Health5G

Project ID: C2017/3-6

Start Date: 1 December 2018

Closure date: 31 December 2021

Partners:

Germany:
Technical University Berlin
Charité Universitätmedizin Berlin
Fraunhofer Institut für Integrierte Schaltungen
highstreet technologies
Inova DE GmbH

Ireland:
RedZinc

Korea:
Kookmin University
Hankuk University of Foreign Studies
LifeSemantics Corp

Spain:
Experis IT
Nunsys

Sweden:
Mälardalen University
Accellrate Mobile Infrastructure AB
Alkit Communications AB
Alten Sverige AB
Camanio AB
CCR-V
Tele2 Sverige AB

Turkey
Enforma
Ericsson Arastirma Gelistirme ve Bilisim Hiz. A.S.
Inosens
Netas
Semper Tech Inc.
Turkcell Teknoloji
Vestel Electronics

Co–ordinator:

Gema Maestro
Experis IT, Spain
E-Mail: gema.maestro@experis.es

Project Website

www.celticnext.eu/project-health5g

https://health5g.eu

Future eHealth powered by 5G

The project's goal was to improve and enable novel eHealth-related use cases through the application of 5G technologies, such as eMBB (Enhanced Mobile Broadband), URLLC (Ultra Reliable Low Latency Communications) or mMTC (Massive Machine Type Communications).

Main focus

The main focus of the project was to create a technological specification to support a variety of use cases that belonged to three different scenarios: hospital, home and emergencies.

Hospital: Advancements in sensing, connectivity and AI also have led to improvements in existing hospital-based patient treatments, resulting in more accurate, personalised and trackable treatments for patients.

Home: While the traditional approach was based on treating an inpatient or an outpatient at a hospital, societal & medical & technological drivers have caused a shift towards extended home care for the patients. Technological developments and ageing populations have been increasingly enabling the elderly and the vulnerable to be taken care of not at specific locations only, but also at the comfort of their homes.

Emergencies: The ubiquitous connectivity and improved sensing & AI technologies have been used in emergency scenarios to improve impacts of first aid and reduce fatality

The following Figure 1 shows the conceptual architecture of the Health^5G platform.

Approach

In order to support a wide variety of use cases, the project focused on creating a common reference architecture, particularised for the different scenarios (hospital, home and emergencies), which each use case then adapted and implemented according to its specific needs. It is shown in Figure 2.

Selected use cases were the high-impact, industry-driven, eHealth-related ones that took advantage of (and had the need for) 5G capabilities. The project then studied and developed selected 5G network and service enablers as well as prototype eHealth applications for the use cases which were piloted and validated in real environments and with end-users, including 5G test networks and hospitals. Lastly, the project results were disseminated via a number of via communication channels and also exploited for the benefit of the society, science, and business.

Achieved results

The work carried out during the project were materialised in 18 demonstrations, such as:
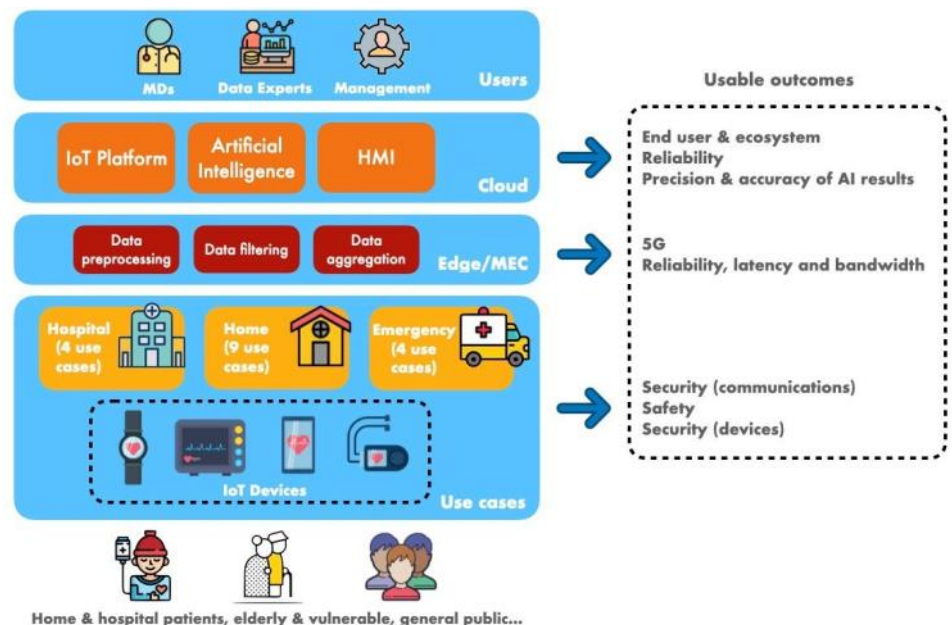

Figure 1. Health^5G Conceptual Architecture

Hospital - Gait monitoring system:

This demonstration showcases the "Gait monitoring system", a platform aimed at following the evolution of patients in rehabilitation for interventions such as hip surgery. In this platform, a pair of sensorised soles and a waist-mounted accelerometer gather gait data from patients. These data are sent to the cloud, analysed and presented in a web front end that can be accessed by a clinician. The system also offers a mobile application that provides videoconference capabilities and the possibility of conducting remote tests. Lastly, this demonstration includes the "CSP broker", a piece of software that recommends the most suitable CSP to deploy the software and it automatically carries out this deployment.

Home – An End-to-End Integrated Demonstration:

Tele2 outdoor 5G network coverage and indoor Wi-Fi coverage with Accellerate Wireless Planner is used together with a 5G router to provide indoor Wi-Fi. A smartphone is also connected to BLE and the Wi-Fi network. Then followed by a training session with the Al-kit's home-based rehabilitation system (eSense). During the training session professional healthcare personnel from Region Västmanland interact in the session through the Camanio eHealth robot system, Giraff. The demo shows the healthcare professional in verbal-visual dialog with the patient. The patient uses the pilot system setup to get advice including to take medication by using the OnDosis oral medicine dosing

device. The Ondosis device system showcases the monitoring of actual patient ingestion of medication and patient medication journals. The demonstration also shows how the remote medical professional can re-plan the rehabilitation exercise regime for the

Figure 2. Health^5G Reference architecture

patient, and how captured data is sent to Enforma's IoT platform for fall-detection analysis.

Emergency - Zero touch infrastructure orchestration for emergency services:

This pilot shows a zero-touch e2e infrastructure orchestration platform (ZIMO) for multi-providers infrastructure services, i.e., 5G network slice and Cloud/Edge computing infrastructure. On an emergency event, the paramedic can access ZIMO and order the deployment of emergency apps in the areas with high-level QoS spe-

cification. An infrastructure slice consisting of mobile network and cloud/edge computing is autonomously composed and provisioned for emergency services on-demand using local network and computing resources provided by different providers.
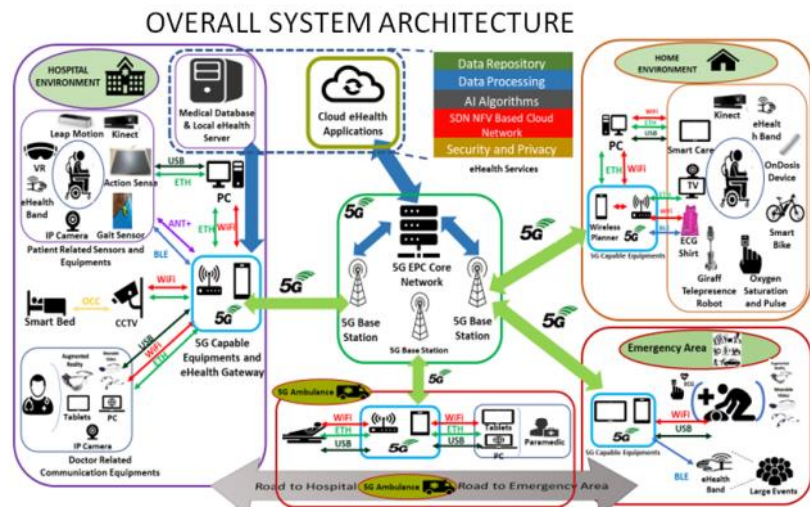
Video recordings of all of these demonstrations can be found in the Health^5G YouTube channel: https://www.youtube.com/playlist?list=PLoI8AGZ6Psu2iFNdGLy4tpTVoJaEzUy43

Impact

The utilisation of 5G technologies was able to introduce several improvements to the use cases, and, in some cases, even rendered them possible. It was observed that 5G increased the bandwidth available for applications, greatly reduced the latency among different components, or allowed to carry out edge processing to lower network load. It also supported slicing concepts, allowing computing and communication infrastructure to be provisioned on-demand for opportunistic mobile applications and decommissioned automatically, resulting in lower operational cost and better resource efficiency.

The consortium brought together the competences in 5G network technologies, healthcare providers and professionals, health product and solution providers, ML&AI solution providers, security solution providers; hence, efficiently filling in the gap from technology to end users' needs.

The consortium contained large enterprises, SMEs and academic partners in a balanced fashion, which ensured the transfer of technical background and theoretical expertise, together with a strong business impact, in a flexible and fast manner into innovative products and services related to 5G enabled health services.

About Celtic–Plus

Celtic-Plus is an industry-driven European research initiative to define, perform and finance through public and private funding common research projects in the area of telecommunications, new media, future Internet, and applications & services focusing on a new „Smart Connected World" paradigm. Celtic-Plus is a EUREKA ICT cluster and belongs to the intergovernmental EUREKA network. Celtic-Plus is open to any type of company covering the Celtic-Plus research areas, large industry as well as small companies

or universities and research organisations. Even companies outside the EUREKA countries may get some possibilities to join a Celtic-Plus project under certain conditions.

Celtic Office

c/o Eurescom, Wieblinger Weg 19/4

69123 Heidelberg, Germany

Phone: +49 6221 989 138

E-mail: office@celticnext.eu

www.celticnext.eu