# Chapter 43

# Security in Transnational Interoperable PPDR Communications:
## Threats, Requirements and Architecture Solution

**Ramon Ferrús**
*Universitat Politècnica de Catalunya (UPC), Spain*

**Oriol Sallent**
*Universitat Politècnica de Catalunya (UPC), Spain*

**Cor Verkoelen**
*Den Haag, The Netherlands*

**Frank Fransen**
*TNO, The Netherlands*

**Keld Andersen**
*Motorola Solutions, Denmark*

**Christian Bjerrum-Niese**
*Motorola Solutions, Denmark*

**Jaakko Saijonmaa**
*Airbus Defence & Space OY, Finland*

**Claudia Olivieri**
*Finmeccanica S.p.a., Italy*

**Michel Duits**
*Direktoratet for Nødkommuikasjon, Norway*

**Anita Galin**
*MSB-Swedish Civil Contingencies Agency, Sweden*

**Franco Pangallo**
*Istituto Superiore delle Comunicazioni (ISCOM), Italy*

**Debora Proietti Modi**
*Istituto Superiore delle Comunicazioni (ISCOM), Italy*

## ABSTRACT

*The relevance of cross border security operations has been identified as a priority at European level for a long time. A European network where Public Protection and Disaster Relief (PPDR) forces share communications processes and a legal framework would greatly enforce response to disaster recovery and security against crime. Nevertheless, uncertainty on costs, timescale and functionalities have slowed down the interconnection of national PPDR networks and limited the transnational cooperation of their*

DOI: 10.4018/978-1-5225-7912-0.ch043

*PPDR forces so far. Currently, the European research project ISITEP is aimed at developing the legal, operational and technical framework to achieve a cost effective solution for PPDR interoperability across European countries. Inter alia, ISITEP project is specifying a new Inter-System-Interface (ISI) for the interconnection of current TETRA and TETRAPOL networks through Internet Protocol (IP) connectivity. This approach turns communications security as a central aspect. In this context, this paper describes the framework and methodology defined to carry out the development of the security requirements for the interconnection of PPDR networks via the new IP ISI and provides a discussion on the undertaken security risk and vulnerability analysis. Furthermore, an overview of the designed security architecture solution for network interconnection is provided.*

## 1. INTRODUCTION

The Public Protection and Disaster Relief (PPDR) sector brings essential value to society by creating a stable and secure environment to maintain law and order and to protect the life and values of citizens. PPDR services such as law enforcement, firefighting, emergency medical services and disaster recovery services are pillars of our society organisation. The most important part of the PPDR work is done in the field. Therefore, radio communications are extremely important to PPDR organizations to the extent that PPDR communications are highly dependent upon it. Indeed, at times, radio communication is the only form of communications available (Baldini, Ferrús, Sallent, Hirst, Delmas & Pisz, 2012).

In Europe, most countries have deployed national PPDR networks based mainly on TETRA and TETRAPOL technologies to serve the communications needs of the diverse PPDR organisations established at national level (Forge, Horvitz & Blackman, 2014; Becchetti, Frosali & Lezaack, 2013). The use of a single, shared PPDR network at national level facilitates the cooperation between the diverse national PPDR agencies that can be provisioned with the proper coordination talk groups. However, transnational cooperation of PPDR agencies across European Union (EU) member states is still not solved as of today, being one of the reasons the lack of interconnection between the national PPDR networks in different countries. This lack of interconnection prevents the support of roaming services (commonly called migration services in PPDR terminology) so that PPDR teams displaced to a foreign country cannot keep using their communications equipment in the foreign area. The growth of international crime requires joint police operations in the field in areas like cross-border pursuit of criminals, cross-border patrols and controls, etc. The need of cooperation is also growing in the last decade in natural calamities (e.g. flooding, earthquakes), disasters (e.g. bomb attacks, aircraft crashes) and generally for injured care and transportation, firefighting and support for civil protection. Since national resources are limited, and time is critical in disaster relief, international cooperation enables a greater effectiveness. Investments needed to achieve transnational interoperability may be well repaid by the reduction of casualties and damages. In this context, the relevance of cross border security operations is already acknowledged at European level and identified as a priority (Schengen Agreements). In addition, according to the article 222 of the Treaty of Lisbon (“mutual solidarity”), the EU shall mobilize member states resources to assist other member states in case of terrorist attacks or in case of natural/man-made disasters. Specific groups of countries (e.g. France-Switzerland, Norway-Sweden, Sweden-Germany, Belgium-Netherlands) are