Power Consumption Drives RF Amplifier Development

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WDD readers identify the key obstacles and prominent security issues for RF amplifiers.

The demand for wireless technologies continues to increase at rapid speeds, making RF power amplifiers a crucial component in wireless infrastructure equipment. Feedback from Wireless Design and Development's (WDD) readers suggests how power consumption, energy efficiency, and sustainability are important drivers in base station design for RF amplifiers.

Performance

When it comes to implementing RF amplifiers into Machine-to-Machine (M2M) technologies, most respondents agreed that operating frequency (36 percent) was the primary performance specification to consider. Other respondents offered the following insight:

- 24 percent believed output power was important to consider.
- 16 percent cited gain flatness.
- 10 percent identified design gain.
- 7 percent thought supply voltage was important.
- 7 percent suggested noise.

The survey results make sense since output power varies with frequency in any amplifier. The degree to which it varies allows certain flexibility in specifying outputs, therefore determining the extent of the amplifier’s intended use.

Challenges with Integrating RF Amplifiers

Designers are faced with various challenges when integrating RF amplifiers into wireless infrastructures. New and innovative techniques and materials are needed to reduce cost, while at the same time maintain the performance.

Fifty percent WDD readers agreed that power consumption was a huge challenged that they faced during the design process of amplifiers. Others stated the following:

- Bandwidth constraints: 39 percent.
- Cost controls & signal strength: 31 percent.
- Parameter variations: 26 percent.
- Area layout/environmental factors: 22 percent.

A small percentage cited that EMI/EMC and MTBF (Mean Time Between Failure) were their major challenges that they faced during the design process, but as the amount of bandwidth continues to become limited, it’s apparent why power consumption, cost controls, and signal strength are at the top.

Design Obstacles

WDD readers identified the usual challenges associated with design when asked about the primary design obstacles for RF amplifiers. Energy efficiency and sustainability (46 percent) led the way with cost (33 percent) not trailing too far behind. Time-to-Market (14 percent) was the third primary obstacle with security (4 percent) identified as the least concerning obstacle.

Security

Although security wasn't identified as a prominent design challenge, WDD readers did site some security issues with RF amplifiers. Some of their individual responses included:

- Hacking.
- Signal interference.
- Reliability and robustness.
- Signal leakage.
- Bandwidth limitations when incorporating security algorithms.
- Encryption.

Trends

While efficiency, physical size, linearity, and reliability are among the key principle concerns for RF amplifier design, 39 percent of WDD's readers stated that power consumption will play the most significant role in the future development of RF amplifiers. Others responded as follows:

- Wireless communication standards: 21 percent.
- Data transfer speeds: 19 percent.
- New network protocols: 9 percent.
- Security: 7 percent.
- Network size: 3 percent.

Other WDD readers provided idividual responses concerning future developments, which are as follows:

- "Wireless standards largely determine the protocols, power consumption, and network speeds."
- "So many electrical/electronic gadgets are being continuously developed, and all require power."
- "Battery efficiency and longer battery life will be paramount."
- "With power being at the premium and many components competing for power, there are trade-offs between the power to the amplifier, versus other functions."
- "Security in terms of SNR, meaning the signal gets through, and in terms of interference rejection (i.e., preventing signal corruption, counterfeiting, etc.)."

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