I/Q STREAMING OF LARGE WAVEFORM FILES TO A ROHDE&SCHWARZ VECTOR SIGNAL GENERATOR

Testing receivers with the most realistic radar, communications or GNSS signals often involves waveform files that are too large for the internal ARB memory in vector signal generators. Scenarios lasting minutes or hours entail files with terabytes of I/Q data. The R&S®SMW-K508 or R&S®SMM-K508 I/Q streaming options allow for such large waveform files by streaming them via Ethernet from a PC to the R&S®SMW200A or R&S®SMM100A vector signal generators.

Your task

Captures of realistic radar, communications or GNSS signals contain transmitter characteristics and non-idealities as well as radio channel properties and effects. Replaying the captures allows receivers to experience realistic signals, even when tested in a laboratory. However, waveform files with long-lasting scenarios are typically very large.

Rohde&Schwarz solution

The R&S®SMW-K508 and R&S®SMM-K508 software options allow large waveform files or recordings of realistic signals to be streamed from a PC to an R&S®SMW200A or R&S®SMM100A vector signal generator with user-friendly R&S®I/Q player PC software.

After setting up and configuring a PC and signal generator, users can open the R&S®I/Q player, select one of their waveform files and start streaming. The I/Q data is transmitted directly from the software to the PC network card for optimum data transfer rates.

An optical cable connects the network card to the vector signal generator and transfers the I/Q data. The generator modulates the I/Q signal to the set RF frequency and the resulting signal is available at the RF output.

As an alternative to the R&S®I/Q player, users can develop their own streaming application using the API, which comes as a C++ library. The library must be linked to the custom software project and the predefined interface implemented to provide I/Q data to the library.

The maximum RF modulation bandwidth achievable with the R&S®SMW-K508 or R&S®SMM-K508 option is 800 MHz at 1 Gsample/s sample rate, dependent on the PC performance and setup.

The I/Q data is buffered inside the generator for a continuous signal flow. The R&S®SMW-K556 customized digital input option that uses a Rohde&Schwarz proprietary protocol is a good candidate for latency-sensitive applications.

Setup for streaming large I/Q files from a PC to the R&S®SMW200A vector signal generator

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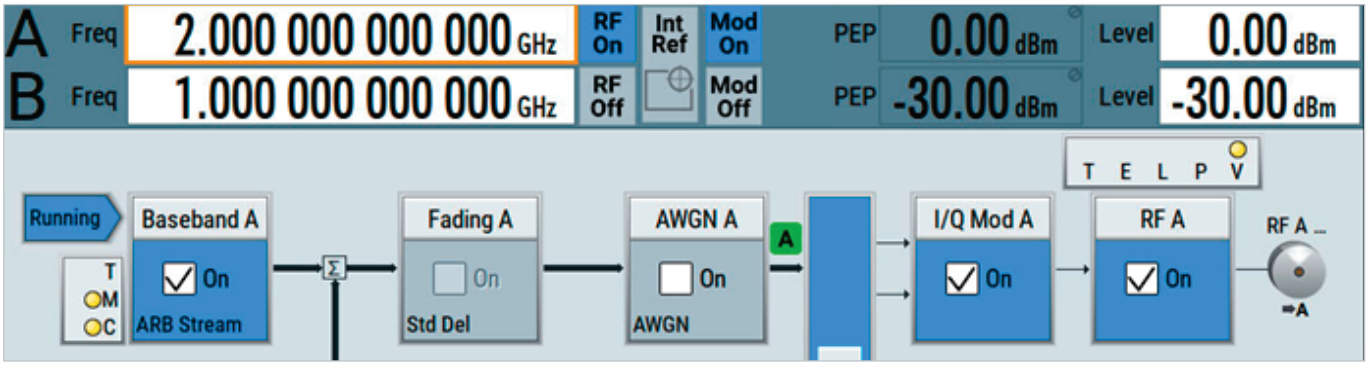
Active I/Q streaming on the R&S®SMW200A



Application

After connecting the PC via the optical cable to the vector signal generator, users can set the center frequency and level in the generator. A few simple configuration steps in the arbitrary waveform modulation (ARB) block of the vector signal generator are needed to activate I/Q streaming. After configuration, the streaming process can be started on the PC. Users can choose whether signal playback at the RF output is triggered from the PC or on the generator with an internal or external trigger event.

Screenshot of the R&S®I/Q player

Synchronization

Signals from multiple RF outputs can be synchronized. Depending on the sample rate, multiple PCs may be required to stream I/Q data for multiple RF outputs. By using the multi-instrument trigger feature, the corresponding I/Q signals can be synchronized within a single or across multiple signal generators. Because of this and the fact that I/Q data is buffered in the vector signal generators, the PCs do not need to be synchronized with each other or with the generators.

Angle of arrival

Testing multichannel receivers often requires simulating the angle of arrival (AoA). As described above, multiple RF output signals can be synchronized. Each signal can also have its baseband frequency, level and phase offsets manipulated to dynamically simulate the angle of arrival using the R&S®SMW-K573 dynamic offset control option. If required, the R&S®SMW-K545 automated RF port alignment option together with a PC software can align the RF paths for amplitude, phase and time at a selected reference plane (e.g. at the DUT RF input ports) prior to playing the I/Q signals.

Key benefits

- Replay of large waveform files
- Commercial-off-the-shelf (COTS) vector signal generators and IT hardware
- Easy to use
- Simulate angle of arrival with the R&S®SMW-K573 dynamic offset control option
- Can be used with R&S®SMW-K545 RF ports alignment

See also

https://www.rohde-schwarz.com/product/smw200a

Rohde&Schwarz GmbH&Co. KG
www.rohde-schwarz.com

Rohde&Schwarz training
www.training.rohde-schwarz.com
Rohde&Schwarz customer support
www.rohde-schwarz.com/support

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Data without tolerance limits is not binding | Subject to change