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Content Production: Opportunities for NR+

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24TH MAY 2022

Content Production: Opportunities for NR+

- What is Content Production
- What is PMSE
- How does Content Production work now
- How is Content Production changing
- Where does NR+ fit in the future of Content Production

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Content Production – What is it?

- TV, Audio and feature film production
- Live Music, Event and Theatre production
- Newsgathering

Its Wireless use is ‘Programme Making and Special Events’ - PMSE

Programme Making and Special Events (PMSE) equipment is meant for use in applications identified in various publications as Services Ancillary to Programme making (SAP), Services Ancillary to Broadcasting (SAB), Electronic News Gathering (ENG) / Outside Broadcasting (OB), Broadcast Auxiliary Systems (BAS) and applications used in meetings, conferences, cultural and education activities, trade fairs, local entertainment, sport, religious and other public or private events

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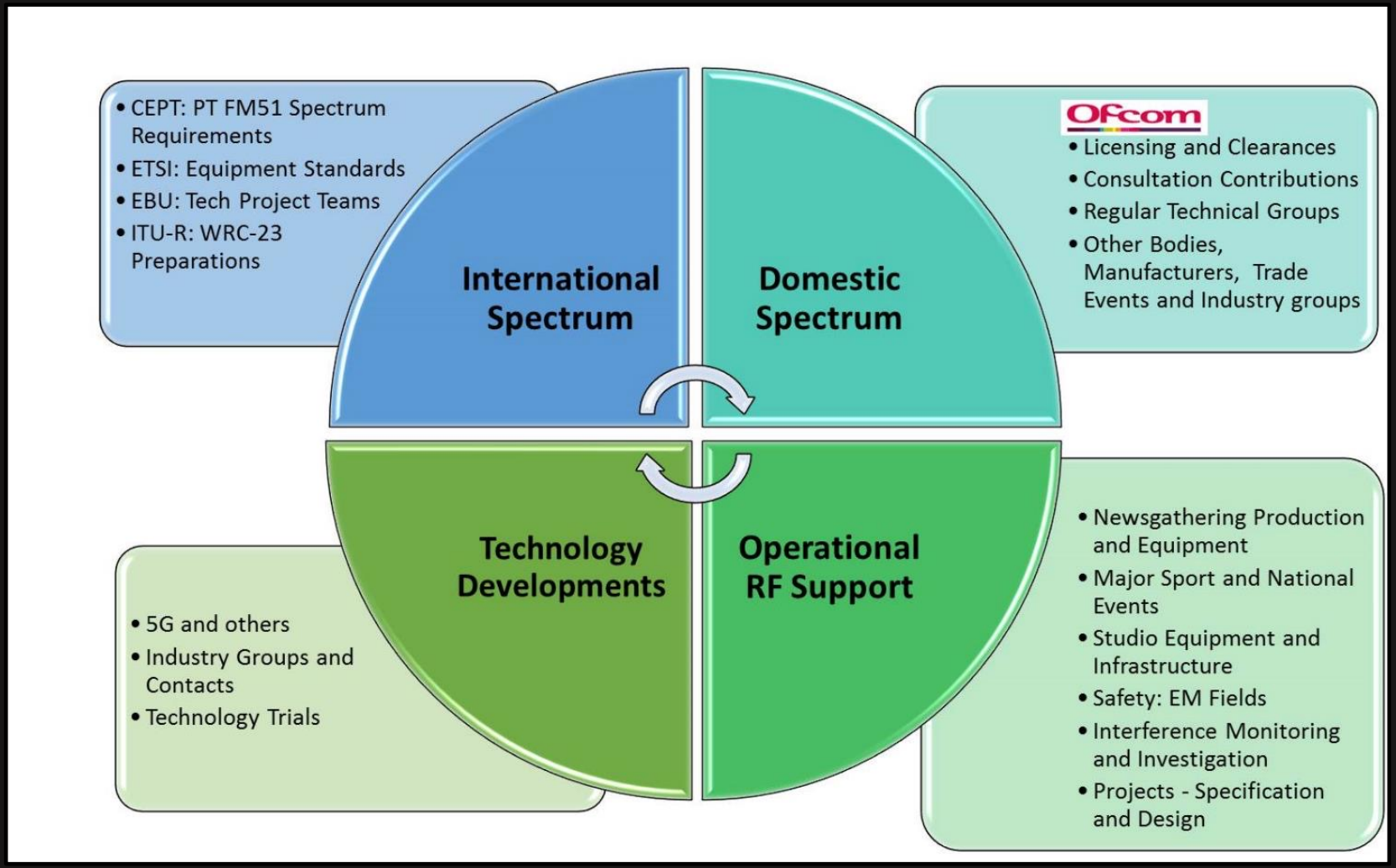
PMSE



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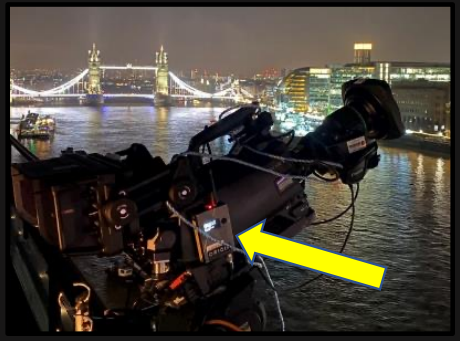
How does it work now?

Multiple unidirectional radio channels

Audio PMSE
In-ear monitor systems
Radio microphones
Audio links

Video PMSE
Airborne Video Links
Cordless cameras
Video links

Service links
Talkback
Data Control



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How does it work now?

Multiple spectrum requirements

Audio PMSE
470 – 694MHz

(was 470 – 862MHz)

Video PMSE
Bands between
2GHz and 8GHz

(Spectrum lost to IMT)

Service links
Talkback
Data Control

(Various but limited)

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High Spectrum Demand - Sporting and Major Events

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High Spectrum Demand – Audio PMSE

Outdoor Music Events

Multiple Bands, multiple Stages

<u>Simultaneously</u>

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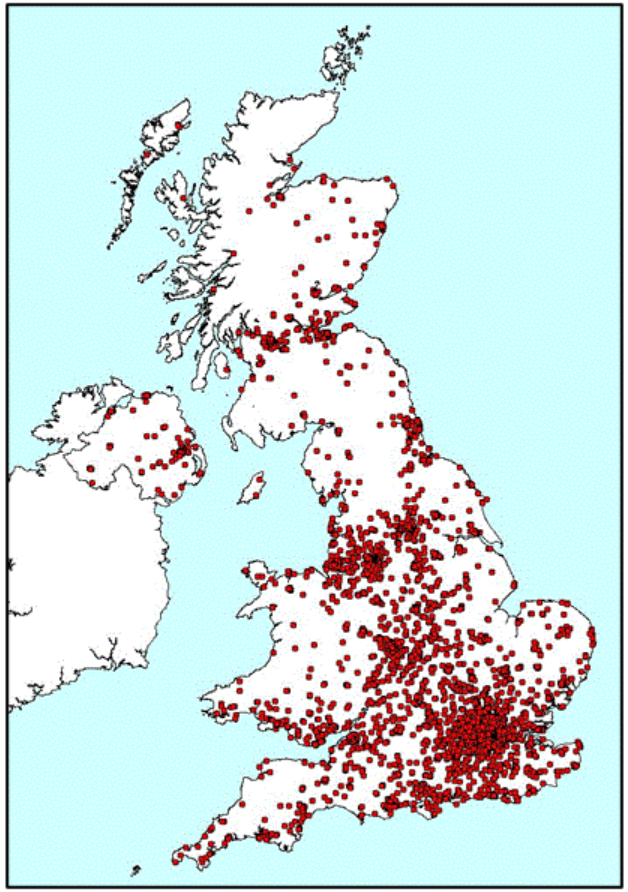
High Spectrum Demand ……everywhere

Maximum Spectrum Demand for Audio PMSE for Representative Production Scenarios

Scenario	Peak Instances of Device Use	Total Spectrum Required (MHz)	Equivalent No of 8 MHz DTTB Channels Required
Film-making: (A major film and/or TV Production Centre)	200	82	11
Large Theatre Production	94	39	5
Outdoor Music Event	260	106	14
TV News Gathering	45	18	3
TV Sporting Event	140	57	8

PMSE licensed locations in 2018 and 2019



(UK examples)

PMSE Equipment requirements – Quality of Service

What does ‘Quality of Service mean for PMSE?

- Guaranteed robust bandwidth, video and audio quality
- Low and reliable latency
- Suitable spectrum solutions
- Suitable bodyworn devices, particularly for audio + battery performance
- <u>Currently achieved using bespoke and proprietary systems</u>

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Mouth-to-Ear latency requirement in live audio production

Roundtrip latency 4ms max

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DECT PMSE: Production Talkback

- Adequate Audio
- Adequate Latency
- Licence Exempt
- Robust Coverage
- Secure

Content Production - Trends

- Wired production using more IP based workflows
- More Cloud based bi-directional workflows
- More scalable IP based resources
- <u>But conventional wireless production is not easily integrated into IP workflows</u>

Content Production – What can 5G and NR+ offer?

- Common network technologies at lower cost
- More flexibility, enhanced facilities and interoperability
- Mass market chipsets cf. traditional bespoke PMSE
- Low latency and reliability to match traditional PMSE

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5G and NR+ Content Production

What are the challenges?

- Equipment
- System Integration
- Connectivity and Spectrum solutions

5G Content Production – Equipment issues

- Prototypes only
- Configuration limits:
  Upload vs Download
- Dubious RF performance of initial products

5G Content Production – Quality of Service

- Public Networks – little progress so far, including on Network Slicing, uplink vs downlink

- Public Networks – Slow roll out of universal SA 5G: namely ‘5G Radio’ AND ‘5G Core’

5G Content Production – Connectivity and Spectrum

- Non-Public Networks:

  Guaranteed QoS

  Optimised upload and download speeds in dedicated spectrum

  More secure than public networks

Non-Public Networks – Spectrum challenges

- Short-term/Short notice spectrum leasing – Rare
- Network Operators have little incentive to engage
- Regulators currently find it too difficult to contemplate

How is it being addressed?

Equipment: Standardisation

3GPP Release 17
Enhancing:

Dynamic Spectrum Sharing

Low Latency

Network Slicing

NPNs

Release 18 to follow

Release 17

- NR MIMO
- NR Sidelink enh.
- 52.6 - 71 GHz with existing waveform
- Dynamic Spectrum Sharing (DSS) enh.
- Industrial IoT / URLLC enh.
- IoT over Non Terrestrial Networks (NTN)
- NR over Non Terrestrial Networks (NTN)
- NR Positioning enh.
- Low complexity NR devices
- Power saving
- NR Coverage enh.
- NR eXtended Reality (XR)
- NB-IoT and LTE-MTC enh.
- 5G Multicast broadcast
- Multi-Radio DCCA enh.
- Multi SIM
- Integrated Access and Backhaul (IAB) enh.
- NR Sidelink relay
- RAN Slicing
- Enh. for small data
- SON / Minimization of drive tests (MDT) enh.
- NR Quality of Experience
- eNB architecture evolution, LTE C-plane / U-plane split
- Satellite components in the 5G architecture
- Non-Public Networks enh.
- Network Automation for 5G - phase 2
- Edge Computing in 5GC
- Proximity based Services in 5GS
- Network Slicing Phase 2
- Enh. V2x Services
- Advanced Interactive Services
- Access Traffic Steering, Switch and Splitting support in the 5G system architecture
- Unmanned Aerial Systems
- 5GC LoCation Services
- Multimedia Priority Service (MPS)
- 5G Wireless and Wireline Convergence
- 5G LAN-type services
- User Plane Function (UPF) enh. for control and 5G Service Based Architecture (SBA)

These are the Rel-17 headline features, prioritized during the December 2019 Plenaries (TSG#86)

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System Integration

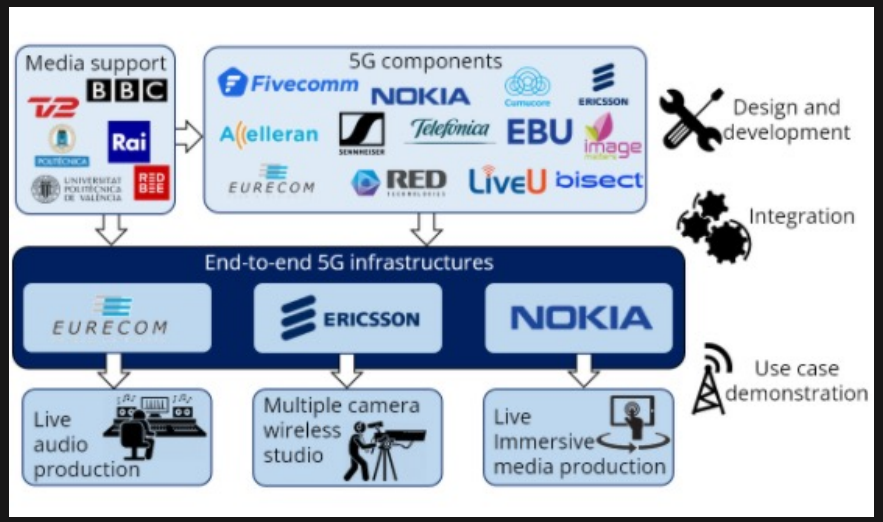
Requirements for Non-Public Networks

Contributing to 3GPP Release 18

Trials and demos

Integration of 5G components into three use cases and performance evaluation

Manufacturers, Telcos, Broadcasters and Content Providers



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Connectivity and Spectrum Solutions

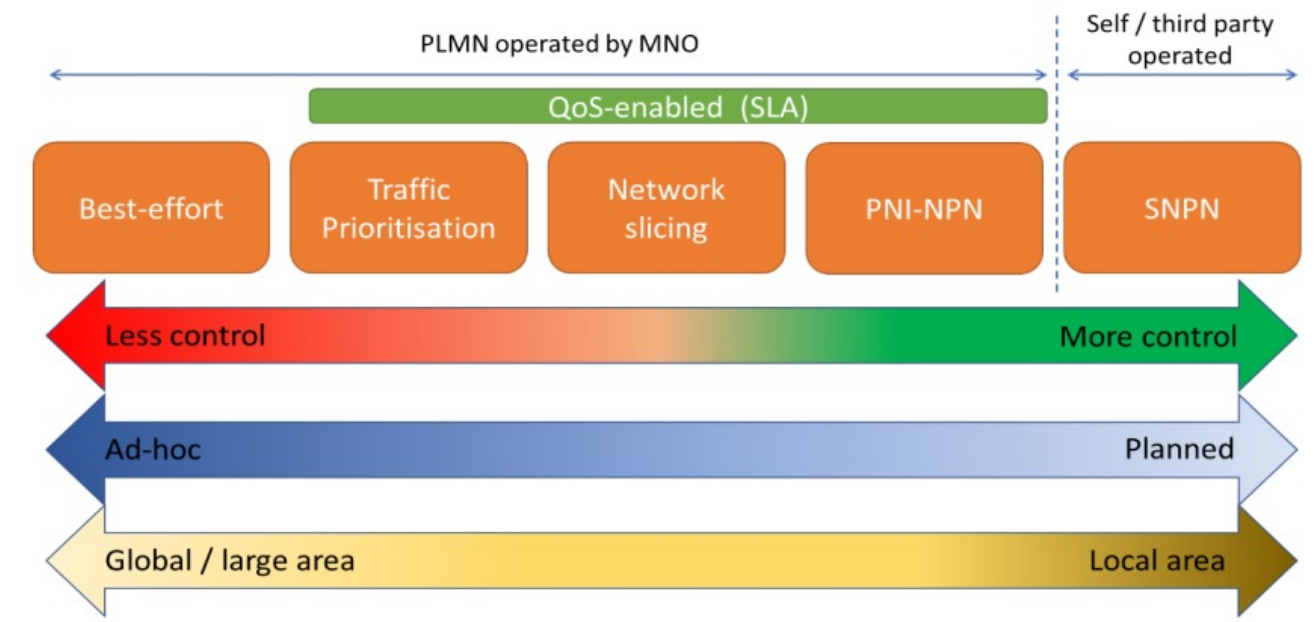

Figure 3: Content producers' perspective on different network configurations

Deliverable D2.2 Regulatory framework and business models for 5G content production

Connectivity and Spectrum Solutions

- Considering the commercial business model
- Cracking the International Regulatory Framework
- Exploring suitable forms of licensing:

  General authorisation
  Secondary to an incumbent
  Individual or Local Area Licensing
  Spectrum Leasing or Trading

Where Next?

- NR+ - the world's first non-cellular 5G technology standard
- NR+ - already with it's own exclusive spectrum and able to expand into 5G NR bands too
- NR+ - delivering URLLC for PMSE, IoT and business comms in standalone networks

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Thank you