



FOR IMMEDIATE RELEASE:

Fan-out: the most dynamic IP landscape in advanced packaging

Fan-Out Wafer Level Packaging Patent Landscape Analysis –
KnowMade – November 2016

FREE WEBCAST:

“Numerous platforms and a big buzz... Is there a Fan-Out bubble?”

December 13 - 5:00 PM CET.

More info. [Camille Veyrier](#)

LYON, France – November 29, 2016: In the fast-growing Fan-Out market showing 80% increase between 2015 and 2017¹, it is today essential to deeply understand the patent strategies of the key players. The Technology Intelligence & IP² Strategy Company, [KnowMade](#) has thoroughly investigated the Fan-Out packaging patent landscape and releases today the new patent landscape analysis titled [Fan-Out Wafer Level Packaging](#). KnowMade report reviews detailed patent analyses including countries of filing, patents' legal status, and patented technologies, as well as patent owners, their IP position, and IP strategies.

“The knowledge of the IP ecosystem allows companies to anticipate changes, identify harvest business opportunities, mitigate risks, and make strategic decisions in order to strengthen one’s market position and maximize return on one’s IP portfolio”, comments **Dr Nicolas Baron, CEO & Founder at KnowMade.**

What are the Fan-Out IP trends? Who are the main patent applicants? What is the IP position for each key Fan-Out companies? KnowMade invites you to discover the status of the Fan-Out patents ecosystem and its impact on the advanced packaging industry.

With Apple and its A10 processor employing TSMC’s InFO-PoP technology, the fan-out market has exploded. A [detailed technology analysis of Apple’s processor](#) has been performed by KnowMade sister company, [System Plus Consulting](#) last month to provide a comprehensive understanding of the A10 manufacturing processes including TSMC’s InFO-PoP technology as well as accurate estimations of manufacturing costs and selling prices³.

Apple’s involvement will undoubtedly generate increased interest in the fan-out platform, and market revenue is forecast to reach around US\$2.5 billion in 2021, with an impressive growth between 2015 and 2017. Moreover, following the high-volume adoption of InFO and the further development of fan-out wafer level packaging technologies, a

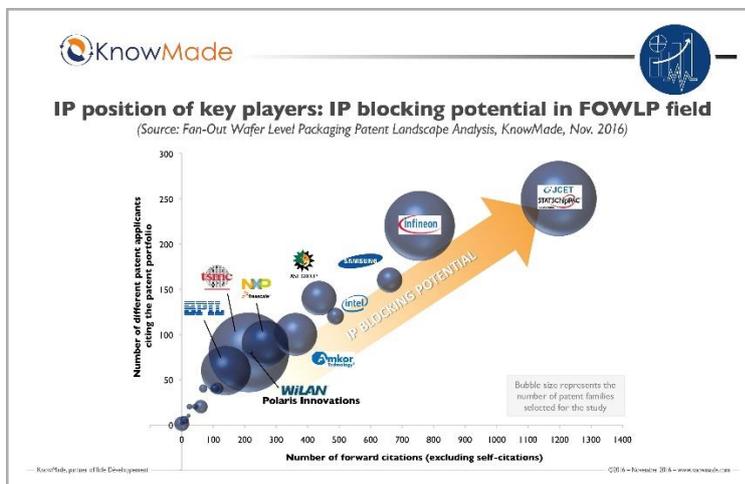
¹ Source : [Fan-out: Technology & Market Trends 2016 report](#), Yole Développement, Aug. 2016

² IP: Intellectual Property

³ Source: [TSMC Integrated Fan-Out Package reverse engineering & costing analysis](#), System Plus Consulting, Oct. 2016

wave of new players may enter the market. The supply chain is also expected to evolve, with a considerable amount of investment in Fan-Out packaging capabilities.

More than 3,100 patents related to over 1,200 inventions on Fan-Out packaging have been published worldwide through September 2016, coming from 100+ patent applicants, announces KnowMade in its FOWL⁴ patent analysis report. A first wave of patent applications occurred between 1999 and 2006, induced by Infineon Technologies. Patent applications have increased since then, with Freescale (NXP), STATS ChipPAC (JCET), SPIL, Amkor, and TSMC entering the Fan-Out IP arena. “Today the number of enforceable patents is increasing worldwide, with several companies already standing out by virtue of their strong IP position”, asserts Dr Nicolas Baron from KnowMade.



All of major players involved has filed patents on Fan-Out packaging, except for Nanium, which does not file any patents at all but instead has adopted a different IP strategy detailed in KnowMade patent analysis.

Another special case is the presence of patent licensing companies like Polaris Innovations, wholly-owned subsidiary of WiLAN, which in 2015 acquired key patents from Infineon Technologies/Quimonda. The visibility

of such companies in the patent landscape is a tangible sign of the market explodes. In the next few years Polaris Innovations could assert its patents to make money.

KnowMade’s experts have also noted Samsung’s conspicuous IP presence in the FOWL⁴ patent landscape, despite the company’s unclear market position. R&D labs, including Fraunhofer, A*STAR, and CEA, are also present but to a lesser extent. Most new entrants in the FOWL⁴ patent landscape are the Chinese players, HuaTian Technology, NCAP and SMIC. More recently, KnowMade’s team has observed Apple’s appearance. Apple, which this year chose TSMC’s InFO-PoP technology for its A10 APE, has recently filed some patents on Fan-Out wafer level packaging, reflecting a genuine interest in the FOWL⁴ platform.

JCET/STATS ChipPAC and TSMC lead the FOWL⁴ patent landscape. From a quantitative point of view, TSMC is the most prolific patent

⁴ FOWL⁴ : Fan-Out Wafer Level Packaging

applicant of the last few years, but according to KnowMade's analyses, JCET/STATS ChipPAC has by far the strongest IP position.

"The company has formidable "IP blocking potential" that empowers it to deter other players to patent inventions that are similar to its own IP portfolio", details Dr Nicolas Baron from KnowMade. "Indeed TSMC is the most serious IP challenger, and it may reshape the patent landscape in the near future upon the approval of its numerous pending patent applications. Both companies feature a large enforceable patent portfolio and a long remaining lifetime of their patents."

The 1,200+ inventions selected by KnowMade for its new FOWLP patent landscape analysis are categorized by technology solution (chip first, chip last, etc.), process step (molding, redistribution layers, etc.), architecture (Package-on-Package, System-in-Package, etc.) and technical challenges (warping, die shift). In this report, the company also reveals the IP strategy and technical choices of the main patent assignees with an IP profile for 18 key players. This report also includes an useful Excel database containing the 3,100+ patents analyzed in the study, including technology segmentation.

A detailed description of this patent investigation is available on [i-micronew.com](http://micronew.com), [advanced packaging reports section](#).



Yole, KnowMade and System Plus Consulting, part of Yole Group of Companies, announce the webcast titled "Numerous platforms and a big buzz... Is there a Fan-Out bubble?". Hosted by i-Micronews.com, this online event will take place on December 13 at 5:00 PM CET. Today, everybody is considering going Fan-Out. But why is that solution such a hot topic? Yole Group invites you to discover the Fan-Out market and understand technology challenges. More information about this webcast, contact Camille Veyrier (veyrier@yole.fr)



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About [Fan-Out Wafer Level Packaging Patent Landscape Analysis report](#) – Nov. 2016

- With Apple and TSMC changing the game, 2016 is a turning point for the Fan-Out market. The number of enforceable patents is increasing worldwide, with several companies already standing out by virtue of their strong IP position.
- About the author: Dr Nicolas Baron is CEO and cofounder of KnowMade. He leads the Physics Department. He holds a PhD in Physics from the University of Nice Sophia-Antipolis, and a Master of Intellectual Property Strategies and Innovation from the European Institute for Enterprise and Intellectual Property (IEEPI Strasbourg), France.

About KnowMade – www.knowmade.com

Knowmade is a Technology Intelligence and IP Strategy consulting company specialized in analysis of patents and scientific information. The company supports R&D organizations, industrial companies and investors in their business development by helping them to understand their IP environment and follow technology trends. Knowmade is involved in Microelectronics & Optoelectronics, Compound Semiconductors, IC Manufacturing & Advanced Packaging, Power & RF Devices, MEMS & Sensors, Photonics, Micro & Nanotechnology, Biotech/Pharma, MedTech & Medical Devices. Knowmade provides Prior art search, Patent Landscape Analysis, Patent Valuation, Freedom-to-Operate Analysis, Litigation/Licensing support, Scientific Literature Landscape, Technology Scouting and Technology Tracking.

The company combines information search services, technology expertise, powerful analytics tools and proprietary methodologies for analyzing patents and scientific information. Knowmade's analysts have an in-depth knowledge of scientific & patent databases and Intellectual Property.

About Yole Développement – www.yole.fr

Founded in 1998, Yole Développement has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services. With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole Développement group has expanded to include more than 50 collaborators worldwide covering MEMS, Compound Semiconductors, LED, Image Sensors, Optoelectronics, Microfluidics & Medical, Advanced Packaging, Manufacturing, Nanomaterials, Power Electronics and Batteries & Energy Management.

The “More than Moore” company Yole, along with its partners System Plus Consulting, Blumorpho and KnowMade, support industrial companies, investors and R&D organizations worldwide to help them understand markets and follow technology trends to grow their business.

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