

IEEE PCJS AP/ED/MTT Societies
FEBRUARY 2006 MEETING



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From millibits to Terabits and Beyond: over 50 years of innovation

Dr. Renuka P. Jindal

The history of communications and technology has witnessed a meteoric increase in communications bandwidth, triggered by three innovations over the past 50 years:

- Solid state devices: the demonstration of the point-contact Bipolar Transistor in 1947 by Bardeen, Brattain and Shockley which started the solid-state revolution, followed by the MOS Field-Effect Transistor by Kahng and Atalla in 1960.
- Communications theory: the development of Information Theory as enunciated by Claude Shannon in 1948, and increased understanding of the trade-offs between signal-to-noise ratio, bandwidth and error-free transmission in the presence of noise.
- Optical technology: the invention of laser by Schawlow and Townes in 1958 with a working demonstration in 1960.

The speaker became involved in studies of noise behavior of MOS devices in the early 1980s, when he began working on the design of lightwave communications systems at Bell Laboratories. MOS devices were being considered for use in high-performance lightwave systems. However, initial attempts at boosting receiver sensitivity and data-rates were seriously hampered by a lack of understanding of the noise performance of MOS devices. The speaker's contributions in this area not only led to a deeper understanding of the noise behavior of MOS devices, but also produced an order of magnitude improvement in their performance.

In this talk, starting from smoke signals at millibits per second, we will trace these events from a historical perspective to see how these key technologies lead to the development of modern wireless and optical networks of terabit capacity with petabits looming in sight.

Renuka P. Jindal is currently a professor of Telecommunications at University of Louisiana, Lafayette, after working for many years at Bell Laboratories in Murray Hill, NJ. Dr. Jindal is Vice-President of Publications for the IEEE Electron Devices Society, and an IEEE Fellow. Dr. Jindal continues to teach and do research in the area of random processes, wireless and lightwave device, circuits and systems. He is also very active in professional activities in conjunction with the IEEE and is an Electron Devices Society distinguished Lecturer.

NOTE: DIFFERENT LOCATION, DATE, AND STARTING TIME

Date: **MONDAY**, February 27, 2006, **5:30 pm**

Place: The College of New Jersey, Armstrong Hall, Room 136, Ewing, NJ

Information: Marisa Hutton at 609-771-2779

On-line directions: <http://www.tcnj.edu/~ccr/about/directions.html>

All PCJS IEEE meetings are open to the public. There is no admission charge and refreshments will be served.