Agilent
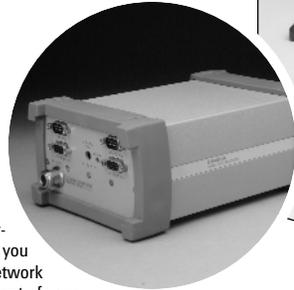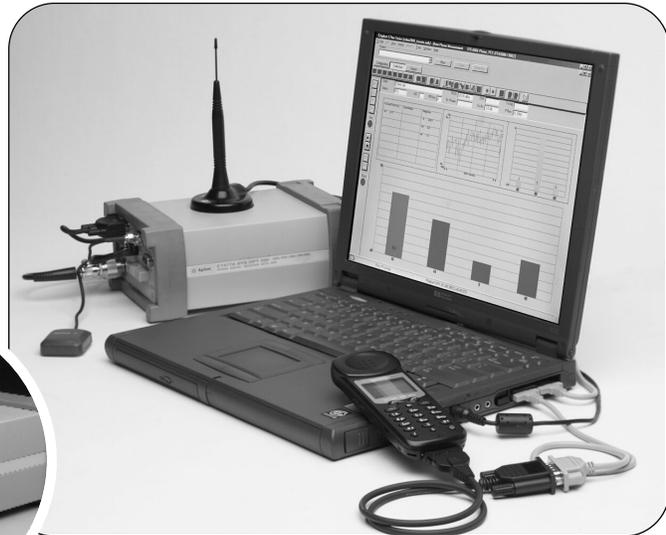
E7477A cdma2000 Drive-Test System

Product Overview

The E7477A cdma2000 receiver- and phone-based system helps you to quickly locate and resolve network problems to speed the deployment of your cdma2000 networks.

The digital receiver provides network independent measurements for characterizing the performance of your cdma2000 networks while the phone provides network performance measurements to determine why problems occur.

The Agilent E7477A cdma2000 Drive-Test System enables wireless service providers and network equipment manufacturers to deploy their cdma2000 networks faster and to optimize network performance while minimizing the time and effort required to do so. The E7477A cdma2000 receiver and phone-based drive test solution provides key contributions for allowing you to be the first to market with your 3G solutions. These contributions include the following:

• Provides a receiver-based solution, independent of the network, to aid in finding network problems quickly.

• Provides phone based solution to determine drop calls, block calls, and locations of high FER.

• Provides a combo based solution allowing comparisons of network independence measurements with network dependent measurements to determine situations like missing neighbors.

• Supports the following frequency bands: 850MHz, 1.8GHz, and 1.9GHz and 2.1GHz using 1XRTT/SR1.

• Provides a portable and rugged receiver for easy network deployment, including the ability to perform drive test functionality in pedestrian settings as found in large metropolitan areas, where traditional drive testing is not feasible.

• Utilizes a scalable drive test platform architecture that allows the addition of up to four digital receivers, supports expansion to support up to four 3G cdma2000 phones and provides evolving platform solutions as the network matures. Using the scalable and evolving drive test platform protects your initial drive test investment.

• Provides automatic software alarm capability to aid in detecting network problems as they occur.

• Provides a cross technology capability that allows current second generation providers (IS-95 & GSM) to migrate to third generation technologies without having to purchase entirely new optimization tools. Purchasing Agilent's drive test solutions protects your initial investment.

Agilent Technologies

Perform Pilot Channel Measurements

- Top N measurement display returns the "N" strongest pilots measured by the receiver. The display can be user configured to display either of the following measurements.

    - Ec
    - Ec/Io
    - Aggregate Ec
    - Absolute delay
    - Aggregate Ec/Io
    - Delay Spread (in Chips)
   - Aggregate-Peak (dB units)

- All Pilots Measurements display shows the amplitude of all the pilots measured by the receiver.
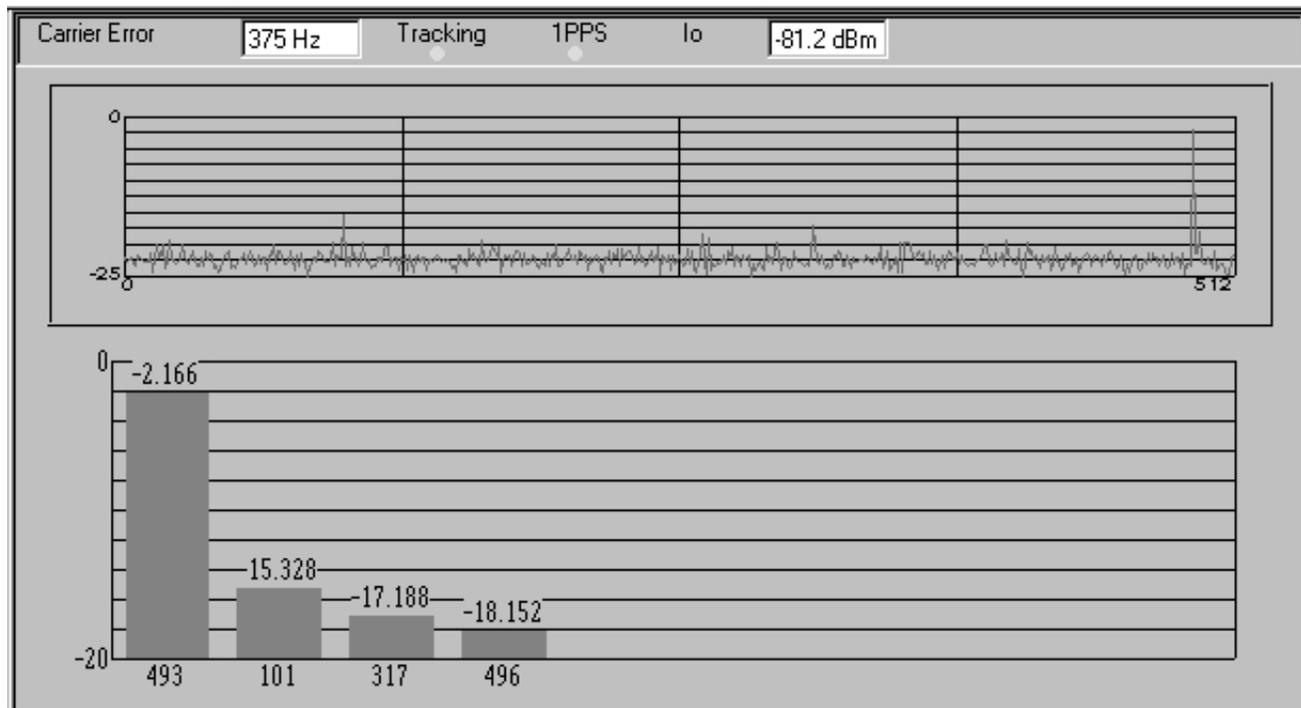
Agilent E7477A cdma2000 All Pilots and TopN Pilot Display

Interference Management and Troubleshooting

The Agilent E7477A cdma2000 receiver-based drive test solution provides a built-in spectrum analyzer capability to help optimization engineers troubleshoot problems in the frequency domain. The advantage of using the built-in spectrum analyzer is that a separate spectrum analyzer is not required. Having a dedicated spectrum analyzer would add additional weight and expense to the drive test solution. The digital receiver, an integral part of the cdma2000 drive test solution, is a compact, DSP-based receiver that is capable of making a core set of spectrum analyzer measurements in addition to making cdma2000 measurements. Both the uplink and downlink frequency bands can be measured.
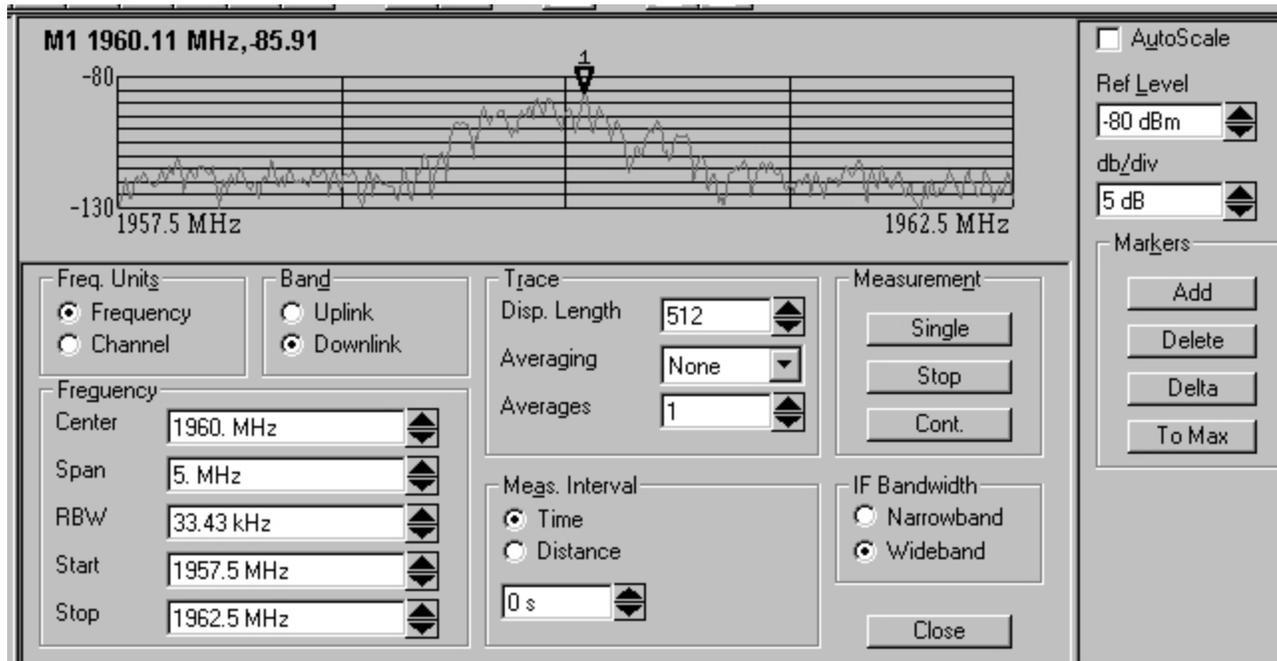
Agilent E7477A cdma2000 Spectrum Analysis Display – Perform interference management and troubleshooting.

Cell Site Selection and Evaluation

Channel Power Measurements

The Agilent E7477A cdma2000 receiver-based drive test solution also provides Channel Power measurements. Channel power is defined as the integrated power within a defined bandwidth. The E7477A drive-test system provides two channel power measurement types: Channel Power List and Channel Power Trace. The Channel Power List allows you to enter a list of channels to be measured. Conversely, the Channel Power Trace measures the channels occupying the frequency range defined by the user.

CW Power Measurements

The Agilent E7477A cdma2000 receiver-based drive test solution provides CW power measurements. The ability to perform CW measurements in the early life cycle of a network is essential when evaluating prospective cell site locations. Performing CW measurements validates that the cell site location will provide adequate RF coverage. The advantages of having Agilent's digital receiver with CW measurement functionality are as follows:

• Reduces the costs of dedicated test equipment (i.e. a separate receiver), since the Agilent receiver can be used for both cdma2000 drive testing and site evaluation/selection activities.

• Allows for CW measurements to be performed as a function of location.

• Measures both uplink and downlink frequencies can be measured.
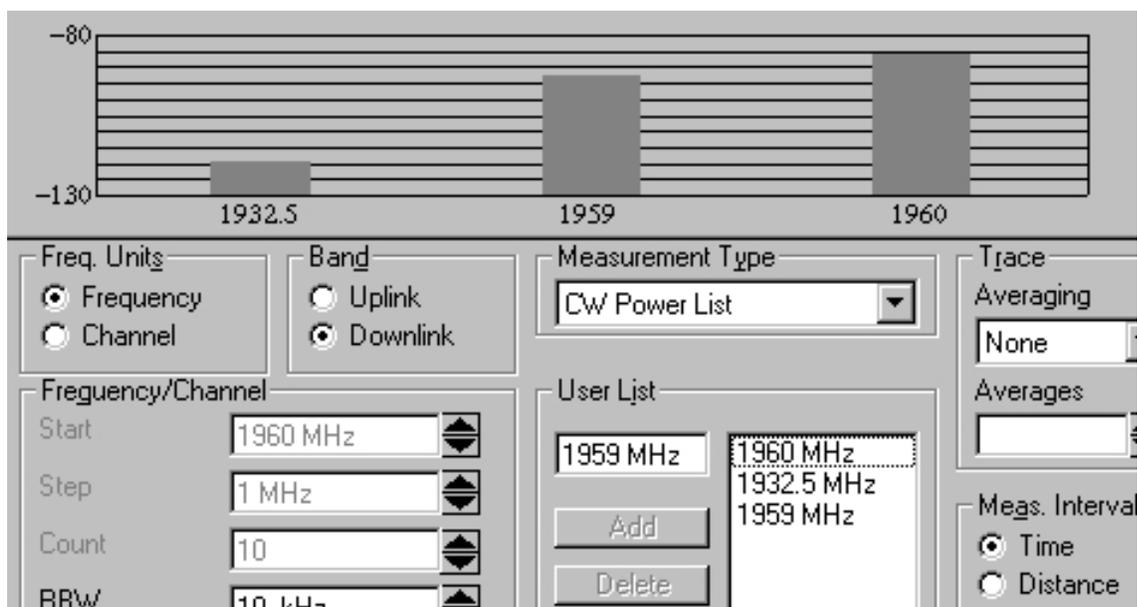
Agilent E7477A cdma2000 CW Power Measurement Display

Perform Phone Measurements

The E7477A system extracts measurement data from the mobile handset. Specific measurements can be extracted by the use of check boxes. Some of the measurement types include:

- State (i.e. CDMA idle, CDMA mobile station initialization, CDMA conversation, etc.)

- RSSI (mobile received power)

- Mobile transmit power

- FER (frame erasure rate)

- Ec/Io (Aggregate or Dominant)

- Transmit gain adjust

- Protocol revision (IS-95A, JSTD8, IS-95B, cdma2000)

- PN list

- Pilot data - active, candidate, and neighbor pilots

- Receive/transmit history

- TA fingers
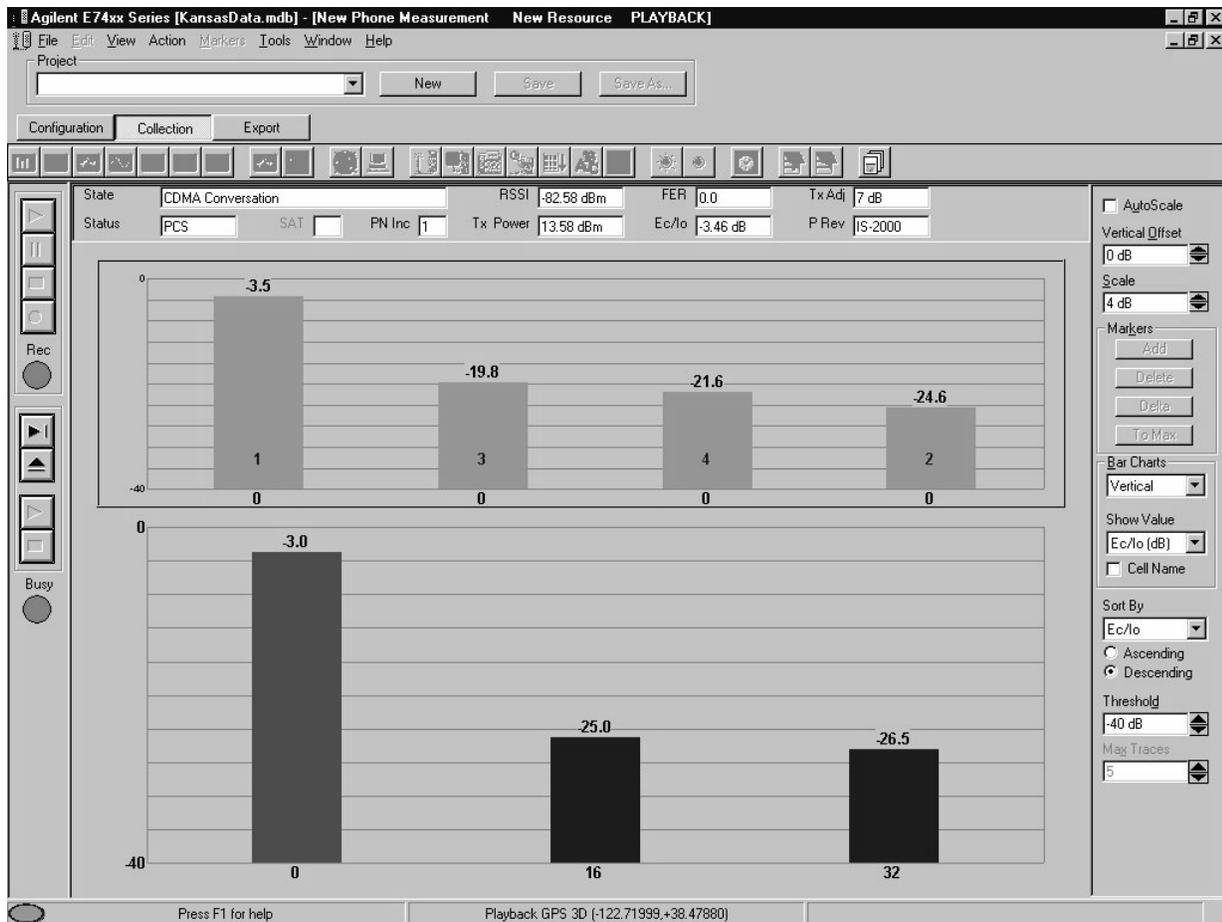
Agilent E7477A cdma2000 phone measurement display

Layer 3 Messaging

The E7477A system extracts and decodes over-the-air messaging from the handset. The user can select any or all of the message types listed below to extract and decode.

• Access

• Paging

• Sync

• Forward traffic

• Reverse traffic

All of the above message types would include any cdma2000 messages that may be transmitted to or from the mobile handset.
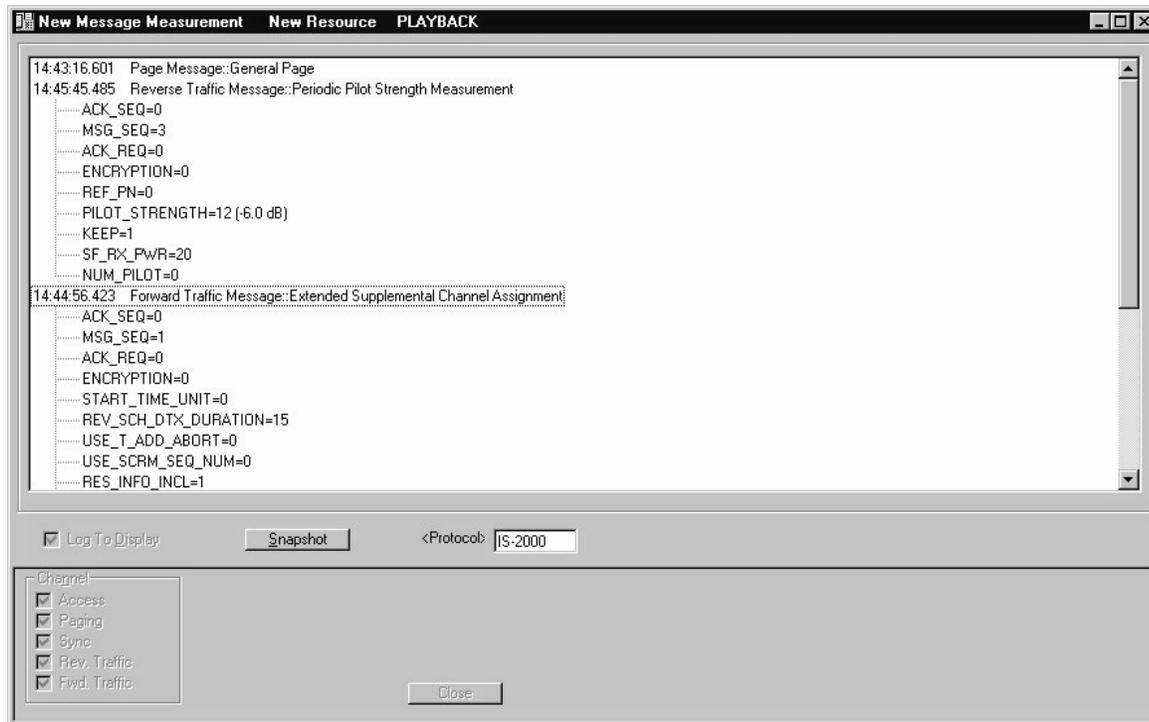

Agilent E7477A messaging display

Call Control

The E7477A provides automated control of up to four handsets. The user can program the handset to complete a sequence of calls, a continuous long call, or to accept incoming calls (terminations). Some of the call control abilities are:

- Call initiation mode (sequence, single, termination)
- Call mode preference (no analog)
- Call initiation control (start, pause, stop)
- Automatic redial (on a drop, on a block, redial interval, redial attempts)
- Phone number to call
- Call option (voice 13kbps, Markov RS1 or RS2, Loopback, EVRC, and TDSO)
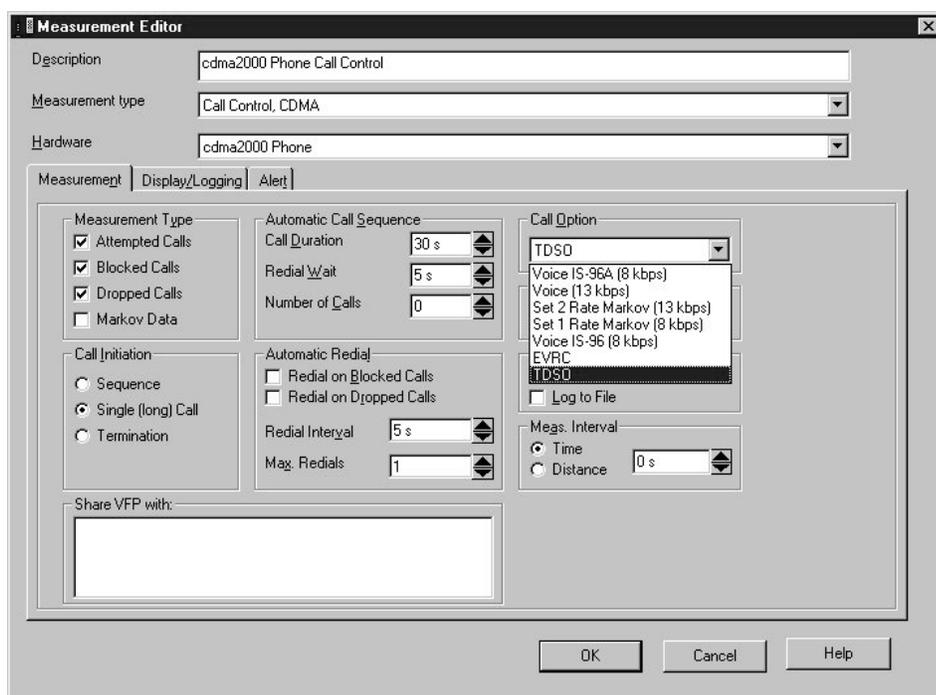
Agilent E7477A control measurement editor

In addition to the control function, the phone control display the information below in a tabular format:

- Channel
- Access time counter
- Redial time counter
- Calls remaining counter
- Total attempts
- Total drops
- Total blocks
- Drop call rate
- Block call rate

Agilent E7477A call control

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Mobile Debug

The E7477A provides mobile debugging messages from the phone handset. These messages are from the mobile software and are useful to phone manufactures and infrastructure providers to understand the internal messaging on the phone.

Time	Severity L...	Message	File Name	Line Num...	Total Mess...	Total Dropp...
16:59:09....	3 (Error)	Tx cmd w/out interrupt asserted	vocm2.c	3845	10763	8667
16:59:09....	2 (High)	Key pressed = 49	uin.c	2894	10763	8667
16:59:10....	3 (Error)	Tx cmd w/out interrupt asserted	vocm2.c	3845	10763	8678
16:59:12....	3 (Error)	Tx cmd w/out interrupt asserted	vocm2.c	3845	10763	8691
16:59:15....	3 (Error)	Tx cmd w/out interrupt asserted	vocm2.c	3845	10763	8700
16:59:16....	3 (Error)	Tx cmd w/out interrupt asserted	vocm2.c	3845	10763	8700
16:59:18....	2 (High)	Key pressed = 49	uin.c	2894	10763	8700
16:59:18....	1 (Medium)	send_burst dtmf 49 0 0	mcctcsup.c	1440	10763	8700
16:59:18....	2 (High)	UI Sleep disable	uin.c	3660	10763	8700
16:59:18....	2 (High)	UI Sleep enable	uin.c	3657	10763	8700
16:59:19....	1 (Medium)	Rxed BS ACK Order	mcctc.c	1542	10763	8700
16:59:19....	3 (Error)	Tx cmd w/out interrupt asserted	vocm2.c	3845	10763	8700
16:59:29....	2 (High)	Add Cset PN=285 eng=7501	srchtc.c	3273	10763	8700
16:59:29....	2 (High)	Jockey pC PN=285 over Aset PN=84	srchtc.c	3300	10763	8700
16:59:29....	1 (Medium)	Rx=-88 dBm, Ref eng,max=0xd79,0x7...	srchtc.c	950	10763	8700

Low   Medium   High   Error   Fatal   Snapshot

Measurement Type
☑ Mobile Messages
Minimum Severity Level

Close

Agilent E7477A mobile debug measurement display

Data Test Functionality

The wireless data measurement capability utilizes the drive test platform and is based on a mobile client(s) and fixed server(s) architecture with user selectable data application sequencing. Test results are collected and displayed on the mobile client(s).

Typical data measurement results provided include:
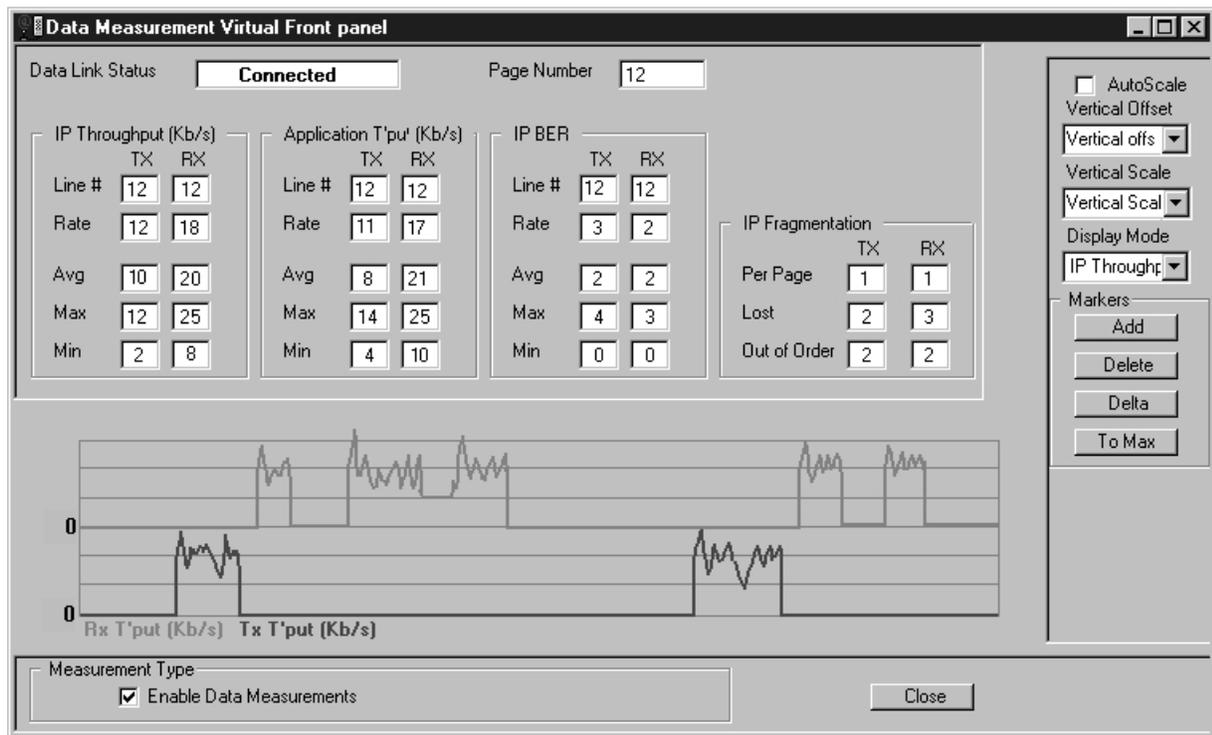
Data integrity; accuracy of data transmitted

Bit error ratio, line error, packet errors

Data throughput, speed of data transfer in both directions

Max, min, and average throughput at link and application layers

Network accessibility

Server connectivity, including Ping and Tracert utilities

Measure Key Data Parameters

Solve Network Problems Quickly

Using the measurements provided by Agilent's E7477A cdma2000 receiver and phone based Drive Test System, the question becomes what problems can be found quickly using the solution. The following sections give only a sample of the many types of problems that can be found and resolved quickly with Agilent's receiver and phone-based cdma2000 drive test solution.


Solve network problems with Agilent's drive test solutions.

Poor RF Coverage

The primary goal of the Agilent E7477A cdma2000 drive test solution is to help you eliminate as many network performance problems as quickly as possible. One of the key problems in the early stages of a network lifecycle is poor RF coverage. Poor RF coverage means that the signal strength is not adequate to provide and/or sustain a cdma2000 call. The Agilent cdma2000 digital receivers provide the necessary RF coverage component within the E7477A drive-test system. The receivers provide accurate and effective measurements about the RF environment. All of the receiver-based measurements are made independent of the network. The Agilent E7477A cdma2000 receiver-based drive test solution provides key diagnostic information necessary to quickly identify network problems. In addition to troubleshooting poor RF coverage problems, the receiver-based solution also provides quick resolution to pilot pollution related problems, where too many pilots, each with significant power, are present. Both conditions: poor RF coverage and pilot pollution lead to problems such as dropped calls. The Top N measurement display is very useful for troubleshooting these types of problems.

Characterizing Multipath Problems

The Agilent cdma2000 receiver-based solution can help characterize multipath content of the signals measured. Multipath includes the multiple components of the same transmitted signal that has numerous propagation paths due to reflections from hills, buildings, and other types of structures and terrain. To help characterize multipath conditions, the Agilent E7477A system provides the following pilot channel measurements: peak power, aggregate peak power, delay spread, and aggregate – peak delta measurements.
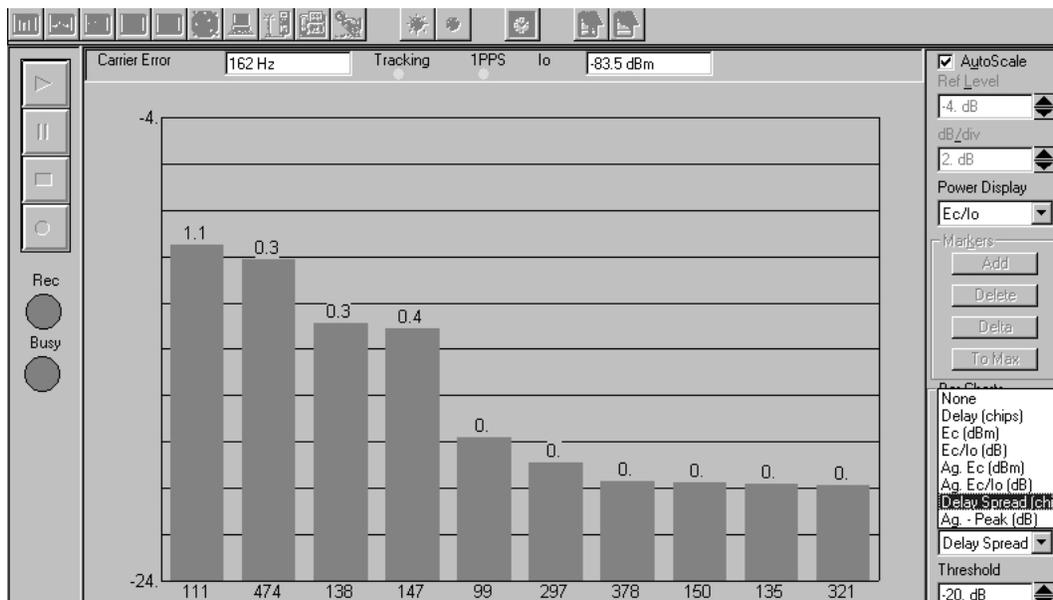

Characterize multipath problems quickly and efficiently.

Island Cell Conditions

The Agilent E7477A receiver-based solution provides the Top N display to aid you in troubleshooting base station timing conditions, especially when a network is being turned-up. These conditions are present when a base station is experiencing excessive timing errors. When these timing conditions occur, the network reliability is greatly compromised, usually resulting in dropped calls.

The Agilent E7477A receiver-based solution is extremely valuable in diagnosing timing error conditions since the receiver can perform measurements to verify the chip offsets of each of the sectors within a base station. The receiver-based Absolute Timing Delay Measurement can alert the user of drifting timing conditions within a base station, since the chip offsets are displayed and can also be used to estimate the distance from the vehicle used for drive testing to the base station being measured.
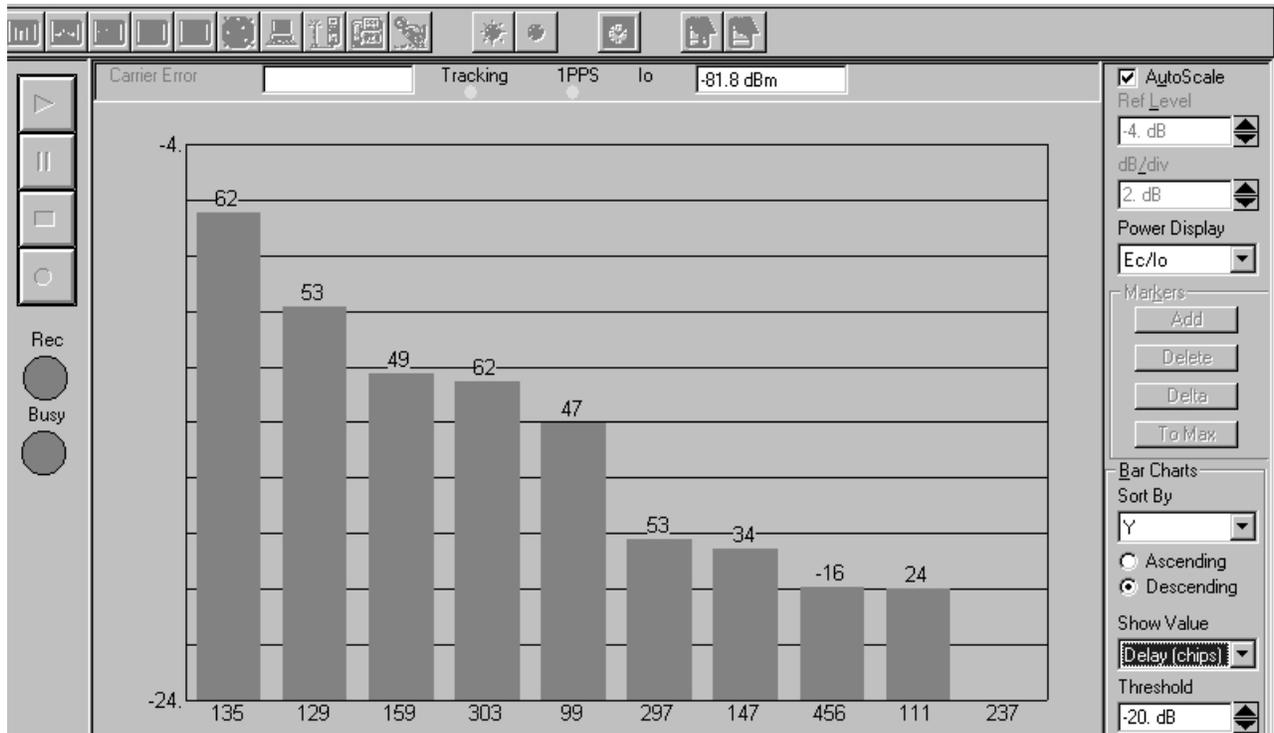
Use the timing delay measurement to troubleshoot island cell conditions

Missing Neighbors

The Agilent cdma2000 receiver and phone based solution can help determine missing neighbor conditions by comparing the strongest pilots from the receiver with the pilots in the active, candidate, and neighbor set of the phone. If the network independent receiver measures a pilot that is not in the active, candidate, or neighbor set, then a missing neighbor alarm is displayed and recorded.
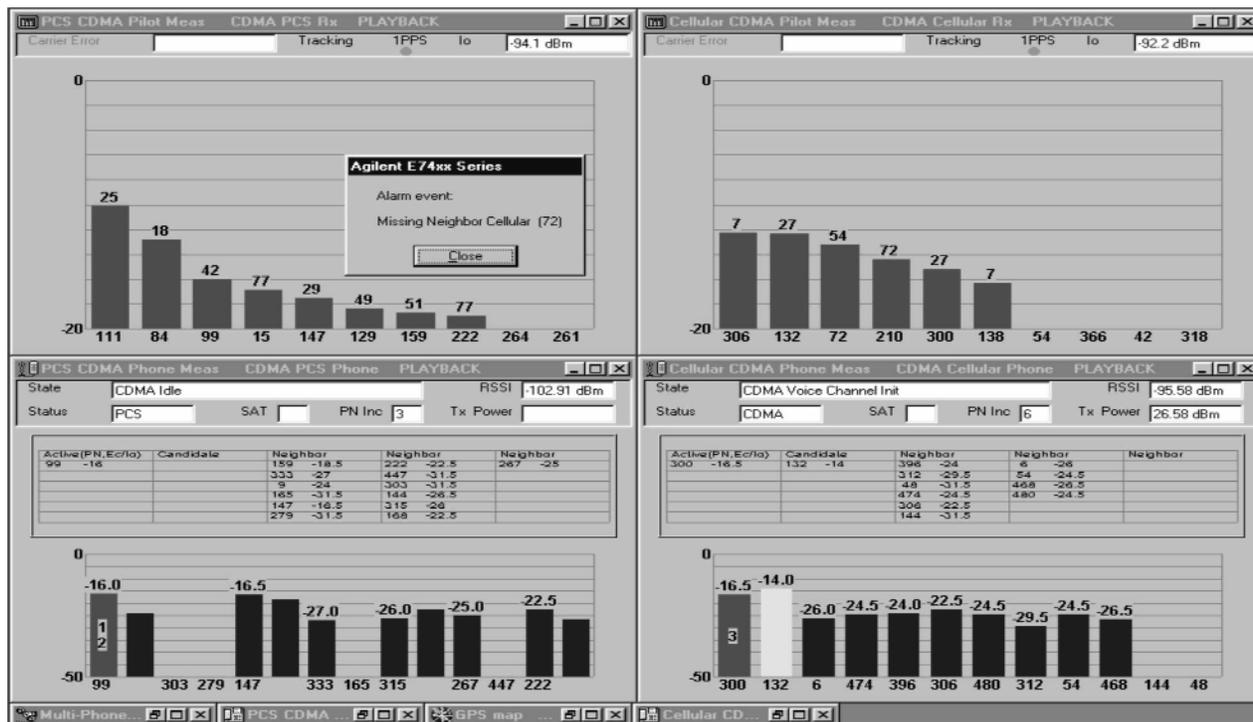
Determine missing neighbors with a combination receiver and phone system.

Perform Drive Test Functionality in Pedestrian Settings

Now you can utilize the same system that you use for outdoor testing to characterize your in-building and high pedestrian traffic areas. In addition, it is the perfect solution for troubleshooting network problems in large metropolitan areas, where traditional drive testing is not feasible. The indoor measurement system features a pen-based tablet computer and provides an ergonomically correct backpack with capacity to carry two digital receivers, two antennas, a Universal Serial Bus (USB), phones, batteries and all the associated cabling. A pen-tablet suspension system is provided to allow hands-free use of the computer.

A pouch on the side of the backpack allows two phones to be carried with the system. Alternatively, for phone based measurements only, the pen-tablet computer and phones can be used without the backpack and receiver configuration.

Characterize your wireless network in pedestrian settings.

Safely Perform Drive Testing using the Vehicle-Mounted Display System

Safely drive test your cdma2000 networks with the vehicle-mounted display system. The system consists of a bright display, rugged, and adjustable pedestal mounting, and a custom keypad. The permanently mounted display system puts key RF parameters in clear view, allowing you to troubleshoot network impairments without taking your eyes off the road. The custom keypad allows you to perform essential drive test functions such as start recording, stop recording, and generating reports with a single key press. Availability subject to local restrictions.

Safely troubleshoot network problems without taking your eyes off the road.

Additional Agilent Literature

Configuration guides

E7473A CDMA Drive-Test System Configuration Guide 5968-5553E

E7474A TDMA Drive-Test System Configuration Guide 5968-5861E

E7475A GSM Drive-Test System Configuration Guide........................5968-5563E

E7490A CDMA Over-Air Maintenance Tool Configuration Guide 5968-8696E

E6481A OPAS32 Engineering Information Management
and Analysis Software 5988-1589EN

Technical specifications

E7473A CDMA Drive-Test System Technical Specifications 5968-5555E

E7474A TDMA Drive-Test System Technical Specifications 5968-5556E

E7475A GSM Drive-Test System Technical Specifications..................5968-5564E

E7490A CDMA Over-Air Maintenance Tool
Technical Specifications 5968-8687E

Product overviews

E7475A GSM Drive-Test System 5980-0439E

E6481A OPAS32 Engineering Information and Analysis Software 5988-0247EN
Indoor Wireless Measurement System 5968-8691E

Application/product notes

CDMA Drive-Test..5968-5554E

Spectrum And Power Measurements Using The Agilent CDMA,
TDMA, And GSM Drive-Test System 5968-8598E

Optimizing Your CDMA Wireless Network Today And Tomorrow
Using Drive-Test Solutions 5968-9916E

Optimizing Your TDMA Network Today And Tomorrow
Using Drive-Testing To Identify Interference In IS-136 TDMA
Wireless Networks..5980-0219E

Optimizing Your GSM Network Today And Tomorrow
Using Drive-Testing To Troubleshoot Coverage, Interference,
Handover Margin, And Neighbor Lists 5980-0218E

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