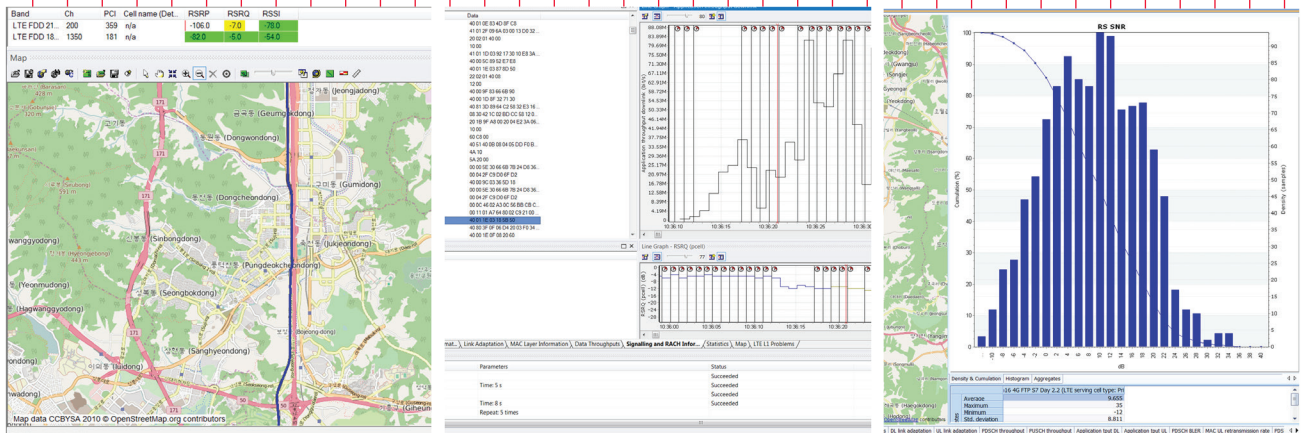# Keysight Technologies
Anite Virtual Drive Testing Toolset

Assess actual performance and interoperability of networks and devices in the laboratory.

Quickly and Efficiently Benchmark with an Integrated Solution Offering a Highly Authentic Field-to-Lab Testing Experience

Leading mobile operators and equipment manufacturers face a growing challenge to quickly and cost-effectively deploy new mobile devices and infrastructure equipped with more features and more technologies, including MIMO, Carrier Aggregation and VoLTE. This intensifies the need for a future-proof test solution that quickly and efficiently benchmarks mobile devices and network infrastructure to assess an end-user's experience of accessing mobile applications.

Accelerate Product Rollouts and Quality Assurance Testing by Integrating Industry-Leading Lab and Field Test Tools with Sophisticated Test Automation

Keysight Technologies offers Virtual Drive Testing Toolset, an automated, lab-based performance and interoperability test solution for cost-effective assessment of mobile devices and network infrastructure. The toolset uses data captured in the field to build tests that replay drive or indoor test routes by emulating real-world RF network conditions in a controlled laboratory environment. This replay can be performed with a real network infrastructure or a simulated network using the Anite 9000 network simulator, providing you with a cost-effective way to verify the end-user Quality of Experience.

Bridge the gap between lab and field testing through seamless real-world representation of the environment, significantly reducing unnecessary field testing and accelerating deployment of devices and networks. Integrate sophisticated test automation with industry-leading field and lab test tools to accurately replicate field mobility scenarios.
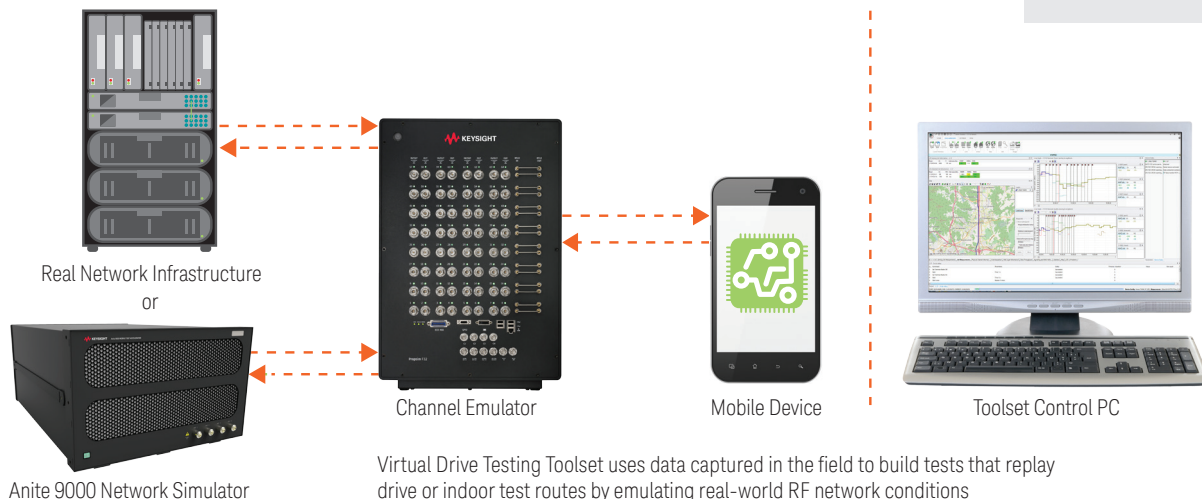
Its powerful automation capability allows repetitive testing of virtual field test routes for different use case scenarios. This enables reliable and cost-effective device benchmarking and resolution of issues found in the field. Virtual Drive Testing Toolset streamlines the performance and interoperability testing process from early R&D lab evaluation through field testing and optimization.

Extensive technology support

- LTE
- WCDMA
- GSM
- Wi-Fi

Chinese mobile operator uses Anite Virtual Drive Testing Toolset for device performance verification in high-speed train scenarios (NS-IOT lab)

Mobile operators in Europe use Anite Virtual Drive Testing Toolset for performance assessment of devices in their Network Vendor labs (NV-IOT lab).
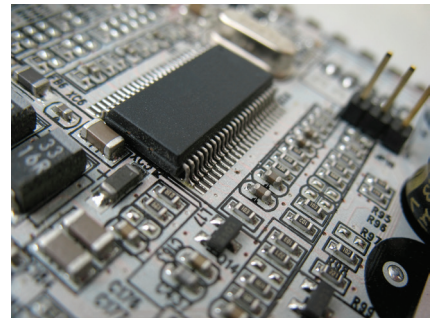
Real Network Infrastructure
or

Anite 9000 Network Simulator

Channel Emulator

Mobile Device

Toolset Control PC

Virtual Drive Testing Toolset uses data captured in the field to build tests that replay drive or indoor test routes by emulating real-world RF network conditions

Virtual Drive Testing Toolset uses data captured in the field to build tests that replay drive or indoor test routes by emulating real-world RF network conditions

Real-World, Automated Performance Testing of Mobile Devices and Network Infrastructure in the Laboratory

Mobile operators use the toolset to comprehensively verify the end-user experience by replicating and repeating virtual drive test scenarios in a controlled lab environment. Virtual drive testing helps mobile operators benchmark and test interoperability of devices and real networks prior to deployment, which enables them to identify and resolve issues earlier in the R&D process. This forms an effective addition to a mobile operator's existing device acceptance process and also helps them determine the root cause of any issues found during deployment. As the toolset supports the mobile operator's own infrastructure elements and services in the lab, test conditions are very realistic closely simulating what end-user's experience in practice.

Network equipment manufacturers use Virtual Drive Testing Toolset to verify the performance of their network infrastructure in combination with mobile devices under real-world wireless propagation scenarios. It enables them to cost-effectively and quickly verify multiple designs or revisions of a single design. This allows them to assure infrastructure performance under a wide range of usage scenarios, radio access technologies and cellular conditions using actual devices that their customers deploy to networks instead of simulated mobile devices.

Device and chipset manufacturers use virtual drive testing to reduce costly field trials by verifying new technology such as VoLTE, carrier aggregation, MIMO, beamforming and CoMP, under realistic network conditions before deploying engineers into the field. The solution also helps them conduct end-to-end performance testing and competitive benchmarking based on different wireless propagation environments and a wide range of mobility and roaming scenarios.

Instantly Access Metrics to Support Decision Making throughout the Entire Development and Launch Process

Verify end-user experience with real-life mobility scenarios

The toolset's KPI analysis enables you to automate a wide range of real-life RF conditions captured in the field, including population density, physical location, mobility scenarios and types of terrain. In other words, Keysight's virtual drive testing solution verifies the end-user experience in typical usage scenarios, such as in-vehicle, in-building, in a dense city environment or in a pedestrian area. Early detection of issues using repeatable and automated testing in a laboratory environment increases productivity and reduces test and quality-related costs.

Accelerate testing with 24/7 automation

Virtual Drive Testing Toolset offers straightforward access to ready-to-run performance and interoperability test case packages, enabling automatic evaluation of Quality of Service metrics. This significantly simplifies and accelerates test case planning and scheduling. The toolset has the capability to virtually roam between different locations across the globe, allowing you to verify the performance of a device under a wide range of roaming conditions. The solution helps verify that a device complies with any mobile operator test plan.
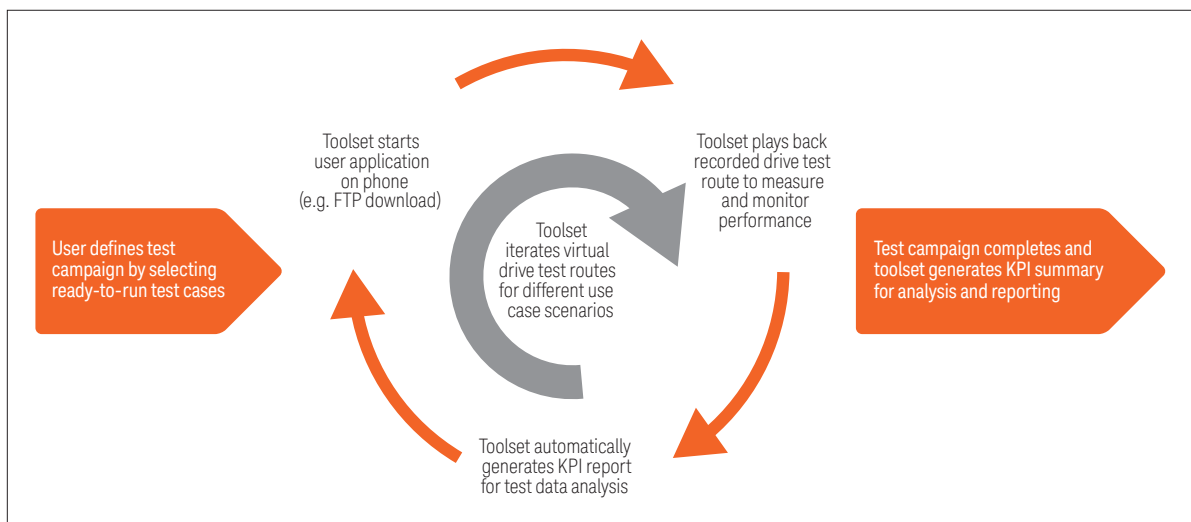
The toolset offers 24/7 automated analysis and reporting on a wide range of parameters, displaying results in intuitive graphs and maps. This makes it a highly effective evaluation tool. The 24/7 automated test execution, data logging, data analysis and reporting capabilities with clear KPI metrics, allows you to significantly speed up test processes and reduce costs. When combined with the ready-to-run test cases, it helps device manufacturers accelerate product maturity and improve performance prior to customer demonstrations and acceptance testing.

Rely on Nemo Drive and Indoor Testing Tools for Benchmarking, Optimization, Monitoring and Data Analysis of QoS and QoE

Streamline your test execution process

Other test solutions use simplified or representative network configurations, not real data. Keysight's Virtual Drive Testing Toolset uses field data derived from drive test logs to build virtual test routes that mimic specific end-user scenarios. It incorporates a number of functions, including test case execution, test campaign management, test system component integration and ready-to-run test case analysis. The toolset executes automated test campaigns based on typical usage scenarios. This enables you to readily assess Quality of Service from an end-user's perspective. The streamlined test execution process is depicted below.

Toolset starts user application on phone (e.g. FTP download)

Toolset plays back recorded drive test route to measure and monitor performance

User defines test campaign by selecting ready-to-run test cases

Toolset iterates virtual drive test routes for different use case scenarios

Test campaign completes and toolset generates KPI summary for analysis and reporting

Toolset automatically generates KPI report for test data analysis

Automated test process

Achieve Real-World Automated Performance Testing of Mobile Devices and Network Infrastructure in the Laboratory

Achieve seamless integration of test tools

Keysight has used its recognized expertise in channel emulation, wireless performance testing and network measurement, together with its market leading Propsim F32 channel emulator, Anite 9000 network simulator and Nemo drive test tools to create Virtual Drive Testing Toolset. This unique approach offers you a complete end-to-end solution revolutionizing the testing of devices and network infrastructure with quicker set-up times and more accurate results.

Virtual Drive testing Toolset uniquely allows you to use real network infrastructure or deploy a simulated network by integrating the Anite 9000 advanced network simulator. The solution enables mobile operators as well as device, chipset and network equipment manufacturers to control the device under test, conduct real-time diagnostics, log test results and analyze test data from one single easy-to-use graphical user interface. By using the same test cases, reports and tools for both lab and field testing, it is possible to streamline the entire performance testing process for Quality of Service and interoperability measurements.

Increase test process efficiency with industry-leading RF propagation channel emulation

Keysight's Virtual Drive Testing Toolset uses the Propsim F32 channel emulator to create the industry's most realistic RF conditions, bridging the gap between lab and field testing; this allows a multi-fold increase of test process efficiency with equal effort. Propsim emulates the air interface between the base station and the mobile device, recreating realistic RF channel conditions such as multi-path propagation, fast-fading and shadowing in a controlled laboratory environment.

Propsim F32 offers the highest emulation capacity for multi-RAT and heterogeneous network environments as it can test up to 32 RF and 128 MIMO channels with a single unit. This makes it a future-proof, cost-effective solution for testing carrier aggregation capable LTE-Advanced devices, requiring a greater number of channels. Its unique multi-link capacity enables easy configuration across a wide range of test configurations.

Propsim F32 is the only single unit channel emulator solution available on the market that supports a configuration of 8 LTE 2x2 MIMO cells simultaneously in the test bed, creating a real-world multi-cell environment. It also has the ability to generate mobility scenarios across multiple radio access technologies: 2G, 3G and 4G, Wi-Fi and more.

Automate End-User, Scenario-Based Testing of Mobile Devices and Network Infrastructure

Accelerate the implementation of field and lab test cases

Automate testing to assess end-user Quality of Experience when accessing typical services and applications (e.g. YouTube and Facebook). The Virtual Drive Testing Toolset's automation capability produces measurement files from wireless virtual drive tests, enabling quick and easy test case analysis. Automated test scripts are used to test data performance (e.g. FTP), voice/video quality or conduct benchmarking. The seamless compatibility between these test scripts and the Nemo drive and indoor testing tools accelerates the implementation of field and lab test cases.

Easily Import and Analyze Test Data with the Nemo Analysis Tools

Obtain instant feedback, analyze data and customize reports

Keysight's Virtual Drive Testing Toolset includes fully-scalable test analysis for benchmarking, automated troubleshooting and statistical reporting. Predetermined report templates help you compare KPIs from different operators, technologies and time frames. A single report displays these results for more in-depth analysis.

The data visualization reports are fully customizable with a comprehensive set of data views, including geo-located KPIs, grids, line graphs, bar graphs, pie charts, surface grids, color grids and spreadsheets. With these reports, you can obtain instant feedback on performance KPIs upon test case completion.

You can easily import test data to and from the Nemo analysis tools, enabling a more comprehensive analysis of test data generated in both field and lab-based testing.

Virtual Drive Testing Toolset

Virtual Drive Testing Toolset Real Network configuration:
- Test live network cells in the laboratory with real UEs or simulated UEs
- Test device network interoperability and performance with live network cells (NV-IOT)

Virtual Drive Testing Toolset Simulated Networks configuration:
- Test device interoperability and performance with simulated network cells
- Device performance test cases in High Speed Train conditions as part of major Chinese mobile operator test plan

The Virtual Drive Testing Toolset includes:
- Test campaign management
- Complete automation, test case execution, data analysis and report generation
- Test campaign creation with desired test case iterations
- Real-time status visualization of applications, devices and network KPIs

Device automation
- Supports user-defined test scripts for data calls, voice calls, messaging etc. with application tester
- Supports cellular modem specific diagnostics monitoring and forcing functions

Test KPI reporting and analysis
- Provides a Microsoft Excel KPI report per test case
- Offers a summary of the entire test campaign
- Enables benchmarking between devices and test campaigns

Manual measurements
- Vast range of user-defined measurements supported
- All cellular technologies and Wi-Fi

Propsim F32 radio channel emulator
- Emulates dynamic RF channel conditions in real-time for testing devices and base stations
- Ready and user-defined Multi-RAT test scenario building with a wide range of configuration options across GSM, WCDMA, HSPA, TD-SCDMA, LTE using the Propsim standard tools wizard
- Drive test data mapping with field-to-lab Virtual Drive Test Modeling Tool
  - Drive test data files include physical cell(s) RF powers, MIMO correlation data, multipath fading data and GPS data
  - Toolset supports Keysight Nemo drive test tools and native modem log data files
- User-defined advanced virtual drive test scenario implementation with Geometric Channel Modeling Tool to test HetNet, CoMP, carrier aggregation, Multi-RAT, 3D-MIMO & beamforming prior to first field deployments and test case implementation with interference
- Supports Wi-Fi access point and device measurements

Anite 9000 advanced network simulator
- Multi-cell LTE and Multi-RAT handovers (WCDMA/HSPA and GSM)
- Data, voice, VoLTE, video, SMS, MMS and more
- Advanced network simulation; field-to-lab network configurations and protocol playback

Optional Keysight Nemo Drive and indoor testing tools for field testing
- LTE, WCDMA/HSPA, TD-SCDMA GSM, CDMA2000, WiFi
- Applications testing with single and multiple test mobiles
- Connected tools for lab and field testing
- Smooth field-to-lab process

Key Features and Functionalities

Propsim F32 channel emulator

Virtual Drive Testing Toolset's automation capability enables you to manage global test campaigns through reliable and quick test case execution, scheduling and analysis. The solution offers a range of Quality of Service measurements, including:

Mobility performance
- Success rate of handover (Single RAT and Multi-RAT mobility testing; includes handover testing)
- Success rate of cell reselection
- Call drop rate
- Service interrupts

Data and application performance
- FTP, HTTP, UDP, iPerf
- Web browsing, YouTube, Facebook
- Video streaming
- MMS, SMS

Voice call performance
- Voice call success rate
- CS fallback performance – call setup time
- VoLTE performance

Voice call quality
- 2G/3G CS, 3G PS calls
- VoLTE

Evolving

Our unique combination of hardware, software, support, and people can help you reach your next breakthrough. We are unlocking the future of technology.

From Hewlett-Packard to Agilent to Keysight

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For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at:
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Unlocking Measurement Insights