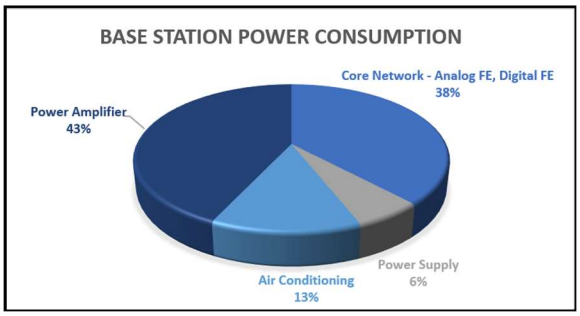
How The Telecommunications Industry Leaves $7 Billion on the Table Each Year

For decades, Telecommunications Engineers have been fighting a growing problem of cell phone and cell base station power consumption. As cell phone generations grow faster and more feature rich, the power to deliver grows disproportionately higher. The Billion $ story goes something like this…

The Power Picture

- MIT Technology Review: worldwide, power for cellular base stations in **2012** consumed nearly 1 percent of all global electricity production.
- Telecom operations account for 2% to 3% of the total **2021** global energy demand
- 5G networks consume 2 to 3 times as much electricity as 4G
- When base stations, data centers and devices are added together, telecommunications will consume more than 20% of the world's electricity by 2025, says Huawei analyst Dr. Anders Andrae. Currently, it is about 11%.
- In 2020 there were about 5.5 million base stations, each using an average 3.27kWh of power. The cost of this electricity worldwide, annually, in 2020, was over $20 Billion, $7 Billion of which was wasted.
- Base station energy consumption follows the pie chart above.



The Villain

- MIT Technology Review: stated "Much of this (power) is wasted by a grossly inefficient piece of hardware: **the power amplifier**, a gadget that turns electricity into radio signals."
- 59% of radio unit(s) power in the base station is consumed by the **power amplifier** which represents a total of 43% of all the base station power.
- Most of the input energy to the **power amplifier** is wasted in heat

The Crime Method

- Digital data transmissions for 4G and 5G networks need higher data rates…
- Multi-carrier techniques (MC) such as Orthogonal Frequency Division Multiplexing (OFDM) are more spectrally efficient and desirable for high data rates, but the corresponding non-linearity of the signals force the power amplifiers to operate at highly inefficient levels.
- Given the envelope fluctuations associated with these techniques, the higher data rates are a trade off to lower power efficiency
- The "back-off" power drain – ruins **power amplifier** efficiency …
  (**power amplifier**'s are biased for peak RF power output; this is when the RF input is at a max value; to linearly amplify the envelope at this point means you have to "back-off" the output power until distortion subsides; backing-off the current dumps power through the impedance, simultaneously significantly reducing power efficiency while generating heat. This is why your iPhone gets warm when you watch a video.)

To The Rescue

- QDAcomm has a solution to this enormous problem
- The solution is QDA (Quantized Digital Amplification)
- Obviating "back-off" tradeoffs, QDA provides linear amplifications at maximum power levels
- QDA improves **power amplifier** efficiency, dramatically, from the 10% level to 50%
- The reductions in wasted power and heat have a massively favorable carbon footprint impact
- Globally, billions are wasted annually. QDA could be used to help recover that.