

#### Key Benefits for Wireless Network Optimization RF Engineers and Technicians

The Agilent E7476A W-CDMA Drive-Test System enables wireless service providers and network equipment manufacturers to turn-up their W-CDMA networks faster and to optimize network performance while minimizing the time and effort required to do so. The E7476A W-CDMA receiverbased 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 automatic software alarm capability to aid in detecting network problems as they occur.
- 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.

- 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 W-CDMA phones when available, and provides 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 while evolving the existing platform to meet the growing needs of our 3G customers and their 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 receiverbased measurements currently available with the Agilent E7476A W-CDMA receiver-based drive test solution.



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## Scrambling Code Analyzer Measurements



Figure 1 - Agilent E7476A W-CDMA 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 1 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. All power measurements can be displayed in either Energy per chip (Ec or Ec/Io) or Energy per bit (Eb or Eb/Io). The display is user configurable to allow the display either of the following measurements.

- Primary Sync Code Measurements
  Power Measurements
  - Secondary Sync Channel Measurements
    - Code Measurements
    - Power Measurements
  - Scrambling Code Measurements
    - Peak Power
    - Peak Power Relative to Io
    - Aggregate Power
    - Delay Spread (in Chips)
  - Delta Power Measurements (in dB units)
    - Secondary Sync Code Primary Sync Code
    - Scrambling Code Secondary Sync Channel
    - Aggregate Power 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 are the same as those displayed in the Top N measurement display described above.

### Interference Management and Troubleshooting

### **Spectrum Analysis**

The Agilent E7476A W-CDMA 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 drive test solution, is a compact, DSPbased receiver that is capable of making a core set of spectrum analyzer measurements in addition to making W-CDMA measurements.

The Agilent W-CDMA receiver covers the entire PHS band and is designed to achieve high dynamic range spectrum measurements. Both the uplink and downlink frequency bands can be measured. The W-CDMA Spectrum Analysis Display is shown in Figure 2.



Figure 2- Agilent E7476A W-CDMA Spectrum Analysis Display

### Cell Site Selection and Evaluation

### **CW Power Measurements**

The Agilent E7476A W-CDMA 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. CW measurements validate 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 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 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 measurement 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 3 shows the Channel Power Measurement display. This display is also used for the CW Measurement.



Figure 3 - Agilent E7476A W-CDMA Channel Power Measurement Display

# Solve Network Problems Quickly

Using Agilent's E7476A W-CDMA Receiver-Based Drive-Test System and the measurement discussed above, the question becomes what problems can be found quickly using our solution. 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 drive test solution.



Solve network problems with drive test solutions.

# Characterizing Multipath Problems

The Agilent W-CDMA 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.

# **Poor RF Coverage**

The primary goal of the Agilent E7476A W-CDMA 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 call. The Agilent W-CDMA 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 receiverbased 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 scrambling code pollution related problems, where too many scrambling codes are present. 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.

# Timing Drift/Timing Overlap Conditions

The Agilent E7476A receiver-based solution provides the Primary Sync Scan display to aid you users in troubleshooting base station timing drift and 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 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 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, 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.





### Safely Perform Drive Testing using the Vehicle-Mounted Display System

Safely drive test your W-CDMA 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 regulations.



# Additional Agilent Literature

Configuration guides
E7473A CDMA Drive-Test System Configuration Guide5968-5553E
E7474A TDMA Drive-Test System Configuration Guide5968-5861E
E7475A GSM Drive-Test System Configuration Guide5968-5563E
E7490A CDMA Over-Air Maintenance Tool Configuration Guide5968-8696E
Technical specifications
E7473A CDMA Drive-Test System Technical Specifications
E7474A TDMA Drive-Test System Technical Specifications5968-5556E
E7475A GSM Drive-Test System Technical Specifications5968-5564E
E7490A CDMA Over-Air Maintenance Tool
Technical Specifications5968-8687E
Product overviews
E7475A GSM Drive-Test System5980-0439E
E7480A CDMA Post Processing Software5968-1549E
Indoor Wireless Measurement System5968-8691E
Application/product notes
N3419 Vehicle-Mounted Display System5980-0721E
CDMA Drive-Test
Spectrum And Power Measurements Using The Agilent CDMA, TDMA, And GSM Drive-Test System
Optimizing Your CDMA Wireless Network Today And Tomorrow Using Drive-Test Solutions5968-9916E
Optimizing Your TDMA Network Today And Tomorrow Using Drive-Testing To Identify Interference In IS-136 TDMA Wireless Networks
Optimizing Your GSM Network Today And Tomorrow Using Drive-Testing To Troubleshoot Coverage, Interference, Handover Margin, And Neighbor Lists

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

www.agilent.com/find/drive\_test

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

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