PROGRESS MEETING,

POZNAN, 24-25 JUNE 2014

DELIVERABLE D3.2 – ANALYSIS OF PPDR RADIO SPECTRUM REQUIREMENTS

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- Deliverable Overview
- What spectrum is required for PPDR?
- Current Situation in Europe and Elsewhere
- Why is additional spectrum required?
- Preferred new PPDR frequency bands in Europe
- Conclusions

D2.1 OVERVIEW

- The Deliverable reviews **existing PPDR frequency bands**, explains why **new frequency bands** are required and **which bands are preferred**
- Details of existing and expected future bands in **Europe, America** and the **Asia Pacific** regions are presented
- **Studies** undertaken in these regions relating to **new PPDR spectrum requirements** are described
- An analysis of the **coverage and cost implications** of various frequency bands for PPDR wide area network coverage is presented

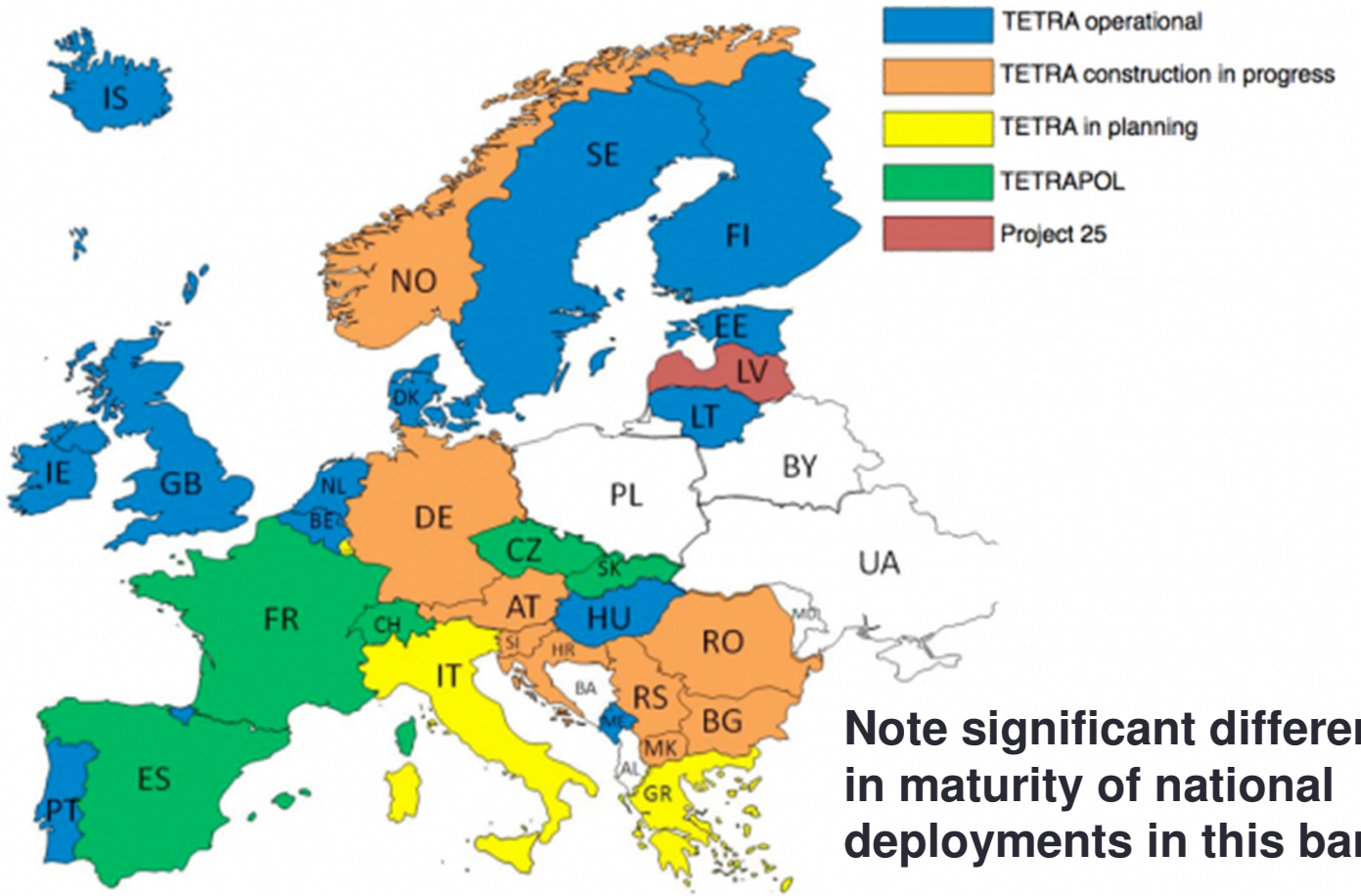
WHAT SPECTRUM IS REQUIRED FOR PPDR?

- **Wide area voice and messaging**, e.g. TETRA
- **Wide area broadband**, e.g. video
- **Local area communication**, including:
  - Extending coverage of wide area networks
  - Direct communication between terminals (DMO)
  - Ad-hoc local area networks
- **Air to ground communications (A2G)**, e.g. helicopters
- **Satellite communications**, e.g. for remote areas and disaster recovery
- **Fixed links**, e.g. network backhaul or temporary links

CURRENT PPDR SPECTRUM IN EUROPE

- Only fully **harmonised** band is **380-400 MHz** – only half of this is available (2x5 MHz) and is used mainly by **TETRA/TETRAPOL**
- Some specific frequencies in this band set aside for **DMO** and **A2G**
- Many countries still have **analogue** systems operating in a variety of VHF and UHF bands (68 – 470 MHz)
- Some countries already have specific bands identified for **broadband PPDR** (e.g. video links) – main bands are **2.3 GHz** and **3.5 GHz** but precise frequencies vary
- CEPT has attempted to harmonise spectrum around 5 GHz (**4940-4990 MHz** and **5150-5250 MHz**) for **local area broadband PPDR**, but few countries have taken this up
- Existing international bands used for **satellite** and **fixed links** (generally shared with other users)

CURRENT STATUS OF 380-400 MHZ



Source: PSRG - Public Safety Radio Group. Status as from April 2013

Note significant differences in maturity of national deployments in this band

NATIONAL BROADBAND PPDR BANDS

(Source: EFIS / national regulatory authorities)

Country	Frequency Band	Application
Austria	2300-2400 MHz	Cordless cameras
France	2310-2400 MHz	Video links
Germany	2347-2385 MHz	Analogue and digital video links
Greece	2300-2400 MHz	Public safety networks (used in five largest cities)
Hungary	2025-2070 MHz, 2200-2245 MHz	Digital broadband video
Ireland	3435-3475 MHz	Airborne video links
Poland	2250-2265 MHz	Digital video
UK	2320-2360 MHz	Wideband mobile emergency services (terrestrial)
	2360-2389 MHz	Wideband mobile emergency services (aeronautical)
	3442-3475 MHz	Airborne video links

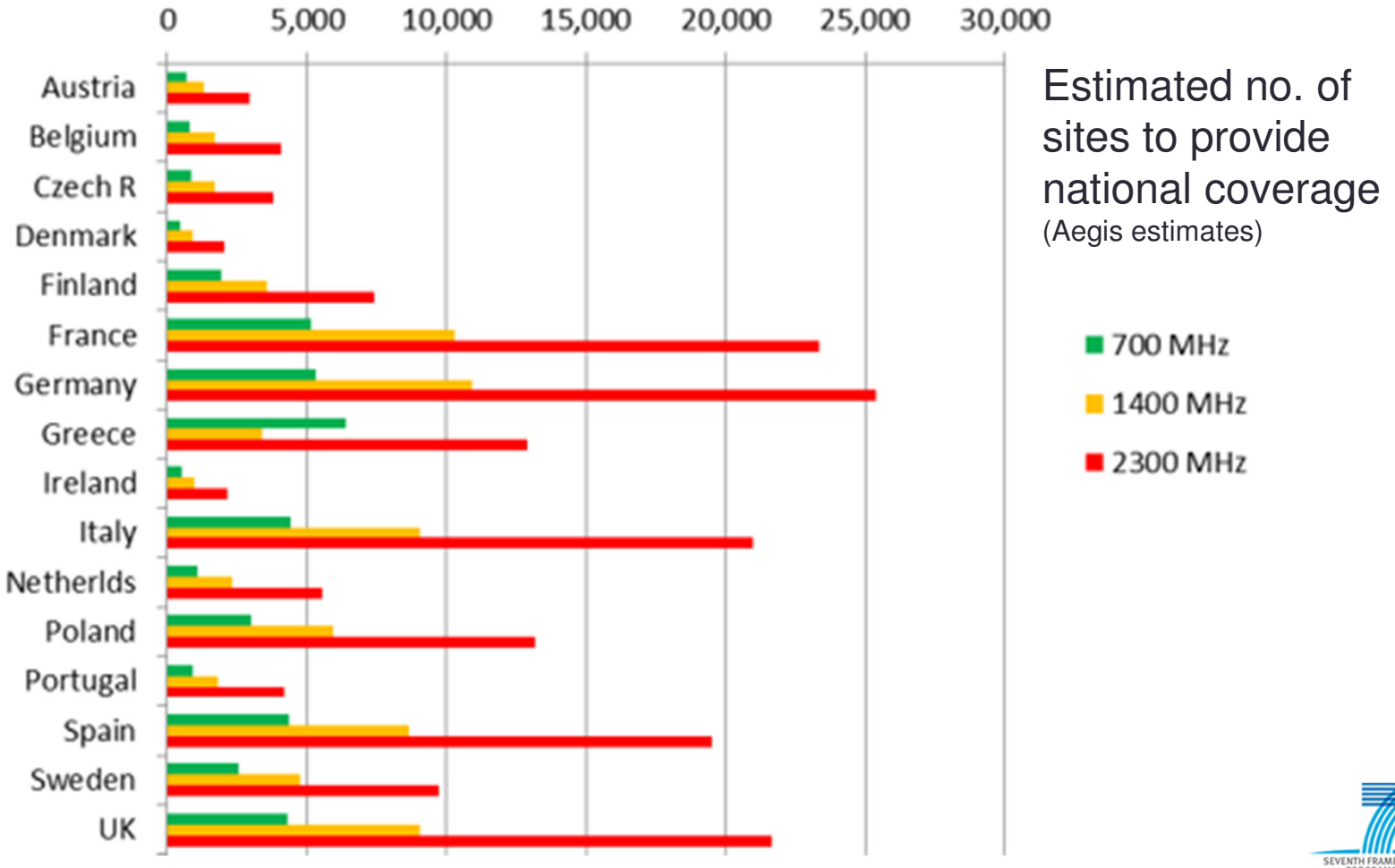
Note lack of harmonisation for such use

PRINCIPAL SATELLITE FREQUENCY BANDS

Band	MHz	Service	Main uses
UHF	406–406.1	MSS	EPIRBs
RNSS	1164–1300/ 1559–1610	RNSS	GPS, GLONASS, GALILEO (satellite navigation services)
L Band	1525–1559/ 1626.5-1660.5	MSS	Principal Mobile Satellite band, used by Inmarsat, Thuraya and others. 1544-1545 MHz and 1645.5-1646.5 MHz reserved for distress and safety communications
	1613.8-1621.35 2483.5- 2500	MSS	Globalstar mobile satellite band
	1621.35-1626.5	MSS	Iridium mobile satellite band
C Band	3600–4200/ 5925-6425	FSS	Mainly used by large fixed earth stations. Shared with fixed links. 3600-3800 may be used by mobile in the future
Ku Band	12500-12750/ 14000-14250	FSS	Mainly VSATs and portable earth stations, including PPDR apps e.g. traffic monitoring and emergency links.
Ka Band	19700-20200/ 29500-30000	FSS	Increasingly used for broadband connectivity or backhaul in remote areas

WHY IS NEW PPDR SPECTRUM REQUIRED?

- **Need to support new applications and services as identified in WP2 deliverables – especially wide area mobile broadband**
- **Need sufficient low frequency (sub – 1 GHz) spectrum to ensure cost effective national coverage**

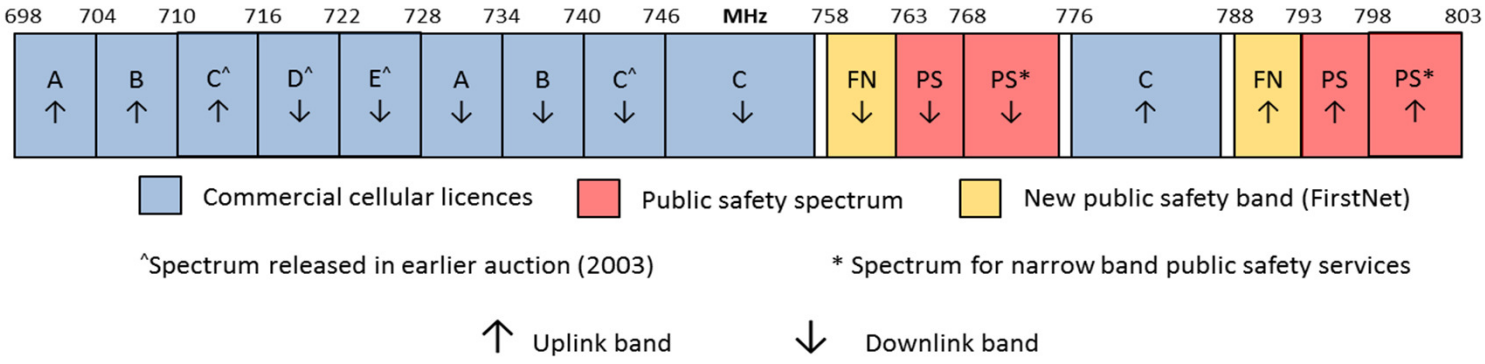


BB PPDR SPECTRUM STUDIES

- ETSI (2011): 10 + 10 MHz
- IABG (2010): 40 + 20 MHz
- Aegis/WIK (2011): 15 + 10 MHz
- ECC PT49: 10 + 10 MHz
- Canada (2011): 10 + 10 MHz
- Hong Kong (2013): 10 + 10 MHz
- Australia (2011): 10 + 10 MHz
- ITU WP5A (2013): 6-18 plus 3-15 MHz
- UAE (ITU WP5A, 2014): 6.3-16.9 plus 6-9.8
- Actual requirement very scenario dependent but broad consensus points towards 10 + 10 MHz in most countries

USA PPDR BANDS

- **USA already has broadband mobile spectrum for PPDR**
  - Existing 2 x 5 MHz blocks
  - New 2 x 5 MHz block for national “FirstNet” network
  - 2 x 18 MHz in total available at 700 MHz (34% of band)
- **Also makes use of dedicated 4940-4990 MHz band for WLAN**



USA 700 MHz band plan

CURRENT EUROPEAN (PT49)PROPOSAL

- **Suggests dedicated band of 2 x 5 MHz plus additional spectrum as required at a national level**
- **700 MHz band favoured, with possible downwards extension to support dedicated PPDR band**
- **Terminals should support both dedicated band and commercial LTE bands**
- **Centre gap could also potentially support PPDR**



CONCLUSIONS

- **Growing global consensus that additional spectrum required for BB PPDR (already implemented in some countries)**
- **Should comprise low frequency (<1 GHz) for WAN and higher (e.g. 4940-4990 MHz) for WLANs**
- **Also need spectrum for specialist apps like DMO and A2G**
- **700 MHz strongly favoured for BB WAN – ECC PT49 has proposed 2x5 MHz dedicated band plus additional from adjacent mobile band where needed**
- **BB LANs should use existing allocations around 5 GHz**
- **Other potential bands of interest include**
  - 2 GHz unpaired bands (1900-1920/2010-2025 MHz)
  - 2 GHz satellite bands (1980-2010/2170-2200 MHz)