R&S®BCDRIVE Broadcast Drive Test Software

Efficient coverage analysis for terrestrial broadcast signals

ROHDE&SCHWARZ

Broadcasting

Product Brochure | 03.00

R&S®BCDRIVE Broadcast Drive Test Software

At a glance

The R&S®BCDRIVE broadcast drive test software controls one or more R&S®ETL, R&S®ETC or R&S®ETH TV analyzers, including one GPS receiver, in order to efficiently analyze coverage for a large number of terrestrial broadcast standards.

Reliable coverage of specific regions is of central importance for terrestrial broadcast network operators. They use complex simulation programs during the planning phase to predict the coverage that will be provided by planned transmitter sites. However, because it is impossible to make a detailed determination of a region's complex propagation characteristics in advance, a series of real field measurements are needed after commissioning to verify that the planned network coverage was achieved.

The R&S®BCDRIVE broadcast drive test software manages this task quickly with a minimum of resources. Depending on the number of frequencies to be measured in parallel, the program can control one or more R&S®ETL, R&S®ETC or R&S®ETH TV analyzers to quickly and accurately perform the measurements needed for quality assessment and root cause analysis in accordance with a variety of terrestrial broadcast standards. The software can be run directly on the R&S®ETL so that an additional controller is not required during the drive test. All that is needed are a USB GPS receiver and the corresponding antennas.

The test results are output as a *.kmz overlay file for Google Earth. The large volume of data acquired during a drive test can then be displayed on a map, with the location of each measured value identified – the key to efficient and reliable coverage analysis. The data can also be exported in the universal *.csv format for other types of postprocessing.

Key facts

- Support of all relevant measurements in accordance with a variety of terrestrial broadcast standards
- Highly informative output through precise signal quality recording every second using the R&S®ETL, R&S®ETC or R&S®ETH TV analyzer
- Efficient drive tests through intuitive program operation and parallel measurement of multiple frequencies
- Effective conversion of test results for Google Earth, or alternatively in *.csv format for maximum flexibility

R&S®BCDRIVE Broadcast Drive Test Software

Benefits and key features

Efficient operation
- Intuitive use, even without a user manual
- Minimal configuration effort

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Flexible measurement modes for every application
- Mobile measurements
- Stationary measurements

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- Parallel
- Serial

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- Traffic light system
- Correlation analysis
- Zoomable measured value aggregation

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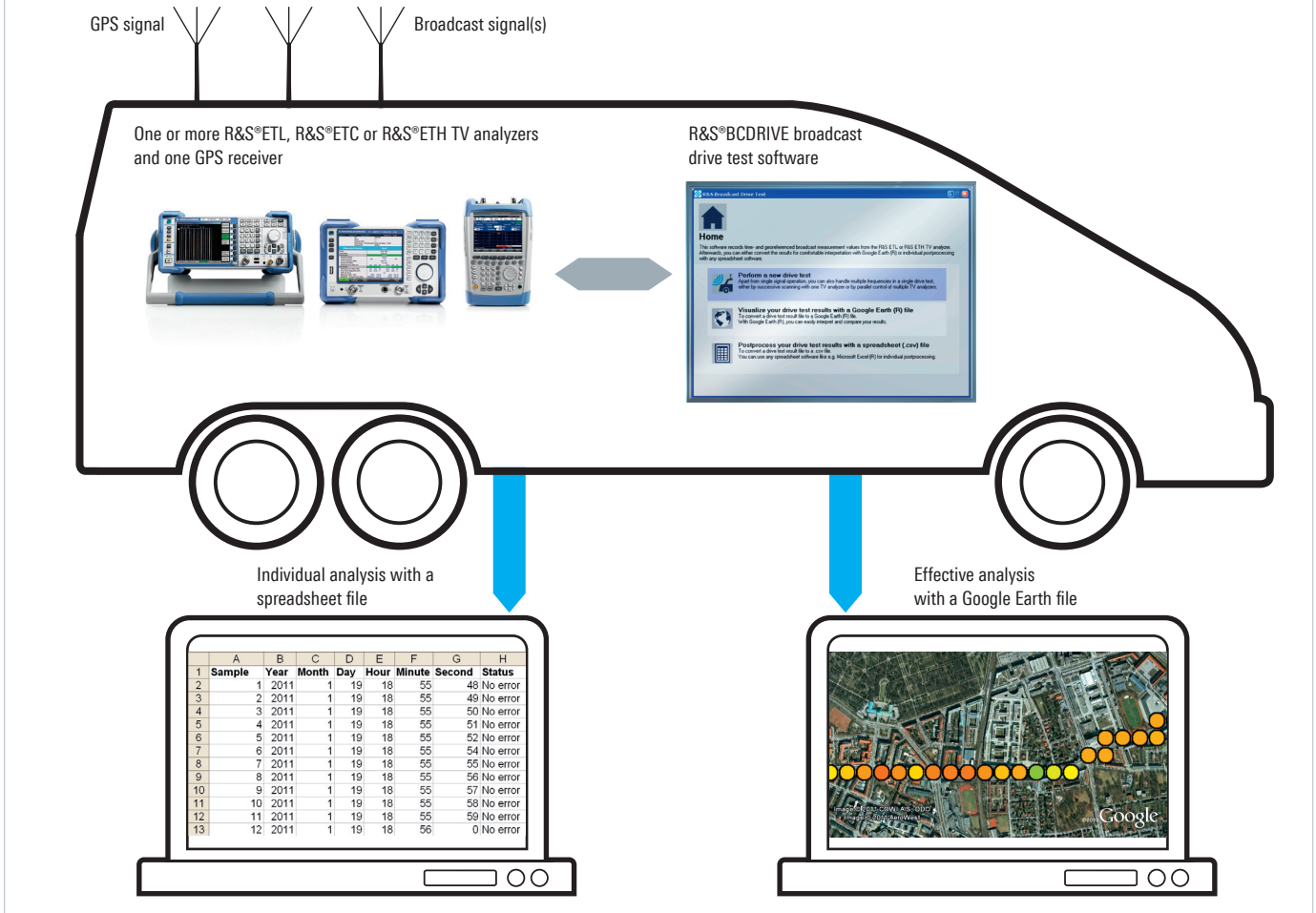
System overview



	A	B	C	D	E	F	G	H
1	Sample	Year	Month	Day	Hour	Minute	Second	Status
2	1	2011	1	19	18	55	48	No error
3	2	2011	1	19	18	55	49	No error
4	3	2011	1	19	18	55	50	No error
5	4	2011	1	19	18	55	51	No error
6	5	2011	1	19	18	55	52	No error
7	6	2011	1	19	18	55	54	No error
8	7	2011	1	19	18	55	55	No error
9	8	2011	1	19	18	55	56	No error
10	9	2011	1	19	18	55	57	No error
11	10	2011	1	19	18	55	58	No error
12	11	2011	1	19	18	55	59	No error
13	12	2011	1	19	18	56	0	No error

Efficient operation

The R&S®BCDRIVE broadcast drive test software is designed based on two central concepts that significantly reduce the time required for a drive test: intuitive operation and minimal configuration effort.

Intuitive use, even without a user manual

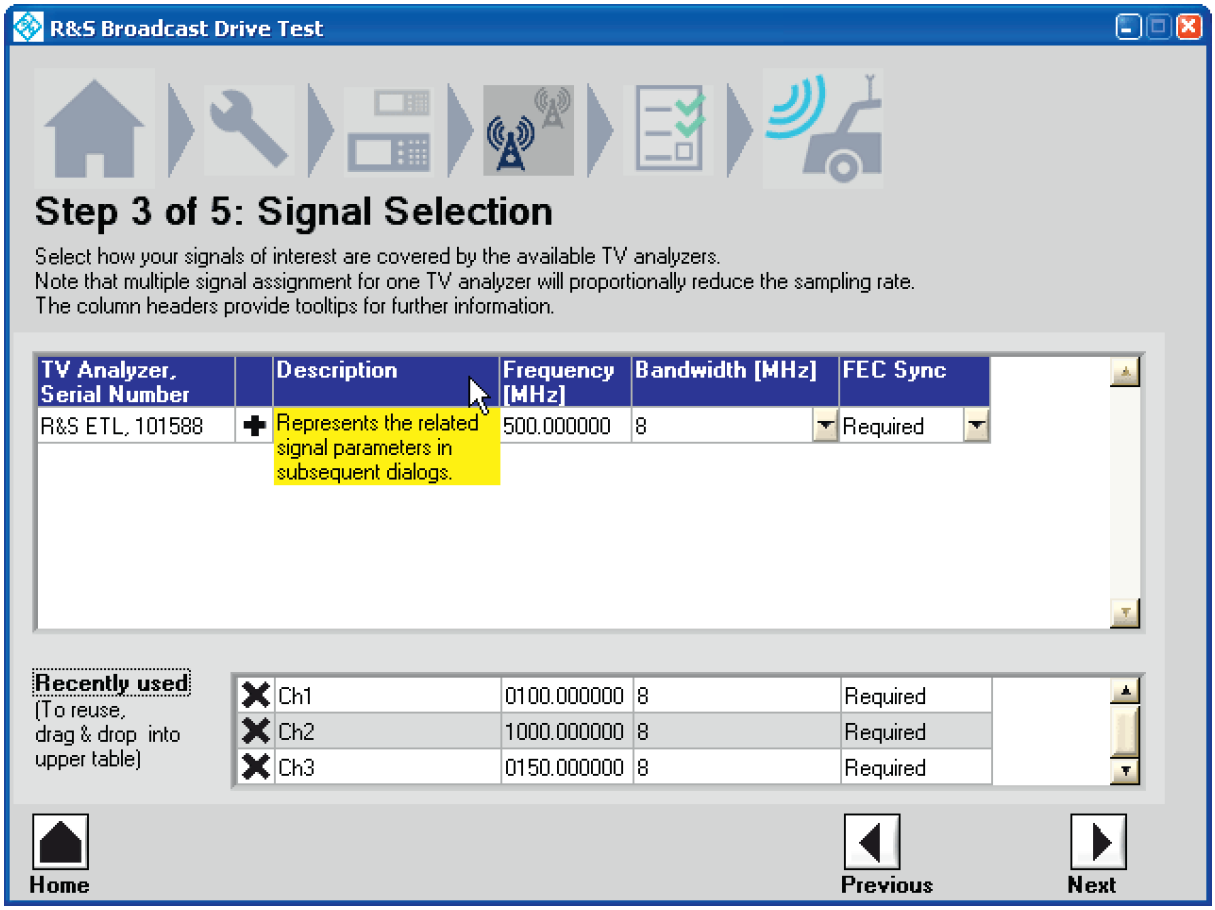
A clearly structured, task-oriented operating concept means that only a few, easy configuration steps are needed to achieve the desired result. Unobtrusive help texts combined with context-specific tooltips ensure that users understand the meaning and effects of every setting.

Minimal configuration effort

The software performs as much of the configuration as possible. For example, the software works in the background to automatically identify any available R&S®ETL, R&S®ETC or R&S®ETH TV analyzers and to preconfigure them for field measurements, through activating the preselector, automatically adjusting the level and other optimizations.

The software then provides help and default values for the few remaining settings. In addition, the last configuration used is loaded each time the program is launched.

Task-oriented, clear, self-explanatory configuration dialogs with a configuration memory make it easy to get started and save time.



Flexible measurement modes for every application

For the supported broadcast standards, the R&S®BCDRIVE broadcast drive test software and the R&S®ETL, R&S®ETC or R&S®ETH TV analyzer together offer all the measurements needed for conclusive signal quality assessment and root cause analysis.

Mobile measurements

Measurements are taken continuously while the test vehicle is moving. This makes it possible to collect information about the reception at many different locations in a short amount of time to analyze coverage. In the case of multipath reception, however, the Doppler effect will cause the signal quality to decrease as the vehicle speed increases.

As a result, the signal quality does not represent stationary reception conditions, making this measurement method useful for the following tasks:

- Analysis of the receive field strength, since this is not affected by the Doppler effect
- Analysis of broadcast services that are intended for mobile reception, and therefore explicitly include the Doppler effect in their coverage requirements
- Preparation for subsequent stationary measurements, which are then reduced to locations where mobile reception was not possible

Stationary measurements

Most terrestrial broadcast signals are received at a stationary position, which is why coverage specifications are frequently designed for this type of reception. In this situation, the test vehicle drives to a number of separate locations and takes a representative stationary measurement at each. This method takes longer than mobile measurement, which is why the R&S®BCDRIVE broadcast drive test software ensures that all instruments are configured correctly upon arrival at the next measurement point. The technician only has to push a button to start signal quality recording.

R&S®ETH – full support of DVB-T/DVB-H and ISDB-T

	Receive field strength	Signal synchronization	Modulation error ratio	Bit error ratio	Channel impulse response
DVB-T/DVB-H	●	●	●	●	●
ISDB-T	●	●	●	●	●

R&S®ETC – full support of DVB-T/DVB-H, DVB-T2 and ISDB-T

	Receive field strength	Signal synchronization	Modulation error ratio	Bit error ratio	Channel impulse response
DVB-T/DVB-H	●	●	●	●	●
DVB-T2	●	●	●	●	●
ISDB-T	●	●	●	●	●

R&S®ETL – support of many broadcast standards

	Receive field strength	Signal synchronization	Modulation error ratio	Bit error ratio	Channel impulse response	Signal/ noise ratio	MPX level/ peak deviation	RDS bit error ratio
ATSC ATSC Mobile DTV	●	○	○	○	○			
DAB/T-DMB	●	●	●	●	●			
DTMB	●	○	○	○ [1]	○ [1]			
DVB-T/DVB-H	●	●	●	●	●			
DVB-T2	●	●	●	●	●			
FM (radio)	●						●	○
ISDB-T	●	●	●	●	●			
Analog TV	○					○		

● Mobile measurements. ○ Stationary measurements.

[1] For OFDM signals.

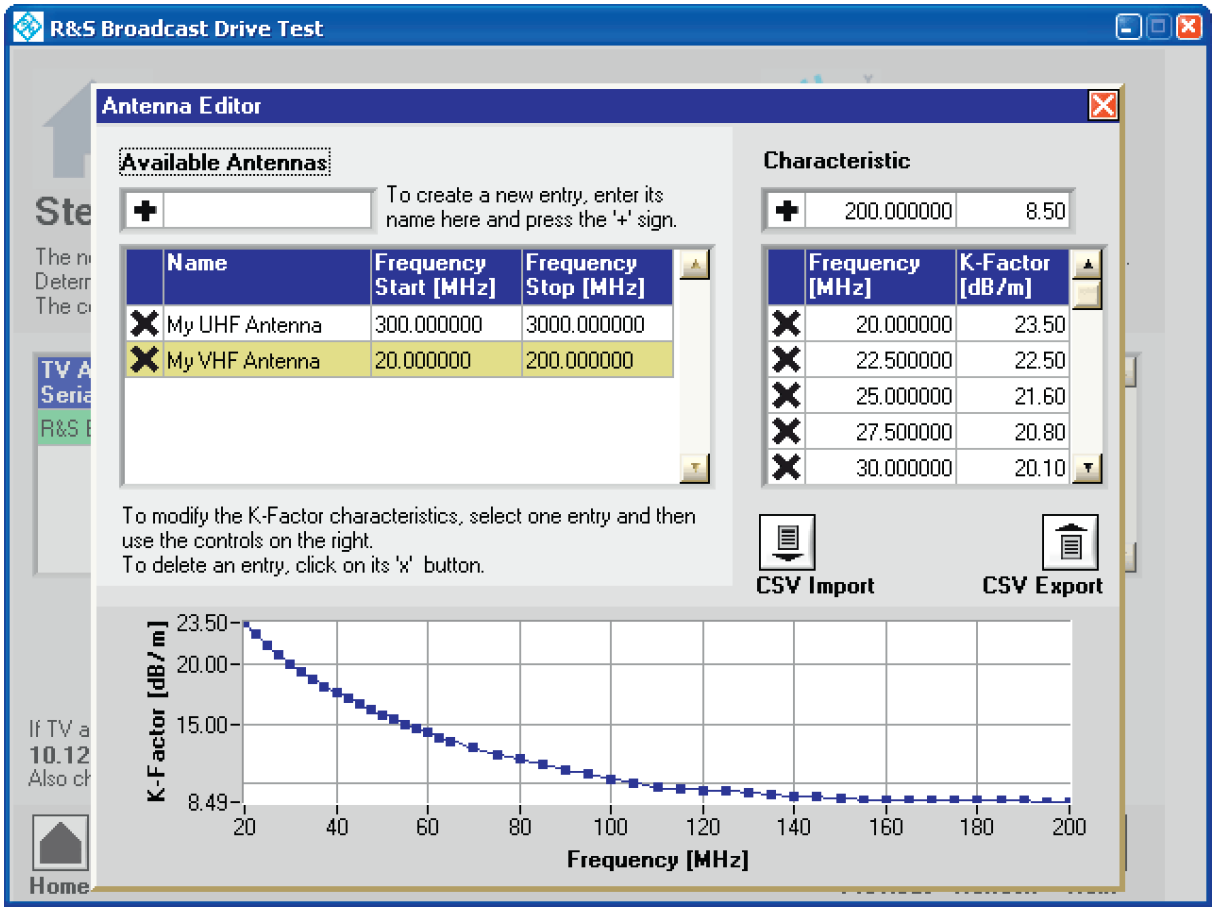
Direct calculation of receive field strength

Because the received signal power depends on the antenna being used, it is not the decisive factor when analyzing broadcast coverage at a specific location. This is why the R&S®BCDRIVE broadcast drive test software includes an integrated transducer function that uses the antenna characteristics to calculate the receive field strength.

Antenna editor

For each antenna type in use, this function determines the individual receive characteristics, which consist of frequency-dependent K factors and are defined by a number of reference points. These characteristics are then interpolated to obtain the interim values. The .csv import/export function makes manual data input unnecessary and speeds up the handling of large reference point volumes.

The antenna editor provided in the R&S®BCDRIVE broadcast drive test software administers the K factors for the antennas in use so that the receive field strength can be calculated automatically.



Measurement of multiple frequencies during a drive test

Terrestrial broadcast network operators often transmit over multiple frequencies simultaneously. An efficient drive test analyzes the coverage for each of these signals. There are two methods of doing this, and these can be combined as needed within the R&S®BCDRIVE broadcast drive test software for a perfectly balanced compromise.

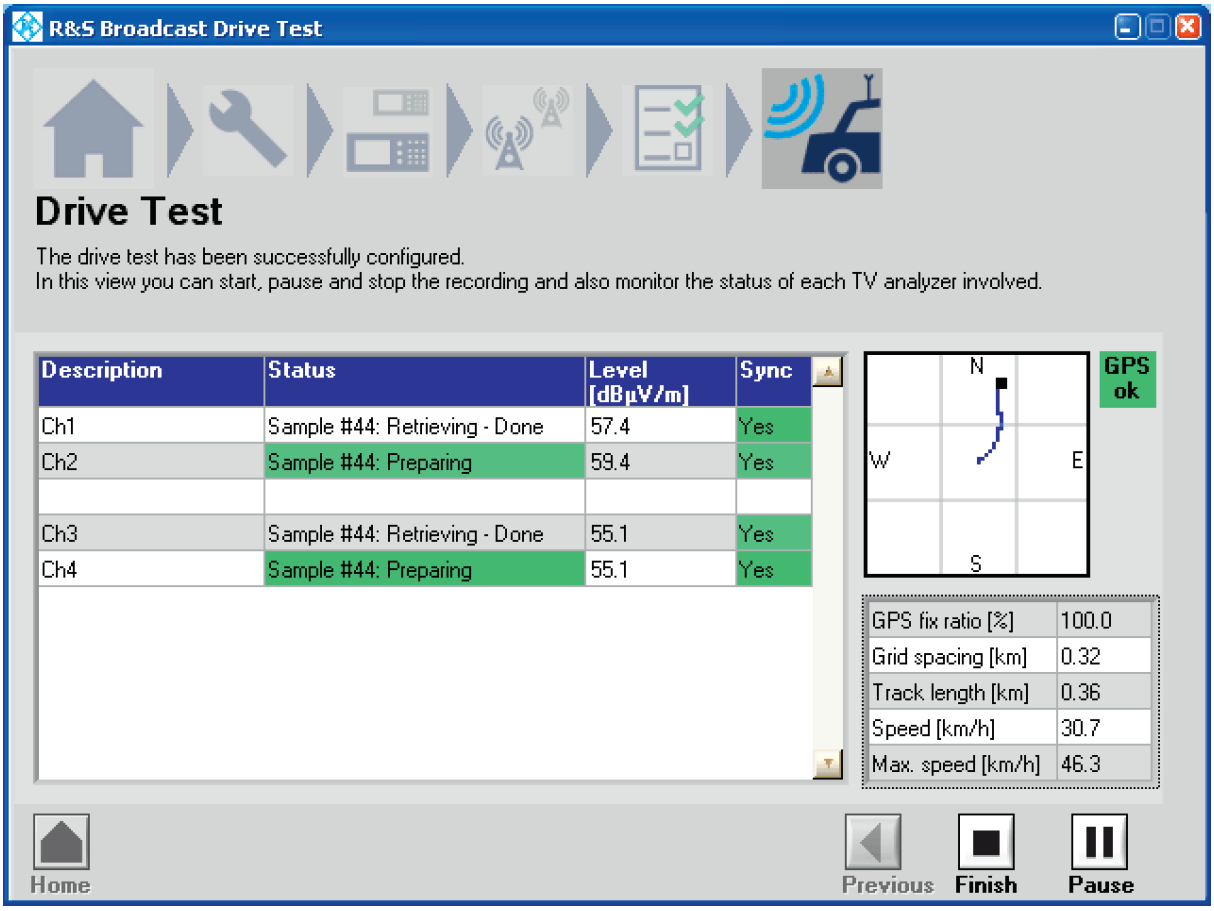
Parallel

Each frequency is measured by a dedicated R&S®ETL, R&S®ETC or R&S®ETH TV analyzer. The analyzers are controlled in parallel. This permits the fastest measurement speed, which is clearly reflected in the maximum spatial resolution achieved for each frequency during mobile measurements.

Serial

A single R&S®ETL, R&S®ETC or R&S®ETH TV analyzer measures the individual frequencies cyclically in series, at a slower measurement speed and therefore lower spatial resolution.

This view in the R&S®BCDRIVE broadcast drive test software shows a well-balanced compromise for measuring multiple frequencies during the drive test:
Two R&S®ETL TV analyzers are used in parallel. The first measures CH1 and CH2 in series, and the second measures CH3 and CH4 in series.



Effective processing of measurement results

The .csv export function in the R&S®BCDRIVE broadcast drive test software provides users with the measurement data in a form that they can use for their own analyses.

They can also display the results in Google Earth using *.kmz files. This function will be described in detail in the following sections.

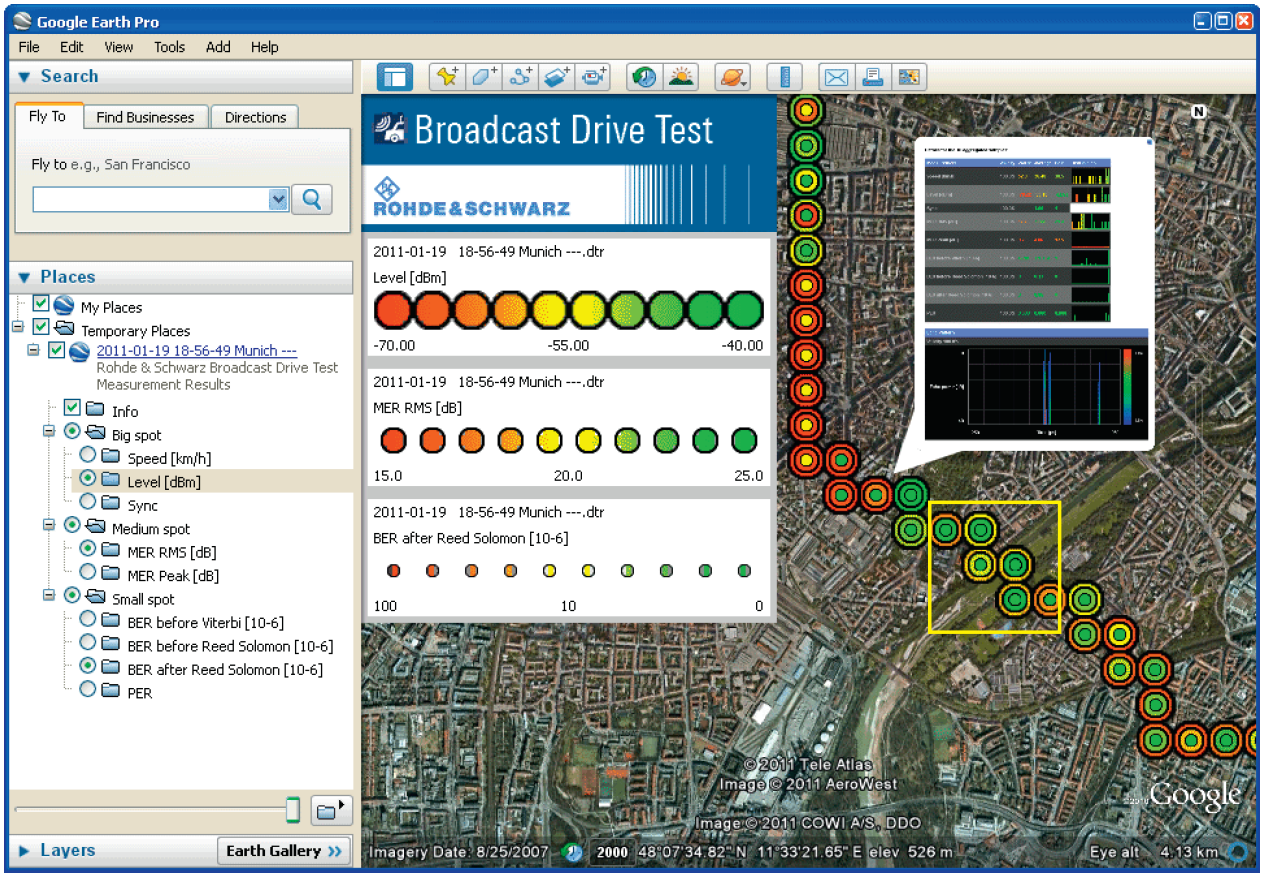
Traffic light system

Every numeric measured value can be displayed on the map as a spot ranging in color from red to yellow to green in accordance with user-defined limits. This makes critical regions easy to recognize.

Correlation analysis

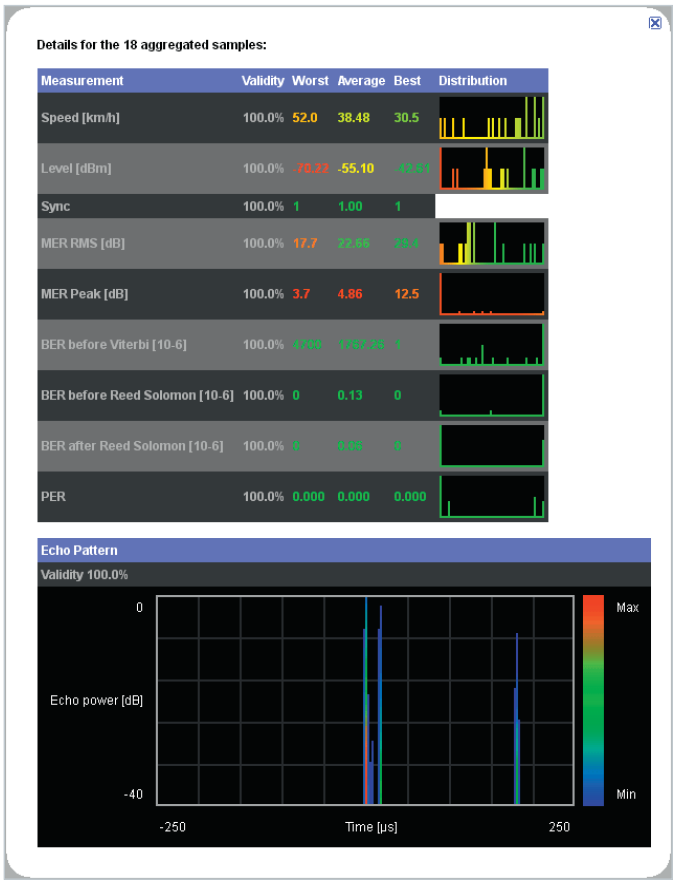
Up to three independent color gradients can be displayed at the same time, differentiated by the size of the measurement points. The color spots can be used to show the correlation between different types of measured values for the same frequency, such as the receive field strength, modulation error ratio and bit error ratio. They can also be used to directly compare a single measured value type over different frequencies. Google Earth can even blend in external data, such as 3D building models or coverage forecasts.

The powerful functionality for displaying measurement results in Google Earth allows direct, color-based correlation analysis of the various measurements. The receive level is indicated by the outer ring of the color spot, the modulation error ratio by the middle ring, and the bit error ratio by the center ring of the color spot for each measurement location. Each of these locations can be clicked to open a detailed view on a white background (see the top screenshot on page 9).

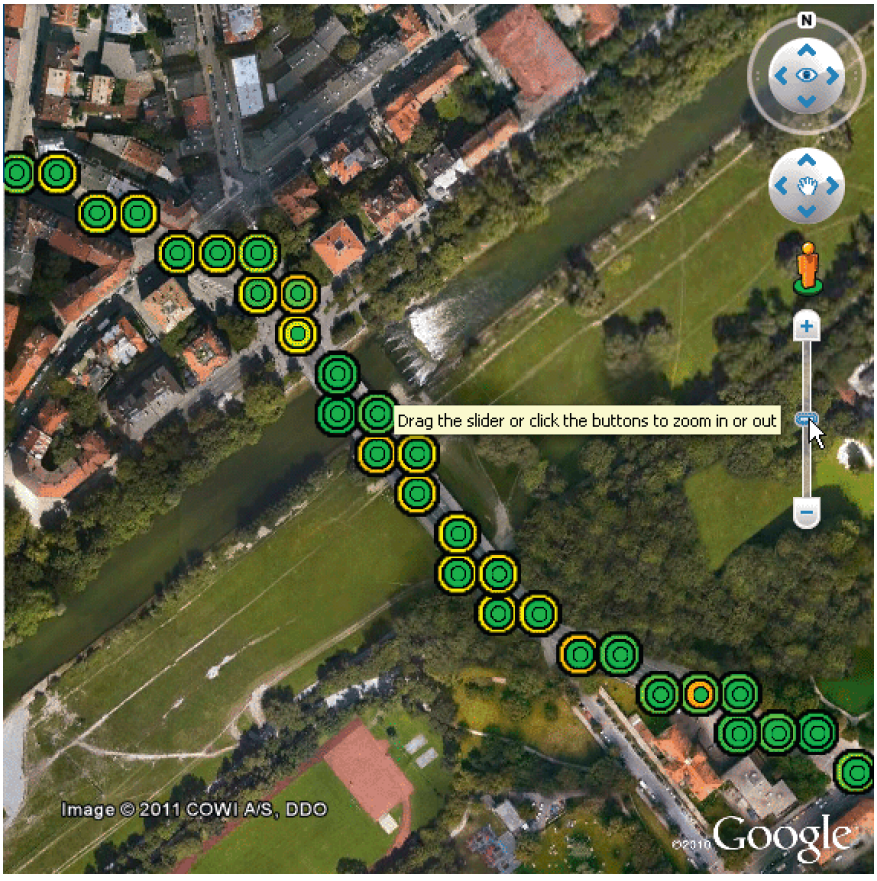


Zoomable measured value aggregation

When the zoom level in Google Earth is reduced, adjacent measurement points are automatically combined. The result represents the poorest of all the values. This prevents overlapping so that the display is always easy to read. The zoom function is also ideal for analyzing coverage for larger regions with a large amount of measurement data: Starting at the lowest zoom level that displays the entire region on the screen, the critical areas can be enlarged. In this detailed analysis, every measurement point on the map can be clicked to open an extensive, detailed view with all results for that location, including graphics showing multipath reception and frequency distributions for all numeric measured values.



This detailed view is available for every measurement location and provides a summary of all values measured at this site for in-depth analysis.



Depending on the zoom level in Google Earth, adjacent measurement points are aggregated automatically to ensure that the display remains readable. This view was obtained by zooming in on the area highlighted in yellow in the screenshot on page 8.

Specifications in brief

Specifications in brief		
TV analyzer	**R&S®ETL**	**R&S®ETC/R&S®ETH**
Instrument characteristics	for data sheet, see PD 5213.7748.22 and www.rohde-schwarz.com	for data sheet, see PD 3606.6970.22, PD 5213.9592.22 and www.rohde-schwarz.com
Maximum number of instruments in parallel	8	8
Measurement speed for complete signal quality recording	typ. 1 s	typ. 2 s
Switchover time during serial measurement of multiple frequencies	4 s to 20 s, depends on broadcast standard and selected measurements	4 s to 8 s
Memory requirements per hour for measurement results		
Internal format	approx. 10 Mbyte	
.kmz format	approx. 30 Mbyte	
.csv format	approx. 30 Mbyte	

System requirements	
Operating system	Windows XP Service Pack 2/Vista/7 (32 bit/64 bit)
Rights	administrator rights (for installation)
Processor	Pentium processor or equivalent, 600 MHz or greater
RAM	512 Mbyte
Hard drive	20 Mbyte for program installation, plus a minimum of 500 Mbyte for recording (USB drive can also be used)
Minimum screen resolution	640 × 480 pixel (VGA), 256 colors
Ethernet connection	Ethernet connection for remote control via LAN (required for controlling R&S®ETC and R&S®ETH TV analyzers; required for controlling R&S®ETL TV analyzers if the software is not run directly on the R&S®ETL or if additional R&S®ETL analyzers need to be controlled)

The R&S®ETL TV analyzer can be easily mounted in 19" test vehicle racks using the optional rackmount adapter.

Ordering information

Designation	Type	Order No.
R&S®ETL configuration example		
Base unit		
TV Analyzer, 500 kHz to 3 GHz	R&S®ETL	2112.0004.13
Hardware options		
RF Preselector	R&S®ETL-B203	2112.0327.02
Software options		
Broadcast Drive Test Software, for R&S®ETL	R&S®BCDRIVE	2115.1360.02
Drive test dependent		
For GPS reception		
Measurement Log	R&S®ETL-K208	2112.0579.02
GPS Module	R&S®TSMX-PPS (or other NMEA-compatible USB GPS receiver)	1503.4850.02
For signal analysis		
ATSC/8VSB Firmware	R&S®ETL-K220	2112.0456.02
ATSC Mobile DTV Firmware [1]	R&S®ETL-K320	2115.1553.02
T-DMB/DAB Firmware	R&S®ETL-K250	2112.0533.02
Digital Demodulator for DTMB	R&S®ETL-B215 (or R&S®ETL-B216)	2112.0156.02
DVB-T/DVB-H Firmware	R&S®ETL-K240	2112.0556.02
DVB-T2 Firmware [1]	R&S®ETL-K340	2112.0527.02
FM (Radio) Firmware	R&S®ETL-K110	2112.0410.02
ISDB-T Firmware	R&S®ETL-K260	2112.0485.02
For test vehicle installation (optional)		
19" Rackmount Adapter	R&S®ZZA-S334	1109.4487.00
DC Power Supply, 11 V to 19 V	R&S®ETL-B230	2112.0256.02
Lithium-Ion Battery Pack, 10 Ah with charger	R&S®ETL-B235 (R&S®ETL-B230 required)	2112.0262.02
R&S®ETC configuration example		
Base unit		
Compact TV Analyzer up to 3,6 GHz	R&S®ETC	2116.5000.04
Compact TV Analyzer up to 8 GHz	R&S®ETC	2116.5000.08
Software options		
Broadcast Drive Test Software, for R&S®ETC	R&S®ETC-K930	2116.5146.02
RF preselection up to 3,6 GHz	R&S®ETC-K1	2116.5098.02
RF preselection up to 8 GHz	R&S®ETC-K1	2116.5181.02
Drive test dependent		
For GPS reception		
GPS-Empfänger	R&S®HA-Z240	1309.6700.03
For signal analysis		
DVB-T, DVB-H realtime analysis	R&S®ETC-K140	2116.5100.02
ISDB-T, ISDB-TB realtime analysis	R&S®ETC-K160	2116.5117.02
DVB-T2 realtime analysis [2]	R&S®ETC-K240	2116.5123.02

[1] R&S®ETL-B300 FPGA extension board (order no. 2112.0385.02) or R&S®ETL-B310 FPGA extension board, high SNR FM (order no. 2112.0340.02) required.
[2] R&S®ETC-B300 FPGA extension board (order no. 2116.5230.02) required.

Designation	Type	Order No.
R&S®ETH configuration example		
Base unit		
Handheld TV Analyzer, 100 kHz to 3.6 GHz, model .04	R&S®ETH	2114.1508.04
Handheld TV Analyzer, 100 kHz to 8 GHz, model .08	R&S®ETH	2114.1508.08
Handheld TV Analyzer, 100 kHz to 3.6 GHz, with tracking generator, model .14	R&S®ETH	2114.1508.14
Handheld TV Analyzer, 100 kHz to 8 GHz, with tracking generator, model .18	R&S®ETH	2114.1508.18
Software options		
Broadcast Drive Test Software, for R&S®ETH	R&S®BCDRIVE	2115.1360.03
RF Preselection	R&S®ETH-K1	2114.1608.04/2114.1608.08[3]
Remote Control	R&S®ETH-K40	2114.1814.02
Drive test dependent		
For GPS reception		
GPS Receiver	R&S®HA-Z240	1309.6700.03
For signal analysis		
DVB-T, DVB-H Analysis	R&S®ETH-K140	2114.1708.02
ISDB-T Analysis	R&S®ETH-K160	2114.1743.02

[2] Depending on base unit model.

Your local Rohde&Schwarz expert will help you find the optimum solution for your requirements.
To find your nearest Rohde & Schwarz representative, visit
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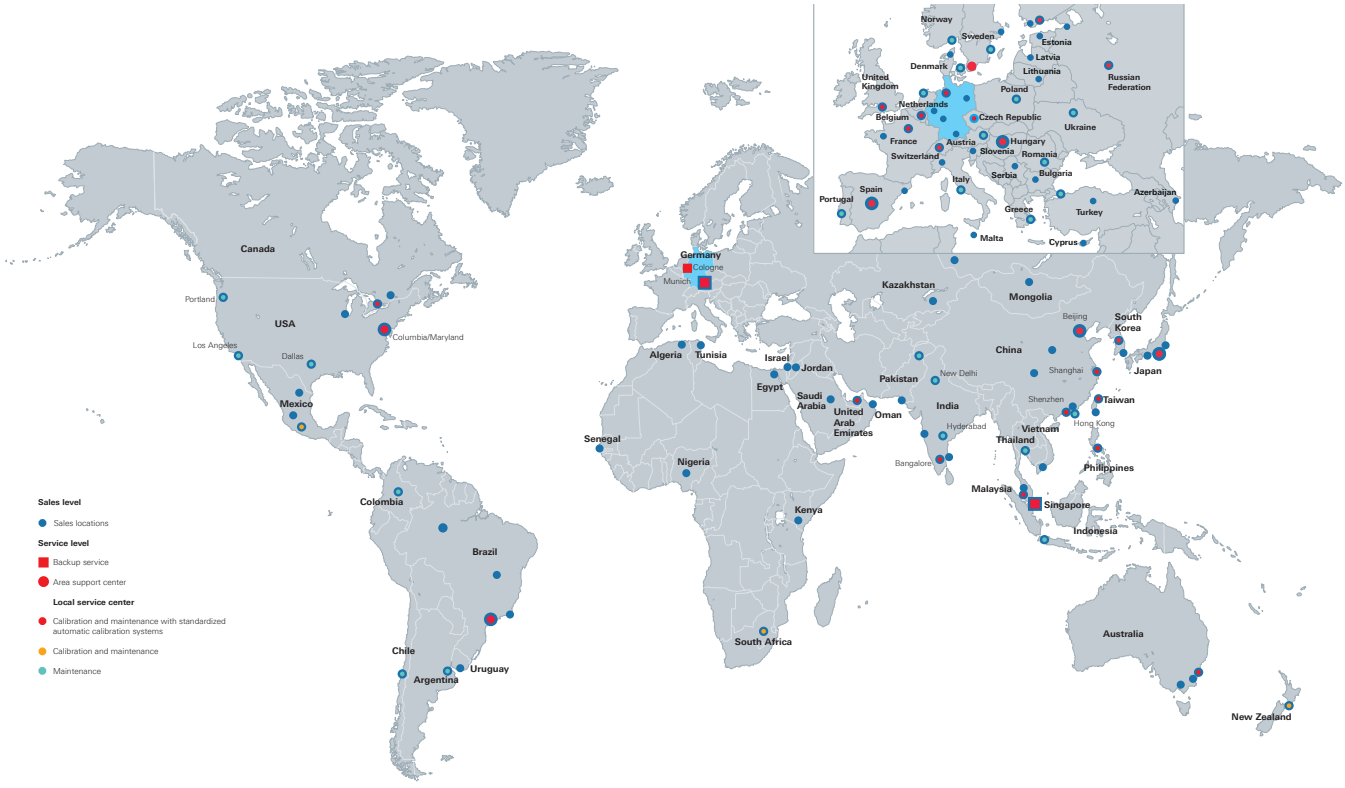
- Technical startup/application development/integration
- Training
- Operation/calibration/repair



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- Customized and flexible
- Uncompromising quality
- Long-term dependability

About Rohde&Schwarz

Rohde&Schwarz is an independent group of companies specializing in electronics. It is a leading supplier of solutions in the fields of test and measurement, broadcasting, radiomonitoring and radiolocation, as well as secure communications. Established more than 75 years ago, Rohde&Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

Environmental commitment

- Energy-efficient products
- Continuous improvement in environmental sustainability
- ISO 14001-certified environmental management system

Certified Quality System
ISO 9001

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