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5G for PPDR: augmenting the PPDR experience

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Outline

- *Starting with a disaster*
- *Step by step …*

    … towards an integrated, advanced solution
- *5G and the 5G Action Plan*
- *COCOM 5G Working Group*
  - **Working Stream 3 – Public Use Cases**
- *PPDR Workshop*
- *Conclusions*

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Starting with one disaster

Fireworks explosion in Enschede, NL

Catastrophic fireworks explosion at the SE Fireworks depot on 13 May 2000. A 40-hectare (100-acre; 0.4 km^2) area around the warehouse was destroyed by the blast. The biggest blast was felt up to 30 km from the scene. The explosion led to the death of 23 people and to 947 injured.

Around 400 houses were destroyed, 15 streets incinerated and a total of 1,500 homes damaged, leaving 1,250 people homeless. Ten thousand residents were evacuated, and damages eventually exceeded 454 M€.

Fire crews were called in from across the border to help battle the blaze; it was brought under control by the end of the day.

The command and control centre was set in a bunker where the commander sat in front of 20 (!) "telephones" to be able to reach the different forces involved!!!

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Lessons learned?

- *Need to be able to transparently "talk" to other forces*
  - **Need for adoption of standardised solution(s)**
- *Years later, the NL were running interoperability trials to make sure all forces were able to talk to each other.*
  - **They were all using TETRA, but still interoperability was DIFFICULT!!!**

- *First project using SDR to allow a single command and control system able to talk ALL radio languages and dialects!*
  - **One "telephone" able to talk to all forces!**

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Step by step

- *WIDENS – FP6 project (2004-06) – an ad hoc infrastructure-less public safety communication network, with a rapidly deployable network component*
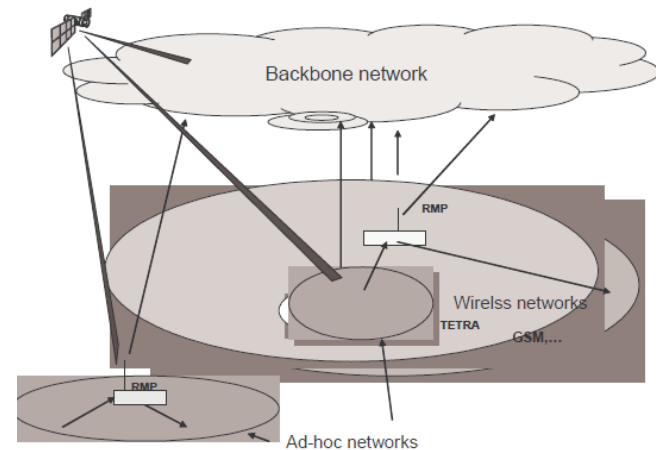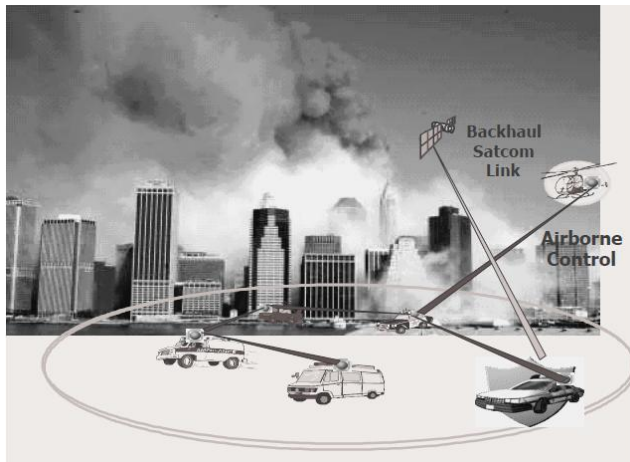
- **Broadband communications to support new applications and services!**

  In this way, public safety, emergency and disaster applications will be enhanced with a high data rate hot spot complementary and interoperable with existing infrastructure (TETRA and Tetrapol)

Step by step

U2010 - FP6 IP project (2006-09) - Ubiquitous IP Centric Government & Enterprise Next Generation Networks, Vision 2010

aiming to provide the most capable means of communication and the most effective access to information to everybody required to act in case of accident, incident, catastrophe or crisis, while using existing and future telecommunication infrastructure.

addressed public safety issues by researching new emergency and crisis management solutions based on IPv6.

Final demo: Fire in the Grouft Tunnel

Step by step

- *EULER – FP7 Cooperation – Security (2009-12) - European software-defined radio (SDR) for wireless in joint security operations -* with the aim of improving interoperability among national and international joint emergency service operations.

- Planning to define and demonstrate how the benefits of SDR can be leveraged to ensure faster deployment in emergency situations.

- Proposing to develop a more agile, interoperable and robust communication system supporting a new range of practical services, such as telemedicine and live video.

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Step by Step

- *LiveCity – CIP Project (2012-15) -* aims at achieving and improving live communication between individuals or groups of individuals in distant places by using high definition (HD) video communication in real time

- *Included an emergency use case: live feeds from an ambulance in Dublin*

  - The paramedics are enabled to transmit the emergency situation and vital signs of the patient to the emergency doctor, by video- and audio link, using real-time high definition video system – the LifeCity camera -, whom is able to assess the emergency situation and advise the paramedics at the emergency site, augmenting the chances of survival within the golden hour.

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Step by step

GEN6 - Governments ENabled with IPv6 - CIP Project (2012-15)

- **IPv6 safety pilot in Ljubljana** - *to demonstrate that it is possible to support the requirements of public safety networks and service using existing devices and solution based on IPv6.*

- **6inACTION** - *Smart communication solutions in emergency situations* - equips first responders with technologically advanced survivable high-performance communications and intervention management services in day-to-day operations and in disaster relief missions.

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6inACTION

Set up site intervention command centre

- Compact mobile or portable network node

- Installed in first responder vehicles

- Provides tactical communication services for intervention management by selecting best available networks for the required services

- Connects to sensor deployments on site

Deploy sensor system on site of the intervention

- Ad-hoc or permanent deployment

- Various commercial sensors – first responder vital signs, Temperature, humidity, avalanche level, flood level, butane sensor,...

- Gateway connects sensors to the command vehicle and headquarters

- Can be kept on site after the intervention is over for long-term site surveillance

Use One-touch triage and tracking application to report conditions and events from the intervention site

- Mobile application for Android and iOS

- Simple one-touch alerting from the intervention site

- Real-time triage reporting

- Real-time unit tracking (time-based and location-based)

- Alerts and reports transmitted to DASHBOARD

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6inACTION

- **Set up site intervention command centre**
- **Deploy sensor system on site of the intervention**
- **Use One-touch triage and tracking application to report conditions and events from the intervention site**

Recent and Ongoing Work in H2020

BroadMap - _www.broadmap.eu_

- first steps towards procurement of 'interoperable next generation of broadband radio communication systems for public safety and security' (DRS-18) to improve PPDR's service to Europe's citizens and enhance interoperability across borders

BroadWay - _PCP Project www.broadway-info.eu_

- Procuring Innovation activity to enable a pan-European interoperable broadband mobile system for PPDR, validated by sustainable test and evaluation capabilities.

➢ **Pan-European Pilot System (TRL8) in 2021**

Current Status

- *Many European countries are still in the process of completing their national TETRA / Tetrapol systems. A few have just recently achieved "national coverage".*

  - **Licences extending till 2020-2030**

- *TETRA and Tetrapol offer essential services like P2T and low-data rate capabilities*
- *Proprietary higher rate solutions are being considered/tested in a few countries*

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The 5G Action Plan - 14.9.2016

COM(2016)588 - 5G for Europe: An Action Plan

Timely deployment of 5G: a strategic opportunity for Europe

The need for a coordinated approach

Keeping Europe ahead in the 5G race: key areas for action

- **A common EU timetable for the introduction of 5G**
- **Unlocking bottlenecks: making 5G radio spectrum available**
- **Leveraging fixed and wireless: a very dense network**
- **Preserving 5G Global Interoperability: standardisation challenges**
- **5G innovation in support of growth**
  - *Stimulating new connectivity-based ecosystems through experiments and demonstrations*
  - *The public sector as an early adopter and promoter of 5G connectivity-based solutions*
  - *A venture financing initiative to stimulate 5G innovation and take-up*

Reinforced by the connectivity targets set out in the Communication "*Connectivity for a Competitive Digital Single Market: Towards a European Gigabit Society*"

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PPDR in the 5G Action Plan

- **Action 7 — The Commission encourages Member States** to consider **using the future 5G infrastructure** to improve the performance of **communications services used for public safety and security**, including shared approaches, in view of the future procurement of advanced broadband public protection and disaster relief (PPDR) systems. Member States are encouraged to include this consideration in their national 5G roadmaps.

- *The idea is not to (immediately) replace current PPDR systems, but supplement them! Add broadband as well as real time capabilities as soon as possible!*

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COCOM 5G Working Group

Workshop
on
5G for PPDR

11 April 2018

Key Outcomes 1/4

- ***Key old PPDR services** to guarantee going forward to 4G/5G:*
  - ➢ Extensive geographical coverage of basic voice and text communication (at least equivalent to PMR)
  - ➢ DMO: Direct device-to-device communications
  - ➢ Pre-emption

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Key Outcomes

- ***Key new services:*** *Broadband video; communication with (critical) Things/Sensors, including drones; accurate location; roaming between public and/or private networks*

- ***Key new functionalities****: End-to-end orchestration of multiple connectivity networks; mission critical network slicing over multi-domain networks; new user interfaces and interaction with new devices such as drones, robots and sensors; inter-governmental/inter-agency interoperability for cross-border cooperation*

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- ***Main issues flagged during Workshop:***
  - ➢ Use of mainstream technology and harmonized spectrum to reduce terminal costs and increase capacity
  - ➢ Evolution from dedicated PPDR/PMR to 4G/5G advanced PPDR Broadband Services starting with Rel. 15
  - ➢ Ensure availability of PPDR-enhanced chipsets for terminals (including mainly DMO function)
  - ➢ Completing standardisation of PPDR: 3GPP lacks experts
  - ➢ Public co-financing of infrastructure to ensure extensive geographical coverage and the availability of specialized PPDR functions in future networks
  - ➢ Need to address spectrum issues, including extensive sharing of commercial bands
  - ➢ Terminals: need ~1M devices to have economies of scale, out of today's ~5M PPDR terminals in EU!

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Key Outcomes 4/4

- ***Ways forward:***
  - ➤ <u>Build confidence on user side</u>: monitor experience in UK (EE/Motorola) and US (FirstNet), government support to trials and innovative procurement, migrate targeted users, …
  - ➤ <u>Involve Network Operators</u> to discuss financing models (e.g. sharing capacity/LSA, subsidising coverage extension possibly by tailoring spectrum license conditions)
  - ➤ Request MS to address <u>transition to broadband</u> solution as part of 5G roadmap reflection
  - ➤ Eventually aim at a <u>sunset date</u> in Europe for old PMR systems, provided that:
    - ▪ Maintenance of legacy is guaranteed until set switch-off date
    - ▪ Alternative (4G/5G) solutions are commercially available with acceptable coverage

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In conclusion

- *Current PPDR systems are here to stay, but well needed advanced services (broadband and real-time) are lacking*

- *Advanced services/capabilities can start being deployed by using LTE-based solutions (starting with Rel. 15), to allow for testing and validation, as well as timely integration with Command and Control systems*

- *Shared solutions, relying on commercial networks, should be considered*

- *5G-based PPDR solutions would require European-wide commitments to achieve the necessary economies of scale*

- *PPDR availability and reliability requirements could possibly justify co-financing of the extended infrastructure*

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5G for good!
5G for PPDR!

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