

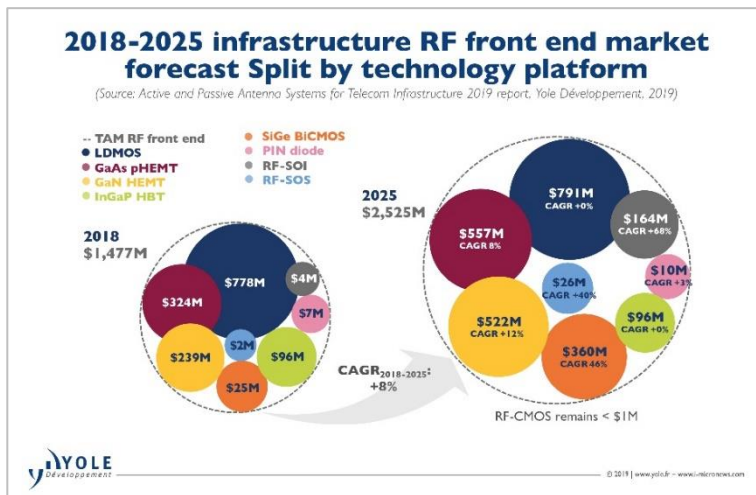


即时发布： 有源天线系统将撼动用于电信基础设施的 射频元件市场

摘自：

- 《用于电信基础设施的有源和无源天线系统》报告，Yole Développement, 2019
- 《用于 5G 与 5G 相关应用的天线专利态势》报告，Knowmade, 2019

法国里昂讯：“用于电信基础设施的 RF FE 市场在 2018 年的价值预计为 14.7 亿美元，且预测将在 2025 年达到 25.2 亿美元”，



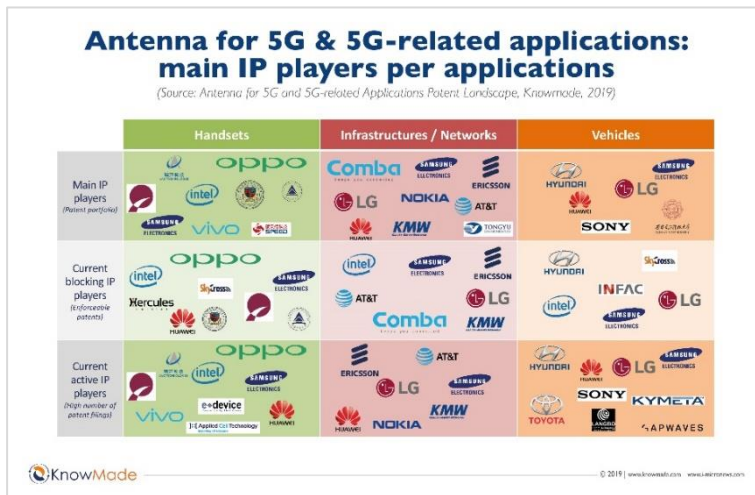
Yole Développement (Yole)公司的射频电子技术与市场分析师 **Antoine Bonnel** 宣称：“由于成本较高的有源天线系统的市场渗透，该产业将迎来意外的增长，2018年至2025年间的CAGR可达8%。”这是由于在AAS的发展进化过程中，从系统层面到射频元件的价值分流。射频前端产业的发展与宏观经济和系统级技术趋势有直接关联，这些趋势自身又和面向运营商的消费级市场趋势直接关联。因此在今天，包括5G实施在内的电信大趋势以急剧的技术变革在通信频率和功率等级方面对射频前端产业机器供应链产生着猛烈的冲击。

包括 Yole 和 Knowmade 公司的 Yole 企业集团公布了其射频电子专题系列报告，并发布了两份专门针对有源和无源天线及其生态系统的技术、市场与 IP 新分析：[《用于电信基础设施的有源和无源天线系统》报告](#)和[《用于 5G 与 5G 相关应用的天线专利态势》报告](#)。两家合作伙伴将各自的专业技能相结合，以来自 Yole 的市场与技术方法配合来自 Knowmade 的 IP 分析，带着详细的发展路线图、市场数字、竞争形势和系统级、元件级（PA、驱动和预驱动、增益模块放大器、LNA、开关、波束成形器、后传网络……）以及技术级（LDMOS、GaAs pHEMT、GaN HEMT、InGaP HBT、SiGe BiCMOS、PIN 二极管、RF-SOI 和 RF-SoS）的更多信息，邀您一同发现这一产业和技术创新。

天线产业的现状如何？各种大趋势对这一市场有何影响？而在幕后，天线厂商又是如何经理自己的活动和开发的呢，尤其是在专利层面上？……Yole 和 Knowmade 的分析师们很高兴在今天为您带来与这一生态系统相关的概述。

天线产业的现状如何？各种大趋势对这一市场有何影响？而在幕后，天线厂商又是如何经理自己的活动和开发的呢，尤其是在专利层面上？……Yole 和 Knowmade 的分析师们很高兴在今天为您带来与这一生态系统相关的概述。

5G 无线通信预期将于 2020 年投放市场，它将成为下一个移动通信技术标准。作为一个很大的市场，随着许多创新技术模块的发展，其配置对当前的射频产业有重大影响，也对支持特定协议和运营模式的新型基础设施配置有重大影响，如 MIMO、大规模 MIMO、波束成形、光束控制、载波聚合及其他。“5G 这个名词直到 2014 年才开始出现在专利中”，Knowmade 的技术与专利分析师 Paul Leclaire 说道：“自此之后，与 5G 相关的专利发布数量就出现了大幅增长。Knowmade 观察到从 2014 年到 2018 年间专利数量的增长率为 113%。这一强劲的加速增长很大程度上是由中国的 IP 竞争参与者推动的，他们占据了该产业 IP 活动的 56%。尤为引人注目的是大量的中国学术界参与者，这在电信领域颇为不寻常。”



如今，与 5G 天线开发相关的 IP 局势依然尘埃未定。“超过 75% 的专利申请还在审核中，因此未来几年还有很大变数”，Knowmade 的首席执行官 Nicolas Baron 评价道：“的确，经过了最初的国内专利申请阶段，包括三星、英特尔、爱立信和华为的主要 IP 与市场竞争者已开始将自己的知识产权组合向全世界拓展。三星和英特尔似乎是目前占据最有利地位的两家领袖，能

限制其主要竞争对手的专利活动和运营自由。”

Yole 的技术与市场分析师 Cédric Malaquin 表示，从技术角度来看，领先的技术平台是 LDMOS。“未来几年中都将保持这样。然而，除了出货元件量的增加，LDMOS 预期不会有其他显著增长。Yole 预测从 2018 年到 2025 年间，在市场平均 CAGR 为 8% 的背景下，LDMOS 的 CAGR 几乎为零。另一方面，像 GaN、GaAs、SiGe 或 RF-SOI 这样的平台将在不久的将来迎来显著增长”，这位 Yole 分析师评述道。

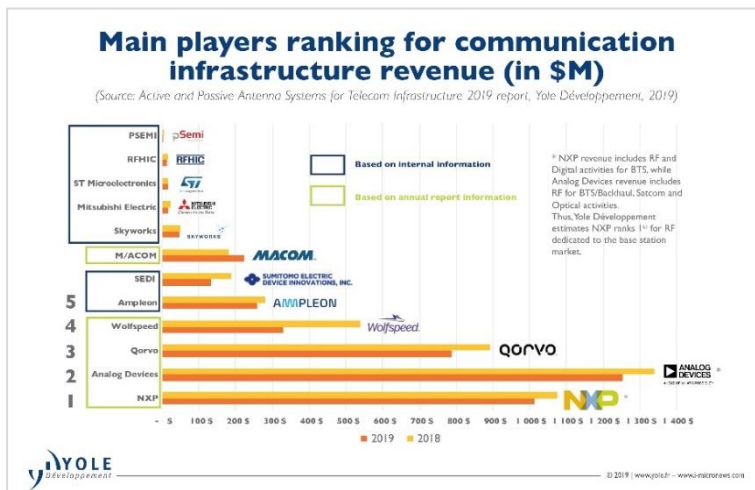
在这方面，最有趣的动向之一就是砷化镓平台预期中的发展。随着 AAS 的到来，将会需要更多的低功率宽带功率放大器和向波束成形器这样的新型元件。这些元件最初大多数应该会在砷化镓平台上制造，尤其是出于性能的原因。这样能在一个不允许出现失效的市场上带来合适的性能水平。但一旦市场发展一定程度，可被认为大于利基市场的时候，像 RF-SOI 或 SiGe 这样的技术就

可望取代砷化镓，就像砷化镓在手机产业已经被取代了一样。砷化镓将会是有源天线元件的一个过渡平台。

与手机产业不同的是，电信基础设施产业中的 RF 前端元件制造商数量众多，而且专项化程度高。许多不同技术平台的使用也就带来了市场上各种各样的元件。

“在这个碎片化的产业中，近期很少出现收购，对初创公司的投资也寥寥无几”，Yole 的 Antoine Bonnabel 解释道：“这是因为产业对电信运营商在配置方面将会做何选择仍旧不确定。”

CMCC 是一个值得注意的例子，它在过去几年中已经两次变更了技术方向。它先是对 64 单元 AAS 感兴趣，因而激励业界开发 5W 范围内带射频功率放大器的元件。但后来 CMCC 由于成本原因转而重新青睐 32 单元系统，导致已经开发出来的元件都不合适了。



如今 CMCC 又开始回到大规模实施 AAS 的计划上，这倾向于更加标准且成本更低的基于 RRH 的配置。CMCC 也决定不会在近期采用超过 3GHz 的频率，因此完全改变了住友商事这样的 GaN 期间开发商的前景。

所有这些战略性变革都影响着技术发展，并为这一产业创造了巨大的不确定性。市场首先要知道电信运营商们将会选择什么方向，然后才能进行整合。

Yole 和 Knowmade 都在射频电子领域涉猎颇深。两家公司发布了大量系列报告，而且全年都将在多场重大国际会议上进行令人印象深刻的讲演。欢迎访问 i-Micronews.com，获取报告、讲演资料和 2020 年的活动日期计划。

For example:

例如:

- 5G 对电信产业的影响：从射频基础设施到移动前端——网络广播。欢迎点击 [5G 影响](#)，观看录制版本。
- 5G 对射频前端的影响：从电信基础设施到手持设备——Yole 功率与无线业务主管 Claire Troadec 在 [2019 年德国慕尼黑黑的欧洲半导体展](#) 上所做的讲演。

请务必关注 Yole 与 Knowmade，期待更多精彩！

ABOUT THE REPORTS



[Active and Passive Antenna Systems for Telecom Infrastructure](#)

The transition to active antenna systems and small cells is changing the technological mix of RF components in telecom infrastructure. – Powered by Yole Développement

[Antenna for 5G and 5G-related Applications Patent Landscape](#)

Players worldwide are racing to develop and assert their next generation of antenna devices. On the cusp of the release of the first 5G devices, get an insider's view of players' IP activities and their related antenna technology developments. – Powered by Knowmade

About the authors:

▪ Yole Développement

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.

▪ Knowmade

Nicolas Baron is CEO and co-Founder of Knowmade. He manages the company's development and strategic direction, and personally leads the Semiconductor department. He holds a PhD in Physics from the University of Nice Sophia Antipolis (France) and a master's degree in Intellectual Property Strategies and Innovation from the IEEPI (Strasbourg, France).

Paul Leclaire works for Knowmade in the fields of RF technologies, wireless communications, and MEMS sensors. He holds a PhD in Micro and Nanotechnology from the University of Lille (France), in partnership with IEMN in Villeneuve-d'Ascq and CRHEA-CNRS in Sophia Antipolis (France). Paul previously worked as a Consultant for an innovation strategy consulting firm.

ABOUT KNOWMADE



Specialized in the analysis of patents and scientific information, Knowmade provides technology intelligence and IP strategy consulting services. The company supports the business development of R&D organizations, industrial companies,

and investors by helping them understand the competitive landscape, follow the technology trends, and discern opportunities and threats in terms of technology and patents.

Knowmade operates in the following industrial sectors: compound semiconductors, power electronics, batteries, RF electronics & wireless communications, solid-state lighting & display, photonics, MEMS sensors, memory, semiconductor manufacturing, packaging & assembly, medical devices, medical imaging, biotech/pharma, and agri-food. Knowmade's experts provide prior art search, patent landscape analysis, scientific literature analysis, patent valuation, IP due diligence, and freedom-to-operate analysis. In parallel, the company proposes litigation/licensing

support, technology scouting, and IP/technology monitoring services. Knowmade's analysts combine their technical and patent expertise with powerful analytics tools and proprietary methodologies, delivering invaluable patent analyses and scientific reviews.



ABOUT YOLE DEVELOPPEMENT

Founded in 1998, Yole Développement 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 covering MEMS and image sensors, Compound Semiconductors, RF Electronics, Solid-state lighting, Displays, software, Optoelectronics, Microfluidics & Medical, Advanced Packaging, Manufacturing, Nanomaterials, Power Electronics, Batteries & Energy Management and Memory.

The “More than Moore” market research, technology and strategy consulting company Yole Développement, along with its partners System Plus Consulting, PISEO and KnowMade, support industrial companies, investors and R&D organizations worldwide to help them understand markets and follow technology trends to grow their business. . For more information, visit www.yole.fr and follow Yole on [LinkedIn](#) and [Twitter](#).

- Consulting & Financial Services: Jean-Christophe Eloy (eloy@yole.fr)
- Reports: David Jourdan (jourdan@yole.fr)

Yole Group of Companies – Public Relations: Sandrine Leroy (leroy@yole.fr)

###