GEC09-2009-020028

Abstract for an Invited Paper
for the GEC09 Meeting of
the American Physical Society

Leveraging Microelectronics Research to Enable A Smarter Planet

TIMOTHY J. DALTON, IBM T. J. Watson Research Center

Over the course of the last fifty years, the microelectronics industry has made tremendous strides in the development and manufacturing of ever more complex integrated circuits (IC). These circuits have typically been applied to the information technology (IT) industry and have driven improvements in the computational power per dollar of many orders of magnitude. Part of the "toolbox" of skills acquired to produce integrated circuits is the ability to form desired patterns at ever decreasing sizes. The minimum controllable feature size has been reduced by six orders of magnitude (from millimeters to nanometers) during the last fifty years. With feature sizes rapidly approaching 10nm, the conventional silicon IC industry is nearing a threshold with the end of conventional silicon scaling approaching. Research today focuses on new device structure to replace the CMOS FET as the engine of the IT industry. A very exciting research area today is the concept of taking the skill-set acquired from IC research, development, and manufacturing, and applying those skills into new domains where they can enable a "smarter planet". These new domains include areas such as energy, water, and health care / life sciences. All of these are outside of the traditional IT focus for microelectronics research, yet, the new "smarter planet" domains may form the basis for future industries. This presentation will look at the evolution of IBM's research model and focus, shifting from one solely focused on IT, to one that compliments IT research with Smarter Planet domains.