



Association of  
Professional Wireless  
Production Technologies

**Spectrum needs for wireless  
microphones and wireless cameras in  
broadcast content production**

Dré Klaassen: president APWPT

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# Introduction



- Who is the APWPT?
- What is PMSE?
- Some history on radio microphones.
- Wireless Cameras.
- Future use.
- The regulatory framework.
- Digital Dividend.
- Conclusions.

# Who is the APWPT



- Association of Professional Wireless Production Technologies an international non-profit organisation, under German law.
- Represents over 25,000 PMSE members globally
- PMSE is crucial on a daily basis for the production of broadcast content and electronic news gathering (ENG).
- PMSE also in the Performing Arts, Independent Film and TV Production, Corporate Events, Concerts, Night Venues, Sports Events, Churches, the Health Service, Education, Local Government, Political Programming and Conferencing, etc.

# What is PMSE



- PMSE = Program Making & Special Events and contain:
  - Wireless microphones and IEM,
  - Wireless intercom,
  - Reporter sets,
  - Audio links,
  - Wireless cameras,
  - Wireless remote control of light, pyrostatistics and décor,
  - Conference systems,
  - Etc.

# Some history on radio microphones



- History of 60 years; early adapter was broadcast.
- Radio Microphones in the slot between the Vision and the Audio carrier of analogue TV carrier, later private facilitators/ rental companies brought PMSE wider in society..
- In EU more then 8 million RM in daily use.
- 80% of all broadcast content production produced with RM.
- Musical Industry would not exist.
- UHF-TV band properties necessary for the use of radio microphones.

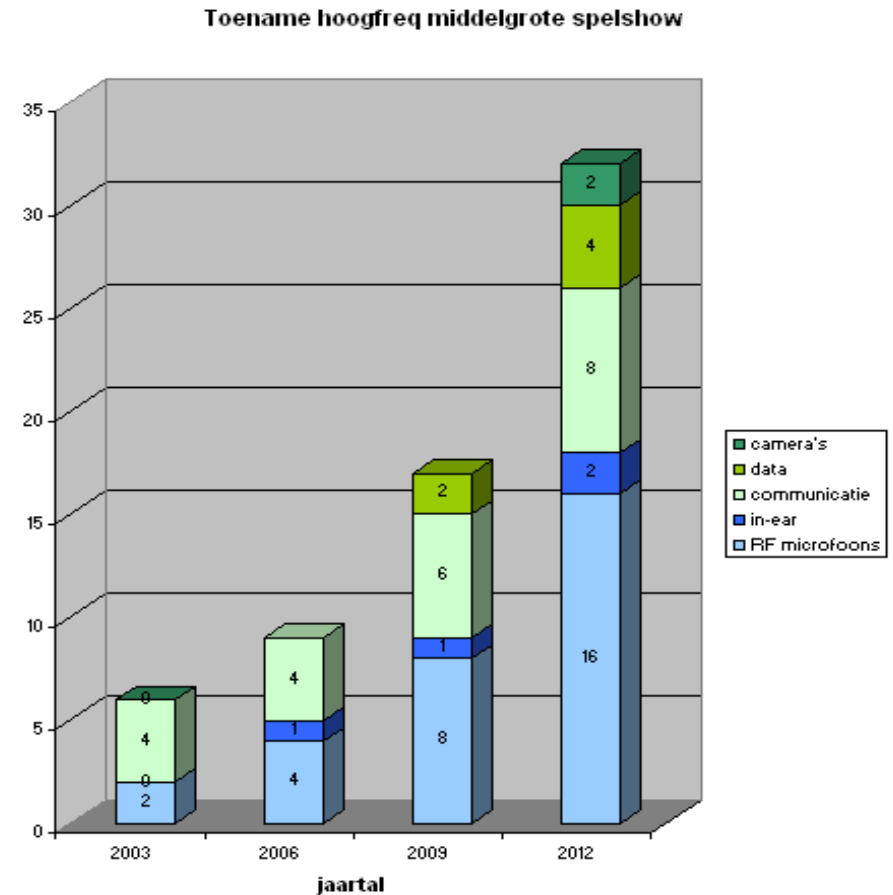
# Wireless Cameras



- Most wireless cameras live in the 2 GHz range .
- Band 2,5-2,6 GHz allocated to IMT.
- Wireless camera manufacturers claim it is a user problem.
- Most users unaware of the problem and when it occurs it is too late to anticipate.
- APWPT has a focus on it but needs strong support of the wireless camera community like the RM manufacturers currently do.
- No acceptable solutions found yet.

# Future use

The demand for PMSE continues to increase (qualitative and quantitative 5-10% annually).



# The regulatory framework

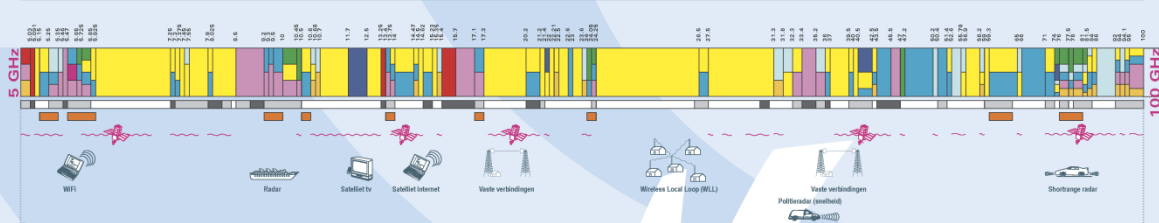
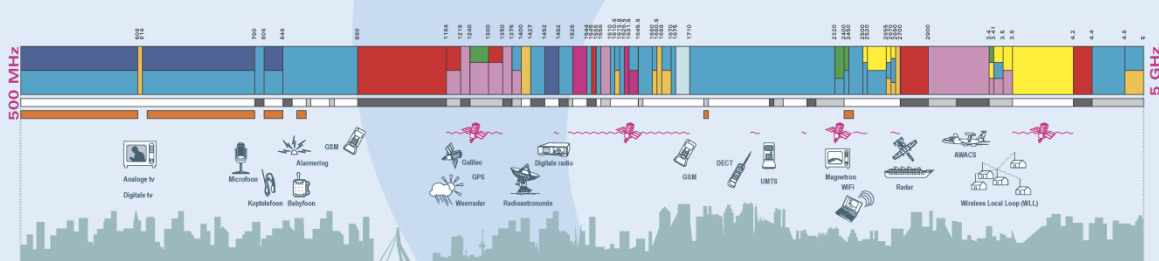
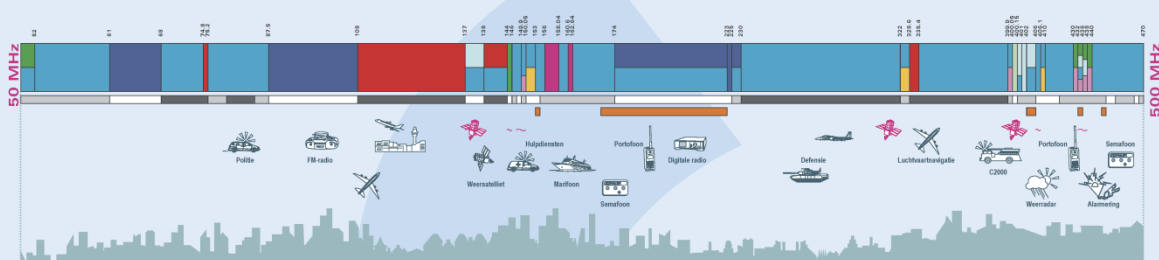
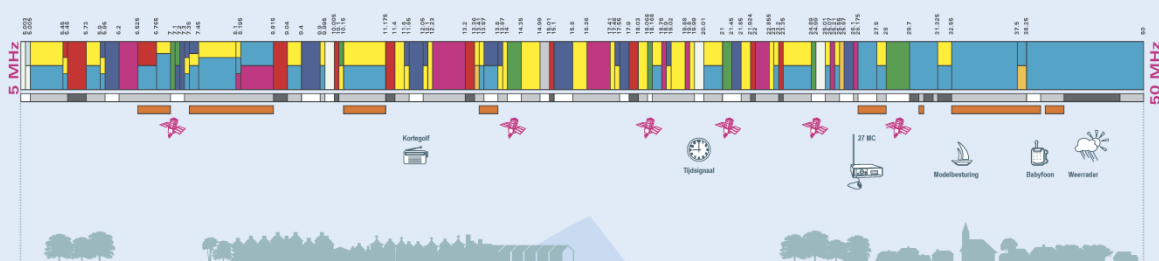
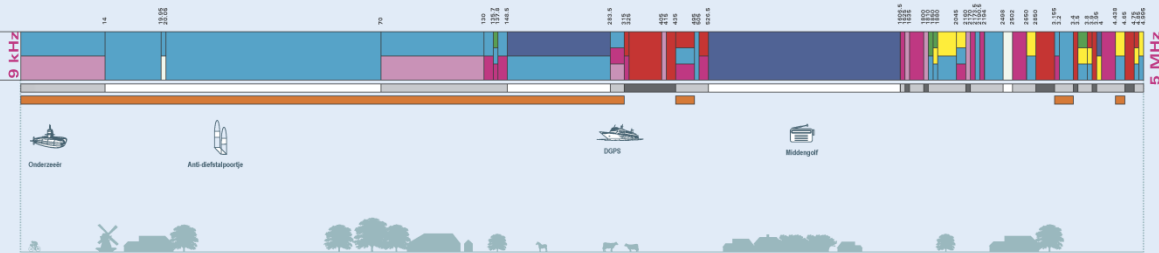
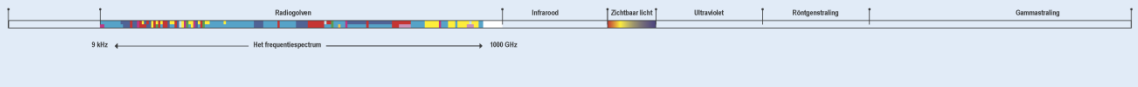


- Regulator organises the use of spectrum
  - Broadcast,
  - Public services,
  - Aviation,
  - Marine,
  - Military
  - Radio Astronomy)
  - Mobile (GSM, UMTS 2G/3G/4G),
  - Satellite services (GPS, Sat-TV)
  - And of course wireless microphones and cameras.



Elektromagnetisch spectrum

Het frequentiespectrum loopt van 9 kHz tot 1000 GHz en is een onderdeel van het elektromagnetisch spectrum. Het frequentiespectrum wordt gebruikt voor telecommunicatie.



# The regulatory framework



- International Telecommunications Union (ITU).
  - Since 1865 and an UN organisation.
  - 193 member states.
  - Mission: promote better telecommunications between member states.
  - ITU-R= Radio communications sector.
  - Divided:
    - ITU region 1: Europe (CEPT) and Africa (ATU),
    - ITU region 2: North and South America (CITEL),
    - ITU region 3: Asia and Australia (APT).

# The regulatory framework



- CEPT/ECC: European Conference of Postal and Telecommunications/Electronic Communications Committee
  - WG FM: Frequency Management (regulation),
  - WG SE: Spectrum Engineering (technical).
- European Union 28 member states.
- European Commission: DG CNECT.
  - Radio Spectrum Policy Group (RSPG).
    - Radio Spectrum Policy Program (dynamic).
    - Radio Spectrum Committee (RSCOM).
- National radio regulators/agencies (NRA)

# Digital Dividend



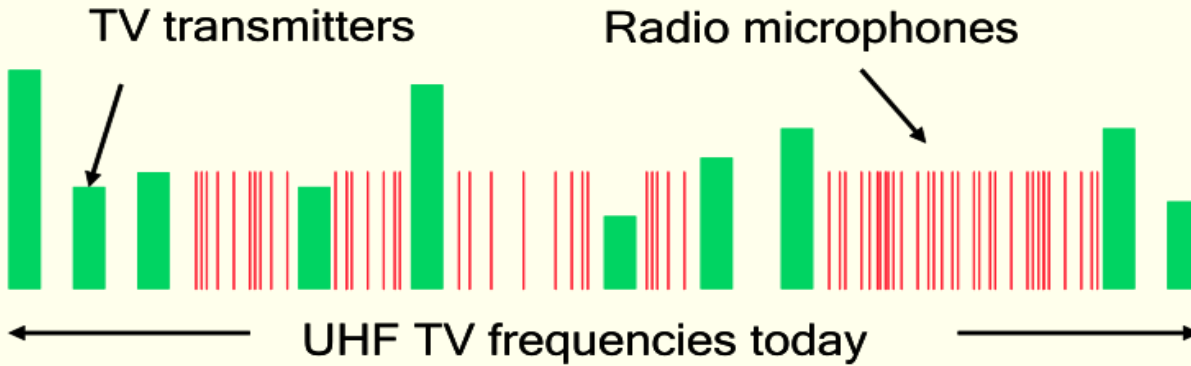
- DD is the result from switching analogue TV transmission into Digital Television (DVB-T2 can accommodate 4 up to 8 programs and/or HD in bandwidth of one TV channel).
- DD has only a political meaning (no gain through increase in program offer (almost same as cable)).
- Regulators want more efficient use of spectrum:
- WRC07, 1st DD: 790-862 MHz, IMT co-primary user.
  - most PMSE equipment with current technology redundant.
- PMSE has only secondary status:
  - Non protection not causing interference basis

# Digital Dividend

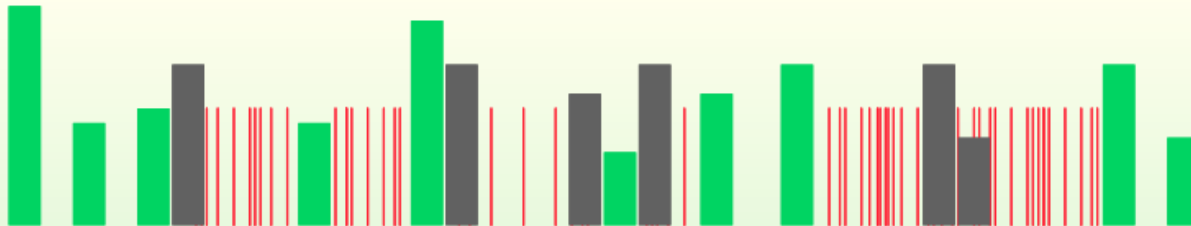


- WRC15, 2nd DD: 694-790 MHz, IMT co-primary user.
  - major events become almost IMPOSSIBLE.
  - Musical industry cannot survive in its current form.
- Next DD's? 470-694MHz? How wise?
- Will the Duplex Centre Gaps work for PMSE
- Cognitive Radio (WSD: thread or chance?)
- Public Safety Services?
- What else?
- And what about noise?

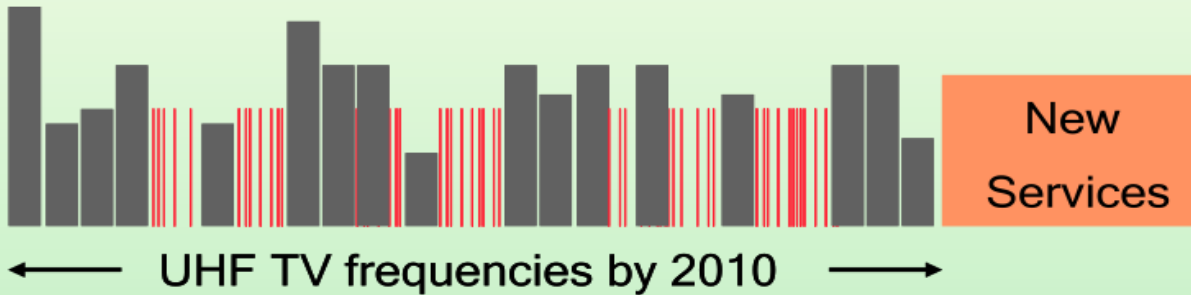
# Digital Dividend



Today:  
Analogue TV only



Transition:  
Analogue. + DVB-T

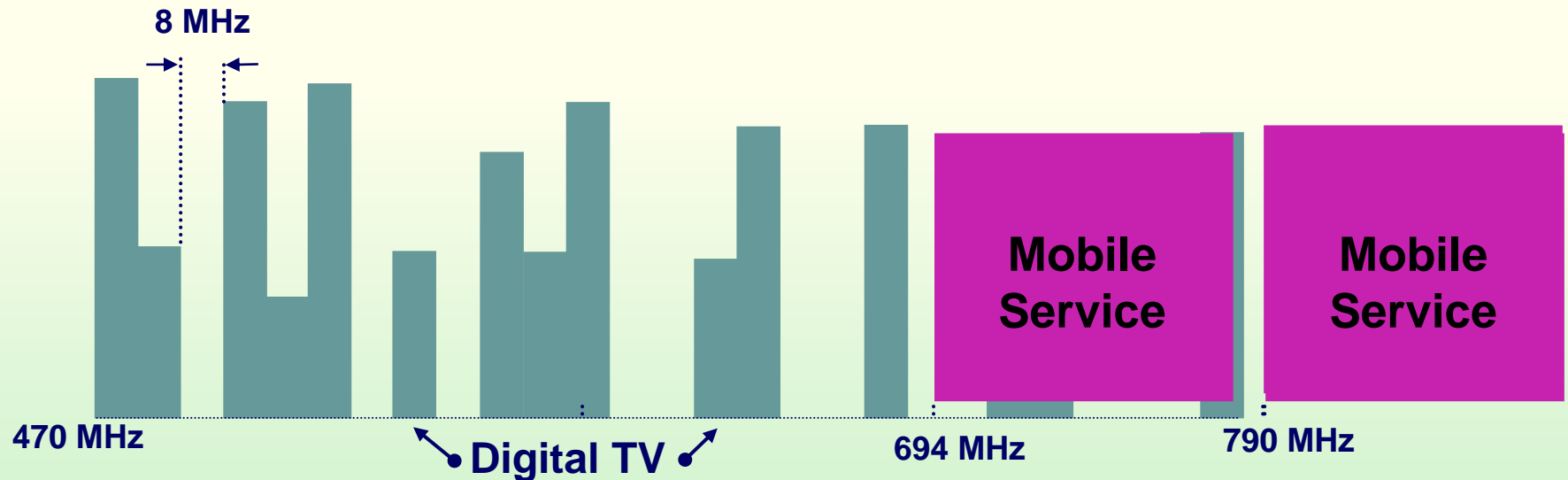


Target:  
Full DVB scenario

# Digital Dividend 2

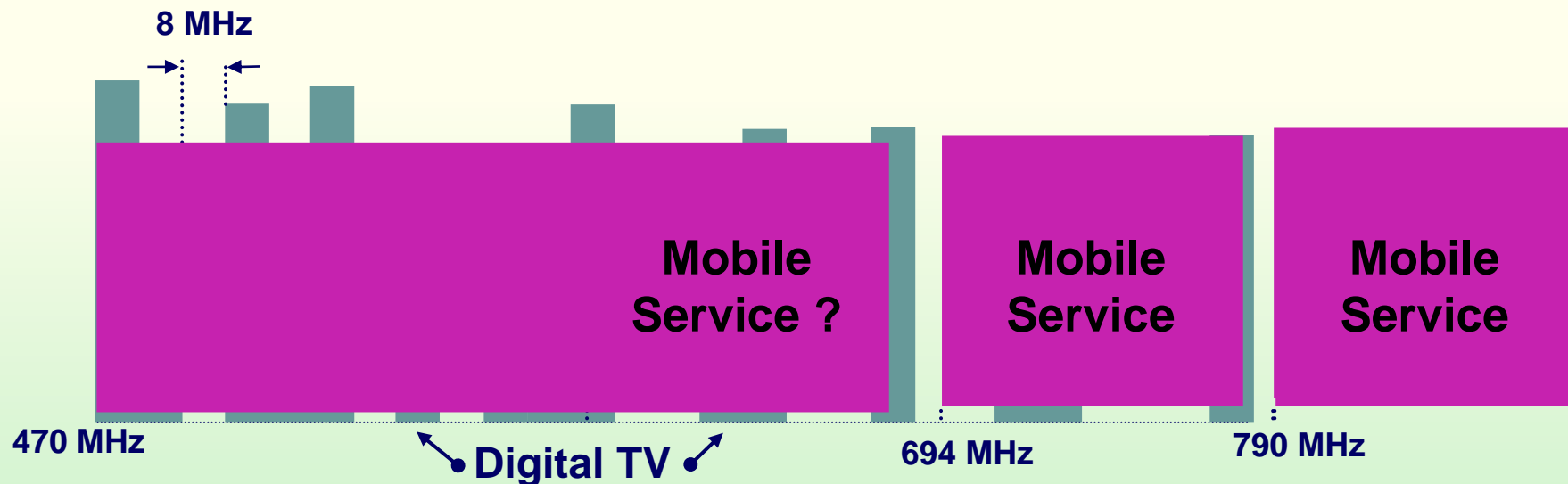


The demand for wireless audio is continuing to increase, while at the same time the amount of spectrum available for DVB-T and PMSE is shrinking.



# Digital Dividen 3?

The demand for wireless audio is continuing to increase, while at the same time the amount of spectrum available for PMSE is shrinking.





# Conclusions



- The UHF is the core audio PMSE band needed for the daily production!
- The 2 GHz band is the core band for PMSE video.
- How to accommodate the PMSE growth?
- The PMSE industry works hard on innovation but needs planning reliability for their investments.
- Mobile Telecommunications need PMSE for SMS and traffic income. Arrangements with PMSE are essential.
- The UHF TV band is the core band for PMSE audio but further alternatives (e.g. L-band) are needed for DD compensation.
- The secondary status is an obstacle for a solution