5G-HEART Newsletter

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Issue No.2

5G HEART
5G Health, Aquaculture and Transport Validation Trials

Project website: https://5gheart.org/

INSIDE THIS ISSUE

"5G-HEART develop and execute large scale healthcare, aquaculture and transport trial activities on actual testbed in EU."

Introduction to 5G-HEART

Healthcare, transport and food verticals are hugely important in Europe, in terms of jobs, size (collectively surpassing €3Trillion) and export trade. Moreover, they are vital from a social perspective, for better patient outcomes, safer transportation and safer and more sustainable food production. 5G is important for these verticals, in terms of improvements for utility, efficient processes, safety among others.

5G-HEART as one of 5G PPP Phase 3 projects will deploy innovative digital use cases involving healthcare, transport and aquaculture industry partnerships.

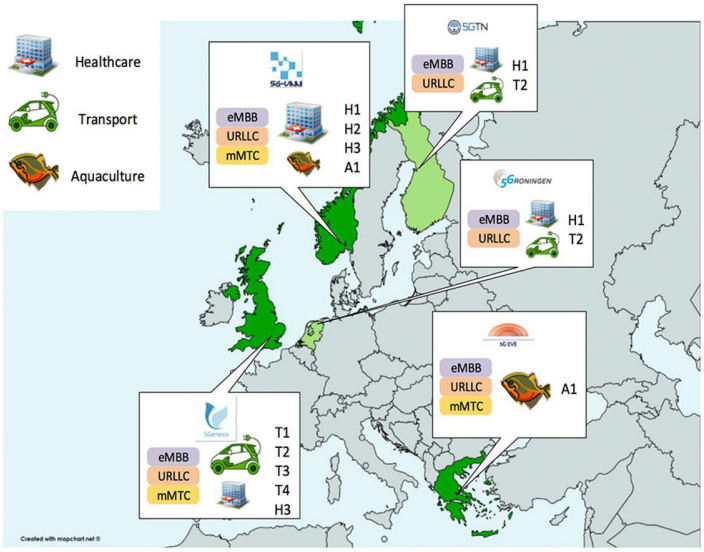


Figure1. 5G-HEART trial sites and use cases

2. Goal of 5G-HEART

The 5G for HEalth, AquacultuRe and Transport (5G-HEART) validation trials project performs vertical validation trials on top of all three ICT-17 facilities (5G-VINNI, 5G-EVE and 5Genesis) and two national 5G test platforms (5GTN and 5Groningen) with use cases from three different vertical domains: healthcare, transport and aquaculture. In the health area, 5G-HEART validates pillcams for automatic detection in screening of colon cancer and vital-sign patches with advanced geo-localization as well as 5G AR/VR paramedic services. In the transport area, 5G-HEART validates autonomous/assisted/remote driving and vehicle data services. Regarding food, 5G-based transformation of aquaculture sector is focused. 5G-HEART takes important steps for progressing the synergy between telecom and vertical industries. These three vertical industries and related connectivity use cases pose diverse technical requirements on wireless network connectivity. In particular, 5G-HEART validates eMBB, URLLC and mMTC services in the setting as illustrated in figure 2.

"5G-HEART validates eMBB, URLLC and mMTC services in three verticals."

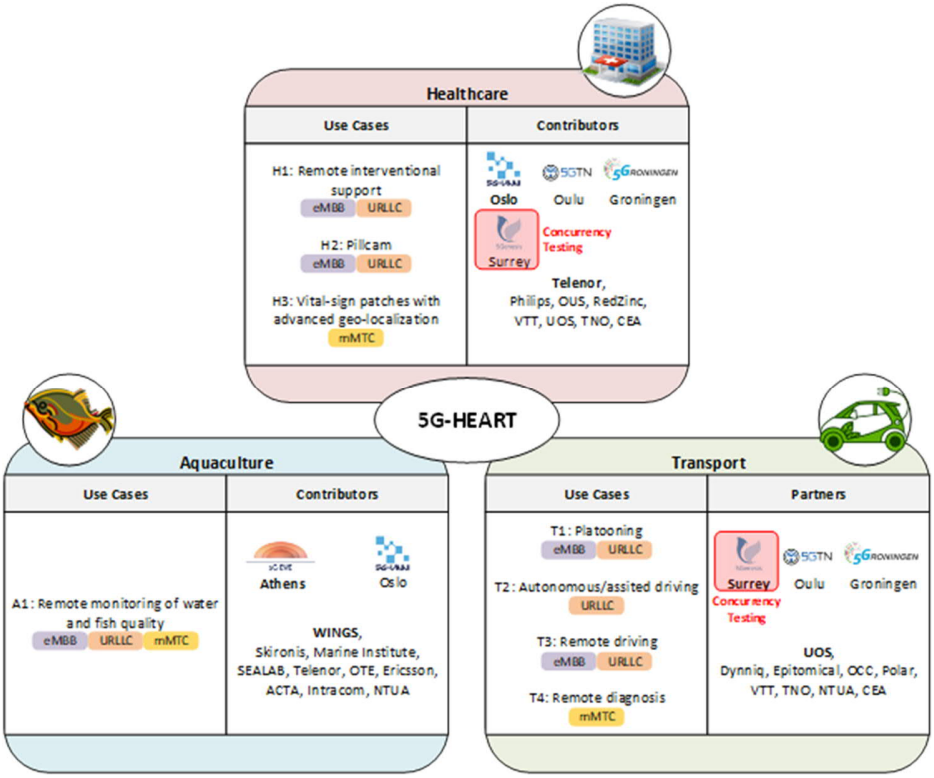


Figure 2. 5G-HEART Ecosystem

3. 5G-HEART use case scenarios and KPIs

5G-HEART analyses network key performance indicators (KPIs) emerging in the considered scenarios/use-cases of all three verticals, Healthcare, Transport and Aquaculture, of 5G-HEART. Table 1 presents the synopsis of the 5G-PPP KPIs and their relevance to 5G HEART.

Table 1. 5G HEART relevance to 5G-PPP KPIs.

Performance Key Performance Indicators		
P1	Providing 1000 times higher wireless area capacity and more varied service capabilities compared to 2010	High
P2	Reducing the average service creation time cycle from 90 hours to 90 minutes	Medium
P3	Facilitating very dense deployments of wireless communication links to connect over 7 trillion wireless devices serving over 7 billion people	Medium
P4	Creating a secure, reliable and dependable internet with a "zero perceived" downtime for services provision	High
Business Key Performance Indicators		
B1	Leverage effect of EU research and innovation funding in terms of private investment in R&D for 5G systems in the order of 5 to 10 times	High
B2	Target SME participation under this initiative commensurate with an allocation of 20% of the total public funding	High
B3	Reach a global market share for 5G equipment & services delivered by European headquartered ICT companies at, or above, the reported 2011 level of 43% global market share in communication infrastructure	N.A.
Societal Key Performance Indicators		
S1	Enabling advanced user-controlled privacy	N.A.
S2	Reduction of energy consumption per service up to 90% (as compared to 2010)	Medium
S3	European availability of a competitive industrial offer for 5G systems and technologies	High
S4	Stimulation of new economically viable services of high societal value like U-HDTV and M2M applications	Medium
S5	Establishment and availability of 5G skills development curricula (in partnership with the EIT)	N.A.

5G-HEART use case scenarios are summarized as follows:

• H1 (H1A “Educational surgery”, H1B “Remote ultrasound examination”, H1C “Paramedic support”, H1D “Critical health event”) – “Remote interventional support” that explores the use of advanced, rich media communications in the context of remote monitoring, education and robotics in patient diagnostics and treatment.

• H2 (H2A “The Pillcam”) – “The Pillcam”, which aims to test real-time transmission with feedback control of a pill camera (capsule video endoscopy) in order to improve diagnosis of cancer or precancerous pathology.

• H3 (H3A “Vital-sign patch prototype”, H3B “Localizable tag”) – “Vital-sign patches with advanced geo-localisation”, whose objective is to explore direct-to-cloud disposable vital-sign patches to enable continuous monitoring of ambulatory patients, anytime and anywhere.

• T1 (T1S1 & T1S2 "High bandwidth in-vehicle situational awareness and see-through for Platooning", T1S3 "Dynamic channel management for traffic progression",) – "Platooning" that considers vehicles forming a tightly coordinated "train" with significantly reduced inter-vehicle distance, thus increasing road capacity and efficiency.

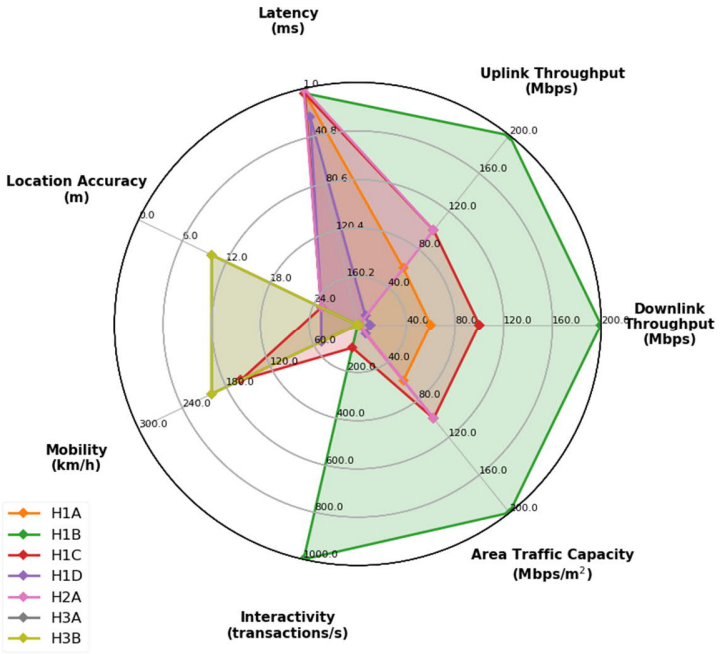
• T2 (T2S1 & T2S2 "Smart junctions and network assisted & cooperative collision avoidance (CoCA)", T2S3 "QoS for advanced driving", T2S4 "Human tachograph") – "Autonomous/assisted driving" which involves semi-automated or fully-automated driving in order to achieve safer traveling, collision avoidance, and improved traffic efficiency.

• T3 (T3S1 "Tele-operated support (TeSo)",) – "Support for remote driving" that enables a remote human operator or a cloud-based application to operate a remote vehicle, and

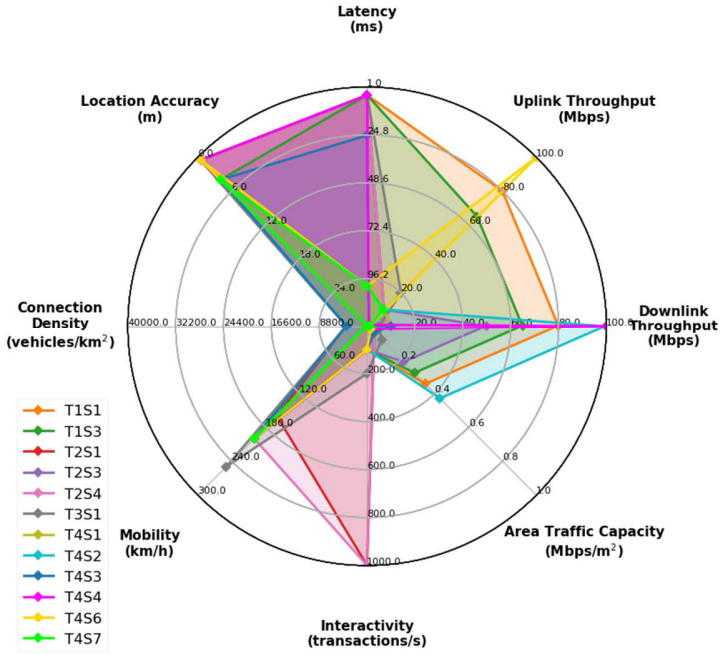
• T4 (T4S1 "Vehicle prognostics", T4S2 "over the air (OTA) updates", T4S3 "Smart traffic corridors", T4S4 "Location-based advertising", T4S6 "Vehicle sourced HD mapping", T4S7 "Environmental services") – "Vehicle data services" that focuses on interconnecting the various third-party data sources and the connected automated vehicles via the available 5G infrastructure.

• A1 (A1S1 "Sensory data monitoring", A1S2 "Camera data monitoring", A1S3 "Automation and actuation functionalities", A1S4 "Edge and cloud-based computing", A1S5 "Cage to cage – on site communication")– "Remote monitoring of water and fish quality"

Figure 3 illustrates the aggregated KPIs of healthcare vertical, transport vertical and aquaculture vertical.



(a)



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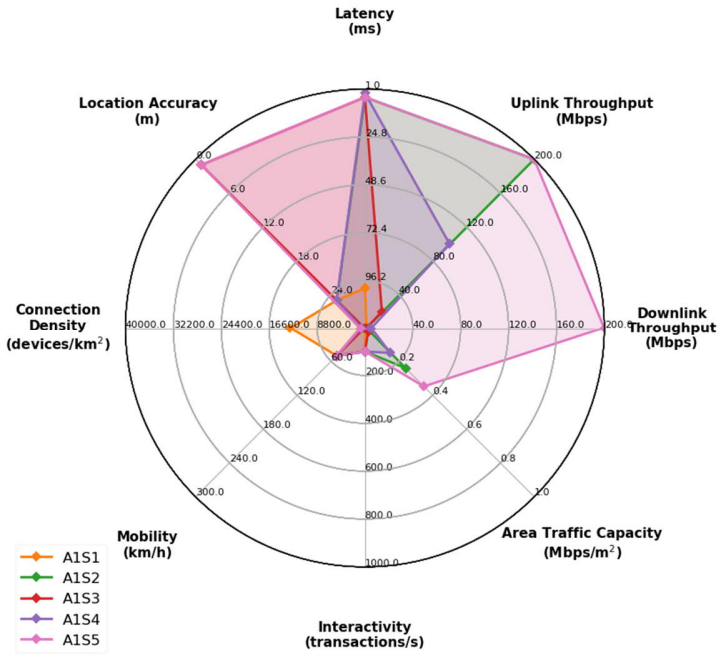

(c)

Figure 3 Aggregated network requirements of healthcare vertical (a), transport vertical (b) and aquaculture vertical (c).

4. Conclusion

5G-HEART defined KPIs for each use case scenario. In the Healthcare vertical, the most stringent requirements included UL - DL throughput, latency, location accuracy, mobility and reliability suggesting the combination of eMBB and URLLC. Energy and power efficiency in relation to coverage turned out to play an important role for use-cases involving battery powered devices suggesting the use of mMTC as well in related scenarios. Regarding the Transport vertical, the most important KPIs that characterised the majority of the scenarios were reliability, location accuracy, latency, mobility, UL-DL throughput and area traffic capacity, suggesting the combination of URLLC and eMBB. On the other hand, the rest of the scenarios of the Transport vertical presented requirements on location accuracy, latency, mobility, and UL-DL throughput, suggesting a combination of eMBB and mMTC. Finally, regarding the Aquaculture vertical, location accuracy, latency, UL/DL throughput, which comprised the most stringent requirements for most of the scenarios, suggested the combination of eMBB and URLLC services, while, taking into account the involved battery powered devices (i.e., various sensors), the energy efficiency requirements suggested also the use of mMTC.