Agilent E7476A W-CDMA (UMTS) Drive Test System with the E6455C IMT2000 Digital Receiver

Product Overview

Figure 1. E6455C IMT2000 receiver used with the E7476A W-CDMA (UMTS) system

The digital receiver provides network independent measurements for characterizing the performance of your W-CDMA (UMTS) networks.

Key benefits

The Agilent E7476A W-CDMA (UMTS) drive test system enables wireless service providers and network equipment manufacturers to turn-up their W-CDMA (UMTS) networks faster and to optimize network performance while minimizing the time and effort required to do so. The E7476A W-CDMA (UMTS) receiver-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:

- A receiver-based solution, independent of the network, helps identify network problems quickly.
- The automatic software alarm detects network problems as they occur.
- A portable and rugged receiver makes network deployment easy and includes the ability to perform drive test functionality in pedestrian settings as found in large metropolitan areas.
- A scalable drive test platform architecture allows you to add up to four digital receivers. That way you can expand and support up to four 3G phones when available, and provide evolving platform solutions as the network matures. Using the scalable and evolving drive test platform, protects your customer's initial drive test investment.
- Builds upon Agilent's proven 2G drive test solutions and evolves the existing platform to meet your growing 3G needs and applications.
- Provides a cross technology capability that allows current second generation providers (GSM and IS-95) to migrate to third generation technologies without having to purchase entirely new optimization tools. Once again, purchasing Agilent's drive test solutions protects your customer's initial investment.

This product overview will describe the receiver-based measurements currently available with the Agilent E7476A W-CDMA (UMTS) receiver-based drive test solution.

Agilent Technologies

Scrambling code analyzer virtual front panel

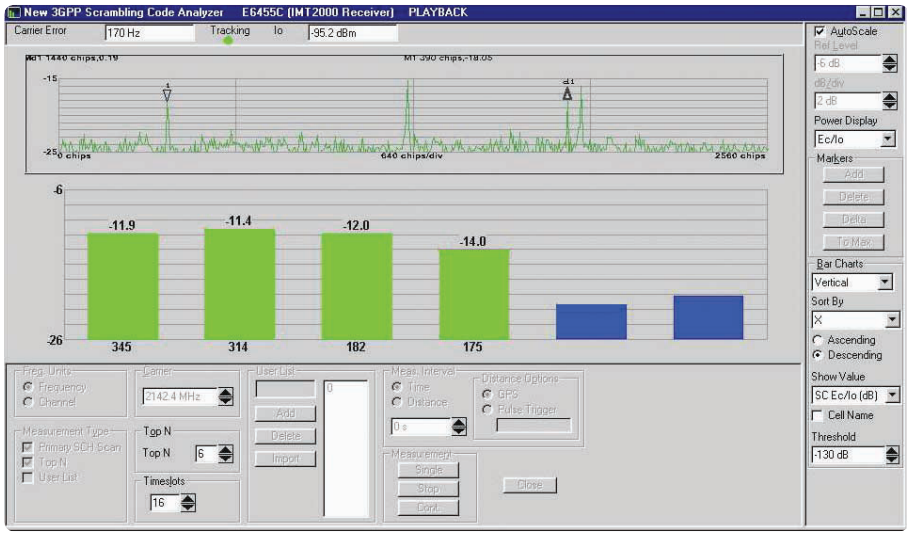

Figure 2. Sample Agilent E7476A scrambling code analyzer display

The subordinate measurement displays available from the scrambling code analyzer virtual front panel are the primary sync scan display, the Top N display (shown in figure 2 above), and the user list display.

- The primary sync code scan measurement displays a trace that shows a spike in the trace for each primary sync code signal detected in one timeslot of 2560 chips.
- The Top N measurement display returns the “N” strongest signals found in one timeslot of 2560 chips. The data displayed can be averaged over several timeslots. The display can be user configured to display either of the following measurements. All power measurements can be displayed in either Energy per chip (Ec or Ec/Io) or Energy per bit (Eb/Io).
  - Primary sync code measurements
    - Power measurements
  - Secondary sync channel measurements
    - Power measurements
  - Scrambling code measurements
    - Scrambling code group
    - Peak power
    - Peak power relative to Io
    - Aggregate power
    - Delay spread (in chips)
  - Delta power measurements (in dB units)
    - Secondary sync Ec/Io - primary Ec/Io
    - Scrambling code Ec/Io - primary Ec/Io
    - SC aggregate power - SC peak power
  - Timing measurements (in chips) – measures the relative time of signal compared to the receiver’s time base.
- User list display – displays a list of up to 20 scrambling codes either entered by the user or imported into the drive test application as a text file. The measurements displayed for the scrambling code powers are the same as those displayed in the Top N measurement display, described above. However the algorithm for this feature does not make use of the sync channel and cannot therefore display the associated sync channel values.

Interference management and troubleshooting

Spectrum analysis

The Agilent E7476A W-CDMA (UMTS) 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 W-CDMA (UMTS) 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 W-CDMA (UMTS) measurements.

The Agilent W-CDMA (UMTS) receiver covers the entire UMTS band and is designed to achieve high dynamic range spectrum measurements. Both the uplink and downlink frequency bands can be measured. A sample spectrum analysis display is shown in figure 3.

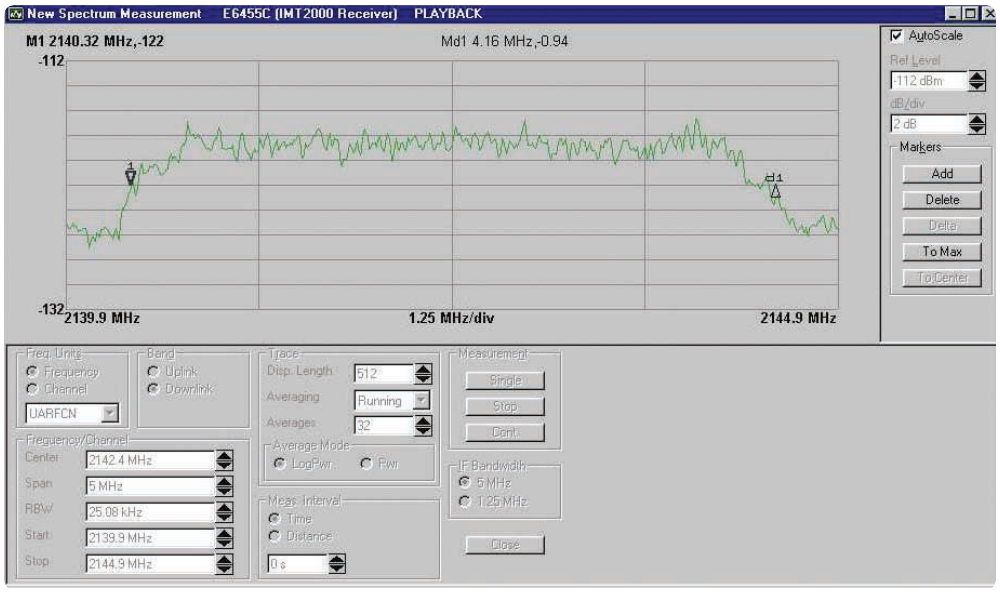

Figure 3. Agilent E7476A spectrum analysis display

Cell site selection and evaluation

CW power measurements

The Agilent E7476A W-CDMA (UMTS) 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 the 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 W-CDMA (UMTS) drive testing and site evaluation/selection activities.
- Allows for CW measurements to be performed as a function of location.
- Measures both the uplink and downlink frequencies.

Channel power measurements

The Agilent E7476A W-CDMA (UMTS) receiver-based drive test solution also provides channel power measurements. Channel power is defined as the integrated power within a defined bandwidth. The E7476A drive test system provides two channel power measure-ment types: channel power list and channel power trace. The channel power list allows the user 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.

Figure 4 shows a sample channel power measurement display. This display is also used for the CW measurement.

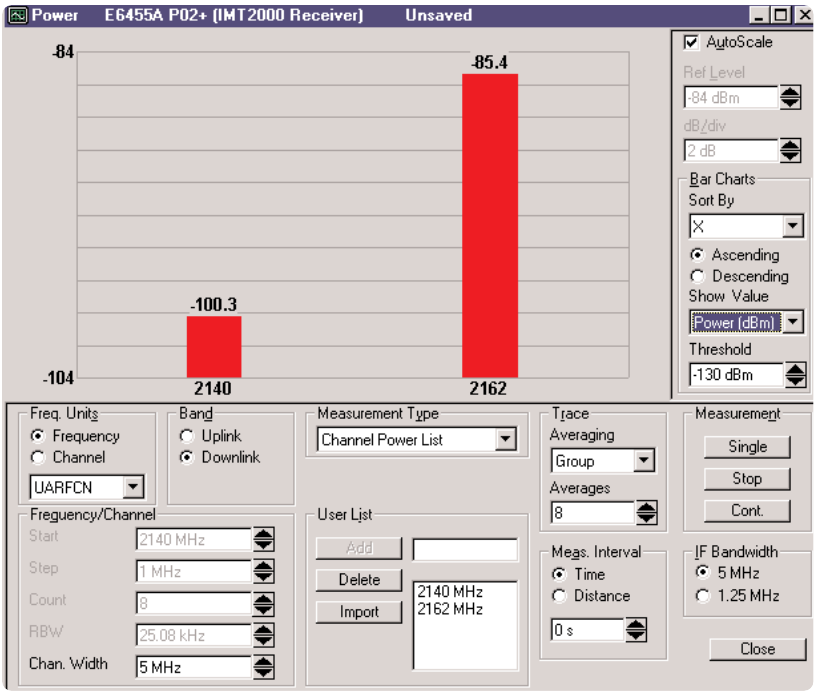

Figure 4. Agilent E7476A channel power measurement display

Solve network problems quickly

Agilent's E7476A W-CDMA (UMTS) receiver-based drive test system and the measurements discussed earlier, identify and solve network problems quickly. The following sections provide a sample of the many types of problems that can be found and resolved quickly with Agilent's receiver-based W-CDMA (UMTS) drive test solution.

Figure 5. Identify and solve network problems with Agilent's drive test solutions

Poor RF coverage

The primary goal of the Agilent E7476A W-CDMA (UMTS) drive test solution is to help you to 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 the signal strength is not adequate to provide and/or sustain a W-CDMA (UMTS) call. The Agilent W-CDMA (UMTS) digital receiver provides the necessary RF coverage component within the E7476A drive test system. The receiver provides accurate and effective measurements about the RF environment. All of the receiver-based measurements are made independent of the network. The Agilent E7476A W-CDMA (UMTS) receiver-based drive test solution provides key diagnostic information necessary to quickly identify network problems.

Scrambling code (pilot) pollution

The receiver-based solution also provides quick resolution to scrambling code pollution related problems, where too many scrambling codes are present. Both conditions: poor RF coverage and scrambling code pollution lead to problems such as dropped calls. The scrambling code analyzer measurement display is very useful for troubleshooting these types of problems.

Characterizing multipath problems

The Agilent W-CDMA (UMTS) 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 E7476A system provides the following measurements using the scrambling code analyzer display: peak power, aggregate peak power, delay spread, and aggregate – peak delta measurements.

Timing drift/timing overlap conditions

The Agilent E7476A receiver-based solution provides the primary sync scan display to aid your users in troubleshooting base station timing drift and/or timing overlap 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 E7476A 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. Since the W-CDMA (UMTS) network is asynchronous, the receiver-based primary sync scan measurement can alert you of drifting timing conditions within a base station, since the chip offsets are displayed and can be used to determine the sectors of the base station and their relative positions within the base station. Using the primary sync scan measurement allows you to visually inspect the scan to detect peaks close in proximity and/or overlapping.

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, the E7476A drive test system 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 ergonomic 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.

Figure 6. Portable E7476A drive test system helps you provide high quality of service.

Figure 7. Agilent's ergonomic backpack is designed for comfort and portability.

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 BTS Maintenance Tool Configuration Guide, 5968-8696E

E7478A GPRS Drive Test System Configuration Guide, 5988-1505EN

Technical specifications/data sheets

E7473A CDMA Drive Test System Data Sheet, 5968-5555E

E7474A TDMA Drive Test System Data Sheet, 5968-5556E

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

E7490A CDMA BTS Maintenance Tools Data Sheet, 5968-8687E

E7478A GPRS Drive Test System Data Sheet, 5988-1506EN

Wireless Data Measurement Data Sheet, 5988-1507EN

Product overviews

E7475A GSM Drive Test System Product Overview, 5980-0439E

E7480A CDMA Post Processing Product Overview, 5968-1549E

Indoor Wireless Measurement System Product Overview, 5968-8691E

E7478A GPRS Drive Test System Product Overview, 5980-2375E

Wireless Data Measurement Product Overview, 5980-2310E

N3419 Vehicle-Mounted Display System Product Overview, 5980-0721E

Application/product notes

CDMA Drive Test Systems Product Note, 5968-5554E

Spectrum and Power Measurements Using the Agilent CDMA, TDMA, and GSM Drive Test Systems, 5968-8598E

Optimizing Your CDMA Wireless Network Today and Tomorrow Using Drive Test Solutions Application Note 1345. 5968-9916E

Optimizing Your TDMA Network Today and Tomorrow Interference Identification for IS-136 TDMA Wireless Networks Application Note 1342, 5980-0219E

Optimizing Your GSM Network Today and Tomorrow Using Drive Testing to Troubleshoot Coverage, Interference, Handover Margin, and Neighbor Lists Application Note 1344, 5980-0218E

For the latest news, product and support information, and application literature, visit our Web site at:

www.agilent.com/find/networks

Agilent Technologies' Test and Measurement Support, Services, and Assistance

Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

Our Promise

Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

Your Advantage

Your Advantage means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and on-site education and training, as well as design, system integration, project management, and other professional engineering services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

By internet, phone, or fax, get assistance with all your test and measurement needs.

Online assistance:

www.agilent.com/find/assist

Phone or Fax

United States:
(tel) 1 800 452 4844

Canada:
(tel) 1 877 894 4414
(fax) (905) 282-6495

China:
(tel) 800-810-0189
(fax) 1-0800-650-0121

Europe:
(tel) (31 20) 547 2323
(fax) (31 20) 547 2390

Japan:
(tel) (81) 426 56 7832
(fax) (81) 426 56 7840

Korea:
(tel) (82-2) 2004-5004
(fax) (82-2) 2004-5115

Latin America:
(tel) (305) 269 7500
(fax) (305) 269 7599

Taiwan:
(tel) 080-004-7866
(fax) (886-2) 2545-6723

Other Asia Pacific Countries:
(tel) (65) 375-8100
(fax) (65) 836-0252
Email: tm_asia@agilent.com

Product specifications and descriptions in this document subject to change without notice.

Printed in USA, July 13, 2001
5980-2132E

Agilent Technologies