Digital RF

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Abstract

Something very special happened at the turn of the last century. It didn’t get nearly as much news coverage as the millennium bug, but its impact will be experienced by most people on earth. In fact, it was a low key phenomenon that received attention only from few technologists. This phenomenon was the ability to reliably scale a CMOS transistor below a certain size, so it could digitally switch at RF frequency rate. This is when “Digital RF” was born. This opened new doors to how wireless communication could be implemented – reliably and inexpensively. The RF circuits finally entered the physics of Moore’s Law. This is nothing short of a paradigm change of RF radio design, benefits of which will be enjoyed by billions of people worldwide instead of privileged millions.

In this presentation, I will describe in the rationale behind this new paradigm. I will overview how Texas Instruments has manifested Digital RF in its Digital Radio Processor (DRP) technology.

Both digital and RF/analog designers can claim they have proven and sufficient design methodologies. The luxury of isolation let them perfect their own world without any concern for the other. But, the world demands efficiency, the latest technology for pennies. While tight integration of RF and digital in SOC is the cost effective answer, it opens a design methodology Pandora Box. What previously could be ignored, has to be considered. What was proven and sufficient, may not work anymore. The resulting paradigm change affects all aspects of the design process from system architecture to circuit design to validation to test. I will describe some of the challenges that have been solved and those remaining to be researched.