European
SME Expertise
in 5G and Beyond

January 2021

USEFUL LINKS

Find the SME you need
www.networld2020.eu/find-the-sme-you-need-new-page

NetWorld2020 SME WG
www.networld2020.eu/sme-wg

NetWorld2020 European Technology Platform
www.networld2020.eu

5G Public-Private Partnership
www.5g-ppp.eu

EDITORIAL

JACQUES MAGEN
AUSTRALO
Chair of the
SME Working Group

NICOLA CIULLI
Nextworks
Vice-chair of the
SME Working Group

This edition of the "SME brochure" is the 5th edition of the brochure. It is released at a time when many SMEs are still suffering from the COVID-19 crisis, and are hoping to see the end of the tunnel somewhere in 2021. This has not prevented the number of members in the SME Working Group to increase again in 2020, providing at the same time additional members to the NetWorld2020 European Technology Platform. By January 2021, there are 195 members in the Group, including 166 SMEs.

We are once again reaching a record number of SMES presented in this edition. Synthetic information on SMEs may also be found on the "Find the SME you need" web page[1], that displays both the expertise and skills of SMEs in 5G-related technology, and their involvement in vertical sectors. More SME success stories have been added on the web page and in this edition of the brochure.

When considering the latest available statistics, the participation of SMEs in the 5G PPP had reached 20.36%, representing a total of 91.38 M€ in EU funding[2]. 183 different SMEs have participated in 5G PPP projects (some in more than one project), i.e., about 29% of the overall number of 5G PPP different participants. There were 317 single SME participations (including SMEs participating in more than one project), i.e., 22.3% of the overall single participations. 65% of the SMEs participating in the 5G PPP have participated in one project, and 33% have participated in at least two projects. There is a similar level of participation of SMEs in Research & Innovation Actions and Innovation Actions. When the latest 5G PPP projects are officially launched, the expectation is to reach 22% SME participation in the 5G PPP overall.

The SME Working Group has been pretty active since the previous edition, which was released in June 2020. An SME Working Group web page was created on the NetWorld2020 web site[3]. With the preparation of the next European Research & Innovation Framework Programme called "Horizon Europe", a dedicated Public-Private Partnership on Smart Networks & Services, in short SNS PPP, shall follow up on the success of the 5G PPP. With the addition of complementary domains such as IoT and AI, the SME ecosystem around 5G and beyond and 6G shall be strengthened. The SME Working Group issued a dedicated "SNS Position Paper" and has initiated the preparation of the contribution of SMEs to the SNS PPP. After the NetWorld2020 Steering Board elections that were held in November 2020 and announced at the very successful General Assembly, are Australo, Montimage, Nextworks, and Quobis.

Despite the odds, this is an exciting time for SMEs, with plenty of opportunities to continue working on innovative solutions and products for 5G and beyond.

I am very glad to join once more our SME WG Chair, Jacques Magen, in introducing this updated edition of the "SME brochure". While the 5G Public-Private Partnership (5G PPP) is approaching its conclusion, with the last batch of research and innovation projects just starting, we can see that the participation of SMEs has been a real success both in terms of budget and active commitment to the projects and related 5G PPP activities.

Horizon Europe is coming, slowly but certainly, and is bringing new perspectives, challenges and opportunities. The biggest one for our community is the establishment of the Smart Network and Services Joint Undertaking (SNS JU), the natural successor of the 5G PPP. Once more, SMEs have done and are doing their part in supporting the other stakeholders (large enterprises, academia and research institutions) along the trip towards this new European Partnership.

Indeed, the pandemic and the related troubles are still here. We still cannot predict how the health and economic consequences of it will unfold in the coming months; we probably only have a glimpse of what will and has to change in the near future. For sure, technology is here to stay and provide a helping hand, both in terms of virtual bridges in a temporarily disconnected world, and market opportunities for many stakeholders.

Walking on the leading edge of innovation is in the genes of many SMEs; having them in mind, we hope the new SNS JU and the new European Technology Platform (successor of Networld 2020) will provide the best ground and support for their development and market success.

RUI L. AGUIAR
Networld2020 Steering
Board Chair

COLIN WILLCOCK
Chairman of
the Board, 5G IA

"The last time we engaged in the production of this brochure we were living in a very different world". That was the (at the time naïve) way I started this editorial last year. As we all are aware off, 2020 was a year like no other. Society saw a disruptive pandemia raging through our countries, major changes on the European Union occurred (from the Brexit discussions to the new recovery budgets), and the approval of the Horizon Europe programme has somewhat lingered slowly in these times. But the overall message of last year still remains valid. On these changing times, SMES are increasingly relevant for the European society. The flexibility, eagerness and drive for innovation, that so many European SMEs possess, are essential for the development of our lives – we have seen many SMEs in the forefront of new technologies for addressing the challenges of our current situation, providing fast responses to the needs of our changed environment, including innovative responses to these new pandemic challenges we have been facing. SMEs have risen to the challenges of the disruption that has descended upon all of us.

Networld2020, the European Technology Platform that collects the efforts of all entities interested in telecommunications and associated technologies, is proud to count 350+ very dynamic SMEs inside its constituency. SMEs have been an essential part on, and a key contributor to, the work we performed. The SME working group has been key in intertwining the realities of innovation in European context and the constrains of SMEs, actively working to facilitate this two-way street, and have become now engaged in contributing to the upcoming workprogramme: The group basic mandate of improving the interest of SMEs for European research, and promoting the advantages of collaborating with SMEs inside the research and innovation communities, will be more important than ever with a new workprogramme arriving. With the upcoming Horizon Europe, novel opportunities will exist for SMEs, most specially because our relations with other industries (the so called vertical markets) are going to increase.

We are confident that the collaboration of SMEs inside European-funded research will continue to increase, and we see SMEs – now more than ever - providing a guiding line for the future diversity of our communications ecosystem, with the ability to smoothly develop cross-disciplinary innovation in segmented markets.

Best of luck to all SMEs, and hope you remain ambitious in your objectives to overcome the testing times we will face this year!
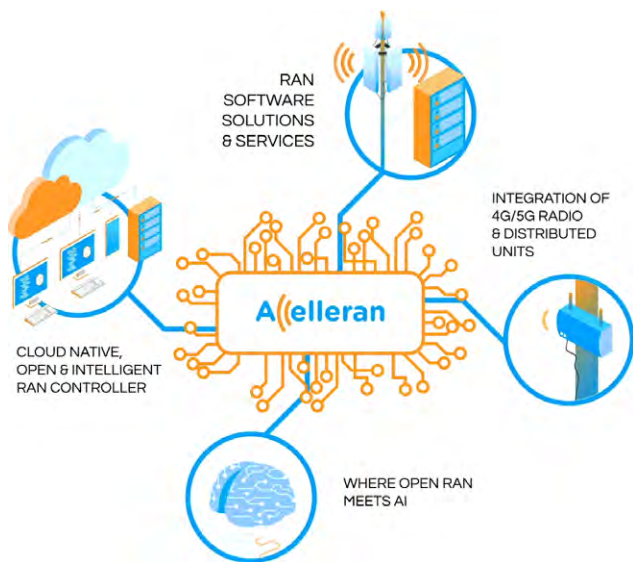
On behalf of the 5G Infrastructure Association (5G-IA), I welcome the opportunity to write an introduction for this new version of the SME brochure. At this difficult time, with the world suffering from Covid-19 it is important to retain hope for the future. In our industry, SMEs play a key role here. They offer the promise to contribute to future growth and opportunities as we try and recover from the terrible effects of the virus. SMEs have the ability to bring new ideas to the market and the flexibility to experiment and eventually create valuable products.

The 5G-IA is committed to the advancement of 5G in Europe. The 5G-IA represents the "private" side in the 5G Public Private Partnership (5G PPP), a 700 Million Euro joint initiative between the European Commission and the European ICT industry. In the context of the 5G PPP, the 5G-IA has been active to ensure a high SME participation. This is because, SMEs are recognized as the catalyst for innovation. Their ability for "out of the box" thinking and their agility to rapidly develop and test ideas in multiple sectors, have been important assets in the industrial digitization of the so-called vertical industries. Joining forces between SMEs and the key ICT companies has been one of the key factors driving the overall success of the 5G PPP programme.

Moving forward, the 5G-IA together with other key industry associations, are driving the formation a new partnership called Smart Networks and Services. The partnership will ensure European leadership in the creation of the next generation network technologies and services. The above-mentioned abilities that SMEs will bring in this new Partnership will be of central importance to create novel services and technological breakthroughs. These will be eventually transformed into valuable solutions for vertical industries thus, creating new jobs and improving the everyday life of European citizens.

COMPANY PROFILES

A((elleran

YEAR ESTABLISHED
2013

NUMBER OF EMPLOYEES
25

MORE INFORMATION
www.accelleran.com

CONTACT
info@accelleran.com

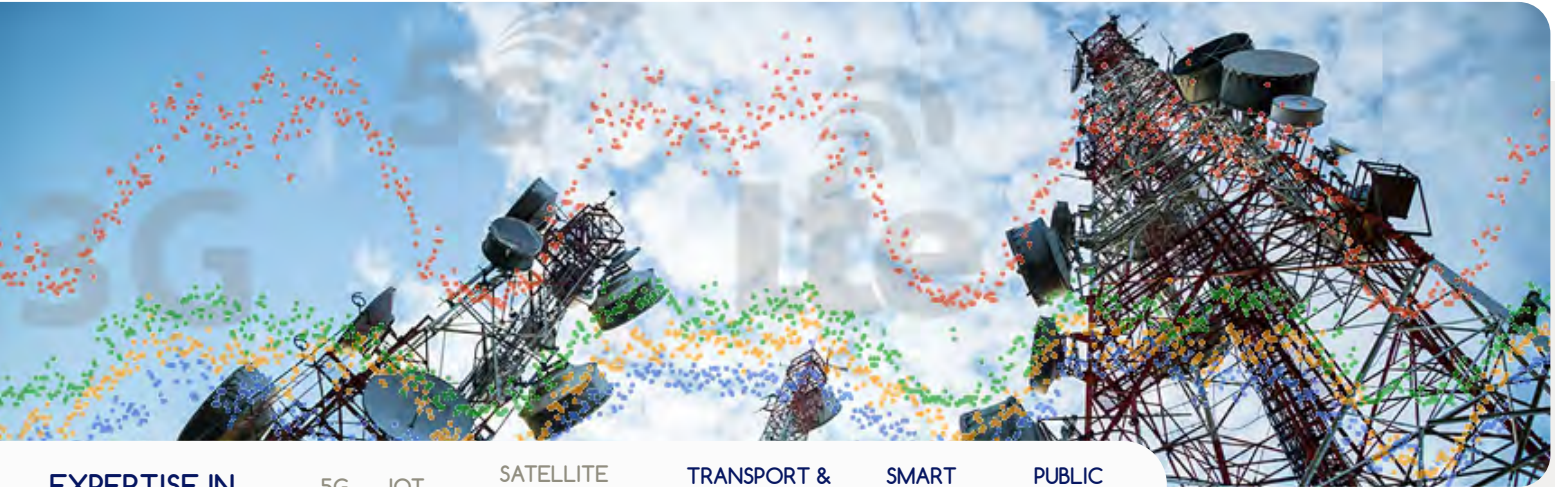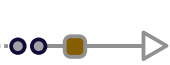| EXPERTISE IN	5G	IOT	NGI	SATELLITE COMMUNICATIONS	MEDIA & CONTENT	TRANSPORT & LOGISTICS	MFG.	ENERGY	SMART CITIES	PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

Accelleran provides Mobile RAN/vRAN software and 4G/5G Small Cell product solutions addressing the real-world challenges of increasing data volumes and 5G applications, calling for hyperdense networks. Accelleran's unique software architecture is genuinely independent from any hardware platform. Operators can leverage one software solution for integrated small cells and for disaggregated and virtualised RAN networks with slicing and edge capabilities. With a global Cellular Industry's leading design team, Accelleran is the technology choice for carrier grade, reliable, performant Small Cells and Radio Access Network software solutions for Fixed Wireless Access, Public Mobile, Private Network, Neutral Host or IoT/Vertical solution providers. Accelleran four core service activities are Consulting & Design, SW Engineering, Test & Integration and Research (7 H2020 5G related projects).

ACHIEVEMENTS & SUCCESS STORIES

Accelleran delivers across the globe carrier grade RAN/vRAN Software and Small Cell products in different architectures. From the versatile, robust, small, lightweight and outdoor integrated E1000 Series Small Cell in different band variants including CBRS, to the ORAN-aligned Cloud Native Virtualised dRAX Open Interface RAN Intelligence enabling AI/ML xApps in an open, scalable and interoperable RAN platform. Accelleran won the 2017 TechTour TOP EVC Final, the 2018 Small Cell Forum Award in the category Outstanding Innovation in Small Cell Technology/Architecture and the 2018 TEAC (TIP Ecosystem Acceleration Centre) UK Wave 2 program. Accelleran has successfully participated in Belgian 5GUARDS and UK 5GRuralFirst projects and currently participates in 5GCity, 5G-Enhance, UNICORE, 5G-CLARITY and 5G-COMPLETE European and joint EU/Japan projects.

INTEREST FOR FUTURE R&D&I COOPERATION

Accelleran seeks European and International RIA, IA, FTI, MSCA... actions and in general any Research, Development and Innovation cooperation projects to underpin the future of mobile RAN/vRAN solutions enabling hyperconnected, ubiquitous, efficient and dense networks. 5G, IoT, Satellite Communications and Next Generation Internet are some of the areas we focus on to enable different vertical sectors such as Transport & Logistics, Manufacturing, Energy, Smart Cities and Public Safety with the networks of the future.

ACTA LTD
Advanced Communications Testing Applications

YEAR ESTABLISHED
2002

NUMBER OF EMPLOYEES
8

MORE INFORMATION
www.acta.com.gr

CONTACT
info@acta.com.gr

EXPERTISE IN   5G   IOT   SATELLITE COMMUNICATIONS   TRANSPORT & LOGISTICS   SMART CITIES   PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

ACTA Ltd is an SME founded in October 2002 in Athens, Greece. Our expertise and experience is as a provider and integrator of long-term performance analysis monitoring solutions as well as ad-hoc network measurements. Main focus is on Telecoms, IT, Electronics and EMF & EMC technologies, utilizing state-of-the-art instruments and solutions from leading manufacturers. ACTA is present in South East Europe.

Typical customers, of ACTA, are Telecom Operators, Integrators, Manufacturers, Utility companies, Universities, Research Laboratories, Enterprises. Solutions provided cover a wide range of technologies with focus on optical, mobile, radio and access networks. ACTA participates in two Horizon2020 EU funded projects, 5G-TOURS and 5G-HEART in partnership with SMEs, Universities and Telecom providers from France, Norway, Italy, UK, Netherlands and Greece.

ACHIEVEMENTS & SUCCESS STORIES

ACTA has provided to Telecom Operators in Greece, transmission performance monitoring solutions. Based on ACTA's KPI Validation Platform and HW probes. Collected data help in Operations and Capacity Planning. Raw data, aggregated according to physical network medium, manufacturer, demographics. 5G network KPIs are collected in 5G-HEART and 5G-TOURS projects.

ACTA's EMF Observatory Application collects measurements from several types of ElectroMagnetic Field monitoring stations. It also manages the EMF monitoring network (alarms, configuration, integrity check). Solution currently deployed at the EMF Authority of Greece (https://paratiritirioemf.eeae.gr), the Romanian (ANCOM) and Paraguayan (CONATEL). EMF Observatory is further developed to support 5G frequencies. ACTA has deployed the TR-069 "0-touch provisioning" xDSL management platform, in three Greek Telecom Operators. Platforms are further developed.

INTEREST FOR FUTURE R&D&I COOPERATION

ACTA Ltd is interested in cooperating with other parties that focus on optical, mobile, radio and access networks. Special focus is on the technology areas of 5G – IoT, hardware design, machine learning software, edge computing, monitoring sensors, blockchain and in electromagnetic fields monitoring.

AETHERIC ENGINEERING

YEAR ESTABLISHED
1989

NUMBER OF EMPLOYEES
2

MORE INFORMATION
www.aetheric.co.uk

CONTACT
enquiries@aetheric.co.uk

EXPERTISE IN SATELLITE COMMUNICATIONS

BACKGROUND, EXPERTISE & SKILLS

As an independent consultancy, specialising in Satellite Communications, we support R&D, design, procurement and implementation of space segment and ground segment systems. We have an in-depth understanding of satellite communications networks and their relevance to commercial applications. Our expertise includes design; procurement; project management; and supervision of manufacture, test, installation and commissioning. Our experience includes working for clients on a world-wide basis.

ACHIEVEMENTS & SUCCESS STORIES

We have performed feasibility studies for satellite communication systems, for example the provision of telecommunication service throughout Africa, and the augmentation of a terrestrial banking network. We have supported the design and the procurement of telecommunications satellites, including GNSS augmentation, broadband connectivity, television distribution and delivery, and data networks as supported applications. We designed and built a prototype transportable VSAT terminal. We also managed studies into the design standards for the user terminals of a broadband satellite communications network.

INTEREST FOR FUTURE R&D&I COOPERATION

We are interested in applying our expertise and experience in support of R&D&I in all aspects of satellite communications. In particular, we would welcome opportunities to support researchers with little expertise, themselves, in satellite communications but with technology or IP that they wish to introduce into the satcom sphere.

App Art

EXPERTISE IN 5G IOT MEDIA & CONTENT HEALTH ENERGY SMART CITIES

BACKGROUND, EXPERTISE & SKILLS

AppArt is a software development company, located in Athens, Greece, with activities focusing mainly in the design and development of Software Applications and Solutions targeted for Telecom Operators, Financial Organizations, Health and Energy Industry.

AppArt delivers both custom, as well as its own solutions. AppArt provides solutions in the areas of Big Data Analytics, implementing a plethora of Use Cases such as, Customer Experience Presentation, Network Performance Management, Digital Network Analytics, Customer Value Management, Enterprise Reporting etc. and in the areas of Mobile Applications creation and Web Development. AppArt provides its own platforms for Business Intelligence, Real Time Campaigns' Management and Next Generation Messaging business functions. AppArt team includes professionals with long market experience and technical expertise, providing the company with the advantage of being able to address business requirements in the most innovative ways.

ACHIEVEMENTS & SUCCESS STORIES

In the area of 5G, AppArt is a member of the consortium of 5G-SOLUTIONS project (https://www.5gsolutionsproject.eu/home). With its participation in 5G-SOLUTIONS, AppArt is leveraging its capabilities even further as it is applying its skills and experience in Analytics area for the design and implementation of the real-time KPI visualization system. More specifically, AppArt is contributing in a) the detailed design of the KPI visualization system, b) the design and implementation of all the integration points of the KPI visualization system with the ICT-17-2018 E2E facilities and c) the development and deployment of all the necessary components comprising the KPI visualization system, in order to meet the required specifications.

AppArt is also member of the consortium of a national funding program in the area of 5G, under the title "5G Traffic". 5G Traffic project is planned to be a development of a framework that will optimize the performance of 5G networks, with software that runs on the control plane and automates the management of forwarding rules at the data plane.

INTEREST FOR FUTURE R&D&I COOPERATION

AppArt has already experience in participating in H2020 actions, , and is currently seeking for new, potential collaborations with other companies/enterprises and/or academic institutions within the frames of European projects, in order to expand further its activities in research and development within the 5G ecosystem.

AppArt is interested in activities related to requirements analysis, design of software solutions and solutions development , mainly in the Data Analytics area for data coming from various sources and to be utilized in different Use Cases of various industries. However AppArt is ready to welcome any other idea, or proposal within, but not limited only to, 5G area.
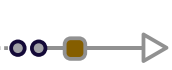
ARCTOS LABS

EXPERTISE IN

5G   IOT   NGI   NETWORK AUTOMATION

BACKGROUND, EXPERTISE & SKILLS

The team consists of very senior consultants with a wealth of experience from the leading global telecom companies. Our experience covers mobile and core systems, software technology, services development, as well as business management.

We are currently active in 5G R&D, edge optimization & automation etc.

ACHIEVEMENTS & SUCCESS STORIES

We provide unique technology for edge workload optimization and similar scenarios that has been showcased in PoC's and in major international conferences (such as MWC)

INTEREST FOR FUTURE R&D&I COOPERATION

Arctos Labs is interested in collaboration projects that moves industry further when it comes to enable emerging edge compute applications and technology

Arteevo

📅 **YEAR ESTABLISHED**
2014

👥 **NUMBER OF EMPLOYEES**
4

ⓘ **MORE INFORMATION**
www.arteevo.com

✉ **CONTACT**
info@arteevo.com

EXPERTISE IN 5G IOT NGI **MEDIA & CONTENT** **SMART CITIES** **ENERGY** **TRANSPORT & LOGISTICS** **MANUFACTURING** **+**

BACKGROUND, EXPERTISE & SKILLS

Arteevo Technologies specializes in developing secure decentralized solutions for ICT, telecom and cyber-physical applications. Key components in our solutions are distributed ledger technology (DLT), cryptographically ensured end-to-end security, confidentiality, decentralized identity management and artificial intelligence. We have developed advanced architectures for the incorporation of dedicated, ultrafast blockchain technology in SDN networks and 5G infrastructures, including the Mobile Edge.

Our other areas of expertise include industrial data and IoT platforms, digital privacy and automation of auditing of business process operations. We take a holistic approach to design of distributed systems that covers both technical and business aspects, including multi-party network governance, cross-provider accountability and end-to-end security.

ACHIEVEMENTS & SUCCESS STORIES

Arteevo has participated in one FP7 and three high profile H2020 IA and RIA projects in the areas of energy, online privacy and automation of industrial and communication business processes, two of these currently in progress, one of them a major PPP. The projects span the domains of energy, pharmaceutical industry, healthcare, social services and manufacturing.

INTEREST FOR FUTURE R&D&I COOPERATION

Arteevo is interested for future R&D&I cooperation in the following research areas: IoT, Cloud and embedded M2M applications, industrial automation, smart cities, smart mobility, health, energy, digital industry, telecom network automation, SDN, virtual networks etc.

We seek to team up with large international domain leaders in the telecom industry – network operators, infrastructure providers, virtualization service providers, edge network operators and developers of advanced telecom applications. We will also welcome opportunities of collaboration with technology SMEs that have complementary expertise.

Our primary interest in such partnerships is in creating novel real-world solutions based on synergies in the technology, market and operational expertise of the partners.

AUSTRALO

EXPERTISE IN   5G   IOT   NGI   MEDIA & CONTENT   MANUFACTURING   HEALTH   SMART CITIES   +

BACKGROUND, EXPERTISE & SKILLS

AUSTRALO is your European partner to thrive in the Lab-to-Market leap. Our mission is to accelerate the potential of landmarks in Science & Technology to transform real-life challenges, creating, communicating, and delivering value to key stakeholders.

AUSTRALO offers:

Community Building. We build bridges with thriving networks in deep-tech, industry, entrepreneurship and vertical sectors, harnessing the power of open innovation.

Marketing Communication. Our experience delivering promotional strategies will give you an outstanding visibility and market position, making your innovation attractive to a critical mass - graphical and multimedia material, website, social media, communication campaigns among other marketing assets.

Go-to-Market. Our team empowers new business ideas to thrive, increasing competitiveness, market assessment and capacity to access customers.

ACHIEVEMENTS & SUCCESS STORIES

With 10+ years of experience, our team participates actively in the European Framework Programme, with a track record of 10 active H2020 projects in 2021. This includes COREnect, the project bringing together the most prominent 5G EU players from the industry and academia to establish a sustainable technology sovereignty in 5G for Europe, promoting innovation and business opportunities.

AUSTRALO is a member in some of the most relevant EU digital networks, including the 5G Infrastructure Association and NetWorld2020 -where we lead the SME Working Group-, Big Data Value Association (BDVA), Next Generation Internet (NGI), Association European NanoElectronics ActivitieS (AENEAS), and Barcelona Tech City. Plus, we are partners in COVID-X, the acceleration programme for data solution defeating COVID-19.

INTEREST FOR FUTURE R&D&I COOPERATION

Our values are rooted in collaboration principles. AUSTRALO is permanently seeking new forms of partnership with organizations from diverse types, mostly centred in empowering Research & Innovation initiatives. The ambition is to continue in Horizon Europe with the performance delivering impact in H2020 (about 25% success rate), participating as partners along with the most prominent industry, academia and non-profit institutions, both from emerging technology and vertical sectors. Complementing our participation in consortia, AUSTRALO offers our professional services as external contractors for running projects, implementing activities such as website development, graphical material, content and promotional campaigns. Additionally, we are interested to reinforce our synergies with other community builders through MoUs, amplifying the outreach capacity for opportunities and news of shared interest.

AZCOM Technology

YEAR ESTABLISHED
1996

NUMBER OF EMPLOYEES
100

MORE INFORMATION
www.azcomtech.com

CONTACT
info@azcomtech.com

EXPERTISE IN   5G   IOT   SATELLITE COMMUNICATIONS   HEALTH   SMART CITIES   **+**

BACKGROUND, EXPERTISE & SKILLS

Azcom Technology is a leader in advanced wireless communication with two decades of experience. It provides a complete suite of software IPR and hardware platforms to build and deploy commercial and special purpose solutions for cellular communications, automotive, aerospace, home automation and mobile applications. Azcom provides highly specialized expertise in areas such as signal processing, algorithm design/simulation and DSP software development for multiple application types, including cellular networks, space and radar communication. The company has experience, competency, established processes and structure to execute complex projects and product development on a turn-key basis. Azcom offers a wide range of product engineering services across a wide range of development platforms and application domains. Azcom involvement in H2020 projects started in 2015.

ACHIEVEMENTS & SUCCESS STORIES

Azcom Technology has successfully participated in funded 5GPPP projects such as 5G NORMA and 5G CORAL. From all these collaborations Azcom developed a strategic 5G knowledge. In the first participation Azcom small cell was controlled by the innovative orchestrator proposed by the 5G NORMA project. Then Azcom 5G focus also involved the automotive field, through PoC realization both hardware and software of an On Board Unit, within the 5G CORAL project. The 5G CORAL demo allowed the connection of vehicles by means of a distributed network, leading to a quicker and distributed manner information exchange. Direct consequences were the optimization of the network response, then improving driver safety.

INTEREST FOR FUTURE R&D&I COOPERATION

Azcom Technology is interested in 5G services and gNB and RU developments, from the low PHY to the higher levels of the protocol stack. Azcom is interested in big tier client and also other small cell partner to help them in building a complete 5G solution. In addition our interest is in radar automotive, biomedical, vehicular communications solutions, home automation, space and satellite communications as well.

Beia
CONSULT INTERNATIONAL

YEAR ESTABLISHED
1991

NUMBER OF EMPLOYEES
50

MORE INFORMATION
www.beia.eu

CONTACT
george@beia.ro

EXPERTISE IN 5G IOT NGI SATELLITE COMMUNICATIONS TELECOMMUNICATIONS EQUIPMENT MEDIA & CONTENT TRANSPORT & LOGISTICS HEALTH ENERGY ✦

BACKGROUND, EXPERTISE & SKILLS

BEIA Consult International is a SME performing research, design, production, distribution, sales, installation and service.

BEIA is one of the leading providers of telecommunications equipment and solutions in Romania and offers consultancy services for carrier grade infrastructure, communication solutions for PABX, voice mail, IVR, call centre, VoIP services.

BEIA has R&D expertise in Cloud and embedded M2M telemonitoring applications, developing IoT based platforms such as agriculture monitoring platform for monitoring ecological parameters, and systems for irrigation management.

BEIA provides managed services & system integration, IP-Wireless-SCADA, GPRS/CDMA communications with TCP/IP embedded, GPS applications, μ-controller programming, software development.

BEIA is certified ISO 9001, 14001, 18001 and 27001 and is a member of various professional organizations such as ARIES, PMI, IEEE, AHK, IPMA.

ACHIEVEMENTS & SUCCESS STORIES

The company's references include over 5,000 national and EU projects for IT and communications solutions, enterprise cloud communications and telemetry, energy, smart cities, public safety, radio networks, etc.

CitiSim - Smart City 3D Simulation and Monitoring Platform

COSIBAS – Cognitive services for IoT-based scenarios in the industrial domain

ESTABLISH – Environmental Sensing To Act for a Better quality of LIfe: Smart Health

Mobiway – Mobility Beyond Individualism: an Integrated Platform for Intelligent Transportation Systems of Tomorrow ProSe – Proximity Services Framework

Power2SME - Aims to create a cloud system that will change SMEs' way of consuming energy

SWAM - Smart WAter Management system for better environmental sustainability

Other projects (finished and ongoing H2020, ECSEL, MSCA, Eureka/Eurostars, ITEA, Celtic, Erasmus, ERA-Net, AAL, BBI, COST, etc.) can be found on BEIA sites.

INTEREST FOR FUTURE R&D&I COOPERATION

BEIA is interested for future R&D&I cooperation in the following research areas (not exclusive): IoT, Cloud and embedded M2M applications, agriculture, environment, smart cities, smart mobility, health and well-being, energy, digital industry, digital life, etc.

To develop our projects or to cooperate within other projects, we need partners to build a comprehensive "ecosystem", interdependent on one another.

1. Horizontal partners: to provide the unified, standards-based network infrastructure and contribute with technologies and experiences to create a complete solution.

2. Vertical Partners: to solve market-specific business problems and address particular use cases, to have the knowledge of specific business operational.

3. Geographic, from Europe and other continents: to understand local environments, laws (such as data privacy regulations), and to facilitate project deployments.

C²TECH

EXPERTISE IN

5G   IOT   SATELLITE COMMUNICATIONS   MEDIA & CONTENT   MANUFACTURING   SMART CITIES   PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

C Tech Information Technologies Industry and Trade Inc. founded in 2005, operates in Defense, Aerospace and Satellite Technologies, Communication Systems, Cyber Security, Modeling and Simulation.

C Tech accomplishes its mission of developing innovative products and creating solutions for national and international markets with its knowledge and experience in information and communication technologies and with its experienced human resources.

C Tech has system engineering, electronic hardware design, digital design, communication system design, RF design, embedded and PC based software design and system development capabilities and integration and production capabilities comprised by these capabilities. C Tech offers products and solutions to various public, private and international stakeholders as the contractor of the projects.

ACHIEVEMENTS & SUCCESS STORIES

C Tech, a subsidiary of TUSAŞ, is one of the few private sector company with infrastructure in electronic design, software development and production under the Defence, Aerospace standards of our country, together with the subcontracting ecosystem. Our company is one of four company in the domestic communication development consortium of TÜRKSAT-6A which is the biggest R&D program and vision project of our country up to today within the scope of the design and production works of military and civil satellite communication systems that it conducts.

C Tech has IS0-9001: 2008 and CMMI Level-3 quality certifications, Production Permission Certificate issued by the Ministry of National Defence, National and NATO Facilities Safety Certifications. It is based on internationally accepted standards and approaches such as IEEE-12207 and MIL-STD-973.

INTEREST FOR FUTURE R&D&I COOPERATION

C Tech considers research and development as core business, actively taking part in European and international funded research projects since its incorporation.

C Tech is looking for international partners focused on R&D&I cooperation in the areas of emerging 5G technologies, Smart Technologies, AI and ML, telecommunications, satellite services, cyber security, V2X and IoT.

Cumucore

YEAR ESTABLISHED
2015

NUMBER OF EMPLOYEES
10

MORE INFORMATION
www.cumucore.com

CONTACT
info@cumucore.com
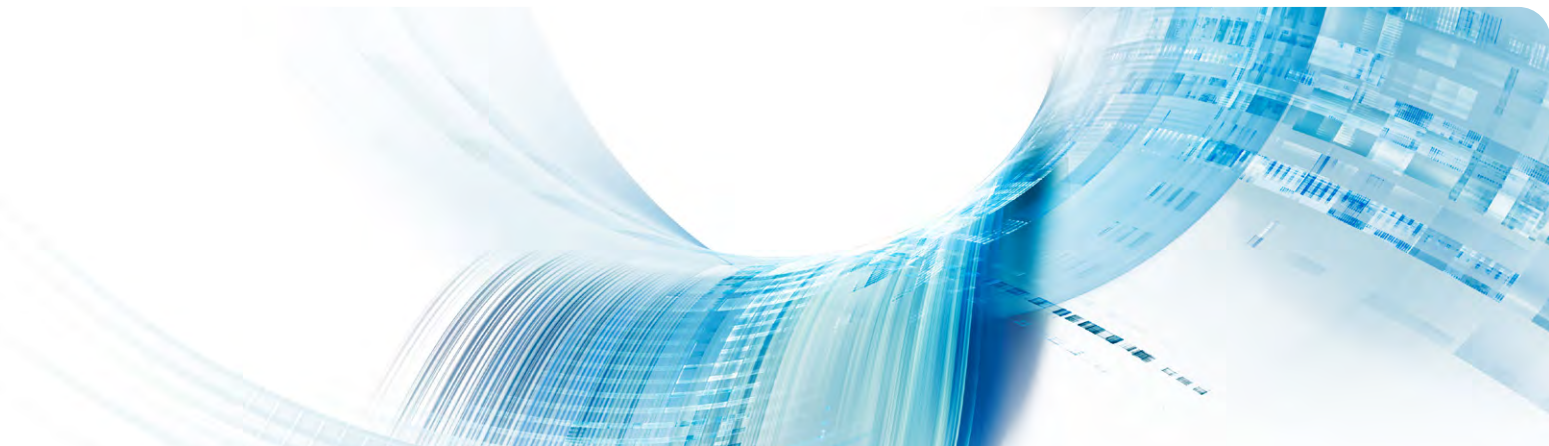
EXPERTISE IN   5G   IOT   SDN, MEC, EMBMS   MEDIA & CONTENT   SMART CITIES   PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

Cumucore is a spin off from Aalto University which products include results of several research projects in cooperation with industry partners such as Nokia, Ericsson, Huawei and Coriant/Infinera.

Ultra-reliable 5G packet core enhanced with SDN mobile backhaul orchestrator to manage network slices and Multi Access Edge (MEC) edge computing. The 5GC includes NB-IOT and eMBMS running in dedicated servers or virtualized on the cloud.

Cumucore 5GC has been deployed in several trials and pilots in Italy, South Africa and middle east showing reliable and optimized packet core for private LTE, Industrial environments and small deployments.

ACHIEVEMENTS & SUCCESS STORIES

Active participation in EU-KR project related to usage of UAV for firefighting including network slicing and MEC for URLLC required for emergency use cases.

Participation to 5G-SMART project for ultra-reliable 5G Core and network slicing for Industrial use cases.

Cumucore as part of Primo-5G project in cooperation with project partners have achieved an important milestone. The first deployment world wide of intercontinental 5G mobile network where Cumucore 5G Core is running in Korea at Yonsei University and Cumucore User Plane GW (UPF) is running in Helsinki at Aalto University (https://twitter.com/PriMO5G/status/120226094516848640o). This open new business models for mobile operators, private and industrial internet 5G networks.

INTEREST FOR FUTURE R&D&I COOPERATION

Cumucore is interested to partner with other SMEs to participate in pilots on NB-IoT, eMBMS, Industrial Internet and private 5G networks. We are looking for partners complementing Cumucore portfolio on RAN including SDR and Cloud-RAN as well as OSS and BSS.

CyberEthicsLab.
Responsible Research and Innovation

YEAR ESTABLISHED
2017

NUMBER OF EMPLOYEES
11

MORE INFORMATION
www.cyberethicslab.com

CONTACT
info@cyberethicslab.com

EXPERTISE IN   IOT   5G   **PUBLIC SAFETY**   **HEALTH**   **ENERGY**   **PRIVACY & DATA SECURITY**

BACKGROUND, EXPERTISE & SKILLS

CyberEthics Lab. (CEL) is an Italian SME with a holistic vision of innovation. CEL's fundamental values are efficiency, scientific curiosity, and respect for human beings and its mission is to promote ethical awareness and behaviour in order to strengthen societal confidence in the future. CEL leverages the experience and knowledge of its multidisciplinary team (i.e. ICT, Law, Philosophy, Politics, Management, Economics), whose members teach at universities and who work on numerous EC Research projects (i.e. 5G-SOLUTIONS, PHOENIX, PERSONA, ASSISTANCE, PERSIST, BRIGHT, POSEIDON). CEL has formulated its own methodology for ethical, societal and legal assessment, a relevant aspect applied to determining the sustainability of 5G technology.

ACHIEVEMENTS & SUCCESS STORIES

Within the contexts of 5G Solutions, CEL has developed the four-pronged conceptual model to be used as the base for the process of assessment of the social acceptance of 5G technology. During the pilots, CEL will test and validate its method on the field. This will offer CEL the chance to gather valuable proof-of-concept for future deployment of its method in a burgeoning marketplace for ethics assessment.

Based on best practices from PMBOK and OpenPM2, CEL has fine-tuned a methodology for stakeholder engagement that has been experimented in PERSONA through a customized web tool. Feedback gathered from the project's Community of Stakeholders were instrumental in developing the tailored impact assessment method for border control authorities.

INTEREST FOR FUTURE R&D&I COOPERATION

CEL's offering is mainly based on promoting innovation and new opportunities in the market as well as creating ethical awareness and promoting ethical behaviour to build confidence and trust. In particular CEL's actions are also directed to promote the inclusion of legal and ethical concerns in the design and implementation of new technologies, the identification of risks on individuals' fundamental rights and the issuance of recommendations aimed to make technologies compliant with ethical principles and the relevant legal framework. CEL aims to reach either European and international partners and one of its main strengths is its capacity to adapt and target its assistance depending on clients' concrete needs and situations.
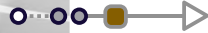
DIGITAL TWIN
T E C H N O L O G Y

YEAR ESTABLISHED
2018

NUMBER OF EMPLOYEES
6

MORE INFORMATION
www.digitaltwin.technology

CONTACT
info@digitaltwin.technology

EXPERTISE IN   5G   IOT   VR/AR   MEDIA & CONTENT   TRANSPORT & LOGISTICS   SMART CITIES

BACKGROUND, EXPERTISE & SKILLS

DigitalTwin Technology is software solution provider for construction and ICT industry. We create digital twins of construction site and urban cities for real-time monitoring and operations. We generate simulation behaviour of those 3D model to predict any possible accidents to mitigate in advance. 5G technology, with its promises of immersive virtual reality, will be a data hungry generation of wireless communications. Arrival of 5G will mean we can push these capabilities away from the PC and into something called the edge cloud, so we only require the headset. This is our cloud AR/VR technology. Cloud VR/AR technology is set to be a disruptive form of immersive multimedia in a number of different ways.

ACHIEVEMENTS & SUCCESS STORIES

Tunnelware is a VaaS (Virtuality as a Service) for tunnel construction industry to manage the construction process while managing the data generated by various sensors and human interaction. With a focus on reducing cost and waste, and increasing productivity, the system will improve the construction process at every stage, delivering "faster builds to a higher quality with fewer defects and more sustainable tunnels.

Cityware is a digital twin of your city to monitor the infrastructure on real-time, simulate the real situation in the virtual world. Completely under GDPR regulation with no video streaming.

INTEREST FOR FUTURE R&D&I COOPERATION

Engineers have been so preoccupied with designing and building the low-latency networks for these emerging applications that they've neglected the rest of our vast, tangled telecom networks. The result is that there is now a growing gap between the capabilities of the fixed and mobile sides of these networks. A big part of the problem is that the way data moves through our networks has been designed for efficiency on the mobile side. In the process our networks have become redundant and prone to clogging on the fixed side.

We are looking for partners in the area of networking who can help us taking this research to the next step. Partners can be from EU region or globally.
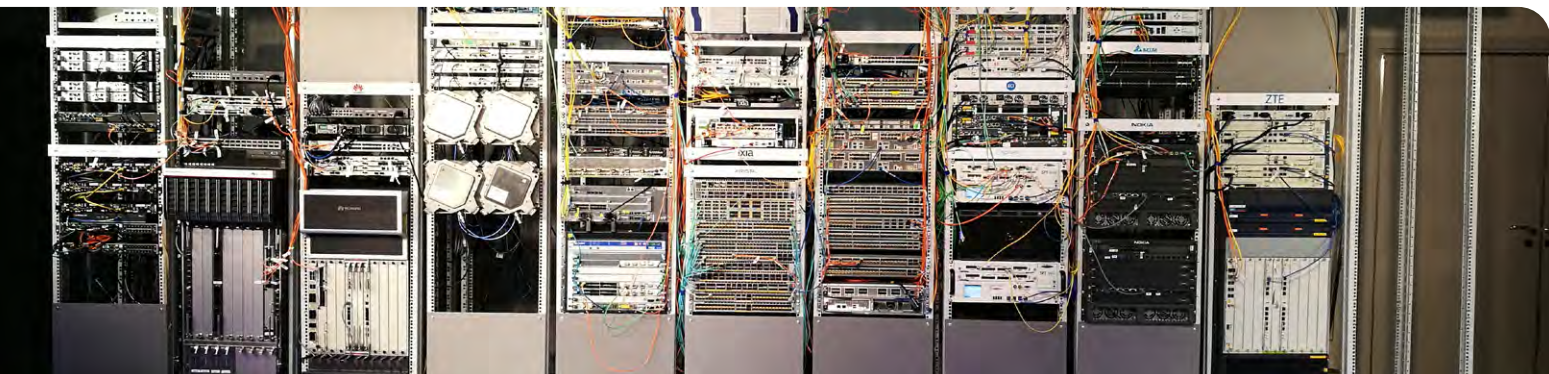
EANTC

EUROPEAN ADVANCED NETWORKING TEST CENTER

YEAR ESTABLISHED
1991

NUMBER OF EMPLOYEES
20

MORE INFORMATION
www.eantc.de

CONTACT
info@eantc.de

EXPERTISE IN 5G IOT NGI MEDIA & CONTENT TRANSPORT & LOGISTICS MANUFACTURING ENERGY SMART CITIES PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

EANTC (European Advanced Networking Test Center) is internationally recognized as one of the world's leading independent test centers for telecommunication technologies. Based in Berlin, Germany, the company offers vendor-neutral consultancy and realistic, reproducible high-quality testing services since 1991. Customers include leading network equipment manufacturers, tier-1 service providers, large enterprises and governments worldwide. EANTC's performance and scalability, interoperability, proof of concept, acceptance tests and network audits cover established, and next-generation fixed and mobile network technologies.

EANTC develops new test methodologies for 5G networks and applications. We especially focus on end-to-end interoperability, scalability, and performance tests. They cover network infrastructure (SDN transport, slicing, telco cloud/NFV, edge computing) as well as network applications for a range of industry sectors.

ACHIEVEMENTS & SUCCESS STORIES

O-RAN: EANTC took part in the European O-RAN and TIP Plugfest 2020 supporting the development of interoperable 5G and LTE OpenRAN solutions. EANTC planned, executed, and documented multi-vendor interoperability tests of O-RAN solutions. The tests focused on Open Fronthaul functionality and compliance, end-to-end (E2E) performance, and O1 management interoperability. EANTC has automated E2E O-RAN tests at the Berlin lab.

5GASP: EANTC defines the testing methodologies for NetApps (network applications) testing and the validation procedures for the 5G network infrastructure and defines and develops the guideline for NetApps certifications.

5G-VINNI: EANTC provides benchmarking methodology and state-of-the-art testing expertise in NFV, SDN, and Network Slicing. EANTC's focus on use case-centered, end-to-end testing will be applied in the project to develop realistic, representative, and reproducible tests.

Innovation cluster 5G BERLIN: is a joint network between research institutes and SMEs. EANTC develops new test methods for 5G networks and applications used in the 5G Berlin context. We focus on end-to-end interoperability, scalability, and performance tests covering both the network infrastructure (SDN transport, slicing, Telco Cloud/NFV, edge computing) and the applications for various industrial sectors.

IETF/NetSecOPEN: EANTC co-created an independent, multi-vendor, multi-labs, and multi-tool test program for NGFW, IDS, IPS, and UTM implementations. The methodology has been prepared as an IETF standard edited by EANTC. The test suite is used for evaluation and certification of network security products, and to provide guidelines for infrastructure testing.

F-Interop: The European research project aimed to develop online test tools supporting IoT-related technologies.

INTEREST FOR FUTURE R&D&I COOPERATION

EANTC has strong industry experience in interop and performance testing of SDN, NFV, 5G services and applications. Being an independent test lab, EANTC is interested in contributing testing, quality assurance, and lab setup/management expertise to research projects. We would like to contribute our extensive commercial telecoms experience and strong focus on realistic scenarios. We find projects exciting that help Europe to capture markets strongly (in TRL 7-8) or to create a technology leadership position (TRL 5-7).

We have worked in small, 50%-funded EU projects as well as in large consortia, fully funded. H2020 and follow-on projects are great, likewise smaller proposals e.g. in the Eurostars area. We are ok to provide Task and WP leaders if desired.

eBOS

📅	**YEAR ESTABLISHED** 2003
👥	**NUMBER OF EMPLOYEES** 30
ⓘ	**MORE INFORMATION** www.ebos.com.cy
✉	**CONTACT** info@ebos.com.cy

EXPERTISE IN   5G   NGI   AI/ML, GRAPH ANALYTICS   SMART CITIES   MEDIA & CONTENT   TRANSPORT & LOGISTICS   MANUFACTURING

BACKGROUND, EXPERTISE & SKILLS

eBOS is an innovative software powerhouse SME providing technological advanced e-business software solutions to enterprise customers around the world. Headquartered in Nicosia, Cyprus, eBOS operates sales branches in Ireland and closely collaborates with strategic partners in Europe and in the USA. eBOS has a long history of engaging with international research and technology organisations, industrial leaders, universities, research organisations and SMEs to drive collaborative technological innovation and bring best-of-breed technologies to its enterprise customers and the wider community.

The development of our WiseBOS product portfolio has equipped us with core competencies which we deploy in R&D projects. The knowledge and innovation gained are then fused into our solutions and services. We seek to explore radically new solutions and technological breakthroughs.

ACHIEVEMENTS & SUCCESS STORIES

eBOS is a partner in three 5G-PPP projects, 5G-SOLUTIONS (https://www.5gsolutionsproject. eu/), MonB5G (https://www.monb5g.eu/) and 5G-ROUTES (starting in 09/2020). Through these projects, eBOS will develop multi-tenant front-end dashboards for KPIs visualisation, friendly to use intent-based APIs and cybersecurity solutions for 5G networks, thus advancing our knowledge and reinforce our understanding in 5G enabling technologies. eBOS plans to apply the results in the company's product portfolio for developing new innovative applications and solutions. Also, we aim to expand our customer base, whilst identifying potential patents for IP protection in collaboration with other consortium partners. eBOS will contribute to the shaping of 5G enabling technologies, thus enabling Europe to maintain a leading and a decisive role in the field of 5G.

INTEREST FOR FUTURE R&D&I COOPERATION

eBOS has a long history of fostering collaborations in R&D&I projects with EU partners and is inherently open to new opportunities for collaborations with interested partners. In particular, eBOS is interested in further developing and exploiting its Research & Development and Innovation activities through cooperation with industrial leaders, universities, research organisations and SMEs in 5G over a broad range of vertical sectors, including Next Generation Media, Transport & Logistics, Autonomous Vehicles, Manufacturing, Smart Cities, Next Generation IoT and Fintech.

eCom Scotland

EXPERTISE IN

5G   IOT   **MEDIA & CONTENT**   MANUFACTURING   HEALTH   ENERGY

BACKGROUND, EXPERTISE & SKILLS

eCom Scotland is a software company based in Scotland, where we research and develop the next generation of innovative online learning solutions, we were first incorporated in 1999 and have been involved in many Internet research projects, as well as active in working with standard bodies such as IEEE and IMS Global. eCom provides both custom and saas solutions, all with a mobile first delivery mode. eCom's cloud applications include VR authoring, online assessment, micro-credentialing, and learning & competency management. eCom's solutions are currently used globally where latency is a big issue. Our solutions are built with the roll out of 5G in mind, and are currently end-cached to support bandwidth restrictions. Our clients are in Oil & Gas, Engineering, Governments, Awarding bodies and Professional Institutes.

ACHIEVEMENTS & SUCCESS STORIES

eCom has many examples of award winning activities, these include. eAA – Innovation Award for eAssessment for use with IoT devices, The Herald Award with RNIB – for providing a fully Accessibility LMS. More on our website www.ecomscotland.com eCom is currently involved in IEEE P1484.20.2 standard development for Recommendations for Defining Competencies, these activities are key to implementation in the use of AI/ ML roles in society.

5G is key to eCom success in the future as our current research in XR will result in solutions where real-time immediate connection is required. In the UK 5G has just been released and we are promoting adoption by our clients as our cloud solutions have a high level of media content and all work better with 5G.

INTEREST FOR FUTURE R&D&I COOPERATION

eCom have a funded project with Dundee University to create best practice for eXtended Reality (XR) training systems based on previous knowledge of designing surface based interactions.

eCom are currently seeking Grant funding with University of Glasgow to develop a 5G project where VR is used to control Robots in the Lab, this will be built on our latest product www.eNetReality.com

eCom are interested to work with teams on any 5G projects involving remote training in the workplace, this could include XR integration with IoT, or Robotics.

IOT

easy global market

📅 **YEAR ESTABLISHED**
2010

👥 **NUMBER OF EMPLOYEES**
15

ℹ️ **MORE INFORMATION**
www.eglobalmark.com

✉️ **CONTACT**
philippe.cousin@eglobalmark.com

EXPERTISE IN   5G   IOT   SATELLITE COMMUNICATIONS   SMART CITIES   PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

Easy Global Market (EGM), first, specialises in validation, testing &interoperability today mainly in IoT and 5G areas. EGM stepped in the 5G area to provide NFV V&V methods for 5G within the H2020 5GTango project and IoT related 5G use cases (IoT slicing) in H2020 5GinFIRE project. Second, EGM provides scientific and engineering services for IoT market from sensors (HW) to data analytics using experience from about 24 international research projects. This applies to vertical fields, such as in Smart cities, Smart water Monitoring, Aquaculture and Agriculture where EGM is currently active within 10 running H2020 projects. In these fields EGM is exploring the use of 5G available technologies (e.g. NB-IOT) for developing devices or virtualized services (e.g. VNFs)

ACHIEVEMENTS & SUCCESS STORIES

On testing matters, EGM is working to provide a 5G NFV V&V platform. EGM has developed key devices to the Bioceanor start-up (www.bioceanor.com) that is supporting booming demand in Aquaculture digitalisation and where 5G is demanded. EGM deployed advanced autonomous sea buoys in Polynesia to help monitoring coral bleaching. EGM is now working more actively in agriculture digitalisation, on soil monitoring and is about to deliver a prototype in the beekeeping area to save bees depopulation. After a first successful product, EGM plans to deliver a low-cost water quality sensor. EGM is also working on virtualized services for smart cities thanks to the EU-Japan project fed4IoT

INTEREST FOR FUTURE R&D&I COOPERATION

We are looking for stakeholders in verticals which need key 5G devices or services exploiting our advanced expertise in IoT and virtualisation. We can work with a broad range of verticals with can be smart cities, automotive, agriculture, aquaculture, water networks, environment, public safety.

We can also develop for 5G-enabled verticals, solution to check KPI and to validate solutions with our V&V platform.

epitomical®

EXPERTISE IN 5G   IOT   SATELLITE COMMUNICATIONS   NGI   TRANSPORT & LOGISTICS   MANUFACTURING   SMART CITIES

BACKGROUND, EXPERTISE & SKILLS

Epitomical is UK based design & engineering company targeting the Transport & Smart Infrastructure Sectors. The company has a headcount of 20 full-time and part-time employees based across Western Europe, India and Japan.

The company has experience in Electrical & Electronic Systems, Embedded & Cloud software, Industrial Design and the planning and creation of Services. Our focus is on building Connected & Autonomous Systems for Air, Marine and Surface Transport Vehicles and associated Infrastructure. Over the past six years, Epitomical has designed and manufactured more than twenty different products for our own brand in addition to product development work for other parties.

ACHIEVEMENTS & SUCCESS STORIES

The company has been successful in the design and launch of numerous products as well as in collaborating with numerous companies including Google, Sony and Jacobs.

Epitomical recently led and delivered Project Alloyed (an Innovate UK funded project) together with sixteen consortium partners. The project delivered a number of positive outcomes in the area of Connected & Autonomous Vehicles including a flexible architecture for connecting Vehicles, Infrastructure & Cloud services. Project details can be found at https://alloyed.epitomical.com/.

In 2019, the company was awarded Horizon 2020 funding for the 5G-HEART project led by the Finnish technical research organisation, VTT. 5G-HEART will trial 5G use-cases across multiple vertical markets including Transport, Healthcare & Aquaculture. Project details can be found at https://5gheart.org/.

INTEREST FOR FUTURE R&D&I COOPERATION

The company is interested in collaborating with technology providers, local & regional authorities as well as other players within the Transport & Logistics ecosystem. This would include end users of services such as those in Healthcare, Construction and Regional & City operations.

Epitomical is currently delivering trials and development projects in Europe, Japan & India and would be interested in exploring other international markets for Connected & Autonomous Systems. These would include markets for autonomous systems leveraging drones, mass-market transport vehicles, pods as well as submersible and semi-submersible marine vehicles. Other areas of interest include organisations with an interest in Satellite Communications, Cellular telecommunications, HD Mapping & Cloud based services.

Fivecomm

YEAR ESTABLISHED
2019

NUMBER OF EMPLOYEES
9

MORE INFORMATION
www.fivecomm.eu

CONTACT
admin@fivecomm.eu

EXPERTISE IN   5G   IOT   MEDIA & CONTENT   TRANSPORT & LOGISTICS   MANUFACTURING   HEALTH   ENERGY   SMART CITIES   +

BACKGROUND, EXPERTISE & SKILLS

FIVECOMM is a technology-based company spin off from the iTEAM Research Institute of Universitat Politècnica de València (UPV), founded in 2019 and focused on the use and implementation of 5G mobile technology for industrial applications. Its aim is the innovation, design, development, production, integration, operation, maintenance, repair and commercialization of systems, solutions and products that make use of 5G, either with public or private networks. Fivecomm works currently in the following product lines: a) autonomous and remote driving of mobile robots; b) artificial intelligence; c) a software platform for end-to-end communication optimization; d) 5G modem customized for different verticals.

ACHIEVEMENTS & SUCCESS STORIES

Fivecomm is a beneficiary in six H2020 projects related to 5G communications. These projects are FUDGE-5G (private networks), 5G-RECORDS (media), iNGENIOUS (IoT), ITN-5VC (vehicular communications), 5G-INDUCE (5G NetApps) and 5G-IANA (automotive industry).

Besides, Fivecomm participates in the Spanish Digitalization Programme through projects that address different 5G use cases related to smart metering, remote skin cancer diagnosis, and connected AGVs both for critical inspection and for logistics inside industries.

At regional level, Fivecomm is part of AUDERE project focused on last mile delivery and urban waste recovery.

Fivecomm works with the MiV (Mobility Innovation Valencia) to develop robotic 5G solutions for the Automotive industry.

Recently, Fivecomm has received the Best Industry 4.0 startup award at the 5th VLC Startup awards.

INTEREST FOR FUTURE R&D&I COOPERATION

Fivecomm is interested in creating future collaborations in the field of industry verticals including robotics, automotive, industry 4.0, smart cities, utilities, health care, and media among others, either from European or international companies. Of course, Fivecomm welcomes proposals and ideas for new areas of collaboration in research and development.

FOGUS
INNOVATIONS & SERVICES

YEAR ESTABLISHED
2016

NUMBER OF EMPLOYEES
10

MORE INFORMATION
www.fogus.gr

CONTACT
info@fogus.gr

EXPERTISE IN   5G   IOT   VR/AR   MEDIA & CONTENT   SMART CITIES

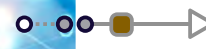## BACKGROUND, EXPERTISE & SKILLS

Fogus is a thriving SME in Greece that aims at integrating state-of-the-art technological advancements and cutting-edge research achievements, towards an immersive communication and computing experience. Founded by a group of industrial and academic experts covering a wide range of disciplines in the area of Information and Communication Technologies (ICT), Fogus exhibits strong research record and vast experience in managing and implementing ICT Research & Innovation actions. Holding experience that ranges from the design of mobile communication protocols to the development of custom-made software, Fogus undertakes: i) end-to-end set-up of network simulation and emulation environments for IoT and user-centric services, ii) development of network functions end protocols for access and transport network domains, ii) analysis of big data with expertise on mapping network and service performance parameters to user-experience metrics, iv) MEC-empowered service provisioning and integration for 5G.

ACHIEVEMENTS & SUCCESS STORIES

Fogus has active role in leading consortia and forums for 5G networks. Currently, the company participates in the 5GENESIS (https://5genesis.eu/) project. 5GENESIS is a large-scale 5G experimentation project that aims at validating 5G KPIs for various 5G use cases, in both controlled set-ups and large-scale events. This will be achieved by bringing together results from a considerable number of EU projects as well as the partners' internal R&D activities in order to realise an integrated End-to-end 5G Facility. Moreover, the company develops integrated services for user-centric digital content delivery in 5G mobile data networks that will be founded on the pillars of a) blockchain based wireless network resource sharing, b) QoE-enhanced video content delivery, c) software-defined networking and d) cache-enabled mobile data networks.

INTEREST FOR FUTURE R&D&I COOPERATION

Fogus research and development team has vast experience in participation to many European R&D projects in the past, including FP7 and H2020 actions, ICT, MSCA ITN, IAPP and RISE actions. The company is mainly interested in 5G and beyond research projects. Strategically, the company is looking for academic and industrial partners for potential collaborations in the following directions: i) exploitation of the last advancements in ICT sector to provide complete end-to-end solutions to vertical industries, ii) scientific research on innovative ideas for wireless mobile networking and service provisioning, and ii) participation in training and knowledge sharing activities, as explained in the MSCA work programme.

25

GigaSys
Solutions

📅 **YEAR ESTABLISHED**
/

👥 **NUMBER OF EMPLOYEES**
1-9

ⓘ **MORE INFORMATION**
www.gigasys.co.uk

✉ **CONTACT**
info@gigasys.co.uk

EXPERTISE IN   5G   IOT   MANUFACTURING   AGRICULTURE   SMART CITIES

BACKGROUND, EXPERTISE & SKILLS

Gigasys Solutions Ltd is a start up on wireless technology consultation and collaborative project management, located in Guildford, Surrey, UK, with expertise on 5G and beyond 5G testbed implementation and innovative concepts and related R&D technical managements.

ACHIEVEMENTS & SUCCESS STORIES

Gigasys Solutions participation in national and European R&D projects, on 5G and beyond 5G technologies contributed on the project planning, development and validation of specific technology components related to 5G PHY/MAC and IoT networks, up to the network applications for related use cases addressing vertical areas such as agriculture and smart city applications.

INTEREST FOR FUTURE R&D&I COOPERATION

Gigasys Solutions is seeking to collaborate on 5G and beyond 5G research and innovation projects. We contribute to the technology development, proof-of-concept and validation with experience on R&D project planning and management.

YEAR ESTABLISHED
2018

NUMBER OF EMPLOYEES
2

MORE INFORMATION
www.hinn.es

CONTACT
jsesena@hinn.es

HOLISTIC INNOVATION
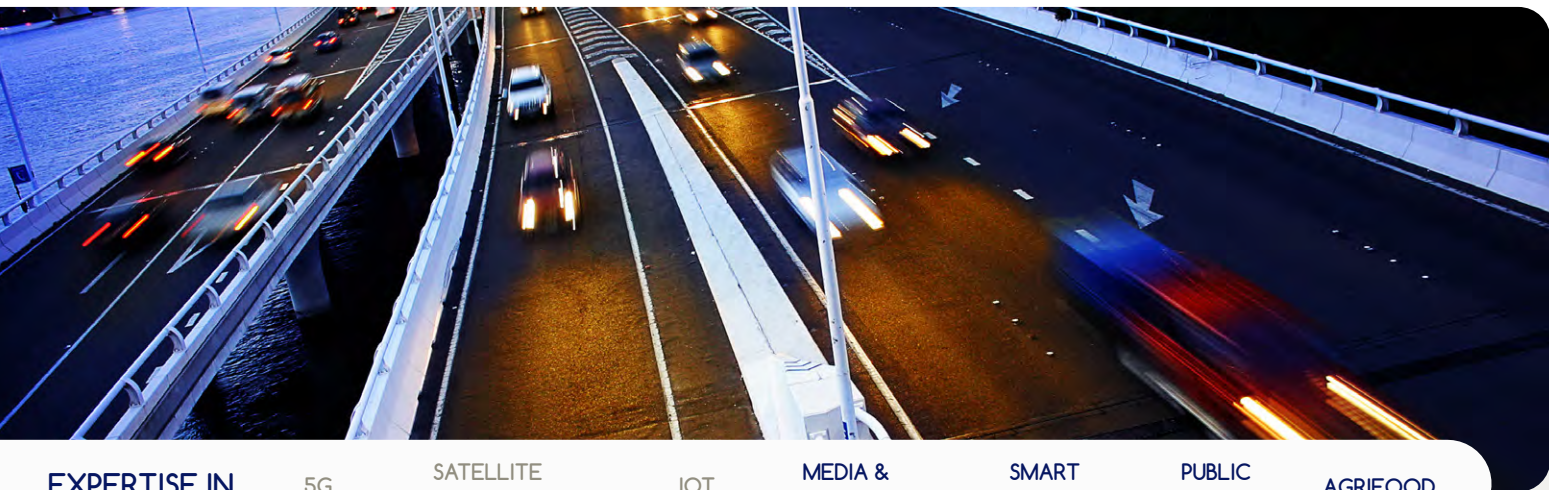
EXPERTISE IN 5G SATELLITE COMMUNICATIONS IOT MEDIA & CONTENT SMART CITIES PUBLIC SAFETY AGRIFOOD

BACKGROUND, EXPERTISE & SKILLS

- Media. New mechanisms to broadcast content and provide personal TV. Assistant to ITU-D on supporting new advanced entertainment systems. Also, research analysis on new preferences of content viewers and comparison of efficiencies of different delivery platforms (satellite, cable, terrestrial over the air, OTT)

- Automotive. Designers and supporters of new solutions for Car2Car communications

- Public Safety. Involvement on the standardization processes for ICT solutions applicable to PPDR.

- Agri-food. From farm to the table. Development of innovative solutions for the olive and vinegars´ plants while observing Compliance requirements for environment, sustainability, climate change, tracing and efficient agri-food industries.

ACHIEVEMENTS & SUCCESS STORIES

Main areas of work have been the assessment of suitable spectrum for 5G and integration of satellite and terrestrial networks. HINN has conducted studies on the use of current available spectrum and future opportunities for 5G in share bands.

Development of management tools combining sensors and data processing of agri-food industries

INTEREST FOR FUTURE R&D&I COOPERATION

Widely involved in activities in Europe, Latin America and Africa. Assistance is regularly provided to Governments of Mexico, Colombia, Paraguay, Eq Guinea as well as ongoing activities in Africa. HINN interest in Morocco, Algeria, Tunisia, Egypt, Lebanon, Argentina, Chile, Brazil, Ecuador, Perú, Venezuela, Colombia, Panamá, Costa Rica, Honduras, Mexico.

Main technology areas are related to spectrum management and efficiency on the use of the spectrum through intelligent terminals capable to share the spectrum as well as development of 5G products for the agri-food industries
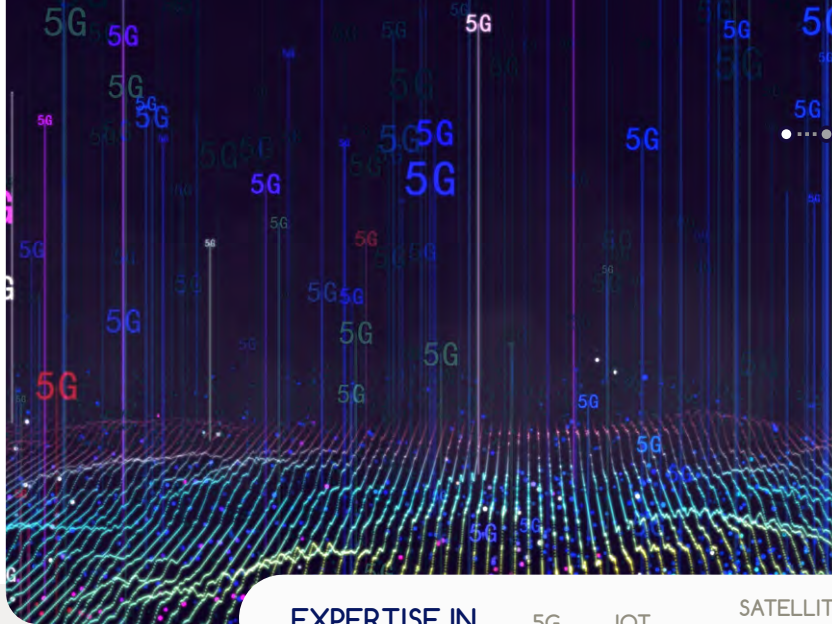
Incelligent
Machine learning – powered Networks

YEAR ESTABLISHED
2014

NUMBER OF EMPLOYEES
15

MORE INFORMATION
www.incelligent.net

CONTACT
info@incelligent.net

EXPERTISE IN 5G IOT SATELLITE COMMUNICATIONS NGI TRANSPORT & LOGISTICS HEALTH FINTECH, PUBLIC SECTOR

BACKGROUND, EXPERTISE & SKILLS

Incelligent delivers Predictive and Prescriptive Analytics solutions, tailored for the sectors: (a) telecommunications; (b) fintech/banking; (c) public sector, focusing on social security, taxation and customs. In the area of telecommunications, the Incelligent product (working name: RAN.ai) targets: (a) Proactive capacity planning and network resource management, at the access and backhaul segments; (b) Proactive customer experience (CX) management; (c) Customer management applications with emphasis on risk minimization; (d) Telco data monetization through the generation of actionable insights, based on traffic concentration and mobility predictions; these empower service providers to optimize their offerings; benefitting sectors ranging from transport infrastructures, to retail / stadiums / malls, and to citizen security / health (including the assessment of pandemic situations as COVID-19).

The target of the vertical (banking, public) sector products is overall risk minimization, customer satisfaction, and optimization of the efficiency of the operations (of the banking or public sector entity).

The Incelligent products rely on: (a) standard and in-house built / patented methodologies, based on Machine Learning (ML) and Artificial Intelligence (AI); (b) means for efficient Big Data management and for flexible functionality deployment.

Incelligent technologies have a footprint in Greece, in Europe and in Middle East. Announcements on successes in further areas are underway.

ACHIEVEMENTS & SUCCESS STORIES

Incelligent is proud to work in the context of 5G PPP, to contribute in the shaping of technologies for 5G and for the generations to follow, Beyond 5G (B5G).

Through its participation to the 5G PPP projects, MATILDA and 5G-PHOS, Incelligent was enabled to mature its technology (in terms of functionality, positioning in standards, etc.), to conduct showcases, and to enhance its expertise with respect to the 5G ecosystem technologies. Advanced services were built by Incelligent, for areas like malls, venues, stadiums, of interest to vertical players and network operators.

Through project LOCUS, Incelligent is building analytics that leverage on advanced localization information, which can have various degrees of detail. Information can come from 3GPP and WiFi standards, operating at sub-6 GHz or at the mmWave bands. Based on raw information and on the Incelligent analytics, the generation of more accurate insights is acheived, therefore, powering advanced network planning, as well as further location-aware applications.

INTEREST FOR FUTURE R&D&I COOPERATION

Incelligent will continue to pursue research and development engagement towards B5G/6G, to maintain competitive advantages, and also for contributing to the maintenance of a prominent European role in the field.

Incelligent aims at developing algorithms for proactive resource and customer experience optimization in B5G / 6G contexts. Moreover, there is the ambition to continue enhancing the development of advanced services that monetize telecommunications data. In addition, there is interest in creating future collaborations in the areas of fintech, public sector applications, as well as smart venues.

Incelligent is an experienced partner, with an extrovert and cooperative mentality, in search for cooperation on research and products development, with an eye for applications with a worldwide potential.
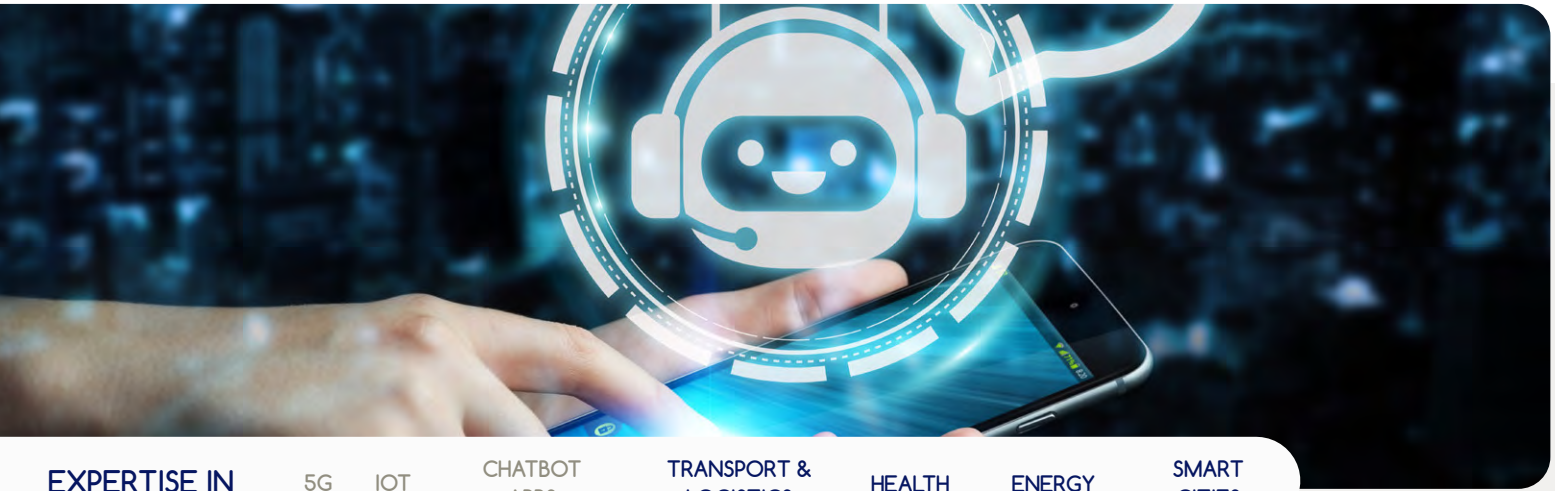
INFO LYSIS

EXPERTISE IN   5G   IOT   CHATBOT APPS   TRANSPORT & LOGISTICS   HEALTH   ENERGY   SMART CITIES

BACKGROUND, EXPERTISE & SKILLS

INFOLYSIS P.C. is an innovative SME company, established in Athens, Greece, specialising on the design and development of chatbots, either as custom-made standalone applications or as subscribed-based services (Chatbot as a Service) via the privately owned chatbot platform. Chatbots are applications that simulate human conversation, based primarily on conversational flows, enriched with DL/NLP technologies for more sophisticated solutions.

INFOLYSiS is committed to driving research results forward in order to expand chatbot applicability in novel ICT use-cases by experimenting with novel technologies, such as 5G, SDN/NFV at the network edge and container-based virtualization in IoT domains. An indicative example includes the INFOLYSiS IoT Virtual GW, which offers the provision of agile interoperability over heterogeneous IoT domains, along with a user friendly chatbot interface.

ACHIEVEMENTS & SUCCESS STORIES

In 2017, INFOLYSiS achieved to commercialise the first chatbot business solution over Viber in Greece, enabling food ordering via chatting. This pioneering solution created strong business cooperation with Viber, granting to INFOLYSiS the title of Viber Preferred Enabling Partner.

Since then, INFOLYSiS demonstrated its solutions to many events organised by Viber. Two events are standing out, the "Viber for Business Innovation Day" at SNFCC and the "Viber Chatbot event" at INNOVATHENS, where both the CEO of Viber Mr. Djamel Agaoua and the VP of Global Partnerships Mrs. Cristina Constandache were present, together with key-players from the Greek market.

Concerning R&D, INFOLYSiS successfully participates in two 5G-PPP/H2020 projects, 5GENESIS (www.5genesis.eu) and 5G!Drones (www.5gdrones.eu), which validate 5G applicability in real life use-cases.

INTEREST FOR FUTURE R&D&I COOPERATION

INFOLYSiS plans to further enhance chatbot characteristics and functionalities with DL/NLP technologies for providing AI-driven chatbots to the Greek market and therefore there is a strong interest for building a cooperation with AI specialised companies.

Moreover, INFOLYSiS is looking for expanding chatbot applicability to new use-cases, such as improving citizen engagement in smart cities and to smart agriculture use-cases for simplifying continuous monitoring process.

Finally, INFOLYSiS also aims to expand its target market for the privately owned chatbot platform beyond the boundaries of Greece, targeting at popular Viber international chatbot markets in Europe, Russia and Asia, but also extending chatbot development over additional messaging platforms that are popular in specific countries, targeting at niche markets.

![Internet Institute logo]

EXPERTISE IN 5G IOT NGI CYBERSECURITY SMART CITIES PUBLIC SAFETY CRITICAL COMMUNICATIONS TELECOMS

BACKGROUND, EXPERTISE & SKILLS

INTERNET INSTITUTE Ltd. (ININ) is an innovation intensive SME, specialized in 5G performance and quality metrics development and validation, 5G testing, benchmarking and end-to-end validation, and quality monitoring and SLA assurance for orchestrated 5G infrastructures and services. Also, we are experienced in design, deployment and operation of reliable and resilient 5G infrastructures for public safety and critical communications sectors.

We address telco, corporate and vertical industrial sectors with our quality MONitoring (gMON) portfolio for performance monitoring and SLA assurance, benchmarking and end-to-end validation of communication infrastructures and services. In addition, we specialise in on-site critical communications, smart sensing and intervention monitoring services with our intervention MONitoring (iMON) and remote MONitoring (rMON) portfolios, customised for public safety and critical infrastructures.

ACHIEVEMENTS & SUCCESS STORIES

We are proud of our continuous cooperation with a number of notable telco players, utility owners and public safety organisations, who help us in creating a realistic hands-on ecosystem for both innovative R&D pilots and actual deployments in practice. We are currently part of the 5G PPP Phase 2 program as part of the MATILDA project (www.matilda-5g.eu) where our primary focus is on quality and performance monitoring capabilities for 5G-orchestrated domains, as well as real-world 5G vertical use cases for emergency response domain. In addition, we've recently launched PPDR One, a one-of-a-kind 5G and NFV ready experimentation facility that facilitates hands-on experimenting with stationary and portable 5G deployments for public safety and critical communications sectors (https://5ginfire.eu/ppdr-one-facility/).

INTEREST FOR FUTURE R&D&I COOPERATION

Our interests for the upcoming R&D&I cooperation are geared towards further advancements in 5G performance and quality monitoring and verification systems and intelligent network orchestration. In particular: quality assurance of mobile, fixed and cloud systems, including 5G related quality metrics development and validation, 5G testing, benchmarking and end-to-end KPIs validation; cybersecurity monitoring, quality monitoring and SLA assurance for 5G infrastructures and services; R&I and piloting of resilient real-time 5G critical infrastructures, and specialised 5G deployments for public safety, automotive, intelligent transport, and utility verticals.

YEAR ESTABLISHED
1997

NUMBER OF EMPLOYEES
25

MORE INFORMATION
www.iquadrat.com/rd

CONTACT
pm@iquadrat.com

EXPERTISE IN   5G   IOT   NGI   MEDIA & CONTENT   SMART CITIES   ENERGY

BACKGROUND, EXPERTISE & SKILLS

IQUADRAT has a focused business plan specifically intended on delivering a "new generation of research tools for system level evaluation of wireless integrated communication systems". The company is involved in projects with large corporate clients, mobile operators and public authorities. Our R&D department is involved in many National and EU-funded research projects, and has extensive know-how in 5G Networks, IoT, simulation methodologies for Radio Access Networks (RAN), Software Defined Networking (SDN) and Demand Response algorithms for Smart Grids. Our key products include: i) an innovative end-to-end 5G platform that employs Network Function Virtualization in conjunction with Machine Learning algorithms that offer automated (zero-touch) network management and orchestration at the cloud/edge/RAN, ii) a suite of System Level Simulators (SLS) that 802.11, 802.15.4, and 4G LTE networks, iii) an SLS for Smart Grids that implements Demand Response algorithms, and iv) an IoT platform for Smart Building automation.

ACHIEVEMENTS & SUCCESS STORIES

Iquadrat is participating in a number of 5G-network related projects, such as the 5GPPP projects 5G-PHOS, MonB5G and 5GROUTES, the H2020 projects IoT SEMIOTICS, MARSAL, 5G-ERA, 5G EPICENTRE, 5G MEDIAHUB, and MSCA-ITNs 5G STEPFWD, SEMANTIC, MOTOR5G, and SPOTLIGHT. Iquadrat has gained extensive know-how in radio access technologies, network platforms, SDN, IoT and energy management methodologies for smart-grids. Key outcomes are i) our IoT platform for Smart Building automation that supports sensing of comfort related parameters (CO_2, humidity, lux, etc.) via our own custom battery operated IoT nodes and transmit data over BLE or 802.15.4, and multi- IoT gateway setups with cloud-based control via a centralized controller; ii) our 5G SDN/NFV platform that decouples the RAN Control & Data Plane, and consolidates the control plane into a single centralized controller, enabling easier coordination among base stations and offering real-time control.

INTEREST FOR FUTURE R&D&I COOPERATION

Iquadrat is interested in international cooperation in H2020 projects in ICT-related research and innovation, such as networking research for 5G and beyond, smart anything everywhere initiatives, tools for smart content in creative industries, etc.

31

YEAR ESTABLISHED
2006

NUMBER OF EMPLOYEES
35

MORE INFORMATION
www.is-wireless.com

CONTACT
info@is-wireless.com

Implementing 5G

EXPERTISE IN   5G   IOT   NGI   ENERGY   SMART CITIES   PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

IS-Wireless develops algorithms, protocols, and tools for 4G and 5G mobile networks. We provide licensable software in the two following areas: i) Software-Defined RAN (SD-RAN) – a NFV-compatible, standard-compliant RAN protocols ready for 4G/5G, it allows mobile networks to support more users with better performance at lower cost ii) the 5GToolset - experimentation solutions for mobile networks supporting research and education on 4G and 5G (5G NR). Our ambition is to bring 4G and 5G innovation for every university and research lab worldwide at affordable prices.

ACHIEVEMENTS & SUCCESS STORIES

IS-Wireless has designed and develops innovative solutions for RAN virtualization like: the software-defined RAN (SD-RAN) – funded by the Public Authority in Poland; we have also developed the 5G Toolset – experimentation software for 4G/5G link and system level testing, and the unique solution called VNF Composition Framework (VCF) to support virtual RAN operation. Our radio resource management (RRM) solutions include among all 4G scheduler that has been integrated with the Eurecom OpenAirInterface to support carrier aggregation under the umbrella of FP7 Solder. It has been upgraded to also support 5G and multi-RAT scheduling (based on LWA, LWIP coextistence protocols). IS-Wireless is proud member of the two industry fora: O-RAN Alliance (O-RAN) and the Telecom Infra Project (TIP).

INTEREST FOR FUTURE R&D&I COOPERATION

We are looking for partners willing to collaborate in: (i) development of 5G small cell protocols and radio resource management solutions for 4G/5G and cloud-RAN (ii) delivering cyber security solutions for 4G/5G small cells. We look forward to cooperate with different verticals (IoT/automotive, public safety, media) as we have our proprietary solutions for virtualized RAN that can be tailored and further adjusted per use-case (e.g. to complement existing products or solutions).

iTTi

YEAR ESTABLISHED
1996

NUMBER OF EMPLOYEES
80

MORE INFORMATION
www.itti.com.pl

CONTACT
piotr.tyczka@itti.com.pl

EXPERTISE IN 5G   IOT   NGI   SATELLITE COMMUNICATIONS   MANUFACTURING   HEALTH   SMART CITIES   PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

The main competences of ITTI related to 5G are in PHY layer (channel coding, modulation, signal processing, synchronisation) and MAC layer (admission control, congestion control optimization), cognitive resource control and service adaptation (cross-layer, context driven, ML-based, QoE/QoS), network and cybersecurity (including ML techniques), test campaigns (e.g. video systems, mobile data services) and validation by means of system/link level simulators.

Our expertise covers eHealth, energy, and public safety vertical sectors. We developed Medstar.co solution that offers telecare support for remote patients. In the energy sector, we worked on optimal control for smart cities (e.g. light control, energy management). We also have extensive expertise in economic evaluation of PPDR networks and social media usage in crisis management within the public safety sector.

ACHIEVEMENTS & SUCCESS STORIES

ITTI has contributed to over 60 international R&D projects in the EC Framework Programmes (FP5, FP6, FP7, H2020), EDA programmes and ESA programmes.

In recent H2020 CAVICO (Context-Aware Video Controller for autonomous transport and security monitoring) project ITTI successfully tested in the 5GinFire testbed the developed system that is able to control the video streaming on the basis of measured QoS and QoE parameters. In another H2020 project – QoEST4CM (QoE SupporT for improved Crisis Management) we provided video streaming system, integrated with UAV in the RAWFIE testbed, enabling for adaptive change of video parameters depending on network conditions, and user requirements.

INTEREST FOR FUTURE R&D&I COOPERATION

Having a competent and experienced team of telecommunication engineers and software developers, ITTI is interested in collaboration with partners on development of innovative solutions for vertical sectors in the 5G ecosystem. In particular, we are interested in integrating novel technologies to our eHealth Medstar. co solution to enhance its functionality leveraging 5G capabilities. We are also seeking partners for collaboration on cybersecurity solutions for 5G networks. ITTI is also willing to involve in 6G research and technology development.
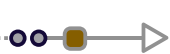
JCP Connect
EDGE CLOUD COMPUTING

EXPERTISE IN

5G   IOT   SATELLITE COMMUNICATIONS   MEDIA & CONTENT   TRANSPORT & LOGISTICS

BACKGROUND, EXPERTISE & SKILLS

JCP-Connect is a French SME with expertise in caching and edge computing for verticals as events, transport and smart cities. We provide portfolio of HW and SW edge computing solutions as well as caching as NFV for content delivery in virtualised environments.

ACHIEVEMENTS & SUCCESS STORIES

Our involvement in numerous H2020 projects (including Beyond 5G and FTI calls) has helped us develop our edge computing and content delivery portfolio. Our gateway MoBCache, mounted on vehicles such as bus, trains, or drones, can collect and process sensor data from the surrounding environment in a secure manner. Our content delivery is currently implementing enhanced security features.

INTEREST FOR FUTURE R&D&I COOPERATION

We are interested to collaborate with telecoms, satellite operators, content and media providers, companies developing AI, etc. We are naturally open to European partners, but we would be happy to collaborate with partners from Africa, Latin America and Oceania as well.

We are interest in R&D collaborations in the following domains: Edge computing, MEC, caching, content security, intrusion detection, mobile IoT.

LioniX INTERNATIONAL
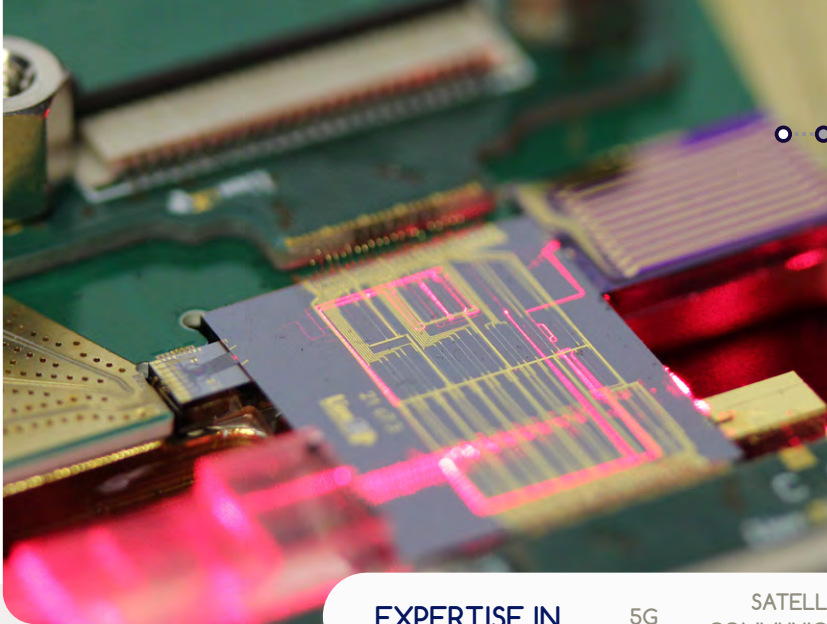
YEAR ESTABLISHED
2016

NUMBER OF EMPLOYEES
50

MORE INFORMATION
www.lionix-international.com

CONTACT
info@lionix-int.com

EXPERTISE IN   5G   SATELLITE COMMUNICATIONS   TELECOM/DATACOM   MANUFACTURING   HEALTH

BACKGROUND, EXPERTISE & SKILLS

Expertise in 5G

LioniX International develops integrated microwave photonics (iMWP) solutions, in particular optical beamforming networks (OBFN) fabricated on integrated photonic modules. These modules enable ultra-high capacity broadband communications from flat-panel antennas for mmWave satellite, aeronautical and 5G terrestrial applications. The hybrid integration of our high-contrast, low-loss silicon nitride photonics platform TriPleX™ with Indium Phosphide (InP) technology provides small, robust, integrated modules with novel RF functions. Examples of functions include tunable lasers, switches, filters, true-time-delay lines, WDM and more. We are a partner in H2020 5G-projects blueSPACE and 5GPHOS where our optical beam forming networks are enabling developments in the next generation of high-bandwidth, high-transmission-density flexible communication networks.

Expertise in vertical sectors

We build customized solutions using Photonic Integrated Circuits (PICs) based on our proprietary waveguide technology (TriPleX™). We work with OEMs and System Integrators to support every stage of the development lifecycle, by vertical integration, in scalable production volumes. And with a strong IP position to secure our technology leadership, we not only develop products but drive innovation.

With experience in beamforming applications in integrated microwave photonics for the aerospace and avionics industry, we focus on 5G/6G wireless solutions for high-speed public transport, military or civil operations. Furthermore, we apply complementary expertise in micro-fluidics, opto-fluidics and MEMS to create PIC-based solutions for applications in Telecom/Datacom, Life Science and Metrology.

Expertise in R&D and Innovation

Our proprietary TriPleX™ platform is perfect for hyperspectral (400-2300 nm) Photonic Integrated Circuits. We lead R&D in integrated photonics functionality, using piezo-based low-power actuation in the H2020 EU projects HAMLET and 3PEAT. Other joint research is driving further improvements in mmWave performance. Our PIC-based modules are developed for different types of products in life science applications, like confocal microscopy, flow cytometry, Optical Coherence Tomography (OCT), endoscopy, spectroscopy, optical biosensors, food sorting and molecular diagnostics.

ACHIEVEMENTS & SUCCESS STORIES

LioniX International secured a seven-figure contract for the development and fabrication of integrated photonic modules that enable ultra-high capacity broadband satellite communications from flatpanel aeronautical antennas. This contract with ViaSat Antenna Systems S.A. is part of the ESA project AIDAN and follows the years of intensive research and development of broadband solutions using microwave

photonics (MWP) beamformers on the proprietary TriPleX™ platform.

Lionix International obtained the prestigious PIC Award 2018 for "Advanced in PIC manufacturing" at the PIC International Conference in Brussels.

Magic Micro, a Kosdaq-listed South Korean electronic component company, acquired a majority share of 75% in LioniX International. This acquisition strengthens the position of both and clearly shows the Photonic Integrated Circuit (PIC) ecosystem is further maturing.

INTEREST FOR FUTURE R&D&I COOPERATION

LioniX International has a strong R&D focus where more than 50 % of the employees have a PhD degree. The focus on integrated photonics, utilizing the benefits of the low-loss high contrast TriPleX™ microprocessors provide numerous solutions for a suite of applications in telecommunication/data communication , sat com, sensing health tech and health care.

The hybrid integration of InP and TriPleX PICs enables small and compact integrated modules with improved stability and performance. Main topics of interest are: [1] implementation of microwave photonics (MWP) processing and analog photonic links (APL) and its application in mmWave beamforming for terrestrial and satcom networks, [2] hybrid tunable lasers for telecom and sensor applications [3] low-power actuation of complex processors through stress-optic tuning.

LiveU

📅	**YEAR ESTABLISHED**	
	2006	
👥	**NUMBER OF EMPLOYEES**	
	250	
ⓘ	**MORE INFORMATION**	
	www.liveu.tv	
✉	**CONTACT**	
	baruch@liveu.tv	

EXPERTISE IN 5G IOT SATELLITE COMMUNICATIONS **MEDIA & CONTENT** TRANSPORT & LOGISTICS PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

LiveU is driving the live video revolution, providing live video streaming for TV, mobile, online and social media. Since the company invented cellular bonding, LiveU's portable live video transmission solutions have replaced traditional SNG trucks, offering far greater mobility and cost-effectiveness for global newsgathering, sports and events coverage. From backpacks to smartphones, and satellite/cellular hybrid to external antenna solutions, LiveU offers a complete range of devices for high-quality live video coverage, together with cloud-based management and video distribution. All LiveU products are 5G ready, designed to transmit effectively from the field over 5G networks. With 3,000+ customers in 130+ countries, LiveU's technology is used by global broadcasters, online media, sports organizations, public safety and autonomous vehicle manufacturers with teleoperation/remote-assisted driving.

ACHIEVEMENTS & SUCCESS STORIES

LiveU offers creative HEVC live video streaming solutions for global newsgathering and every type of sporting event, including the FIFA World Cup™, Winter and Summer Olympic Games, Super Bowl, US Collegiate Championships, IRONMAN and Absa Cape Epic mountain bike race (South Africa).

LiveU has been involved in a series of 5G tests worldwide, for example, teaming up with AT&T to trial 5G with its portable HEVC units for live news and sports broadcasts, and taking part in Vodafone's 5G Experience Day, delivering 4K feeds from the 4K camera and over the 5G network to test 5G potential.

LiveU is an active partner in successful EU collaboration projects, including: the 5GPPP research project, 5G-Xcast; 5G-Solutions (2019); 5G-Tour (2019); PrEstoCloud and others.

INTEREST FOR FUTURE R&D&I COOPERATION

LiveU is looking for EU Horizon 2020 and international collaboration projects in: autonomous vehicles and connected cars, media and broadcasting, 5G, trials, public safety, telemedicine, video compression and video delivery over low cost public internet and any other area that requires reliable high-quality real-time video from the field for monitoring and/or control. LiveU contributes real-time video and data delivery over multiple cellular networks, high quality video over the public internet, remote teleoperation of SAE L3, L4, L5 vehicles and more.
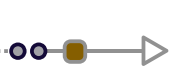
YEAR ESTABLISHED
2005

NUMBER OF EMPLOYEES
28

MORE INFORMATION
www.magister.fi

CONTACT
info@magister.fi

EXPERTISE IN

5G   IOT   SATELLITE COMMUNICATIONS   TRANSPORT & LOGISTICS   MANUFACTURING   ENERGY   SMART CITIES

BACKGROUND, EXPERTISE & SKILLS

Magister Solutions is specialist in communication network simulation and emulation tools and services for modelling real world telecom (satellite and terrestrial) in detail. Services for telecommunication include network simulation environments, concept, algorithm and software development, machine learning expertise, testing and PoC development.

ACHIEVEMENTS & SUCCESS STORIES

Magister Solutions has developed several simulators modelling terrestrial and satellite networks in details. One of the latest developments is a novel simulation framework called Self-Organizing Simulator 3 (SonS3) that makes use of real network data to enable an accurate performance analysis of mobility related SON use cases. In addition to simulator development, we also developed an MRO algorithm which adapts dynamically the Cell Individual Offset (CIO), and a performance analysis within a realistic urban scenario. The proposed MRO algorithm leads to an overall reduction of more than 30% in mobility problems without causing a significant increase in the number of HOs.

INTEREST FOR FUTURE R&D&I COOPERATION

We are working as a R&D&I partner with companies that are developing wireless systems, providing telecom services or looking for expertise in telecommunications. These companies include Satcom vendors and operators, Telecom vendors and operators and companies in defence and aerospace sector.

MARTEL

📅	**YEAR ESTABLISHED** 1996
👥	**NUMBER OF EMPLOYEES** 16
ⓘ	**MORE INFORMATION** www.martel-innovate.com
✉	**CONTACT** info@martel-innovate.com

EXPERTISE IN   5G   IOT   NGI   SATELLITE COMMUNICATIONS   MEDIA & CONTENT   TRANSPORT & LOGISTICS   SMART CITIES   PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

Martel is a dynamic Swiss-based company with more than 20 years' experience managing digital research and innovation projects across Europe and worldwide. After more than 100 projects, Martel has grown from its origins as a small consulting agency into a thriving organisation with employees located in offices in Zurich, Lugano and Lausanne. In the past five years, Martel's business has diversified to include research and development activities in the area of next generation internet technologies, such as 5G, IoT and Cloud. Our R&D department is specialised in virtualisation and orchestration of virtual resources, including IoT functions and Virtual Network Functions. Martel is an active member of key organisations including 5GIA, Networld2020, FIWARE Foundation, BDV, AIOTI, IoT Forum, and NEM.

ACHIEVEMENTS & SUCCESS STORIES

The proliferation of IoT and the rise of 5G are unleashing the potential to transform public services, transportation, safety, sustainability and infrastructures across many smart city scenarios. Orchestra Cities (orchestracities.com) is a data and IoT-driven solution allowing cities to collaboratively develop and share smart services using Open Source software, APIs and Data Models. It offers easy plug-and-play on top of 5G. Orchestra Cities was developed with the European cities of Antwerp and Helsinki and is now being trialled in Wolfsburg, Germany. It is modular and scalable, satisfying the needs of cities of different sizes. It allows cities to manage data access in a flexible way and in compliance with GDPR. Orchestra Cities supports different data formats and enables the creation of visual dashboards, which present a realtime view of city services.

INTEREST FOR FUTURE R&D&I COOPERATION

Martel is interested in further developing Orchestra Cities and in trialling it in a variety of scenarios. These trials will complement and extend the platform's current smart cities focus and explore its development and deployment in other verticals, such as smart mobility, automotive, smart energy, sustainability and multi-media content scenarios. We are also looking to explore the behaviour of the Orchestra Cities platform combined with 5G technologies. In turn, this will allow the incorporation of 5G infrastructures and solutions in combination with advanced IoT, Cloud and AI. Our interest is in the convergence between IoT management solutions and 5G, including the usage of micro-services architectures. We are also looking to bring usage scenarios in the context of Electric Vehicle Charging Station Management, Parking Management, Air Quality Management and Waste Management.

mbi

	YEAR ESTABLISHED
	2001
	NUMBER OF EMPLOYEES
	38
	MORE INFORMATION
	www.mbigroup.it
	CONTACT
	info@mbigroup.it

EXPERTISE IN 5G   IOT   SATELLITE COMMUNICATIONS   MEDIA & CONTENT   TRANSPORT & LOGISTICS   ENERGY   SMART CITIES   PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

MBI has experience and interests in Business Analytics and Optimization, where MBI provides customized solutions for Risk Management, Business Intelligence and Optimization to mainly the Telco, Energy, Gas, Water companies and Satellite Communications and applications, where MBI closely collaborates with the satellite operators and SatCom ecosystem in a wide variety of innovative solutions in the area of hybrid satellite/terrestrial networks, entertainment, applications for mobile or automotive devices.

MBI Research and Development activities are mainly focused on advanced networking, optimization, signal processing, network planning and software defined radio technologies.

MBI has acquired a deep know-how on Software-Defined Radio and GPU technologies and more generally on software-based approach for the development of ground telecom components, both at hub and terminal side.

ACHIEVEMENTS & SUCCESS STORIES

MBI solution for seamless vertical handover has been adopted by some leading European enterprises.

MBI provides solutions for IoT networks via satellite used in multiple domains (agriculture, energy, public safety, etc).

MBI works with the main European satellite operators and the European Space Agency in the standardization, development and testing of highly efficient, energy saving and green communications protocols.

MBI realized the first software implementation of a complete testbed for the ETSI S-MIM protocol.

MBI is patenting its solution to measure rain fields using satellite receivers.

MBI is founding member of the 5G-MAG (Media Action Group) in which needs of the broadcast and media domains are analysed in order to provide 5G standardization bodies with requirements and specifications.

INTEREST FOR FUTURE R&D&I COOPERATION

MBI is willing to explore collaborations with partners whose intent is to to integrate satellite communications in the 5G world, by applying virtualization and orchestration concepts to hybrid networks to be used for fixed and mobility applications.

MBI is also interested in bringing its large expertise on IoT via satellite in 5G networks.

Collaborations with satellite terminals manufacturers should be welcome.

39

montimage

YEAR ESTABLISHED
2004

NUMBER OF EMPLOYEES
10

MORE INFORMATION
www.montimage.com

CONTACT
contact@montimage.com

EXPERTISE IN   5G   IOT   NGI   CYBERSECURITY

ALL VERTICALS
(MONITORING AND SECURITY MANAGEMENT
SOLUTION APPLICABLE IN ALL VERTICAL SECTORS)

BACKGROUND, EXPERTISE & SKILLS

Montimage specialises in the development of techniques and tools for security and performance analysis and management of 4G/5G/IoT networks using real-time monitoring and cyberprotection techniques. It provides flexible Security and Monitoring as a Service adapted for SDN/NFV-based dynamic environments. Montimage's expertise covers the detection, prevention and mitigation of cyber-security incidents in both the data and control planes. Its security management solution allows deploying and configuring monitoring agents to analyse network behaviour using DPI and AI techniques.

Montimage has deep knowledge of network and application protocols and behaviour; and, its products are completely build in-house. In consequence, they are trustworthy, adaptable, reliable, robust and can deal with high throughputs and complex systems. Montimage can rapidly provide proofs-of-concepts adapted to specific needs.

ACHIEVEMENTS & SUCCESS STORIES

Montimage's solutions have been applied to improve the resiliency and trustworthiness of complex systems and adapted to different domains, including: automotive/transport, manufacturing/industry, health, telecommunications, critical infrastructures. The solutions can be extended to deal with proprietary protocols and analyse the behaviour and business activities of the different sectors.

Montimage has successfully deployed its solution in the SoftFire platform (Software Defined Networks and Network Function Virtualization Testbed within FIRE+, www.softfire.eu) to improve the security-awareness of the operators; and its IoT solution in Fed4Fire platforms.

Montimage commercialises advanced solutions for creating instant 4G/5G mobile networks for emergency situations, events requiring extra bandwidth, and improving coverage in white/gray zones. It has an ongoing collaboration with Cumucore to commercialise 4G/5G mobile solutions in a box.

INTEREST FOR FUTURE R&D&I COOPERATION

Montimage participates in many collaborative research projects that allow introducing innovative techniques into its products. For instance:

SISSDEN H2020 project where it analyses darknet and honeypot network traffic to detect low-intensity attacks and evasion techniques.

SENDATE CelticPlus project where it defines and implements new techniques for managing the security of SDN/NFV-based 5G networks.

ANASTACIA H2020 project where it implements new solutions for IoT network security.

Montimage is actively searching for new partnerships and collaborations. It can bring its technical knowhow and tools, its fast exploitation strategy, as well as its experience in the participation and management of projects in different research programs.

European SME Expertise in 5G and Beyond

nemergent solutions

YEAR ESTABLISHED
2017

NUMBER OF EMPLOYEES
30

MORE INFORMATION
www.nemergent-solutions.com

CONTACT
info@nemergent-solutions.com

EXPERTISE IN   5G   IOT   MISSION CRITICAL COMMUNICATIONS   TRANSPORT & LOGISTICS   ENERGY   SMART CITIES   PUBLIC SAFETY   MFG.   HEALTH

BACKGROUND, EXPERTISE & SKILLS

Pioneers in the industry, Nemergent leads the way towards more open Mission Critical Communications. Nemergent Solutions SL has significant expertise in designing and prototyping novel PPDR (e.g. Blue lights) and Public Transport (e.g. FRMCS communications) solutions over mobile broadband technologies, supporting mission critical communications between end users. Nemergent's portfolio includes a complete and fully 3GPP standard MCPTT/MCS ecosystem made up of early implementations concerning MCPTT/MCS Application Servers (AS), MCPTT/MCS management servers and the Nemergent MCX Client for Android and Linux operating systems. The server-side components are designed as NFV components, fostering agile and flexible deployments in 5G-alike setups. The innovation-driven nature of the company promotes the establishment of commercial links with different UE, IMS and EPC leading companies.

ACHIEVEMENTS & SUCCESS STORIES

Nemergent Solutions is involved in international R&D projects oriented to PPDR where it takes advantage of its best-of-breed products. The company is engaged in 5GPPP 5GENESIS project bringing the first real-world mission critical integration and use-cases over 5G and US NIST/PSCR MCS TaaSting to fulfil the needs of mission critical community for compliance testing (RAN5) based on TTCN-3 code specs. It has also finalized a OC2 project in Fed4FIRE+ and OC1 in INTER-IoT and it has also been involved in US NIST/PSCR PSIAP achieving end-to-end mission critical communications according to 3GPP specifications together with Sonim and their XP8 ruggedized devices. Nemergent Solutions is a regular company showcasing its technology in different events and counts with a network of well-established partners.

INTEREST FOR FUTURE R&D&I COOPERATION

The R&D background shows the clear advocacy of the Nemergent Solutions to improve and adapt future MCS communications and the importance of first responders and public protection together with verticals such as railways, ports, fleets management, airports and mining among others. The firm is devoted to adapt and adjust the current mission critical products towards 5G technology and operations and therefore, aims at collaborating with partners providing orchestrators, MEC solutions, 5G Cores, gNodeBs, 5G UEs, deployables, drones, PPDR-related IoT products, and finally other 3GPP MCS compliant vendors and companies for interoperability purposes. These international collaborations are intended not only to serve as an early adoption of 5G operations, but also to assess the service-level KPIs of standardized mission critical products.

41

![NEXTWORKS — ENGINEERING FORWARD]

YEAR ESTABLISHED
2002

NUMBER OF EMPLOYEES
45

MORE INFORMATION
www.nextworks.it

CONTACT
info@nextworks.it

EXPERTISE IN 5G   IOT   NGI   SMART FACTORIES   MEDIA & CONTENT   MANUFACTURING   ENERGY   SMART CITIES   PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

Nextworks has long-term experience in 5G control and orchestration technologies, built on top of solid know-how of ETSI NFV and MEC specifications and architectures. We have deep hands-on expertise with various NFV MANO software tools (ETSI OSM, OpenBaton, Cloudify), SDN controllers (OpenDaylight, ONOS), VIMs (OpenStack), cloud native orchestration (Kubernetes). We developed various solutions for control and orchestration of Network Slices, Network Services and Service Chains made of Virtual network Functions in 5G environments, both proprietary and open-source. We also have strong involvement in SDOs, particularly at ETSI NFV and MEC, where we have been working in various specialist task forces and NFV Plugtests.

Our R&D and products target domains closely related to Media, Smart Cities, Smart Homes and Smart Factories.

ACHIEVEMENTS & SUCCESS STORIES

Our mission is to provide cutting-edge solutions and consultancy services tailored to customers' needs.

Through the participation in 5G PPP projects, Nextworks is developing a strong asset of software prototypes for 5G, NFV, SDN and MEC; this includes: 5G Apps & Service Catalogue, TIMEO (Transport Infrastructure and MEC Enabled Orchestrator), SEBASTIAN (Service Based Slice Translation, Integration and Automation), Plug & Play control of 5G VNFs, 5GCity Service Development Kit.

Our prototypes are demonstrated at various international events, such as ECOC, EuCNC, ICT, OFC, MWC.

Our background translates into consultancy services: i) Specialized Training on NFV/MEC technologies and software tools; ii) Technical Project Management for 5G trial experimentation; iii) Standards Development Support in ETSI Specialist Task Forces and NFV Interoperability and API conformance Plugtests.

INTEREST FOR FUTURE R&D&I COOPERATION

Despite the solid R&D in Software Networks of these years, work is still needed to realize the vision of Smart Networks for any Vertical service on top. Key challenges to address include aspects of control over multiple distributed network control operating systems; use of powerful abstractions for resources and services; new naming schemes for virtualised resources for automated discovery; intent-based APIs and highly configurable policies to control resource and service lifecycles; high degree of automation to enable cognitive (at first) and intuitive (then) network behaviours.

To properly address these challenges, we seek for teaming with international experts on virtualization and control technologies (Networking Industry), service operation (Telcos), vertical business service offering (above all [Industrial-]IoT domain top players for our target products), and top-tier research centers and universities.

NOUVEAUCOMM

YEAR ESTABLISHED
2014

NUMBER OF EMPLOYEES
5-10

MORE INFORMATION
www.nouveaucomm.com

CONTACT
navnit.goel@nouveaucomm.com

EXPERTISE IN   5G   IOT   AI   WEBSITE DEVELOPMENT   CLOUD   TRANSPORT & LOGISTICS   SMART CITIES   PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

We develop customized Data communication solutions helping customers to realize potential of existing Network, while providing innovative solutions in the field of unprecedented business and technological changes.

We Provide

- Innovations and products in wireless, IP and cloud networking, IoT, NFV and SDN

- R&D Consultancy and Test Services

- Customized solutions for Tactical Communication, public safety and other vertical markets

ACHIEVEMENTS & SUCCESS STORIES

1. Design and Development of Remote Environ Monitoring System

2. IoT Gateway with GPRS connectivity to cloud with optional Wi-Fi and 4G interface to cloud for remote solar power monitoring application

3. Prototype Trial in a small vineyard in Houston USA for LoRA based system for Smart Agriculture

4. Setup Website Design and Hosting Business

INTEREST FOR FUTURE R&D&I COOPERATION

We are looking for projects in Wireless 5G, IoT, Test Beds, R&D Services including Architecture, Software and Hardware Design and Testing. We are also looking for Business Development partners.

pureLiFi

EXPERTISE IN   5G   IOT   LIFI   MANUFACTURING   SMART CITIES   PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

pureLiFi is the global leader in LiFi technology. We are bringing to market the world's first commercial light antennas, which are the optoelectronic components that make LiFi possible in consumer electronics, lighting, and mobile devices.

LiFi is high speed wireless communications using light rather than radio frequencies. LiFi pushes wireless to new limits by offering gigabit speeds, ultra-low latency, high quality connections with military grade security.

Applications for LiFi range from gigabit smart homes, AR/VR, and LiFi enabled mobile phones to industrial manufacturing and defence applications. The pureLiFi team includes highly qualified, international light communication engineers and management experience in the mobile and semiconductor sectors exceeding 50 years.

ACHIEVEMENTS & SUCCESS STORIES

Named Scotland's most innovative company in 2020. pureLiFi has deployed LiFi in hundreds of countries worldwide covering dozens of use cases.

pureLiFi has lead commercialisation and miniaturisation of LiFi technology with the launch of the only Light Antenna on the market ready for integration into mobile devices, lighting, and consumer electronics in 2019.

pureLiFi are founding members of the Light Communications Alliance alongside industry leaders such as NOKIA, Du Telecommunications, and Liberty Global.

pureLiFi also chairs the IEEE 802.11bb Task Group which is developing the Global standard for LiFi, ensuring LiFi is integrated into every light and every device.

INTEREST FOR FUTURE R&D&I COOPERATION

Just as 4G and Wi-Fi make up our daily arsenal of wireless tools today – LiFi as a 5G technology will be another key internet-lifeline in everyone's pocket. The future for LiFi is integration into all of our devices, smartphones, tablets and wearable technology. We are interested to support today's most demanding use cases including but not limited to: Smart home, Device to device communication, Media & game streaming, Virtual, Augmented and Mixed Reality.

pureLiFi is currently involved on several EU Horizon 2020 projects (5G-CLARITY, ENLIGHT'EM, ALC, WORTECS) and will look for more H2020 and international collaboration projects in LiFi, 5G and beyond.

Quobis

YEAR ESTABLISHED
2006

NUMBER OF EMPLOYEES
51

MORE INFORMATION
www.quobis.com

CONTACT
Yudani.riobo@quobis.com

EXPERTISE IN   5G   IOT   NGI   **MEDIA & CONTENT**   **TRANSPORT & LOGISTICS**   **HEALTH**   **SMART CITIES**

BACKGROUND, EXPERTISE & SKILLS

Quobis is an European leading company in voice interconnection expert services and well-known as one of the pioneers in the deployment of WebRTC technology after being involved in the release of the industry's first WebRTC Application Controller. Today, this element is part of the core network of different telcos worldwide. In addition, Quobis Communication Platform is helping enterprises from different industries such as telecommunications, BFSI or retail to quickly adopt the most advanced ways of communications such as video calling, instant messaging, VoIP, etc. for improving collaboration between office and deskless workers and creating a richer customer experience."

ACHIEVEMENTS & SUCCESS STORIES

Quobis is one of the partners involved in 5GTANGO project, a 5GPPP Phase2 Innovation Action that enables the flexible programmability of 5G networks with:

a) an NFV-enabled Service Development Kit (SDK);

b) a Store platform with advanced validation and verification mechanisms for VNFs/ Network Services qualification (including 3rd party contributions);

c) a modular Service Platform with an innovative orchestrator in order to bridge the gap between business needs and network operational management systems.

The main role of Quobis in this project consists of the development and implementation of the communication suit pilot, that enables real-time videoconferences using media VNFs, application VNFs and platform VNFs for the 5GTANGO platform.

INTEREST FOR FUTURE R&D&I COOPERATION

Quobis has broad experience working on international projects not funded by public agencies as is a key partner for some of the larger network integrators and service providers that see Quobis as the reference partner for projects with special needs in UC.

Quobis is already cooperating in R&D&I projects with partners in Europe and Brasil. We are looking at strengthening those partnerships as well as opening up to new countries and new projects.

Quotient Associates

EXPERTISE IN   5G   IOT   NGI   **SATELLITE COMMUNICATIONS**   **MEDIA & CONTENT**   **TRANSPORT & LOGISTICS**   **SMART CITIES**   MFG.   HEALTH   **PUBLIC SAFETY**

BACKGROUND, EXPERTISE & SKILLS

Quotient is an international strategy, technology, security and economics consultancy to the communications industry. The company specialises in all aspects of fixed and wireless communications, broadcasting, security, and spectrum regulation and management.

ACHIEVEMENTS & SUCCESS STORIES

We are used to both leading and participating in multidisciplinary projects. Our skills lie in 5G new technologies in both core and RAN, 5G network security and project management. We are currently serving as part of the technical design authority for UK Government (DCMS) testbeds and trials, which include the vertical sectors of Industrial Internet of Things, Smart Tourism, Connected and Autonomous Vehicles, Healthcare and Agriculture Technology. We also have an overarching security role across all projects, which are now all up and working.

INTEREST FOR FUTURE R&D&I COOPERATION

We are looking to be involved in any of the above in a technology; strategy; testbeds and trials; network or application security; and / or project management role.

realwireless.
independent wireless experts

YEAR ESTABLISHED
2006

NUMBER OF EMPLOYEES
15

MORE INFORMATION
www.real-wireless.com

CONTACT
Simon.fletcher@real-wireless.com

EXPERTISE IN   5G   IOT   SATELLITE COMMUNICATIONS   MEDIA & CONTENT   TRANSPORT & LOGISTICS   SMART CITIES   MANUFACTURING   HEALTH   PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

Real Wireless is the pre-eminent independent expert advisor in wireless technology, strategy & regulation worldwide. We bridge the technical and commercial gap between the wireless industry (operators, vendors and regulators) and users of wireless (venues, transportation, retail and the public sector) - indeed any organization which is serious about getting the best from wireless to the benefit of their business.

ACHIEVEMENTS & SUCCESS STORIES

A key partner in 5G-PPP projects in the specialist area of Techno-Economics. Having worked in the thought leading 5G-NORMA project on Cloudification of 5G we have published papers and deliver for clients in the area of TCO optimal evolution of networks based on evaluation of potential ROI. In 5G-MoNArch we developed capabilities to looked at Socio-Economic value creation. Harnesses these two capabilities we now work in the 5G-TOURS project evaluating innovations and Use Cases across Health, Tourism and Transport sectors. We have developed analytic tools leveraging radio and architecture principles to develop quantitative analysis outcomes which inform our business, technical analysts.

INTEREST FOR FUTURE R&D&I COOPERATION

European and International clients and partners that would gain deep insight on the architecture and technologies of advanced networks. Our tooling and experienced consultants can rapidly assess TCO, ROI and other commercial and technical metrics and provide a solid evidence bases of technical and business validation of research projects.

![redmill marketing associates]

YEAR ESTABLISHED
2007

NUMBER OF EMPLOYEES
7

MORE INFORMATION
www.redmillcommunications.com

CONTACT
guy@redmillcommunications.com

EXPERTISE IN	5G	IOT	SATELLITE COMMUNICATIONS	MEDIA & CONTENT	TRANSPORT & LOGISTICS	SMART CITIES	ENERGY	HEALTH	PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

Redmill Marketing Associates (RMA) is a UK-based full-service B2B marketing agency, founded in 2007, that is dedicated to providing telecoms and technology companies with the support and strategic input they need to meet their growth objectives.

We have deep experience and expertise of mobile communications and networks and, in particular, 5G evolution and market development. Our expertise spans infrastructure, applications and services, backed by a clear understanding of market context and trends.

Our customer portfolio covers: smart technology, IoT, SaaS, mobile networks, 5G evolution, network planning / analysis, AI and ML, as well as OSS and BSS. We provide our customers with a focused and responsive service that acts as a seamless extension of their own marketing resources.

ACHIEVEMENTS & SUCCESS STORIES

We work with leaders and innovators from our industry, including Tambora Systems, Telecom26, CROSS Network Intelligence, InfoVista, Polystar, Digitalk, Spirent / Mobilethink, Gintel, 5G Briefing, and others.

We are proud of our continuous support for customers over more than a decade, providing strategic input and marketing services to reach growth targets, M&A goals, market penetration and expansion targets, and to plan new sales and lead generation channels.

Tambora Systems: transforming an innovative startup into a fast-growing and relevant entrant offering orchestration of dynamic network slicing to control latency and QoS for LTE / 5G applications.

Polystar: supporting an established provider of Service Assurance, CEM, Data Monetisation, and 5G Network Load Testing tools with strategic marketing input and content creation.

INTEREST FOR FUTURE R&D&I COOPERATION

RMA is dedicated to fostering new partnerships with SMEs in order to help them reach new markets, define successful market strategies, and to provide market analysis to identify growth opportunities.

In particular, we are interested in delivering marketing projects in the following areas: 5G, IoT, Smart Technologies, AI and ML, B2B and VAS solutions for operators, NGN OSS / BSS, Core Network functions, EPC, IMS and more.

RFSAT Limited

📅 **YEAR ESTABLISHED** 2008 (UK), 2018 (Ireland) and Athens (GR)	ℹ️ **MORE INFORMATION** www.rfsat.com
👥 **NUMBER OF EMPLOYEES** 10	✉️ **CONTACT** Dr Emmanouela Vogiatzaki emmanouela@rfsat.com

EXPERTISE IN   5G   IOT   NGI   MEDIA & CONTENT   TRANSPORT & LOGISTICS   SMART CITIES   MFG.   HEALTH   PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

RFSAT is a registered non-profit private research-performing SME organization with offices in Dublin (Ireland), and Athens (Greece). Its activities focus on applied research and technological development through national and international research funding, industrial consultancy and commercial exploitation of research results in the telecommunications industry. Main focus areas include networked audio-visual media processing and communication for e.g. unmanned and autonomous (aerial) surveillance, cyber-physical resilience including intrusion detection and prevention, multi-spectral and 3D surveillance/modelling for large areas, structures and tangible objects (e.g. for Cultural Heritage and Environmental protection, Security and Crisis Management etc), Machine Learning and Artificial Cognitive Intelligence (AI) for situation awareness, Mixed-Reality systems for serious gaming applications, e-Health and tele-assistance including Ambient Assisted Living (AAL) to address needs of ageing population, ultra-low-power wireless embedded sensing and control, immersive user interfaces, integrated Information Management Systems (IMS), hybrid indoor/outdoor (A/D GNSS and Galileo, wireless, cellular, inertial and mobile) positioning and localization, GIS and Location Based Services (LBS), Smart Energy/Grid and critical infrastructure protection for Smart Cities and other related technological areas. RFSAT is expert in networking and telecommunications technologies, including 5G mobile communications, from high-level algorithmic design to efficient low-level hardware and implementation and VLSI fabrication on silicon, and cyber security.

ACHIEVEMENTS & SUCCESS STORIES

Our company motto is anthropocentric and social orientation in our research directions, having resulted in our technologies from FP7-StrokeBack project integrated in stroke rehabilitation products from Meytec (Germany), our 3D scanning techniques along with algorithms detecting degradation of Cultural Heritage objects from H2020-SCAN4RECO project integrated into automated system of Ormylia (Greece), while our innovative solutions combining ignition detection on autonomous UAS platforms from FP7-AF3 project have been successfully demonstrated by ELBIT Systems for fighting wild forest fires.

INTEREST FOR FUTURE R&D&I COOPERATION

RFSAT invests in funded research activities under European programs (FP7, Horizon'2020, COST etc.) in the thematic areas of Information and Communication Technologies, Security (Secure Societies), Environment, Space, Transport and Health. RFSAT is an active member of Networked Media (NEM) and NetWorld2020 European Technology Platforms (ETP), Integrated Mission Groups for Security (IMG-S), ENISA Network and Information Security (NIS), European Connected Health Alliance (ECHAlliance), European Alliance for Innovation (EAI), Infrastructure for Spatial Information in Europe (INSPIRE), and other European alliances, platforms and professional organizations. RFSAT allies as SME stakeholder with several relevant ongoing projects funded under Horizon 2020 and COST programs with various past activities also in FP6 and FP7. Its contribution areas have been in Smart Energy and IT critical infrastructure protection with applications areas of Smart Energy, Environment, Climate Change, as well as Precision Agriculture, social network analytics, vulnerability analysis and validation, interoperability of surveillance systems and other similar areas.

SEVEN
Solutions

YEAR ESTABLISHED
2006

NUMBER OF EMPLOYEES
41

MORE INFORMATION
www.sevensols.com

CONTACT
jlgutierrez@sevensols.com
carlos.valenzuela@sevensols.com

EXPERTISE IN   IOT   ENERGY   SMART CITIES   FINANCIAL

BACKGROUND, EXPERTISE & SKILLS

Seven Solutions, worldwide leaders in the White Rabbit (IEEE 1588 high-accuracy profile) timing technology. It is a private held leading company in accurate sub-nanosecond time transfer and frequency distribution for reliable industrial and scientific applications. Our timing solutions have been validated during the last 9 years and we offer currently the best interoperable, dependable and ultra-accurate time transfer and synchronization approach in the market (nanosecond accuracy, deterministic, dependable and scalable).

Seven Solutions provides solutions capable of distributing time and frequency over metro and long-haul 5G links in both back-haul and front-haul:

- Ultra-accurate Time and Frequency Transfer (phase transfer using IEEE 1588 High-Accuracy Profile)

- Reliable GNSS Timing Solution with integrated accurate Time Transfer capability over optical fiber (backup system)

- High bandwidth & latency bounded Ethernet communications

- Deterministic data delivery based for Time-Aware Applications

ACHIEVEMENTS & SUCCESS STORIES

Currently collaborating with Tier 1 technology partners towards the standard eCPRI. Validating our solution with Deutsche Telekom for the visibility network.

INTEREST FOR FUTURE R&D&I COOPERATION

We are interested in collaborating in ICT-related H2020 calls related to telecom, satellite services, 5G, IoT, smart cities and energy. Cooperation with international partners from different sectors to setup pilots and PoCs.

Siklu

EXPERTISE IN   5G   IOT   NGI   MANUFACTURING   SMART CITIES   PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

Siklu is a provider of wireless connectivity solutions based on mmWave technology. Siklu's products include both point-to point solutions with data rates as high as 10Gbps for backhaul/fronthaul applications and point-to-multi-point solutions that may be used for broadband fixed access applications or small-cell backhaul applications. Siklu has intellectual property in the RFIC and mmWave beam-steering antenna. This allows Siklu to design mmWave remote radio heads compatible with 5G standards. In addition to our hardware portfolio Siklu leads the mmWave industry with a suite of SaaS applications including automated complex network design tools, ROI calculators and management systems

ACHIEVEMENTS & SUCCESS STORIES

Siklu focuses on Gigabit Wireless Access (GWA) and Smart Cities as well as cellular front haul and backhaul. By the end of 2018 we had networks deployed in over 150 Smart Cities around the world. Currently the largest mmWave market is the US, where Siklu has roughly 60% market share for 60, 70/80GHz systems. From a product perspective in 2018 we launched our 10Gbps product with the longest range in the market, a new small size Terminal Unit for outdoor deployment hat is just slightly bigger than a typical smart phone, and our automated network design tool WiNDE.

INTEREST FOR FUTURE R&D&I COOPERATION

Siklu has been intensively involved in R&D and innovation cooperation projects. It has participated in FP-7 projects BunGee and IPHOBAC-NG, as well as in H2020 projects RAPID, and currently participates in the projects 5G-PHOS and THoR. Siklu is also involved with other research consortia and collaborates on research with partners from both industry and academy. Siklu cooperation interests include mmWave radio and antenna technology, high-speed modem technology, mmWave beamsteering antennas, 5G RRH, mmWave/fiber integration and other ideas that may be exploited in our target markets.
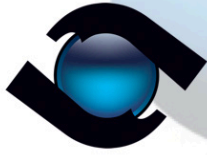
SOLIDSHIELD
EASY TOOLS FOR
NETWORK SOFTWARE SECURITY

SOLIDSHIELD

YEAR ESTABLISHED
2003

NUMBER OF EMPLOYEES
3

MORE INFORMATION
www.solidshield.com

CONTACT
vincent@solidshield.com

EXPERTISE IN	5G	IOT	MEDIA & CONTENT	DEFENSE SECTOR

BACKGROUND, EXPERTISE & SKILLS

We protect software against confidentiality (reverse engineering) and integrity (tampering) attacks. We are active in the field of entertainment (DRM), the defence sector and more recently with the telecom industry. Our core expertise is transverse to the whole ICT but we bring tailored turnkey solutions to each sector. We operate with both Java and compiled languages (C, C++, Go, …).

In the telecom industry, our solution can be automatically applied, without any programming required and does not drop the performance of the protected network function. We have our own software-based security solution and we are also capable of leveraging and coupling with hardware-based trusted execution environment (e.g., Intel SGX).

Our automated workflow is a key value. It is linked to our ability to process binary-level ready-to-deploy software, with no changes from the software vendor. Henceforth, our solution can be applied on 3rd party code.

We have been selected in two SDN collaborative projects (Sendate Tandem and Inspire 5G).

ACHIEVEMENTS & SUCCESS STORIES

In one collaborative project (Sendate Tandem), we had demonstrated how a Security NF (malware probe) can be itself secured in order to prevent an Introspection attack. Without protection the malware probe detection can be "inversed" by the attacker. Reversely, with our protection, the operation is far more complex. The demonstration also covered the setup workflow, done in one click.

INTEREST FOR FUTURE R&D&I COOPERATION

We see these CHALLENGES for the Telecom Industry, for which we are looking forward to participating to a consortium:

A. Bringing trust to AI/ML that will be managing un-supervised autonomic SDNs?
B. Bringing to TELCOs self-efficiency to check the safety of VNFs (known vulnerability-free) before their deployment as well as enforcing their integrity when they are operated of-premises.
C. Designing a fully secured network function integrity chain made of detection, transfer of alarm and reaction.
D. Bringing TEE (namely Intel SGX) to VNFs, by designing a fluid and simpler workflow to leverage this low use technology.

SRS
SOFTWARE RADIO SYSTEMS

YEAR ESTABLISHED
2012

NUMBER OF EMPLOYEES
10

MORE INFORMATION
www.softwareradiosystems.com

CONTACT
info@softwareradiosystems.com

EXPERTISE IN   5G   IOT   NGI   SATELLITE COMMUNICATIONS   MEDIA & CONTENT   TRANSPORT & LOGISTICS   SMART CITIES   PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

Software Radio Systems (SRS) is the team behind the popular srsLTE project (www.srslte.com). Providing a complete open-source end-to-end mobile network implementation, srsLTE is used by leading mobile wireless researchers around the world and is the enabling SDR platform behind 5 of the 6 most recent coordinated vulnerability disclosures listed on the GMSA mobile security hall of fame.

Commercially, SRS builds upon the proven srsLTE platform to provide customized, high-performance 4G and 5G mobile network solutions including IoT and V2X. Customer successes include operational air-to-ground broadband networks, launched and active LEO satellite systems, advanced 5G field-test solutions and deployed mobile wireless sensor and analytic networks.

ACHIEVEMENTS & SUCCESS STORIES

SRS is involved in international R&D projects which focus on novel applications of mobile wireless technology. The company is engaged in the 5GPPP 5GVINNI project where it contributes SDR components for 5G, building upon its proven srsLTE platform. In the US, the company has successfully completed a 2-year project with NIST/PSCR under the Department of Commerce. The OpenFirst project provides an end-to-end reference network implementation for research, prototyping, test and validation of LTE technologies for public safety communication. SRS works with the European Space Agency on projects related to multimedia delivery over hybrid satellite/terrestrial networks and efficient satellite backhaul of IoT traffic. The company is a regular MWC exhibitor and works globally with Tier 1 mobile operators and OEMs.

INTEREST FOR FUTURE R&D&I COOPERATION

SRS is looking for international partners focused on RDI cooperation in the areas of emerging 5G technologies, cyber-security, V2X and IoT. We have extensive experience in working directly with RDI partners to accelerate proof-of-concept and shrink time-to-market and we regularly engage in projects under NIST, ESA, H2020 and others.

Suite5
We Deliver Intelligence

YEAR ESTABLISHED
2017

NUMBER OF EMPLOYEES
20

MORE INFORMATION
www.suite5.eu

CONTACT
contact@suite5.eu

EXPERTISE IN   5G   IOT   DATA ANALYTICS   MEDIA & CONTENT   MFG.   ENERGY   SMART CITIES   PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

Suite5 Data Intelligence Solutions is a data analytics and software house with a strong focus on R&D and Innovation projects. Suite5 participates in such activities as an analytics and intelligence provider, working on topics such as big data, data management and insights generation, in various verticals. In more detail, the company works on analytics solutions that are able to provide descriptive and prescriptive analytics, which are based both on structured and unstructured data and are coming out of hardware and software sensors. The company participates in such attempts in the 5G sector (MATILDA project), as well as in other sectors such as Aviation (ICARUS project), Manufacturing (EOSC-hub project, UPTIME project), Cybersecurity (FutureTPM project) and Energy (FLEXCoop project).

ACHIEVEMENTS & SUCCESS STORIES

In MATILDA Suite5 worked on the development of policy models for applications that run on top of SDNs, and in the area of Analytics that are able to the behaviour of systems in 5G ecosystems. Those two combined are in a position assist decision making towards network placement, deployment and reconfiguration and could help to generate new insights about 5G applications and new policies for optimum utilisation of resources.

INTEREST FOR FUTURE R&D&I COOPERATION

Suite5 is highly interested in joint ventures which have R&D and Innovation interest in any vertical that either is in need of advanced data insights and analytics, or expects to benefit from the application of data technologies to traditional functions towards using data intelligence and softwarisation to explore value that is not exploited yet.

TechNarts

📅 YEAR ESTABLISHED
2007

👥 NUMBER OF EMPLOYEES
14

ℹ️ MORE INFORMATION
www.technarts.com

✉️ CONTACT
horizon@technarts.com

EXPERTISE IN	5G	IOT	NGI	TRANSPORT & LOGISTICS	HEALTH	PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

Nart Informatics (TechNarts) is an SME founded in 2007 in Ankara, Turkey. Our expertise is developing large-scaled, robust, trustworthy software applications to solve complex and inextricable problems of enterprises. Our focus is on telecom, health and transport sectors as well as government and non-profits.

TechNarts's network operations support system STAR, is a highly effective solution for Telcos and in use for 10+ years, processing millions of network performance data annually with complex and learned algorithms, provides real-time intelligence about the network's current state end-to-end manner and generates automated reports with big data analytics. It provides critical value to operators by reducing service outage risks and increasing operational efficiency.

The main activities of TechNarts are analysing, design, software development and integration.

ACHIEVEMENTS & SUCCESS STORIES

TechNarts is the developer and implementer of the first successful, country-wide and full-cycle pharmaceutical traceability system in the world.

Another flagship solution is STAR which is operational in one of the telecom operators in Turkey for more than 10 years. STAR integrates multiple network technologies and layers such as SDH, DWDM, Radiolink, IP/MPLS and mobile (LTE/3G/4G/5G) and interprets the data gathered from 50K network devices in daily base.

TechNarts received 3 Seal of Excellence certifications from SME Instrument program and completed several R&D projects realized with the national funding programs.

TechNarts currently works on the new upgrade that will solve 5G networks. In addition, TechNarts is a member of Communication Technologies Clustering in Turkey and participates its "End-to-End 5G" project.

INTEREST FOR FUTURE R&D&I COOPERATION

TechNarts is seeking for collaboration with SMEs, startups, telecom operators, integrators, industry partners as well as academic institutions to carry out R&D&I activities.

Our focus is particularly on processing network performance data through ML and AI applications, Zero-Touch-Network management, IoT and 5G networks.

We look for partners from Telco sector as well as from other verticals such as mobility and transport, smart energy/utilities, health, automative.

Telcaria

EXPERTISE IN 5G NGI TRANSPORT & LOGISTICS MANUFACTURING

BACKGROUND, EXPERTISE & SKILLS

Telcaria is an SME providing advanced services to network operators and equipment manufacturers worldwide. We partner with network operators to redesign their products towards NFV/SDN based network infrastructure and cloud-computing applications.

Telcaria is headquartered in Madrid, Spain, and has collaborations with the IMDEA Networks and top Universities in the area: UC3M, UPM and UAH. This critical mass of networking expertise located in very close proximity creates many synergies, having the members of these institutions a history of fruitful collaboration between them. The company is currently working in three H2020 EU (5GEVE, 5GROWTH and 5G-DIVE), collaborates as an expert in the Master of SDN&NFV technologies offered by UC3M and is currently actively developing and commercially distributing Alviu, its SD-WAN solution.

ACHIEVEMENTS & SUCCESS STORIES

Telcaria has participated in EU/FP7 NetIDE and two 5G-network-related projects: EU/H2020 SUPERFLUIDITY and 5G-CORAL (shortlisted in the Glotel Award for 'Best 5G innovation' and CSI Award for 'Best 5G project and innovation' in collaboration with Taiwanese partners), and is an active partner in 5GEVE, 5GROWTH and 5G-DIVE.

As an advanced network service virtualization SME, Telcaria has benefited from the technology advances generated from the previously mentioned projects acquiring the know-how for applying technologic achievements for rapid prototyping, design, validation, and direct deployment of Edge and Fog distributed computing platforms, advanced multi-domain monitoring platforms, innovations in orchestration mechanisms to assist offloading and roaming scenarios among others. Additionally, Telcaria has disseminated its results in mayor events and public demonstrations such as EuCNC.

INTEREST FOR FUTURE R&D&I COOPERATION

Telcaria research and development team has experience in participation in multiple European R&D project such as, FP7 and H2020. Telcaria is looking in partnering with vendors, academic and industrial partners, interested in future R&D&I cooperation in beyond 5G, SDN, NFV, edge and fog computing, distributed datacentre platforms, SLA assurance, network slicing, Zero-touch network and service management (and network intelligence platforms). We are actively searching for new partnerships and collaborations which can further enhance Telcaria product line or in the design of third-party enhanced systems, providing solutions for operators and enterprises.

TREE
TECHNOLOGY

YEAR ESTABLISHED
2018

NUMBER OF EMPLOYEES
75

MORE INFORMATION
www.treetk.com

CONTACT
contact.treetechnology@
treetk.com

EXPERTISE IN IOT   NGI   TRANSPORT & LOGISTICS   SMART CITIES   MANUFACTURING   HEALTH   PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

Tree Technology is an R&D-performing company providing information and communication technology solutions based on Big Data and Artificial Intelligence. Tree helps optimizing processes and business operations in several sectors using advanced ICT, integrating emerging technologies as part of the Smart Data ecosystem. In particular in 5G, Tree Technology is active in accompanying industrial partners such as telecommunication operators in their digital transformation, contributing with our knowledge in advanced AI and Big Data technologies. In addition to that, Artificial Intelligence-based solutions for cybersecurity in the 5G telco infrastructure are also offered by the company.

ACHIEVEMENTS & SUCCESS STORIES

Tree Technology operates in several vertical sectors, such as Telecommunications, Health, Transport, Finance, Insurance, Industry, Public Safety, or Security. Tree Technology accompanies industrial partners in their digital transformation and business optimisation, contributing with expert knowledge in advanced smart data technologies such as Big Data, Data Science and Computer Vision. In particular, Tree Technology helps to exploit data to add value to business, with the aid of real time data processing, data mining and automated and deep learning strategies (artificial intelligence).

INTEREST FOR FUTURE R&D&I COOPERATION

Our R&D activity provides us with knowledge and differential capabilities, based on advanced technologies aligned with worldwide innovation priorities, allowing us to develop competitive advantages. Tree Technology is very active in cooperative R&D initiatives, both publicly and privately funded. In example, Tree Technology actively participates in international R&D projects, strongly performing in the European R&D programme Horizon 2020 in different areas, both as a partner and as a leader. We are open and interested in collaboration in R&D wherever our expertise can add value. Our core activity is in the area of Artificial Intelligence and Big Data, so we are interested to collaborate with partners and initiatives demanding these competencies.

TST

YEAR ESTABLISHED
2007

NUMBER OF EMPLOYEES
17

MORE INFORMATION
www.tst-sistemas.es

CONTACT
amedela@tst-sistemas.es
falcala@tst-sistemas.es

EXPERTISE IN 5G IOT TRANSPORT & LOGISTICS ENERGY SMART CITIES PUBLIC SAFETY

BACKGROUND, EXPERTISE & SKILLS

TST participated in the Flex5Gware project (http://www.flex5gware.eu/), focused on flexible and efficient HW and SW platforms for 5G network elements and devices, addressing increased capacity, reduced energy footprint, as well as scalability, modularity and reconfigurability. Research was demonstrated on proof-of-concept implementations. TST participated on a PoC for testing the reconfiguration of the radio behaviour according to different optimization criteria, allowing for instance multi-cell dynamic resource allocations and switching across different radio access technologies according to the link quality. Furthermore, TST's participation in the FLEXNET project makes the company contribute to the development of flexible networks, focusing in IoT use cases. IoT is a growing market, and also an essential part of the future evolution of 5G networks.

ACHIEVEMENTS & SUCCESS STORIES

TST provides IoT custom solutions on the smart cities, industry (IIoT and Industry 4.0) and precision farming domains. TST support companies to transform their ideas into innovative, profitable and feasible market solutions, with main focus on Smart City, Agri-food and Energy Efficiency business areas: some examples are environmental sensing, level sensors for urban waste management, water control for precision farming and real time location systems.

TST has a broad experience in R&D projects, being involved in 20+ EU funded research projects related to IoT, smart services and future networks (from diverse programmes such as ICTFP7, ICT-CIP, ICT-H2020, EUJ-H2020, ECSEL, CELTIC, EUROSTARS or PENTA). TST's research activity has been recognized by the Spanish Ministry of Economy and Competitiveness, which awarded the company the official "Innovative SME" seal.

INTEREST FOR FUTURE R&D&I COOPERATION

TST relies on a highly experienced team of telecommunication and electronics engineers with more than 15 years of research in wireless communications, sensor networks and IoT platforms. The company's goal is to create cutting-edge and competitive products and services, helping the clients to reduce operating costs.

Thus, TST looks forward to continue working with other potential partners coming from both industry and academia, in R&D and innovation activities, offering it´s experience in IoT hardware design and development, smart sensing and system integration. The way forward for TST includes the involvement in initiatives related to 5G, Software Defined Networks and edge and fog computing, retorting to its expertise and know-how in the IoT and networks fields.

UBITECH
ubiquitous solutions

EXPERTISE IN   5G   IOT   AI   SECURITY   MEDIA & CONTENT   MANUFACTURING   SMART CITIES   ENERGY   HEALTH   PUBLIC SAFETY
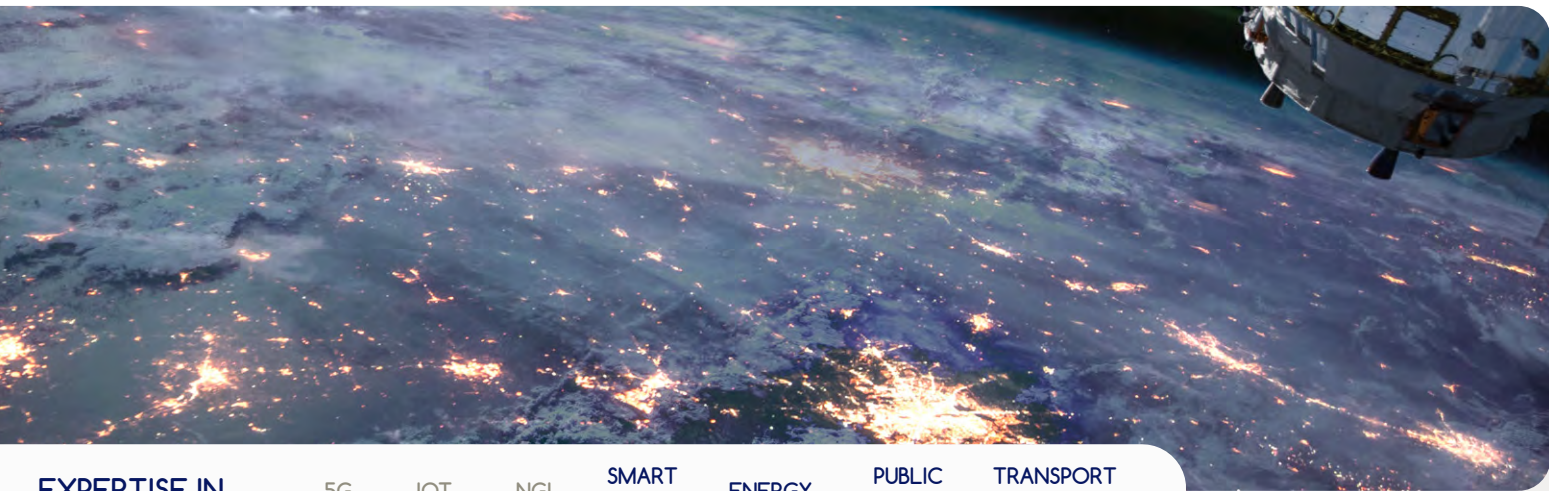
BACKGROUND, EXPERTISE & SKILLS

UBITECH is active in a series of 5G PPP projects, focusing mainly on the design and development of software development kits and intelligent orchestration mechanisms for network applications. UBITECH is the technical coordinator of the MATILDA H2020 5G PPP project targeting at the provision of a novel holistic framework for enabling vertical industries to take advantage of a 5G ecosystem. UBITECH has developed various application and network services orchestration mechanisms, taking into account the separation of concerns among vertical application and NFV orchestrators, as well as end to end slice management mechanisms. UBITECH has also invested on the design and development of a 5G analytics engine exploiting novel AI technologies, providing resource and elasticity efficiency profiling of 5G services.

ACHIEVEMENTS & SUCCESS STORIES

UBITECH has developed a set of intelligent orchestration mechanisms (e.g. rules-based policy management framework for NFVOs as well as vertical application orchestrators, big data analytics techniques for network services and applications profiling) and introduced them in existing orchestrators, such as the SONATA NFVO as well as the inhouse developed orchestrator, known as Maestro (https://themaestro.ubitech.eu/). UBITECH has also significantly contributed towards the design and implementation of OSS northbound APIs, targeting at interconnection of vertical application orchestrators with telecom operators' network management systems.

INTEREST FOR FUTURE R&D&I COOPERATION

UBITECH is highly interested in establishing R&D and Innovation cooperation in the framework of research and development projects regarding the evolution of intelligent orchestration and slice management mechanisms, as well as collaborations with telecom operators and vendors towards the design of OSS-oriented functions and APIs, as well as the development of targeted AI mechanisms for resource and elasticity efficiency profiling of network services and apllications.

ubiwhere
SUITING THE FUTURE

YEAR ESTABLISHED
2007

NUMBER OF EMPLOYEES
70

MORE INFORMATION
www.ubiwhere.com

CONTACT
rdi@ubiwhere.com

EXPERTISE IN 5G   IOT   NGI   SMART CITIES   ENERGY   PUBLIC SAFETY   TRANSPORT & LOGISTICS

BACKGROUND, EXPERTISE & SKILLS

Ubiwhere is a Portuguese high-tech SME, focused on research and development of innovative, user-centred software solutions to address the challenges of Smart Cities and Telecommunications.

We've participated in numerous national and European RDI projects, which have extended our expertise on IoT systems architecture, blockchain, cyber-security, AI, ETSI MEC Compliant and 5G services and orchestration, among other telecom-related topics and leveraged our contribution to leading standardization entities such as ETSI. Such experience aligned with a highly strategic vision and a fully motivated team has driven the creation and successful implementation of a wide portfolio of solutions priming on interoperability, network security and data protection to meet the needs of the Telecom ecosystem and support the evolution of next-generation networks and services.

ACHIEVEMENTS & SUCCESS STORIES

Since the beginning, Ubiwhere stood out for its know-how in scalable software architectures that prompt the creation of innovative solutions handling multimodal data collection, analysis and visualisation, driving our involvement in remarkable European alliances such as 5G-PPP. Our participation in the 5G-PPP programme and Network Management WG leveraged our knowledge in 5G technology and convergence networks and paved the way for the creation of novel solutions with great business potential. Smartlamppost product considerably benefited from 5G-PPP Phase 1, 2 and 3 projects (SELFNET, SONATA, 5GCITY, 5GZORRO), which uses urban furniture to provide 5G networks, EV-charging stations and edge computing capabilities, among other plug-and-play functionalities, allowing the combination of innovative services and supporting our vision of a rich ecosystem of partnerships between different verticals.

Moreover, we will contribute to Affordable5G, deploying Smartlamppost to validate a project's use case, holding the opportunity to confirm the impact of our product within an additional scenario and enhance its functionalities.

INTEREST FOR FUTURE R&D&I COOPERATION

Ubiwhere is always actively searching for both R&I partnerships and commercial joint ventures. The company's team includes different Telecommunications Engineers and highly-qualified Software Developers. Ubiwhere positions itself both as a 5G enabler and 5G vertical service provider (by providing services benefitting from the 5G KPIs and infrastructure).

Most recently, and aligned with Smartlamppost's web marketplace roadmap, the company has been focused on DLTs (Distributed Ledger Technologies) and Smart Contracts, designing innovative solutions which brings value to the new multi-stakeholder environment brought forth by 5G networks. Companies whose expertise is on virtualized RAN and other 3GPP-standard technologies are of great interest, as Ubiwhere intends to bridge these 5G networks with public or private blockchains, in the scope of its Smartlamppost product.

YEAR ESTABLISHED
2017

NUMBER OF EMPLOYEES
5

MORE INFORMATION
www.urbanhawk.space

CONTACT
robert.sugar@urbanhawk.space

EXPERTISE IN   5G   IOT   SATELLITE COMMUNICATIONS   MEDIA & CONTENT   TRANSPORT & LOGISTICS   SMART CITIES

BACKGROUND, EXPERTISE & SKILLS

We are a Bristol based startup into smart city relevant data driven solutions. We excel in commercialising early concepts. Currently, as partner in the 5G-Victori consortium, we are trialling our Future Mobility solutions with multiple rail operators across cities of Europe. Our technical skills are focused on real-time large data processing in HPC, AI, 3D mapping and visualisation. We develop our own data platform that we deploy throughout commercial use cases.

ACHIEVEMENTS & SUCCESS STORIES

From zero to post revenue in 18 months with clients in insurance, logistics, and marine. Finalised the Sea Traffic Management European project in 2019.

INTEREST FOR FUTURE R&D&I COOPERATION

We are interested to join Smart City and IoT related projects, that are trialled through telecom like in 5G, or in operation management like in rail, marine ports, or other transport operations. Wherever we can marry state of the art data technology of current and next generations with commercial applications.

Vertical M2M

EXPERTISE IN   5G   IOT   SMART CITIES   ENERGY   PUBLIC SAFETY   TRANSPORT & LOGISTICS   MANUFACTURING   HEALTH

BACKGROUND, EXPERTISE & SKILLS

Vertical M2M has a strong expertise in telecom software and PaaS architectures, and advanced skills in telecommunications, supporting many different telecom protocols through an agnostic approach.

With a 12+ year - experience in IoT, we also bring a complete framework and sets of tools for secured IoT applications over 5G networks, all based on a containerized Kubernetes architecture.

ACHIEVEMENTS & SUCCESS STORIES

As a telecom software vendor dedicated to IoT, we invest a wide part of our resources in R&D. and were involved in several R&D 5G projects, among which the NGPaaS project (H2020 5G-PPP – ngpaas.eu), led by NOKIA, rated "exceptional achievements" by the EC, or the SCORPION project, providing IoT infrastructure to support these projects through our solution, CommonSense IoT Platform®.

Over the past 12 years, we also deployed many IoT projects, with a particular focus on the following markets through mostly white-label solutions:
-   energy: smartwater and renewable energy monitoring solutions for Utilities
-   smartcities: smartmetering solutions, streetlighting services, building management,...
-   manufacturing/industry: predictive maintenance, process monitoring and smartfactory, putting together combinations of heterogeneous secured IoT systems.

INTEREST FOR FUTURE R&D&I COOPERATION

We are particularly interested in any collaborative research related to IoT over 5G networks (massive IoT, mission critical IoT, vertical IoT or Edge Cloud IoT) and bring contributions either at the IaaS or the PaaS levels.

We also have a strong interest in 5G applications for the energy, smartcity, public safety or industry/smartfactory areas and are eager to be part of PoCs or large-scale experiments applied to these markets.

VISIONA
Ingeniería de Proyectos

YEAR ESTABLISHED
2006

NUMBER OF EMPLOYEES
7

MORE INFORMATION
www.visiona-ip.es

CONTACT
info@visiona-ip.es

EXPERTISE IN 5G IOT NGI AI **MEDIA & CONTENT** **HEALTH** **ENERGY** **SMART CITIES** **PUBLIC SAFETY**

BACKGROUND, EXPERTISE & SKILLS

VISIONA is a cutting-edge Information Technology SME that has actively participated in several open calls from the research and innovation EU programmes, like the H2020 5G-PPP Phase-1 5G-Crosshaul and Phase-2 NRG5 projects. VISIONA team counts on with expertise in designing big systems and managing projects of big magnitude, in designing network elements and network services for NFV and SDN, planning and operation of networks based on these technologies. Strong background in virtualization of functions that lead to 5G-ready innovative and smart environments.

VISIONA is specialized in groundbreaking media and artificial intelligence technologies as machine vision and deep learning. This makes of VISIONA a suitable partner for any vertical demanding such expertise (from media to smart cities and energy related contexts, among others).

ACHIEVEMENTS & SUCCESS STORIES

Artificial intelligence for machine vision is the core of all the solutions developed by VISIONA which aim to address the needs of different verticals.

For instance, VISIONA's approach to the preventive maintenance of critical energy infrastructures is able to detect, from an autopilot drone, different changes in the target zones in order to predict possible dangerous conditions on the environment or in the structures.Image processing and deep learning techniques are exploited by VISIONA for: (1) people and vehicle detection system in critical locations, (2) change recognition system on UAV imagery and (3) abnormal hot points through thermal image.

VISIONA also counts on with a portfolio of innovative solutions for parking monitoring and management, advanced surveillance of public and crowded spaces, and QoE/QoS tools for video quality assessment among other.

INTEREST FOR FUTURE R&D&I COOPERATION

VISIONA is seeking EU partners interested in collaborating with our SME to identify synergies so that we could work together on the creation of innovative solutions and the design strategies for exploitation of cooperation results in order to achieve maximum impact of 5G-related technologies after experimentation. VISIONA is open to start any kind of project related to artificial intelligence in any vertical as the technology has a wide range of applications.

WEST Aquila
Wireless Embedded Systems Technologies
L'Aquila

YEAR ESTABLISHED
2004

NUMBER OF EMPLOYEES
10

MORE INFORMATION
www.westaquila.com

CONTACT
info@westaquila.com

EXPERTISE IN   5G   IOT   HEALTH   ENERGY   SMART CITIES

BACKGROUND, EXPERTISE & SKILLS

The company has already gained more than a decade-long experience by participating as a key technological partner in several national and European projects, with emphasis on integration of heterogeneous wireless interfaces and IoT.

Furthermore, the company is in one of the five Italian cities selected by the Italian Ministry of Economic Development for pre-commercial 5G trials. It is now surrounded by a 5G eco-system composed of network operators, chip makers, telecom manufacturers and vertical sector integrators that refer to healthcare, mobility, energy, safety and emergency management.

ACHIEVEMENTS & SUCCESS STORIES

WEST has a record of participations in several EU projects, including two ITN Marie Curie projects (Greenet and Aquasense) focused on the analysis, design, and optimisation of energy efficient wireless networks, and three IAPP Marie Curie projects, WSN4QoL (a healthcare-oriented project proposing Wireless Sensor Networks for Quality of Life), SmartNRG (dealing with new solutions for energy distribution and management for smart cities) and CASPER (dealing with improvement of the Quality of Experience perceived by End Users in mobile wireless networks).

WEST has also participated to a national project on Structural Health Monitoring, where a WSN is used to monitor historical buildings after the earthquake of 2009 in L'Aquila, and UbiCare and CASA+, two projects aimed at remote monitoring aged people and patients who have Down syndrome.

INTEREST FOR FUTURE R&D&I COOPERATION

WEST is a highly dynamic and innovative company, which aims at bridging the gap between the academic and industry sectors. In this perspective, the company envisions the possibility to exploit cutting-edge technologies in multiple application domains. As an R&D company, there is always a strong interest in fostering new cooperations devoted to study, analyse and prototype solutions in the field of networked embedded systems and cyber-physical systems.

WEST has a history of collaborations with EU partners from both academia and industry sectors but is inherently open to new opportunities for collaborations with interested partners from all around the world.

WINGS ICT SOLUTIONS

YEAR ESTABLISHED
2012

NUMBER OF EMPLOYEES
115

MORE INFORMATION
wings-ict-solutions.eu

CONTACT
info@wings-ict-solutions.eu

EXPERTISE IN 5G IOT NGI MEDIA & CONTENT TRANSPORT & LOGISTICS SMART CITIES HEALTH ENERGY PUBLIC SAFETY +

BACKGROUND, EXPERTISE & SKILLS

WINGS ICT Solutions develops solutions (hardware and software) for verticals. Vertical areas covered are: (1) environment, especially, air quality, but also the management of critical conditions (e.g., wildfires, floods, etc.); (2) networks and infrastructures, which covers utilities (water, gas, energy), transportation (people and logistics), construction (smart buildings, dams, etc.); (3) production and manufacturing, namely, factories, food security (aquaculture), food safety; (4) provision of digital solutions for service sectors, namely, health, defence, government, education/culture/entertainment. The solutions rely on: (1) IoT and embedded/edge intelligence; (2) advanced networks (NB-IoT, 5G), advanced backend functionality, leveraging on cloud (dockers) and big data (leveraging on Kafka, Spark, diverse data bases, etc.) infrastructures; (3) Artificial Intelligence (AI) powered functionality (e.g., leveraging on trustworthy machine learning, etc.) and decision support systems; (4) Visualization (frontends, mobile applications, Augmented/Virtual Reality). In the light of the above, WINGS has developed and constantly updates the products: (1) AIRWINGS (air quality); (2) ARTEMIS (utilities); (3) WINGSPARK (parking and in general transport infrastructures); (4) AQUAWINGS (aquaculture); (5) AGNES (food safety); (6) STARLIT (health). Moreover, WINGS works on tools for intent-based networking, diagnostics, orchestration, simulation. WINGS is proud to have already collaborated with distinguished top companies in Greece and internationally. Furthermore, collaborations are built in the EU and beyond, on B5G/6G and on verticals, ensuring always sustainability in all aspects.

ACHIEVEMENTS & SUCCESS STORIES

WINGS has the following highlights. In the area of the environment the AIRWINGS platform has been expanded to go, beyond the delivery of insights regarding aspects like pollution, to the delivery of recommendations towards connected cars (5G-Carmen); this is a step towards making AIRWINGS a vital tool, not only for monitoring, but also for enforcing decisions to the benefit of the economy and society. In the area of networks and infrastructures two achievements can be highlighted. First, in the area of utilities, the WINGS ARTEMIS platform has been expanded to manage (monitor, control, activate, shutdown), through 5G (5G EVE), highly heterogeneous and also sheer volumes of devices, related to metering, utility-networks (assets) management, installations security, water quality. Second, in the area of transportation, the PARKWINGS platform has been expanded to offer space-availability predictions in smaller time scales, and AR-powered assistance to the driver (5G Tours, one installation in Athens International Airport partner); likewise, 5G-Mobix enabled advanced solutions for secure and efficient logistics. In the area of food security/aquaculture, 5G enabled WINGS to enhance the AQUAWINGS platform by embedding high quality video and underwater drones (5G Heart, installation in partner farm, in West Attika). Moreover, regarding food safety, AGNES was enhanced through scanners capable of using 5G for transmitting large quantities of data with higher efficiency, in terms of delay (5G EVE). In the area of health (service sectors), the WINGS STARLIT platform was enhanced with numerous capabilities, in the area of patient monitoring, assisted living, accident handling, ambulance assistance (5G-EVE, 5G-Tours, 5G-Heart).

INTEREST FOR FUTURE R&D&I COOPERATION

WINGS aims at further developing its development and innovation activities through cooperation with industrial and academic partners in B5G/6G and in diverse vertical sectors, namely, related to the environment (air quality), utilities (energy, water, gas), transportation (logistics, mobility of people), construction (smart buildings), factories, aquaculture/agriculture/food-security, health and assisted living, security, education/culture/recreation. WINGS has strong interests in and/or already develops Digital Twin technologies, human machine interfaces, nanonetworks. WINGS also develops novel systems and components on intent-based networking, application/network performance diagnostics, intelligent orchestration (from cloud to edge to devices), system level simulation. WINGS has teams specialized in software, hardware, optimization techniques, machine learning, IoT, AI, AR/VR, cloud and big data platforms. There are also extensive skills for project and technical management, workpackage leadership, and systems design, development and validation.

Zeetta NETWORKS

📅 YEAR ESTABLISHED
2015

👥 NUMBER OF EMPLOYEES
25

ⓘ MORE INFORMATION
www.zeetta.com

✉ CONTACT
vassilis@zeetta.com

EXPERTISE IN   5G   IOT   NGI   **MEDIA & CONTENT**   **PUBLIC SAFETY**   **SMART CITIES**   **MANUFACTURING**

BACKGROUND, EXPERTISE & SKILLS

Zeetta Networks simplifies network operations and improves the efficiency of a 5G network with intelligence and automation. Zeetta offers a multi-domain orchestration technology based on 5G network splicing™ and slicing. Network slicing is the ability to define and provide prioritised, partitioned and protected subnetworks to ensure that business and time-critical systems can run over shared infrastructure without interference. Network splicing™ is a unique concept developed by Zeetta that allows network slices to be joined in sequence to extend reach for the provision of a seamless, continuous service. These technologies will play an important role in manufacturing applications, particularly where assets must be tracked across multiple sites, geographic locations and indoor and outdoor environments. The company has received a number of industry awards including GSMA's GLOMO Award, TMF's Excellence Award and 5G World Award. In 2019 Zeetta Networks was recognised as a "Gartner Cool Vendor".

ACHIEVEMENTS & SUCCESS STORIES

Zeetta Networks currently participates to three 5GPPP projects: MetroHaul, 5G-PICTURE and 5G-VICTORI.

Earlier in the year, Zeetta Networks announced as the lead partner for the €10m 5G-ENCODE project that will deliver a private 5G network at the National Composites Centre (NCC) in the Southwest of England. This is the UK Government's biggest investment in 5G for manufacturing to date and part of their Industrial 5G Testbeds and Trials Programme. The project consortium consists of 11 partners including Telefonica, Toshiba, Siemens and Solvay. ·The 5G-ENCODE project will explore new business models and value propositions for enterprise private 5G networks in an industrial environment and test new 5G technologies such as network splicing and slicing in a real operating setting.

INTEREST FOR FUTURE R&D&I COOPERATION

Zeetta will be interested in working together with other European and international partners organisations in a wide variety of collaborative project focusing on private 5G networks, industrial 5G networks and applications and network orchestration and automation where the company's patent-protected network splicing and slicing technology can be used to optimise the performance of the network.

66

SME SUCCESS STORIES

A((elleran

Accelleran participation in several national and European RIA and IA H2020 5G-focused projects enabled the different consortia involved to leverage on Accelleran's RAN/vRAN Software Solutions and Small Cell products to enable new 5G architectural paradigms (virtualisation, slicing, edge computing,…) and advances required in future networks. The participation of Accelleran in some of these projects also distilled into the launch of Accelleran ORAN-aligned Cloud Native Virtualised dRAX Open Interface RAN Intelligence enabling AI/ML xApps in an open, scalable and interoperable RAN platform. Beside the pilot deployments where operators are currently evaluating the use of Accelleran dRAX Open Interface RAN Intelligence to enable the new 5G paradigms, one of the most important reference deployment cases for dRAX, focused on the Smart Cities vertical, is the Distributed Cloud and Radio Platform for 5G Neutral Hosts envisaged by the H2020 5GCity project, with deployments in Barcelona, Bristol and Lucca. 5GCity has designed, developed, deployed and is demonstrating, in operational conditions, a distributed cloud and radio platform for municipalities and infrastructure owners acting as 5G neutral hosts.

The following are some of the projects where Accelleran has participated and is participating with its RAN/vRAN Software Solutions and Small Cell products:

- 5GUARDS: Flanders (Belgium) based imec.ICON collaborative project involving the major Flemish universities and industry partners (SMEs, big infrastructure provider and big mobile operator). The goal of the 5GUARDS project was to investigate, evaluate and demonstrate how various services with diverse requirements could be simultaneously supported by the future 5G network based on the concept of network slicing. 5GUARDS envisioned three building blocks will contribute to the realization of services with diverse requirements: core slicing, RAN slicing and dynamic software reconfiguration.

- 5GRuralFirst: 5G RuralFirst is a co-innovation project led by Cisco and a consortium of other partners from across business, government and academia. Its first goal is to create rural test-beds and trials for 5G wireless and mobile connectivity across three main sites in the Orkney Islands, Shropshire and Somerset.

- 5GCity: 5G-PPP Phase 2 project (call H2020-ICT-2016-2) in which Accelleran is participating with the goal of enabling a distributed cloud radio platform for neutral hosts. To do so, 5GCity's main aim is to build and deploy a common, multi-tenant, open platform that extends the (centralized) cloud model to the extreme edge of the network, with a demonstration in three different cities (Barcelona, Bristol and Lucca), and thus advance the state of the art to solve the main open research challenges in the 5G-based edge virtualization domain, including the neutral host perspective in dense deployment environments such as cities. Accelleran´s dRAX Open Interface RAN Intelligence with Neutral Host and Network slicing functionality is used in 5GCity virtualized platform together with with Accelleran Small Cells in different bands.

- 5G-Enhance: joint EU H.2020 (call H2020-EUJ-2018) and Japanese research project looking at testbed development for advanced 5G topics like eMBB in dense urban areas with high mobility. Establishing long-term research collaboration between EU/Japan research institutes, Accelleran's small cell technologies are being leveraged for infrastructure deployments.

- UNICORE: (call H2020-ICT-2018-2) with the ICT focus on lightweight Unikernel VMs. These software technologies will be vital for VNF IaaS deployments allowing quick deployment and high scalability in the future VNF IaaS networks. Accelleran participates with the migration of dRAX Open Interface RAN Intelligence from Kubernetes Docker containers or Openstack VMs frameworks towards lightweight Unikernel VMs.

- 5GClarity: (H2020-ICT-2018-2020 call): 5G multi WAT system with 4G, 5G-NR, WiFi and LiFi technology.

- 5GComplete: (H2020-ICT-2018-2020 call): 5G framework for secure computing nodes.

ACTA LTD
Advanced Communications Testing Applications

ACTA Ltd is an SME founded in October 2002 in Athens, Greece. Our expertise and experience is as a provider and integrator of long-term performance analysis monitoring solutions as well as ad-hoc network measurements. ACTA is a member in two Horizon2020 European Union funded projects, 5G TOURS and 5G HEART.

- ACTA's experience and expertise, from its KPI validation platform (KVaP) application and use of hardware probes in Telecom networks, will be utilized during the 5G-TOURS and 5G-HEART, Horizon2020 projects. Currently we have supported the efforts to convert the user/Vertical defined business KPIs into network KPI's, and specify the relevant, measurable, network KPI values. When

the 5G-TOURS and 5G-HEART pilot 5G networks are installed, by Ericsson and Nokia respectively, ACTA will utilize probes and the KVaP application to measure the performance of the network. The network KPI values will be compared to the required per Vertical Use Case, to verify that the pilot 5G networks are providing, what is promised. One telecom network should be able to provide a solution for all the Vertical requirements. Any major differences will be identified and discussed with the technology partners in the Projects, to either point out that the required values are not achievable, or make adjustments to the 5G pilot network installations in order to achieve the desired KPI values.

ACTA Ltd is interested in cooperating with other parties that focus on optical, mobile, radio and access networks. Special focus is on the technology areas of 5G – IoT, machine learning software, edge computing, monitoring sensors, blockchain and in electromagnetic fields monitoring.

Arteevo delivers industrial, telecom and business process automation solutions based on Distributed Ledger Technology and Artificial Intelligence. Specializing in business-oriented DLT networks, Arteevo uses its deep expertise in the field to architect highly secure decentralized automation solutions for telecom networks, manufacturing, healthcare, energy, IT service management and more.

Arteevo has initiated several projects by putting forward innovative solution concepts. For example:

H2020 PharmaLedger project – Blockchain platform for healthcare and pharmaceutical industry, in partnership with 12 largest global pharmaceutical companies. We initiated the technological concept and the public part of this public-private partnership consortium, created the blockchain platform architecture that was adopted by the project, and are playing a key role in the implementation of the architecture and the multi-party governance model for this decentralized business network.

H2020 WeldGalaxy project – Decentralized data platform for the European welding industry. Arteevo is playing a key role in the design and implementation of the DLT-based architecture of the platform, and has developed several key innovations – including automated confidential tender offer process over DLT, DLT-based standards certification process management, and more.

H2020 OPERANDO project – we initiated this project by creating a concept of automated Privacy Authorities that enforce online privacy of consumers through technological means. The project created two strains of solutions – for consumer using private web services (B2C), and for Government to Citizen (G2C) services. The solution allowed citizens to control their identities and anonymity in using the web-based services, while enabling the service providers to comply with difficult to implement GDPR requirements.

FP7 ASPIS project – we initiated this project by proposing a highly innovative solar energy solution based on diurnal collection of sunlight by dynamic, computerized lens arrays. The project involved specialists in solar panel manufacturing, lens manufacturers, and several partners specializing in embedded ICT. It resulted in the development of highly efficient distributed solar energy solution.

Cooperation on SDN network security using embedded DLT, artificial intelligence and remote integrity attestation. Arteevo has partnered with leading European telecom operators, research institutes and technology SMEs to create and advanced technological and business concept of Beyond 5G network infrastructure security.

Azcom Technology is a leader company in advanced wireless communication, with two decades of experience in the wireless Telecom market. We developed a complete suite of software IPRs and hardware platforms to build and deploy commercial and special purpose solutions for cellular communications, automotive, aerospace, home automation and mobile applications. Our business includes both products and services. The most recent product of our wireless portfolio is a LTE/NB-IoT small cell, customizable for different solution, such as providing private LTE/NB-IoT deployments, and available also in NIB configuration along with our Core Network EPC. Azcom Technology offers also services, from turnkey solutions to the optimization of third party software for a wide range of clients and in different areas from industrial 4.0 to automotive to home automation. This year Azcom is engaged in development for its first Open RAN compliant product.

Azcom involvements in H2020 framework started in 2015, when Azcom joined the 5GPPP Phase 1 5G Novel Radio Multiservice adaptive network Architecture (NORMA) project (http://www.it.uc3m.es/wnl/5gnorma/). 5G NORMA aimed to develop a novel mobile network architecture that provides the necessary adaptability in a resource efficient way able to handle fluctuations in traffic demand resulting from heterogeneous and dynamically changing service portfolios and to changing local contexts. In the contest of 5G NORMA

Azcom have developed the Native Multi-Service Architecture Proof of Concept (PoC), showing the support of service flexibility using the decomposition of mobile network functions and their allocation to the edge cloud or central cloud, based on the service requirements. In this demo Azcom small cell functionality has been extended to support the control commands received from an external orchestrator. This work opened Azcom small cell product to the new frontier introduced in the 3GPP Release 15 standard including the implementation of Distributed Unit (DU) and Radio Unit (RU), also enabling software defined mobile network control.

Azcom focus is not limited only to the 5G mobile infrastructure, and in the 5GPPP Phase 2 Azcom joined the 5G Convergent Virtualised Radio Access Network Living at the Edge (CORAL) project (http://5g-coral.eu/). 5G CORAL aims to deliver a convergent 5G multi-RAT access through an integrated virtualized edge and fog solution that is flexible and scalable, where Edge Data Centre (DC) are smaller data centres than clouds, located typically closer to the connectivity nodes and Fog Computing Devices (CD) provide computing, storage and/or networking capabilities on terminals or a near-terminal infrastructure nodes and access point. Consequently, new delay sensitive services can be provided. Azcom contributed to the Connected Car PoC, where 5G CORAL technologies, functions application and services, can be run on the vehicles, in the On Board Unit (OBU) and

on the Road Side Unit (RSU). Compared to a legacy architecture where all the application and services are placed beyond the core network, this configuration leads to a quicker and distributed manner information exchange, resulting in an optimization of the network response, improving driver safety.

Azcom designed and developed the OBU and integrated the RSU with all the required 5G CORAL vehicular applications, services and network functions, exploiting also an innovative multi-RAT approach. The importance of the OBU has been grown since it is also used as the basic block of the implementation carried on by Azcom in the European C-ROADS project (https://www.c-roads.eu/platform.html) which aims to implement and test, in real traffic conditions, cooperative systems based on V2X technologies and involve technology partners.

Azcom next steps are focusing in the direction of an implementation of ORAN interface, and renewed interest in H2020 and Horizon Europe projects to adjust the Azcom future vision and direction.

CyberEthicsLab.

Responsible Research and Innovation

Respect, autonomy, dignity, privacy, and freedom: there is no reason for these concepts to be separated from technical innovation and technological progress. Indeed, they are what CyberEthics Lab. (CEL) strives to implement into business as well as research and development projects as an innovation consultancy service company. CEL has provided many other R&D projects and customers with assessments of the technologies' social acceptability from a value perspective.

In the context of 5G-SOLUTIONS project, in which company employees act as DPO and Chair of the Ethics Panel, CEL's approach has helped to create awareness among consortium partners of other ethical and legal risks that would have otherwise been ignored.

CEL's role in the process of creating socially responsible innovation ecosystems has been and is central. In PERSIST (Grant Agreement 875406), CEL has provided clinicians with a far-too-often overlooked perspective on gender and ethics that has allowed them to provide customised care for their colorectal and breast cancer patients pre- and post-

treatment. In ASSISTANCE (Grant Agreement 875406), CEL has created a framework based on ethics and legal compliance and respect for gender diversity that will help project partners adopt more acceptable technology. Some results that prove our approach is right are as follows:

- CEL is currently working on 10 Horizon 2020 projects that directly involve more than 100 partners across Europe.

- First quarter financing amounts in 2020 were 400% of what they were in 2018.

- Employee count has grown by five times over the same period to satisfy new contracts for service provisioning.

EANTC
EUROPEAN ADVANCED NETWORKING TEST CENTER

EANTC, as a German SME, is one of the world's leading independent test centers for telecommunication technologies providing vendor-neutral consultancy and realistic, reproducible high-quality testing services.

EANTC took part in the European O-RAN and TIP Plugfest 2020, supporting the development of interoperable 5G and LTE OpenRAN solutions. EANTC planned, executed, and documented multi-vendor interoperability tests of O-RAN solutions. The tests focused on Open Fronthaul functionality and compliance, end-to-end (E2E) performance, and O1 management interoperability. EANTC has automated E2E O-RAN tests at the Berlin lab.

In Q4 2020, we conducted our first remote multi-vendor interoperability event focused purely on NETCONF and transport network-specific YANG models investigating only the management plane between controllers and network devices. We successfully completed more than 39 test combinations in four categories: Device functions and configurations, service provisioning, monitoring and data export, Precision Time Protocol features.

EANTC participates in several European H2020 calls and projects focused on 5G networks and applications. As work package leader, EANTC provides benchmarking methodology, state-of-the-art testing expertise, and certification guidelines.

eBOS

MORE INFORMATION
www.5gsolutionsproject.eu
www.monb5g.eu

CONTACT
info@ebos.com.cy

eBOS Technologies Ltd is an innovative software powerhouse SME providing technological advanced e-business software solutions to enterprise customers around the world. Headquartered in Cyprus, eBOS has a long history of engaging with international research and technology organisations, industrial leaders, universities, research organisations and SMEs to drive collaborative technological innovation and bring best-of-breed technologies to its enterprise customers and the wider community.

With an increasingly comprehensive portfolio of software solutions, investments in Research and Development are crucial to eBOS. The development of eBOS product portfolio as a specialist software powerhouse has equipped us with core competencies which we deploy in R&D projects. The knowledge and innovation gained from our participation to such projects are then fused into our solutions and services. Our activities not only seek to improve existing systems to keep them competitive, but also explore radically new solutions and technological breakthroughs. Our aim is to identify new and emerging technologies and leverage them to deliver cutting-edge, robust and cost-effective engineering solutions.

Our core areas of expertise include intelligent front-end dashboards and APIs development, advanced big-data analytics, Artificial Intelligence/Machine Learning, cybersecurity, quality assurance and data management, risk assessment and compliance, covering a wide range of application domains, including 5G, NFV/SDN, digital security, security of industrial IoT and others. Our expertise has been extended in the context of 5G-SOLUTIONS (https://www.5gsolutionsproject.eu/) and MonB5G (https://www.monb5g.eu/) 5G-PPP projects, including a recently funded ICT-53 project on 5G for connected and automated mobility (5G-ROUTES). We apply our expertise to different vertical domains, including Factories of the Future, Smart Energy, Smart Cities and Ports, Media & Entertainment, Transport & Logistics, Autonomous Mobility, etc.

eBOS is the Quality Assurance & Risk Manager in 5G-SOLUTIONS with the responsibility of organising and supervising quality review/peer reviews for all deliverables including the implementation of the quality management plan. eBOS is also engaged in the design and development of the technological enablers, and in particular of the front-end dashboard of the innovative smart KPI visualisation system for facilitating the near real-time analysis, presentation, benchmarking and performance validation of reference 5G network KPIs against predefined target values. eBOS also leads the design and the development of intent-based APIs for stimulating innovation and fostering the development, portability and provisioning of new innovative applications by SMEs.

eBOS has the role of the Dissemination and Communications Manager in MonB5G and is also currently working on the design of the MonB5G security framework, the development of AI-driven security algorithms to provide novel mechanisms for mitigation of network slicing threats, the integration and testing of all components and the proof-of-concept experimentation.

In 5G-ROUTES, eBOS will undertake the role of the Innovation Manager leading the relevant innovation, data management and IPR activities, and will leverage its expertise in front-end dashboards to design and develop the tenant web portal for facilitating access to the platform including the presentation of the results from the field trials.

eBOS is also actively participating in a number of 5G-PP Working Groups, including Test, Measurement and KPIs validation WG, the Trials WG, Software Networks WG, Vision & Societal Challenges WG and NetWorld2020 SME WG.

MORE INFORMATION
www.incelligent.net

CONTACT
kt@incelligent.net
info@incelligent.net

Incelligent is a company based in Athens, Greece, founded in 2014 by highly experienced telecom business professionals and R&D engineers. Currently, its workforce consists of highly competent software engineers/ developers, machine learning engineers and big data scientists.

By following best practices in data-driven development (DataOps), Incelligent has managed to systematically incorporate the latest advances in Big Data, Analytics and Artificial Intelligence (AI)/ Machine Learning (ML) technologies in its product research and development processes, resulting into a diverse product portfolio that includes out-of-the box and production-ready, AI/ ML solutions, tailor-made for the Telecommunications, Banking and Public sectors.

With respect to the telecommunications sector, Incelligent has launched RAN.ai, a suite of solutions built on top of advanced big-data analytics and ML/ AI for improving telecom RAN operations, currently deployed in Greece for a major operator. RAN.ai aims to support the strategic decision processes with respect to RAN evolution by capitalizing on its predictive and "What-If" scenario building capabilities. More specifically, it delivers accurate predictions for traffic demands and subsequent critical insights regarding future spectrum requirements, network rollout and capacity needs. It further allows for the setup of scenarios to evaluate the impact of strategic decisions

and thus enabling optimized network planning, targeted investments and smart expenditures and eventually in enhanced customer experience (CX) and maximized ROI. With regards to credit risk operations in the Telco sector, Incelligent has deployed a credit risk minimization and risk-based marketing solution for a major operator in the Middle East catering to the minimization of losses, the increase of sales opportunities and therefore revenues, as well as boosting customer engagement.

The aforementioned capabilities are similarly exploited in Incelligent's solution involving credit risk management and analytics-based marketing for the Banking sector.

Additionally, Incelligent is currently involved in three 5G-PPP projects, namely MATILDA, 5G-PHOS and LOCUS, offering its personnel the opportunity to enhance their competencies with respect to the 5G ecosystem. Through its current involvement in phase-3 5G-PPP project LOCUS (http://www.locus-project.eu/), Incelligent aims to enhance its engagements in the Telecommunications sector and expand its portfolio of solutions, adding new enhanced software modules/ functionalities. By combining fine-grained localization information and Incelligent's advanced traffic and mobility prediction mechanisms, the new functionalities and insights yielded will be exploitable by current products and could potentially be used in fine-tuning network resource allocation, as well as for

enabling other vertical/ 3rd party services.

The role of the phase-2 5G-PPP projects, MATILDA (http://www.matilda-5g.eu/) and 5G-PHOS (http://www.5g-phos.eu/) should also be acknowledged, as through these projects Incelligent was able to mature its technology and diversify, as well as enhance its product portfolio. In particular, the following has been achieved: (a) Enrichment of the set of use cases addressed and of the supported functionalities/ solutions in its portfolio, leveraging on the capabilities brought by 5G and its ecosystem; (b) Positioning of the advanced functionalities in forward-looking (pre-)standardization groups, especially in ETSI and others; (c) Performing validation activities and showcases, relevant to verticals entities (e.g., stadiums, malls, etc.) and in collaboration with large vendors and operators; (d) Improvement of the company's position in the research field and global market through the participation in various events, i.e. conferences, exhibitions and so on, as well as publications.

On the whole, Incelligent is proud to have delivered contributions, which assist in the overall shaping of the 5G world and lead to a prominent European role in the field.

The Company InnoRoute (Munich, Germany) has achieved business success with a new routing concept and their router platform TrustNode. A feasibility study conducted within a SMEINST Phase 1 project allowed us to verify the concept and to become partner in two 5G PPP projects:

1. CHARISMA: optimization of TrustNode platform for ultralow latency.

2. SELFNET: optimization of TrustNode platform for modularity and extension to SDN (Software Defined Networking).

Thanks to ultralow latency and SDN support, we were able to enter the Industry 4.0 business. Today, major players from Automotive and Industrial segment use the TrustNode as evaluation and prototyping platform for TSN (Time Sensitive Networking, IEEE Ethernet). We got contracts to develop further TSN functionality for the TrustNode. Modularity of our platform allowed us to do this fast and at low cost.

At the research side, the combination of TSN and SDN became a technology trend. Being the only supplier for both in one device made the company a welcomed partner in German research projects for Industry 4.0. We were partner in TreuFunk and are associated partner in FlexSi-Pro and TACNET4.0.

Next step planned by InnoRoute is to offer a low latency networking service.

InnoRoute's TrustNode

IQUADRAT R&D has a focused business plan specifically intended on delivering a "new generation of research tools for system level evaluation of wireless integrated communication systems". The company's R&D department is involved in many National and EU-funded research projects, and has extensive know-how in Network Function Virtualization (NFV) technologies, Zero-touch automation at the network layer using state-of-the-art machine learning algorithms for network status prediction, IoT Networking, simulation methodologies for Radio Access Networks, Software Defined Networking (SDN) and Demand Response algorithms for the Smart Grid.

Under the framework of the 5G-PPP project 5G-PHOS, IQUADRAT has developed a software that enables SDN-based dynamic network resource management for 5G fronthaul configurations that optimizes the fronthaul's grade of service and power consumption by adjusting the functional splitting according to the fronthaul load levels. The developed software has been tested by considering the 5G-PHOS converged optical-wireless network architecture, which proved that our product can provide useful insights for the development of resource management techniques adapted to fronthaul architectures with virtualization and dynamic functional splitting capabilities.

IS-Wireless (SME, Poland) has successfully contributed to the 5G Essence project where the company is working on a centralized radio resource management for the cloud-RAN solutions in the two-tier cloud networks (especially multi-RAT scheduling for 4G and 5G networks). Moreover IS-Wireless is currently together with the Thales (France), ORION (Greece) and other partners working on planning the public safety showcase for demonstrating the benefits of 5G mission critical applications in coexistence with centralized RAN. The final demonstration of the 5G Essence as regards "mission critical" will be presented during the B-APCO conference (in UK) on 13-14 November 2019, shortly before the project finalizes. IS-Wireless is working on the delivery of a complete software defined (SD) RAN solution to be showcased next year.

nemergent solutions

Q1 2019 marks the end of the first integration cycle for the H2020 ICT-17 5GENESIS project and its five platforms in Athens, Malaga, Limassol, Surrey and Berlin, together with its Portable 5G Demonstrator. The 5GENESIS SMEs already had and will continue to have a significant impact on the project advances and achievements through the continuous provision of essential components and valuable expertise. With their work Nemergent, Fon, Athonet, RunEL, INFOLYSIS, Avanti, FOGUS and OneAccess bring to 5GENESIS standardized mission critical services, integration of WiFi and cellular access, a 4G/5G Core, a gNodeB, an interoperable IoT vGW and also support the virtualization process of core elements of the 5GENESIS infrastructure among other core pieces and the KPI monitoring and analysis procedures.

5Genesis

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ENGINEERING FORWARD

(i) MORE INFORMATION
www.nextworks.it

✉ CONTACT
n.ciulli@nextworks.it

In the context of its activities across several 5G PPP projects, Nextworks has developed a strong asset of software prototypes for an advanced NFV MANO framework targeting 5G infrastructures and integrating innovative features for 5G telcos, service providers and vertical industries. The core of Nextworks service management and orchestration framework is built around the 5G Apps & Service Catalogue, TIMEO (Transport Infrastructure and MEC Enabled Orchestrator), SEBASTIAN (SErvice BAsed Slice Translation, Integration and AutomatioN), the Plug & Play control of virtualized functions for 5G, and the 5GCity Software Development Kit. On top of these service management and orchestration framework, Nextworks has developed, in the context of the 5G-MEDIA project, a 5G media use case for UHD media content distribution over virtualized Content Delivery Networks (CDNs), which integrates and enhances open source CDN solutions with Nextworks' SmartHome Symphony product.

○ The 5G Apps & Service Catalogue, started as part of the SELFNET project (5G PPP Phase 1) and further advanced in 5G-MEDIA (5G PPP Phase 2), is a generalized catalogue of descriptors that allows service customers to bring their own VNFs and services into the 5G management and orchestration layer, with unified ETSI NFV standard format where applicable (aligned to the latest best of bread ETSI SOL specifications) and MANO specific translation towards ETSI OSM and other NFV-MANO stacks. It started as part as research activity and prototype in the SELFNET project and further advanced to a consolidated catalogue solution in 5G-MEDIA project. Further extensions are planned in 5G EVE project (5G PPP Phase 3) to support onboarding and exchange of slice, service and function descriptors from multiple domains.

○ TIMEO is an enhanced NFV Orchestrator originally developed in the context of 5G-Crosshaul project (5G PPP Phase 1) and further extended in blueSPACE project (5G PPP Phase 2). It is an ETSI NFV compliant NFVO which implements the ETSI IFA interfaces and information models for service and VNF/MEC apps package lifecycle management. It extends the NFV MANO models with mechanisms to support advanced resource allocation strategies for transport network (SDN based) and network+IT, can interface to packet and optical network controllers via Transport API, can manage power states for network and computing devices and is able to handle management and monitoring of both VNFs and PNFs.

○ SEBASTIAN is a tool for service-driven slice management and orchestration, implemented as part of Nextworks activities in 5G-TRANSFORMER (5G PPP Phase 2) and extended in SliceNet (5G PPP Phase 2) and 5G EVE (5G PPP Phase 3). It allows modelling and instantiation of vertical-driven services in 5G network slices, with multi-slice arbitration mechanisms. Key features of SEBASTIAN are the automated translation from business/service to network slice requirements; the slice arbitration for efficient service sharing, re-usability and composition; multi-tenancy with service isolation and SLAs management.

○ The Plug & Play control framework, developed in the SliceNet project (5G PPP Phase 2), allows to deploy customized slice control instances for verticals in the form of isolated control environments where customized control logic can be plugged to build a truly tailored slice control at runtime. These functions have been designed from the beginning around the principles of modularity, flexibility and open interfaces, in order to simplify and fasten the introduction of novel features, algorithms and even platform components. In this sense, Nextworks assets are designed and prototyped to provide an extensible and integrated framework to foster and stimulate the research in the network slicing and NFV area, providing an agile platform to quickly and efficiently develop, integrate and experimentally validate innovative features in an ETSI NFV compliant environment.

○ The 5GCity Software Development Kit is a toolkit that allows wiring, in an arbitrary sequence, a pre-defined set of abstract functions defining the logical service chain of the Vertical service, generating the corresponding network service and virtual network function templates with all the complexity required by the NFV-MANO layer. The 5GCity SDK abstracts infrastructure's low-level details and automatically translates functional components and business requirements into descriptors of virtual computing and networking resources for the operational service. In the 5GCity project, the SDK module is planned to be used in the three city-wide pilots of Barcelona (ES), Bristol (UK) and Lucca (IT) to design the various network service and experimentation scenarios of the Neutral Host, Media industry use cases (immersive media and collaborative media), and waste management through video analytics.

The open and modular nature of the 5G Apps & Service Catalogue, TIMEO, SEBASTIAN, Plug & Play control and 5GCity SDK is key facilitator of an intense collaboration of Nextworks team with other researchers in 5G PPP, who can easily contribute to the evolution of the frameworks in their specific area of expertise. For example, the collaboration with academic partners allows to introduce new resource allocation algorithms, while the possibility to easily integrate new drivers for NFVI domains opens opportunities to interact with multi-technology infrastructure providers. These collaborations create multi-faceted value chains that continuously encourage to investigate new research directions.

This set of assets allows Nextworks researchers to early introduce innovative functionalities for the management of 5G infrastructures and the orchestration of 5G services, often anticipating the major themes and trends of the research. Starting from 5G PPP Phase 1, Nextworks has already developed solutions for the joint orchestration of cloud and network resources, as part of a wider strategy for energy efficient service deployments, with a demonstration at the 5G Global Event 2nd in November 2016. In this particular case, TIMEO orchestrated the automated configuration of the fronthaul/backhaul network in the service lifecycle management (as further demonstrated at EuCNC conference in June 2017); the capability was further extended in the blueSPACE project to cover also optical-based transport networks (public demonstration at ECOC 2018 conference), a topic which is still attracting strong interest of network vendors and potential customer. Similarly, Nextworks started very early to design solutions for sharing and composition of network services in NFV frameworks, which constitutes the baseline enabler for the efficient management of network slices in shared and multi-tenancy environments. Relying on these concepts, SEBASTIAN already integrates basic mechanisms for service-driven management, composition and sharing of network slices (as demonstrated in EuCNC 2018, ECOC 2018, ICT 2018 and OFC 2019 conferences), with the objective of efficiently arbitrating the execution of multi-tenant and concurrent vertical services requesting network slices. This topic is expected to draw much attention during 5G PPP phase 3, when several 5G services will run in live trials. Here, Nextworks has already demonstrated a realistic 5G media use case that enables Media Service Providers to build flexible and adaptable media distribution service chains, made up of virtualized functions, and deliver UHD media contents while users are moving in a geographically distributed 5G networks, as successfully demonstrated at the Mobile World Congress 2019.

Deeply involved in the development of the main research areas in network slicing and orchestration for 5G, Nextworks is in a strong position to successfully propose highly innovative solutions to its customers, above all in the consultancy market. In this area, the development and demonstration activities performed over the 5G Apps & Service Catalogue, TIMEO, SEBASTIAN and the Plug & Play control platforms, already integrated with a 5G media vertical use case for UHD media content distribution over vCDNs, are key references and success stories to present the company expertise to potential customers, thus increasing competitiveness and differentiation from competitors. If that's true that today many companies are offering integration services around several of the orchestration platforms developed in mainstream open source projects, it is a fact that not so many are able to go beyond what is available there in terms of features and functionalities. Moreover, most of the potential customers in this area are developing their own proprietary MANO solutions, requesting specialized skills to enhance them and introduce innovative concepts. Nextworks' PoCs in public exhibitions are excellent opportunities to present new ideas developed by the company, demonstrating their technical feasibility and potential benefits.

Telcaria is an SME providing advanced services to network operators and equipment manufacturers worldwide. We partner with network operators to redesign their products towards NFV/SDN based network infrastructure and cloud-computing applications. We collaborate with the IMDEA Networks and top Universities in the area: UC3M, UPM, and UAH. This critical mass of networking expertise located in very close proximity creates many synergies, having the members of these institutions a history of fruitful collaboration between them. The company is currently working in three H2020 EU (5GEVE, 5GROWTH, and 5G-DIVE), collaborates as an expert in the Master of SDN&NFV technologies offered by UC3M and is currently actively developing and commercially distributing Alviu, its SD-WAN solution.

Telcaria has participated in EU/FP7 NetIDE and two other 5G network-related projects: EU/H2020 SUPERFLUIDITY and 5G-CORAL (shortlisted in the Glotel Award for 'Best 5G innovation' and CSI Award for 'Best 5G project and innovation' in collaboration with Taiwanese partners), and is an active partner in 5G-EVE, 5GROWTH and 5G-DIVE. As an advanced network service virtualization SME, Telcaria has benefited from the technology advances generated from the previously mentioned projects acquiring the know-how for applying technologic achievements for rapid prototyping, design, validation, and direct deployment of Edge and Fog distributed computing platforms, advanced

multi-domain monitoring platforms, innovations in orchestration mechanisms to assist offloading and roaming scenarios among others. Additionally, Telcaria has disseminated its results in major events and public demonstrations such as EuCNC.

Recently Telcaria successfully concluded EU/H2020 5G-CORAL, leading the SD-WAN PoC which demonstrates how the SD-WAN enables the federation of resources across different administrative domains while maintaining the service uninterrupted and guaranteeing a certain level of QoE at the Edge/Fog, enabling seamless migration between radio access technologies across domains by leveraging in roaming and offloading capabilities. This PoC has had a positive impact by improving latency, bandwidth and jitter by moving applications closer to the end-users, allowing service providers to serve more users in the same area due to the increased capacity and reduced latency of the Edge and Fog, contributing to reduce the bottlenecks caused when application traffic moves from user's terminal to the cloud.

In the wake of 5G PPP projects, Telcaria has motivated current employees to develop their professional careers to pursue a Ph.D. and has been able to hire new employees.

ubiwhere
SUITING THE FUTURE

ⓘ MORE INFORMATION
www.ubiwhere.com

✉ CONTACT
rdi@ubiwhere.com

Founded in 2007, in Aveiro, Portugal, Ubiwhere is a high-tech SME that builds innovative, user centred software solutions with two core areas of application: Smart Cities and Telecommunications.

Our background on 5G deployments and our expertise on the development of 5G network service orchestration platforms, MEC orchestration services and 5g services based on NFV and SDN technologies, have allowed us to take part and lead diverse RDI projects addressing the 5th generation network. More recently, and leveraged by the need of both our Telecommunication and Smart City deployments and RDI projects, Ubiwhere has been focusing on Artificial Intelligence, Cyber Security and Blockchain. Such know- how drove our involvement in remarkable joint initiatives carried out by the EU, tackling challenges of the Europe of the future, namely 5G-PPP, 5G-IA, BDVA, AIOTI, ERTICO and EIP-SCC IMET and boosted our contribution to prominent standardization entities such as ETSI.

Ubiwhere has been participating in the 5G-PPP program through Phase 1, Phase 2 and Phase 3. This participation has fostered Ubiwhere's position as an active part of the 5G ecosystem while opening doors to the creation of innovative solutions with great business potential. Listed below, are the products which were created or affected by Ubiwhere's participation in the 5G-PPP program.

◎ Smartlamppost (https://smartlamppost.com/) is a clean solution that leverages on urban furniture to elegantly provide 5G network deployment, EV-charging stations and edge computing capabilities, among other plug-and-play functionalities, targeting municipalities but also other vertical businesses (such as MNOs). Its modularity, offers a flexible and cost-effective way of tackling current e-mobility and 5G communication barriers.

◎ The Urban Platform (https://urbanplatform.ubiwhere.com/) was created from Ubiwhere's vision of a holistic perspective of the smart urban environment for cities actively looking to contribute back to those who manage it and their inhabitants, providing a global and integrated view. Supporting centralised collection and processing of data from heterogeneous sources and city systems, while providing the seamless integration and standardisation of different kinds of communication protocols and standards, the Urban Platform helps the city with correlation of information for knowledge extraction, forecasting, reporting and impact assessment, as well as to meet the Sustainable Development Goals (SDGs) by taking into account the Sustainable Cities and Communities Indicators from ISO 37120 and 37122, among other indicators.

◎ Unicle (https://unicle.io) has been created out of Ubiwhere's approach to V2X and its convergence with 5G technologies. Knowing the ever-growing relevance of 5G in this domain, Ubiwhere has been capitalising its knowledge on ETSI MEC and the C-ITS stack to create an Edge Computing framework focused on the deployment and management of V2X-oriented leveraging Edge Computing and 5G radio technology (such as C-V2X). The goal is to position such product as a complementary feature of Smartlamppost: besides being able to equip such urban furniture with dedicated V2X radio components and Edge Computing elements, Unicle provides now Service Providers from the Mobility space, Mobile Network Operators and the Automotive Industry with a platform which effectively allows them to deploy VNFs and or Linux Containers which will run co-located with the radio elements, providing access to the user plane via the local breakout and, thus, providing much reduced latency which are key for CCAM (Cooperative and Connected Automated Mobility) services and applications.

◎ NFVal tool is a software tool able to allow Network Service programmer to validate both VNF and NS packages (supporting different Orchestrators) and in case an incompatibility is detected, allow its fast identification by identifying its root cause. The tool performs three kinds of validation:

◎ Syntax validation: The service descriptor and corresponding function descriptors are syntactically validated against the scheme templates specified by data model of the targeted Orchestrator

◎ Integrity validation: The validation of integrity verifies the overall structure of descriptors through the inspection of references and identifiers both within and outside the individual descriptors

◎ Topology validation: This tool provides a set of mechanisms to validate and aid the development of the network connectivity logic identifying potential loops/cycles, unliked nodes and potential network bottlenecks

Below a list of the 5G-PPP projects as well as its main contribution for the previously mentioned products:

◎ SELFNET (https://selfnet-5g.eu/): SELFNET project enabled Ubiwhere to define and understand the lifecycle of a Service Orchestration framework with Self-Healing, Self-Optimization and Self-Protection capabilities. Smartlamppost product vision was born at the end of SELFNET project leveraging on its architecture as well as on its monitoring and self action capabilities for the edge computing and orchestration framework.

◎ SONATA (https://www.sonata-nfv.eu/): In the context of SONATA, Ubiwhere's contribution was mainly focused on the SDK for Service development component. NFVal tool first version was created in the context of SONATA (supporting only SONATA MANO) and later evolved by Ubiwhere's R&I department to support other NFV MANO orchestrators (latest version of NFVal presented to ETSI for integration in OSM). Additionally, Smartlamppost's platform targeting Service Providers (a relevant stakeholder in the broader 5G multi-stakeholder ecosystem) shares SONATA's vision of an SDK for the development and deployment of Network Services in a MANO Orchestration framework.

◎ 5GCity (https://www.5gcity.eu/): This phase 2 project shares the vision of Smartlamppost product in the fact that both projects envision the usage of urban furniture across a city to provide network and computational resources to third parties. Smartlamppost edge orchestration framework was considerably boosted by Ubiwhere's participation in the project and critical to Smartlamppost's path to market. Additionally, this project allowed Ubiwhere to establish important partnerships and co-creation activities with other partners of the project - namely, Accelleran, a Small Cell vendor, with whom Ubiwhere has already performed commercial activities in the scope of Smartlamppost through 4G media trials in Portugal, following also the Neutral Hosting approach. Having in mind the Edge Computing capabilities of our Smartlamppost and alignment with the project's goal of having different Service Providers from different verticals deploying numerous applications leveraging 5G, Ubiwhere has contributed with a V2X use case which led to a new product called Unicle (https://unicle.io) (currently in BETA). Having contributed also with the front-facing multi-tenant web platform of the project, the technologies applied in the scope of this platform greatly influenced the development of our Urban Platform, which has already been also deployed in the city of Barcelona (one of 5GCity's targeted cities for trials).

◎ 5GZorro (https://5gzorro.eu/): With this Phase 3 5G-PPP project started in November 2019, Ubiwhere intends to continue its commitment to create a multi-stakeholder 5G marketplace, aligned with Smartlamppost's dedicated Marketplace app (https://smartlamppost.com). Through blockchain and Smart contracts technology, Ubiwhere hopes to design the new set of shared business logic and SLAs as Smart Contracts and benchmark 5GZorro's findings when applying such set of rules in the telecom space: Mobile Network Operators, Site Owners, Spectrum Regulators and, finally, Service Providers. With this convergence of 5G technology and DLTs (Distributed Ledger Technologies), Ubiwhere hopes to enhance the existing Smartlamppost Marketplace with a new trustless layer, effectively providing all of these entities with built-in protection mechanisms - as example, guarantying a certain SLA based on different monitored parameters which, if verified, may reflect positively or negatively in the billing process (automated P2P payments, through blockchain technology) .

As a final remark, Ubiwhere is always seeking for strategic partners that can provide strategic value to both its research activities but also to its commercial endeavours. Ubiwhere is already paving the 5G market with the outcomes of the research it performed in the 5G-PPP program and expects to follow this row in the immediate future.

5G capabilities allow us to implement VNFs to deliver computer vision services through the network by deploying them around the network. More precisely, for our use case, the deployment should be done in the edge as we need to lower the delay to the minimum to increase drone autopilot reaction. The drone is piloted by a VNF, having a manual, automatic and remote flight control. The computer vision results, done from another VNF, may change the drone path depending on the detection and drone flight mode.

Visiona's approach to the preventive maintenance aims to detect, from an autopilot drone, different changes in the target zones in order to predict possible dangerous conditions on the environment or in the structures.

Regarding the artificial intelligence applied to vision, Visiona developed three systems:

- People and vehicle detection system in critical locations.

- Change recognition system on UAV imagery.

- Abnormal hot points through thermal image.

Our target with the first implementation is to analyse infrastructures and detect elements that could imply a risk, such a person or a vehicle in a forbidden and hazardous zone.

The second one is focused on finding environmental changes in areas close to key infrastructures. To do so, the system needs to have a record of the initial status of the area to have a reference to compare with.

The third one, based on thermal image, implements an alert system for the hot points of the, in our case, dehydration chimneys of the gas plant. This can be applied to any other case.

All implementations are based on images obtained from Unmanned Aerial Vehicles (UAV). As a result, image processing techniques are a crucial part of the developments. More precisely, Deep Learning techniques applied to this field such as Convolutional Neural Networks. This technique is the base of most of the cutting-edge implementations of deep learning based on images.

Different challenges are going to be addressed with our approach. First, the use of drone imagery is a demanding task for the detection system, due to the reduced size of the relevant objects related to the complete image. Subsequently, the development of an implementation robust to lighting variations, environmental conditions and other factors produced by the different scenarios is one of our main goals.

Related to the change detection system, the capability of adaptation is a crucial factor for the viability of the algorithm. The main variation between this approach and the deepest learning methods for image processing is that we need to have a previous reference to compare with. As a result, the development process has a different perspective from the standard designing of deep learning models for computer vision.

To complement the explained above, Visiona's quality probe may be deployed in the different nodes of the network to analyse the QoS and QoE of the video that the operator is receiving remotely. The quality probe can detect no video (video is cut), freezing, packet loss, colour errors or audio defects. It has also the feature of demanding a new network path in case one of those failures are detected in the video, if in the edge the video is correct, of course.
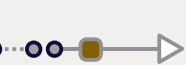
WINGS
ICT SOLUTIONS

The WINGS success stories are related to the engagement in international cooperations, including H2020 and 5G-PPP projects. Through these activities, and especially, 5G-PPP, vertical solutions that leverage on advanced wireless technologies have been conceived, while contributions have been made for the development and validation of various technology components.

WINGS has success stories in all the main vertical areas that it addresses: utilities, food security, smart city applications, and industry / logistics.

WINGS Nb-IoT based device for enabling smart water management, consumption monitoring/ predictions and fault management

In the area of utilities, WINGS has collaborated with OTE and is deploying smart water management solutions in the South of Greece (e.g., Argos/Peloponnese, and elsewhere). First emphasis is on industrial areas, while residential deployments are also underway. The solutions provide the means for monitoring and predicting consumptions,

as well as faults that may occur in the utility networks. The technology foundation comprises IoT (Internet of Things) devices encompassing local intelligence, cloud-based AI (Artificial Intelligence) algorithms for predicting/reasoning, and advanced wireless networks. Communications rely, firstly, on Nb-IoT; more advanced 5G-based versions are being prepared/trialled (esp. in testbeds, as those provided by 5G-EVE), so as to prepare for augmented experience and fast actuation, in the presence of a massive volume of diverse devices.

Camera to be installed underwater, for monitoring the production, and to transmit through cabling and 4G/5G.and fault management

In the area 5G-powered food security, WINGS started the work from aquaculture installations, based on its AQUAWINGS platform and the 5G-Heart project. Use cases addressed are water quality monitoring, the assessment of the health of the production, and the optimization of the feeding. Monitoring relies on multiple sensors,

video cameras and underwater drones. The higher the video quality, the faster and more robust the identification of diseases and the designation of mitigation actions. Moreover, underwater drones are essential for checking the quality of the farm cages. Video streaming and drone manipulation rely on 5G (and on underwater cables).

Instrumental for WINGS, for developing further competences and solutions for the industry/logistics case, is the Clear-5G project. Based on use cases from Taiwanese partners, specific robotic and advanced-wireless solutions have been developed, for automating factory floor tasks. The solution is validated based on proof of concept activities (a final phase, in Taiwan, will be pursued with some delay, caused by the COVID-19-induced bans) and based on simulation (for considering larger production lines). Finally, through 5G-Tours WINGS will enhance the smart city applications portfolio. WINGS will deploy a smart-parking and passenger security (evacuation) solution for the Athens International Airport. Moreover, there will be AR/VR applications targeted to high-school students, for the culture, tourism and safety fields, in cooperation with the partner institution EA (link, private institution providing primary, high-school and lyceum level education).

WINGS is honoured to be part of the journey of shaping emerging and future networking / cloud / application technologies, in cooperation with its partners, including world renowned multi-nationals, for the benefit of the European industry and citizen, while also having an eye to the world.

SME MEMBERS

3logic MK srl	Italy	Ascora GmbH	Germany
4GCelleX	Israel	ASN Plus s.r.o.	Czech Republic
Abeeway	France	aspien GmbH	Germany
Accelleran	Belgium	Astius Technology	United Kingdom
ACORDE Technologies S.A.	Spain	ATC	Greece
ACTA Ltd	Greece	Ateknea Solutions Europe	Spain
ADVANTIC SISTEMAS Y SERVICIOS S.L.	Spain	Athonet	Italy
AICO EDV-Beratung GmbH	Austria	ATiT	Belgium
AITIA International, Inc.	Hungary	Atlantic Wireless Telecommunications	Ireland
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Alpineon d.o.o.	Slovenia	AUSTRALO	Spain
AMBEENT WiRELESS	Turkey	Avanti Communications plc	United Kingdom
Amledo & Co	Sweden	AWE Communications GmbH	Germany
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AMVG	Turkey	Azcom Technology	Italy
Ansur Technologies	Norway	BALKANPLAN Ltd.	Bulgaria
Antares S.c.ar.l.	Italy	b-com	France
Antycip Simulation	United Kingdom	Beacon Tech Ltd. Yoram Bar-Zeev	Israel
AnySolution S.L.	Spain	Beia Consult International	Romania
APFUTURA	Spain	Bettair Cities	Spain
AppArt	Greece	Bianor Services EOOD	Bulgaria
Applied RESearch to Technologies s.r.l. (ARES2T)	Italy	Blu Wireless Technology Ltd	United Kingdom
Aradiom	Turkey	Bluegiga Technologies Oy	Finland
Aratos Technologies	Greece	Bluetab	Spain
Arctos Labs Scandinavia AB	Sweden	Business Integration and Business Intelligence	Montenegro
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ArtHaus DOO Skopje	Macedonia	Cellusys	Ireland
Artklikk Ltd.	Hungary	CEVA-DSP Ltd	Israel
		Citypassenger	France

European SME Expertise in 5G and Beyond

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COMSIS	France	ESPACI	Spain
Consultancy & Management Services	Belgium	ETA2U	Romania
Consultora de Telecomunicaciones Optiva Media SL	Spain	EUROB CREATIVE	Spain
Content Group Austria	Austria	Euroma	United Kingdom
Core Network Dynamics	Germany	EUROPEAN DYNAMICS S.A.	Greece
Corporate Fiber Technologies AB	Sweden	European Media Laboratory GmbH	Germany
Creativ-IT	Spain	Euroreporter	Italy
Creativity Software	United Kingdom	Evolution-net	France
Cumucore Oy	Finland	Exagate	Turkey
CyberEthics Lab.	Italy	Excellis Business Consulting	U.K
CyberLens Ltd	United Kingdom	EXENTE	Spain
CyRIC (Cyprus Research and Innovation Center Ltd.)	Cyprus	Eyeled GmbH	Germany
Das Photonics	Spain	Feron Technologies P.C.	Greece
DeFuTech	Germany	FGFactory	Ukraine
Delektre Oy	Finland	FIDO Intelligence	Poland
Diamond Age GmbH	Austria	Filtronic Broadband Ltd	United Kingdom
Digital Dispatch	Finland	FirstPoint Mobile Guard	Israel
DigitalTwin Technology GmbH	Germany	FIVECOMM - 5G COMMUNICATIONS FOR FUTURE INDUSTRY VERTICALS, S.L.	Spain
Domos AS	Norway	Florella Ltd	Hungary
Douglas Connect GmbH	Switzerland	Fogus Innovations & Services	Greece
EANTC AG	Germany	FTI Communication Systems Ltd	United Kingdom
Easy Global Market	France	Future Intelligence	Greece
EBNER electronic GmbH	Austria	GARD	Israel
eBOS Technologies Ltd	Cyprus	GENERUM OY	Finland
eCom Scotland Ltd	U.K	Gigasys Solutions Ltd	United Kingdom
Edosoft Factory, S.L.	Spain	Globberry	Ukraine
EFP Consulting Ltd	Israel	Globema Sp. z o.o.	Poland
Ege Sistem Bilisim Hiz. San. ve Tic. Ltd. Sti. (egesys)	Turkey	Gluk Advice BV	Netherlands
ELSIS	Lithuania	Grado Zero Espace Srl	Italy
Emblasoft	Sweden	Gradus Bilisim Teknolojileri Ltd Sti	Turkey
Emisfera Societa Cooperativa	Italy	Grant Thornton Advisory	Czech Republic
Energy Sistem Soyntec SA	Spain	gutura GmbH	Germany
EPIDOTE CONSULTING	Belgium	GWT-Tud	Germany
Epitomical Limited	United Kingdom	Hedz Hungary,Ltd.	Hungary
		Hendrik Berndt Consulting	Germany

hi2	Spain	ISED SpA	Italy
HI-IBERIA	Spain	ISOLUTIONS LLC	Ukraine
Hiro-microdatacenters	Netherlands	IS-WIRELESS	POLAND
Hisbim IT Co.	Turkey	IT ware Kft.	Hungary
Hringidan / Vortex Inc	Iceland	ItoM	Netherlands
Hyperborea SRL	Italy	ITTI Sp. Z o.o.	Poland
I.C.A. (Informática y Comunicaciones Avanzadas)	Spain	JCP-Consult SAS	France
IDATE	France	K.-D. Kohrt	Germany
IDESIO s.r.l.	Italy	Kahdeksas Kanava Oy	Finland
IDS Ingegneria dei Sistemi Spa	Italy	Kiwok Nordic AB	Sweden
IIMC International Information Management Corporation Ltd	Ireland	kleos r&d	France
ILS Technologies	France	Klubverband-ITA Ltd.	Bulgaria
Incelligent	Greece	KOHS	Austria
INCITES CONSULTING SARL	Luxembourg	Kontor 46 s.a.s.	Italy
Infocom S.R.L.	Italy	LABRIS NETWORKS	Turkey
InfoGraph Ltd.	Greece	Larkhill Consultancy Limited	U.K
INFOLYSIS P.C.	Greece	Lattanzio e Associati	Italy
Ingenieria y Soluciones Informaticas	Spain	Level7 S.r.l.u.	Italy
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inno group	Germany	LioniX International	Netherlands
Innomine Group	Hungary	LiquidEdge Ltd	Ireland
InnoRoute GmbH	Germany	LiveU Inc.	Israel
INNOVAS	France	Load Interactive lda	Portugal
Innovati Networks S.L.	Spain	LUDMATEC	Germany
Innovators S.A.	Greece	M.B.I.	Italy
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Intelekti Ltd.	Bulgaria	Magister Solutions Ltd	Finland
INTERFUSION SERVICES LTD	Cyprus	MÁNTICA Solutions S.L.	Spain
INTERINNOV	France	MANZALAB	France
INTERNET INSTITUTE, communications solutions and consulting, Ltd.	Slovenia	Martel GmbH	Switzerland
Intron ltd	Ukraine	Maseng AS	Norway
INVOLI SA	Switzerland	Mavigex s.r.l.	Italy
ip.access Ltd	U.K	Meteorological and Environmental Earth Observation (MEEO)	Italy
IPCom GmbH & Co. KG	Germany	milestone management gmbh	Austria
IQUADRAT INFORMATICA	Spain	MiSONE	Turkey
IRIS Technology Solutions S.L.	Spain	MOBICS S.A.	Greece
		Mobintec Ltd	United Kingdom

European SME Expertise in 5G and Beyond

Modio Computing PC	Greece	Piran Partners LLP	U.K
moltosenso s.r.l.	Italy	Pluribus One S.r.l.	Italy
Montimage	France	Polatis Ltd	United Kingdom
MostlyTek LTD	Israel	Postron Engineering S.r.l.	Italy
Mr. NeC	Netherlands	Power Operations Limited	United Kingdom
Multicell	France	Pozitron	Turkey
Naevatec	Spain	PragmaDev	France
Nart Bilişim	Turkey	Primetel Ltd	Cyprus
Nemergent Solutions SL	Spain	PRISMA Telecom Testing	Italy
Neogames	Sweden	PROCENNE	Turkey
Neoscopio	Portugal	Qamcom Research & Technology AB	Sweden
Net Surfing S.r.l.	Italy	QUOBIS NETWORKS	Spain
Net Technologies	Finland	R2M Solution s.r.l.	Italy
Net7	Italy	Ranplan Wireless Network Design Ltd	United Kingdom
Netfort Technologies	Ireland	Real Wireless Ltd	United Kingdom
NETvisor Ltd.	Hungary	Redmill Marketing Associates	United Kingdom
Next European Industry	Belgium	Régens IT Plc.	Hungary
Nextworks s.r.l.	Italy	Research for Science, Art and Technology (RFSAT) Limited	Ireland
ng-voice GmbH	Germany	Rinicom	U.K
Nine Tiles	United Kingdom	RS-techMarketing	Israel
Nites a.s.	Czech Republic	RunEL NGMT	Israel
Norcontel (Ireland) Ltd	Ireland	SAE - Automation,s.r.o.	Slovak Republic
Notitia Ltd	Croatia	Saliwell Ltd.	Israel
NOVATEX SOLUTIONS LTD	Cyprus	Sapienza Sl	Spain
Nuromedia	Germany	SATELIO IOT SERVICES, S.L.	Spain
one2many	Netherlands	Seavus	Sweden
one2tribe sp. z o.o.	Poland	SemiBlocks	Netherlands
Open Cells Project	France	Seprotronic GmbH	Germany
Optare Solutions	Spain	Sequans communications	France
OPTRONICS Technologies SA	Greece	SETCCE	Slovenia
ORION INNOVATIONS PRIVATE COMPANY	Greece	Seven Solutions S.L.	Spain
PARAGON Europe	Malta	Siklu Communication	Israel
PARAGON LTD	Greece	SK Consulting e.U.	Austria
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Pharrowtech	Belgium		

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SQS,S.A	Spain	Trust-IT Services Ltd	United Kingdom
Starhome GmbH	Israel	TST	Spain
Steininger Consulting	Austria	TTG Int.LTD	Turkey
Strosek Design GmbH & CO.KG	Germany	TTI	Spain
SUITE5 DATA INTELLIGENCE SOLUTIONS	Ireland	UAB Telesoftas	Lithuania
SUNTECH LTD.	Poland	UBITECH	Greece
Super Radio AS	Norway	Ubiwhere	Portugal
SWAPCOM	France	UNIVERSAL K Ltd.	Bulgaria
SwissMedia - Swiss IT & Multimedia Association	Switzerland	Urban Hawk Ltd	United Kingdom
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SYNYO GmbH	Austria	Value Grid	Germany
SystAG Systemhaus GmbH	Germany	Verhaert	Belgium
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Tamum Consulting	France	VirtuOR	France
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Targeting Innovation Ltd	U.K	VOCS	Belgium
T-CONNECT SRL	Italy	WAVECOMM S.r.l.	Italy
Tekever	Portugal	WEST Aquila Srl	Italy
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Oledcomm	France
QUOBIS NETWORKS	Spain
Satelio IOT Services	Spain
Seven Solutions S.L.	Spain

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