Experiment #12

PPDR situational awareness through voice interface and TETRA [SIRESP]

Background

This Factsheet reports an experiment conducted in the context of the SIRESP bootcamp , which took place in November 2023, in Portimão, Portugal, with the presence and active participation of 5G-EPICENTRE.

Although the experiment was triggered by a challenge proposed by **SIRESP** (the Integrated System for Portugal's Security and Emergency Networks, https://www.siresp.pt/), and not originally prepared as a 5G-EPICENTRE third-party experiment, it certainly represented an opportunity to address concrete requirements defined by the PPDR community, and once more, show the adaptability of the 5G-EPICENTRE use-case-driven network applications (UC4, Mobitrust) to new scenarios and challenges. The basic SIRESP challenge was the interoperability with Terrestrial Trunked Radio (TETRA) technologies and devices, which are expected to be widely used in PPDR operational scenarios in the years to come, and the real-time access to Mobitrust through standard, voice-only TETRA devices.

As the participation of 5G-EPICENTRE in the SIRESP bootcamp went considerably beyond the dissemination of project results, and new technological components were integrated with the network application integration elements from the project's UC4, it makes sense to report these results as part of third-party experimentation program, and not as simple dissemination activity.

Overview and Objectives

TETRA has been the key standard for communications in the public safety sector since the mid-1990s, providing dependable voice and data services. However, the limitations of TETRA networks are becoming increasingly apparent in the last few years, especially the limited data speed, difficult integration of data-driven applications and poor scalability. For these reasons, migration from TETRA to 5G can offer important advantages, and is increasingly seen as a key requirement to meet the growing demands of critical communications infrastructures. However, the migration process will probably take years, and will be done progressively.

SIRESP is responsible for commanding and coordinating the emergency and security communications network in Portugal. TETRA is presently a basic building block of the SIRESP communications infrastructure, and will continue to be in the foreseeable future, at least until 2030. Also, the integration of new technologies, especially 5G, will be done iteratively, on a gradual basis, which means that interoperation between technological domains will be a key requirement to enable this transition.

SIRESP organizes and promotes bootcamps regularly, aimed at testing, demonstrating and validating new technological solutions and their application in multiple PPDR operational scenarios, with a strong focus on the interoperation with existing PPDR technologies and devices. The third SIRESP bootcamp took place in Portimão,

This project has received funding from the European Union's Horizon 2020 Innovation Action programme under Grant Agreement No 101016521.

Portugal, in November 2023[1], with the participation of three 5G-EPICENTRE partners – ALB, ONE and HPE. In addition to the demonstration and dissemination of project results, namely those related to the Mobitrust platform and the "IoT for improving first responders' situational awareness and safety" network applications (see D4.2), the participation of 5G-EPICENTRE was also focused on building and demonstrating a scenario involving interoperation with TETRA technology, following the challenge proposed by SIRESP. In addition to the three 5G-EPICENTRE partners, ALTICE/MEO, also present at the SIRESP bootcamp event, actively collaborated in the conception and development of the experiment, and respective demonstration.

In many practical scenarios, the real-time access to the information provided by a platform like UC4's Mobitrust (*e.g.*, ambient temperature, positioning and heartbeat rate of fellow team members) are vital to elements active in the field, especially to those with a coordinating role. Unfortunately, quite often, the only available communication tool is a TETRA device, which can only be used for human-to-human voice communications. To circumvent this limitation, BOTSchool, a conversational AI-based platform provided by Altice Labs[2] was integrated with the Mobitrust API to enable the communication of this type of information to operational elements in the field.

BOTSchool is a versatile platform that easily creates and automates conversational experiences. With a focus on no-code configuration and a user-friendly interface, BOTSchool provides a solution for companies to integrate conversational AI into their customer service and support processes. BOTSchool can be deployed in a variety of scenarios and offers Interactive Voice Response (IVR) integrations and wide language coverage. For these reasons, BOTSchool, and particularly the integration of BOTSchool with Mobitrust, was considered the ideal solution to address the challenge proposed by SIRESP and to enable the exploitation of the Mobitrust features in a TETRA-based environment.

Experiment Deployment

Figure 1 represents the basic network setup installed at the SIRESP bootcamp, consisting of TETRA-Private 5G integration scenario, based on two federated HPE Private 5G tactical bubbles operating in different frequency bands and one relaying to the other, including the connection to a TETRA network and to Altice/MEO public network (PSTN). This scenario, based on HPE technology and Altice/MEO network service, enabled the connectivity between legacy narrowband (LMR/PMR/TETRA, military radios) voice-based technology to wideband 3GPP-based Private networks and then to the Altice/MEO public network.

The BOTSchool platform played a key role in this scenario by enabling voice communication between first responders in the field and the Mobitrust platform. Prior to the event, BOTSchool was adapted to integrate with the Mobitrust API and enable the access to the relevant information through voice communication and enable a dialogue like the one illustrated in Figure 2. The list of parameters provided by Mobitrust included heartbeat rate, breathing rate, positioning coordinates and movement status, among others.

[1] SIRESP, "SIRESP Bootcamp," [Online]. Available: https://www.siresp.pt/eventos-siresp/bootcamp/. [Accessed June 2024].

[2] BotSchool , "BotSchool Conversational AI Platform," [Online]. Available: https://www.botschool.ai/. [Accessed June 2024].

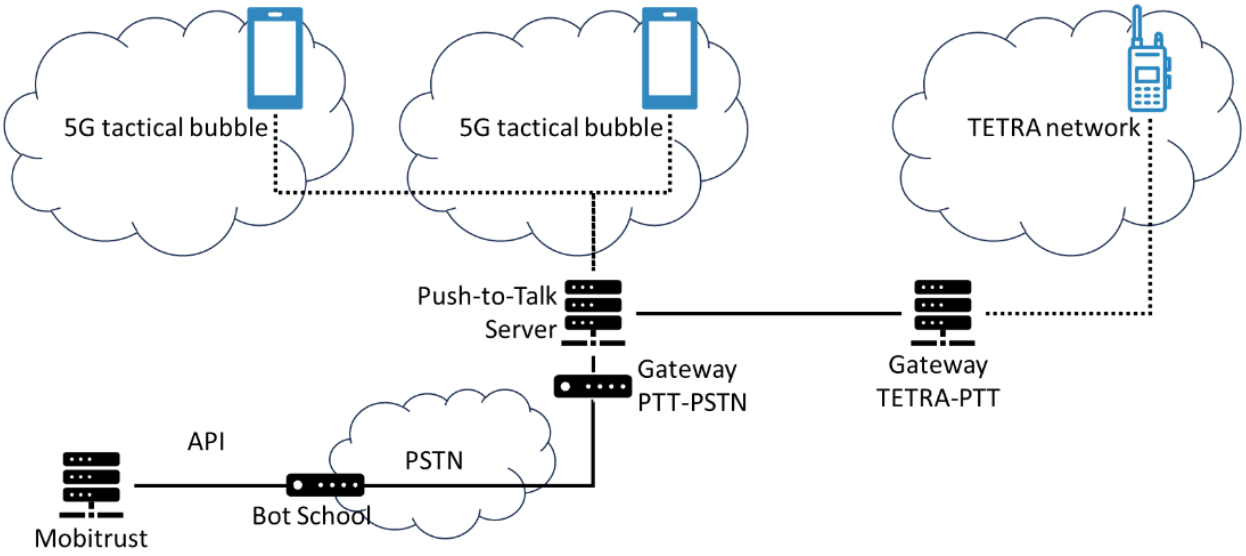

Figure 1: Network setup deployed at SIRESP bootcamp, November 2023

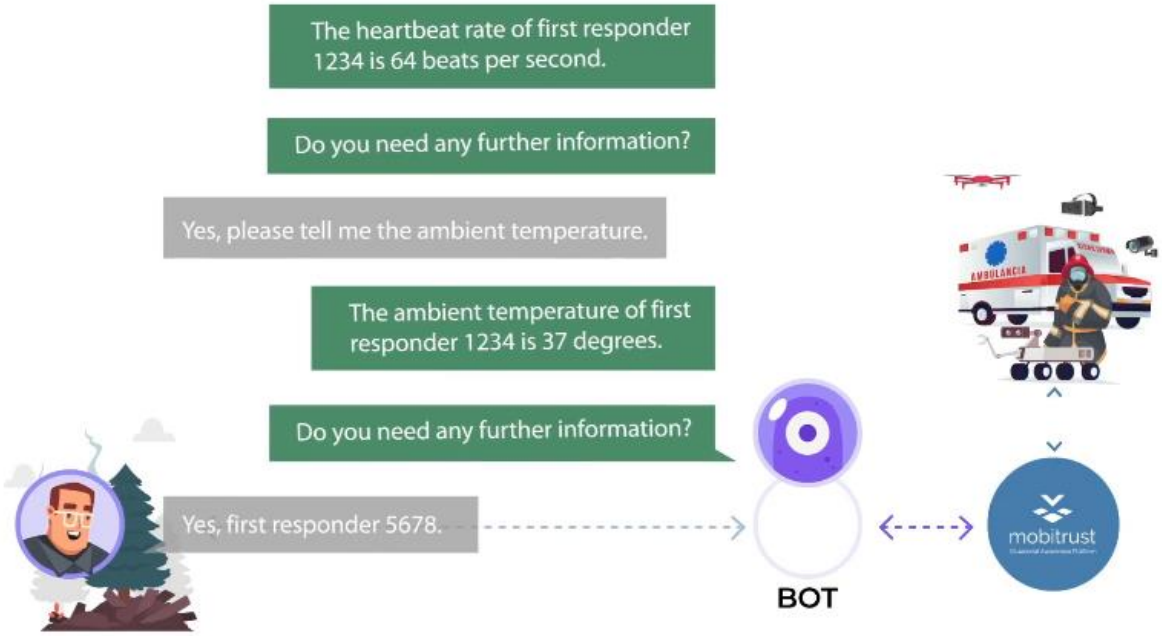

Figure 2: Human-BOT dialogue example

Experiment Execution, Results and Overall Evaluation

The experiment results were demonstrated on several occasions during the SIRESP bootcamp event, including a demonstration to the SIRESP management officers and local municipality authorities, as shown in Figure 3. Two scenarios were demonstrated, with the end user connected from a 5G tactical bubble, and from the TETRA network. The basic scenario is illustrated in Figure 2 – in the context of an emergency operational scenario, using

a voice-only TETRA device, a First Responder gets real-time situational information about fellow team members involved in the same operation, something that normally would require the employment of advanced 5G devices and availability of a 5G network.
The envisaged results were successfully achieved – the demonstrations done at the SIRESP boocamp event (Figure 3) clearly showed the value of the Mobitrust network application extensions and overall UC4 platform in PPDR scenarios, not only in pure 5G networks, but also in interoperation with legacy network technologies, most notably TETRA.

Figure 3: Demonstration at SIRESP bootcamp

It was also a successful demonstration of team effort – ONE provided the Mobitrust platform and 5G-EPICENTRE's UC4-based network application integration elements, ALB provided the BOTSchool platform, including the integration with the Mobitrust API, Altice/MEO provided the interconnection to the public network and, last but not least, HPE provided the 5G and TETRA tactical bubbles.
In summary, the following overall conclusions can be identified:

- Interoperability with TETRA technology will continue to be a key requirement to be considered in the introduction of 5G in PPDR scenarios. TETRA technology will remain a key component of PPDR network infrastructure in the next few years.
- Mobitrust, one of the 5G-EPICENTRE applications, in spite of being primarily targeted at pure 5G scenarios, was proved to represent a flexible and effective solution in scenarios supported by legacy technologies, especially TETRA.
- A virtual assistant, such as BOTSchool, provides a solution to enable legacy voice-only communication equipment, such as TETRA devices, to access key information in operational scenarios, especially to first responders.