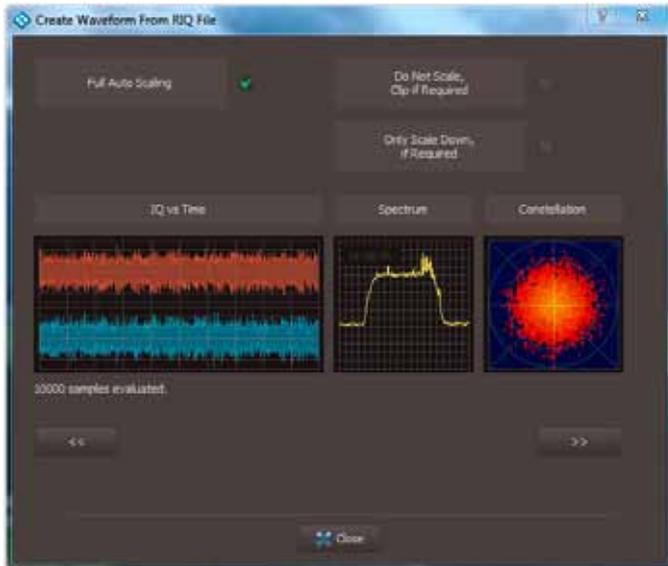


Replication of real-world RF signals in the lab

Recording, converting and playing back real-world signals



The R&S®ARBToolbox Plus is a powerful, easy-to-use set of tools for creating and manipulating waveforms for Rohde&Schwarz vector signal generators and baseband I/Q modulation generators.

Your task

Various applications and scenarios in the field of radio-monitoring require the presence of real-world RF signals. For example, evaluation of signal classification equipment or efficient training of radio operators is very difficult without the appropriate RF environment. Many types of modulation, encryption and transmission systems can-

not be simulated or generated artificially and need to be acquired off the air. In order to control when these signals appear, they need to be available to the user as recordings.

Monitoring solution

The Rohde&Schwarz solution described here consists of three separate, independent steps (recording, converting, playing back the signal of interest) which can be performed individually and independently.

Recording the baseband signal

With the signal processing concept used in all currently available Rohde&Schwarz receivers, the IF signal is available in the digital complex baseband. Therefore the raw baseband information is available in an I/Q format and virtually any RF signal which is present on air can be recorded to a hard drive.

The R&S®PR100 portable receiver is ideal for mobile radio-monitoring applications. The internal storage can be extended with an SD card of up to 32 Gbyte. With the R&S®PR100-IR internal recording option, it is possible to record either audio, spectrum or I/Q data directly to internal storage or to an installed SD card. But only I/Q data contains all the information required to reproduce the signal correctly.

To perform an I/Q data recording, the R&S®PR100 needs to be operated in the fixed frequency mode (FFM). The user tunes the receiver to the frequency of interest and sets the demodulation bandwidth to the bandwidth of the signal of interest. The demodulation bandwidth is the limiting factor for the bandwidth of the I/Q baseband recording (500 kHz in the R&S®PR100). The user then presses the "REC" button on the front panel to access the recording menu and selects the "IQ data" recording mode. The F2 key starts and stops the recording. The size of a recording file is limited to 4 Gbyte. With a bandwidth of up to 500 kHz, the user can record up to approx. 26 minutes in one file. Before removing the SD card from the receiver, the user should verify that the file has been saved correctly on the SD card.

Converting the recorded files

After recording, the raw baseband data is available in a two channel *.riq file. This file consists of one channel of “I” data and one channel of “Q” data and certain header information (center frequency and bandwidth). To be read by the signal generator, this information needs to be converted into an appropriate waveform tag. This can be done using the R&S®ARBToolbox Plus software which is available free of charge on the Rohde&Schwarz website (http://www2.rohde-schwarz.com/en/service_and_support/Downloads/Application_Notes).

The layout of the R&S®ARBToolbox Plus software is similar to a browser. The user searches for the recorded file in the browser; to convert the file, the user right clicks on the file and selects “Import RIQ” from the dropdown menu. To finish the conversion, the user simply follows all steps in the process. The converted file is a *.wv file that can be played back by a signal generator equipped with an arbitrary waveform generator.

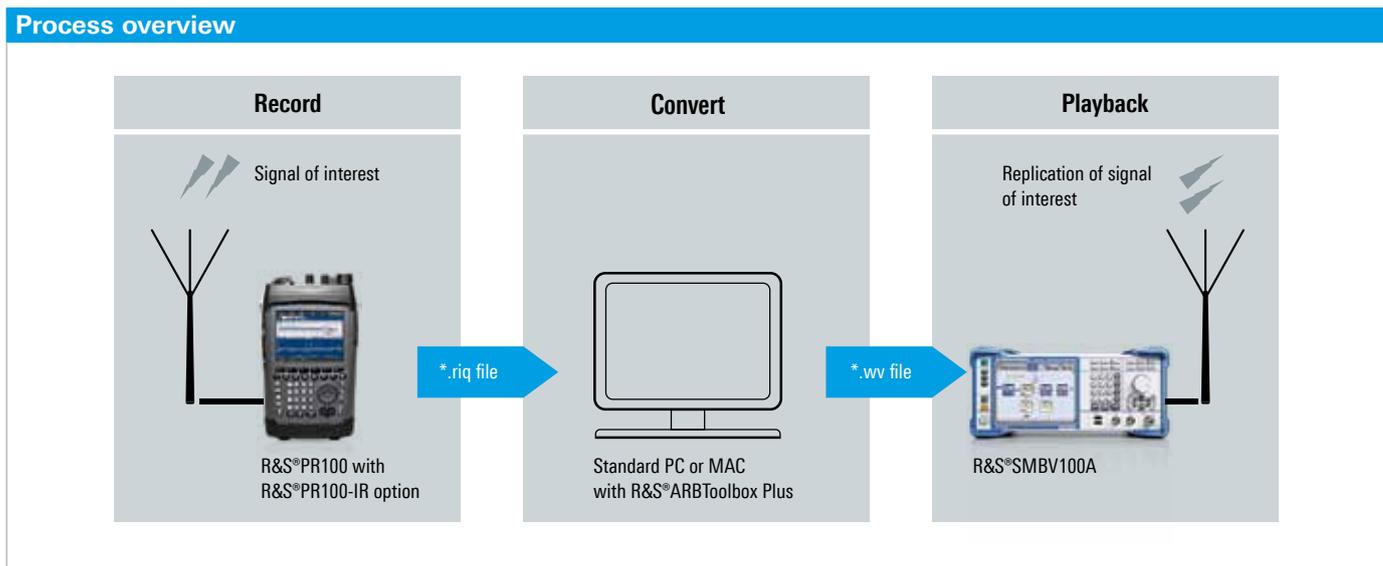
Playback of recorded and converted files

To get the previously recorded signal back “on air”, a signal generator with an arbitrary waveform generator (ARB), such as the R&S®SMBV100A, is required. The ARB is needed to reproduce the signal.

The converted files must be stored on the signal generator’s internal storage. When playing back the signal, the user has to ensure that the signal emitted by the generator does not interfere with any existing service.

The R&S®PR100 has a maximum I/Q bandwidth of 500 kHz, which is sufficient for most signal types. The lightweight (3.5 kg) receiver operates up to four hours on only one battery, allowing users to record signals virtually anywhere.

Recording the raw baseband information in an I/Q format gives the user full control over the signals, and all information is preserved in the recordings.



Designation	Type	Order No.
Portable Receiver	R&S®PR100	4071.9006.02
Internal Recording (option)	R&S®PR100-IR	4071.9358.02
R&S®ARBToolbox Plus	free-of-charge software tool	
Vector Signal Generator	R&S®SMBV100A	1407.6004.02
Baseband Generator with ARB (32 Msample), 120 MHz RF bandwidth	R&S®SMBV-B50	1407.8907.02

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