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

Facing Wireless Network Challenges

The RANAdvisor network optimization platform enables wireless service providers, network equipment manufacturers, and contractors to address their challenges in optimizing wireless voice and data network performance by quickly and accurately identifying problems. It is a Windows®-based wireless-network test solution for site evaluation, base-station turn-up, system acceptance, and ongoing optimization and troubleshooting. The platform grows as needs arise, and provides industry-leading performance during all phases of the network life cycle.

The platform’s functionality and performance addresses the challenges facing the wireless industry across all major technologies. Viavi Solutions™ 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 (FDD/TDD), LTE-A, HSPA+, CDMA, cdma2000, 1xEV-DO Rev 0/A/B, GSM, GPRS, EDGE, W-CDMA/UMTS, WiMAX, WiFi, or a combination of technologies, the platform will assist you address your challenges.

Key Benefits

- Comprehensive technology support 2G/CDMA/1xEV-DO Rev 0/A/B/WCDMA/HSPA+/LTE-FDD/LTE-TDD/LTE-A
- Test anywhere with vehicle-based, backpack, and handheld solutions
- Reduce setup time with hardware auto-detection and configuration
- Get faster results with integrated graphical test/status sequencer
- Find problems faster with real-time KPIs
- Deploy LTE-A (carrier aggregation/higher throughputs)
- Quickly validate voice-over-LTE (VoLTE) service
- Open architecture that is compatible with all leading post-processing tools, such as Actix and Windcatcher
- Reduce costs with flexible server-based licensing

Applications

- RF planning, verification, model tuning
- RF optimization and troubleshooting
- Spectrum clearing
- Interference analysis
- Benchmarking
- Voice quality testing
- Data service testing
- Outdoor/indoor testing
- VoLTE testing
- LTE Advanced
RANAdvisor Gets the Job Done Fast

RANAdvisor is the most powerful and versatile optimization tool available for easier network optimization. Features include:

- LTE and LTE-A carrier aggregation
- VoLTE testing and VoLTE KPIs
- LTE MIB/SIB decoding
- POLQA MOS voice quality
- Real-time KPI measurements
- Automatic device detection and configuration
- Flexible drag-and-drop user-interface
- Shared projects and customized views
- MapX®-enabled mapping capabilities with OpenStreetMap
- Parameter time based charting
- Graphical sequencer and status view
- Parallel and serial testing
- HTTP transfer test
- Web browsing test
- E-mail test
- Auto FTP upload of log files
- Protocol decodes
- PC Tel receiver support
- Broad LTE chipset and device support
- WinPCAP capture for IP analysis
- API for systemized testing
- Flexible server-based licensing

All these features and more provide you unparalleled measurement integrity, stability, capability, reliability, and breadth of mobile-device support. They 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, the Viavi family of measurement receivers brings market-leading performance to your drive test toolkit.

Computer Hardware Requirements

The system requires a PC.

PC Specifications

PC requirements differ depending upon the hardware configuration and selected parameters.

Minimum PC hardware specifications:

- Intel® Core™ i5-2520M (2.5 GHz) 4 GB RAM
- 250 GB 7200 rpm hard-disk drive
- DVD±RW drive
- USB 2.0 ports (for license key and multiple-hardware support)
- 1280 x 800 display resolution minimum

Recommended PC hardware specifications:

- Intel Core i7-2820QM (2.3 GHz) 8 GB RAM
- 250 GB 7200 rpm hard-disk drive
- DVD±RW drive
- USB 2.0 ports (for license key and multiple-hardware support)
- 1280 x 800 display resolution minimum

Supported Windows versions:

- Windows 7 32-bit (Ultimate or Enterprise)
- Windows 7 64-bit (Ultimate or Enterprise)
Manage Costs with Flexible Software Licensing
The platform has the option of server-based software licensing to help reduce costs by letting you buy only those licenses needed for simultaneous use. This lets you maintain a pool of measurement licenses on a server and to distribute them to drive-test client PCs via a check-out process. This method includes a number of advantages over the traditional ‘dongle’ license key methodology, including improved resource sharing across geographically dispersed teams and protection against loss.

Expand Your Tools, Not Your Budget
The functionality of the platform can be increased, as your network testing needs increase. Whether determining quality of service from the customer perspective, or performing comprehensive network management, it offers a common solution to fit your requirements. Add functionality as network testing requirements increase and leverage your existing hardware and software investment by adding more software licenses instead. For example, if you are testing 3G today and moving to LTE with a current receiver that supports your LTE frequency bands, you can enable LTE support via a software license rather than by buying a new receiver. This flexibility lets you leverage your tools and training investment to test new technologies faster and while increasing your overall ROI.

Comprehensive Network Management
Performing comprehensive wireless network and service testing requires a combined phone and receiver solution. This solution lets you identify network problems and quickly determine their cause, assuring the highest level of network optimization and reducing potentially negative impact on your customers’ quality of service. The receiver and phone work together, measuring both passive RF and testing active service as you move through your network, ensuring that your customers can receive service everywhere.

A phone and receiver combination solution can be used to:

• Manage your network life cycle measurement needs with one integrated solution
• Monitor the RF uplink and downlink bands while actively testing voice, video, and data
• 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 (missing neighbor analysis)
• Identify areas of signal degradation due to interference
• Save training and support costs with a single interface phone and receiver system

Network Performance from Your Customer’s Perspective
If you do not require the full analysis power of a combined receiver and phone solution, you can start with a phone-only system or a receiver-only system and upgrade later.

A phone-only solution is ideally suited for testing the network and services the way your customers use them. Engineers can quickly identify network and revenue-threatening service issues.

Extensive Phone Support
The platform supports the most popular subscriber phones and modems available today. Using the same phones that subscribers use lets you simulate their experiences on your own or a competitor’s network.

Phones also provide access to Layer 1, 2, and 3 protocol measurements, including RLP, RLC/MAC, and LLC parameters (where appropriate), that are essential for optimizing and troubleshooting wireless networks.
A phone-only solution can be used to:

- Test network parameters to quantify your network the way subscribers perceive it
- Collect and record network information messages including network ID and cell identities
- Evaluate call-processing operations: setup, disconnect, blocks, and 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, and LLC
- Quantify wireless data users’ quality of service (with data measurement options)

**Network-Independent Problem-Solving**

In the multitechnology (2G/3G/LTE) environment of today’s wireless networks, it is essential to equip your RF engineers with the right tools. The RANAdvisor Receiver has been developed to enable RF engineers to visualize the air interface and quickly identify and resolve radio access network (RAN) issues.

The market-leading receiver supports up to four simultaneous technologies and up to eight simultaneous bands.

- 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 eight RF bands) and multi-technology operation in a single compact hardware package
- GSM, CDMA, WCDMA, LTE-FDD, and LTE-TDD support
- Built-in 50-channel GPS for high-accuracy location measurements
- Software-upgradeable hardware platform for extended product life

*Not supported on the W1314B*
PC Tel Receiver Support

RANAdvisor supports the PCTel receiver.

For more information, refer to the RANAdvisor Receiver configuration guide or contact a Viavi representative.

WiFi Characterization

Characterize WiFi hotspots using either the PC WiFi connection or a WiFi-enabled dongle.

Powerful Platform Features to Address Network Optimization Challenges

Many integral features are common to the platform software, irrespective of technology that can record and playback data sets, export 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 online help and tutorial facilities.

Real-Time KPI Reporting (SUS Lock feature*)

Real-time KPI reporting ensures you will not have to wait until the end of a collection period before finding out that you need to repeat the test. RANAdvisor’s real-time KPI reporting will advise you immediately a problem is detected, letting you make real-time, pragmatic decisions about your tests. This saves you time, and ensures that you can complete the test during a single visit.

System Performance

Application performance KPIs:
- FTP throughput
- iPERF throughput
- PING round-trip time

Network quality and performance KPIs:
- PDSCH throughput avg/min/max
- PUSCH throughput avg/min/max
- RLC throughput avg/min/max
- RSRQ avg/min/max
- SINR avg/min/max (UE based)

Network coverage:
- Serving RSRP avg/min/max

Network Mobility
- Handover time (intra-frequency)
- Handover time (inter-frequency)
- Handover time (inter-RAT)
- Handover success rate

Real-time KPIs key benefits include:
- Instant identification of a problem
- More efficient data collection and processing
- Real time updates allow you to take action during rather than after data collection
- KPIs stored in log file for later analysis
- Pre-defined KPI set
- KPI selection mechanism and integration with data items tree

* Features indicated as SUS Lock will only be enabled on systems with a currently valid SUS agreement.
Managing Projects

The platform project concept combined with its device manager gets systems up and running extremely quickly, right out of the box, providing a new level of control for managing drive teams. A project is defined as a collection of views with associated hardware, measurements, call sequences, events, and map/chart settings that can be defined even without connected hardware. Projects can be shared and distributed because the associated layouts and settings are saved with the project file. Users can clone a project to make a change or to base a new project on an existing one, minimizing setup time and increasing staff efficiency.

Flexible User Interface

The flexible GUI enables configuring of each system to the exact needs of the engineer using it. The use of projects lets multiple engineers use the same system with their own specific settings, making it easier for everyone involved. Measurements and graphs can be moved and changed as needed. The GUI lets users create new lists, time-charts, or graph views, or choose from the default technology-specific sets and, if required, adapt them to suit their needs. They can 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, even while collecting data. Users can also save views for later use or for distribution.

Key Features

- Auto-device detection and auto-configuration
- Drag-and-drop interface
- Generate a grid containing user-selected results, even from multiple devices
- Chart, graph, and map parameter choices
- Template views are provided for each supported technology
- View synchronization synchronizes all other views to one time signature by clicking a point on a map, chart, protocol message, or event

Project Work Sheets

The platform gives full workspace management flexibility through the tabbed work sheet feature. Measurements can be displayed on any one work sheet or on multiple work sheets. Work sheets provide the flexibility to represent data and information and group views as necessary.
Test Sequencing

Creating test plans is easy with the graphical test sequencer that lets users create complex test sequences without writing scripts or code. The available tests provide a comprehensive range of test scenarios like a simple voice call test or full data network testing, such as SMS, MMS, HTTP, FTP, PING, video, PESQ, VoLTE, QCHAT, and POLQA. The sequencer lets you run serial tests or parallel so you can test the network and services exactly the way customers use them.

Graphical tree-structured sequencer

The sequencer log view lets you view test details in real time or during play-back to fully understand and analyze issues as they occur.

Sequencer log view

Instant Parameter Searching

The solution supports many devices and thousands of measurements. Manually searching through an extensive list of measurements for the ones needed can be frustrating and time consuming. The parameter-searching capability lets you instantly find any parameter associated with any technology/device and quickly drag them into a measurement view as shown saving valuable time during troubleshooting.

Parameter-searching capability

Users can drag the desired measurement into the measurement view so it will be measured during the next drive.

Measurements to run on the next drive
Quickly Correlate Related Measurements

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

Event/Alarm Monitoring

The platform provides comprehensive, flexible events management by displaying events on the route-map, chart, events list, and protocol views. In addition to audio notification, users add on-screen popup texts to alert them that an event has occurred. Event markers can be viewed during a drive test or playback and can be exported for post-processing. Users can also add events during playback to help simplify data searching and analysis.

Map Visualization

The route map view shows a map of the current position and the route traveled as data is collected within the tool. Several layers of user-selectable information can be displayed, including map layers, color-coded channel and signal information, alarm markers, and notes. Cell site locations, including site names, can also be plotted on the map when linked to the appropriate cell site database.

MapX technology provides:

- Compatibility with the widest possible range of customer-furnished maps
- Extensive range of supporting map projections (for example, WGS84, NAD27, and more)
- Up to four measurement trace plots simultaneously, with visual offsetting
- Multiple synchronized mapping views
- Outdoor and indoor configurations
- OpenStreetMap™ Visualization

RANAdvisor supports OpenStreetMap, eliminating the need for customers to buy maps and helping reduce costs. Customers still must buy the MapX mapping engine license.

Easy Visualization in Google Earth

Vizualize and analyze drive results by exporting drive measurement results, such as signal strength, markers, and the route, to view in Google Earth. Select and deselect exported data and parameters that appear in the Google Earth selection tree to view them as desired.
Use Indoors or Outdoors

The RANAdvisor platform can be used for both indoor and outdoor applications. The equipment can be deployed outdoors in a vehicle- or as a backpack-based solution. Indoor testing is extremely important today because most traffic comes from places such as office buildings, shopping malls, airports, and stadiums. For indoor applications where satellites are not visible, a simple point-and-click positioning interface replaces GPS navigation. Viavi also provides an alternative solution for indoor testing. The RANAdvisor TrueSite solution is a discreet ultra-portable solution that can be configured as a single phone or a multi-phone (and optional receiver) solution controlled by a tablet conveniently stored in a small messenger bag. Refer to the TrueSite brochure for details.

Voice Quality Verification

RANAdvisor supports POLQA and PESQ voice-quality testing technologies for fixed, mobile, and IP-based networks. POLQA was standardized by the International Telecommunication Union (ITU-T) as new Recommendation P.863, and can be applied for voice-quality analysis of HD voice, 3G, 4G, and LTE networks.

VoLTE

RANAdvisor supports VoLTE testing between two supported VoLTE handsets, letting customers validate that the VoLTE services they are delivering meet the quality customers expect. In addition to IMS-based VoLTE measurements, audio MOS measurements require the appropriate POLQA license. The following KPIs are reported:

<table>
<thead>
<tr>
<th>Measurements Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAS protocol</td>
</tr>
<tr>
<td>Call statistics</td>
</tr>
<tr>
<td>R-factor MOS</td>
</tr>
<tr>
<td>POLQA MOS</td>
</tr>
<tr>
<td>RTP analysis</td>
</tr>
</tbody>
</table>

Supports these KPIs:

<table>
<thead>
<tr>
<th>IMS Signalling</th>
<th>VoLTE Call Control</th>
<th>RTP Metrics</th>
<th>User Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIP message log</td>
<td>CM call ID</td>
<td>Sequence number (packets)</td>
<td>POLQA Voice MOS</td>
</tr>
<tr>
<td>SDP presence</td>
<td>Call success/</td>
<td>RTP packet loss rate</td>
<td>R-Factor/MOS</td>
</tr>
</tbody>
</table>

| Call duration /hold     | RTP packet jitter  |
| Call drop               | RTP packet delay variation |
| Codec type              | RTP packet one-way delay |
|                        | Codec bit rate     |

LTE-A

RANAdvisor supports LTE-A carrier aggregation measurements that enable you to characterize the component carriers used to deliver the aggregated throughput. The following measurements are made for both the primary and secondary component carriers: CellId, EARFCN, PCI, RSRP, RSRQ, and EARFCN.
Manage Valuable Data Service Quality

RANAdvisor provides a suite of data tests applicable to 2G, 2.5G, 3G, and LTE that support both circuit- and packet-switched technologies to enable you to characterize your services. Measurements can be made simultaneously across multiple networks using commercial devices. Used in conjunction with a phone/modem they provide an array of troubleshooting possibilities with access to Layer 1, 2, and 3 measurements and with these tests: email, iPerf, http, PING, FTP, MMS, and SMS.

Video Streaming with MOS

The video streaming test lets users download video streams in .3gpp format. It provides blurriness, blockiness, jerkiness, and overall MOS.

Remote Control API (SUS lock feature*)

RANAdvisor can be operated via a scripting API. If you are working in a lab or need to perform testing over a prolonged period, you can remotely control your testing from anywhere by connecting the RANAdvisor laptop to the Internet and creating the appropriate scripts. The example below shows the RANAdvisor actively testing services and the Viavi SART solution monitoring the protocol links to provide unique, detailed testing and troubleshooting capabilities.

Typical applications are:

- Labs where you need to control and synchronize multiple solutions
- Automated testing
- Remote control

The API gives you a choice of several different languages to create the controlling scripts: SOAP/XML, C, C++, Python, or Perl. Sample code is provided to show how the API can be used. The following functional areas can be controlled via the API:

- Open project
- Start/stop logging
- Set sequencer test values
- Get status of sequencer test
- Check events status
- Check system event status
- Monitor specific data items
- Export results
**Captured-Data Replay and Analysis**

The platform’s powerful replay functionality enables review of the collected measurement data. The built-in charting and mapping functions can display measurements and parameters within the collection application. Alarms can be set to trigger for specific protocol messages or when breaching user-set limits on measurement parameters. To analyze data with third-party tools, such as MapInfo or Excel, the platform’s advanced export capabilities can share all or selected data with other analysis applications. Users can select the exact set of parameters for export and filter them within the export operation to meet analysis needs. For example, they can export the number of pilots that 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.

**Post Processing — Gladiator™**

For post drive collection analysis, Gladiator G-Station is a full-featured post-processing and reporting tool. Technology-based, pre-defined area-, event-, and application-based reports help you quickly assess network coverage and quality.

With its flexible Custom Design Center, you can create presentations and reports in formats supported by most common office applications.

**Visualization Capabilities**

- Table view — presents data in tabular format
- Graph view — charts measured data over time
- Map view — displays data in geocoded thematic map layers
- Decoder — displays decoded protocol messaging

**Analysis Capabilities**

An extensive set of analysis tools for each of the main cellular technologies are streamlined through a six-step optimization process to help you complete the most common engineering post-processing tasks:

- Coverage
- Pollution
- Neighbor lists
- Events
- Troubleshooting
- KPI reports

Refer to the Gladiator Post Processing data sheet for complete details.