

# STATUS OF PANEL LEVEL PACKAGING 2018

## Market & Technology report - April 2018

*Panel level packaging players are ready for high volume production.*

### WHAT'S NEW

- Updated 2017 - 2023 Panel Level Packaging (PLP) forecast, by packaging platform
- Updated, in-depth analysis of potential applications that could drive the PLP business
- Update on the activities of the various players involved in PLP
- Updated "Equipment and Materials" section: in-depth coverage of the processes, tools, and materials for PLP, as well as technical challenges, key suppliers, and competitive benchmarking
- Equipment suppliers' PLP-specific strategies
- Different players' PLP technology development, readiness, and adoption time
- Comprehensive analysis of the various manufacturing challenges for PLP adoption
- Revised technology roadmap (based on the 2017 - 2023 high volume manufacturing technology roadmap)

### KEY FEATURES OF THE REPORT

Get the sample of the report on [www.i-Micronews.com](http://www.i-Micronews.com)

- Overview of panel packaging technologies that are available or in-development: FOWLP panel and embedded die
- Commercialization status, market adoption, and potential for each packaging technology
- Drivers and challenges for technology adoption
- Per-player product/technology description and analysis
- Detailed supply chain, market adoption roadmap, and volume forecast for each panel platform
- Panel adoption and panel equipment readiness roadmap
- Equipment and materials challenges

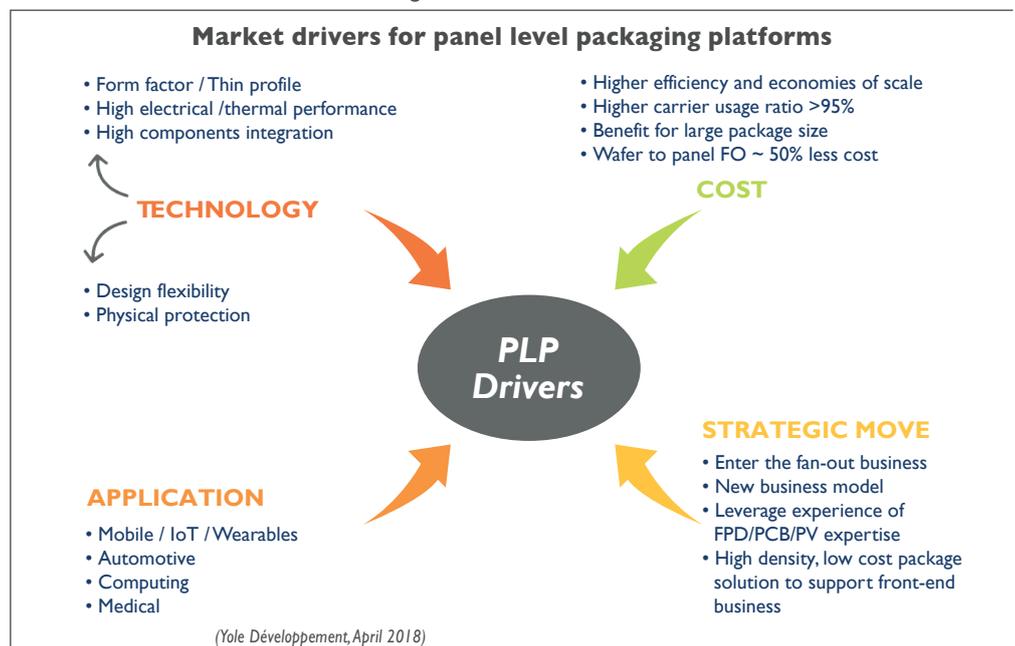
### WHY IS THE INDUSTRY INTERESTED IN PANEL LEVEL PACKAGING?

The demand for lower cost plus higher performance, coupled with OSAT/assembly house end-customers' desire for increasingly lower prices, has driven the semiconductor industry to develop innovative solutions. One approach to reducing overall cost is to switch from wafer and strip-level to a larger-size panel format that takes advantage of efficiency and economies of scale. Going from wafer to panel (for example 12" wafer to 18" x 24" panel) could enable cost reductions of up to 50% (if technologies are ready) and yields exceeding 90%. Panel-level manufacturing has the potential to leverage the knowledge and infrastructure of wafer-level packaging (WLP) and the PCB/flat-panel display/photovoltaic industries.

Various factors are driving Panel Level Packaging (PLP) development and encouraging diverse players from across the supply chain (including equipment and materials) to invest in panel infrastructure. On one side, the leading fabless

players want OSATs to reduce the cost of high-density FOWLP and going to large size panel is seen as the key step to significantly reducing the package price. In fact, FOPLP is on every big OSAT's roadmap. On the other side are players whose strategy is to invest and develop PLP capability and push hard for its adoption. These players, mainly driven by the success and publicity surrounding FOWLP, are also those that:

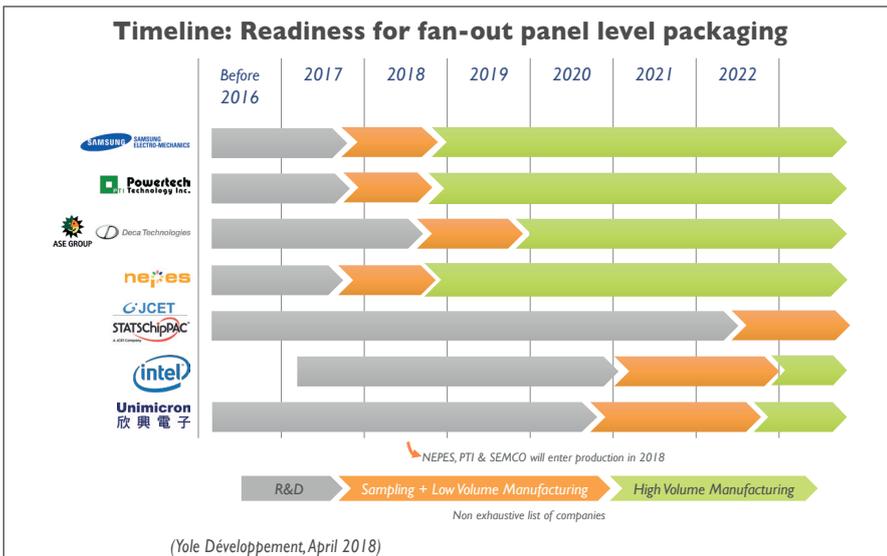
- Missed the early FOWLP (eWLB) wave (i.e. PTI, ASE)
- Were affected by losses in the substrate business and want a new business model that utilizes their experience in substrate manufacturing (i.e. SEMCO, Unimicron)
- Already have experience in panel processes (i.e. LCD packaging) and believe they can leverage this experience for PLP (i.e. NEPES)
- Want to develop high-density, low-cost packaging to support their front-end chip business (Samsung Electronics, Intel)



### SUPPLY CHAIN: STATUS AND READINESS

Many packaging platforms can be considered panel-based, but for this report we consider only two packaging technologies to be PLP, where both RDL interconnect fabrication and further assembly are done at panel level (with panel size >300 mm x 300 mm): FOPLP and embedded die. Between the two, FOPLP is the most-discussed and the one which attracts the greatest interest of many players (including equipment and suppliers), and thus is the main focus of this report.

Lots of players have been developing FOPLP technology, but after years of development/qualification/sampling, three players will finally enter in production in 2018: Powertech Technologies (PTI), NEPES, and SEMCO. NEPES has been in low-volume production since 2017. ASE, in partnership with Deca Technologies, is in the advanced development stage and will commence volume production in 2019/2020. Each player has its own business strategy and is working on its own FOPLP technology (panel size, leveraging

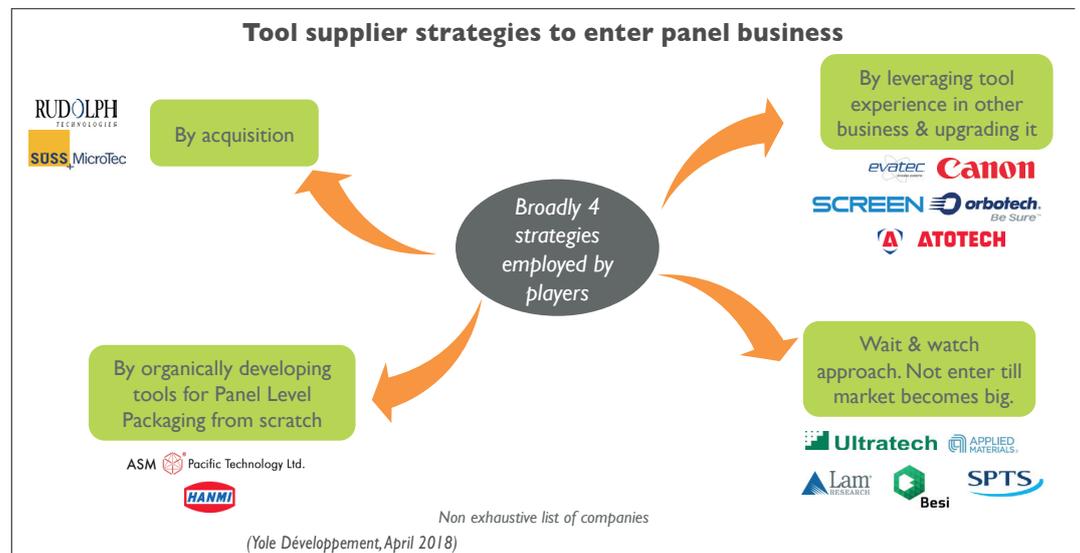


different infrastructure, etc.). For example, NEPES is focused on the coarse design (>10/10 L/S), targeting automotive, sensors, and IoT applications, and will likely not explore high-density design. On the other hand, PTI and SEMCO’s long-term aim is to target mid and high-end applications that require 8/8 or less L/S. Meanwhile, Unimicon is working on a business model whereby it will manufacture the high-density RDL, with further assembly done by an OSAT partner or customer. Also, prominent OSATs like Amkor and JCET/STATS ChipPAC are currently in a “wait and

see” stage, evaluating various options. They will not enter volume production before 2022.

Equipment availability for PLP is not a bottleneck today. Tools are available in the market to support various process steps in panel processing. However, certain tools that support high-density panel packaging are special and expensive. So, tool cost, not availability, is the bottleneck. For some panel-producing process steps (plating, physical vapor deposition [PVD], molding, die attach, and dicing), tools are readily available and can be adapted from the PCB, flat-panel display, or LCD industries. However, for other key process steps inherent to advanced packaging (i.e. lithography), the development of new, upgraded tool capabilities is necessary to support such steps as fine L/S patterning on panel, thick-resist lithography, panel-handling capabilities, exposure field size, and depth of focus. Over the last few years, these tools have been in development at equipment suppliers.

Equipment suppliers are adopting different strategies for entering the PLP business: acquisition (for example, Rudolph Technologies has developed PLP-focused tools based on knowledge received through its acquisition of AZORES Flat Panel Display Panel Printer); by leveraging tool experience from other businesses and upgrading it (i.e. Evatec, Atotech, SCREEN); and by organically developing PLP tools from scratch (ASM). Also, some tool suppliers have a strong position in the FOWLP market but are skeptical of the PLP business and thus are taking a wait-and-see approach (Ultratech, Applied Materials, Lam Research).



### TECHNICAL CHALLENGES AND HIGH VOLUME MANUFACTURING ROADMAP FOR PANEL LEVEL PACKAGING

Certain criteria must be fulfilled and certain challenges overcome for FOPLP’s broad adoption. These criteria/challenges are linked to large capex investment, standardization, multisource availability, and most importantly, market availability to keep the panel line running. There are technical challenges too, such as warpage control, die placement accuracy, and the fabrication of sub 10/10um line, etc. on large panels.

it’s very difficult for end-customers to multisource. Also, it’s not profitable for equipment suppliers to design and manufacture equipment according to different customers’ requirements.

Standardization of the panel size and assembly process is the biggest hurdle for FOPLP adoption. Each player is developing its own process using different panel sizes and infrastructure (PCB/LCD/WLP/PV/Mix) catering to specific applications and customers. In this scenario

Given the technical challenges that will adversely affect the yield, the FOPLP that go into HVM production will support a relatively simple design: >10/10 umL/S, <10 x 10 mm<sup>2</sup> package size, Max 2L RDL. With the maturation of the technology and the experience gained, FOPLP will eventually be adopted for high-density design with <10/10um L/S, multi-layer RDL, >15 x 15mm<sup>2</sup> package size, and multi-die SiP integration.

### Roadmap: volume production for fan-out panel level packaging

	2018	2019	2020	2021
Maximum package size	8*8mm <sup>2</sup>	10*10mm <sup>2</sup>	15*15mm <sup>2</sup>	
Maximum level of RDL	2RDL		3RDL	
Line/Space	15/15µm	10/10µm	8/8µm	5/5µm
Package minimum thickness (without BGA)	250µm	200µm	150µm	
Minimum die size (X-Y directions)	900µm	500µm	200µm	
Maximum die size (X-Y directions)	10mm	12mm	15mm	
Minimum bump pitch	400µm		350µm	
Minimum die-to-die distance	250µm		200µm	

(Yole Développement, April 2018)

#### OBJECTIVES OF THE REPORT

- Provide an overview of panel package technologies
- Describe the key applications that could use the panel infrastructure
- Highlight panel package solutions and the players supporting these packages
- Identify the current and future industrial players for each packaging technology, based on panel level
- Provide market data and forecasts for panel products
- Explore each segment's competitive landscape

#### COMPANIES CITED IN THE REPORT (non exhaustive list)

AMS, Amicra Microtechnologies, Amkor, Analog Devices, Apple, Applied Materials, Asahi Kasei, ASE, ASM Pacific, AT&S, Atotech, AVX, Besi, Bosch, Canon, CEA-LETI, Continental, Dai Nippon, Daimler, DNP, DYCONEX AG, Dow Electronic Materials, Evatec, EVG Group, Ford, Fujikura, GaN Systems, General Electric, Hanmi, HD Micro/DuPont, Heidelberg Instruments, HighTec EDV System, Huawei, Ibiden, Infineon, Intel, IPDiA, IME A\*Star, IMEC, ITRI, IZM Fraunhofer, J-Devices, JSR Micro, Kulicke & Soffa (K&S), Kyocera, Maxim, Merck/AZ EM, Mitsui Kinzoku, Murata Electronics, Nagase, Nanium, NCAP China, Nikon, Nitto Denko, ON Semiconductor, Orbotech, ORC, Panasonic, Powertech Technologies, Qorvo, Qualcomm, Rohm Semiconductor, Rudolph, Sarda Technologies, Schweizer, SCREEN, Shinko, Shin Etsu, STMicroelectronics, SUSS MicroTec, Taiyo Yuden, Tazmo, TCL, TDK-EPCOS, TEL, Texas Instruments (TI), Thales, Towa, TransSiP, Tokyo Ohka Kogyo Co., LTD. (TOK), TSMC, Shin-Etsu MicroSi, Samsung Electro Mechanics (SEMCO), STATS ChipPAC, Ultratech, Unimicron, USHIO, UTAC, Valeo, Vishay, Yamada and many more...

#### TABLE OF CONTENTS (complete content on i-Micronews.com)

<b>Introduction, definitions and methodology</b>	<b>2</b>	<b>Fan-Out Panel Level Packaging (FOPLP)</b>	<b>68</b>
> Report objectives		> FOPLP players having panel manufacturing activities	
> Who should be interested in this report?		> Key challenges	
> Companies cited in this report		> FOPLP HVM adoption issues	
> Definitions, limitations and methodology		> FOPLP Panel commercialization status and supply chain	
> Glossary		> 2017–2023 market forecast (revenues, units, panel starts)	
> What's new since last report ?			
<b>Executive summary</b>	<b>17</b>	<b>Embedded Die</b>	<b>136</b>
<b>Advanced packaging trends and market drivers</b>	<b>32</b>	> Overview of the ED technologies	
<b>Overview of panel manufacturing</b>	<b>36</b>	> Key players activity	
> Definition of Panel Level Packaging		> Motivations and drivers	
> Overview of the Panel technologies /Key segments descriptions		> 2017–2023 market forecast (revenues, units)	
> 2017-2023 total market forecast (revenues, units)		> Market dynamics	
> Applications targeted with Panel		> Embedded die package volume production roadmap	
> Market drivers: general motivations and drivers		> Business model & supply chain	
> Key players activities worldwide		<b>Equipment and materials tool-box</b>	<b>152</b>
> Industrial players activity		> Equipment and material for FOPLP	
> Key R&D players activity		> Equipment and material for ED	
> Commercialization status		<b>Conclusion and perspectives</b>	<b>248</b>
> Supply chain			

#### RELATED REPORT

Benefit from our Bundle & Annual Subscription offers and access our analyses at the best available price and with great advantages



- Status of Advanced Substrates 2018: Embedded Dies & Interconnects, Substrate Like PCB Trends
- Status of the Advanced Packaging Industry 2017
- NXP SCM-i.MX6 Quad High Density Fan-Out Wafer-Level System-in-Package
- Bosch LRR4 77GHz Long Range Radar Sensor

Find all our reports on

[www.i-micronews.com](http://www.i-micronews.com)



#### AUTHOR

**Santosh Kumar** is currently working as Senior Technology & Market Research Analyst at Yole Développement, the «More than Moore» market research and strategy consulting company. He worked as senior R&D engineer at MK Electron Co. Ltd where he was engaged in the electronics packaging materials development and technical marketing. His main interest areas are advanced electronic packaging materials and technology including TSV and 3D packaging, modeling and simulation, reliability and material characterization, wire bonding and novel solder materials and process etc. He received the bachelor and master degree in engineering from the Indian Institute of Technology (IIT), Roorkee and University of Seoul respectively. He has published more than 20 papers in peer reviewed journals and has obtained 2 patents. He has presented and given talks at numerous conferences and technical symposiums related to advanced microelectronics packaging.

Find more details about this report here:





# ORDER FORM

## Status of Panel Level Packaging 2018

### BILL TO

Name (Mr/Ms/Dr/Pr): .....

Job Title: .....

Company: .....

Address: .....

City: .....

State: .....

Postcode/Zip: .....

Country\*: .....

\*VAT ID Number for EU members: .....

Tel: .....

Email: .....

Date: .....

### PAYMENT

**BY CREDIT CARD**

Visa       Mastercard       Amex

Name of the Card Holder: .....

Credit Card Number: .....

Card Verification Value (3 digits except AMEX: 4 digits): .....

Expiration date: .....

**BY BANK TRANSFER**

BANK INFO: HSBC, 1 place de la Bourse, F-69002 Lyon, France,  
 Bank code: 30056, Branch code: 00170  
 Account No: 0170 200 1565 87,  
 SWIFT or BIC code: CCFRFRPP,  
 IBAN: FR76 3005 6001 7001 7020 0156 587

**RETURN ORDER BY**

- FAX: +33 (0)472 83 01 83
- MAIL: YOLE DÉVELOPPEMENT, Le Quartz, 75 Cours Emile Zola, 69100 Villeurbanne/Lyon - France

### PRODUCT ORDER - REF YDI8015

**Please enter my order for above named report:**

One user license\*: Euro 5,990

Multi user license: Euro 6,490

- The report will be ready for delivery from April 26<sup>th</sup>, 2018

- For price in dollars, please use the day's exchange rate. All reports are delivered electronically at payment reception. For French customers, add 20% for VAT

I hereby accept Yole Développement's Terms and Conditions of Sale<sup>(1)</sup>

Signature: .....

\*One user license means only one person at the company can use the report.

**SALES CONTACTS**

- Western US & Canada - Steve Laferriere: + 1 310 600-8267 – laferriere@yole.fr
- Eastern US & Canada - Troy Blanchette: +1 704 859 0453 – troy.blanchette@yole.fr
- Europe & RoW - Lizzie Levenez: + 49 15 123 544 182 – levenez@yole.fr
- Japan & Rest of Asia - Takashi Onozawa: +81 34405-9204 – onozawa@yole.fr
- Greater China - Mavis Wang: +886 979 336 809 – wang@yole.fr
- Specific inquiries: +33 472 830 180 – info@yole.fr

<sup>(1)</sup> Our Terms and Conditions of Sale are available at [www.yole.fr/Terms\\_and\\_Conditions\\_of\\_Sale.aspx](http://www.yole.fr/Terms_and_Conditions_of_Sale.aspx)  
 The present document is valid 24 months after its publishing date: April 19<sup>th</sup>, 2018

### SHIPPING CONTACT

First Name: ..... Last Name: .....

Email: ..... Phone: .....

### 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 and Batteries & Energy Management.

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.

**CONSULTING AND ANALYSIS**

- Market data & research, marketing analysis
- Technology analysis
- Strategy consulting
- Reverse engineering & costing
- Patent analysis
- Design and characterization of innovative optical systems
- Financial services (due diligence, M&A with our partner)

More information on [www.yole.fr](http://www.yole.fr)

**MEDIA & EVENTS**

- i-Micronews.com website & related @Micronews e-newsletter
- Communication & webcast services
- Events: TechDays, forums...

More information on [www.i-Micronews.com](http://www.i-Micronews.com)

**REPORTS**

- Market & technology reports
- Patent investigation and patent infringement risk analysis
- Teardowns & reverse costing analysis
- Cost simulation tool

More information on [www.i-micronews.com/reports](http://www.i-micronews.com/reports)

**CONTACTS**

For more information about :

- Consulting & Financial Services: Jean-Christophe Eloy (eloy@yole.fr)
- Reports: David Jourdan (jourdan@yole.fr) Yole Group of Companies
- Press Relations & Corporate Communication: Sandrine Leroy (leroy@yole.fr)

**Definitions:** "Acceptance": Action by which the Buyer accepts the terms and conditions of sale in their entirety. It is done by signing the purchase order which mentions "I hereby accept Yole's Terms and Conditions of Sale".

**"Buyer":** Any business user (i.e. any person acting in the course of its business activities, for its business needs) entering into the following general conditions to the exclusion of consumers acting in their personal interests.

**"Contracting Parties" or "Parties":** The Seller on the one hand and the Buyer on the other hand.

**"Intellectual Property Rights" ("IPR")** means any rights held by the Seller in its Products, including any patents, trademarks, registered models, designs, copyrights, inventions, commercial secrets and know-how, technical information, company or trading names and any other intellectual property rights or similar in any part of the world, notwithstanding the fact that they have been registered or not and including any pending registration of one of the above mentioned rights.

**"License":** For the reports and databases, 3 different licenses are proposed. The buyer has to choose one license:

- One user license: one person at the company can use the report.
- Multi-user license: the report can be used by unlimited users within the company. Subsidiaries and Joint-Ventures are not included.
- Corporate license: purchased under "Annual Subscription" program, the report can be used by unlimited users within the company. Joint-Ventures are not included.

**"Products":** Depending on the purchase order, reports or database on MEMS, CSC, Optics/MOEMS, Nano, bio... to be bought either on a unit basis or as an annual subscription. (i.e. subscription for a period of 12 calendar months). The annual subscription to a package (i.e. a global discount based on the number of reports that the Buyer orders or accesses via the service, a global search service on line on I-micronews and a consulting approach), is defined in the order. Reports are established in PowerPoint and delivered on a PDF format and the database may include Excel files.

**"Seller":** Based in Lyon (France headquarters), Yole Développement is a market research and business development consultancy company, facilitating market access for advanced technology industrial projects. With more than 20 market analysts, Yole works worldwide with the key industrial companies, R&D institutes and investors to help them understand the markets and technology trends.

## I. SCOPE

- 1.1 The Contracting Parties undertake to observe the following general conditions when agreed by the Buyer and the Seller. ANY ADDITIONAL, DIFFERENT, OR CONFLICTING TERMS AND CONDITIONS IN ANY OTHER DOCUMENTS ISSUED BY THE BUYER AT ANY TIME ARE HEREBY OBJECTED TO BY THE SELLER, SHALL BE WHOLLY INAPPLICABLE TO ANY SALE MADE HEREUNDER AND SHALL NOT BE BINDING IN ANY WAY ON THE SELLER.
- 1.2 This agreement becomes valid and enforceable between the Contracting Parties after clear and non-equivocal consent by any duly authorized person representing the Buyer. For these purposes, the Buyer accepts these conditions of sales when signing the purchase order which mentions "I hereby accept Yole's Terms and Conditions of Sale". This results in acceptance by the Buyer.
- 1.3 Orders are deemed to be accepted only upon written acceptance and confirmation by the Seller, within [7 days] from the date of order, to be sent either by email or to the Buyer's address. In the absence of any confirmation in writing, orders shall be deemed to have been accepted.

## 2. MAILING OF THE PRODUCTS

- 2.1 Products are sent by email to the Buyer:
  - within <sup>[1]</sup> month from the order for Products already released; or
  - within a reasonable time for Products ordered prior to their effective release. In this case, the Seller shall use its best endeavours to inform the Buyer of an indicative release date and the evolution of the work in progress.
- 2.2 Some weeks prior to the release date the Seller can propose a pre-release discount to the Buyer  
The Seller shall by no means be responsible for any delay in respect of article 2.2 above, and including incases where a new event or access to new contradictory information would require for the analyst extra time to compute or compare the data in order to enable the Seller to deliver a high quality Products.
- 2.3 The mailing of the Product will occur only upon payment by the Buyer, in accordance with the conditions contained in article 3.
- 2.4 The mailing is operated through electronic means either by email via the sales department or automatically online via an email/password. If the Product's electronic delivery format is defective, the Seller undertakes to replace it at no charge to the Buyer provided that it is informed of the defective formatting within 90 days from the date of the original download or receipt of the Product.

2.5 The person receiving the Products on behalf of the Buyer shall immediately verify the quality of the Products and their conformity to the order. Any claim for apparent defects or for non-conformity shall be sent in writing to the Seller within 8 days of receipt of the Products. For this purpose, the Buyer agrees to produce sufficient evidence of such defects. .

2.6 No return of Products shall be accepted without prior information to the Seller, even in case of delayed delivery. Any Product returned to the Seller without providing prior information to the Seller as required under article 2.5 shall remain at the Buyer's risk.

## 3. PRICE, INVOICING AND PAYMENT

- 3.1 Prices are given in the orders corresponding to each Product sold on a unit basis or corresponding to annual subscriptions. They are expressed to be inclusive of all taxes. The prices may be reevaluated from time to time. The effective price is deemed to be the one applicable at the time of the order.
- 3.2 Yole may offer a pre release discount for the companies willing to acquire in the future the specific report and agreeing on the fact that the report may be release later than the anticipated release date. In exchange to this uncertainty, the company will get a discount that can vary from 15% to 10%.
- 3.3 Payments due by the Buyer shall be sent by cheque payable to Yole Développement, credit card or by electronic transfer to the following account:  
HSBC, 1 place de la Bourse 69002 Lyon France  
Bank code: 30056  
Branch code: 00170  
Account n°: 0170 200 1565 87  
BIC or SWIFT code: CCFRFRPP  
IBAN: FR76 3005 6001 7001 7020 0156 587

To ensure the payments, the Seller reserves the right to request down payments from the Buyer. In this case, the need of down payments will be mentioned on the order.

- 3.4 Payment is due by the Buyer to the Seller within 30 days from invoice date, except in the case of a particular written agreement. If the Buyer fails to pay within this time and fails to contact the Seller, the latter shall be entitled to invoice interest in arrears based on the annual rate Refi of the «BCE» + 7 points, in accordance with article L. 441-6 of the French Commercial Code. Our publications (report, database, tool...) are delivered only after reception of the payment.
- 3.5 In the event of termination of the contract, or of misconduct, during the contract, the Seller will have the right to invoice at the stage in progress, and to take legal action for damages.

## 4. LIABILITIES

- 4.1 The Buyer or any other individual or legal person acting on its behalf, being a business user buying the Products for its business activities, shall be solely responsible for choosing the Products and for the use and interpretations he makes of the documents it purchases, of the results he obtains, and of the advice and acts it deduces thereof.
- 4.2 The Seller shall only be liable for (i) direct and (ii) foreseeable pecuniary loss, caused by the Products or arising from a material breach of this agreement
- 4.3 In no event shall the Seller be liable for:
  - a) damages of any kind, including without limitation, incidental or consequential damages (including, but not limited to, damages for loss of profits, business interruption and loss of programs or information) arising out of the use of or inability to use the Seller's website or the Products, or any information provided on the website, or in the Products;
  - b) any claim attributable to errors, omissions or other inaccuracies in the Product or interpretations thereof.
- 4.4 All the information contained in the Products has been obtained from sources believed to be reliable. The Seller does not warrant the accuracy, completeness adequacy or reliability of such information, which cannot be guaranteed to be free from errors.
- 4.5 All the Products that the Seller sells may, upon prior notice to the Buyer from time to time be modified by or substituted with similar Products meeting the needs of the Buyer. This modification shall not lead to the liability of the Seller, provided that the Seller ensures the substituted Product is similar to the Product initially ordered.
- 4.6 In the case where, after inspection, it is acknowledged that the Products contain defects, the Seller undertakes to replace the defective products as far as the supplies allow and without indemnities or compensation of any kind for labor costs, delays, loss caused or any other reason. The replacement is guaranteed for a maximum of two months starting from the delivery date. Any replacement is excluded for any event as set out in article 5 below.
- 4.7 The deadlines that the Seller is asked to state for the mailing of the Products are given for information only and are not guaranteed. If such deadlines are not met, it shall not lead to any damages or cancellation of the orders, except for non acceptable delays exceeding [4] months from the stated deadline, without information from the Seller. In such case only, the Buyer shall be entitled to ask for a reimbursement of its first down payment to the exclusion of any further damages.

4.8 The Seller does not make any warranties, express or implied, including, without limitation, those of sale ability and fitness for a particular purpose, with respect to the Products. Although the Seller shall take reasonable steps to screen Products for infection of viruses, worms, Trojan horses or other codes containing contaminating or destructive properties before making the Products available, the Seller cannot guarantee that any Product will be free from infection.

## 5. FORCE MAJEURE

The Seller shall not be liable for any delay in performance directly or indirectly caused by or resulting from acts of nature, fire, flood, accident, riot, war, government intervention, embargoes, strikes, labor difficulties, equipment failure, late deliveries by suppliers or other difficulties which are beyond the control, and not the fault of the Seller.

## 6. PROTECTION OF THE SELLER'S IPR

- 6.1 All the IPR attached to the Products are and remain the property of the Seller and are protected under French and international copyright law and conventions.
- 6.2 The Buyer agreed not to disclose, copy, reproduce, redistribute, resell or publish the Product, or any part of it to any other party other than employees of its company. The Buyer shall have the right to use the Products solely for its own internal information purposes. In particular, the Buyer shall therefore not use the Product for purposes such as:
  - Information storage and retrieval systems;
  - Recordings and re-transmittals over any network (including any local area network);
  - Use in any timesharing, service bureau, bulletin board or similar arrangement or public display;
  - Posting any Product to any other online service (including bulletin boards or the Internet);
  - Licensing, leasing, selling, offering for sale or assigning the Product.
- 6.3 The Buyer shall be solely responsible towards the Seller of all infringements of this obligation, whether this infringement comes from its employees or any person to whom the Buyer has sent the Products and shall personally take care of any related proceedings, and the Buyer shall bear related financial consequences in their entirety.
- 6.4 The Buyer shall define within its company point of contact for the needs of the contract. This person will be the recipient of each new report in PDF format. This person shall also be responsible for respect of the copyrights and will guaranty that the Products are not disseminated out of the company.
- 6.5 In the context of annual subscriptions, the person of contact shall decide who within the Buyer, shall be entitled to access on line the reports on I-micronews.com. In this respect, the Seller will give the Buyer a maximum of 10 password, unless the multiple sites organization of the Buyer requires more passwords. The Seller reserves the right to check from time to time the correct use of this password.
- 6.6 In the case of a multisite, multi license, only the employee of the buyer can access the report or the employee of the companies in which the buyer have 100% shares. As a matter of fact the investor of a company, the joint venture done with a third party etc...cannot access the report and should pay a full license price.

## 7. TERMINATION

7.1 If the Buyer cancels the order in whole or in part or postpones the date of mailing, the Buyer shall indemnify the Seller for the entire costs that have been incurred as at the date of notification by the Buyer of such delay or cancellation. This may also apply for any other direct or indirect consequential loss that may be borne by the Seller, following this decision.

7.2 In the event of breach by one Party under these conditions or the order, the non-breaching Party may send a notification to the other by recorded delivery letter upon which, after a period of thirty (30) days without solving the problem, the non-breaching Party shall be entitled to terminate all the pending orders, without being liable for any compensation.

## 8. MISCELLANEOUS

All the provisions of these Terms and Conditions are for the benefit of the Seller itself, but also for its licensors, employees and agents. Each of them is entitled to assert and enforce those provisions against the Buyer.

Any notices under these Terms and Conditions shall be given in writing. They shall be effective upon receipt by the other Party. The Seller may, from time to time, update these Terms and Conditions and the Buyer, is deemed to have accepted the latest version of these terms and conditions, provided they have been communicated to him in due time.

## 9. GOVERNING LAW AND JURISDICTION

- 9.1 Any dispute arising out or linked to these Terms and Conditions or to any contract (orders) entered into in application of these Terms and Conditions shall be settled by the French Commercial Courts of Lyon, which shall have exclusive jurisdiction upon such issues.
- 9.2 French law shall govern the relation between the Buyer and the Seller, in accordance with these Terms and Conditions.