**Press Release**
September 16th, 2021
LYON, France

# Cellular IoT: towards a ramp-up?[1]

***Cellular IoT gets full benefit of 5G and will reach 900 million units a year in 2026.***

**OUTLINE:**

- Market and technology trends:
  The market will ramp up in 2023.
  The cellular IoT[2] market will feature:
  - Both low-volume and high-cost modules for 5G.
  - High-volume and low-cost modules for NB-IoT and LTE[3]-M applications.

  The latter will replace the 2G/3G devices currently deployed.
  This growth will lead to a market value of over US$800 million at the RF[4] front-end level.
  Cellular IoT will benefit from 5G deployments through private networks with either private or public frequencies, and public networks.
  Larger deployments will be seen in China, the U.S. and Europe with a high 5G SA penetration rate.
- Supply chain:
  Only a few companies have the capability to develop 5G modules.
  Qualcomm is the first company offering a commercial chipset for 5G…
  For NB-IoT, price point in lower, but stays too high for any small entrant.

*"Wireless connectivity of things has stopped being an abstract concept".* asserts **Claire Troadec, Division Director, Power & Wireless at Yole Développement (Yole).** *"Today, everyone has their personal experience with connectivity or at least has heard about it. It could be through Bluetooth earphones, a fitness band or the connection of their electric meter to their home Wi-Fi. These applications, often using Wi-Fi or Bluetooth, are referred to as Personal Area Networks or Home Automation".*

This market, which is based on short-distance, non-critical operations, already exists. Nevertheless, the generalization of the IoT, connected devices in all aspects of our society and industries, has not fully happened yet. So, what's next?

There has been a lot of movement in the IoT field with the arrival of 5G. With the development of network slicing, a technology mainly intended for IoT. Moreover, regulators

[1] Extracted from: 5G mMTC and IoT platforms - Technology and Market Trends 2021 report, Yole Développement, 2021
[2] IoT: Internet of Things
[3] LTE: Long Term Evolution
[4] RF: Radio Frequency

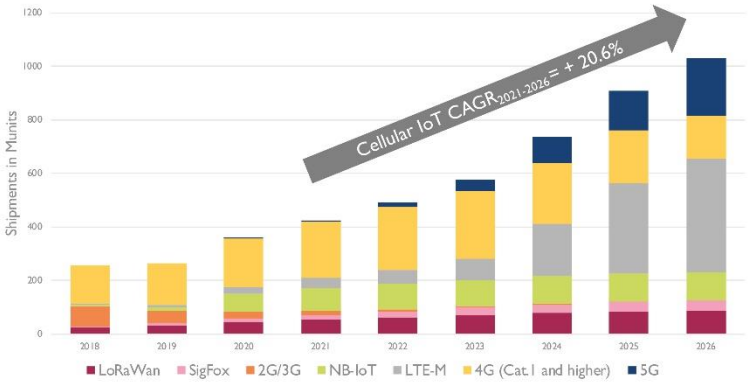
are opening frequencies for private networks that private companies would directly license. Furthermore, new 5G connectivity industrial modules are emerging.

*"In general, the value chain is starting to mature and now offers convenient solutions for IoT developments using cellular connectivity; It is expected to solve most of the previously seen IoT adoption and development problems".* emphasizes **Mohammed Tmimi, PhD, Technology and Market Analyst, RF Devices & Technologies at Yole.** He adds: *"It also means that the volumes for 5G IoT and cellular IoT, in general, will start their ramp-up quite soon. However, they will not reach the unrealistic advertised volumes."*

Indeed, cellular IoT will persist as a combination of niche applications without the awaited expansion into personal area networks, i.e., wearables and consumer electronics, announces Yole, in its new RF electronics report, 5G mMTC and IoT platforms - Technology and Market Trends 2021.

**2018-2026 cellular and LPWAN IoT module shipments in MUnits**

*(Source: 5G mMTC and IoT platforms - Technology and Market Trends 2021 report, Yole Développement, 2021)*






Therefore, the market research and strategy consulting company, Yole announces today the release of its 5G mMTC & IoT platforms technology and market analysis.

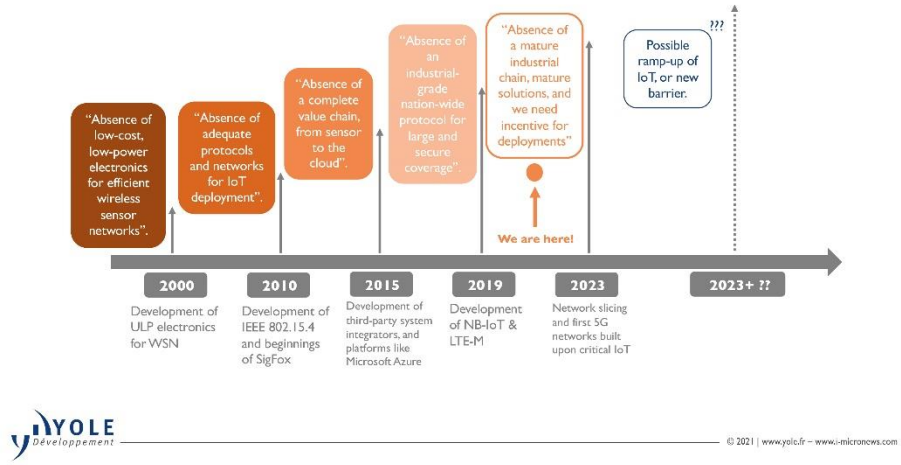
Because of the dynamic of this industry, Yole's analysts have decided to investigate cellular IoT solutions and their impact on the 5G implementation. This new report is a comprehensive description of the general market dynamics. With market forecasts at the wafer, components and system levels and related market trends, this study offers realistic prospects regarding the market potential at the RF front-end level. Yole delivers an in-depth analysis of the existing and emerging applications with a special focus on 4G/5G public and private frequencies… In addition a significant section is dedicated to the analysis of the competitive landscape, the supply chain, the market shares...

As analyzed by Yole's team in the new 5G mMTC and IoT platforms - Technology and Market Trends 2021 report, multiple approaches have been tried in the past to develop the IoT. They have used unlicensed frequencies, through protocols like the IEEE802.15.4 based

Zigbee or Z-Wave, the LoRaWAN and Sigfox protocols, or long-range Wi-Fi. But this has not been a success, mainly due to the general requirement for data reliability and security, meaning confidentiality, integrity, and availability. But this is changing now with cellular protocols aimed at IoT.

**Cellular IoT survived until now, but will it overcome the future challenges?**

*(Source: 5G mMTC and IoT platforms - Technology and Market Trends 2021 report, Yole Développement, 2021)*




These cellular protocols range from the low data rate NB-IoT to the very high data rate, high reliability, low latency 5G Cat20. The latter has finally started to see traction from the industry. For **Cédric Malaquin, Technology & Market Analyst, RF Devices & Technology at Yole** : *"Cellular deployment is expensive, either on a capital expenditure standpoint for private networks or an operating expenditure standpoint when using public networks. But 5G offers unprecedented capabilities in terms of data security, creating a market opportunity for critical applications. These are niche applications, for example, in highly automated industrial environments, where wireless connectivity adds a lot of value. Other applications range from machine vision to autonomous guided vehicle monitoring. They are now motivating investment in 5G deployments, thus opening the market for all other cellular-based deployments to come".*

Market volume is expected to reach 900 million devices in 2026. It started in 2020 with a volume of 298 million units driven by the replacement of 2G/3G devices like points of sale or telematics.

These volumes are still very far from the billions of industrial connected devices anticipated by tech companies several years back. This is mostly due to the niche nature of IoT applications. But this still represents a big market opportunity, reaching US$859 million in 2026 from US$257 million in 2020 with a 22.3% CAGR[5] for 2020-2026 at the RF front-end component level.

[5] CAGR : Compound Annual Growth Rate

Yole's analysts expect to see increased use of cellular IoT in 2023 thanks to worldwide deployments of true 5G public networks, using standalone 5G, permitting network slicing.
They also expect to see a new RF module offering in 2023, given that today the only solution is provided by Qualcomm at a quite expensive cost. Developments are awaited from other players, like Sequans Communications. Qualcomm will also soon release its second generation of 5G modules, expected at half the price of its current solution. The IoT industry needs this diversification and strengthening of supply.
By 2023, Yole sees also more private networks deployments. Whereas today they are starting at pilot level and are meant for high-value applications. But, once deployed, they are expected to be used for lower value IoT applications, especially those using LTE-M or the future NR-Light protocols.
Therefore, the future ramp-up of IoT is expected through the conveniently timed conjunction of events at public network, devices, and private network levels for 2023. Once this cellular IoT adoption happens, the democratization of the technology will finally take place. It will be followed by industrial consolidation in the longer term, and ubiquitous use of the licensed radio frequencies for non-consumer purposes.

*All year long, Yole Développement publishes an impressive collection of RF-dedicated reports. Experts realize various key presentations, organize key conferences and interview leading industrial companies all year long. Their aim is to deliver key results and technology and market trends and explain the major changes.*
*In this regard, do not miss the EETIMES's presentation "5G IoT, What can we expect?", by Antoine Bonnabel, Technology & Market Analyst for the Power & Wireless team at Yole on i-Micronews, RF devices section – Recorded version.*
*Make sure to be aware of the latest news coming from the industry and get an overview of our activities on i-Micronews.*
*Stay tuned!*

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## About our RF electronics Team

**Mohammed Tmimi, Ph.D.,** is an RF Technologies and Markets Analyst at Yole Développement (Yole). Prior to Yole, Mohammed was engaged in developing a novel approach for RF/mmW high-speed serial links for high-performance chips at STMicroelectronics' Crolles R&D site in France as part of his Ph.D. During his Ph.D., he also worked on mmW design in advanced FD-SOI nodes and proposed an original interconnect technique for 2.5D/3D packaging. Mohammed now holds a patent on these serial links and has published two scientific papers. Mohammed graduated from INP Grenoble (France) with a master's in microelectronics and an electronics engineering degree from ENSAO (Morocco). He was awarded his Ph.D. in Nano Electronics and Nano Technologies from the University of Grenoble Alpes, France.

**Antoine Bonnabel** works as a Technology & Market Analyst for the Power & Wireless team of Yole Développement (Yole). He carries out technical, marketing and strategic analyses focused on RF devices, related technologies and markets. Prior to Yole, Antoine was R&D Program Manager for DelfMEMS (FR), a company specializing in RF switches and supervised Intellectual Property and Business Intelligence activities of this company. In addition, he also has co-authored several market reports and is co-inventor of three patents in RF MEMS design. Antoine holds a M.Sc. in Microelectronics from Grenoble Institute of Technologies (France) and a M.Sc. in Management from Grenoble Graduate School of Business (France).

As a Technology & Market Analyst, specialized 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 characterization 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. Cédric graduated from Polytech Lille in France with an engineering degree in microelectronics and material sciences.

**Claire Troadec** is Director of the Power & Wireless Division at Yole Développement (Yole), part of Yole Group of Companies. These activities are covering power electronics, batteries & energy management, compound semiconductors and emerging materials and RF electronics. Based on her valuable experience in the semiconductor industry, Claire is managing the expansion of the technical and market expertise of Power & Wireless team. Daily interactions with leading companies allow these analysts to collect a large amount of data and cross their vision of market segments' evolution and technology breakthroughs. In addition, Claire's mission is focused on the management of business relationships with leading companies of this sector and the development of market research and strategy consulting activities inside the Yole group. Claire Troadec holds a Master's degree in Applied Physics specializing in Microelectronics from INSA (Rennes, France). She then joined NXP Semiconductors, and worked for 7 years as a complementary metal-on-silicon oxide semiconductor (CMOS) process integration engineer at the IMEC R&D facility. During this time, she oversaw the isolation and performance boosting of CMOS technology node devices from 90 nm down to 45 nm. She has authored or co-authored seven US patents and nine international publications in the semiconductor field and managed her own distribution company before joining Yole Développement in 2013.

## About the report

**5G mMTC and IoT platforms - Technology and Market Trends 2021**

*Cellular IoT to get full benefit of 5G starting in 2023 and to reach 900M units a year in 2026.* – Performed by Yole Développement

**Companies cited:**

Aarna Natworks, Alcatel Lucent, Altair, Aruba, AT&T, Atmel, AWS, Bird, Bosch, British Telecom, CAVLI Wireless, Cheerzing, China Mobile, Cisco, EnOcean, Ericsson, Fibocom, Geotab, HBC, Hisense, Hisilicon, Hewlett Packard, Huawei, IBM, Infineon Technologies, Intel, Lierda, LinkLabs, Long Ung, Losant, Mediatek, Meig, Microchip, Microsoft Azure, MobileTek, MuRata, Neoway, NimbeLink, Nokia, Nordic Semiconductor, NXP, Orange, OVH, Pycom, Qorvo, Qualcomm, Quectel, and more…

**Related reports:**

- Cellular RF Front-End Technologies for Mobile Handset 2021
- 5G's Impact on RF Front-End for Telecom Infrastructure 2021
- RF Front-End Module Comparison 2021 – Vol. 2 – Focus on 5G Chipset

**About Yole Développement**

Founded in 1998, Yole Développement (Yole) has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services, reverse engineering and reverse costing services and well as IP and patent analysis. With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole group of companies has expanded to include more than 80 collaborators worldwide… More

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