



Smart Platform

QOE INTELLIGENCE TO MAXIMIZE NETWORK QUALITY AND PERFORMANCE

ROHDE & SCHWARZ

Make ideas real





Smart A NEW GENERATION PLATFORM FOR MOBILE NETWORK TESTING

The Smart platform is a suite of cutting-edge analytics combined with a modular set of software and hardware components for high-quality data acquisition that empowers mobile network operators to maximize the end-user quality of experience (QoE).

Integrated, modular and flexible, the Smart platform ensures efficient and reliable operation in all areas of mobile network testing, from engineering and optimization to benchmarking and monitoring. By effectively assessing and systematically identifying QoE centric factors, the highly innovative Smart platform offers mobile network operators the most advanced solutions to ensure network quality and performance.

More information at www.rohde-schwarz.com/smart





INITIATE NETWORK IMPROVEMENTS WITH A SINGLE QOE CENTRIC SCORE

The QoE centric Network Performance Score (NPS*) is a single metric that characterizes the overall network QoE. It is integrated into the Smart platform and is the ideal point of reference for facilitating benchmarking and reducing the complexity of targeted improvements in network quality and performance.

- ▶ The NPS methodology offers transparent, independent and accurate QoE centric characterization of a network's quality and performance. The NPS enables comparison of KPIs across countries and competitors and ultimately effective identification of key areas for strategic network investments.
- ▶ Starting from the QoE centric NPS, the collected network testing data can be fully exploited with a seamless user interface and direct drilldown functions to obtain rootcause information. This provides visibility of critical factors that have the greatest impact on the network's quality and performance, how they compare with competitors and enables prioritization of targeted actions for improvements.

* ETSI (European Telecommunications Standards Institute) TR 103 559 network performance scoring methodology for QoE centric and global network comparability

REDUCE TIME TO MARKET FOR 5G, IOT AND NEW SERVICES

Mobile operators are facing multiple challenges and increasing complexity due to high cost pressure, strong competition and the required deployment of new technologies, services and devices to deliver optimal subscriber QoE.

- ▶ The fully integrated Smart solutions platform supports all test scenarios and technologies over the entire network lifecycle from the lab to the field. It allows fast validation of network planning for the rapid deployment of new technologies and services such as NB-IoT, LTE-M and 5G.
- ▶ The Smart platform is an end-to-end mobile network testing solution that covers the entire value chain, from data collection to gaining insights automatically. The Smart platform offers tailor-made solutions to deploy new technologies and services with higher productivity and efficiency than any comparable available product.



GENERATE HIGH-QUALITY DATA TO ENSURE QUALITY RESULTS

Sound decisions for targeted network quality and performance improvements can only be made based on accurate and valid data.

- ▶ The Smart platform offers a modular set of specially engineered software and hardware components for collecting high-quality data. The provision of uniform and stable measurement conditions results in reliable and reproducible data.
- ▶ Rohde & Schwarz offers the most comprehensive set of test cases for network quality and performance assessments, from accurate RF measurements with scanners to QoE centric test cases for apps and services, including voice, video and data.

GAIN DEEP INSIGHTS FOR INTELLIGENT, QOE CENTRIC QUALITY AND PERFORMANCE IMPROVEMENTS

A powerful and effective big data analytics tool is crucial in order to fully exploit the data from mobile network assessments and gain deep network insights for targeted improvements.

- ▶ SmartAnalytics is the new generation, web-based analytics suite from Rohde & Schwarz. It offers advanced features to get more value out of collected data and deeper QoE centric insights with less manual intervention through automated features.
- ▶ SmartAnalytics with its multiple use-case driven analytics features provides visibility of key factors influencing network performance and subscriber QoE. It shows context, development trends, problems and possible degradation causes and supports drilldown from a high-level NPS view down to root cause analysis.

Smart platform

A FULLY INTEGRATED SOLUTION FOR ALL USE CASES

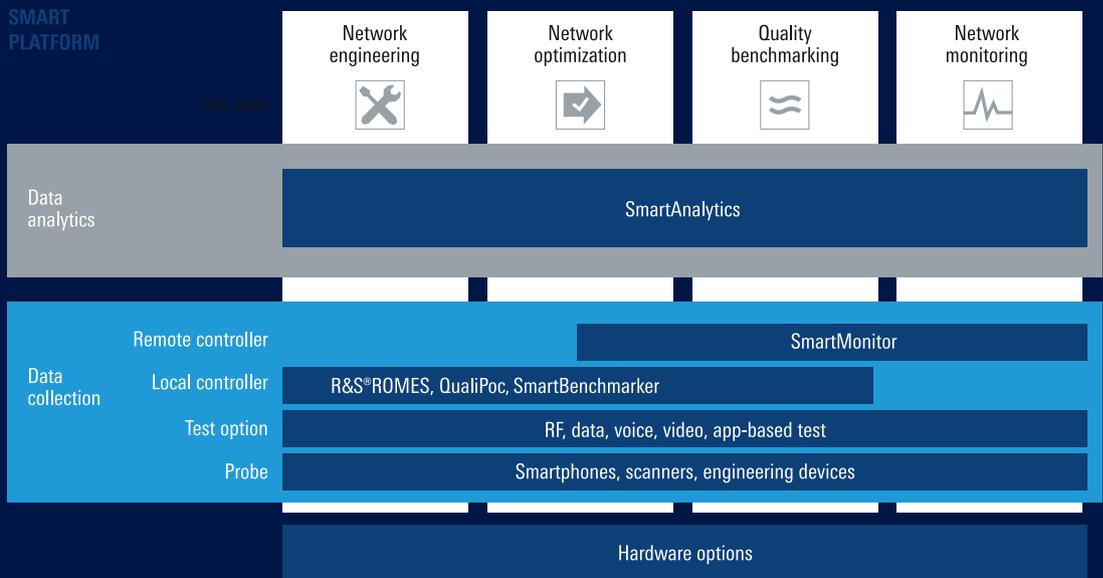
In an increasingly complex and technology-driven market, mobile network operators are facing the challenges of reducing costs and increasing competitiveness. At the same time investments in infrastructure and resources are required to ensure the successful rollout of new services and technologies such as NB-IoT, LTE-M and 5G.

The Smart platform from Rohde&Schwarz returns control of investment costs to the mobile network operator. It integrates the industry's most advanced testing solutions in a modular, flexible software and hardware platform. The fully integrated platform consists of a set of specially engineered hardware components for high-quality data collection and a new generation of data analytics that delivers deep insight into critical factors affecting subscriber quality of experience (QoE) and network performance.

The platform uses standard modules to address all use cases and test scenarios in the network lifecycle, from lab engineering and optimization to benchmarking and monitoring. Targeted use-case testing solutions and extensive drilldown functions enable operators to effectively and systematically assess and identify network QoE and performance-critical factors. Operators can ensure network quality and network performance while prioritizing strategic investments for future improvements.

Scalable, future-proof and with flexible licensing, the Smart platform helps operators reduce the time to market for new services and technologies while ensuring optimal end-user QoE and network performance.

Smart Platform

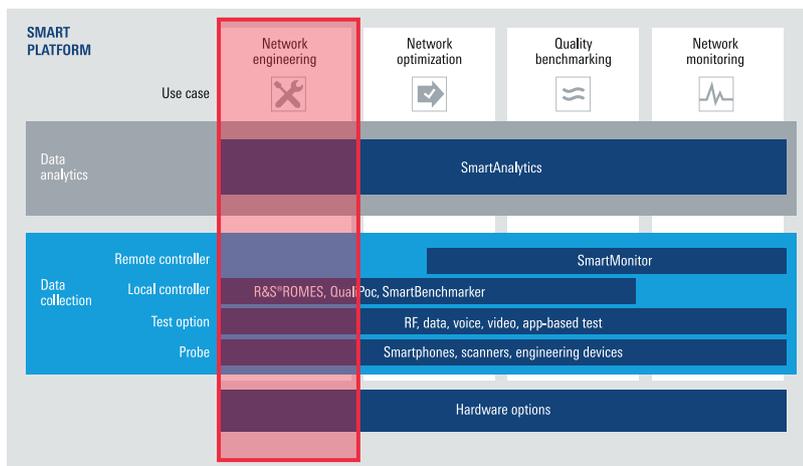


Use case centric solutions

The Smart platform from Rohde&Schwarz can be tailored to the user's specific use case. For example, the network engineering use case or a network trial rollout have a different focus and set of test and measurement requirements than a countrywide network benchmarking campaign.

The Smart platform meets these demands and provides the necessary flexibility in delivering exactly the right test solution components and options for data collection and data analytics.

Example solution configuration for use case network engineering



Use case

- ▶ 5G NR deployment and coverage measurements

Data analytics

- ▶ SmartAnalytics

Data collection

- ▶ Local controller: R&S®ROMES4
- ▶ Test option: RF environment (e.g. power, SINR, quality)
- ▶ Probe: RF scanner R&S®TSME6 or R&S®TSMA6

Hardware options

- ▶ Laptop, tablet
- ▶ Carrying bag for walk test-based testing (ZCB2)

Solution configuration for 5G NR deployment and coverage measurements



R&S®ROMES4 and R&S®TSME6



R&S®ROMES4 and R&S®TSMA6

THE FASTEST WAY FROM QOE CENTRIC DATA TO ACTIONABLE INSIGHTS

Network Performance Score

The end-user quality of experience of services and applications is essential for an operator's success.

Rohde&Schwarz has applied its prominent role in the definition and standardization of mobile network quality test methods to develop the industry's most accurate and insightful test platform for QoE measurements of applications such as voice and video. As the co-inventor of POLQA (ITU-T P.863) for voice quality tests and the inventor of VMOS (ITU-T J.343.1) for video quality tests of all kinds of video services, Rohde&Schwarz provides the industry reference against which network performance and quality is measured.

Network Performance Score methodology

The Network Performance Score methodology consists of three layers. The scoring methodology is based on the integrative QoE evaluation of service classes. The combination and weighting of different dimensions for one service class are essential (e.g. availability of the service, waiting time and the perceived service quality itself).

Each of the three dimensions has its own impact on the end-user QoE. Each dimension needs to be normalized to a common scale (e.g. 0 to 1000) and assigned its own weighting. All dimensions of one service class can be aggregated to a single performance number for this service class.

All services and applications are evaluated separately following the same multidimensional concept. All these performance numbers for each service class are weighted again and aggregated to an overall score describing the network's performance in the region where the measurements were made.

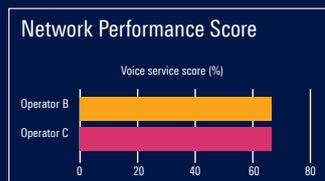
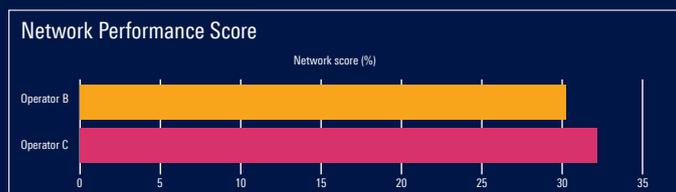
The performance in the different regions can again be weighted by importance (e.g. population density) and combined to an overall, e.g. a country-wide NPS.

Our expertise in QoE testing and benchmarking has been incorporated in the definition and integration of the Network Performance Score methodology in ETSI.

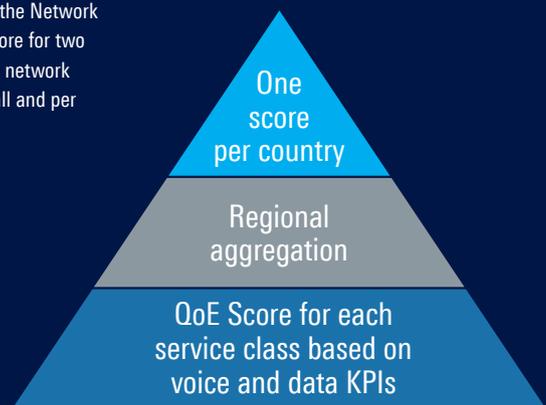
The ultimate target: maximized QoE from an optimized network

The NPS methodology implemented in the SmartAnalytics software solution with all the details from the multi-dimensional QoE evaluation provides a guideline for mobile network operators to efficiently and effectively optimize their networks. SmartAnalytics provides insights into the potential for improvement and the foundation for network optimization based on the actual vs. the maximum achievable score per test category/service/region/technology/etc.

SmartAnalytics identifies and prioritizes exactly which parameters to optimize to achieve the greatest QoE improvement and give the mobile network operator a competitive advantage.



Visualization of the Network Performance Score for two different mobile network operators (overall and per traffic type)



INTELLIGENT INSIGHTS INTO MOBILE NETWORK PERFORMANCE

Network complexity is increasing and the emergence of technologies such as IoT and 5G create new cellular use cases with more demanding subscriber and machine QoEs. It therefore becomes even more critical to understand the current network status and pinpoint areas for development that will efficiently deliver the required performance for the specific use case.

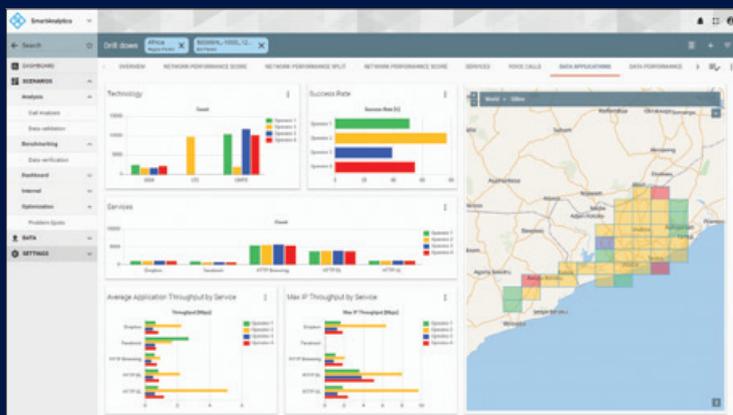
Traditional, highly skilled and labor-intensive methods of postprocessing network performance data to extract intelligence on which to make network development decisions is becoming increasingly challenging, necessitating a more automated approach that can be conducted by less skilled operators.

The new generation, web based software suite SmartAnalytics is the key tool to effectively store, process and visualize big data, gain deep network insights and ultimately build intelligence for investment prioritization based on the most critical factors influencing the network performance and quality of experience (QoE).

SmartAnalytics offers versatile, use-case driven analytics features to generate QoE centric insights for testing the entire network lifecycle, from network engineering and optimization to benchmarking and monitoring.

Thanks to its seamless user interface, the integration of the Network Performance Score and direct drilldown features to obtain root cause information based on layer 3 information, SmartAnalytics helps reduce operational complexity and increase productivity.

SmartAnalytics is a powerful analytics suite that offers all the features necessary for data management and validation, statistical and diagnostic analysis (root cause analysis), as well as descriptive and predictive analysis and reporting.



Identify critical factors and make QoE centric network quality and performance improvements with SmartAnalytics

HIGH-QUALITY DATA IS THE FOUNDATION FOR STRATEGIC DECISIONS

Mobile network operators have to make well-informed, fact-based decisions for strategic investments. This is only possible based on intelligent insights generated from reliable and accurate data. The Smart platform provides a set of specialized, modular test equipment to collect accurate, validated and reproducible data.

Industry-leading hardware

Applied research engineers and R&D engineers at Rohde&Schwarz have designed leading-edge hardware that ensures a stable thermal environment and uniform RF conditions for all network probes, effectively minimizing factors that may distort the measurement of network performance and ensuring accurate, reproducible and comparable data acquisition. Existing users, including leading global operators, have confirmed the system's high reliability and appreciate the retest rate of almost zero.



Portable multi-channel
and multi-technology
hardware platform



Thermal containment modules ensure uniform and stable conditions for benchmarking campaigns

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

Sustainable product design

- ▶ Environmental compatibility and eco-footprint
- ▶ Energy efficiency and low emissions
- ▶ Longevity and optimized total cost of ownership

Rohde & Schwarz customer support

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