

ISITEP

D8.4.1 - EXPLOITATION REPORT

Document Manager:	Christian Bjerrum-Niese	MOT	Editor
--------------------------	-------------------------	-----	--------

Programme:	Inter System Interoperability For TETRA-TetraPol Networks		
Project Acronym:	ISITEP		
Contract Number:	312484		
Project Coordinator:	FINMECCANICA		
SP Leader:	FINMECCANICA		

Document ID N°:	ISITEP_D8.4.1_20160712_V1.1	Version:	V1.1
Deliverable:	D8.4.1	Date:	12/07/2016
		Status:	Approved

Document classification	Public
--------------------------------	---------------

Approval Status	
Prepared by:	Christian Bjerrum-Niese (MOT)
Approved by (WP Leader):	Christian Bjerrum-Niese (MOT)
Approved by (SP Leader):	Federico Frosali (FNM)
Approved by (Coordinator):	Paolo Di Michele (FNM)
Security Approval (Advisory Board Coordinator):	Etienne Lezaack (BFP)

CONTRIBUTING PARTNERS

Name	Company / Organization	Acronym	Role
Christian Bjerrum-Niese	Motorola Solutions	MOT	Editor and main author
Jaakko Saijonmaa	Airbus Finland	ADS FI	Contributor
Dimitris Androutsopoulos	Net Technologies	NETFI	Contributor
Ramon Ferrus	Universitat Politecnica de Catalunya	UPC	Contributor
Federica Battisti	Universita Degli Studi Roma Tre	RM3	Contributor
Bram van den Ende	TNO	TNO	Contributor
Vincenzo Abbate	Exprivia	EXP	Contributor
Franco Pangallo	ISCOM	ISCOM	Contributor

DISTRIBUTION LIST

Name	Company / Organization	Role / Title
Federico Frosali	FNM	Technical coordinator and SP leader
Paolo Di Michele	FNM	Project Coordinator
Christian Bjerrum-Niese	MOT	Editor and 8.4 Leader
Jaakko Saijonmaa	ADS FI	8.4 Participant
Serge Delmas	ADS FR	8.4 Participant
Dimitris Androutsopoulos	NETFI	8.4 Participant
Marianne Storrøsten	DNK	8.4 Participant
Anita Galin	MSB	8.4 Participant
Etienne Lezaack	BFP	8.4 Participant

REVISION TABLE

Version	Date	Modified Pages	Modified Sections	Comments
V1.0	28/06/16	All	All	First released report
V1.1	12/07/16	All	All	Final Release

Publishable extended abstract

This document is the deliverable D84.1 from Work Package 8.4 “Exploitation Report” of the FP7 project ISITEP. This work was carried out as part of the Sub Project 8 (SP8) Dissemination.

It is an essential goal of the ISITEP project to ensure continued deployment of network interconnections, as they have been developed, standardised and demonstrated under ISITEP.

Exploitation analyses are divided into different categories, according to consortium partner type. Questionnaires have been distributed and responses have been collected and analysed in this report.

ISITEP has proven that TETRA ISI enables cross-border communications by means of gateway connectivity between TETRA networks from different vendors. Commercial exploitation is already underway, and further expected to expand after the modernisation of the ISI standard has been completed. Limited TETRA-TETRAPOL interoperability has also been explored, however with limited functionality and exploitation opportunity.

CONTENTS

PUBLISHABLE EXTENDED ABSTRACT	4
1. INTRODUCTION	6
2. METHODOLOGY	6
3. STAKEHOLDER ANALYSIS	7
4. ACADEMIC EXPLOITATION	8
5. COMMERCIAL EXPLOITATION	8
6. IPR STRATEGY	9
7. STANDARDS DEVELOPMENT	9
8. CONCLUSION ON EXPLOITATION STRATEGIES	10
APPENDIX A – DESCRIPTION OF WORK	11
Work Package definition	11
Description of Work	11
APPENDIX B – PARTNER EXPLOITATION STRATEGIES	12

1. Introduction

In this work package, we will be reviewing the future exploitation opportunities of connecting PPDR systems. The objectives and scope of the work package are given in the Appendix A. A summary of the objectives are :

1. Prepare material to promote ISITEP
2. Submit the ISI-IP specification for ETSI standardisation
3. Establish a working group to evaluate ISITEP
4. Commercial exploitation strategies
5. Academic exploitation strategies

The dissemination activities are also part of exploitation, however not included in this report due to the overall organization of the SP8. Dissemination activities are rather reported under deliverables from WP8.2 and WP8.3.

2. Methodology

In this section, the methodologies for analysing and concluding on the exploitation strategies are being presented. In addition, there will be given reference to other work packages of ISITEP where the associated and further exploitation is presented; in particular any work items relating to dissemination are captured in associated work packages under SP8.

Method for Objective 1 – Prepare material to promote ISITEP

Presentation material to promote ISITEP is being developed under WP8.2 “Production of dissemination material” and further promoted under WP8.3 “Events, workshops, meetings”. Based on the deliverables from those work packages, it is safely concluded that dissemination material has been prepared and shared, and is actively being used by ISITEP consortium members.

It is therefore concluded that this objective has been reached, and any further work is referred to WP8.2 and WP8.3.

Method for Objective 2 – Submit the ISI-IP specification for ETSI standardisation

The modernization of the ISI standard is an ongoing effort, which will most likely not be completed before end of the ISITEP program. A brief analysis of completed, ongoing and future work items shall be presented.

Method for Objective 3 – Establish an ISI Working group

The ISITEP project leadership decided to promote ISITEP during the Critical Communications World (CCW) conference in Barcelona in May of 2015. In collaboration with the conference organizer IIR Telecoms & Technology, a master class session was established as part of the main conference program of CCW. A range of ISITEP partners were actively engaged in presentations as well as

reaching out to further members of the PPDR community. The ISI working group is considered as constituted by ISITEP partners actively engaged in planning, development and deployment of ISI.

Method for Objective 4 – Commercial exploitation strategies

The leading manufacturers of PPDR systems are all represented in the ISITEP consortium (Leonardo Company, Airbus D&S, Motorola Solutions). From an investment perspective of any inter-system connectivity by PPDR operators, it is obvious that a starting point will be primarily driven by the commercialisation of gateways, whereas secondary exploitations of deployment, network integration and associated applications are derived accordingly.

The method used to analyse commercial exploitation is therefore focussing on the prospective commercialisation of ISI gateways. However, it should also be noted that the value of commercialisation is not being included in the analysis due to the obvious commercial confidentiality of competing manufacturers' business cases and go-to-market plans.

Consortium partners representing the industry are reporting their individual exploitation results in Appendix B.

Method for Objective 5 – Academic exploitation strategies

The outcome of academic exploitation is mainly given by means of dissemination of the work completed in ISITEP. As mentioned before, this work package is not directly capturing the results of dissemination (e.g. publication of peer-reviewed papers and academic reports), but rather being referred to other work packages under SP8 Dissemination.

Consortium partners representing academia are reporting their individual exploitation results in Appendix B.

Other methodologies- IPR

While not being stated as a primary objective of WP8.4, the creation of intellectual property rights (IPR) is also a part of the exploitation strategies. However, after surveying the consortium members IPR activities in the this, no IPR creation has been reported.

3. Stakeholder analysis

We have analysed the various stakeholder objectives, both from participating consortium partners, from Advisory Board member, and external to the ISITEP project. Whereas a common goal among stakeholders is to enable cross-border communication of public safety radio users, it is clear that the nature of stakeholders' future exploitation opportunities are varying significantly.

The consortium members of ISITEP are very much representing an end-to-end view of value and service delivery of cross-border PPDR communications in that anything from security experts, system and terminal manufacturers, integrators, application developers, operators and radio users are represented directly or indirectly by the consortium members.

Our categorisation of stakeholder is shown below:

Stakeholder category	ISITEP partners
Radio Network operators	DNK, MSB, V&J
Radio terminal users	BFP, V&J
System manufacturers	AIR FI, AIR FR, LEO, MOT
Application developers	NETTECH, EXP
Terminal manufacturers	LEO
Consultancies, integrators	TNO, ISCOM, AMP
Universities and academia	RM3, UPC

We choose to divide the consortium into producers and consumers of cross-border communications, so that consumers represented by network operators and radio users are not included directly in the exploitation analysis. Each of the producers has been asked to contribute with a brief description of their plans for exploitation of the work carried out under ISITEP.

The contributions are presented in Appendix B.

4. Academic Exploitation

Academic exploitation is outlined by the two university partners RM3 and UPC. Several publications and conference presentations have been given. In addition, other academic activities were sponsored by ISITEP, such as organizing of work shops, Ph.D. dissertations, and more. For complete details of academic exploitation, please see Appendix B.

5. Commercial Exploitation

The availability of TETRA Inter System Interoperability (ISI) and consequential enablement of communication between TETRA networks has been long awaited within the mission critical communications community of Europe.

However, a “chicken and egg” dilemma developed, where TETRA network operators encouraged the industry to prioritize their development efforts whereas the industry encouraged their customer base to place delivery orders for ISI. In all fairness, both types of actors responded rationally, however resulting in very limited deployments of ISI. The network vendors were eager to display progress on ISI development and demonstrations through marketing campaigns, nevertheless ISI was deemed immature for operational deployment by the network operators. A scepticism developed as more “slideware” than software was perceived to being created by the vendors.

With ISITEP coming to a conclusion, it is now clear that ISI truly is ready for deployment and therefore the industry should concentrate on the marketing message that ISI gateways are available for deployment and operational use. The technical challenges are no longer the most critical obstacle, rather it is the operational and legal aspects that require further resolution for a successful rollout of network connectivity by means of ISI.

6. IPR strategy

After having surveyed the consortium partners, we conclude that no patents have been reported to have been created from ISITEP.

7. Standards development

It is a primary goal of ISITEP to modernize the ETSI TETRA standard specification for ISI. A complete new set of specifications are planned according to the table shown below.

Document	Contributor	Submitted	Status
Principles for ISI over IP	MOT – LEO	Completed	Approved by ETSI WG3
Structure of the specifications	MOT – LEO	Completed	Approved by ETSI-WG3
ISI General Design	MOT	Q4-2015	Submitted to ETSI-WG3
ISI Mobility Management	MOT	Q4-2015	Submitted to ETSI-WG3
ISI Group Call	MOT	Q1-2016	Submitted to ETSI-WG3
ISI Individual Call	LEO	Q1-2016	Submitted to ETSI-WG3
ISI Short Data and Status	LEO	Q1-2016	Submitted to ETSI-WG3
ISI Audio Format	LEO	Q1-2016	Submitted to ETSI-WG3

As with most ETSI standard efforts, an accurate time table for completion of the standard cannot be given. However, it is most likely that a final standard can be made ready by first half of 2017 (subject to comments from ETSI members).

The need for additional, supportive amendments to the existing and drafted standards have also been identified within ISITEP as an outcome of the interoperability tests conducted under WP4.7.

8. Conclusion on exploitation strategies

To date, it is Airbus Finland and Motorola who have chosen to productize the ISI gateway, whereas Leonardo and Airbus France are “still” at the prototype stage of development. It becomes evident that the strategies of different companies somewhat prohibit a free exchange of commercialization plans for ISI. Nevertheless, the results from ISITEP are so far developed and matured that we make the claim that ISI is not just supported by a few manufacturers, but also being deployed in the field (Norway-Sweden gateway connection).

The ISITEP project objective to connect competing technologies (TETRA and TETRAPOL) appears to have failed, both from a market and from a technology viewpoint. The legacy of ISITEP will partly be impacted by this, and only limited exploitation of TETRA-TETRAPOL connectivity should be anticipated.

Academic exploitation strategies are very much as expected; increased publication activity, and identification of new insights for teaching purposes within telecommunications and IP security.

The impact for SMEs is less clear based on responses. The market of some SMEs appear to be project driven and of regional scope when it comes to ISI. The exception is Net Technologies, whose applications were developed with a pan-European scope in mind.

We have outlined the exploitation results for the different type of manufacturers. The ISITEP project has greatly enhanced the chances of better PPDR collaboration across borders, especially in those cases where TETRA networks are deployed on each side of the border.

In the future, the commercial exploitation of ISITEP will therefore mainly benefit users and operators of TETRA networks. The bold vision of ISITEP will be that all TETRA networks have an embedded ISI gateway to connect to neighboring networks. The modernization of the ISI standard is an essential enabler of this vision.

Appendix A – Description of Work

The objectives and scope of this work package 8.4 of ISITEP are reproduced in this appendix.

Work Package definition

ISITEP Work Package 8.4 “Exploitation strategies” as described in the Description of Work:

Objectives:

ISITEP will unlock the market situation and enable more effective emergency services for the citizens. The European investment in this project will enable industry to sell products to all 27 Member States and in addition to all other countries, which have an interest in joint operations.

This Work package aims to

- Implement a working group to evaluate the results of ISITEP during their advancement and study how these results could evolve in market opportunities.
- Describe how the results of ISITEP project will be used in the future development and in the future architecture of PPDR systems.

A supporter of this WP will be the TETRA & Critical Communication Association (TCCA), which has organizational members in 160 countries. TCCA conducts every year seminars and conference around the world including the very large World Congress. The TETRA & Critical Communication Association (TCCA), also known as TETRA Association, is in the Advisory Board, and therefore will be able to promote ISITEP work to the market. This WP will provide the material needed for this Association to promote the work of this project to interested emergency services around the world.

The activity will be performed by MOT and SES that will manage the working group of manufacturers (SES, AMP, CASFI, CAS FR) and end users (BFP, DNK, MSB) . NETTECHN will also exploit the market opportunities of supporting tools.

Description of Work

This task will focus on:

- Transferring the proposed update to the standard from this project to ETSI following the procedures ETSI has in place.
- Developing presentation material and train the presenters
- Conducting presentation at TCCA event
- Reporting from the events on the Internet.
- Implement a working group to evaluate the results of ISITEP .
- Exploit technology results for future development

Appendix B – Partner exploitation strategies

The partners listed in the table below have contributed to this report with a short description of their exploitation strategies.

Partner name	Type of partner
Airbus Finland	Large system manufacturer
Motorola Solutions	Large system manufacturer
Net Technologies	Integrator/SME
Exprivia	Integrator/SME
ISCOM	Integrator/SME
TNO	Consultancy
Universitat Politecnica de Catalunya	University
Universita Degli Studi Roma Tre	University

Net Technologies (NETFI)

Role of NETFI in ISITEP

NETFI in ISITEP, apart of the overall partial contribution, is developing certain supporting tools. These tools are very important in order to improve operational interoperability between various PPDR authorities at European Level. In addition, NETFI is developing the Semantic/Syntactic Translator Tool which is used in the ISITEP enhanced terminal.

Market Targets

Given the nature of users of ISI and operations interoperability, some basic market targets have been identified, namely:

- PPDR authorities in Europe
- Network and terminals manufacturers
- Operations organizations
- TETRA/TETRAPOL users

Tools exploitation

NETFI will continue developing the tools into commercial products. We will exploit by upgrading the correspondings databases with more products from the market, under Cooperation Agreements. Focus will be given to improve the usage of ISI results of ISITEP and to roaming features.

In all tools, we will integrate the SST tool, offering uniques translating features to users.

Tools will be offered in 2 different sales modes:

- Selling of licences per user
- Under SLA agreements with potential clients

ISITEP usage

Apart of the tools, NETFI will use ISITEP results and know how gained in our standard service portfolio. We intend to inform all our clients for the benefits of ISITEP and offer interoperability consulting services to clients.

Exprivia(EXP)

Exprivia is highly motivated to continue to follow ISITEP project in its future developments, both in terms of design evolution, with the confirmation of existing or even new partners, which at the business level concerning cooperation with hardware Producers to the realization of hardware and / or software evolved to be put on the market, based on the results of the project. Exprivia thanks to ISITEP project has renewed and expanded its software development team, used and appreciated further their own project and test managers and has already ready new ideas on how to evolve the developed software, making himself ready to face the new phases that surely will come from results of project ISITEP.

Exprivia already has other collaborations on other projects, with some of the key partners involved in the project ISITEP such as LeonardoCompany (ex Finmeccanica,ex Selex), which is active on the Defense and Aerospace market with design, development and integration of real time software components since 1985, mainly in the segment of civil and military command and control systems, with a stable workforce of more than 50 units.

Twenty years of experience in the real time software domain raises Exprivia as trusted supplier/partner in the implementation of the most advanced technological solutions. Exprivia has consolidated and recognized skills within the following application domains:

- Push-to-Talk Instant Communications Solutions;
- Instant services as Localization, Dynamic Alert and Enhanced Messages;
- Presentation systems (2D and 3D), Virtual Reality, Augmented Reality;
- Development and integration of software components;
- Development of algorithms for image processing and video analysis;
- Big Data Analytics & Data Visualization;
- Cyber Intelligence in support of investigative processes and intelligence through the use of solutions and tools owners and no;
- Cyber Security;
- Web Applications & Mobile Solutions;
- Algorithmic and software embedded general / special purpose;
- Verification and Validation of large distributed systems.

Airbus D&S (Finland)

ISITEP has significantly contributed to the EU level target of establishing international cross-border interworking in public safety radio networks, the target worked for in TETRA standardization and community since early 2000's, the self-evidence of GSM networks since 1990's. ISITEP has conducted several operational trials, creating trust for end user organizations that TETRA industry in large is committed to support TETRA ISI. This is the basis of TETRA ISI exploitation also within Airbus TETRA customer base.

Airbus will make its ISITEP developments in TETRA ISI available for all Airbus TETRA users, having the required Airbus TETRA infrastructure SW release in place in their network. With the results of ISITEP developments and trials, we also have the message to our TETRA customers of not just fulfilling TETRA standard and TETRA ISI IOP features in Airbus TETRA ISI interface, but also ensuring end-users operational interoperability between ISITEP TETRA ISI manufacturers, fitting together the some different internal ways of implementing TETRA services between networks of the manufacturers .

We do not see TETRA ISI as such, to be any significant sales item for TETRA manufacturers, as it does not increase number of base stations or TETRA core network elements, except the TETRA ISI GW's for the international ISI connections. Also starting point is that our customer's existing TETRA terminals can migrate cross-border, thus not creating any significant terminals sales prospects. Hence we see that the benefit for the TETRA industry and also Airbus is that TETRA ISI increases the motivation of TETRA operators and end users to keep TETRA networks in shape, modernize them with new technology upgrades and also take new communications opportunities in TETRA into use. As example, using TETRA services by LTE smart phones via commercial and/or dedicated LTE networks opens the way to use transparently TETRA home services also outside own national borders. Hence direct TETRA home services use with smart LTE phones complements the ISITEP proven cross-border TETRA ISI use cases. TETRA customers can thus develop their own innovative use cases to use TETRA as well as broadband data services for their benefit with the operationally proven technical solutions, created also in scope of ISITEP.

Universitat Politecnica de Catalunya (UPC)

UPC, as a reference institution in Spain, is going to exploit its participation in the project in order to further strengthen its ability to pursue research, development and teaching activities both for its own benefit and for the benefit of its country and the EU in general. In particular, the obtained expertise by UPC in ISITEP is expected to be applied to:

- Bring the forefront of technological development into their syllabuses to educate future engineers, particularly in subjects related with telecommunication systems and advanced mobile communications.
- Disseminating main results in conferences and relevant forums as well as through publications in magazines and journals.
- Continue a close collaboration with the Spanish non-profit institution COIT (Official College of Telecommunications Engineers), which contributes to bringing together and reinforcing the different institutions and companies of the telecommunications sector in Spain, including acting as an advisor to the Ministry of Industry. Public safety communications is within the areas of interest for the COIT.
- To improve the UPC's postgraduate and customized training courses, facilitating the convergence between research departments and public or private companies.
- Stay competitive for future research initiatives in different domains (H2020, national programmes, etc.).

Universita Degli Studi Roma Tre (RM3)

RM3 has contributed to increase the visibility of the work in progress in the ISITEP project both in the scientific community and in the first responders' network by:

- presenting a contribution "TETRA-TETRAPOL subscriber solution of the future" devoted to the introduction of the enhanced terminal defined in SP5, to the 18th Annual Critical Communications World congress, held in Barcelona, Spain from May 31 to June 2, 2015;
- presenting a contribution entitled "Enhanced Terminal for Secure Mobile Communication over TETRA and TETRAPOL networks" to the 2015 IEEE International Conference on Multimedia and Expo (ICME 2015), held in Torino, Italy from June 29 to July 3, 2015.

From a research point of view, a PhD grant has been dedicated to related topics. The ongoing research covers the analysis of the security of Android based smartphones and in particular the design of protocols and operating system updates needed for enforcing security in an open source environment.

Finally, in the academic environment, the scientific outcomes of this project are now part of the "Communication Security" course in the Telecommunication engineering Master Degree.

Motorola Solutions (MOT)

Partly thanks to sponsorship of ISITEP and further investments by Motorola, the Motorola ISI gateway is becoming productized as an integrated feature for Dimetra networks. We anticipate that primary users of ISI will be public safety users operating in near-border areas. ISI gateway will not drive sales to new markets, but rather become an upsell opportunity for existing customers, mainly within the public safety segment.

Based on our knowledge of the PPDR market, we have drawn a map of Europe where nation-wide PPDR systems are coloured by technology and by manufacturer. See Figure 1 below. Note that colourings are subject to change and interpretation. But please consider the colourings mainly to be representing a patchwork of interconnection opportunities.

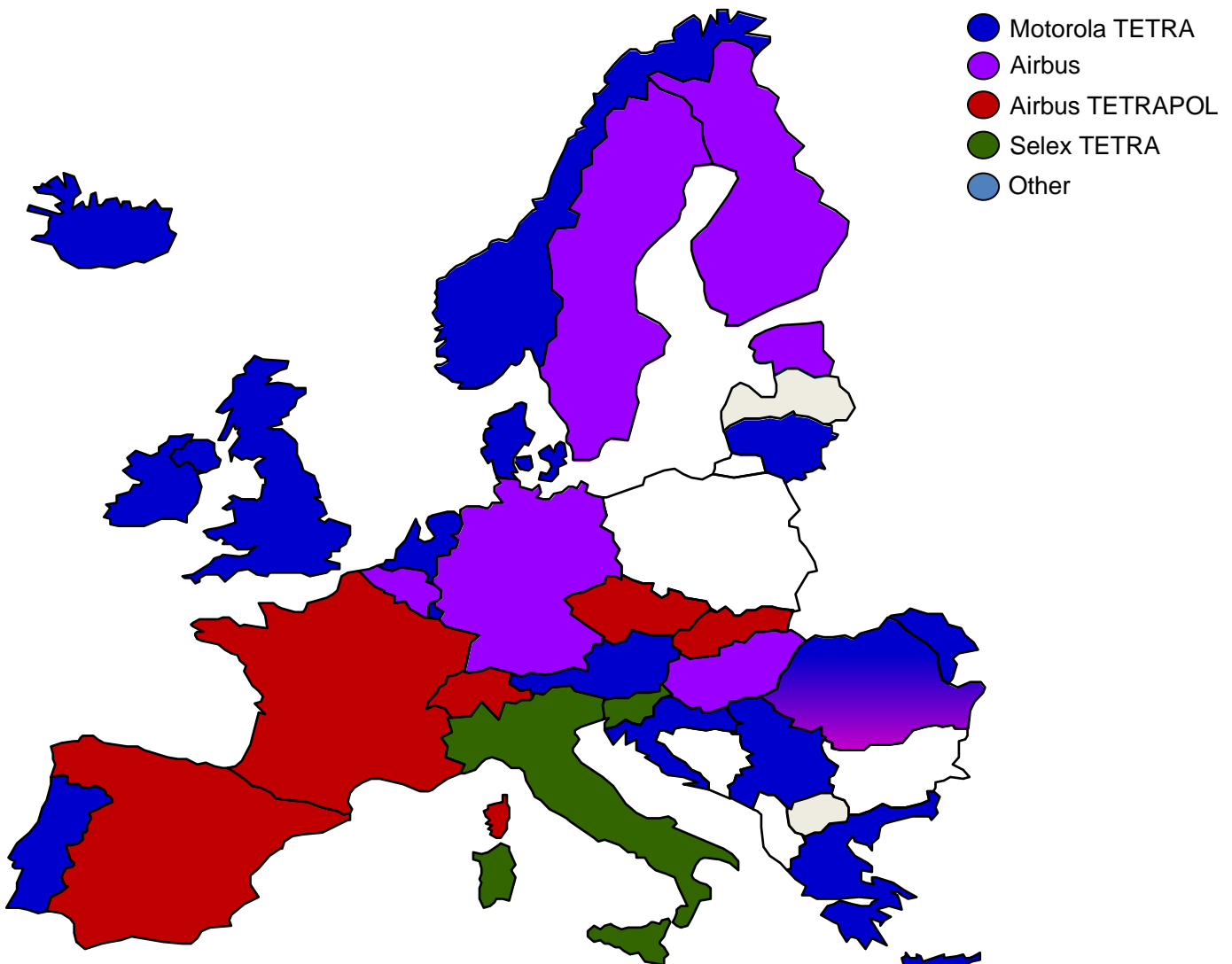


Figure 1: Nationwide PPDR networks of Europe.

Opportunity 1 – Connecting nation-wide PPDR systems

It is clear from the investigating the map, that the need for connecting to either another technology or at least to another manufacturer's system is highly increasing the business opportunity in comparison to same-vendor, same-technology gateways. As an example, the business case for Motorola-Airbus TETRA gateways is substantially larger than for Motorola-Motorola TETRA gateways.

Another takeaway for the map is the possible formation of ISI clusters. The first cluster is expected to evolve from the Nordic countries, starting with Norway-Sweden, then later followed by Finland and/or Denmark. Other clusters could be the networks in the 3-country pilot, Netherlands-Belgium-Germany, potentially also Luxembourg, where the need for cross-border communication was shown to be evident in the WP7.2 trial.

Opportunity 2 – Connecting nation-wide PPDR systems to smaller transport systems

In addition to large (nation-wide) system connections, there are additional means of exploiting the ISI gateway architecture. A nation-wide PPDR network could also be connected to multiple smaller networks in a hub-and-spoke configuration. As an example, a radio system serving an airport or a regional transportation network could be mobilized during an emergency situation, where transport operators are active in the evacuation of citizens, and collaboration with blue light services is of essence.

Opportunity 3 – Disruptive expansions

TETRA ISI has been evaluated for more disruptive cases, where existing systems from one supplier could be expanded using an ISI gateway to another system from a different supplier. As large systems are not replaced very often, network operators are forced to lock in with one system supplier, with the consequential risk of becoming monopolized. The question is if ISI can unlock the market for network expansions in a disruptive manner. Technically, such a configuration is possible, however not necessarily viable. It remains to be seen if operators are willing to carry the overhead of managing two sub systems with dual network operations and management and a reduced feature set (not all TETRA services are supported across the ISI interface) with the advantage of unlocking the market to more competition.

Opportunity 4 – Migrating terminals

Whereas Motorola has not been involved in SP5 terminal development, we do expect that the need for ISI migration capability of terminals will drive new sales. The enabling migration capability of terminals, in the TETRA standard denoted as Air Interface Migration (AIM), is already an available feature in Motorola terminals, and the ISITEP project has spurred renewed market interest in this capability.

TNO

Exploitation possibilities for TNO in this particular project are limited. Please take note of the following:

- The ISITEP project offered TNO the opportunity (again) to work closely with the Dutch Police. This fruitful cooperation may lead to new engagements in the future on similar or other communications topics;
- The ISITEP project helped us in understanding some of the existing interop solutions and practical procedures, and not only in the context of the Hot Pursuit demonstration. This knowledge will be reused in current R&D projects and standardization activities focusing on 3GPP technology and its application in the PPDR domain
- TNO has been able to further improve its evaluation methodology which is applied more often in professional domains like PPDR.

ISCOM

The work done by ISCOM as part of project activities has contributed to reinforce and to give more experience in its business as Tetra Certification Body, in the study and development of European standards in order to verify interoperability in the Tetra communication systems.

During this development period of the project we had the chance to work in cooperation with all European partners to strengthen our expertise on the great potential of communication between countries to achieve a more efficient organization.

During our work activities, in meetings with the working groups responsible for environmental health and coordination in case of natural disasters, we have decided to bring to the attention the potential of global communications with good prospects for the future.