ESTABLISH PRACTICAL GUIDELINES FOR DESIGN OF CONCURRENT MULTI-BAND POWER AMPLIFIERS: *Dual Band Load Pull*

Advancement in telecommunications technology, has led to development of devices that today, face an increasing need to support multiband operation. With the goal of concurrent radio transmission, this directly translates into problems with load optimization at all the supported fundamental frequencies, the related harmonics and the inter/intra band modulations.

Of particular interest to us, are the frequencies close to the fundamental; as the synthesis of required load network for optimum termination at these frequencies is not trivial. And before attempting to develop a certain load network, we need to know what the loads to be presented are. Although the estimation of termination required for ideal device operation is an area that has been explored, this does not help with practical scenarios where device parasitics come into play. Here is where expertise in circuit simulation tools that can handle nonlinear device operation, comes in handy.

Although circuit simulators like ADS have the capability to perform non-linear simulations, it is the accuracy of the device model that determines the accuracy of the predicted optimum load. Accurate Characterization of the DUT using measured LP data is a whole different area of research. Results of our Load Pull simulation, therefore, assume the availability of acceptably accurate device models for prediction of optimum load.

Generation of Load Pull contours helps to visualize the regions on the smith chart that provide a constant power to the load. This is based on sweeping a huge set of reflection coefficients at the load terminal and plotting the output power.

As noted previously, a concurrent radio transmission system needs to have the load network optimized for all intended and consequent frequencies of operation. This means that the relatively small sweep space of load impedance values at one frequency, now extends into a whole matrix of values to be swept at each of the fundamental frequencies, each of the significant harmonics and each relevant combination of intermodulation frequencies. Clearly, this is a nested sweeping process where the order of swept points increases by several magnitudes, which could translate into several days of test bench sweep time.

This process however, is not necessary, if the aim is to predict a range of complex impedances for maximizing one parameter in the circuit, say, the output power.

The current work presents an approach towards minimizing the required sweeps to drastically improve the required simulation/tuning time and demonstrates a one bench solution to perform your optimization, taking into consideration all desirable metrics.

This MS (Non-Thesis) Oral is being conducted via distance video-conferencing, using **Zoom**

Time: **Nov 17, 2017 3:30 PM** Central Time (US and Canada)

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