Chapter 5. Architecture and equipment configuration

So far, the document has dealt with the all the theoretical aspects of the project, both for the technologies involved in the project, TETRA and GSM, and for the concrete context, e-Triage. Unfortunately, practice always implies some changes that need to be analysed. Those details will be covered in this section along with a brief description of the actual equipment used for the tests, which will be introduced and whose implications will be studied in order to be able to carry out the intended tests.

5.1 Comments on e-Triage

Figure 2.1 showed the general architecture of e-Triage and Figure 4.1 showed a simplified scenario including only the TETRA network in the disaster area. A few comments need to be done on the common architecture of the project which may influence the outcome of the tests:

- As it was explained in chapter 2, An On-Site Emergency Communications Equipment (OSECE) can be either an Emergency Communications Suitcase (ECS) or a Coordination Point Communications Equipment (CPCE), which is some sort or vehicle, typically a van. It was also explained that the TETRA & GSM integration would only take place in the latter since it's the only option where both technologies are present (the size of the TETRA equipment is simply too large).

- All the different technologies included in a CPCE (GSM/GPRS, TETRA, WLAN and

optionally DECT) have different coverage areas.

- In the particular case of this project, TETRA has larger coverage than GSM, so it might not be possible to reach a GSM mobile station that is reachable by a TETRA one. It also comes without saying that these coverage areas will strongly depend on the particular environment, too.

- All OSECE's, either a ECS or CPCE, are interconnected via a wireless technology, typically WLAN. How this takes place goes beyond the scope of this document and as far as the present project is concerned it'll be totally transparent to it [1].

This said, by the time of this report there's only one ECS assembled in TriaGnoSys, and the the van will play the role of a CPCE is still being developed. Due to having only one TETRA BTS and BSC, only scenarios with a single OSECE in the disaster area will be tested. Fig. 5.1 shows this architecture.

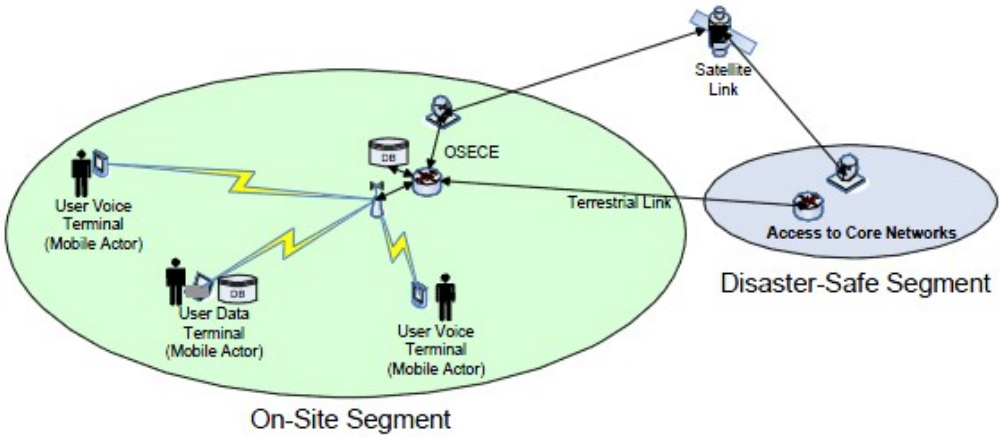

Figure 5.1. General e-Triage architecture.

The implementation began by configuring the TETRA equipment and implementing it, making it work by establishing a connection with a SIP server. After that, the GSM BTS, BSC and MSC were configured and subsequently integrated by using a Private Branch

[1] Therefore, issues such as how far a OSECE's are from one another is not something to be analysed here; they will just be reachable for all we know.

Exchange (PBX) software, Asterisk [2]. It is Asterisk then the one connecting to a SIP server, and not TETRA's Voice Gateway. All the equipment used and the configuration process will be introduced in the next two sections.

5.2 TETRA equipment

The equipment used has been drawn up here:

- A DAMM TetraFlex [15] base transceiver station and a base station controller (referred to as TETRA BTS and BSC respectively from now on). In particular, the products used belong to the TetraFlex outdoor systems [16] (productsheet available here). The IP nature of the DAMM TetraFlex will affect the theoretical discussion presented in chapters 1 to 4. This will be covered here.

- Two Motorola MTP850 TETRA terminals [17].

The BSC contains the needed software to manipulate the system. It is activated by means of Dongle. Very simply, Dongle is some software included within a USB stick that contains what DAMM applications can -or can't- be used; in other words, it manages permissions on the system. Two software elements are used to configure the DAMM equipment:

(a) The Network Management (NM): it's a graphical user interface (GUI). It displays some of the information needed to configure the system and allows users to change some parameters of the system in a simple way.

(b) The OM Control: based on a command-line interface. Although less nice to final users, it fully permits to make the most of the system.

The whole configuration process can be broken down into three parts:

1. Network configuration.

2. Everything that involves communication only between TETRA terminals: individual and groups calls and texts.

[2] A Private Branch Exchange is a telephone exchange that serves a particular business, as opposed to one that operates for many businesses of the general public. Asterisk then is a software implementation of a PBX.

3. Calling an outer mobile station (e.g. a GSM phone). This requires the configuration of a Voice Gateway (referred to as 'Voice GW' from now on) included within the BSC.

An important feature to the equipment is the output, the kind of data that comes out of the BSC. Despite the theoretical explanation in the previous sections regarding TETRA, the output of the BSC is a 100% IP-based at a rate of 64 kbps instead of ISI-based chunks of data. All connections are made via ethernet cables.

5.3 GSM equipment

The GSM equipment will vary depending on where the GSM core network is located. In other words, it will depend on whether the A-bis interface is taken over satellite or not.

- If the BSC and MSC are located within the disaster area the equipment used consists of an external BTS that is connected via Ethernet to a PC-based server. Both the BSC and MSC are implemented via software and have been installed and configured within the PC. Asterisk is also present and configured in this PC. All the necessary configuration files are given in Appendix C.

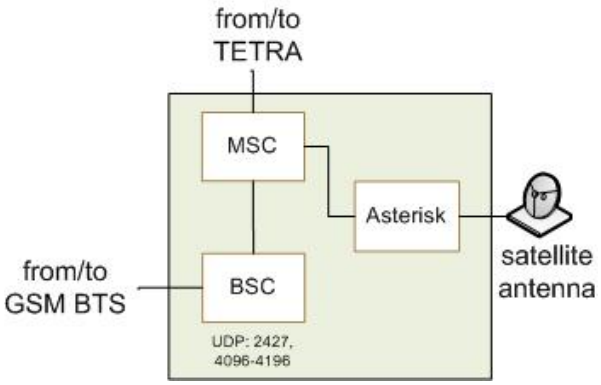

Figure 5.2. General TETRA architecture.

- If the BSC and the MSC are located remotely in the safe area, and the BTS remains in the disaster area the equipment is the same that has already been described in Section 4.2.

- A number of different GSM terminals were used for the test. The only important thing was the SIM cards which were properly configured in Asterisk.

Other than these, a BGAN antenna was used and placed onto the roof while the duration of the satellite tests.