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Press Release

5G and health applications: An unprecedented experiment carried out in the operating room of the Rennes University Hospital

Rennes, April 21, 2022 - **5G technology** is opening up tremendous opportunities in healthcare. An unprecedented experiment was conducted today at the [Rennes University Hospital](#) in partnership with [AMA](#), [b<>com](#) Nokia, Orange, and Philips: Simulating a surgical procedure in a wireless operating room. It follows an initial test conducted in September 2021 of a remote diagnosis during an emergency medical procedure in a connected ambulance. Made possible by the advanced features of this next-generation network, these trials are part of the European research project [5G-TOURS](#)¹, which is associated with the European Horizon 2020 program. A look back at these promising advances to improve the quality and efficiency of patient care.



*5G experimentation in the TherA-Image room at the University Hospital of Rennes:
simulation of cardiac surgery on a "phantom" patient monitored by a remote surgeon
©b<>com*

The 5G wireless operating room

The development of minimally invasive techniques in surgery requires the assistance of various imaging devices such as acquisition and visualization equipment. These devices transmit a large amount of data, which when sent wirelessly over current networks restricts their use. The absence of telecommunication cables offers considerable advantages in increasing the efficiency of care for patients and the medical team: Easy reconfiguration of the block for specific operations, and fewer cables to hinder the practitioners' movements and require disinfection between two operations. Research teams are demonstrating how 5G can help improve the conditions for performing these interventions.

During an experiment carried out this morning in the TherA-Image² room at the Rennes University Hospital, a "ghost" patient³ underwent a cardiac procedure performed by Erwan Donal (cardiologist) followed remotely from Athens by Dr. Alexandos Stefanidis. This operation was facilitated by the superimposition of ultrasound images and X-rays retransmitted thanks to 5G at 26 GHz through an augmented reality application, thus affording the medical and nursing team more comfort and efficiency during the operation.

The challenge of this experiment is to obtain a perfect synchronization of the images to increase the operational performance of the medical care. Any lag could cause the practitioner's movements to be in the wrong place.



Ultrasound and X-ray signals are merged by the augmented reality application and transmitted over the 5G network ©b<>com

Several wireless video streams, using an experimental 5G network at 26 GHz, were implemented to achieve this result:

- The transmission of a stream from an ultrasound scanner and a fixed HD camera to an augmented reality application and a display screen for the surgeon
- A stream from the server hosting the augmented reality application to the operating room screen
- A final stream from the surgeon's connected glasses to the computer of a remote colleague



Embedded glasses device allowing cardiologist Erwan Donald to exchange remotely with a colleague ©b<>com

The success of this 5G-enhanced surgery has encouraged the teams at Rennes University Hospital and its partners to continue their experiments. One of the next technical challenges is to better adapt the various video streams to the capabilities offered by 5G, in order to obtain even better image quality.

Remote expertise in a connected ambulance, tested in September 2021



Remote expertise in a connected ambulance ©b<>com

In order to improve and optimize the management of a patient in a life-threatening emergency outside the hospital, emergency physicians very often need medical advice or even assistance with therapeutic procedures provided by an expert who is not physically present.

Current telecommunication networks do not allow for the rapid transmission of medical imaging data without deteriorating their quality. With very high throughput and low latency, 5G at 26 GHz allows this data to be sent in real time, without loss of quality.

In September 2021, the partners carried out a test in real conditions, a few kilometers from Rennes University Hospital. Emergency physician Tarik Cherfaoui performed a cardiac ultrasound on a "ghost" patient³ in an ambulance, guided remotely by the Hospital's teams. Dr. Erwan Donal, cardiologist, had images transmitted in real time by the ambulance's ultrasound scanner thanks to the video stream of the connected glasses - developed by the company AMA - with which the emergency doctor is equipped. He was able to guide the emergency physician on the orientation of the probe and help him interpret the results.

This connected duo then forms a single team to provide first aid to the patient as quickly as possible.

This accurate and ultra-fast diagnosis is a major benefit for patients. It allows hospital teams to precisely qualify the patient's needs even before they enter the hospital. It also allows them to anticipate and optimize their hospitalization process in a consistent manner.



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"The use of XpertEye by emergency services accelerates the understanding of the situation, especially when the visual assessment is critical: Traumatology, neurology, dyspnea, skin rash, etc. For this reason, some thirty agencies, including paramedics and firefighters (SAMU, SDIS and HAD), have already adopted this assisted reality solution. As with most connected innovations, the constraint remains access to a reliable network. 5G will ensure better quality video streams, the ability to stream HD video, and the ability to exchange more and more data faster," said **Guillaume Campion, VP Products & Partnerships at AMA.**

*"We have been working on 5G networks and beyond since our inception and as part of these Europe-wide experiments, we brought our 5G private network core solution called *Dome*. This first test phase was a success both at the technical level, with the conclusive implementation of a private 5G experimental network on the b<>com campus, and at the application level where medical teams were able to transmit medical images (ultrasound probe and connected glasses) remotely and without loss of quality,"* explains **Mathieu Lagrange, Director of Networks and Security at b<>com.**

"Medical procedures are becoming increasingly complex and require the use of multiple medical imaging devices. The presence of connecting cables constitutes a risk to the movements of the personnel and their ability to focus on what they're doing. They also prevent equipment from being transferred easily from one room to another. The use of 5G in the OR offers the promise of eliminating these cables while maintaining fast and secure signal transmission," says **Professor Erwan Donal, a cardiologist at Rennes University Hospital.**

"The use of 5G in healthcare will improve access to care and medical expertise throughout the country by providing the means for better healthcare assistance: From health monitoring for prevention and early detection, to the diagnosis and intervention phases in the ambulance in the event of an incident," summarizes **Dr. Tarik Cherfaoui, deputy head of the Adult Emergency Services department at Rennes University Hospital.**

"Nokia teams are very proud to collaborate on this project for which we have set up a private 5G RAN experimental network on the 26 GHz frequency band. This spectrum, which offers unparalleled bandwidth, will allow for a significant increase in 5G throughputs, at levels much higher than those of 3.4-3.8 GHz. This is particularly interesting for medical applications that require the exchange of important data in real time and in a totally reliable way" said **Olivier Audouin, Director of Research Partnerships, Nokia Bell Labs.**

"We are delighted to collaborate in experiments of this scale in the medical field that use 5G to provide concrete answers to the needs of practitioners while improving patient monitoring. 5G will increase the development of applications for all sectors of activity tenfold," says **Michaël Trabbia, Chief Technology and Innovation Officer, Orange.**



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Experiments on a European scale

The ambition of the European 5G-TOURS project, funded by the European Union's H2020 program, is to pave the way for future uses of 5G networks in the fields of transport, tourism and healthcare. The project brings together some 30 major public and private players¹.

In the field of health, two of the four experiments of the project are being tested at Rennes University Hospital in partnership with AMA, b<>com, Nokia, Orange and Philips.

¹ [5G TOURS](#), the partners: Ericsson (Italy), Samsung (UK), Telecom Italia (Italy), Orange (France), Hellenic Telecommunications (Greece), Nokia (France), Philips (Netherlands, France), RAI (Italy), Athens Airport (Greece), Comune di Torino (Italy), Rennes University Hospital (France), Ellinogermaniki Agogi School (Greece), Meleton Asfaleias Center (Greece), Atos (Spain), Wings (Greece), Expway (France), Real Wireless (UK), AMA (France), Sequans (France), Liveu (Israel), Acta (Greece), b<>com (France), Universidad Carlos III de Madrid (Spain), Universidad Politecnica de Valencia (Spain), IIT (Italy).

² [therA-Images room](#)

³ cardiac simulation device

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