5G Phased Array PA Requirements

5G Standards will be based on scalable platform which supports various radio air interfaces. The scalability will be in multiple dimensions, such as bandwidth, power consumptions, latency, efficiency, and etc.

This implies scalable requirements mixed signal converters in terms of sampling frequency, oversampling ratio, effective number of bits, image rejection, bandwidth, and etc.

This document walks through single scenario and shows detail in how to define Phased Array PA requirements.

Readers are encouraged to send their comments and/or questions to the author, <u>Shafie@ieee.org</u>, and I will be more than happy to address them.

5G Phased Array PA Requirements

Assuming the following Tx front end architecture for 27.5 to 28.35 GHz band, the EIRP \leq 43dBm.



Proposed 5G Tx Front End Architecture

```
P_{out} = 43dBm - 13dBi + 3dB - 6dB = 27dBm
```

6dB is due to summation of 4 PA output power, therefore, 27dBm output power for each PA is required.

N±1 and N±2 ACLR will be 12 and 6 dB relaxation above FCC current requirements, respectively.



$$V_P = \sqrt{P \cdot R} = \sqrt{0.501W \cdot 50\Omega} = 5V$$

$$I_P = \frac{V_P}{R} = \frac{5V}{50\Omega} = 100mA$$

Transducer power gain of $G_T \ge 22 dB$ will be assumed, which imply DA output power of 5dBm.