5G Validation Trials for the Healthcare, Transport and Aquaculture Industries

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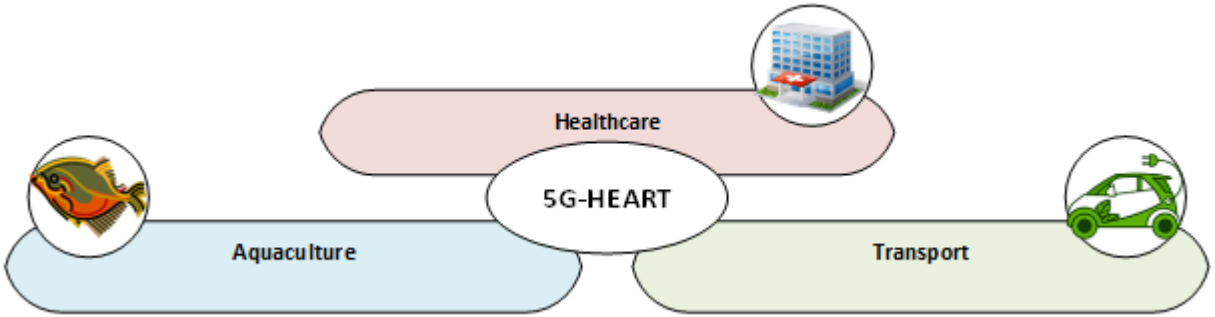
5G HEART project

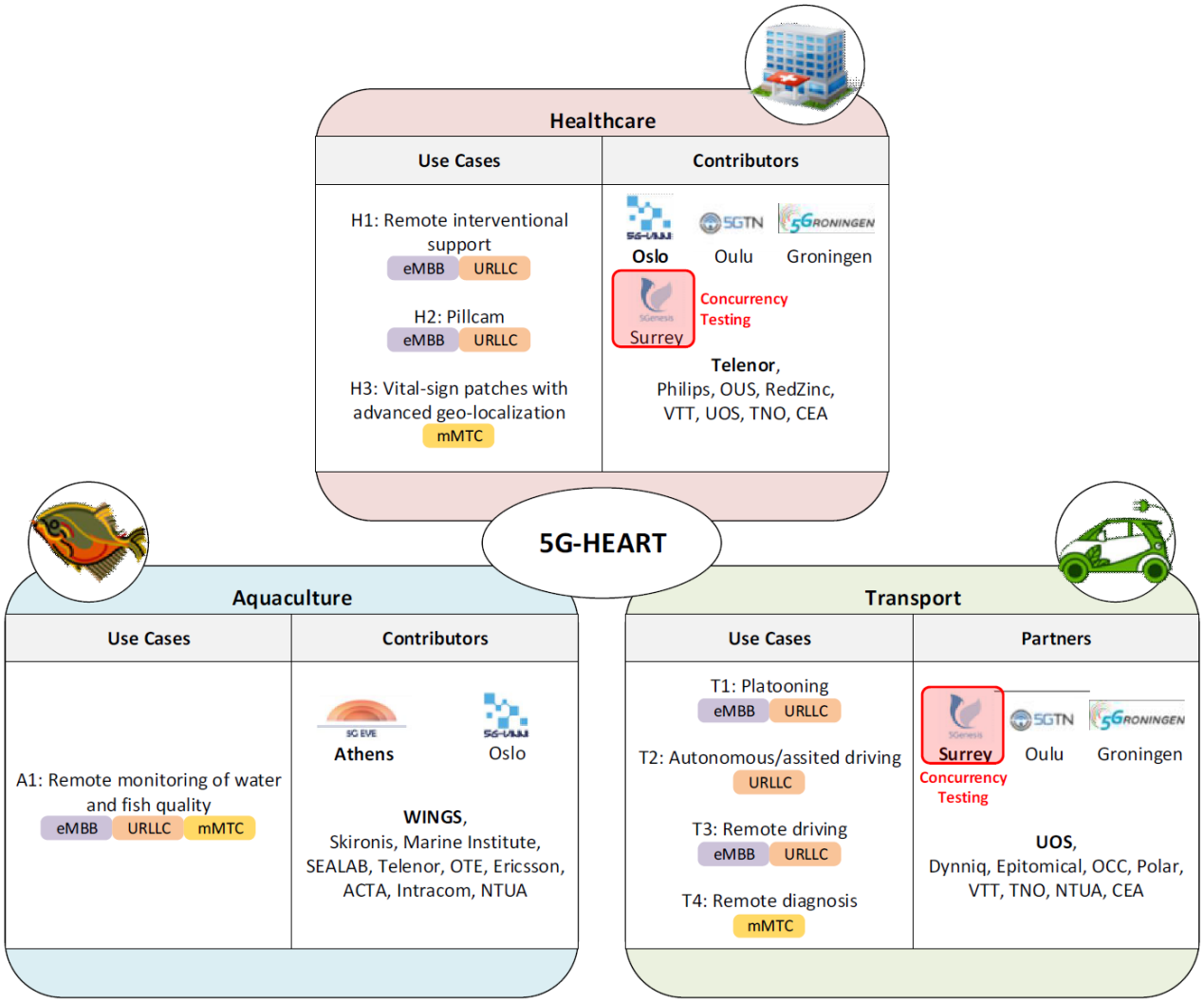
- 5G-HEART: 5G HEalth AquacultuRe and Transport validation trials
- ICT-19-2019 Advanced 5G validation trials across multiple vertical industries
- 21 Participants (shown bellow)
- Start date: 01/06/2019 duration 3 years

5G HEART concept

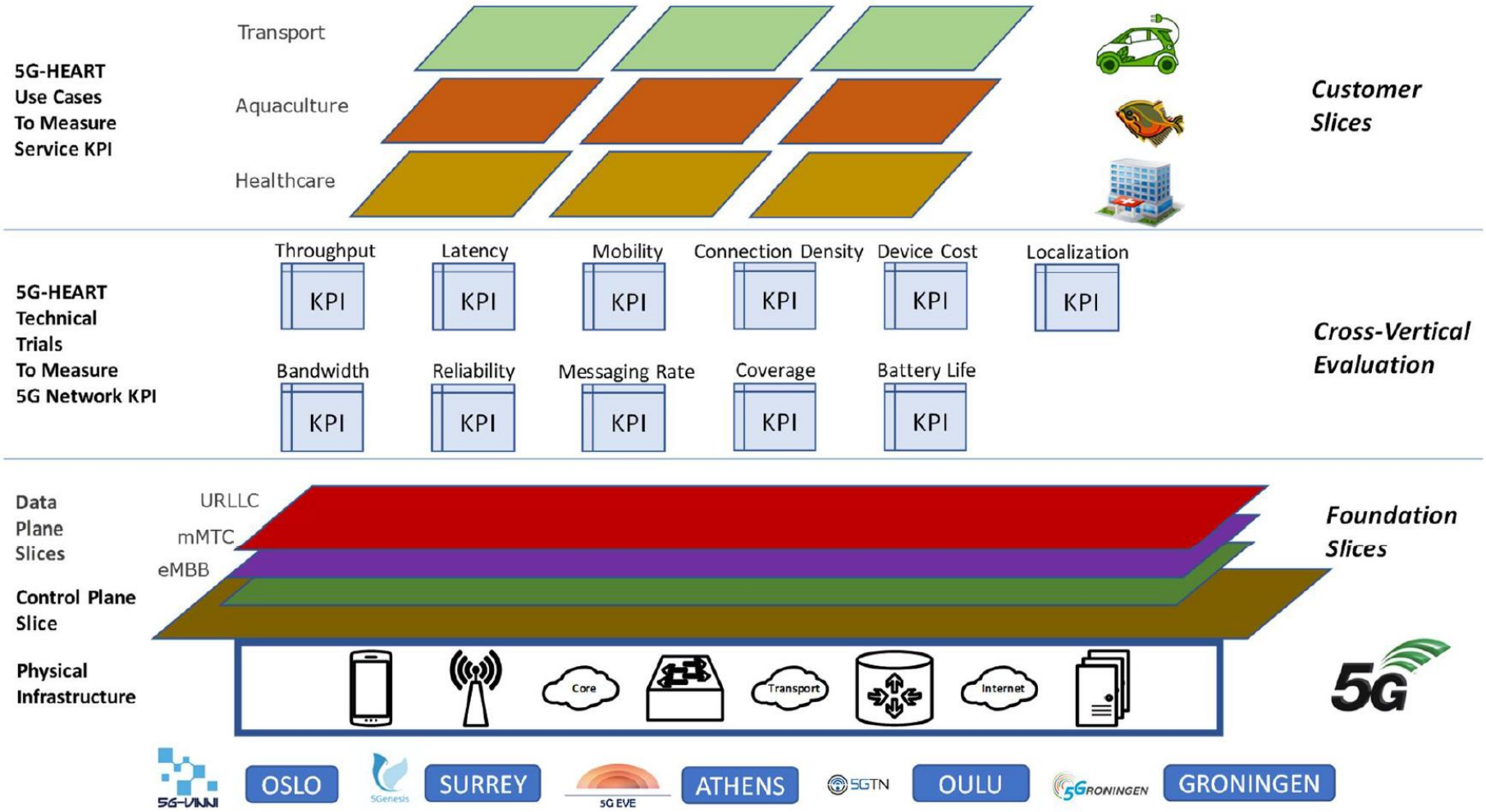
- **Transport**: Advanced driver assistance systems by improving the cooperative automatic driving in such a way that sensor information will be exchanged in real time between thousands of cars connected in the same area. Most foreseen applications cannot be implemented with today's communication technologies.
- **Healthcare**: 5G has huge potential to enhance the quality of experience of surgeons using operating robots by cutting latencies and allowing the remote use of these robots from everywhere. Ultra-low latencies can also allow for real-time artificial perceptions (audio, vision, haptics) and augmented reality. The main use cases identified on healthcare are: Assets and interventions management in Hospital, Robotics, Remote monitoring and Smarter medication.
- **Aquaculture**: Connectivity is the cornerstone of this transformation and IoT a key enabling technology that is increasingly part of agricultural equipment. A key requirement is of course the ability of communication networks to deploy and cover rural areas efficiently.



5G-HEART Ecosystem

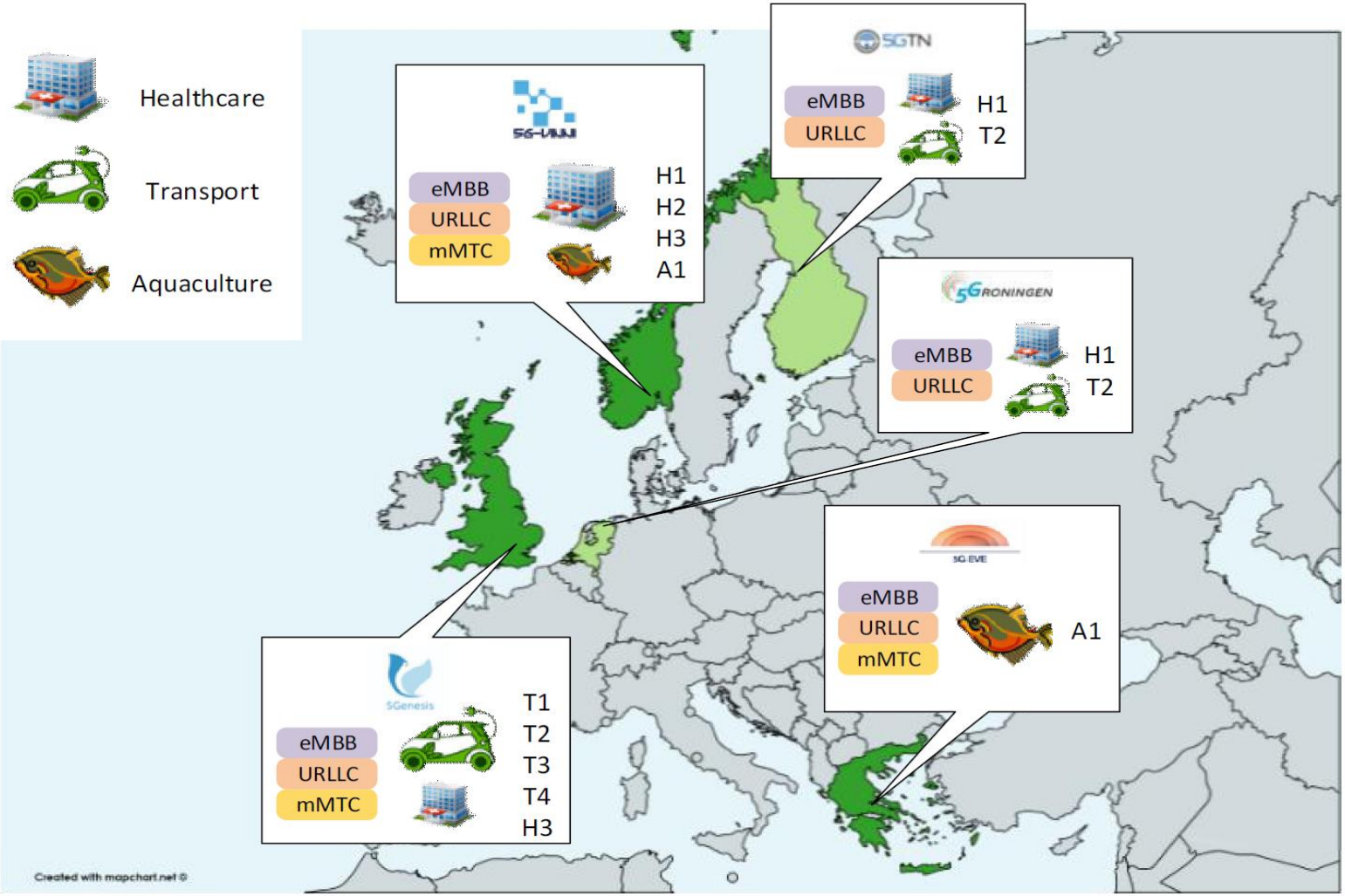


5G-HEART main elements and overall approach



5G HEART

5G-HEART trial sites and use cases



Use cases and scenarios – HealthCare

Scenarios

- Remote interventional support
- The Pillcam
- Vital-sign patches with advanced geolocation

Challenges

- Reliable delivery of real-time high quality video, especially in critical emergency care like ambulance services
- The delivery of patient information wirelessly raises the concern of absolute privacy for the patients
- Localisation of patients in indoor environment, e.g. in hospitals or in (non-instrumented) residential buildings, is subject to dynamic changes of the radio propagation environment

Use cases and scenarios – Transport

Scenarios

- Platooning
- Autonomous/assisted driving
- Support for remote driving
- Vehicle data services

Challenges

- Can 5G networks/infrastructures efficiently support (and scale) in the face of diverse functional and QoS requirements of different transport use case scenarios, simultaneously? How can the concepts of E2E slicing, SDN and mobile edge computing, be applied (and extended) for this purpose?
- Advanced vehicles of the future should not be regarded as a single entity/system, but rather as an expanding system of systems.
- What are the technological gaps and barriers to making the vision of connected/autonomous driving based solely on 5G technology, a reality?

Use cases and scenarios – Aquaculture

Scenarios

Remote monitoring of water and fish quality

Challenges

- Underwater cameras are tethered by wire and connected to a local gateway in a mooring system, and this impacts the design of 5G architecture and management solutions
- Identification and configuration of network parameters that impact device battery lifetime and power consumption
- The realisation of URLLC-based automation and actuation services – e.g. Remotely Operated Vehicles (ROVs), drones and feeding systems – with limited accessibility and in potentially hostile environment/weather (i.e. offshore)

Aquaculture Use Case

Bring to market a new and cost-effective, networked solution to optimize the aquaculture producers' activity

Greek Aquaculture pilot site

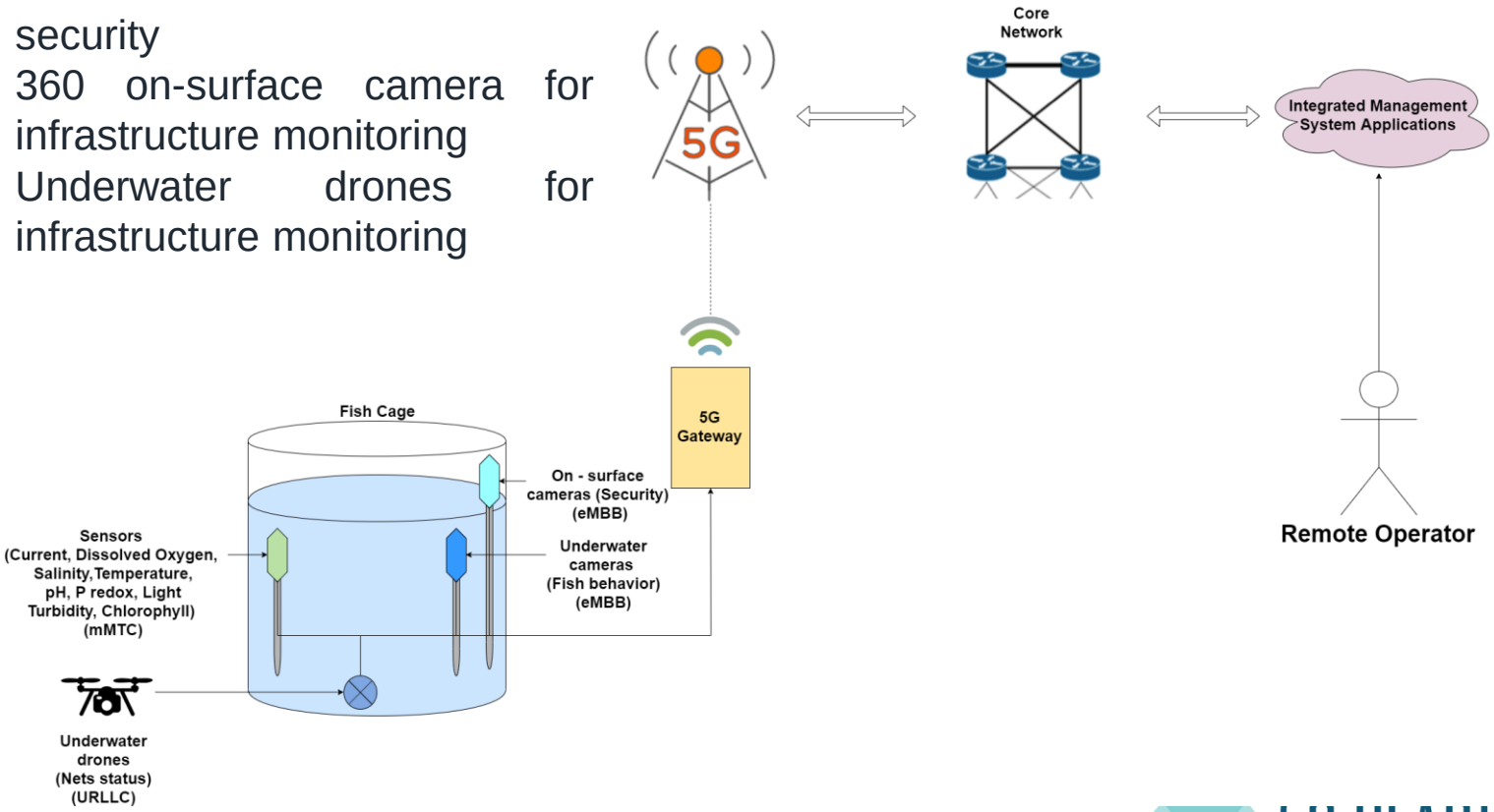
1. Remote monitoring of physical conditions at site
2. Security footage site monitoring
3. Fish monitoring
4. Infrastructure monitoring
5. Autonomous functionality

Test cases

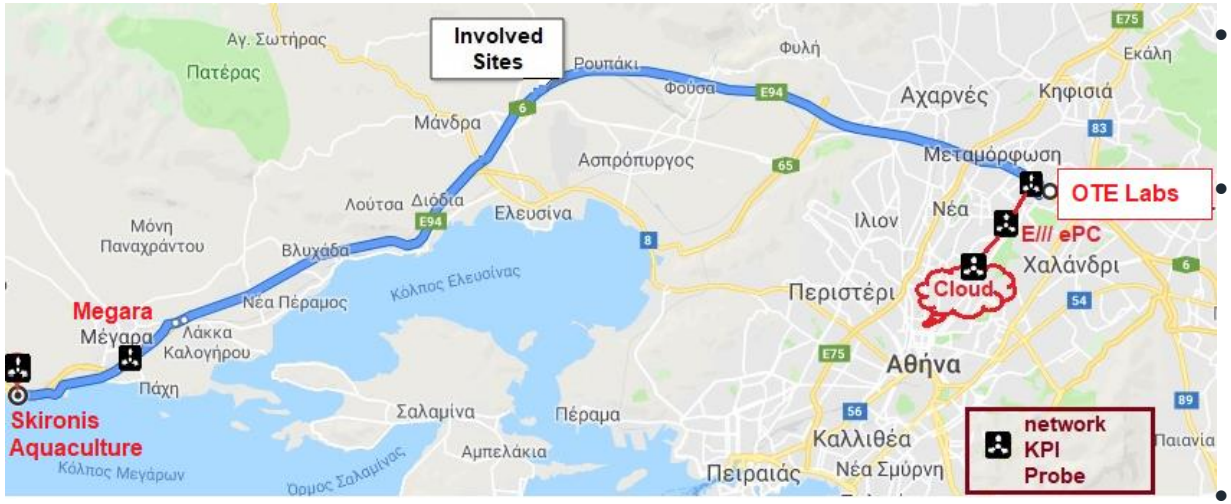
- Remote monitoring of physical conditions at site
- Live stream – transfer and storage of image/video data
- Edge and cloud-based computing
- Cage to cage – on site communication

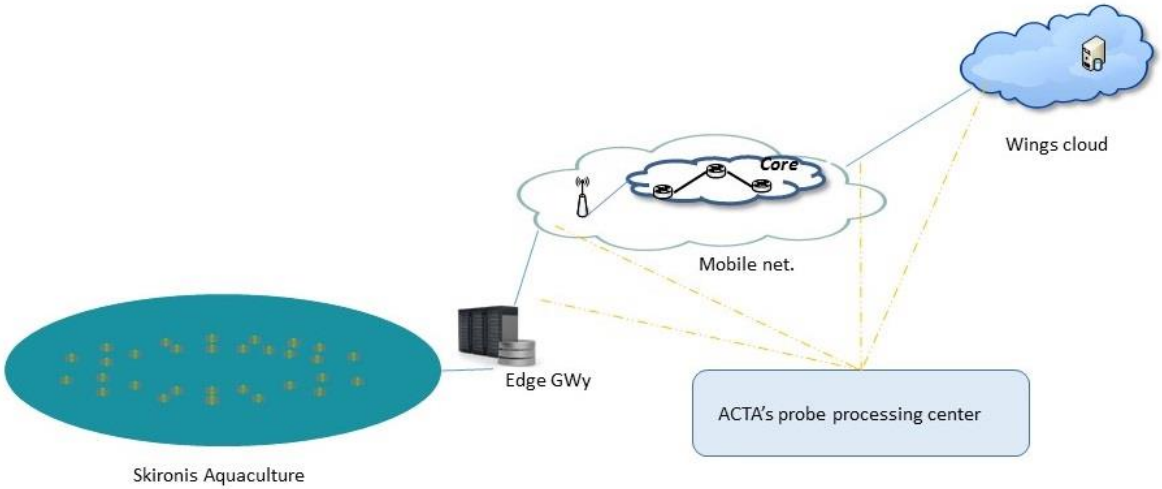
Aquaculture scenario architecture

- Water quality sensors for measuring at real-time parameters like oxygen, temperature, salinity, current, meteorological data
- Underwater cameras for monitoring fish behavior in the cages
- Over the surface cameras for security
- 360 on-surface camera for infrastructure monitoring
- Underwater drones for infrastructure monitoring



Aquaculture platform





- 5G network implemented over fiber optics and 10 Gbps connection.
- The Skironis Aquaculture site will be connected, via the OTE premises at the City of Megara, to the OTE LABs in the OTE-Academy location.
- From there, there will be a connection to the Ericsson ePC and finally reach the Cloud and the Service application (WINGS).
- ACTA Ltd. will install probes for real-time 5G network KPI measurements.

Conclusion

- The 5G for Health, Aquaculture and Transport (5G-HEART) validation trials project performs vertical validation trials on top of all three ICT-17 facilities and two national 5G test platforms with use cases from three different vertical domains.
- The selected verticals for 5G-HEART trials are Aquaculture, as well as Healthcare and Transport, both of which have been identified as priority vertical sectors for Europe,
- There will be a Greek Aquaculture pilot, deployed in Megara, Attica near Athens where the Greek node of 5G-EVE (offered by OTE & E///) is located, and will be exploited to make the 5G network available to the site

Thank you

Q & A