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The 5G Infrastructure Public Private Partnership (PPP) Programme comprised 93 projects that were organized in three distinctive phases, namely, specification, development, and realization of trials and pilots (T&P). As of March 2024, nearly all PPP projects have concluded their activities, with only 8 Phase 3 projects still on-going. Projects generated outstanding results and achieved a large impact, as it has been regularly highlighted in the various documents elaborated by the 5G Infrastructure PPP and the 5G-IA (e.g., whitepapers, reports, brochures, roadmaps), as well as in the corresponding project websites. Collectively, 5G Infrastructure PPP projects created a portfolio of advanced European telecommunication solutions. They also ensured a large momentum and dynamism for the actual trials of these solutions, as well as the further development of 5G systems on the road towards 6G networks, including other projects being funded by the 6G Smart Networks and Services (SNS) Joint Undertaking (JU).

Specifically, Phase 2 and Phase 3 projects were aimed to extensively validate and conduct T&Ps of 5G technology in many vertical sectors, this including automotive, industry, media & entertainment, public safety, health, energy, smart cities, transport & Logistics among others. In this respect, a collection of four “5G Infrastructure PPP – Trials & Pilots” brochures were released in September 2019, December 2020, August 2021 and November 2023. They portrayed 40 of the most impactful Phase 2 and Phase 3 T&Ps. Following open calls addressed to 5G Infrastructure PPP projects, a panel of more than 15 experts selected the 10 T&Ps to be included in each brochure. The evaluation criteria included impact on 5G network definition, achieved KPIs, technology and market readiness Levels, societal impact, 5G empowerment, to name a few.

This Trials & Pilots Summary Brochure is aimed to present a synthesis of the vast amount of work carried out by the portfolio of Phase 2 and Phase 3 5G Infrastructure PPP projects. Section 1 presents a high-level view of the achievements of the project portfolio, this including key figures such as the number of use cases addressed per call or year, or their geographical distribution for the whole duration of the programme. This analysis follows from the data gathered in Section 2. The latter includes a number of tables with the names of the T&Ps and use cases, vertical sectors addressed, locations and dates. This information is fully synchronized with that in the PPP Verticals Cartography. It is worth noting that this summary brochure focuses only on large-scale trials and pilots (i.e. TRLs 5-6-7). Hence, it does not include information on the realization of proofs-of-concept, prototypes and demonstrators. Alternatively, the interested reader is referred to the 5G Infrastructure PPP Verticals Cartography for further information on them (https://verticals-cartography.5g-ppp.eu).

We are indebted to all PPP projects and their technical managers and deputies (listed in Section 3 ahead) for their achievements and contributions towards the realization of the challenging goals of the 5G Infrastructure PPP programme. We also warmly thank them for their support in the elaboration of this summary brochure.

We sincerely hope that you will enjoy reading this brochure as much as we did while putting it together.

Didier Bourse, Alexandros Kaloyxlos, Mikael Fallgren, Carles Anton, Kostas Trichias, Claudio De Majo, Carole Manero and Miguel Alarcón
5G Infrastructure PPP Trials & Pilots

**IN NUMBERS**

**9 VERTICALS**
- Transport & Logistics
- Industry
- Health
- Media & Entertainment
- Smart Cities
- Automotive
- Energy
- Public Safety

**23 COUNTRIES**

**90 CITIES**

**322 TRIALS & PILOTS**

**5 BROCHURES**

**40 CHAMPIONS**
PPP PROJECTS TRIALS & PILOTS
OVERALL SUMMARY PERSPECTIVES & ANALYSIS

This Section 1 presents the overall summary perspectives, including key figures, over the complete PPP lifetime, based on the detailed summary of projects T&Ps captured in Section 2.

First, 322 T&Ps were successfully implemented during the full lifetime of the PPP programme (2015-2024), some of which having been organized over multiple locations/countries. The PPP Programme counted 93 projects over 3 consecutive Phases. Phase 1 included 19 projects that did not contribute to T&Ps. Phase 2 included 21 projects and almost all of them contributed to T&Ps, with a total number of 60 T&Ps. Phase 3 included 53 projects and was implemented in two consecutive sub-Phases, including specifically focused Strategic Objectives (SOs) namely:

Phase 3.1
- ICT-17: Infrastructure Projects.
- ICT-19: Advanced 5G validation trials across multiple vertical industries.

Phase 3.2
- ICT-20: 5G Long Term Evolution.
- ICT-42: 5G Core technologies innovation.
- ICT-53: 5G for Connected and Automated Mobility (CAM).
- ICT-52: Smart Connectivity beyond 5G.
- ICT-41: 5G innovations for verticals with third party services.

Virtually all projects contributed to T&Ps, with a total number of 262 T&Ps (137 in Phase 3.1 and 125 in Phase 3.2), much higher number compared to Phase 2, as expected also considering the PPP phased evolution and the overall maturity of the R&I.

The distribution of T&Ps over the PPP phases and years if depicted in Figure 1. The major contribution was from ICT-19 projects that were clearly focused on verticals T&Ps.

![Figure 1: PPP T&Ps over PPP programme phases and years](image-url)
The distribution of T&Ps over Phases and SOs is depicted in Figure 2.

The distribution of T&Ps over EU Countries is depicted in Figure 3. It must be noted that some of the T&Ps listed in Section 2 Tables were run in multiple locations/countries, and, accordingly, the figures in Figure 3 reflect such multi-location T&Ps. Besides, it is worth noting that the figure depicts the locations/countries where the T&Ps took place, but partners from many other countries also contributed to their realization.
The T&Ps cities cartography is depicted in Figure 4. The city names included correspond to locations with more than 5 T&Ps run or with the highest number of T&Ps in a given country. In this case, one single city name for the related country is included, or potentially two, if equal numbers.
During the development of the PPP programme and projects, the following specific Verticals categorization was converged and defined over the complete programme:

**AUTOMOTIVE**
including Connected car – V2X, Autonomous driving, Remote assisted driving, Telematics...

**INDUSTRY**
Including Manufacturing & Automation (Factory & process automation, In-factory tracking of goods and resources, Telemetry & Monitoring, Zero Defect Manufacturing (ZDM)...), Agriculture & farming technologies, Aquaculture / Aquafarming, Financial Services...

**MEDIA & ENTERTAINMENT**
Including Broadcast services (B2C, B2B2C, Home production), Immersive & integrated Media and Gaming, (Mass) Media production, generation and consumption, Fixed (Home and SOHO) services, Education (MOOCs)...

**PUBLIC SAFETY**
Including Emergency communication, Daily first response, Rapid disaster response, Public event management, Critical assets protection and surveillance, Border protection and remote area coverage...

**HEALTH**
Including Smart health, Smart pharmaceuticals, Medical emergency management, Hospital administration, Telemedicine...

**ENERGY**
Including (Residential/industry) energy management and provisioning, Energy Distribution, Energy Management, Electric vehicles smart charging, Advanced monitoring and maintenance support, Smart metering...

**SMART CITIES**
Including Public administration, Tourism, Assisted living, People mobility, Smart Building, I2X (traffic lights, sensors...), Education – Smart Campus...

**TRANSPORT & LOGISTICS**
Including Rail, maritime and aviation, Efficient mobility of people and goods, Mobility as a Service, Smart Ports (incl. Autonomous assets & Logistics and Safety), Smart Roads, Smart Railways Tracks, Smart Airports...

The distribution of T&Ps over the verticals sectors is depicted in Figure 5. Specific T&Ps targeted multiple verticals sectors (related category in the Figure). As experienced during the PPP lifetime, the major focus for T&Ps was on industry 4.0, transportation and logistics; media and entertainment and automotive, followed then by public safety, smart cities, health and energy. Several Phase 2 and Phase 3.2 projects also served multiple verticals.
Last but not least, the distribution of T&Ps per Vertical Sectors per Phase and SO is depicted in Figure 6. Complementing the previous analysis, the major contribution to T&Ps was from ICT-19 projects, mainly on Industry, Transports and Logistic and Media and Entertainment.
TRIALS & PILOTS SUMMARY
5G Infrastructure PPP - Trials & Pilots Summary Brochure

**5G CAR**

5th Generation Communication Automotive Research & Innovation

- **Lane Merge**
  - Automotive
  - Linas/Montlhery
  - Q2 2019

- **See Through and Sensor Sharing**
  - Automotive
  - Linas/Montlhery
  - Q2 2019

- **Cooperative Safety**
  - Automotive
  - Linas/Montlhery
  - Q2 2019

- **VRU Protection**
  - Automotive
  - Linas/Montlhery
  - Q2 2019

**5G CITY**

A Distributed Cloud & Radio Platform For 5G Neutral Hosts

- **Neutral host pilot (Telecom pilot)**
  - Smart Cities
  - Lucca, Barcelona, Bristol
  - Q1 2020

- **Unauthorised Waste Dumping Prevention**
  - Smart Cities
  - Lucca
  - Q1 2020

- **Mobile backpack media unit (media pilot)**
  - Smart Cities, Media & Entertainment
  - Barcelona
  - Q1 2020

- **UHD video distribution (media pilot)**
  - Smart Cities, Media & Entertainment
  - Lucca, Bristol
  - Q1 2020

- **Video acquisition and edge/cloud production (media pilot)**
  - Smart Cities, Media & Entertainment
  - Barcelona, Bristol
  - Q1 2020

**Legend**

- **Trials & Pilots Champions**
  - T&P Brochure 1 - 2019
  - T&P Brochure 2 - 2020
  - T&P Brochure 3 - 2021
  - T&P Brochure 4 - 2023
<table>
<thead>
<tr>
<th><strong>5G ESSENCE</strong></th>
<th>Embedded Network Services For 5G Experiences</th>
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<tbody>
<tr>
<td><strong>Next-Generation integrated in-flight Connectivity and Entertainment Systems</strong></td>
<td>Media &amp; Entertainment</td>
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<tr>
<td><strong>E2E Slicing for Mission Critical Applications</strong></td>
<td>Public Safety</td>
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<tr>
<td><strong>5G Edge Network Acceleration for Stadium</strong></td>
<td>Media &amp; Entertainment</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>5G-MEDIA</strong></th>
<th>Programmable Edge-To-Cloud Virtualization Fabric For The 5G Media Industry</th>
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<tbody>
<tr>
<td><strong>Remote Production</strong></td>
<td>Media &amp; Entertainment</td>
</tr>
<tr>
<td><strong>Immersive media and Virtual Reality</strong></td>
<td>Media &amp; Entertainment</td>
</tr>
<tr>
<td><strong>UHD over vCDN</strong></td>
<td>Media &amp; Entertainment</td>
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</tbody>
</table>
# 5G-MONARCH

5G Mobile Network Architecture For Diverse Services, Use Cases, And Applications In 5G And Beyond

<table>
<thead>
<tr>
<th>1</th>
<th>Smart Sea Port</th>
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</thead>
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<tr>
<td>Logistic, Transport</td>
<td>Hamburg</td>
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</table>

<table>
<thead>
<tr>
<th>1</th>
<th>5G Touristic City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart Cities, Tourism</td>
<td>Turin</td>
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</tbody>
</table>

# 5G-PHOS

5G Integrated Fiber-Wireless Networks Exploiting Existing Photonic Technologies For High-Density SdN-Programmable Network Architectures

<table>
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<tr>
<th>PON-overlaid analog Fronthaul</th>
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<tbody>
<tr>
<td>Telecom</td>
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<table>
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<tr>
<th>Analog Backhaul/Fronthaul in Hotspot Area</th>
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<tr>
<td>Telecom</td>
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</table>

<table>
<thead>
<tr>
<th>Analog Fronthaul in Dense Area</th>
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<td>Telecom</td>
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# 5G-PICTURE

5G Programmable Infrastructure Converging Disaggregated Network And Compute Resources

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<tr>
<th>2</th>
<th>Railway</th>
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<tbody>
<tr>
<td>Transport &amp; Logistics</td>
<td>Barcelona</td>
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<table>
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<tr>
<th>Mega-event in Stadium</th>
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<tbody>
<tr>
<td>Media &amp; Entertainment</td>
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</tbody>
</table>
### Smart City
- **Smart Cities**: Bristol
- **Q1 2020**

### 5GTANGO
5G Development And Validation Platform For Global Industry – Specific Network Services And Apps

#### Smart Manufacturing
- **Industry**: Detmold
- **Q2 2019**

#### Immersive Media
- **Media & Entertainment**: Cologne, Madrid
- **Q2 2019**

#### Communication Suite
- **Telecom**: Vigo
- **Q2 2019**

### 5G TRANSFORMER
5G Mobile Transport Platform For Verticals

#### Extended Virtual Sensing
- **Automotive**: Torino
- **Q4 2019**

#### On-site live experience
- **Media & Entertainment**: Spanish Golf open 2019
- **Q4 2019**

#### Ultra High-Definition (UHD)
- **Media & Entertainment**: Madrid
- **Q4 2019**

#### Heart-attack Emergency
- **eHealth**: Madrid
- **Q4 2019**
### Cloud robotics
- **E-Industry**
- **Madrid**
- **Q4 2019**

### 4G/5G Network as a Service (NaaS)
- **Telecom**
- **Madrid**
- **Q4 2019**

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### 5G-XCAST
**Broadcast and Multicast Communication Enablers For The Fifth Generation Of Wireless Systems**

#### Hybrid Broadcast Service
- **Media & Entertainment**
- **Munich**
- **Q3 2018**

#### Multimedia Public Warning
- **Public Safety**
- **Turku**
- **Q2 2019**

#### Object-based broadcast
- **Media & Entertainment**
- **Guildford**
- **Q3 2019**

#### Media Content Distribution at Scale
- **Media & Entertainment**
- **Munich**
- **Q3 2019**

---

### BLUESPACE
**Building On The Use Of Spatial Multiplexing 5G Networks Infrastructures And Showcasing Advanced Technologies And Networking Capabilities**

#### High-capacity mm-wave 5G for Smart Office
- **Media & Entertainment**
- **Eindhoven**
- **Q2 2020**
## Building Research Establishment

<table>
<thead>
<tr>
<th>Internet Of Radio Light</th>
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<tbody>
<tr>
<td><strong>IO RL</strong></td>
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<td><strong>Smart Factory – Inter and Intra Enterprise Integration</strong></td>
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<td>Media &amp; Entertainment</td>
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## MATILDA

A Holistic, Innovative Framework For The Design, Development, And Orchestration Of 5G-Ready Applications And Network Services Over Sliced Programmable Infrastructure

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<td><strong>Internet Of Radio Light</strong></td>
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<td><strong>MATILDA</strong></td>
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<tr>
<td><strong>High Resolution Media on Demand</strong></td>
</tr>
<tr>
<td>Media &amp; Entertainment</td>
</tr>
</tbody>
</table>

| **PPDR - 5G Emergency Infrastructure with SLA Enforcement** |
| Media & Entertainment | Ljubljana | Q3 2019 |

| **Smart Factory – Inter and Intra Enterprise Integration** |
| Industry 4.0 | Bremen, Athens | Q4 2020 |

| **Smart City Intelligent Lighting System** |
| IoT Smart Cities | Bucharest | Q4 2020 |

<p>| <strong>Distributed System Testing (Remote control of automoblie testing systems)</strong> |
| Testing 4.0 | Bremen | Q4 2020 |</p>
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<th><strong>METRO-HAUL</strong></th>
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<td>METRO High bandwidth, 5G Application-aware Optical Network, with Edge Storage, Compute and Low Latency</td>
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<td><strong>Network Slicing for Improving Public Safety</strong></td>
</tr>
<tr>
<td>📍 Large scale event sites (concerts, sports stadiums)</td>
</tr>
<tr>
<td><strong>Crowdsourced Video Broadcast</strong></td>
</tr>
<tr>
<td>📍 MultiMedia</td>
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<th><strong>NRG-5</strong></th>
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<td>NRG-5 Enabling Smart Energy As A Service Via 5G Mobile Network Advances</td>
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<td><strong>Advanced metering as a service (AMlaaS)</strong></td>
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<td>📍 Energy</td>
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<td><strong>Enabling aerial Predictive Maintenance for utility infrastructures (PMaaS)</strong></td>
</tr>
<tr>
<td>📍 Energy</td>
</tr>
<tr>
<td><strong>Enabling resilience and high availability via Dispatchable Demand Response (DDRaaS)</strong></td>
</tr>
<tr>
<td>📍 Energy</td>
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<table>
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<td>E2E-aware Optimizations And Advancements For The Network Edge Of 5G New Radio</td>
</tr>
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<td><strong>Serving MegaCities Areas Through 5G Technologies</strong></td>
</tr>
<tr>
<td>📍 MegaCities</td>
</tr>
<tr>
<td><strong>Serving Industrial Areas Through 5G Technologies</strong></td>
</tr>
<tr>
<td>📍 Industry</td>
</tr>
</tbody>
</table>
**SAT5G**

Satellite And Terrestrial Network For 5G

- **Satellite backhaul to moving platform**
  - Airline infotainment, Munich, Q4 2019

- **Satellite multicast to network edge (MEC)**
  - Cellular broadband, Surrey, Q4 2019

- **Satellite multi-linking for video and Internet**
  - Fixed broadband, Surrey, Q4 2019

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**SLICENET**

End-to-End Cognitive Network Slicing and Slice Management Framework In Virtualised Multi-Domain, Multi-Tenant 5G Networks

1. **5G Smart Health (Connected Ambulance)**
   - eHealth, Cork, Q2 2020

2. **5G Self-Healing Smart Grid**
   - Energy, Aveiro, Q2 2020

3. **5G Smart City Lighting (SmaLI-5G)**
   - Smart City, Bucharest, Q4 2019, Q2 2020

4. **Wearable eHealth Headset – (Blue Eye)**
   - eHealth, Cork, Q2 2020

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**5G-EVE**

5G European Validation Platform For Extensive Trials

- **Media content in high-speed trains**
  - Transport, Turin, Q1-Q2 2021
5G Infrastructure PPP - Trials & Pilots Summary Brochure

Urban mobility flow management
- Smart city, Transport
- Turin
- Q3 2020 - Q2 2021

3. Smart Turin: Safety and environment
- Smart city
- Turin
- Q1-Q2 2021

Smart tourism: Augmented fair experience
- Smart tourism
- Turin
- Q1-Q2 2021

2. Experiential Tourism through 360° video and VR over 5G
- Smart tourism
- Madrid
- 2019-2020

UHF Media, On-site Live Event Experience and Immersive and Integrated Media
- Media and Entertainment
- Madrid
- Q3 2020 - Q2 2021

3. Autonomous vehicles in manufacturing environments
- Industry 4.0
- Madrid
- Q3 2020 - Q2 2021

High-quality multi-site Gaming Experience
- Media and Entertainment
- Madrid; Athens
- Q1-Q2 2021

Video 360° 5G virtual Visit
- Media and Entertainment
- France
- Q1-Q2 2021

Fault Management for distributed Energy Generation in Smart Grids
- Smart energy
- Paris
- Q1-Q2 2021

Resolving Outages and Ensuring the Stability of Smart Grids by means of 5G
- Utilities (smart energy)
- Athens
- Q1-Q2 2021

Autonomous vehicles in manufacturing environments
- Industry 4.0
- Athens
- Q3 2020 - Q2 2021
Connected Ambulance; Patient metrics; 4k Video from site
- Healthcare
- Athens
- Q3 2020 - Q2 2021

Safety and Environment: Health Monitoring and Forecasting
- Smart City
- Athens
- Q1-Q2 2021

5G-VINNI
5G Verticals Innovation Infrastructure

Neurorehabilitation Therapies Over 5G (W/ Altran)
- eHealth
- Leganés
- Q1 2021

OSM Orchestration of Edge Deployment using the OpenNess platform
- Media & Entertainment, Smart Cities (Tourism)
- Leganés
- Q4 2020

OpenQKD Quantum Cryptography for B2B and 5G networks
- eHealth, Industry 4.0, Smart cities
- Spain
- Q2-Q4 2021

5G Cellular Backhauling via Satellite
- PPDR
- Luxembourg
- Q3 2020 - Q2 2021

QoS Management for Media Broadcast
- Media & Entertainment
- Martlesham
- Q1 2020 – Q3 2021

Remote robotic control with 360° VR based telepresence – Phase 1
- Industry 4.0
- Martlesham
- Q2 2019 - Q1 2020

Remote robotic control with 360° VR based telepresence – Phase 2
- Industry 4.0
- UK
- Q4 2019 – Q4 2020

Not-spots in 5G & beyond: Reflectors as a potential remedy
- Undergrounds, Tunnels, Railway Tracks & dense urban cities
- UK
- Q2 2020 – Q1 2021
<table>
<thead>
<tr>
<th>Use Case</th>
<th>Industry/Use Case</th>
<th>Location</th>
<th>Start/End Period</th>
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<tbody>
<tr>
<td>Assisted Living equipment test</td>
<td>Assisted living</td>
<td>Martlesham</td>
<td>Q4 2019-Q1 2020</td>
</tr>
<tr>
<td>5G robotic arm with VR telepresence</td>
<td>Industry 4.0</td>
<td>Martlesham</td>
<td>Q2 2020</td>
</tr>
<tr>
<td>NRG-5 Use case 1: AI-based Object Recognition over 5G</td>
<td>Transport, Campus, Industry 4.0, Healthcare</td>
<td>UK</td>
<td>Q4 2020</td>
</tr>
<tr>
<td>Augmented Reality Application on Smartphones</td>
<td>Media</td>
<td>UK</td>
<td>Q4 2021</td>
</tr>
<tr>
<td>Dedicated slice for Norwegian Defence</td>
<td>Public Safety</td>
<td>Oslo</td>
<td>Q2 2020</td>
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<tr>
<td>Drone Control</td>
<td>Public Safety</td>
<td>Oslo</td>
<td>Q2 2021</td>
</tr>
<tr>
<td>5G remote robotic ultrasound examination</td>
<td>Health Care</td>
<td>Oslo</td>
<td>Q4 2020-Q2 2021</td>
</tr>
<tr>
<td>Push to talk for Public Safety Application</td>
<td>Public Safety</td>
<td>Norway</td>
<td>Q3 2021</td>
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<tr>
<td>Remote interventional support for emergency care application - mobile ultrasound</td>
<td>eHealth</td>
<td>Munich</td>
<td>Q1-Q2 2021</td>
</tr>
<tr>
<td>Nomadic Multimedia Acquisition and Delivery</td>
<td>Media</td>
<td>Berlin</td>
<td>2019-2021</td>
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<tr>
<td>Factory Deployment</td>
<td>Industry 4.0</td>
<td>Berlin</td>
<td>2019-2021</td>
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<tr>
<td>Ultra-High-Fidelity media</td>
<td>Media</td>
<td>Greece</td>
<td>2019-2021</td>
</tr>
</tbody>
</table>
### 5G Infrastructure PPP - Trials & Pilots Summary Brochure

#### User and Machine Generated Content
- Media entertainment, eHealth
- Greece
- 2019-2021

#### Cooperative Media Production
- Media
- Greece
- 2019-2021

### 5GENESIS
5th Generation End-to-end Network, Experimentation, System Integration, And Showcasing

<table>
<thead>
<tr>
<th>Activity</th>
<th>Sector</th>
<th>Location</th>
<th>Time Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>3GPP MCS &amp; Video for Surveillance</td>
<td>PPDR</td>
<td>Malaga</td>
<td>Q2 2021 - Q4 2021</td>
</tr>
<tr>
<td>AR/VR to support Teaching at UMA</td>
<td>Education</td>
<td>Malaga</td>
<td>Q3 2021</td>
</tr>
<tr>
<td>Mobile Video for Public Safety</td>
<td>PPDR</td>
<td>Malaga Port</td>
<td>Q4 2021</td>
</tr>
<tr>
<td>Festival of Lights</td>
<td>Media and Entertainment</td>
<td>Berlin</td>
<td>Q4 2021</td>
</tr>
<tr>
<td>5G-enabled UAV Control and Communication</td>
<td>Transport</td>
<td>Athens</td>
<td>Q4 2020</td>
</tr>
<tr>
<td>5G-enabled UAV Surveillance (Eye in the Sky)</td>
<td>Transport /Media and Entertainment</td>
<td>Athens</td>
<td>Q4 2021</td>
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<tr>
<td>UAV-enabled Connectivity for Underserved Areas</td>
<td>Transport &amp; Logistic</td>
<td>Athens</td>
<td>Q4 2021</td>
</tr>
<tr>
<td>Immersive Applications for Sport Events</td>
<td>Media and Entertainment</td>
<td>Athens</td>
<td>Q4 2021</td>
</tr>
</tbody>
</table>
Security as a Service (Sec-aaS)
- Industry 4.0
- Athens
- Q4 2021

Satellite-terrestrial (5G) integrated Maritime Communications
- Transport & Logistic
- Limassol
- Q4 2021

5G-enabled UAV Surveillance (Edge-enabled Agriculture Applications)
- Transport & Logistic
- Limassol
- Q2 2021

Massive IoT services
- Smart City
- Surrey
- Q4 2021

Multi-RAT Integration for 5G-enabled Smart-City Applications
- Smart City
- Surrey
- Q4 2021

5G-CARMEN
5G For Connected And Automated Road Mobility In The European Union

AD I4 Lane-Change Maneuvers Centralized (MEC-based)
- Automotive (cross-border)
- Munich, Kufstein, Trento
- Q1 2021- Q2 2022

5G assisted cooperative and automated manoeuvres in cross-border scenarios
- Automotive (cross-border)
- Kufstein, Brennerpass, Trento
- Q1 2021- Q2 2022

Edge-Orchestrated ad-hoc Emergency Vehicle Clearance
- Automotive (cross-border)
- Brennerpass, Trento
- Q1 2021- Q2 2022

AD I4 In-Lane Situation Awareness-based Manoeuvres
- Automotive (cross-border)
- Trento, Kufstein, Brennerpass
- Q1 2021- Q2 2022
5G MOBIX
5G For Cooperative & Connected Automated Mobility On X-Border Corridors

Advanced Driving (lane merge, overtaking, collision avoidance, assisted advanced driving)
Automotive (cross-border) Spain - Portugal + FR, NL, CN Q1 2021 - Q2 2022

Vehicles Platooning (see-what-i-see, L4 platooning)
Automotive (cross-border) Greece - Turkey + DE, CN Q1 2021 - Q2 2022

Extended sensors (assisted border crossing, cooperative perception / HD maps)
Automotive (cross-border) Brennerpass, Trento Q1 - Q2 2021

Remote Driving (automated shuttle, tele-operation, remote manoeuvre)
Automotive (cross-border) Spain - Portugal + FI, NL, CN, KR Q1 - Q2 2021

Vehicle QoS support (public transport scenarios, tethering via vehicle)
Automotive (cross-border) Spain - Portugal + KR Q1 - Q2 2021

5G CROCO
5G Cross-Border Control

3 4 Tele-operated Driving (ToD)
Automotive (cross-border) Munich Q3 2020, Q3 2021

3 HD maps for enabling autonomous driving
Automotive (cross-border) A9 Germany, AstaZero Q3 2020, Q3 2021

3 Anticipated Cooperative Collision Avoidance
Automotive (cross-border) Monthléry, Barcelona Q3 2020, Q3 2021

5G MOBIX
5G For Cooperative & Connected Automated Mobility On X-Border Corridors

Advanced Driving (lane merge, overtaking, collision avoidance, assisted advanced driving)
Automotive (cross-border) Spain - Portugal + FR, NL, CN Q1 2021 - Q2 2022

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Extended sensors (assisted border crossing, cooperative perception / HD maps)
Automotive (cross-border) Brennerpass, Trento Q1 - Q2 2021

Remote Driving (automated shuttle, tele-operation, remote manoeuvre)
Automotive (cross-border) Spain - Portugal + FI, NL, CN, KR Q1 - Q2 2021

Vehicle QoS support (public transport scenarios, tethering via vehicle)
Automotive (cross-border) Spain - Portugal + KR Q1 - Q2 2021
### 5G!Drones

Unmanned Aerial Vehicle Vertical Applications’ Trials Leveraging Advanced 5G Facilities

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Location</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UAV Traffic Management</strong></td>
<td>SC1: UTM Command and Control</td>
<td>France/5G-EVE</td>
<td>Q3 2020 – Q2 2022</td>
</tr>
<tr>
<td><strong>Situation awareness</strong></td>
<td>Monitoring a wildfire</td>
<td>France/5G-EVE</td>
<td>Q3 2020 – Q2 2022</td>
</tr>
<tr>
<td><strong>Public safety</strong></td>
<td>Disaster recovery</td>
<td>France/5G-EVE</td>
<td>Q3 2020 – Q2 2022</td>
</tr>
<tr>
<td><strong>UAV Traffic Management</strong></td>
<td>Location and aviation restriction map</td>
<td>Aalto, Oulu</td>
<td>Q3 2020 – Q2 2022</td>
</tr>
<tr>
<td><strong>UAV Traffic Management</strong></td>
<td>UAV Logistics</td>
<td>Aalto</td>
<td>Q3 2020 – Q2 2022</td>
</tr>
<tr>
<td><strong>IoT</strong></td>
<td>Enhanced IoT data collection</td>
<td>Aalto</td>
<td>Q3 2020 – Q2 2022</td>
</tr>
<tr>
<td><strong>UAV Traffic Management</strong></td>
<td>Map &amp; supporting visualization/analysis software</td>
<td>Oulu</td>
<td>Q3 2020 – Q2 2022</td>
</tr>
<tr>
<td><strong>Public safety</strong></td>
<td>Police Including counter-UAS</td>
<td>Oulu</td>
<td>Q3 2020 – Q2 2022</td>
</tr>
<tr>
<td><strong>Situation awareness</strong></td>
<td>Long range power inspection/ SAR Operation on lake</td>
<td>Oulu</td>
<td>Q3 2020 – Q2 2022</td>
</tr>
<tr>
<td><strong>Situation awareness</strong></td>
<td>Location in non-GPS environments</td>
<td>Oulu</td>
<td>Q3 2020 – Q2 2022</td>
</tr>
<tr>
<td><strong>Connectivity Extension</strong></td>
<td>Improve connectivity in highly crowded environments</td>
<td>Athens / 5GENESIS</td>
<td>Q3 2020 – Q2 2022</td>
</tr>
</tbody>
</table>
### 5G HEART

**5G Health Aquaculture And Transport Validation Trials**

<table>
<thead>
<tr>
<th>Test Case</th>
<th>Category</th>
<th>Locations</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>5G empowers ambulance services</strong></td>
<td>Healthcare</td>
<td>Oslo, Oulu, Groningen</td>
<td>Q3 2021 - Q3 2022</td>
</tr>
<tr>
<td><strong>Automatic Polyp Detection</strong></td>
<td>Healthcare</td>
<td>Oslo</td>
<td>Q3 2021 - Q3 2022</td>
</tr>
<tr>
<td><strong>Vital-sign patches with advanced geo-localization</strong></td>
<td>Healthcare</td>
<td>Eindhoven, Grenoble</td>
<td>Q3 2021 - Q3 2022</td>
</tr>
<tr>
<td><strong>Smart junctions</strong></td>
<td>Automotive</td>
<td>Groningen</td>
<td>Q3 2021 - Q3 2022</td>
</tr>
<tr>
<td><strong>Human tachograph</strong></td>
<td>Automotive</td>
<td>Oulu</td>
<td>Q3 2021 - Q3 2022</td>
</tr>
<tr>
<td><strong>Remote driving</strong></td>
<td>Automotive</td>
<td>Surrey</td>
<td>Q3 2021 - Q3 2022</td>
</tr>
<tr>
<td><strong>Vehicle sourced HD mapping</strong></td>
<td>Automotive</td>
<td>Surrey</td>
<td>Q3 2021 - Q3 2022</td>
</tr>
<tr>
<td><strong>Remote monitoring of water and fish quality</strong></td>
<td>Aquaculture</td>
<td>Athens, Oslo</td>
<td>Q3 2021 - Q3 2022</td>
</tr>
<tr>
<td><strong>Concurrent testing</strong></td>
<td>Automotive and</td>
<td>Surrey, Athens</td>
<td>Q1 2021 - Q3 2022</td>
</tr>
<tr>
<td></td>
<td>Healthcare</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5G-enabled Growth In Vertical Industries

3. Connected Worker Remote Operation of Quality Equipment
   - Industry 4.0
   - Bilbao
   - Q2 2021 - Q4 2021

Connected Worker Augmented Zero Defect Manufacturing (ZDM) Decision Support System (DSS)
   - Industry 4.0
   - Bilbao
   - Q2 2021 - Q4 2021

2. Digital Twin Apps
   - Industry 4.0
   - Torino
   - Q2 2021 - Q4 2021

2. Telemetry/Monitoring Apps
   - Industry 4.0
   - Torino
   - Q2 2021 - Q4 2021

2. Digital tutorials and remote support
   - Industry 4.0
   - Torino
   - Q2 2021 - Q4 2021

Safety Critical Communications
   - Transportation
   - Porto de Aveiro
   - Q2 2021 - Q4 2021

Non-safety Critical Communications
   - Transportation
   - Porto de Aveiro
   - Q2 2021 - Q4 2021

4. Advanced monitoring and maintenance support of secondary substation - Medium Voltage/Low Voltage (MV/LV) distribution substation
   - Energy
   - Technological Campus of the University of Aveiro
   - Q2 2021 - Q4 2021

4. Advanced critical signal and data exchange across wide smart metering and measurement infrastructures
   - Energy
   - Technological Campus of the University of Aveiro
   - Q2 2021 - Q4 2021
5G SMART
5G For Smart Manufacturing

5G-Enhanced Industrial Robots
- Industry 4.0
- Kista
- Q4 2021

5G for Enhanced Industrial Manufacturing Processes
- Industry 4.0
- Aachen
- Q4 2021

5G in Semiconductor Factory
- Industry 4.0
- Reutlingen
- Q4 2021

5G SOLUTIONS
5G Solutions For European Citizens

Time-critical process optimization inside digital factories
- Factory of the Future
- Brussels
- Q2-2021 - Q3-2022

Non-time-critical communication inside the factory
- Factory of the Future
- Brussels, Ireland, Trondheim
- Q2-2021 - Q3-2022

Remotely controlling digital factories
- Factory of the Future
- Brussels, Trondheim
- Q2-2021 - Q3-2022

Connected goods
- Factory of the Future
- Brussels
- Q2-2021 - Q3-2022

Rapid deployment, auto/re-configuration, testing of new robots
- Factory of the Future
- Trondheim
- Q2-2021 - Q3-2022

Industrial Demand Side Management
- Smart Energy
- Turin
- Q3-2020 - Q3-2022
<table>
<thead>
<tr>
<th>Category</th>
<th>Location</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Vehicle (EV) Smart Charging</td>
<td>Turin</td>
<td>Q3-2020 - Q3-2022</td>
</tr>
<tr>
<td>Electricity network frequency stability</td>
<td>Turin</td>
<td>Q3-2020 - Q3-2022</td>
</tr>
<tr>
<td>Smart city co-creation</td>
<td>Trondheim</td>
<td>Q4-2021 - Q3-2022</td>
</tr>
<tr>
<td>Smart buildings / Smart campus</td>
<td>Dublin</td>
<td>Q3-2020 - Q3-2022</td>
</tr>
<tr>
<td>Autonomous assets and logistics for smart harbour/port</td>
<td>Herøya (Norway)</td>
<td>Q1-2021 - Q3-2022</td>
</tr>
<tr>
<td>Port Safety: monitor &amp; detect irregular sounds</td>
<td>Herøya (Norway)</td>
<td>Q3-2021 - Q3-2022</td>
</tr>
<tr>
<td>Ultra High-Fidelity Media</td>
<td>Patras</td>
<td>Q3-2020 - Q2-2022</td>
</tr>
<tr>
<td>Multi CDN selection</td>
<td>Patras</td>
<td>Q4-2021 - Q2-2022</td>
</tr>
<tr>
<td>On-site Live Event Experience</td>
<td>Patras, Norway</td>
<td>Q3-2021 - Q2-2022</td>
</tr>
<tr>
<td>User &amp; Machine Generated Content</td>
<td>Patras</td>
<td>Q3-2020 - Q2-2022</td>
</tr>
<tr>
<td>Immersive and Integrated Media and Gaming</td>
<td>Patras</td>
<td>Q3-2020 - Q2-2022</td>
</tr>
</tbody>
</table>
### Cooperative Media Production
- Media & Entertainment
- Patras
- Q3-2020 - Q2-2022

### Multi-vertical concurrent usage of 5G slices
- Many
- Norway, Turin and Patras
- Q3-2021 - Q4-2022

### 5G-TOURS
**Smart Mobility, Media And E-Health For Tourists And Citizens**

#### Augmented tourism experience
- Smart Cities (Tourism)
- Turin
- Q2 2020

#### Telepresence
- Smart Cities (Tourism)
- Turin
- Q2 2020

#### Robot-assisted museum guide and monitoring
- Enhanced Tourism
- Turin
- Q4-2020 Q3-2021 Q3-2022

#### High quality video services distribution
- Media
- Turin
- Q3-2020 - Q2-2022

#### Remote and distributed video production
- Media
- Turin
- Q2 2020 - Q2 2021

#### Remote health monitoring and emergency situation notification
- e-Health
- Rennes
- Q3-2020 - Q2-2022

#### Teleguidance for diagnostics and intervention support
- e-Health
- Rennes
- Q3-2020 - Q2-2022
Wireless operating room
- e-Healt
- Rennes
- Q3-2020 - Q2-2022

Optimal ambulance routing
- e-Health
- Rennes
- Q3-2020 - Q2-2022

Smart Airport parking management
- Transport & Logistics
- Athens
- Q3-2020 – Q1-2022

Video-enhanced ground-based moving vehicles
- Transport & Logistics
- Athens
- Q3-2020 – Q1-2022

Emergency airport evacuation
- Transport & Logistics
- Athens
- Q3-2020 – Q1-2022

Excursion on an AR/VR-enhanced bus
- Transport & Logistics
- Athens
- Q3-2020 – Q1-2022

5G-VICTORI
Vertical Demos Over Common Large Scale Field Trials for Rail, Energy And Media Industries

eMBB under high speed mobility in Rail environments
- Transport & Logistics
- Patras
- 2022

Digital Mobility
- Transport & Logistics
- Bristol, Berlin, Alba Iulia Municipality
- Q4 2022 - Q2 2023 - Q2 2022

Critical services for railway systems
- Transport & Logistics
- Berlin
- Q2 2023
### Factories of the Future: Digital Utilities
- Industry
- Patras
- Q2 2023

### CDN services in dense static and mobile environments
- Media & Entertainment
- Berlin, Patras
- Q2 2023

### Energy metering for HV and LV
- Industry
- Patras, Alba Iulia Municipality
- Q2 2023 - Q2 2022

### 5G CLARITY
#### Beyond 5G Multi-Tenant Private Networks Integrating Cellular, Wi-Fi, And LiFi, Powered By Artificial Intelligence And Intent Based Policy

#### Wireless multi-service support in Industry 4.0
- Industry Logistics, Industry 4.0
- Madrid
- Q4 2022

#### Enhanced positioning for AGV in intralogistics process
- Industry Logistics, Industry 4.0
- Madrid
- Q4 2022

#### Enabling enhanced human-robot interaction
- Smart City, Tourism
- Bristol
- Q1 2022

### 5G COMPLETE
#### A Unified Network, Computational And Storage Resource Management Framework Targeting End-To-End Performance Optimization For Secure 5G Multi-Technology And Multi-Tenancy Environments

#### 5G-COMPLETE Infrastructure Slices in Support of Smart Energy Metering Services
- Smart Energy, Smart Cities
- Athens
- Q2 2022
5G System over Multi-domain Transport Infrastructure for UHD videos streaming and mobile robots

- Vertical-agnostic (enabler)
- Lannion
- Q2 2023

5G Wireless Transport services with MEC capability for NOs and Advanced Surveillance/Physical Security Service

- Vertical-agnostic (enabler)
- Athens
- Q1 2024

Service Slices Deployment in 5GUK Test Network

- Media and Entertainment, Smart Cities, Gaming
- Bristol
- Q4 2023

INSPIRE-5GPLUS
Intelligent Security And Pervasive Trust For 5G And Beyond

Secured Anticipated Cooperative Collision Avoidance

- Transportation
- Barcelona
- Q4 2022

Definition and assessment of Security and Service Level Agreements and automated remediation

- Vertical-agnostic
- Paris
- Q4 2022

Network attack detection over encrypted traffic in SBA

- Vertical-agnostic
- Madrid, Paris
- Q4 2022

E2E Encryption TEE secured SECaaS

- Vertical-agnostic
- Murcia
- Q4 2022

End-to-End Slice Protection based on Moving Target Defense and Anomaly Detection

- Vertical-agnostic
- Athens
- Q4 2022
<table>
<thead>
<tr>
<th><strong>GDPR aware counterparts for cross-border movement</strong></th>
<th>Vertical-agnostic</th>
<th>Murcia</th>
<th>Q3-2020 - Q2-2022</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intelligent and Secure Management of Shared Resources to Prevent (D)DoS</strong></td>
<td>Vertical-agnostic</td>
<td>Paris</td>
<td>Q3-2020 - Q2-2022</td>
</tr>
<tr>
<td><strong>Security posture assessment and threat visualization of 5G networks</strong></td>
<td>Vertical-agnostic</td>
<td>Athens</td>
<td>Q3-2020 – Q1-2022</td>
</tr>
<tr>
<td><strong>Secure and privacy enabled local 5G infrastructure</strong></td>
<td>Vertical-agnostic</td>
<td>Oulu</td>
<td>Q3-2020 – Q1-2022</td>
</tr>
</tbody>
</table>

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**LOCUS**

**Localization And Analytics On-Demand Embedded In The 5G Ecosystem For Ubiquitous Vertical Applications**

<table>
<thead>
<tr>
<th><strong>Smart Network Management</strong></th>
<th>Smart Cities - multiple verticals</th>
<th>Malaga</th>
<th>Q4 2022</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-driving Objects</strong></td>
<td>Transportation, Factory of the future, Ports - Airports</td>
<td>Livorno Interport</td>
<td>Q4 2022</td>
</tr>
<tr>
<td><strong>People Mobility</strong></td>
<td>Transportation, Smart City, Airports, Tourism</td>
<td>Athens</td>
<td>Q4 2022</td>
</tr>
</tbody>
</table>
**MONB5G**

Distributed management of Network Slices in beyond 5G

- **Zero-Touch Network and service management with end-to-end SLAs**
  - Augmented Reality (AR), Tactile Internet
  - Barcelona
  - Q2 2022

- **AI-assisted policy-driven security monitoring & enforcement**
  - Application-agnostic
  - Sophia-Antipolis
  - Q2 2022

**TERAWAY**

Terahertz Technology For Ultra-Broadband And Ultra-Wideband Operation Of Backhaul And Fronthaul Links In Systems With SDN Management Of Network And Radio Resources

- **Establishment of Photonics-based THz Links**
  - Application-agnostic
  - Athens
  - Q4 2023

- **Demonstration of the feasibility of THz-based Localization Process**
  - Industry 4.0, Application agnostic
  - Athens
  - Q4 2023

- **Backhaul/Fronthaul cellular Connectivity / PtP x-Haul Wireless Links in W/D and THz Bands, integrated in a 5G core network**
  - Application-agnostic
  - Athens
  - Q4 2023

**5G-LOGINNOV**

5G Technologies To Innovate Logistics And Ports For A Sustainable Future

- **Floating Truck & Emission Data, GLOSA & Automated Truck Platooning, Dynamic control loop for environment sensitive traffic management**
  - Industry 4.0 & Automotive
  - Hamburg Port area
  - Q3 2022-Q2 2023
**Optimal selection of yard trucks, Optimal surveillance cameras and video analytics, Predictive Maintenance**

- Industry 4.0, Transport & Logistics
- Athens-Pireus Port area
- Q3 2022-Q2 2023

**Port control, logistics and remote automation, Business critical and mission critical communications**

- Industry 4.0, Transport & Logistics
- Luka Koper Port area
- Q3 2022-Q3 2023

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**5GMETA**

Monetizing Car & Mobility Data For New Entrants, Technologies And Actors

**R&D Live Training Loop-5G**

- Automotive
- San Sebastian
- Q3 2022-Q4 2023

**Networking Parking**

- Smart Cities
- Satory
- Q3 2022-Q4 2023

**Driving Safety & Awareness**

- Automotive
- Turin and Modena
- Q3 2022-Q4 2023

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**5G-RECORDS**

5G Key Technology Enablers For Emerging Media Content Production Services

**Live Audio Production, Multiple Wireless Cameras, Live Immersive Media Production**

- Professional Content Production
- Sophia Antipolis, Aachen, Segovia, Madrid
- Q3 2022, Q3 2022, Q2 - Q3 2022
AFFORDABLE5G
High-tech and affordable 5G network roll-out to every corner

Emergency Communications: critical services system. Service Capacity. Increasing Latency. Main Core Outage
- PPDR
- Malaga, Barcelona
- Q1 - Q2 2022

Smart City Edge Deployment: Detection and Triggering of Emergency Situations. Tracking of Targets
- Smart Cities, Public Safety
- Malaga, Barcelona
- Q1 - Q2 2022

FUDGE-5G
Fully Disintegrated Private Networks For 5G Verticals

Concurrent Media Delivery comprising of Remote Production and Media Showroom
- Media and Entertainment
- Oslo
- Q4 2021 - Q2 2022

Deployable 5G Network for Public Protection and Disaster
- PPDR
- Rygge
- Q4 2021 - Q2 2022

5G Virtual Office for Hospitals
- e-Health
- Oslo
- Q4 2021 - Q2 2022

Industry 4.0 Campus Network
- Industry 4.0
- Oslo
- Q4 2021 - Q2 2022

Interconnected NPNs
- Eduroam, Industry4.0, inter-connecting Football Stadiums
- Oslo, Valencia, Berlin
- Q3 2022, Q4 2022
### INT5GENT
**Integrating 5G Enabling Technologies In A Holistic Service**

<table>
<thead>
<tr>
<th>Service Description</th>
<th>Location</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring, Maintenance and Security Services for Critical Infrastructures, (in the presence of other Telecom Operator Services)</td>
<td>Barcelona</td>
<td>Q4 2022 - Q4 2023</td>
</tr>
<tr>
<td>High-capacity Connectivity to FWA Terminals and Self-organising Nodes, with enhanced Baseband Signal Processing and Data Processing at the Edge</td>
<td>Athens</td>
<td>Q1 2024 – Q2 2024</td>
</tr>
<tr>
<td>Portable 5G Mobile System with Cloud native Capabilities and AI-based Edge Analytics</td>
<td>Athens</td>
<td>Q1 2024 – Q2 2024</td>
</tr>
</tbody>
</table>

### 5G-BLUEPRINT
**Next Generation Connectivity For Enhanced, Safe & Efficient Transport & Logistics**

<table>
<thead>
<tr>
<th>Service Description</th>
<th>Location</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automated barge control</td>
<td>Antwerp, Zelzate</td>
<td>Q3-Q4 2022, Q1-Q3 2023</td>
</tr>
<tr>
<td>Automated docking</td>
<td>Vlissingen</td>
<td>Q2-Q4 2022, Q1-Q4 2023</td>
</tr>
<tr>
<td>CACC-based platooning</td>
<td>Antwerp, Vlissingen, Zelzate</td>
<td>Q2-Q4 2022, Q1-Q4 2023</td>
</tr>
<tr>
<td>Remote takeover</td>
<td>Antwerp, Vlissingen, Zelzate</td>
<td>Q2-Q4 2022, Q1-Q4 2023</td>
</tr>
</tbody>
</table>
### 5GMED

**Sustainable 5G Deployment Model For Future Mobility In The Mediterranean Cross-Border Corridor**

**Small-scale trials: Remote Driving UC, Road Infrastructure, Digitalisation UC, Follow-ME Infotainment UC**
- **Automotive**
  - Cross-border scenarios
  - Castelloli, Paris-Satory, E-15 highway in cross-border
- **Q3 - Q4 2023**

**Small-scale trials: Future Railway Mobile Communications UC**
- **Railways**
  - Cross-border scenarios
  - Rail track in cross-border area using LFP maintenance train
- **Q3 - Q4 2023**

**Large-scale trials: Remote Driving UC, Road Infrastructure Digitalisation UC, Follow-ME Infotainment UC**
- **Automotive**
  - Cross-border scenarios
  - E-15 highway in cross-border
- **Q2 2024**

**Large-scale trials: Future Railway Mobile Communications UC**
- **Railways**
  - Cross-border scenarios
  - Rail track in cross-border area using TGV train (SNCF)
- **Q2 2024**

### 5G-ROUTES

**5th Generation Connected And Automated Mobility Cross-Border EU Trials**

**See-Through Platooning**
- **Terrestrial Ecosystem, Automated Driving, URLCC + eMBB**
  - Latvian Estonian border, Valka/Valga
- **Q2 2024**

**Sharing perception and road hazard at the border for connected and automated driving**
- **Terrestrial Ecosystem, Awareness Driving, URLCC**
  - Latvian Estonian border, Valka/Valga
- **Q2 2024**
### 3D Real-time Virtual Collaboration on the Go, Railway Passengers
- **Terrestrial Ecosystem, Uninterrupted Infotainment Passenger Service on the Go, eMBB + URLCC**
- **Latvian Estonian border, Valka/Valga**
- **Q2 2024**

### 360 Immersive Multiuser Gaming on the Go
- **Terrestrial & Maritime Ecosystem, Uninterrupted Infotainment Passenger Service, URLCC**
- **Latvian-Estonian border, Valka/Valga, Gulf of Finland (Helsinki-Tallinn)**
- **Terrestrial: Q2 2024**
- **Maritime: Q3/24**

### Connected logistics
- **Maritime Ecosystem, Multimodal Services, mMTC**
- **Gulf of Finland (Helsinki-Tallinn)**
- **Q3 2024**

### Live video streaming between ferries and between ferry and harbour at cross-border
- **Maritime Ecosystem, eMBB**
- **Gulf of Finland (Helsinki-Tallinn)**
- **Q3 2024**

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### 5GRAIL

#### 5G For Future Railway Mobile Communication System

**ETCS, ATO , Operational voice and Railway Emergency Communication (REC) (optional, with MCX over the top solution) PIS**
- **Railways**
- **Laboratory tests / Montigny (Ile-de-France) - France**
- **Q1 2022-Q1 2023**

**ETCS, Operational voice and Railway Emergency Communication (REC), TCMS, Critical video, Non critical video**
- **Railways**
- **Laboratory tests / Budapest-Hungary**
- **Q1- Q4 2023**

**ETCS, ATO, Remote Vision (sub-system of the remote driving system)**
- **Railways**
- **Fields tests / Vigneux -sur-Seine (Ile-de-France) - France**
- **Q1 2023 – Q3 2023**
**5G Application & Services Experimentation And Certification Platform**

**Vehicle Route Optimizer in a Virtual OBU’s with Interdomain Support and Privacy Preserving**
- **5GASP**
- **Automotive**
- **Aveiro, Murcia, Bucharest**
- **Q2 2023**

**Autonomous Vehicle Teleoperations / Remote Driving**
- **5G-EPICENTRE**
- **Automotive / PPDR**
- **Murcia, Bristol, Patras**
- **Q2 2023**

**5G Network Resilience and Privacy in the International PPDR Operations**
- **5G-EPICENTRE**
- **PPDR**
- **Patras, Ljubljana, Aveiro, Bristol**
- **Q2 2023**

**5G Experimentation Infrastructure Hosting Cloud-Native Netapps For Public Protection And Disaster Relief**

**Multimedia MC Communication and Collaboration Platform**
- **5G-EPICENTRE**
- **PPDR, Public Safety**
- **Spain, Germany, Portugal**
- **2023-2024**

**Multi-agency and multi-deployment mission critical communications and dynamic service scaling**
- **5G-EPICENTRE**
- **PPDR, Public Safety**
- **Spain, Germany, Portugal**
- **2023-2024**

**ETCS, TMCS, Operational voice and Railway Emergency Communication (REC)**
**TCMS, Critical video, Non critical video**
- **Railways**
- **Fields tests / Erzgebirge - Germany**
- **Q1 2023- Q3 2023**

**5G Network Resilience and Privacy in the International PPDR Operations**
- **Murcia, Bristol, Patras**
- **Spain, Germany, Portugal**
- **Q2 2023**

**ETCS, TMCS, Operational voice and Railway Emergency Communication (REC)**
**TCMS, Critical video, Non critical video**
- **Railways**
- **Fields tests / Erzgebirge - Germany**
- **Q1 2023- Q3 2023**
Ultra-reliable drone navigation and remote control
- PPDR, Public Safety
- Spain, Germany, Portugal
- 2023-2024

IoT for improving first responders’ situational awareness and safety
- PPDR, Public Safety
- Spain, Germany, Portugal
- 2023-2024

Wearable, mobile, point-of-view, wireless video service delivery
- PPDR, Public Safety
- Spain, Germany, Portugal
- 2023-2024

Fast situational awareness and near real-time disaster mapping
- PPDR, Public Safety
- Spain, Germany, Portugal
- 2023-2024

AR and AI wearable electronics for PPDR
- PPDR, Public Safety
- Spain, Germany, Portugal
- 2023-2024

AR-assisted emergency surgical care
- PPDR, Public Safety
- Spain, Germany, Portugal
- 2023-2024

5G-ERA
5G Enhanced Robot Autonomy

5G enhanced robot autonomy
- PPDR
- Semi-autonomous transport
- Healthcare robots
- Industrial 4.0
- Athens, Valencia
- Brno
- Valencia
- Cambridge, Rende
- Q3-Q4 2023
- Q3-Q4 2023
- Q1-Q2 2024
- Q1-Q2 2024
<table>
<thead>
<tr>
<th>Application</th>
<th>Description</th>
<th>Location</th>
<th>Timeframe</th>
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<tbody>
<tr>
<td>Remote Driving (Remote Assistance)</td>
<td>Automotive - Public safety Vehicle Movement and image processing</td>
<td>Ulm, Ljubljana</td>
<td>Q2 2023 - Q1 2024</td>
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<tr>
<td>Manoeuvres Coordination for Autonomous Driving</td>
<td>Automotive – Safety Vehicle Movement and image processing</td>
<td>Ulm</td>
<td>Q2 2024</td>
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<tr>
<td>Virtual Bus Tour</td>
<td>Automotive - Media Infotainment</td>
<td>Ulm</td>
<td>Q1 2024</td>
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<tr>
<td>AR Content Delivery for Vehicular Networks</td>
<td>Automotive – Smart city Site info collection and display</td>
<td>Ulm, Ljubljana</td>
<td>Q1 2024</td>
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<tr>
<td>Parking Circulation and High-risk Driving Hotspot Detection</td>
<td>Automotive – Safety, Smart Traffic Planning</td>
<td>Ulm</td>
<td>Q2 2024</td>
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<tr>
<td>Network Status Monitoring</td>
<td>Generic (incl. Automotive)</td>
<td>Ulm, Ljubljana</td>
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</tr>
<tr>
<td>Situational Awareness in Cross Border Tunnel Accidents</td>
<td>Automotive – Public Safety, Data sharing and action coordination</td>
<td>Ulm, Ljubljana</td>
<td>Q2 2024</td>
</tr>
</tbody>
</table>
5G-INDUCE
Open Cooperative 5G Experimentation Platforms For The Industrial Sector NetApps

**Autonomous Indoor Fleet Management**
- Industry 4.0, Indoor logistics - AGV Control
- Valencia
- Q4 2023

**Smart Operation based on Human Gesture Recognition**
- Industry 4.0, Internal logistics - AGV Control
- Valencia
- Q4 2023

**VR Immersion and AGV Control**
- Industry 4.0, Internal logistics - AGV Control
- Valencia
- Q4 2023

**ML-Supported Edge Analytics for Predictive Maintenance**
- Industry 4.0, Predictive Maintenance & Faults' management
- Genoa, Athens
- Q2 2024

**Inspection (corrosion detection) and Surveillance Services for Critical Infrastructures**
- Industry 4.0, RT drone video processing and alerting
- Athens
- Q4 2023

**AR-based Remote Maintenance, Repairing and Upgrade**
- Industry 4.0, Remote Maintenance and guidance
- Athens, Genoa
- Q2 2023

**Smart indoor Logistics and work safety Operations**
- Industry 4.0, Indoor Logistics and safety
- Genoa
- Q1 2024

**Drone assisted Network Performance and Coverage Monitoring for Industrial Infrastructures**
- Network Monitoring
- Genoa
- Q1 2024
### 5G MEDIA HUB

**5G Experimentation Environment For 3rd Party Media Services**

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<th>Application</th>
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<th>Location</th>
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<tr>
<td>Immersive AR, VR and XR applications</td>
<td>Media &amp; Entertainment</td>
<td>Barcelona and Norway</td>
<td>Q1 2024</td>
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<tr>
<td>Smart Media Production</td>
<td>Media &amp; Entertainment</td>
<td>Barcelona and Norway</td>
<td>Q1 2024</td>
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<tr>
<td>Smart media content distribution</td>
<td>Media &amp; Entertainment</td>
<td>Barcelona and Norway</td>
<td>Q1 2024</td>
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### EVOLVED-5G

**Experimentation And Validation Openness For Longterm Evolution Of Vertical Industries In 5G Era And Beyond**

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<th>Location</th>
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<tbody>
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<td>Industry</td>
<td>Malaga, Athens</td>
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<tr>
<td>Security Guarantees and Risk Analysis for the FoF Communication and Management Systems</td>
<td>Industry</td>
<td>Malaga, Athens</td>
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<tr>
<td>Agility in the Production Line Infrastructure through Automation and Robotic Parts</td>
<td>Industry</td>
<td>Malaga, Athens</td>
<td>Q4 2022-2023</td>
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</table>
**SMART5GRID**

**Demonstration Of 5G solutions For Smart Energy Grids Of The Future**

- **IP monitoring tool for supporting advanced grid automation**
  - Energy
  - Olbia, Sardinia
  - Q1 2024

- **Remote Inspection of Automatically Delimited Working Areas at Distribution Level**
  - Energy
  - Barcelona
  - Q1 2024

- **Millissecond Level Precise Distribution Generation Monitoring (+Control)**
  - Energy
  - Bulgaria
  - Q1 2024

- **Real-time Wide Area Monitoring**
  - Energy
  - Greece
  - Q1 2024

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**VITAL-5G**

**Vertical Innovations In Transport And Logistics Over 5G Experimentation Facilities**

- **Assisted Vessel Transport**
  - Transport & Logistics
  - Port of Antwerp
  - Q2 2022 – Q2 2024

- **5G Connectivity and Data-enabled Assisted Navigation using IoT Sensing and Video Cameras**
  - Transport & Logistics
  - Galati, Danube river port
  - Q2 2022 – Q2 2024

- **Automation & Remote Operation of Freight Logistics (Warehouse Logistics)**
  - Transport & Logistics
  - Athens
  - Q2 2022 – Q2 2024
6G BRAINS
Bringing Reinforcement Learning Into Radio Light Network For Massive Connections

<table>
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<th>Project Description</th>
<th>Industry</th>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
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<tr>
<td>THz Communication in Industry 4.0 Manufacturing</td>
<td>Industry 4.0</td>
<td>Blaichach</td>
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<tr>
<td>Optical Wireless Communication in Industry 4.0 Manufacturing</td>
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<td>Blaichach</td>
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<td>Sub 6GHz Communication in Industry 4.0 for TDoA Uplink Location Estimation</td>
<td>Industry 4.0</td>
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<tr>
<td>Sub 6GHz and mmWave Communication in Industry 4.0 for AoA Beam Steering and TDoA Uplink and OWC Downlink RSS Location Estimation using Data Fusion</td>
<td>Industry 4.0</td>
<td>Israel, UK</td>
<td>Q3 2023</td>
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AI@EDGE
A Secure And Reusable Artificial Intelligence Platform For Edge Computing In Beyond 5G Networks

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<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
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<tr>
<td>Virtual Validation of Vehicle Cooperative Perception</td>
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<tr>
<td>Secure and Resilient Orchestration of Large (I)IoT Networks</td>
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<td>Kaiserslautern</td>
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<td>Edge AI Assisted Monitoring of Linear Infrastructures using Drones in BVLOS Operation</td>
<td>Drones</td>
<td>Madrid</td>
<td>Q4 2023</td>
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<tr>
<td>Smart Content &amp; Data Curation for in-Flight Entertainment Services Operation</td>
<td>Aviation</td>
<td>Munich</td>
<td>Q4 2023</td>
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DAEMON
Network Intelligence For Adaptive And Self-Learning Mobile Networks

Data-driven resource orchestration
Telecom  London  Q4 2023 – Q1 2024

Proactive anomaly detection for IoT services in a global roaming platform
Telecom  Madrid  Q4 2023 – Q1 2024

DEDICAT 6G
Dynamic Coverage Extension And Distributed Intelligence For Human Centric Applications With Assured Security, Privacy, And Trust: From 5G To 6G

Smart Warehousing: Optimized Automated Real-Time Monitoring, Surveillance and Operations for Smart Warehousing
Smart warehousing, Logistics, Manufacturing, Telecom  Athens  Q4 2022 - 4Q23

Enhanced Experience: Dynamic Video Offloading and Mobile Adaptation for Live Performances at Public Venues (Real or Virtual)
Media & Entertainment, Telecom  Oulu, Surrey  Q4 2022 - 4Q23

Public Safety: Efficient, Reliable End-to-End Disaster Management also addressing Cases of Damaged Network Infrastructure
Public Safety, Telecom  Elancourt  Q4 2022 - 4Q23

Smart Highway: Enhancing V2X Communication in Smart Highway
Smart Highway, Automotive, Smart cities, Telecom  Wommelgem, Annaberg-Bucholz  Q4 2022 - 4Q23
### MARSAL

**Machine Learning-Based, Networking And Computing Infrastructure Resource Management Of 5G And Beyond Intelligent Networks**

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<tr>
<th>_dense_user-generated content distribution with mmWave fronthauling</th>
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<tr>
<td>🌟 <strong>Dense User-Generated Content distribution with mmWave Fronthauling</strong></td>
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<tr>
<th>Ultra-dense video traffic delivery in a converged Fixed-Mobile network</th>
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<tr>
<td>🌟 <strong>Ultra-dense video traffic delivery in a converged Fixed-Mobile network</strong></td>
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<td>🌟 Smart cities, Media &amp; Entertainment, Telecom</td>
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<thead>
<tr>
<th>Cognitive Assistance and Smart Connectivity for next-generation sightseeing</th>
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<tbody>
<tr>
<td>🌟 <strong>Cognitive Assistance and Smart Connectivity for next-generation sightseeing</strong></td>
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<td>🌟 Smart cities, Tourism, Telecom</td>
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<tr>
<th>Data security and privacy in multi-tenant infrastructures</th>
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<tbody>
<tr>
<td>🌟 <strong>Data security and privacy in multi-tenant infrastructures</strong></td>
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<tr>
<td>🌟 Smart cities, Telecom</td>
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### RISE-6G

**Reconfigurable Intelligent Sustainable Environments For 6G Wireless Networks**

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<th>Boosting the 5G connectivity via RIS-empowered network in a train station</th>
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<tr>
<td>🌟 <strong>Boosting the 5G connectivity via RIS-empowered network in a train station</strong></td>
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<tr>
<td>🌟 Transportation</td>
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<table>
<thead>
<tr>
<th>5G localisation via RIS-based infrastructure in a factory environment</th>
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<tbody>
<tr>
<td>🌟 <strong>5G localisation via RIS-based infrastructure in a factory environment</strong></td>
</tr>
<tr>
<td>🌟 Industry, Telecom</td>
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# TeraFlow

Secured Autonomic Traffic Management For A Tera Of SDN Flows

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
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<tbody>
<tr>
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<td>Telecom</td>
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<td>Q2 2023</td>
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<tr>
<td>Flow Management in Multi-domain scenarios</td>
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<tr>
<td>Resilience and Cybersecurity in B5G Networks</td>
<td>Telecom</td>
<td>Madrid</td>
<td>Q2 2023</td>
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</tbody>
</table>
EDITORS & CHAMPIONS
The editors of this PPP Trials & Pilots (T&Ps) Brochure are Didier Bourse (Nokia), Alexandros Kaloxylos (6G-IA), Mikael Fallgren (Ericsson), Carles Anton (CTTC), Costas Trichias (6G-IA), Claudio De Majo (TRUST-IT), Carole Manero (IDATE) and Miguel Alarcón (Martel).

The following Table summarizes the key PPP projects Technical Managers and Deputies who contributed to the overall PPP projects and program achievements and to this PPP projects Trials & Pilots (T&Ps) Brochure. Note that this Brochure included all T&Ps from PPP Phase 2 and Phase 3 projects.

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<th>PPP PROJECTS PHASE I</th>
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<td>Xavier Costa and Xi L</td>
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<td>5G-ENSURE</td>
<td>Pascal Bisson and Emmanuel Dotaro</td>
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<td>5GEx</td>
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<td>5G-NORMA</td>
<td>Mark Doll and Peter Rost</td>
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<td>5G-XHAUL</td>
<td>Daniel Camps and Jesus Gutierrez Teran</td>
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<td>CHARISMA</td>
<td>Shuaib Siddiqui and Michael Parker</td>
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<td>Martin Tolan and Diego Lopez</td>
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<td>FANTASTIC-5G</td>
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<td>Miquel Payaro and Nikolaos Bartzoudis</td>
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<td>METIS-II</td>
<td>Hans-Peter Mayer and Michal Maternia</td>
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<td>mmMAGIC</td>
<td>Miurel Tercero and Dan Warren</td>
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<td>SELFNET</td>
<td>Jose Alcaraz-Calero and Qi Wang</td>
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<td>SESAME</td>
<td>Tasos Kourtis and Ioannis Giannoulakis</td>
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<td>SONATA</td>
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<td>SPEED5G</td>
<td>Seiamak Vahid and Panagiotis Demestichas</td>
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<td>Bessem Sayadi</td>
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<td>VirtuWind</td>
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<td>Felipe Huici and Gino Carrozzo</td>
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<td>Ioannis Giannoulakis and Fotis Lazarakis</td>
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<td>PPP PROJECTS PHASE II</td>
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<th>ICT-42</th>
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