

Benchmarker II

The reference benchmarker



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For mobile operators, quality of experience (QoE) is one of the key factors driving revenue and reducing churn. Benchmarking tests against the competition are an effective way to assess the competitive situation and trigger focused investments; they are also a valuable information source for focused promotional campaigns. Given the evolving technology trend in mobile communications and the constant demand for new services and better network performance, it is crucial that operators have a reliable, accurate, and reproducible way to measure their subscribers' QoE and compare themselves with competitors.

Benchmarker II is a fully fledged solution for large-scale drive-test-based quality of experience benchmarking campaigns. It allows mobile operators and testing service providers to assess and compare service quality (QoS and QoE) based on the most comprehensive set of key performance indicators (KPIs) and accurate test scenarios.

Benchmarker II is based on a highly reliable, modular, and scalable hardware platform which guarantees unmatched system stability, outstanding testing flexibility, high operational efficiency, and maximum future readiness. Combined with its versatile and productive data management, analysis, and reporting software suite, Rohde&Schwarz mobile network testing (MNT) offers the most powerful solution for network service benchmarking.

Thanks to many years of experience with major industry players in the field, Benchmarker II has established itself as the de facto industry standard for network service benchmarking. Benchmarker II clearly demonstrates Rohde&Schwarz MNT's leadership and expertise in the field of mobile network testing.

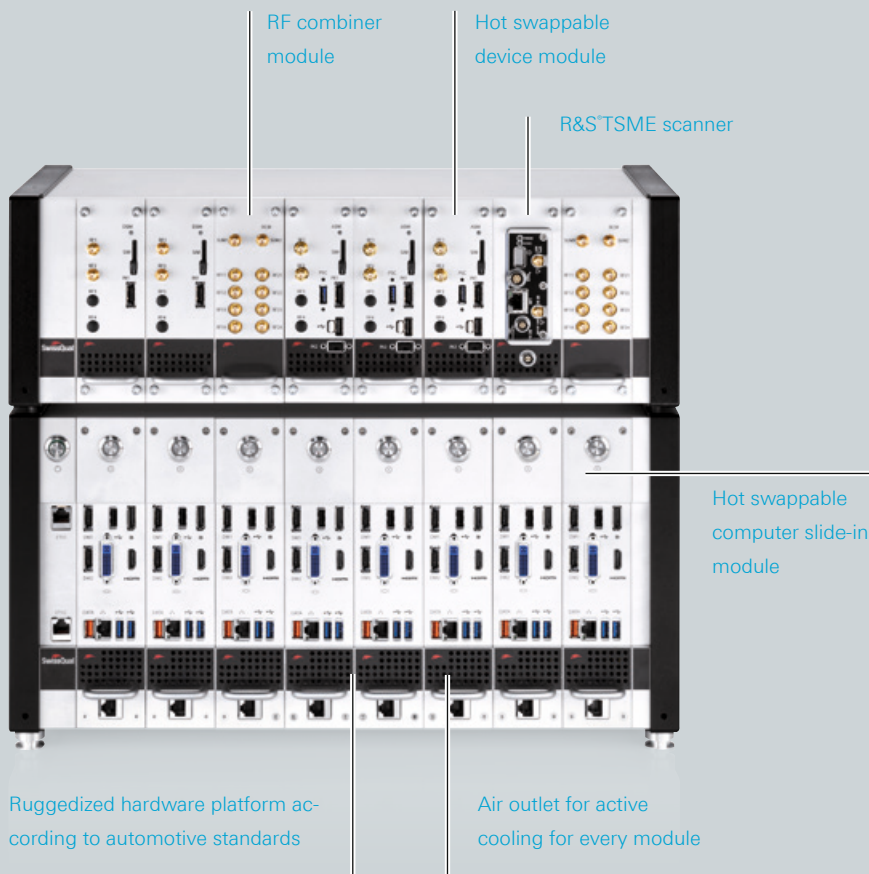
Key use case

Large-scale benchmarking campaigns

Benchmarker II is the ideal solution for large-scale drive test campaigns in all environments (highways, urban areas, the country side, etc.). The multi-channel solution can measure multiple operators and their services in parallel (up to 48 channels), collecting voice, messaging, video, and data KPIs. In addition, an optional RF scanner, such as the R&S®TSMW or R&S®TSME, can be supported to provide a full representation of the physical RF environment.

At a glance

- Modular and scalable solution for large scale and fully fledged drive-test-based quality of experience benchmarking campaigns
- Laptop-controlled system with SmartBenchmarker
- Highly reliable hardware platform designed for drive testing – shock and vibration proof according to automotive standards – and equipped with self-healing features, auto shutdown, and smart power concepts as well as active cooling features to ensure uninterrupted and accurate data collection
- Fully modular and scalable system architecture supporting up to 48 devices located in hot swappable slide-in modules
- Support of a wide range of devices such as commercial smartphones (end-user devices), USB modems, and optional RF scanners (R&S®TSMW or R&S®TSME)



Modular and scalable architecture



Controlling laptop with the SmartBenchmarker software interface

Benchmarker II

Perfection in every single detail



Future-proof concept using built-in RF antennas

The Test Device Containment Module (TCM) sets optimal conditions for uninterrupted data collection in a stable environment. It ensures maximum data quality for large-scale benchmarking campaigns with Benchmarker II and offers the following key product benefits:

- enables the use of unmodified test devices (smartphones) and their built-in RF antennas.
- ensures stable thermal environments and uniform conditions for all test devices to guarantee comparable results.
- allows simulation of multiple end-user scenarios (handheld, beside head) in different environments (pedestrian, in-car, in-house) by applying exchangeable, intended RF attenuation (absorbing foam) onto the test devices.
- supports a unique device self-healing feature to minimize failures or lost data to prevent redrives.
- offers convenient test device access and simplifies future product updates.

Enabling multiple installations

The TCM is fully compatible with Benchmarker II. Up to 16 TCMs can be installed in the special Vehicle Roof Box (VRB) with IP65 cable duct through the car roof or rear side window, or in a customized setup.



Patent pending TCM provides active cooling inside the TCM and a forced airflow around the device itself. A hinged top with a single latch to release simplifies handling.

Product Highlights

True and systematic network benchmarking

It is not without reason that Rohde&Schwarz MNT is the global leader in mobile network service benchmarking: Rohde&Schwarz MNT's unique and long-standing expertise has enabled the development of a product that immediately became an industry reference and the foundation for accurate measurements. With Benchmarker II, Rohde&Schwarz MNT offers the most powerful and mature mobile network benchmarking solution industry-wide.

Benchmarker II is designed and built on the most reliable hardware platform that provides a stable environment for precise and reproducible measurements. In addition, a unique set of features ensures an accurate and uninterrupted data collection process which results in maximum data quality and, ultimately, represents the true end-user perspective and a most accurate network status.

True end-user-based network status

Rohde&Schwarz MNT uses commercial end-user smartphones with real mobile operator firmware as test devices and offers the widest range of supported devices in the industry; new commercially launched devices are continuously integrated. Offering a broad set of test options and scenarios combined with the latest devices, Rohde&Schwarz MNT ensures that the most accurate status of a mobile network and its services are measured from a real end-user perspective.

True benchmarking approach

To ensure maximum data quality Rohde&Schwarz MNT pays attention to detail where it matters most. Measurements are fully reproducible and independent of underlying technologies. All test devices are in the same controlled and stable environment and are continuously monitored. During data collection, all measurements are validated, labelled, and evaluated in real-time, based on criteria defined over the course of many years of field experience. All tests are synchronized among different test devices for a true and systematic benchmarking process and to guarantee that results are unbiased and fully comparable.

Hot swappable device slide-in module with active cooling concept, featuring defined airflow path for a controlled and stable test device environment



Intelligent and robust hardware design

Rohde&Schwarz MNT has long-standing expertise in designing and developing drive test systems. Benchmarker II has been field-proven in the most challenging environments by top-tier mobile operators and testing service providers around the world. The hardware is designed for automotive use, guaranteeing highest system stability during large-scale drive tests in any condition. This is ensured by unique features, including:

- hot swappable device and measuring PC modules equipped with solid state disks tested against shock and vibration.
- self-recovery functionalities on each measuring device that allow automatic recovery during the measurement, thus minimizing user intervention and the need for redrives.
- independent temperature control on each module and device, allowing to measure in the most extreme conditions without affecting the measurement's reliability.

Key Product Features

Designed for large-scale drive-test-based benchmarking

Highly reliable hardware platform for uninterrupted and accurate data collection

Benchmarker II's hardware platform offers:

- shock and vibration proof hardware for drive testing in any vehicle type without restrictions, as it is fully EMC/safety compliant with automotive standards and authorization
- smart powering concepts to survive power dips during motor cranking, allowing direct operation from the vehicle's power net. Optional backup battery modules (UPS) to compensate longer power failures and avoid corrupt or lost data
- brownout protection circuits to protect vehicle batteries from deep discharge and to safely shutdown the system in case of low car battery status to avoid corrupt or lost data.
- effective, active cooling concepts to guarantee maximal performance up to highest operating temperatures
- phone interface with patented power interruption concept, automatic power fault recovery, high mechanical stability phone cradle, and external antenna low loss connectors
- system self-healing functions (system watchdog with automatic reboot function of test devices in case of device failure).
- patented data card recovery device to automatically reboot stuck devices.

Functional and ergonomic design to maximize operational efficiency

Some of Benchmarker II's key design features include:

- safety approved hot swappable system slide-in modules to minimize downtime during extensive measurement campaigns and to reduce operational complexity (e.g. ad hoc system configuration changes or extensions).
- fully front-operated rack system with special features to avoid hardware misconfiguration or system damage (e.g. individual connectors).

Fully fledged benchmarking solution

Benchmarker II provides an extensive range of functionalities to test voice, data, video, and messaging to assess quality of service (QoS) and quality of experience (QoE) from a real end-user perspective, including the complete information about the physical RF environment.

SmartBenchmarker – test configuration and control as well as data live display and file replay

SmartBenchmarker, the control console from Rohde & Schwarz MNT, allows the user to configure benchmarking campaigns from A to Z, adding all possible test campaigns before hitting the road. It offers a fully customizable graphical interface and flexible workspaces for the configuration of comprehensive benchmarking campaigns to monitor the status of tasks, units and devices, and active measurements in real-time; they also allow the individual configuration of event monitors and audio alarms for immediate notifications during testing. In addition, advanced mapping functions are available.

Comprehensive measurements (data collection, test setup/definition)

Rohde & Schwarz MNT has been working with device-based testing before anyone else – starting with the launch

of QualiPoc Android more than 10 years ago, using the first generation of smartphones. Such long-standing experience translates into maximum reliability, precision, and short time to market.

Benchmarker II is able to perform a wide range of service tests and collect a comprehensive set of results and related standard KPIs for voice, data, video streaming, and messaging based on the latest industry standards such as from ITU-T, ETSI, and VQEG. As a co-inventor of POLQA, Rohde & Schwarz MNT is in the unique position to enable operators to perform a sophisticated root cause analysis. In addition, operators can prioritize quality issues to be solved first and take action to rapidly fix the issues that are most detrimental to end customers.

Key benefits

Using Benchmarker II will reward you with long-term values, including:

- maximum QoS/QoE data quality and reliability for strategic decisions based on the de facto industry reference product from the market leader.
- reduced operational costs and lower redrive rates thanks to highest system stability and self-healing functions.
- most comprehensive and up-to-date QoS/QoE testing feature set and full compliance with latest industry standard KPIs.
- future-proof product concept thanks to a modular and scalable product design and continuous integration of new end-user devices.



Technical Specifications

Software specifications

Technologies

Extensive technology test support including: GSM, GPRS, EDGE, WCDMA, HSDPA, HSUPA, HSPA+, CDMA, EVDO, LTE, LTE-A (Cat6, Cat9)

Devices

More than 200 devices supported, including latest Android smartphones, and USB modems as well as RF scanners (Rohde&Schwarz, PCTel).

System Architecture

PC-based modular architecture, up to 8 modules supporting up to 32 devices and optional RF scanner. Controlled via the SmartBenchmarker software interface on a laptop.

Protocol Layers

Full logging and decoding of multiple protocol layers on all technologies: 3GPP, L2, L3, TCP/IP text decoding of L3 messages, and TCP/IP packets.

User Interface

Combines system management interface with user-configurable workspaces for real-time data and file replay. A special benchmarking mode provides the user with all vital system statuses and overview information, including test results.

Service Testing Options

Benchmarking or service testing with wide range of services:

- Voice telephony: speech MOS for traditional Voice/VoLTE service
- Data: Ping, FTP/FTPS DL/UL, HTTP/HTTPS, Capacity, Network Performance Test
- Video streaming: YouTube and others including video MOS using ITU J.343.1
- App services: Facebook, Dropbox, Ookla speed test

Speech Quality (MOS)

Speech quality testing to answering stations or mobile-to-mobile. Standard algorithms integrated for intrusive voice MOS assessments on narrowband and wideband channels:

- ITU-T P.863 (POLQA)
- ITU-T P.862 (PESQ)
- Squad

VoLTE

Speech quality using POLQA along with many VoLTE specific KPIs are supported on VoLTE capable devices.

Video Quality (VMOS)

Video quality testing for multimedia IP-based video services (e.g. YouTube) in the presence of encrypted bitstream data using the J.343.1 algorithm.

Control and Analysis

Device configuration, real-time results display and offline replay, KPIs provided on the SmartBenchmarker interface running on the laptop.

Data Management

Data collection performed on modules, and at the end of the measurement securely transferred to the controlling laptop.

Measurement Events and Alarms

Standard and configurable real-time status information and measurement related events available on the controlling device. Audible as well as pop-up alarms available and customizable in SmartBenchmarker.

KPI Analysis

More than 250 key performance indicators (incl. ETSI) available in real-time as well as in post processing.

Post Processing Platform

NQDI with in-depth data analysis, network troubleshooting, report generation, and historical performance trending. Flexible and customizable data selection and filtering capabilities, including time and data, network technology, operator, device type, map polygon regions, service quality threshold, layer 3 messages, and more. Customizable Excel reports based on KPIs with a powerful report generator.

Post Processing Compatibility

Compatible with major third-party post processing vendors.

Hardware specifications

Dimensions

Main chassis (CMR) 24.9 cm x 49.3 cm x 25.1 cm
(9.8 in x 19.4 in x 9.9 in)

Device chassis (DMR) 24.9 cm x 49.3 cm x 17.3 cm
(9.8 in x 19.4 in x 6.8 in)

Weight

Main chassis (CMR) 7 kg (15.4 lb)

Device chassis (DMR) 4.4 kg (8.8 lb)

Computer slide-in module (CSM) 1.2 kg (2.6 lb)

GPS

USB GPS antenna connected to the first CSM

Temperature

–40 °C to +50 °C (–40 °F to 122 °F), minimum of 0 °C
(32 °F) at the start of operation

Vibration

Vibration proof for drive testing according to automotive standards: IEC/EN 60068-2-64

Drop Test

ISTA 2A, non-operational in transport package

Power Consumption

Main chassis, fully equipped, up to 420 W

Service that adds value

- ▮ Worldwide
- ▮ Local and personalized
- ▮ Customized and flexible
- ▮ Uncompromising quality
- ▮ Long-term dependability

Rohde & Schwarz

The Rohde & Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, monitoring and network testing. Founded more than 80 years ago, the independent company which is headquartered in Munich, Germany, has an extensive sales and service network with locations in more than 70 countries.

www.rohde-schwarz.com

Mobile network testing

The company's broad and diverse product portfolio for mobile network testing addresses every test scenario in the network lifecycle – from base station installation to network acceptance and network benchmarking, from optimization and troubleshooting to interference hunting and spectrum analysis, from IP application awareness to QoS and QoE of voice, data, video and app-based services

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