

LOW COST 60 GHZ GB/S RADIO

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Abstract

The demand for ultra-high data rate wireless communication systems is increasing daily with the emergence of a multitude of multimedia applications. In particular, the needs become urgent for ultrahigh speed personal area networking and point-to-point or point-to-multipoint data link. This demand has since pushed the development of technologies and systems operating at the millimeter-wave frequencies, and overcome the current limitations of alternative solution such as 802.11n and UWB. This trend has also been reinforced by the exponentially growth of the emerging automotive collision avoidance radar applications. Indeed, the availability of several GHz band-width unlicensed ISM bands in the 60GHz spectrum represents a great opportunity for ultra-high speed short-range wireless communications. Since the mid-90s, many examples of MMIC chip-set have been reported for 60 GHz radio applications using GaAs FET and InP pHEMT technologies. Despite their commercial availability and their outstanding performances, these technologies struggle to enter the market because of their prohibitive cost and their limited capability to integrated advanced base-band processing. In addition, the combination, of a low cost highly producible module technology, featuring low loss and embedded function such as antenna, is required to enable a high volume commercial use of the 60 GHz systems. The recent advances of CMOS and SiGe process technologies have now made the design of low-cost highly integrated millimeter-wave radios possible in Silicon. In combination with an optimum organic Liquid Crystal Polymer packaging approach, this represents a unique opportunity to develop Gb/s radio that could address the increasing demand in term of data rate throughput of the emerging broadband wireless communication systems. In this paper we discuss the circuit and module challenges that will enable a successful deployment of 60GHz gigabits wireless systems.

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