Husni Harb 12/13/13 Introduction to Load-Pull Systems M. Hashamiand /F.Ghannouchi

Load-pull is the manipulation of the load impedance of a radio frequency load for objectives of measuring the desired outcome performance of radio frequency power devices for high signals and extreme conditions. The device under analysis could be a radio frequency power amplifier with conventional 50Ω impedance, which is the minimal line impedance. Load-pull analysis provides the means to examine circuit characteristics favorable in enhancing the design of a circuit for optimal performance under extreme signal conditions and operating circumstances. Load-Pull procedure is essential when non-linear position is prevalent and load-Pull system is immensely capable of determining essential impedance value by utilizing impedance tuner while altering the reflection coefficient at the load. Finding the appropriate impedance in a transmission system is important in order to optimize performance of that system, bearing in mind that changing the impedance (Z) will ultimately change the reflection coefficient (Г): ГL = (ZL – Z0)/(ZL + Z0). The type of tuner used can be either passive or active which is referred to as either a passive or active load pull system.

However, both passive/active load pull systems respectively provide substantial and advantages and disadvantages. Passive devices operate optimally when measuring the desired outcome performance of radio frequency power devices for high signals and extreme conditions. Notable advantages such as high radio frequency power devices, high speed impedance, non-complicated utilization, muffled oscillation, and cost effective. It’s imperative to note that passive system has a governing limitation in high reflective coefficient analysis.

However active system highly utilized with high reflective coefficient values. Active Load-pull system operates with in parameters of Smith Chart. Smith chart enables the progression of impedance matching. The Smith chart highlights purely resistive circuit as well as several cases where a reactance prevails. A circuit can be capacitive or inductive if it is not purely resistive. In a purely resistive circuit, the load absorbs all input power. Load pull measurements/analysis can insure that the performance of the circuit at small and large signal levels is acceptable, considering criteria such as transmission efficiency and harmonic output.