



BOOSTING THE *Wi-Fi 6* EXPERIENCE FOR MOBILE DEVICES

Better, faster Wi-Fi is here. The two newest versions of 802.11 – that is, **Wi-Fi 6** (which runs in 2.4 and 5 GHz spectrum), and Wi-Fi 6E (which uses the 6 GHz spectrum) – deliver impressive benefits to mobile and portable experiences, with noticeably higher speed, lower latency, and more robust network connections. Wi-Fi 6/6E is tailor-made for our increasingly connected, on-the-go society, so it's no surprise that mobile and portable devices are some of the first to integrate Wi-Fi 6/6E connectivity.

To make the most of what these modules can offer, though, and really deliver on the promise of next-generation Wi-Fi, developers need to look beyond the module and focus the Radio Frequency (RF) chain. That's because small adjustments, made in that portion of the design that runs between the wireless module and the antenna, can boost the Wi-Fi signal, increase performance, and lower power consumption.

For most engineers, though, tweaking the RF chain is easier said than done. RF optimization is considered one of the most difficult specialties in electrical engineering to master. That's why, when working with complex protocols like Wi-Fi, design teams save time and effort by using pre-integrated RF solutions, called Wi-Fi Front-End Integrated Circuits (FEICs), which are purpose-built solutions that complete the RF chain.

FEICS FOR A COMPETITIVE EDGE

With the right FEIC on board, new smartphones, wearables, laptops, tablets, and other portable computing devices can deliver the very best in mobile Wi-Fi experiences. Whether it's sharing a smartphone-generated hotspot with coworkers, streaming a high-definition movie to a tablet, or wearing an Augmented Reality or Virtual Reality (AR/VR) headset while gaming with friends, a FEIC can deliver smoother, more reliable Wi-Fi 6/6E performance while extending battery life and signal range.

OPTIMIZED FOR WI-FI 6/6E

A FEIC designed for use with Wi-Fi 6/6E orchestrates signals so that they don't interfere with each other, and incorporates individual components that are configured to perform at their best at each point in the RF chain. The result is a highly integrated component that simplifies development while helping to address key challenges in mobile Wi-Fi 6/6E design, including operation in noisy environments and the use of multiple antennas for transmission and reception (Tx/Rx).

- **CLEANER SIGNALS**

The FEIC's line-up tuning is done in such a way that undesired input frequencies are rejected as much as possible. RF signals are less likely to collide and interfere with each other, and unwanted signals are less likely to reach the Wi-Fi SoC. An optimized circuit topology makes for crisp, clear signals that are easier to manage.

- **STRONGER SIGNALS**

The FEIC's RF amplifiers boost weak signals without adding noise. The RF chain becomes more sensitive, and is better able to select from multiple input signals, while also making the signal stronger. There is a tradeoff here, since amplification consumes energy and generates heat, so power efficiency is an important measure of amplifier performance.

- **HIGHER EFFICIENCY**

To transmit over a longer distance, it is key to generate high power levels at the mobile device's antenna. But when transmitting at GHz frequencies it is a challenge to do so at a good efficiency while still maintaining a

sufficient linearity on the signal. This is where efficient semiconductor devices and well-optimized RF chains in a FEIC can make the difference. With the right combination of semiconductor process and design you will get a clean and powerful signal while dissipating very little power.

NXP FEICS GIVE WI-FI 6/6E WHAT IT NEEDS

Our WLAN720xx single FEIC product family for Wi-Fi 6/6E builds on our more than 30 years of RF experience and uses our groundbreaking SiGe:C BiCMOS technology, making it possible to integrate the Power Amplifier (PA), switch, and Low Noise Amplifier (LNA) into a single chip, with all the RF blocks in a single device. Other solutions, which use traditional RF technologies, typically need to split bandwidth, expand the size of the die, or require more complex routing, for a more complicated design. Also, because our single channel FEICs are housed in very small QFN packages, they can be placed closer to the antenna, further improving power consumption and simplifying the layout.

These features deliver tangible, real-world benefits in mobile and portable applications. Using Dynamic EVM, a measure of signal quality, as an indication, our FEICs work efficiently to ensure Wi-Fi 6/6E signals experience only minimal degradation when exposed to noise, distortion, and spurious signals.

- **HIGHER PERFORMANCE**

As signals pass through the FEIC and its optimized RF chain, they remain strong and easy to manage, allowing the system to dramatically improve data rates and range, for a better experience. AR/VR headsets don't stutter when gamers move with the action, for example, and video calls, made on the go, don't get dropped when the caller moves away from a hotspot.

- **LONGER BATTERY LIFE**

The optimized RF chain, with its high-efficiency circuits, saves power at every stage, so the system uses less energy, even during transmission. There's more time spent enjoying standout Wi-Fi 6/6E connectivity before the battery needs a recharge.



DON'T DELAY

Wi-Fi 6/6E is a pivotal technology for mobile and portable designs, and now is the time to start putting it to work. Our FEICs are designed to enhance performance while saving time and effort, so wireless systems get to market faster. Our FEICs are fully qualified on leading

System-on-Chip (SoC) reference designs for mobile and portable platforms. Because so much of the up-front engineering work and testing is already done, these platforms help avoid the challenges and costs associated with RF design, and help development teams deliver exceptional wireless experiences faster than ever.

CONNECT WITH NXP TO DISCOVER THE POSSIBILITIES

NXP offers one of the broadest wireless portfolios in the industry, and our early successes with Wi-Fi 6 show just how committed we are to creating a connected world that anticipates and automates. To learn more about how our optimized FEIC and Wi-Fi 6/6E solutions can transform mobile, visit www.nxp.com/wifi6.



Rick van Kemenade

As Marketing Manager for NXP's Smart Antenna Solutions product line, Rick is responsible for NXP's highly integrated 5G and Wi-Fi 6 RF front-end IC portfolios, serving both the infrastructure and mobile markets.