



E6474A Drive Test

Wireless Network Optimization Platform

Key Features

- Flexible and customizable platform
- Multiple technologies supported on a single platform
- Integration of phone and receiver measurements
- Real-time parameter mapping with base station overlay

Benefits

- Single platform that can expand as your needs increase – Lowers your cost of ownership
- Open architecture for post processing or dedicated post processing toolbox
- One stop support from the same vendor for collection and analysis

Applications

- RF planning/verification/model tuning
- RF optimization and troubleshooting
- Spectrum clearing
- Interference analysis
- Benchmarking

Facing the challenges of wireless networks

Optimizing your network, expanding service coverage, and rapidly deploying new technologies and data services, with the highest possible quality, is critical to the growth of your customer-base and revenue. Having the right test and measurement tools in place to help you meet these goals is essential. Tools that are accurate, scalable and cost effective, providing depth of insight into network performance and rapidly pinpointing the root cause of problems.

The E6474A Network Optimization Platform enables wireless service providers and network equipment manufacturers to address their challenges in optimizing wireless voice and data network performance by quickly and accurately identifying problems. The E6474A Network Optimization Platform provides you with a Windows® based wireless network test solution that can be utilized in site evaluation, base-station turn-on, system acceptance, and on-going optimization and troubleshooting. The E6474A Network Optimization Platform grows with your needs, and provides industry-leading performance during all phases of the network lifecycle.

The E6474A Network Optimization Platform provides functionality and performance designed to address the challenges facing the wireless industry across all major technologies. JDSU is committed to offering early to market solutions to help you stay ahead of your competition as you roll out next generation networks and services. Whether your system is LTE, HSPA+, CDMA, cdma2000, 1xEVDO, GSM, GPRS, EDGE, W-CDMA/UMTS or a combination of technologies the E6474A Network Optimization Platform provides a solution that will assist you in addressing your challenges.



The best has just got better

The E6474A Wireless Network Optimization Platform has gone through a major re-engineering process at release 10.0, giving you access to the most powerful and versatile optimization tool on the market. This release introduces new platform functions including:

- Flexible user-interface design environment with parameter drag-and-drop
- Improved mapping capabilities (with MapX)
- Improved parameter time-charting
- Click and Sync view synchronization
- Project and customized view sharing
- Single sequencer for both voice and data calls
- New events management system
- Enhanced protocol decode visualization

All these features have been added while retaining the unparalleled measurement integrity, stability, reliability and breadth of mobile device support. These new features provide your RF engineering teams with a powerful set of network optimization and service assurance tools with the flexibility to build and share 'projects' and customize measurement views and service test sequences. This unparalleled versatility maximizes the visualization of network performance and supports real-time troubleshooting.

To compliment the new software architecture, JDSU's new family of measurement receivers brings market leading performance to your drive test toolkit.

Manage your drive test tool distribution

The E6474A platform has the option of server-based software licensing. This provides you with the ability to maintain a pool of E6474A measurement licenses on a server and to distribute them to drive-test client PCs via a check-out process. This method gives a number of advantages over the traditional 'dongle' license key methodology including improved resource sharing across geographically dispersed teams and protection against loss.

Expand tools rather than expanding budgets

The functionality of the E6474A Network Optimization Platform can be increased, as your network testing needs increase. Whether determining quality of service from the customer perspective, or performing comprehensive network management, the E6474A Network Optimization Platform offers a common solution to fit your requirements. As your network testing requirements increase, you may expand your tools, leveraging your existing hardware and software. If you decide to enhance your current network, or migrate your network, the E6474A Network Optimization Platform can be leveraged so that your tools and training investment is minimized as you evaluate and turn-on new technologies and data formats.

Comprehensive network management

To perform comprehensive wireless network testing, a phone and receiver combination solution is required. This solution allows you to identify network problems, and quickly determine the cause of the problems, assuring the highest level of network optimization and reducing potential negative impact on your customers' quality of service. The receiver and phone work together, linked so that they track as you move through your network. This solution is essential for rapid network installation, expansion, and proactive maintenance. Multiple phones and receivers may be added when needed for evaluation and turn-on of new technologies and data formats.



A phone and receiver combination solution can be used to:

- Manage your network lifecycle measurement needs with one integrated solution
- Monitor the RF uplink and downlink bands while on a call
- Perform integrated analysis using the phone and receiver at the same time
- Correlate call drops within the RF environment
- Compare phone reported neighbor list with the actual strongest neighbors measured from the receiver (i.e, missing neighbor analysis)
- Identify areas of signal degradation due to interference
- Save training and support costs with a single interface phone and receiver system

Please refer to the technology specific data sheets for detailed phone and receiver measurement information.

Network performance from your customers' perspective

If you do not require the full analysis power of a combined receiver and phone system, you can start with a phone-only system and upgrade later.

This solution is ideally suited for established networks and provides users the ability to proactively identify trouble spots, and assist in performing preventive maintenance. A phone-only solution can be expanded to include multiple phones, indoor measurements, wireless data and services measurements or digital receivers as your requirements expand.

Extensive phone support

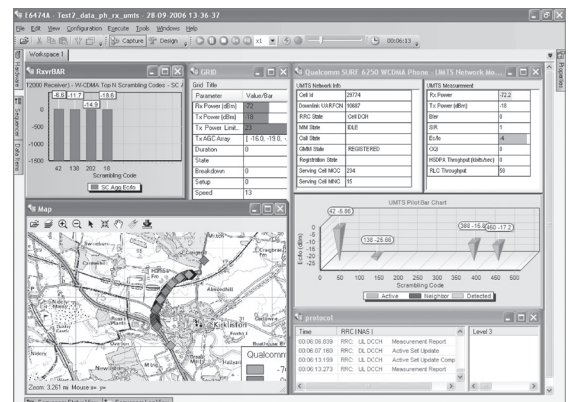
The E6474A Network Optimization Platform offers extensive support of phones, including the most popular subscriber phones available today. This provides the ability to most accurately simulate the subscriber experience when optimizing networks. JDSU provides rapid integration of new phones to match the demands of the industry.

Specialized measurements from these phones give access to Layer 1, 2 and 3 measurements including RLP, RLC/MAC and LLC parameters (where appropriate), essential in the optimization

and troubleshooting of wireless networks.

A phone-only solution can be used to:

- Test network parameters that will allow you to quantify how your network is perceived by subscribers
- Collect and record network information messages including network ID and cell identities
- Evaluate call-processing operations - setup, disconnect, blocks, drops
- Measure and report the signal strength and quality of the received base station signals and identify no-service or coverage issues
- View and log protocol messages in decoded form for easy interpretation
- Evaluate network performance at different layers - MAC, RLC, LLC
- Quantify wireless data users' quality of service (with data measurement options)



Network independent problem solving

In the multi-format environment of today's wireless networks, it is essential to equip your RF engineers with the right tools. The new Wireless Measurement Receiver has been developed to enable RF engineers to visualize the air interface and quickly identify and resolve Radio Access Network (RAN) issues.



With multiple technology multi-band (up to 4) support in a single receiver unit, the new Receiver platform delivers market leading performance.

- Fast, accurate, network-independent RF measurements for optimization and troubleshooting tasks both in the field and in the lab.
- Multi-band (uplink/downlink, up to four RF bands) and multi-technology operation in a single compact hardware package
- In-built 12-channel GPS for high accuracy location measurements
- Software-upgradeable hardware platform for extended product life
- Integral 4-port USB 2.0 hub enabling up to four USB devices with charging

A receiver-only solution gives you the ability to make measurements independent of the network. Phones depend on parameters in the network to help maintain the call - such as neighbor lists. A receiver-only solution allows you to identify problems independent of the network. For example, in CDMA networks, pilot pollution and missing neighbors can be identified within your network. In GSM networks co-channel and adjacent channel interference problems can be identified, as can missing neighbors. The E6474A Wireless Network Optimization Platform gives many tools at your disposal to help easily identify the cause of these problems.

A receiver-only solution is ideally suited for network build-out and turn-up, band clearing, RF planning, network expansion, and base station installation and maintenance. This solution can be expanded to include multiple receivers, and can support different technologies or data formats. One or more phones can be added to the same platform for comprehensive network management.

A receiver-only solution can be used to:

- Find network problems faster through network independent measurements
- Reduce network downtime by identifying interfering signals while the network is live
- Manage interference with co-channel and adjacent channel measurements (e.g., GSM networks) and detection of other spurious signals
- Carry out BCH Analysis on GSM networks, includes BSIC decode feature.



- Perform pilot scanning for CDMA pilot pollution including multipath measurements and chip delay.
- Perform code domain power measurements on IS-95A and cdma2000 1XRTT networks for over-the-air base station testing.
- Perform spectrum analysis, covering both the downlink and uplink bands
- Measure channel and CW power

For information on JDSU receiver technologies and bands supported please refer to the E6474A Configuration Guide or contact your JDSU representative.

Base station turn-on and maintenance

The E6474A Network Optimization Platform may be used to measure code domain power (CDP) for IS-95A and cdma2000 1XRTT signals. These measurements provide real-time insight for traffic analysis, capacity management, and base station health. CDP trace capability measures the relative powers of all 64 cdmaOne Walsh codes, and all 128 cdma2000 Walsh codes, depending on the configuration. The Walsh codes are displayed in a bar graph format with a unique color for each channel type. View CDP statistics, as well as TopN pilots to provide a complete analysis of your base station health.

Powerful platform features to address your network optimization challenges

There are many features that are common to the E6474A platform software, irrespective of technology. These integral features include the ability to record and playback data sets, export the data for further analysis (including decoded protocol messages), link parameters, create and share projects, customizable views, display parameters on time charts and route maps and define flexible alerts and alarms, based on user requirements. The platform software includes powerful on-line help and tutorial facilities.

Simplified system setup

The setup and configuration of hardware on the E6474A platform is done using a very intuitive device oriented hardware configuration panel and associated device add wizard, giving clear visualization of the drive-test PC's available ports and connected

hardware devices. This greatly reduces the time to setup a system for drive test readiness.

Project concept

The platform's new project concept combined with its device manager means you will be able to get up and running out-of-the-box extremely quickly and be able to manage your drive teams with a new level of control. A project is defined as a collection of views with associated hardware, measurement, call sequence, events and map/chart settings and can even be defined without hardware connected. A set of default technology and application oriented projects are provided. Projects are designed for sharing and distribution – the associated layouts and settings are saved with the project file. They can be built from scratch or adapted from a supplied set.

Flexible user interface

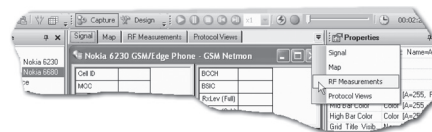
The new flexible user interface means that almost every part of the GUI can be moved and changed to suit your needs. Create list, time-chart, or graph views from scratch or choose from the default technology-oriented set and, if required, adapt them to suit your needs. Create and modify these new GUI elements by simply dragging and dropping parameters on a chart, a grid or a map, with automatically assigned default scales and colors. You can even do this while collecting data, and save your own views for later use or distribution. Key Features include:

- Drag and drop interface
- Generate a grid containing user selected results even from multiple devices
- Chart, graph and map your choice of parameters
- Template views will be provided for each supported technology

- View synchronisation – for example click a point on a map, chart, protocol message or event and all other views synchronize to that time signature

Tabbed worksheets

The E6474A Network Optimization Platform gives full flexibility of workspace management through the tabbed worksheet feature. Any measurement views can be displayed on any worksheet, and indeed, can be displayed on multiple worksheets if desired. This provides you with the flexibility to represent data and information and group views as you desire.



Call sequencing

All the tests are configured and managed from the tree structured sequencer. The tests available provide a comprehensive range of test scenarios from a simple voice call test to full data network testing including SMS and MMS and internet connection testing.

Protocol analysis

Provides you with the flexibility you need to display which protocols you want and in how many views. This ensures that you can see every protocol message during collection and replay. Double-click on a protocol message to see what all the other views, charts and maps show at that point.

View synchronization

During recording and playback you can synchronize all your open views, to the same point in time by double-clicking on a map, chart, event marker or a protocol message. This assists troubleshooting by quickly

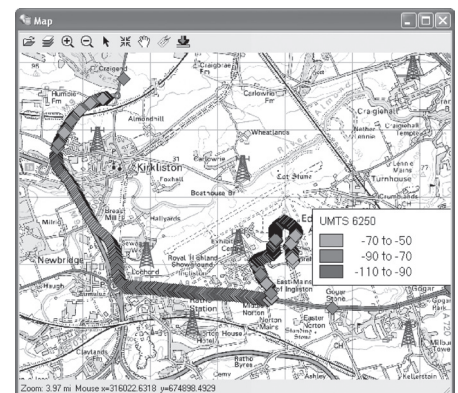
highlighting related measurement information.

Event monitoring

The E6474A Network Optimization Platform provides comprehensive and flexible events management allowing visualization of events on the route-map, chart, events list and protocol views. In addition to audio notification you have the facility to cause platform actions such as stop or pause. Event configurations are created through the intuitive measurements drag and drop facility or can be exported and imported, allowing operators to share alarm set-ups or use the supplied default set. Event markers can be viewed during a drive-test and in playback and can be exported for post-processing. You can also add events during playback to help simplify data searching and analysis.

Mapping interface

The Route Map view shows the current position and the route travelled on a map as data is collected. Several layers of user-selectable information can be displayed, including map layers, color coded channel and signal information, alarm markers, and notes. Base station locations, with site names, can also be plotted on the map when linked to the appropriate cellsite database.





The E6474A software now incorporates MapX® technology to provide:

- Compatibility with the widest possible range of customer furnished maps
- Extensive range of supporting map projects (for example WGS84, NAD27, and more)
- Faster troubleshooting through better visualization of the collected parameters
- Up to four measurement traces can be plotted, with visual offsetting, at the same time
- Multiple synchronized mapping views

Outdoor and indoor configurations

The E6474A Network Optimization Platform can easily be configured for outdoor applications. For indoor configurations (available with release 10.2 and onwards), GPS navigation is replaced with a simple point and click positioning interface.

Manage the integration and quality of data services

With the convergence of mobile phones and the Internet, wireless networks need to be optimized for data services. JDSU now offer a number of optional data testing applications on the E6474A platform:

- E6474A Wireless Data Measurements
- E6474A Wireless Application Measurement Software (WAMS)

Both options are wireless technology independent, applicable to all 2G, 2.5G and 3G, circuit switched and packet switched technologies. Measurements can be made simultaneously across multiple networks using commercial modem-capable devices. Used in conjunction with an engineering

mobile gives you an array of troubleshooting possibilities, through access to the Layer 1, 2 and 3 measurements from the device.

E6474A Wireless Data Measurements option is a client/server based data measurement capability and is aimed at early verification of the data-oriented network. This option provides key measurements such as bit error ratio, packet error rate, latency and data throughput on both transmit and receive paths. Real-time test results can be displayed and recorded on the client PC. The server can be strategically placed for enhanced fault finding, for example prior to rolling out live services it can be placed at the GGSN, isolating the external web interface. Your control of different uplink/downlink data geometries, delays in server response time and TCP/UDP transactions, enables emulation of different data services.

Post-processing measurement data

E6474A Wireless Application Measurement Software (WAMS) enables you to carry out end-to-end user experience tests using real data applications, for example MMS, SMS, WAP, HTTP, FTP and email, and their related protocols and data structures. WAMS enables you to quickly verify all the elements in the delivery chain (wireless interface, backhaul, and application specific routers, switches and servers) and to give a clear indication of where to direct your troubleshooting efforts, if required. An extremely intuitive sequencing engine enables you to manage your dial-up or LAN connections, serial and parallel sequencing scenarios and control of each test's properties (for example selection of HTTP 1.0 or 1.1, whether to include embedded objects, email protocol selection etc.). Other tests

integral to WAMS include voice call, video call and GPRS attach/detach.

WAMS Lite (E6474A-745) is a low cost entry point to basic data service testing. Tests included are FTP, PING, voice connectivity and video connectivity.

Video telephony and streaming

To measure the quality of your video services, the E6474A drive test system has both video telephony and video streaming test options. These test options integrate seamlessly with the other data tests and platform functionality.

E6474A #741 video streaming test

This test provides the ability to download video streams in either .rm or .rtsp formats. It supports the Real Player format and provides accessibility, throughput and error ratio measurements on the downloaded stream.

E6474A #742 video telephony Test

This test provides the ability to set up a video telephony call between two handsets connected to the mobile drive test system. Call establishment and progress metrics are measured, together with bit error ratio performance of both the audio and video portions of the call. This option allows you to evaluate the performance of your video telephony network infrastructure to ensure it meets your service delivery targets.

A future enhancement is video Mean Opinion Scoring (MoS) measurement functionality. This enhances the existing video test options. Please contact your JDSU sales representative for more details on the availability of the Video MoS options.

For further information please refer

to Data Service Assurance Product Overview and Wireless Application Measurement Software Data Sheet

The E6474A has powerful replay functionality that lets you review the measurement data that you have just collected. With the use of the built-in charting and mapping functions, you can visualize the measurement parameters right there in the collection application. Alarms can be set to trigger on specific protocol messages or when user-set limits on measurement parameters are breached.

If you prefer to analyze your data with third party tools such as MapInfo, Excel, the E6474A has advanced export capabilities that let you share all or selected data with other analysis applications. You can select the exact set of parameters you wish to export and filter them within the export operation to meet your analysis needs - for example you can export items such as number of pilots which exceed a particular threshold or data throughput values only when a TBF is active. Exports can be freely made in CSV or tab delimited formats.

Some third party tools, such as those provided by Actix have direct import capability and they can read our data files without further modification.

Analysis Reporter

JDSU offers an extensive array of tools for different levels of post processing analysis capabilities. The Analysis Reporter option is a simple-to-use report tool, which is integral to the E6474A platform. It works on pre-defined export files, using both phone and receiver data, and can quickly generate comprehensive network performance overview and detailed network analysis reports and histograms including performance summary reports, call quality analysis

reports, details on performance per call, neighbor and handover summary and drill-down, aggregate Ec/Io vs RxPower and many more.

Analysis Reporter currently supports GSM, GPRS, cdma2000, UMTS and data measurements on a single E6474A product option.

Computer hardware requirements

The E6474A system requires a PC. The PC requirements differ depending on the hardware configuration and on which parameters are being selected.

Minimum PC specifications:

- XP Professional SP2 (inc XP for Tablet PC)
- 1.6GHz Pentium M 512MB RAM
- Parallel port or USB Port (for software key)
- PCMCIA slot or a USB connection (for multiple hardware support)
- 30 GB hard disk space
- CD-ROM drive recommended for installation
- 1024 x 768 display resolution minimum

Recommended PC specifications:

- XP Professional SP2 (inc XP for Tablet PC)
- Intel® Core™ Duo T2500 (2GHz) 2GB RAM
- Parallel port or USB Port (for software key)
- PCMCIA slot or a USB connection (for multiple hardware support)
- 50 GB hard disk space
- CD-ROM drive recommended for installation
- 1280 x 1024 display resolution minimum

Integration with other JDSU products

J7839 Signaling Analyzer Import of E6474A Drive Test Data

For true end-to-end protocol analysis, you can load your drive test protocol logs into your mobile network analysis software using the J7839 Signaling Analyzer Import of E6474A Drive Test Data. This product allows you to visualize the Um protocol and NBAP (Node B Application Part) on a single screen with a combined Uu/Iub/Iu call trace providing correlated data on the radio and network interfaces on a single screen.

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