

Inter System Interoperability

D7.3.1 DEMONSTRATOR PLAN AND REQUIREMENTS

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Publishable extended abstract

This deliverable presents ISITEP WP73.1 demonstrator plan and requirements. It is established after discussions with end users from advisory board involved in this demonstrator and will be basis for D73.2 Demonstrator design.



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1. INTRODUCTION

1.1. Introduction

ISITEP aims at achieving the interoperability between legacy PMR networks based on TETRA and TETRAPOL technologies. In order to avoid deeply modifying already deployed networks, ISITEP's partners' strategy consists in the implementation of gateways connected to legacy networks.

WP73 focuses on a non planned event requiring cooperation of several PPDR agencies using different technologies. This is typically crisis management and involves specific deployable means. WP73 is also the only scenario involving two TETRAPOL networks users on the same field. The tasks of this WP have been carefully prepared in close cooperation with TETRAPOL end users from advisory board.

1.2. Document scope and purpose

D73.1 established WP73 demonstrator plan and requirements. It will be the basis for D73.2 Demonstrator design.

1.3. Table of figures

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1.4. Abbreviations

Acronym	Definition
AG	Access Gate
AI	Air Interface
CN	Control Node (TETRAPOL network)
CAN	Code Nature of Address
EMOCH	Emergency Multi site Open Channel
ETH	ETHernet
GW	GateWay
HW	HardWare
IP	Internet Protocol
LAG	Line Access Gate
LABS	Line Access Base Station
LATC	Line Access Terminal Controller
LCT	Line Connected Terminal
Li	L1st bit (=0 if last element in address list)

MD	Mediation Device in charge of Network Management
MMI	Man Machine Interface
MOCH	Multi-site Open Channel
MSW	Main Switch (TETRAPOL network)
NA	Non Applicable
NPI	Numbering Plan Identifier
OA&M	Operation Administration and Maintenance
OMC	Operation & Maintenance Computer
PBM	Product Business Manager
PCM	Pulse Coded Modulation
RN	Regional Network
RSW	Radio Switch (TETRAPOL network)
SSW	Secondary Switch (TETRAPOL network)
SW	SoftWare
ST	System Terminal
TKG	Talk Group
TDM	Time Division Multiplexing
TMP	Technical Management Position
TPA	Talking Party Address
TPOL	TETRAPOL
TPS	Terminal Programming Station
TRS	Technical Requirements Specification

2. DEMONSTRATOR PLAN

2.1. Demonstrator general objectives

The WP 7.3 aims to demonstrate the feasibility of a Swiss-French PPDR cross border cooperation scenario using the ISITEP frameworks (i.e. procedures, network technology, terminals and supporting tools) and assessing the associated benefits. More specifically, we identify a Disaster Relief scenario where an airplane crashes into Geneva Border. Such scenario is of extremely interest for Switzerland and France that periodically organize trials on this theme. A joint cooperation between Swiss and French PPDR operators with ISITEP enabled interoperability is expected to improve effectiveness and ultimately reduce side effects from the Disaster. The WP activity is supported by the Geneva State Police who organizes the periodic trials and is inside ISITEP Advisory Board.

The Swiss-French border area is very small, but highly populated especially around the city of Geneva. Security activities and operations are in a joint collaboration between Swiss and French police. The “Airplane Disaster in Geneva Border” scenario will imply TETRAPOL (France) - TETRAPOL (Switzerland) and a TETRA network through the deployable TETRA-TETRAPOL gateway that allows interoperability with other operators coming from TETRA systems.

The specific WP objectives will include:

- Verification of the ISITEP procedures
- Demonstration of roaming capabilities of terminals
- Evaluation of enhanced terminals
- Final assessment on procedures, technologies and tools and performance evaluation

Procedures between involved agencies are already in use and periodic training sessions are organized between end users. So, the trial aims to demonstrate the use of technology to support the procedures and assess the benefits that can be taken from the innovation developed within ISITEP framework.

2.2. Number of agencies involved

Main agencies involved in WP7.3 demonstrator are Swiss federal police and French gendarmerie end users who are members of ISITEP advisory board. It means the demonstrator is defined closely with these two end users and that they are involved in each step in order to orient the development of the demonstrator to solutions they can benefit from as a priority. In addition to this PPDR cross border cooperation, cooperation with a local agency having its own PPDR network will be considered to enrich the demonstrator. This agency will represent a local emergency service and is particularly relevant in the type of envisaged scenario.

2.3. Technologies involved

This demonstrator is the only one within ISITEP framework where several TETRAPOL networks are involved. The demonstrator plans to demonstrate as prior focus interoperability between agencies working on different TETRAPOL networks. Besides, and enriching the demonstrator, we will suppose the local agency having its own PMR network works on TETRA technology. So, TETRAPOL and TETRA interoperability will be demonstrated.

2.4. Number of networks interconnected

The trial will show the interconnection of 3 networks in order to support interoperability between agencies: 2 TETRAPOL networks and 1 TETRA network.

2.5. ISITEP demonstrated gateways and innovation

WP7.3 demonstrator is focused on TETRAPOL-TETRAPOL IOP use case. So, WP7.3 demonstrator plans to demonstrate the TETRAPOL-TETRAPOL gateway (see WP44: Tetrapol-Tetrapol gateway development and integration).

Moreover, WP7.3 demonstrator plans will involve a TETRA network. WP7.3 plans to demonstrate the deployable TETRA-TETRAPOL gateway from WP45. This gateway suits perfectly in the envisaged scenario of airplane disaster as it is supposed to support field deployment of interoperable solutions and roaming in crisis situations where Tetra/Tetrapol radio coverage is not available and therefore low bandwidth scenarios are to be faced.

Finally, WP7.3 demonstrator plans to show the usage of the enhanced terminal developed in WP5. This so-called enhance terminal includes two modems: one TETRAPOL modem and one TETRA modem. These modems are controlled by a common control unit running on an android stack. The assembled device allows benefiting from the connection to the two networks.

2.6. Trial environment

No formal validation and work under process to ensure the place the demonstration will be held. The foreseen place is the CERN: <http://home.web.cern.ch/>. It is on the Swiss-French border and hosts also a TETRA network. Technical responsible people from CERN have already given a favorable feedback towards the initiative. TETRAPOL Swiss and French networks are currently integrated into indoor CERN infrastructure with CERN own TETRA network, especially in the LHC tunnel: <http://home.web.cern.ch/about/accelerators/large-hadron-collider>. In the specific context of the envisaged crisis management scenario, specific packages will be used. Solutions must be deployable.

2.7. Relationship with other work packages and inputs

The main baseline for WP73 demonstrator is the end-user requirement specifications from WP2 and more specifically D23.1 “End-user requirements document draft” and D23.2 “End-user requirements document candidate release” that are already published and then draft versions of D23.3 “End-user requirements document final release” that will be published by the end of the project on M30.

Moreover, the industrial partner, Airbus DS FR, as leader of this demonstration case had close interaction and collaborative work with the end users from ISITEP advisory board especially interested in the results and achievements within this work package: Swiss federal police and French gendarmerie. Ongoing workshop have been organized in order to ensure to take into account all their requirement, answer concretely and at short term view to the needs they have expressed and define strategic directions for PPDR interoperability at mid-term on currently deployed networks.

2.8. Approach

Based on a base scenario that will be defined in D73.2, several vignettes will be defined. Each vignette will be described. For each vignette, the link with the base scenario will be clarified, the vignette will be described and the technical set-up will be described.

The different vignettes will be chosen in such a way that several incident development phases and different levels of crisis response organizations are touched upon. On the other hand the vignettes are chosen such that the main benefits of ISITEP will be displayed. These main themes are:

- Achieving interoperability
- Fast and easy deployment

The scenario starts in a daily situation without any emergency threat. Then, the incident starts developing through several phases. Starting on a local level with local emergency services then developing in a national upscaling phase and finally ending with a cross border situation where international units cooperate together.

2.9. Comparison to other ISITEP scenarios

WP7.3 is a typical Disaster Recovery use case. It plans consider PPDR communications requirements for both the short and medium terms where existing infrastructures have been rendered unserviceable by a man made or natural disaster. Moreover we assume that we are in a rolling or mountainous region where the usage of tactical solutions must be given priority.

This demonstrator focus on the secure communications needs for voice, and data applications-services capabilities used by Rescue Workers, Military, Police, Fire, Ambulance and other rescue workers during a significant disaster where all or a major part of the existing PPDR communications infrastructure may be unavailable or destroyed. The use case defines the capabilities and the services that are often established today using deployable communications. The use identifies the applications and services that can be introduced using local deployable data networks, as location based asset management and mapping. This will include how these can be securely integrated into existing deployable solutions, providing the PPDR with a holistic communications capability that addresses

their voice, data needs both locally at the incident, as well as for remote situational awareness and management. Deployed communications would need to be able to deal with adverse environmental conditions and could include extreme conditions (wind speeds, large areas without energy/drinkable water etc.), where integration with satellite as a primary communications mechanism or a transmission backhaul could be deployed. Biggest problem will be the maintaining of PPDR communications on 24/7 basis, despite all upcoming problems.

In defining the Disaster Recovery services, the use case also identifies the security, interoperability, system integration and quality of service requirements as the incident develops and evolves.

2.10. Demonstrated environment

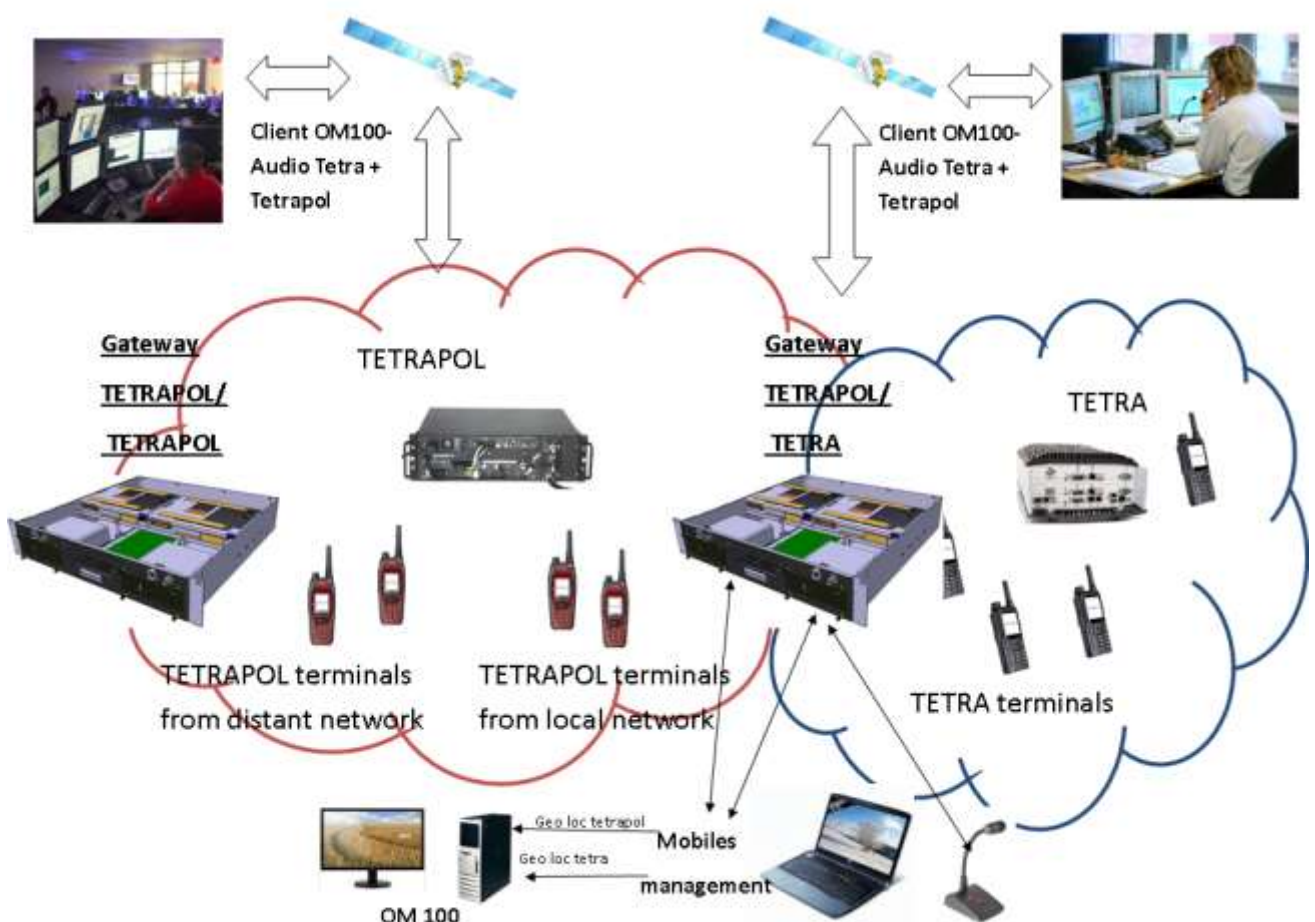


Figure 1 : Demonstrated environment

The demonstrator plans to show how PPDR communications can interoperate during crisis management operations. The demonstrator will be designed in order to be as representative as possible to concrete situation end users may be faced to:

- On the field, a TETRAPOL network is deployed. This network can be already installed and the incident can occur under its coverage. OR, this network is a hastily formed network, a TETRAPOL tactical bubble deployed especially to deal with the crisis situation in case there is no TETRAPOL coverage or in case the infrastructure may have collapsed.
- On the field, TETRAPOL end users with devices from another TETRAPOL network are joining. They need to interoperate with the previous on field worker using their day to day device.
- Remotely, Command center and control room are monitoring resources and control the communications. A remote IP link must be established.
- On the field, a TETRA network is deployed. It is the same as for the TETRAPOL network: This network can be already installed and the incident can occur under its coverage. OR, this network is a hastily formed network, a TETRA tactical bubble deployed especially to deal with the crisis situation in case there is no TETRA coverage or in case the infrastructure may have collapsed.
- On the field, means have to be deployed in order to share a common operational picture and especially the geolocation of the teams involved in the resolution of the incident. This information is transferred to control centers.

2.11. Demonstrator overview

The main part of the demonstrator plans to demonstrate the gateways and the new possibility for end users to cross the border with their own devices and interoperate with the end users from their networks as well as end users from other networks. The demonstrator plans also to show the enhanced terminal developed in the framework of WP5.

2.11.1. Demonstrator technical set-up

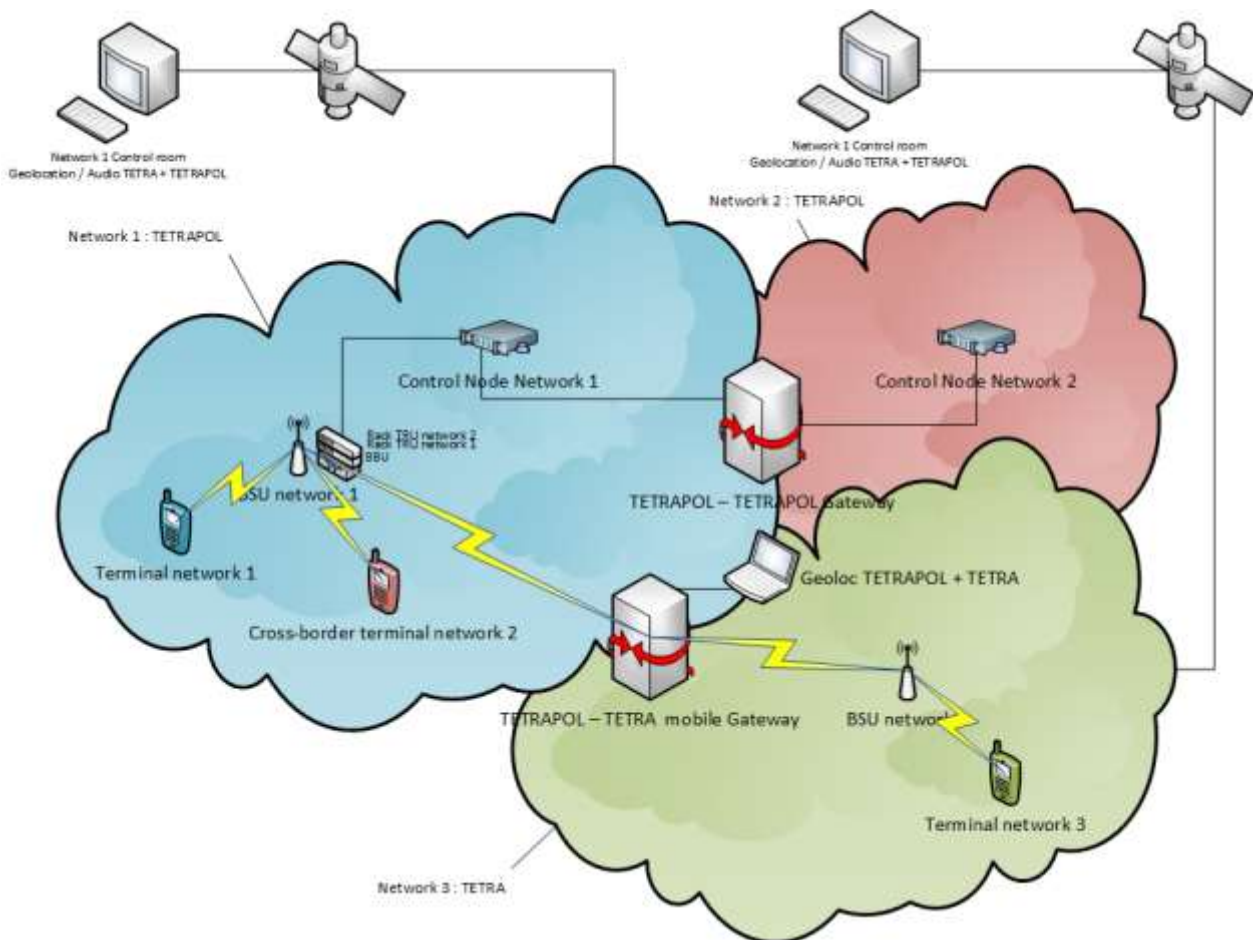


Figure 2 : Demonstrator technical set-up

The figure above represents the technical set-up of the demonstrator. All the elements from demonstrated environment presented in the previous section can be mapped on the elements of this technical set-up.

2.11.2. Enhanced terminal

In addition to the technical set-up of the previous section, WP73 demonstrator plans to show the enhanced terminal developed in WP5. The terminal shall be able to connect to TETRA and TETRAPOL networks that will be used in the demonstration.

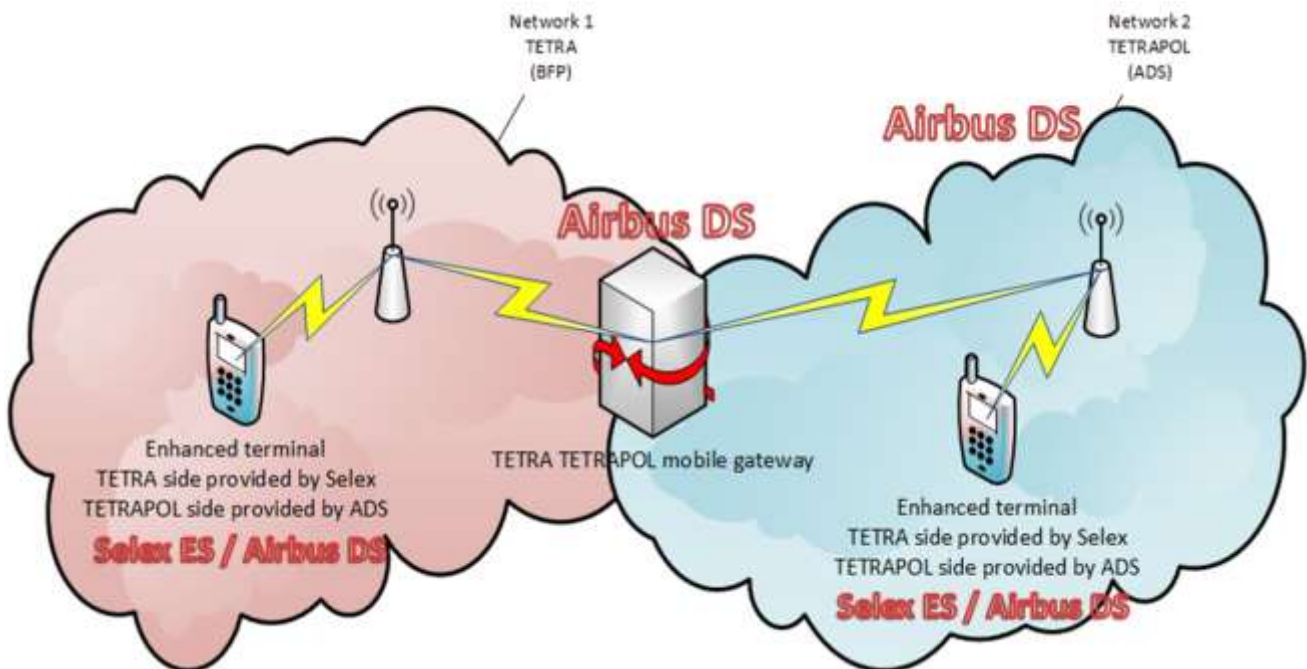


Figure 3 : ISITEP enhanced terminal demonstration

2.12. Key performance indicators and target performance

2.12.1. TETRAPOL-TETRAPOL simulated Roaming

TETRAPOL-TETRAPOL roaming is a totally new subject dealt with within ISITEP. It is a strong requirement from the end users faced to the necessity to cross the border. In particular, when following a robber from Switzerland to France, Swiss policemen must keep the contact with their home network (and especially control center able to coordinate some actions with cross border organization) even when the coverage of the equipments of its own network is off and he enters the cross border network coverage. The demonstration targets to answer practically to this type of requirement directly addressed from end users. The demonstrator will show a simulated roaming aiming to answer to this particular use case.

Target performance TETRAPOL-TETRAPOL simulated roaming: to propose within the ISITEP framework concrete, affordable and short term solution allowing a TETRAPOL end user to cross the border and seamlessly roam to new networks maintaining connectivity with its team. The solutions allowing end users to keep their own device must be favored. Solutions based on two modems must be rejected.

Associated key performance indicators: global prize of the solution, percentage of end users functionalities kept during roaming operation, down service duration during simulated roaming operation

2.12.2. Deployable gateway

Target performance for TETRA-TETRAPOL deployable gateway: to propose within ISITEP framework an innovative TETRA-TETRAPOL gateway, hastily deployable endowed with geolocation applications and fully remotely piloted through IP link.

Associated key performance indicators: number of operators requested to deploy the gateway, number of key benefits for end users on the developed gateway compared to currently deployed gateways, number of audio frames lost during a PTT activation between the two networks.

2.12.3 Enhanced terminal

Target performance for enhanced terminal: to build in ISITEP a prototype of the enhanced terminal consisting of two modems (one TETRA and one TETRAPOL) piloted by a common control unit running on an android device.

Associated key performance indicators: number of services supported by the terminal, prize of the terminal.