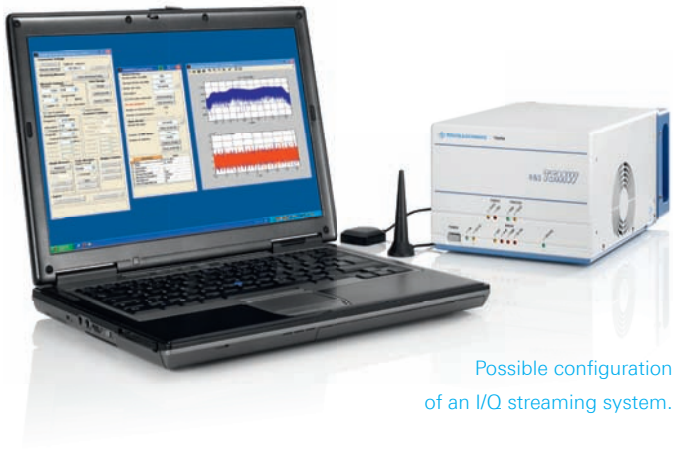
Mobile realtime I/Q streaming Application

Seamless detection with a bandwidth of up to 20 MHz



Possible configuration of an I/Q streaming system.

Your task

To keep pace with the development of new standards or components, you want to record any type of RF signal in the baseband to further process or analyze such signals. Or you want to measure an unknown signal that you want to record together with geographical information for analysis at a later time.

The R&S®TSMW radio network analyzer with the R&S®TSMW-K1 option is the ideal tool for performing the above and multiple other tasks.

T&M solution

The R&S®TSMW-K1 option for the R&S®TSMW enables users to perform I/Q baseband measurements directly from MATLAB® or a user-specific C++ application and to post-process the measurement data as required.
In MATLAB®, signal processing algorithms can be developed based on a generic C++ API and converted into a powerful C++ application with minimum effort.

The R&S®TSMW includes a variety of features:

- Two frontends with a 20 MHz bandwidth to handle center frequencies from 30 MHz to 6 GHz for independent or simultaneous measurements
- Sampling rate reduction with user-specific filtering to implement any sampling rate from 1 Msymbol/s to 21.94 Msymbol/s
- Channel splitting into up to four subchannels per channel
- Integrated preselection with preamplifier for a high dynamic range also in the presence of strong interferers
- Automatic attenuation control
- Integrated GPS

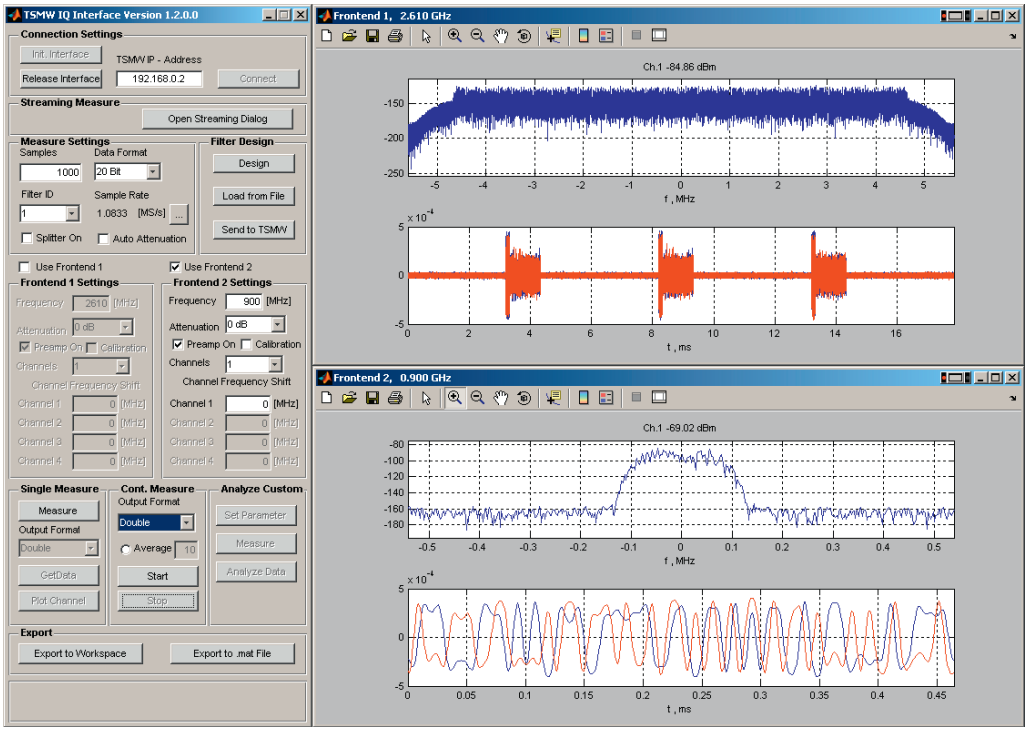
A special highlight offered by the R&S®TSMW is seamless I/Q streaming with a bandwidth of up to 20 MHz. I/Q data can either be automatically stored on the hard disk of the control PC or processed online (provided that the computing power is sufficient). Here, the R&S®TSMW can be used as a mobile I/Q recorder and the integrated GPS allows the assignment of I/Q measurement data and geographical position.
The maximum recording time depends on the selected sampling rate and bit width. Approx. 37 Mbyte/s of data is obtained for a bandwidth of 10 MHz (≙ 11 Msymbol/s and 12-bit resolution), for example. In this case, a fast 500 Gbyte hard disk allows a recording time of >200 minutes.
An extra feature of the MATLAB® streaming application allows parts of the recorded I/Q stream to be converted into the Rohde&Schwarz I/Q format and thus to be output on Rohde&Schwarz signal generators.
The R&S®TSMW is rugged and compact. Its flexible DC power supply makes it ideal for mobile scenarios.

Application

The supplied MATLAB® example application (see figure) enables users to immediately put the R&S®TSMW into operation. After defining all important parameters such as center frequency, digitization resolution and measurement bandwidth, users can start I/Q baseband measurements both in the block and streaming mode. In addition, measurement data can be exported to the MATLAB® workspace for further analysis, which already allows simple measurement tasks to be solved.

The supplied MATLAB® example application is provided in the source code. Users can easily see and comprehend how the application was implemented in MATLAB® or make program-specific expansions or adaptations to handle specific applications. Moreover, C++ example applications are offered to enable easy porting of algorithms from MATLAB® to C++. A detailed manual is provided to support developers.

For the first time, the R&S®TSMW-K1 option enables users of the mobile radio network analyzers from Rohde&Schwarz to perform I/Q baseband measurements in the field in addition to optimizing mobile radio networks. Offering unrivaled sensitivity and flexibility, the R&S®TSMW is clearly superior to other instruments in its class.



MATLAB® example application with WiMAX™ [1] and GSM measurements performed in the frequency and time domain on one receiver each.

[1] "WiMAX Forum" is a registered trademark of the WiMAX Forum. "WiMAX," the WiMAX Forum logo, "WiMAX Forum Certified," and the WiMAX Forum Certified logo are trademarks of the WiMAX Forum.

Technical information

System components (base configuration)	R&S®TSMW with the R&S®TSMW-K1 option	
	PC or powerful laptop with PCIe Gigabit LAN, fast SATA hard disk or SATA-RAID system with multiple hard disks to help ensure maximum I/Q streaming performance	
	MATLAB® license for expanding the example application	
Specifications in brief	30 MHz to 6 GHz, max. 20 MHz I/Q streaming bandwidth (depending on PC used), two independent receivers each with a bandwidth of 20 MHz, noise factor typ. 7 dB at 3.5 GHz	
	DC power supply, 9 V to 18 V, typ. 65 W, compact design: 180 mm × 130 mm × 270 mm (7.09 in × 5.1 in × 10.63 in)	
	Gigabit LAN, integrated GPS	
	digital filter bandwidths	800 kHz to 20 MHz
	max. demodulation bandwidth	2 × 20 MHz
	I/Q data format	8 bit, 12 bit, 16 bit or 20 bit

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Mobile realtime I/Q streaming | PD 5214.1643.92 | Version 01.00 | January 2009
Data without tolerance limits is not binding | Subject to change
Printed in Germany (sk)

*0.14 €/min within German wireline network; rates may vary in other networks (wireline and mobile) and countries.