you accelerate development and get better devices to market sooner.

Now with 42 Mbps HSDPA-MIMO, DB-DC-HSPDA, and DC-HSDPA

Develop, integrate, and validate devices

Data rates up to:

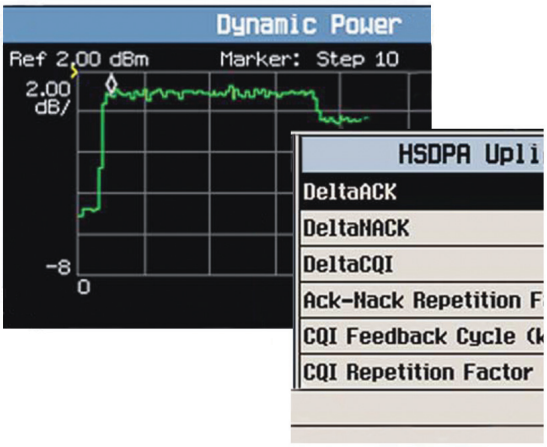
- 42 Mbps (HSDPA-MIMO with 64QAM)
- 42 Mbps (DB-DC-HSDPA)
- 42 Mbps (DC-HSDPA)
- 28 Mbps (HSDPA-MIMO with 16QAM)
- 21 Mbps (HSPA+)
- 14.4 Mbps (HSDPA)
- 11.5 Mbps (HSUPA)



With the Keysight E6703I W-CDMA/HSPA lab application, developers have the only instrument available that provides a systematic approach to root-cause analysis of high throughput issues in the mobile protocol stack; from MAC to IP.

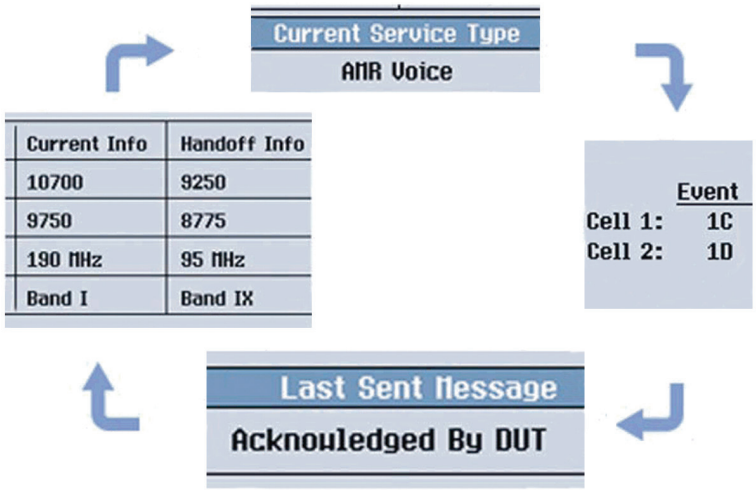
Get to RF conformance faster

The E6703I is the only solution available providing both signaling variables and measurements for testing 3GPP TS34.121 Sections 5, 6, 7, and 9. Others can emulate HSPA, but only the Keysight solution drives the mobile into the correct state for the latest HSPA testing required by 3GPP.



Quickly test any design change

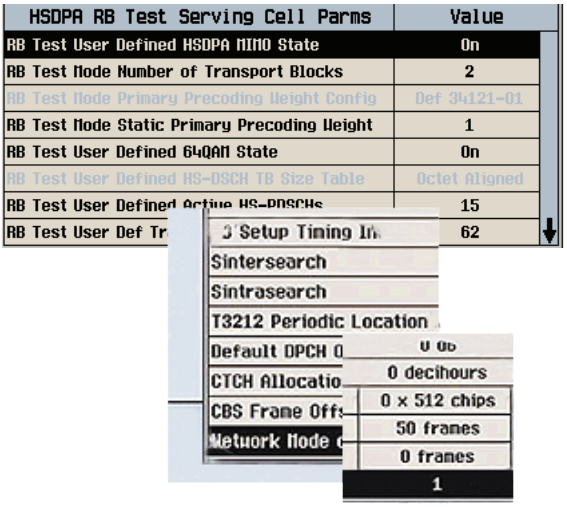
With support for voice, video, short message service (SMS), multi-media messaging service (MMS), cell broadcast SMS (CBSMS), circuit-switched data, and packet data call connections, design changes in anything from RF to TCP can be quickly validated with a complete regression test of mobile functions right at your desk.



Helping You Get Your Job Done Faster

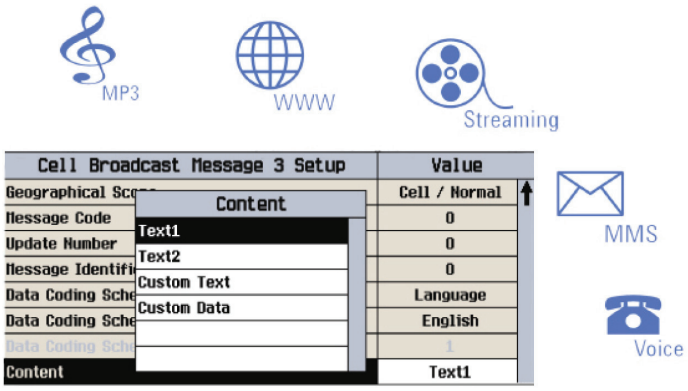
Fast and flexible signaling—with you in control of network operations

Our network emulation is designed to make connecting calls fast and simple—and give you choices. We have pulled some of the most commonly requested parameters up from the protocol stack, providing many different connection scenarios without requiring you to fully understand the 3GPP stack and a complex scripting language. The E6703I delivers the control you need to get your job done faster.



The world's wireless applications brought right to your fingertips

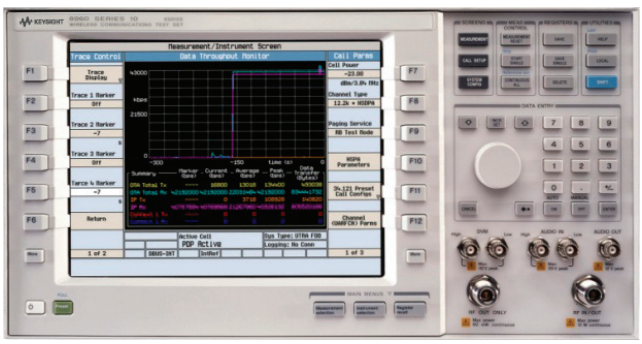
Keysight lab applications bring testing and tuning end-user applications right to your desk—without limiting how far your device may search when looking for real content. With our industry-leading SMS/MMS/cell broadcast messaging capabilities, live end-to-end video conferencing, and blazing fast packet connections to the Internet over RF, you have the capability to test most mobile applications fully without leaving your office.



Developing more than just W-CDMA/HSPA devices? Just hook it up and go!

If your development needs go beyond W-CDMA/HSPA, with additional firmware that same box on your desk can connect calls from GSM to EDGE Evolution and everything in between. Keysight leads the industry in support of 2G, 3G, and 3.5G solutions for cdma2000®, 1xEV-DO, TD-HSUPA, HSDPA-MIMO, DB-DC-HSDPA, and DC-HSDPA. Contact your Keysight sales engineer to learn how the E5515C/E test set gives you the flexibility to adapt quickly to emerging standards and technologies.

- DB-DC-HSDPA
- HSDPA-MIMO
- DC-HSDPA
- HSPA+
- HSUPA
- HSDPA
- W-CDMA
- TD-HSUPA
- TD-HSDPA
- TD-SCDMA
- 1xEV-DO
- cdma2000
- IS-95
- EDGE Evolution
- EGPRS
- GPRS
- GSM



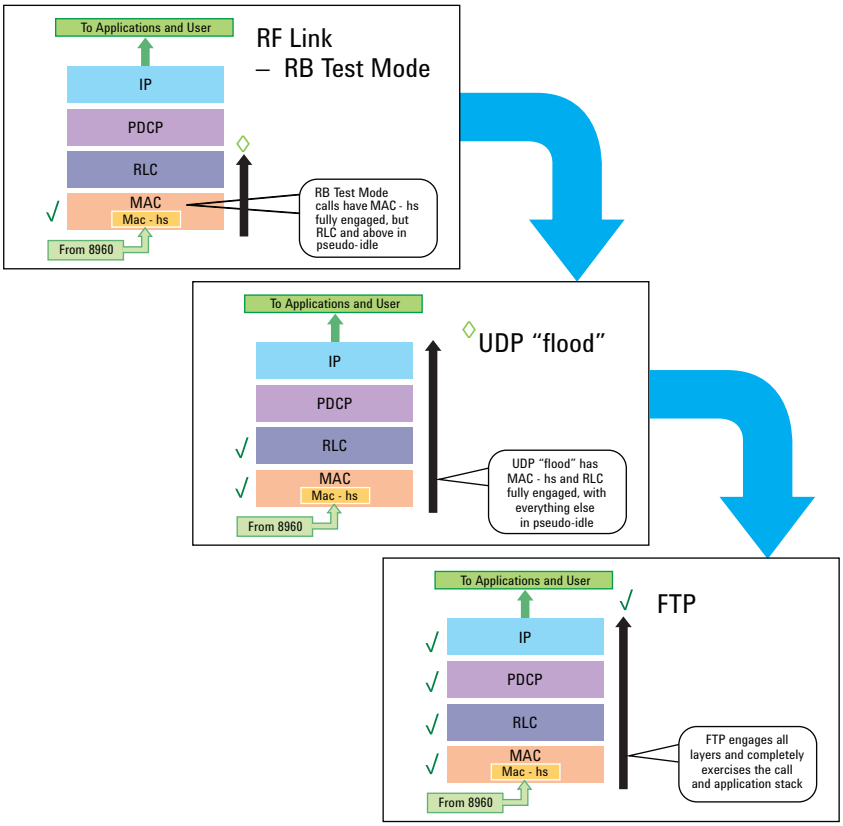
Find Design Issues Earlier, Resolve Them Faster

Functional test analysis

Reduce development and verification cycle time by systematically engaging mobile device layers "up the stack" to find design problems early—before they are found by your customers.

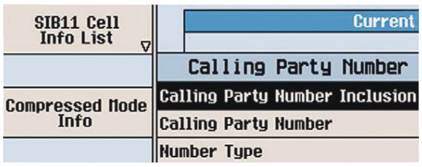
Validate a phone's data throughput capability while using SMS, MMS, data transfer, video, or other 3G services, all in the presence of realistic network impairments.

Drive down defect resolution cost by finding complex hardware, protocol, and application related issues that are specific to how the phone will function on the network, early in the design cycle. All this for a price that is significantly less than traditional script-based test equipment.



Base station emulation

From basic network settings like country code and cell ID, lab application variables for network emulation extend into such things as network operating mode, TMSI assignment, authentication, neighbor list management, and PDP context rejection; giving you the flexibility you need.

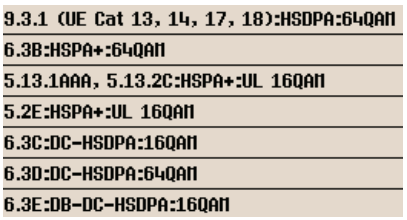


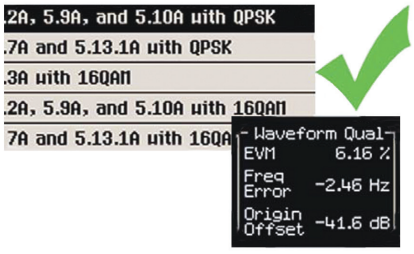
The pulse of mobile/network interactions

Wireless Protocol Advisor software gives you all messages for the mobile and network from MAC layer all the way to IP. And, with triggering and filtering functionality, you can set up troublesome scenarios that fail intermittently on Friday and come back Monday morning with a bounded and focused protocol log of exactly what happened surrounding the particular issue. The latest protocol logging for DC-HSDPA and HSDPA-MIMO can help you find and resolve problems early in the design life cycle.

RF conformance—mandatory in GCF

Today, with the availability of more competitive mobile devices, network operators are becoming very selective, and demanding validation. With the largest and most compliant set of RF measurements available among one-box-testers, the E5515C/E can get you into validation sooner.
http://rfmw.em.keysight.com/rfcomms/refdocs/wcdma/wcdma_meas_navigation.html





E6703 Family of Lab Applications

E6703I is our latest application release for the industry leading call box and the right choice for R&D engineers needing world class functionality in a single instrument. The E6703I added several capabilities including:

- HSDPA-MIMO test modes and IP data support both for 28 Mbps with 16QAM, and 42 Mbps with 64QAM downlink
- DB-DC-HSDPA test modes and IP data support for 42 Mbps downlink
- Baseband fading for DC-HSDPA and HSDPA MIMO with PXB
- LTE/3G interRAT handover such as, 3G redirect to LTE, and SMS over SGs
- Enhanced CPC to work simultaneously with MAC-ehs

E6703I with E6720A-003 is our emerging high-performance application. The Annual Contract is designed for engineers who need early access to leading-edge functionality such as CELL_PCH and URA_PCH transitions.

Technical Specifications

These specifications apply to an E5515C/E mainframe with Option 003 installed when used with the latest shipping version of the E6703I lab application.

The above application also includes functionality described within the latest shipping version of E1963A W-CDMA test application with firmware. Please refer to the E1963A data sheet for details and specifications for all functionality covered within the E1963A at: http://literature.cdn.keysight.com/litweb/pdf/5990-5637EN.pdf

Specifications describe the test set's warranted performance and are valid for the unit's operation within the statedenvironmental ranges unless otherwise noted.

Supplemental characteristics are intended to provide typical, but non-warranted, performance parameters that may be useful in applying the instrument. These characteristics are shown in italics and labeled as "typical" or "supplemental." All units shipped form the factory meet these typical numbers at +25 °C ambient temperature without including measurement uncertainty.

Technical Specifications (continued)

W-CDMA RF analyzer (measurements only)	
Change of TFC	
Measurement method	The measured results include the step-down and step-up relative power, along with the step-down and step-up error, for all symmetric reference measurement channels supported
Input center frequency ranges	800 to 1000 MHz 1700 to 1990 MHz
Input power level range	–61 to +28 dBm
Change of TFC relative measurement accuracy	< +3.0 dB for power range < 26 dB
Measurement interval	617 µs (= 1 timeslot (667 µs) – 25 µs transient periods at either side of the nominal timeslot boundaries)
Measurement triggers	Protocol and external
Temperature range	+2 to +55 °C
Concurrency capabilities	Change of TFC measurements cannot be made concurrently with other measurements
Out of sync handling of output power	
Measurement method	The E6703I provides signaling and parameter configuration for this measurement, but requires use of an external analyzer to perform the required measurement
Input center frequency ranges	800 to 1000 MHz 1700 to 1990 MHz
Input power level range	–61 to +28 dBm
Temperature range	+20 to +55 °C
Concurrency capabilities	Out of sync handling of output power measurements cannot be made concurrently with other measurements
PRACH preamble analysis measurement	
Measurement method	The measured results include the same results as IQ tuning (excluding PCDE) done on UE PRACH preambles; relative power versus chip is also included
Measurement chip rate	3.84 Mcps
Frequency range	800 to 1000 MHz 1700 to 1990 MHz
Input level range	–25 to +28 dBm
EVM measurement range	Up to 35% EVM
EVM measurement accuracy	2.3% residual EVM +0.5% algorithm EVM error valid within +10 °C of the temperature at which the previous “Calibrate Measurements” was executed
Frequency error measurement range	+1 kHz
Frequency error measurement accuracy	+5 Hz
Timing error measurement range	+25 µs
Timing error measurement accuracy	+130 ns (0.5 chips)
Measurement interval	All results except relative power (user-selectable to one of two) – 1067 µs (= PRACH preamble burst = (4096 chips) – 1017 µs (= PRACH preamble burst – 25 µs transient periods at beginning and end of bursts = 3904 chips)
Relative power (not user-settable)	1067 µs (= PRACH preamble burst = 4096 chips)
Trigger mode	Auto, protocol, external, RF rise
RF rise trigger	Nominal trigger range = expected power setting +9 dB
Temperature range	+20 to +55 °C

Technical Specifications (continued)

Reporting of CQI measurement	
Measurement description	The channel quality indicator (CQI) value is a measurement report sent to the network by the UE indicating that for the data block just received, if the downlink channel had been formatted as indicated by the reported or lower CQI value, the HSDPA block error ratio for the channel would not have exceeded 10%.
The reporting of channel quality indicator test has two parts, which are run in sequential order	Part 1: Measure CQI variance Part 2: Measure HSDPA BLER vs. CQI sense
Measurement results	Graphical and numeric results are provided for cumulative frequency distributions
Part 1 numeric results provided	Downlink TF CQI CQI reports Median CQI CQI in range (%) Pass/Fail
Part 2 numeric results provided	Downlink TF CQI Median CQI statDTXs Filtered ACKs Filtered NACKs Filtered ACKs + NACKs Filtered BLER (%) The existing HBLER measurement is used in the reporting of CQI measurement. See the E1963A data sheet for more details
Measurement interval	Defined in 3GPP TS 34.121
Trigger mode	HS-DPCCH
Temperature range	+20 to +55 °C
Concurrency capabilities	Reporting of CQI measurements cannot be made concurrently with other measurements

Option 004 digital bus	
Functionality	Allows baseband, digital IQ data from the signal generator to be sent to an external N5106A PXB baseband generator and channel emulator for fading and then returned to the test set for modulation
Connector	Rear panel, 50 pin high density
Signal generator ALC mode	Closed or open (default of closed); open loop mode must be used during fading to maintain the desired signal characteristics
ALC open loop calibration	Calibrates the RF source when operating in the ALC open loop mode; the accuracy remains valid with a +5 °C window of the temperature at which the calibration was performed
ALC open loop RF in/out composite absolute output level accuracy degradation (must add this to the main level accuracy specification for temperatures within +5 °C of the last ALC open loop calibration)	< +0.75 dB, –109 to –70 dBm/1.23 MHz, < +0.50 dB, –70 to –35 dBm/1.23 MHz, < +0.75 dB, –35to –13dBm/1.23 MHz
ALC open loop RF out only composite absolute output level accuracy degradation (must add this to the main level accuracy specification):	< +0.75 dB, –109 to –70 dBm/1.23 MHz, < +0.50 dB, –70 to –35 dBm/1.23 MHz, < +0.75 dB, –35to –13dBm/1.23 MHz
ALC open loop carrier feedthrough:	Typically < –40 dBc, (nominal ambient < –47 dBc after IQ calibration)

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