

Demodulation of four channels in parallel with just one receiver

Multichannel signal reception in parallel using digital downconverters in a monitoring receiver



Your task

You want to demodulate received signals to extract the content. You are working in a radiomonitoring environment and may not know which demodulation type and bandwidth are required or when signals will be on air. You need to demodulate signals received at different frequencies at the same time, but your budget or your installation space and power requirements limit you to a single receiver setup. Additionally, you want to store the demodulated information either as an audio file or a baseband (I/Q) file for offline analysis and further evaluation.

Monitoring solution

Using the R&S®EB500 monitoring receiver with its optional digital downconverters (R&S®EB500-DDC), you can perform the described monitoring tasks easily and conveniently.

A single monitoring receiver can demodulate (or measure the level of) up to four signals in parallel. Demodulation type and bandwidth, as well as the center frequency and the applied squelch level, can be set fully independently for each channel.

The four channels must be set to a frequency within the R&S®EB500's realtime bandwidth (up to 20 MHz) and the receiver itself has to be set to fixed frequency mode (FFM).

The main demodulation channel has a maximum bandwidth of 5 MHz bandwidth. Each of the three additional DDC channels has a maximum bandwidth of 1 MHz.

The content of four different on-air channels is demodulated in parallel and stored internally to the receiver's hard drive or streamed out via the 1 Gbit LAN interface to a remote control PC. On the remote control PC, four different files will be automatically created to independently record the received on-air signals.

The demodulated content of analog modulated signals (AM, FM, etc.) is recorded as an audio *.wav file, which can be replayed using a standard Windows media player, for example.

The demodulated content of digitally modulated signals (4PSK, 16QAM, etc.) is recorded as a baseband I/Q *.wav file, which can be further analyzed using a signal analysis software package (e.g. R&S®GX430). The data format description of the I/Q *.wav file allows third party software to be used for analysis, e.g. a Matlab® software package (programming skills highly recommended).

Application

TETRA

Per channel, a 25 kHz bandwidth is used (up to 150 kHz for wideband TETRA). Each available demodulation channel (one plus three) can be used for recording and offline analysis or decryption (use I/Q demodulation and remote PC).

GSM

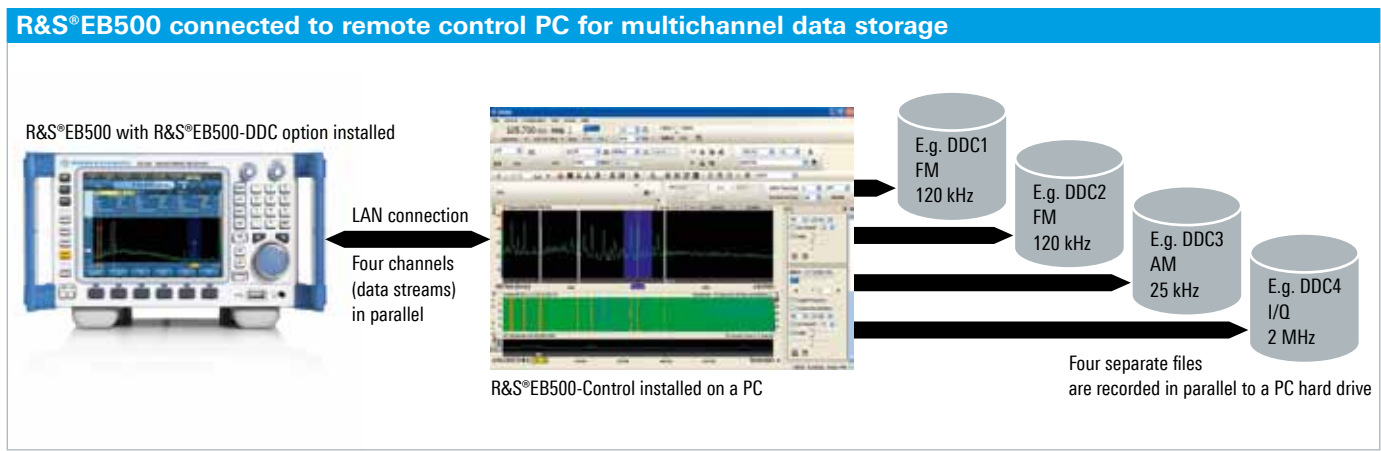
Per channel, a 200 kHz bandwidth is used (250 kHz channel spacing). Up to four neighboring GSM channels can be recorded in parallel per DDC (max. 1 MHz). This means up to 16 channels are available for documentation purposes (use I/Q demodulation).

PTT (push-to-talk)

Push-to-talk communications uses bidirectional data transfer at one frequency (one demodulation channel needed per active communications session) or unidirectional data transfer at two frequencies (two demodulation channels needed). With four DDCs it is possible to capture up to four independently active bidirectional communications sessions at the same time.

ATC (air traffic control)

Each 25 kHz wide ATC channel (AM modulated) easily fits into one DDC channel. In total, the ATC band does not exceed 20 MHz. Channels distributed somewhere inside the used ATC band can be easily covered.



Specifications		
R&S®EB500, model .03	with front panel realtime bandwidth	9 kHz to 6 GHz (fully optional) 1 kHz to 20 MHz
R&S®EB500, model .02	without front panel realtime bandwidth	9 kHz to 6 GHz (fully optional) 1 kHz to 20 MHz
One main demodulation channel		for level measurement, demodulation and digital baseband output (I/Q)
	bandwidth	100 Hz to 5 MHz
	demodulation modes	AM, FM, PM, LSB, USB, LSB, CW, I/Q, PULSE
Three optional digital downconverter (DDC) channels		for level measurement, demodulation and digital baseband output (I/Q)
	bandwidth	100 Hz to 1 MHz
	demodulation modes	AM, FM, LSB, USB, CW, I/Q, PULSE

Designation	Type	Order No.
Digital Downconverter	R&S®EB500-DDC	4072.9500.02
Monitoring Receiver, with control front panel	R&S®EB500	4072.5004.03
Monitoring Receiver, without control front panel	R&S®EB500	4072.5004.02

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