



## SEMINAIRE EXCEPTIONNEL

de **13 h à 14 h**, amphithéâtre, Bât. INP, MINATEC,  
ouvert aux chercheurs des autres laboratoires

Jeudi 05 juin 2008

“Design of the millimeter wave LNA in CMOS 90 nm technology for  
smart dust wireless sensor network”

par Javad YAVAND HASANI

**Abstract:** Capability of sub-0.1  $\mu\text{m}$  CMOS technologies in MMW band, besides its low power consumption, high degree of integration and low cost, has made it a proper choice for Wireless Sensor Networks, in which a large number of sensor nodes should communicate data for a long time, with very limited DC power. RF front-end is the most challenging part of this node, in terms of integration and DC power consumption. On the other hand, Low Noise Amplifier (LNA) is of high importance, due to high inherent noise of CMOS technology.

In this presentation, the design and optimization of a cascade LNA in STMicroelectronics 90 nm Global Purpose (GP) CMOS process is described. Since the used technology is not a RF process, active and passive devices design and modelling for such high frequency is the most design challenge. We have developed an accurate layout-based model for MOS transistors and inductors. The models have been validated using the foundry design kit and 3D electromagnetic simulation in HFSS. Finally these models have been used in design and optimization of our LNA circuit. The LNA is single stage amplifier with cascode configuration. This configuration offers good noise performance, low power consumption and high reverse isolation.

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