

# RADAR TECHNOLOGIES FOR AUTOMOTIVE 2018

Market & Technology report - November 2017

*How will radar sensor technology shape the cars of the future?*

*Prepare for the automotive sensor industry's golden age, in which radar will be increasingly viewed as a key technology for autonomous vehicles.*

## KEY FEATURES OF THE REPORT

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

- Automotive radar module market forecast (Mu & \$M) through 2022
- Automotive radar chip market forecast (Mu & \$M) through 2022
- Automotive radar landscape/ ecosystem mapping
- Technology overview
- Technology trends: integration, performance improvement

## OBJECTIVES OF THE REPORT

Ecosystem identification and analysis

- Defining the application range
- Technical market segmentation
- Market trends and forecasts
- Key players, by market and analysis

Analysis and description of markets and technologies involved:

- Detailed applications per market segment
- Major actors, worldwide
- Technology trends
- Main technical challenges

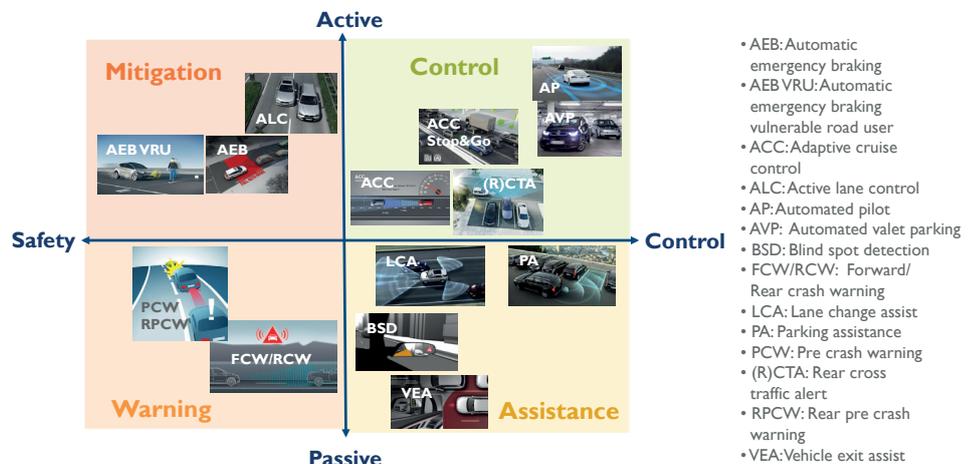
## AUTOMOTIVE IS EXPERIENCING AN EXPLOSION OF NEW HIGH-TECH APPLICATIONS

Automatic emergency braking, adaptive cruise control, and lane-change assist are some examples of these new applications. Spurred by the New Car Assessment Program, OEMs are designing cars with numerous sensors that enable applications like these. And since most of these new applications are safety-related, the sensors must be highly accurate. This means very tight specifications for object detection and classification, as well as being ultra-reliable: operable in every weather condition, in poor lighting, near or far, and with a wide field of view. Radar technology is well-suited to fulfill most of these requirements. We say "most" because

object classification is not currently possible with radar, but certain companies are moving quickly to unlock this capability in imaging radar.

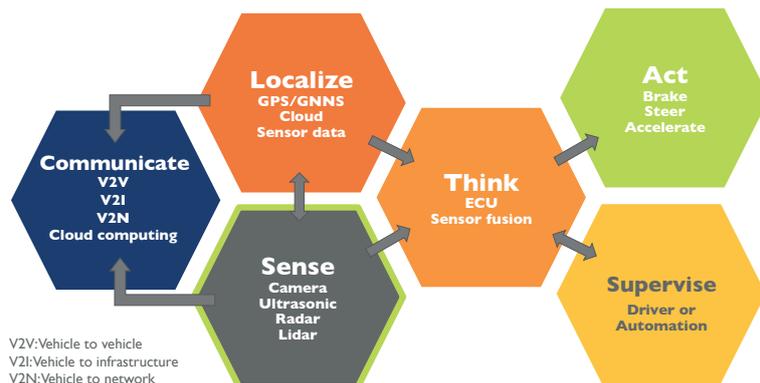
Radar has an impressive technology roadmap allowing for huge resolution improvement as well as device miniaturization and cost reduction. Despite small growth (~3%) in global car sales until 2022, Yole Développement expects an average growth rate of 25% for radar module sales, and an average growth rate of 22% for radar chip sales over the next five years - with autonomous driving being the next long-term driver for radar technology growth.

### Explosion of automotive applications



(Yole Développement, November 2017)

### Vehicle automation process



V2V: Vehicle to vehicle  
V2I: Vehicle to infrastructure  
V2N: Vehicle to network

(Yole Développement, November 2017)

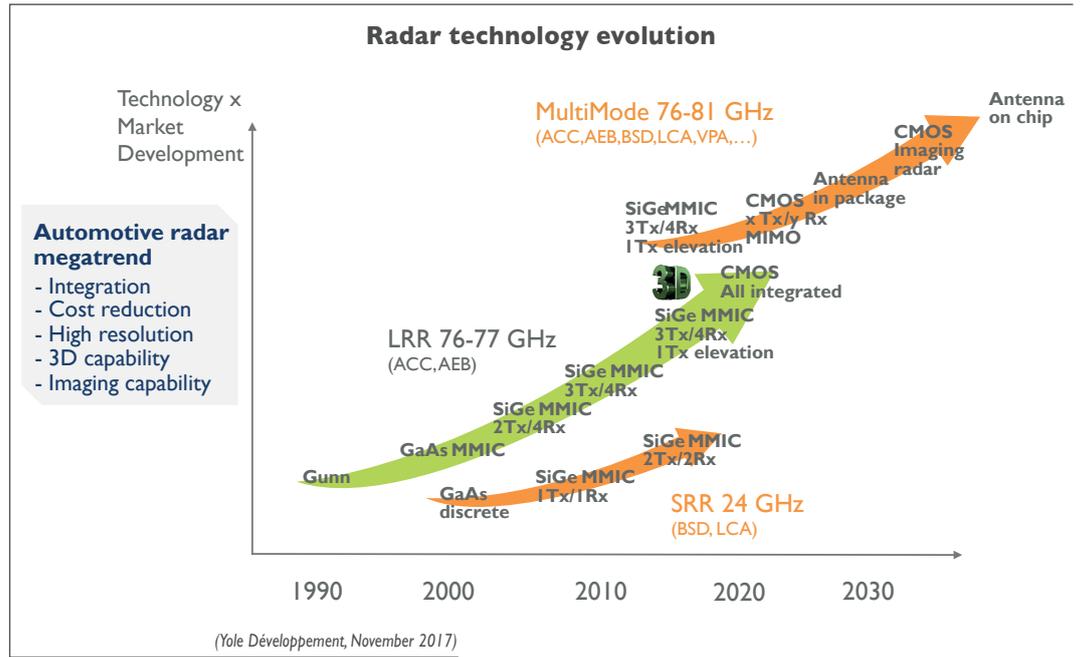
## IN THIS HIGHLY DYNAMIC MARKET, MILLIMETER WAVE TECHNOLOGY IS AT THE EPICENTER

77 GHz radar in W band development is overtaking the current mainstream 24 GHz offer in the unlicensed ISM (industrial, scientific, medical) band. 77 GHz radar combines better range coverage (thanks to its “full power” mode) and larger available bandwidth, thus improving range resolution and accuracy by a factor of 20x. Other benefits include its 3x smaller form factor and improved velocity resolution.

Radar architectures have reached a new level of complexity, requiring innovation in antenna design, complex modulation techniques, and target resolution algorithms. Multi-beam, multi-range

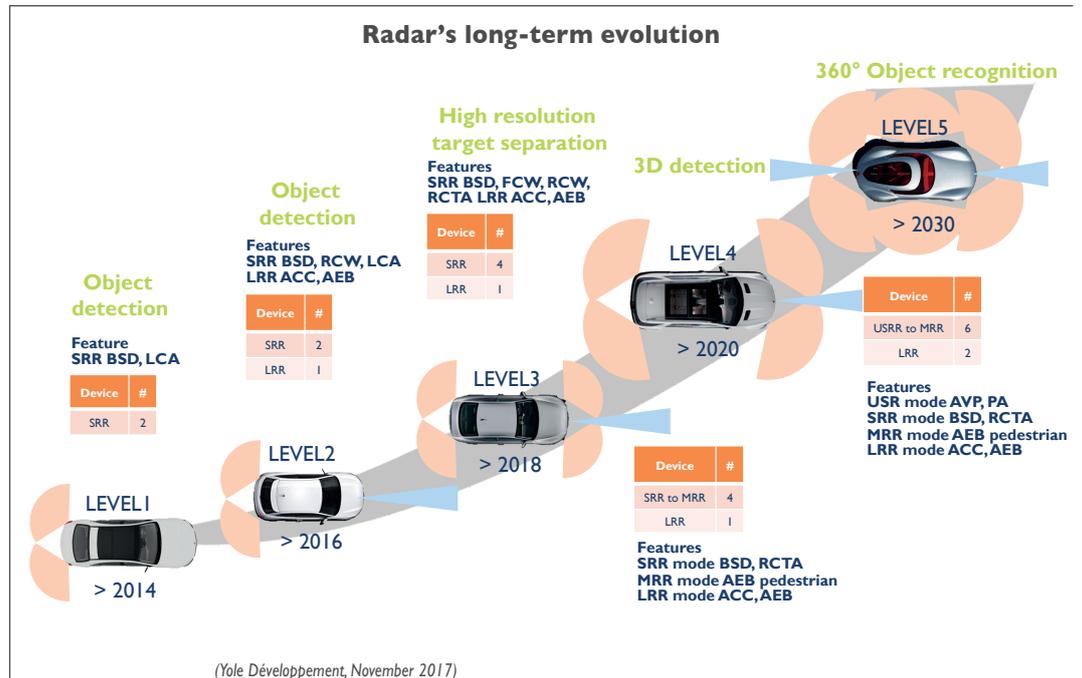
requirements have led to complex antenna arrays that are multiplying transmit-and-receive paths and adding 3D detection capability. Chipmakers have developed new chips to support these stringent requirements, increasing the number of channels that a single chip can handle.

Integration is another big area for exploration. A battle is underway between the well-established SiGe technology and the more recent RFCMOS platform, which is quickly becoming a reality thanks to players like Texas Instruments - which has spent the last decade developing RFCMOS technology.



## A WELL-ESTABLISHED SUPPLY CHAIN IS FACING UNPRECEDENTED COMPETITION

Innovative startups like Metawave and Uhnder, which are proposing disruptive technologies for very high-resolution electronic steerable antennas and imaging radar, are competing head-to-head with well-established



module makers like Continental and Bosch. Regarding automotive 77 GHz radar chips based on a 130nm SiGe platform, NXP and Infineon are the top suppliers, with other big semiconductor companies like Texas Instruments and ADI offering products based on advanced CMOS nodes (down to 28nm).

Foundries are also positioning themselves in this ecosystem. For example, GLOBALFOUNDRIES and its 22FDX platform, TOWERJAZZ and its 180nm SiGe platform, and UMS too. It is exciting to see such a wide diversity of technology

offerings, a clear confirmation of the automotive radar market's traction. However, penetrating the automotive market with new technologies is no easy task. On the contrary, entering and maintaining a position in the automotive supply chain is a long, trust-based process.

We are certainly entering a new "radar age", with many developments, disruptive technologies, and new entrants positioning this technology as the primary sensor - along with imaging (cameras) for ADAS and autonomous vehicles.

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

Acura, Airgain, Alfa Romeo, Analog Device, Anatel, Arbe Robotics, Argo AI, ARTSys360, Autoliv, Autoroad, Automotive Distance System Control, Audi, Bentley, BMW, Bosch, Broadcom, Bugatti, Buick, Chevrolet, Chrysler, Codha Wireless, Commsignia, Continental, Cruise, Cypress, Daihatsu, Denso-Ten, Delphi, Echodyne, Fiat, Fomoco, Ford, Furuno, Geely, Gemalto, General Motor, GlobalFoundry, GMC, Hamaton, Harada, Harman, Hella, Honda, Hyundai, IMST, InnoSent, Infineon, Infinity, Jaguar, Jeep, Kia, Laird, Lesswire, Lexus, Lincoln, LM technologies, Mando, Marvell, Maxim Integrated, Mercedes, Metawave, Melexis, Mini, Mitsubishi, Murata, Nanoradar, Neteera, Nissan, Novatel, NuTonomy, NXP, Oculii, Omniradar, Ottomatika, Oryx, OriginGPS, Panasonic, Peugeot, Porsche, Redpine signals, Renault, Qorvo, Qualcomm, Range Rover, Samsung, SAIC, SEAT, Semtech, Sierra Wireless, Skyworks, Skoda, ST Microelectronic, Subaru, Telit, Tesla, Texas Instruments, Tata, Toshiba, Toyota, Towerjazz, TpsCo, Trimble, Ublox, Uhnder, United Monolithic Semiconductors, Valeo, Vayyar, Volkswagen, Volvo, Wieson, ZF-TRW and more.



**AUTHORS**

As a Technology & Market Analyst specializing in RF devices & technologies at Yole Développement (Yole), **Cédric Malaquin** is involved in the development of technology and market reports as well as the production of custom consulting projects. Prior to working with Yole, Cédric was employed at Soitec as a Process Integration Engineer for nine years, and then as an Electrical Characterization Engineer for six years. Cédric has contributed heavily to FDSOI and RFSOI product characterization and has 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.



Since 2013, **Claire Troadec** has led RF activity at Yole Développement. After graduating from INSA Rennes in France with an engineering degree in Microelectronics and Material Sciences, she joined NXP Semiconductors, where she worked for seven years as a CMOS Process Integration Engineer at the IMEC R&D facility. During this time she oversaw the isolation and performance boost of CMOS technology node devices from 90nm down to 45nm. Claire has authored or co-authored seven U.S. patents and nine international publications in the semiconductor field, and she managed her own distribution company before joining Yole Développement.

**TABLE OF CONTENTS** (complete content on [i-Micronews.com](http://i-micronews.com))

<b>Scope of the report</b>	<b>5</b>	<b>Technology overview</b>	<b>90</b>
<b>Introduction, definition &amp; methodology</b>	<b>15</b>	> Radar architecture	
<b>Executive summary</b>	<b>30</b>	> Modulation techniques	
<b>History and overview</b>	<b>45</b>	> Antenna technologies	
> History of radar		> Digital and analog beam forming	
> Frequency regulation		> Introduction to software	
> Automotive use cases		<b>Radar evolution trend</b>	<b>110</b>
> Benchmark with camera, lidar and ultrasonic		> From dedicated to multimode	
<b>Market forecast</b>	<b>65</b>	> Resolution, 3D and imaging	
> Market drivers		> Antenna and beam management	
> Radar modules (\$M, units)		> Chip integration, node shrinking	
> Radar chips (\$M, units)		<b>Other radio based technology introduction</b>	<b>125</b>
> Market share		> WiFi, BT, NFC	
<b>Supply chain &amp; ecosystem</b>	<b>80</b>	> GNSS	
> Ecosystem		> Vehicle communication technology, V2X	
> Module maker		<b>Conclusions &amp; perspectives</b>	<b>135</b>
> Chip maker		<b>Yole Développement presentation</b>	<b>140</b>
> Start up landscape			

**RELATED REPORT**

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



- Imaging Technologies for Automotive 2016
- Bosch LRR4 77GHz Long-Range Radar Sensor
- Continental ARS4-A 77GHz Long-Range Radar Sensor
- Delphi RaCAM Long-Range Radar Sensor

Find all our reports on [www.i-micronews.com](http://www.i-micronews.com)





# ORDER FORM

## Radar Technologies for Automotive 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

#### SALES CONTACTS

- North America - Steve Laferriere: +13106 008 267  
laferriere@yole.fr
- Europe & RoW - Lizzie Levenez: + 49 15 123 544 182  
levenez@yole.fr
- Japan & Rest of Asia - Takashi Onozawa: +81 3 6869 6970  
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:  
November 28, 2017

### PRODUCT ORDER - Ref YDMSI7054

Please enter my order for above named report:

One user license\*: Euro 5,490

Multi user license: Euro 6,490

- The report will be ready for delivery from December 27, 2017
- 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.

### SHIPPING CONTACT

First Name: .....

Email: .....

Last Name: .....

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.