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## GaN power electronic solutions for efficient Wireless power transfer

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The world deals day in and day out with electrical power — billions of kWh of power is delivered from wall outlets to power our electronic devices all with the help of power cord. World is becoming smarter every day and the need to cut this cord and go wireless which was envisioned by Tesla years ago is finally set to become a reality now. From mobile computing & communications, vehicle charging to medical equipment and implants, wireless technology is drawing centre stage. The pressing demand for convenience, flexibility and safety has created a strong desire to make this technology real. But the problems regarding implementation are many and this study will focus on the heart of the wireless system—the amplifier using the novel gallium nitride based devices. In this study, I will discuss the wireless power landscape, introducing the GaN RF space, state of the art amplifiers, benefits of GaN wireless technology, potential applications, review the applicability of these devices in the real world and finally discuss whether they will compete, coexist with other age old technologies to unleash the era of wireless power transfer.

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## On the capacity of massive MIMO channel with Rayleigh and Rician fading

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Massive MIMO (multiple input multiple output) systems are one of the most promising research areas in the field of wireless communications these days. The fact that massive MIMO is one of the most important technologies for the future cellular and wireless communications is its significant capacity gain over traditional single input single output (SISO) channels. In this paper, introduction on the channel capacity of a massive MIMO will be given over Rayleigh and Rician fading. Also in this paper, we will discuss massive MIMO channel capacity over Rayleigh fading with water filling technique. This paper also offers analysis and simulations to the performance of MIMO system and its expected capacity for different channel distribution. Two types of distributions (Rician, Rayleigh) are considered with different parameters to produce the channel matrix and determine the capacity for several cases of antenna numbers in both transmitter and receiver sides.

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