Advanced DAB/DAB+ Receiver Simulation Demo

LN2 implemented 2 demo simulators which represent the 2 solutions that LN2 provides, either a) DSP or b) chip:

a) Software (SW)
b) Hardware (HW)

HW simulator:

LN2 provides solutions for improving the performance of the receiver of a Baseband system. In order to measure the improved performance and compare it with the conventional receiver that is currently at the market, we demonstrate a transmission flow from the transmitter to the receiver with the use of the demo simulator.

The whole transmitter, as well as the channel and the FFT, are implemented in MATLAB code and represented in the corresponding yellow box "MATLAB". The solution that LN2 provides and the corresponding modules of the receiver are designed in hardware using VHDL language and implemented in a Field Programmable Gate Array (FPGA) board. These 3 modules are represented in the yellow box "FPGA". Every basic component of the LN2 receiver is implemented in hardware except of the interleavers.

In the real-time HW simulator, the user chooses desirable transmission parameters of the experiment that he wishes to observe. The Bit-Error-Rate metric is used for the performance measurement. This BER plot includes pre-computed results of the conventional receiver that is currently on the market (to the best of our knowledge), pre-computed results of LN2 receiver as well as real-time measurements.

When the simulation begins, every frame of data travels from the transmitter (MATLAB) to the receiver (FPGA) and back to MATLAB for BER measurements. In order for the flow of the simulator to work properly, there are multiple transmissions of data between the MATLAB and the LN2 modules implemented in the FPGA. The demo displays also constellation and channel response plots for every frame. These plots demonstrate the range of effects of introduction of noise to the information data. Regularly the real-time BER results from the simulator are updated and displayed in the BER plot and eventually approach the pre-computed LN2 results. Therefore, after a sufficient number of transmitted frames, the real-time results will match the pre-computed LN2 results.

As far as the communication between the FPGA and MATLAB is concerned, we used Ethernet connection and TCP/IP protocol. This communication allows us to distribute the system both on software and hardware.

SW simulator:

The difference here is that the 3 LN2 modules of the receiver are implemented in MATLAB or C code and not in Hardware language. So, the whole flow is implemented in MATLAB.