Software

OLYMP Engineering Designs a Complex LTE UMTS Repeater Using NI AWR Software

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Figure 1: The OLYMP Engineering LTE UMTS repeater

OLYMP Engineering LLC is a leading company in the field of RF and wireless systems, offering its customers a range of communication and information technologies such as development of various communication protocols, algorithms, and RF hardware for different applications.

The Design Challenge

Designers at OLYMP Engineering were challenged to design an LTE universal mobile telecommunications system (UMTS) repeater (Figure 1) that would work with a very complex algorithm. Successful deployment would only be possible with exacting modeling and simulation, so NI AWR Design Environment, specifically Visual System Simulator (VSS) software, was chosen as the best solution for the design.

The Solution

One of the key requirements was that after the system was designed in VSS, it must be simulated and measured with real signals. Thanks to the tight integration between VSS and NI hardware/LabVIEW software, the designers were able to use LabVIEW to generate the LTE signal, then the NI vector signal transceiver (VST) to acquire

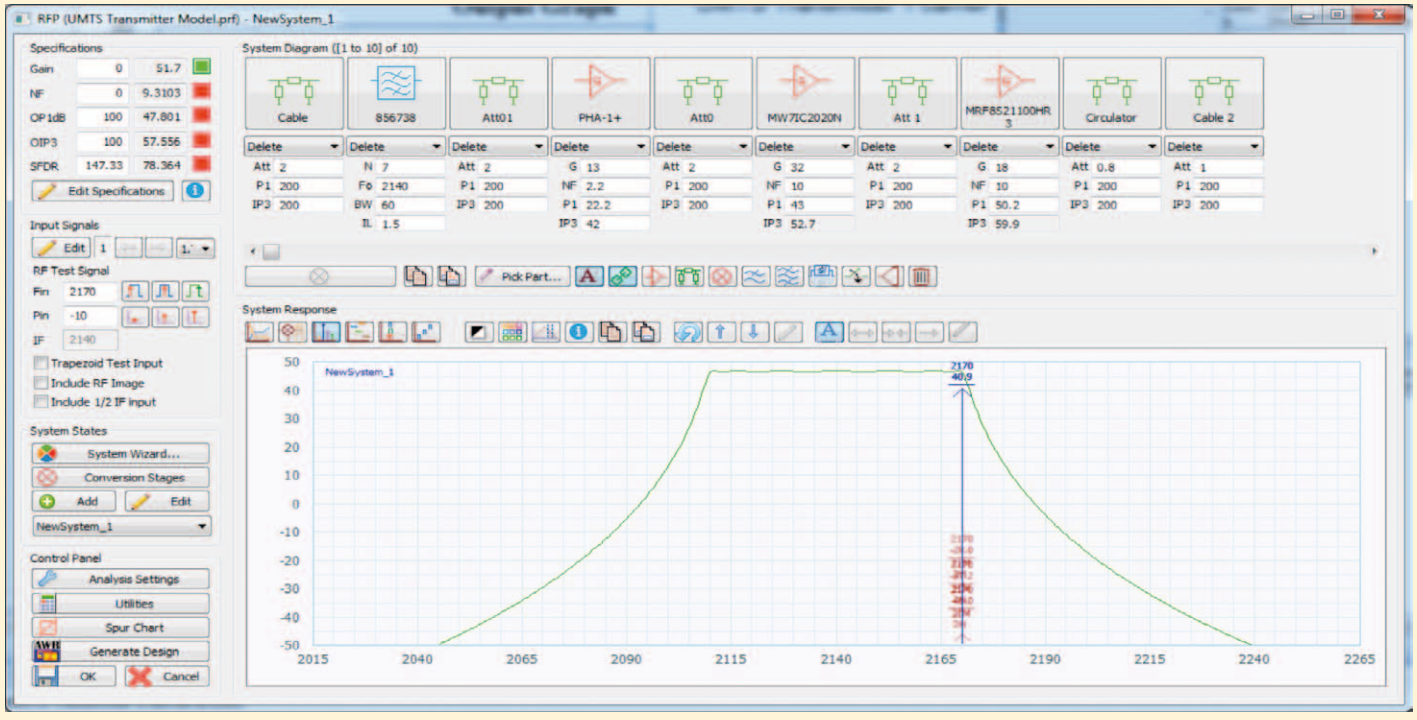

Figure 2: RFP block diagram of UMTS transmitter with matching of components

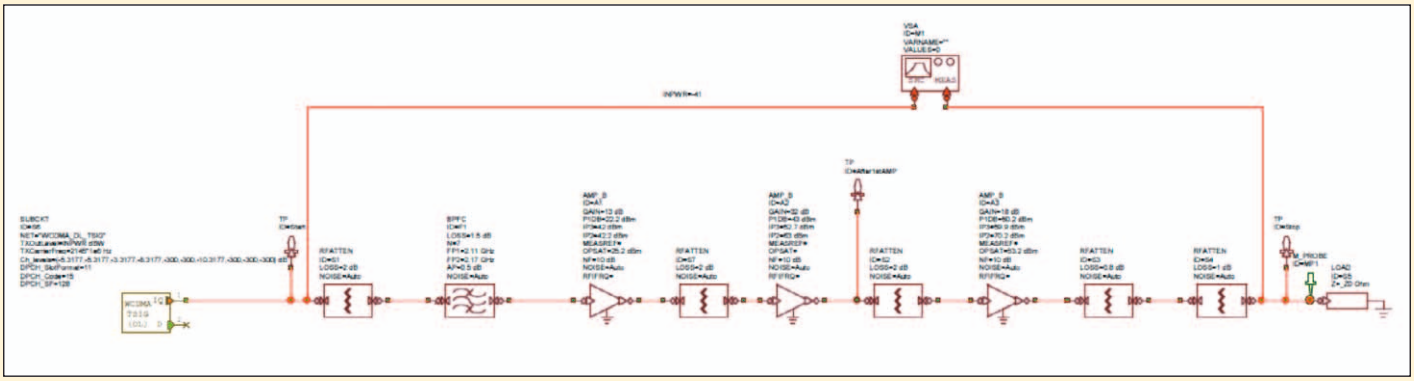

Figure 3: Single carrier UMTS transmitter diagram in VSS simulation environment

that signal and, with LabVIEW call functions, use VSS to evaluate the model with the recorded signal.

Why NI AWR Design Environment

OLYMP Engineering designers chose VSS because of the tight integration with LabVIEW and NI hardware. The combined solution delivered innovative technologies in a single integrated platform that enabled higher productivity. The designers were impressed with the breadth of the VSS libraries and its unique models, as well as tools within VSS such as the radio frequency planning (RFP) utility. RFP enabled the engineers to complete the frequency planning quickly and avoid unexpected spurs in the signal bands of the UMTS repeater transmitter, as shown in Figure 2. The resulting design, as shown in Figure 3, was then used to perform various measurements (Figure 4) such as spectral compliance, adjacent channel power ratio (ACPR), and error vector magnitude (EVM), and was optimized in VSS to ensure that all the requirements were met. The design phase of the LTE repeater took only a week, enabling OLYMP to meet a very tight deadline before starting the real hardware development. The designers were even more pleased that first results showed good correlation to simulation results. ◄

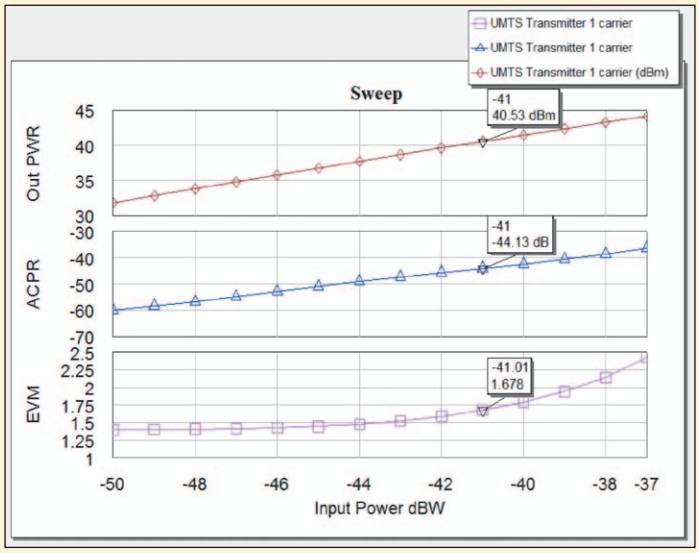

Figure 4: Dependence of output power, ACPR, and EVM on input power