



INDUSTRY TRENDS: WIRELESS

A bright future of RF technologies

RF¹ technologies enable wireless connectivity and sensing, which are key functions in any market segment from consumer to automotive.

In the mobile handset market, LTE evolution (LTE-Advanced, LTE-Pro) but also upcoming 5G which was just specified at the end of June 2018 through the 3GPP release 15 bring innovative RF technologies to the market such as carrier aggregation, MIMO, beam forming and dual connectivity in the sub 6 GHz or even millimeter-wave radio link. The mobile RF Front End market is expected to enjoy a sustainable growth with a CAGR² of 14% reaching US\$35.2 billion in 2023. This market opportunity translate into fierce competition between the current leader which are Broadcom, Skyworks, Qorvo and Murata and attract giant companies willing to expand from their core activities such as Qualcomm, Intel or HiSilicon. The RF front-end industry not only involve front-end module companies but also impact surrounding business for foundries, epi house, substrate providers, OSAT³ for packaging, assembly and test and of course equipment providers.

In the automotive market, wireless radar sensing for anti-collision systems is achieving a good market penetration along with other sensors such as imaging, ultrasonic or even LiDAR. This is driven by government policy for road safety improvement which incentivises traditional car makers to embed sensors for car environment monitoring.

Another trend which favours radar implementation in the car is automated drive which will require 360° surveillance in real time. Radar is well suited for object detection in a cost effective way. It is operable in all weather conditions and has a promising technology roadmap to enable object classification and imaging. The radar market is expected to reach US\$7.5 billion in 2022 based on a 25% CAGR between 2016 and 2022, at the module level. A strong ecosystem serves this market with leaders such as Bosch and Continental at the module level, supported by Infineon and NXP at the chip level. Again, witnessing a strong market dynamic, fierce competition is occurring at both module and chip level. e.g. Texas Instruments disrupting current technology with an all integrated chip solution or even a strong Chinese ecosystem building up.

Both examples illustrate the bright future for the RF industry and many more cases including telecommunication infrastructure, AR/VR, connected vehicles, Internet of Things, remote surgery are all expected to contribute greatly to the picture.

1. RF: Radio Frequency
2. CAGR : Compound Annual Growth Rate
3. OSAT : Outsourced Semiconductor Assembly and Test

As a Technology & Market Analyst, specialised in RF devices & technologies within the Power & Wireless division at Yole Développement (Yole), **Cédric Malaquin** is involved in the development of technology & market reports as well as the production of custom consulting projects. Prior his mission at Yole, Cédric first served Soitec as a process integration engineer during 9 years, then as an electrical characterisation engineer during 6 years. He deeply contributed to FDSOI and RFSOI products characterization. He has also authored or co-authored three patents and five international publications in the semiconductor field.

2017 – 2023 RF front-end modules market outlook

Source: 5G Impact on RF Front-End and Connectivity for Cell Phones report, Yole Développement, 2018

