Opportunities for NR+

PMSE : Event & Content Creation

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Agenda

- **PMSE Market** — **Barclay Milne**
- **PMSE Use of DECT Today** — **Wolfgang Fritz**
- **PMSE Opportunities for NR+** — **Andreas Wilzeck**

... a new

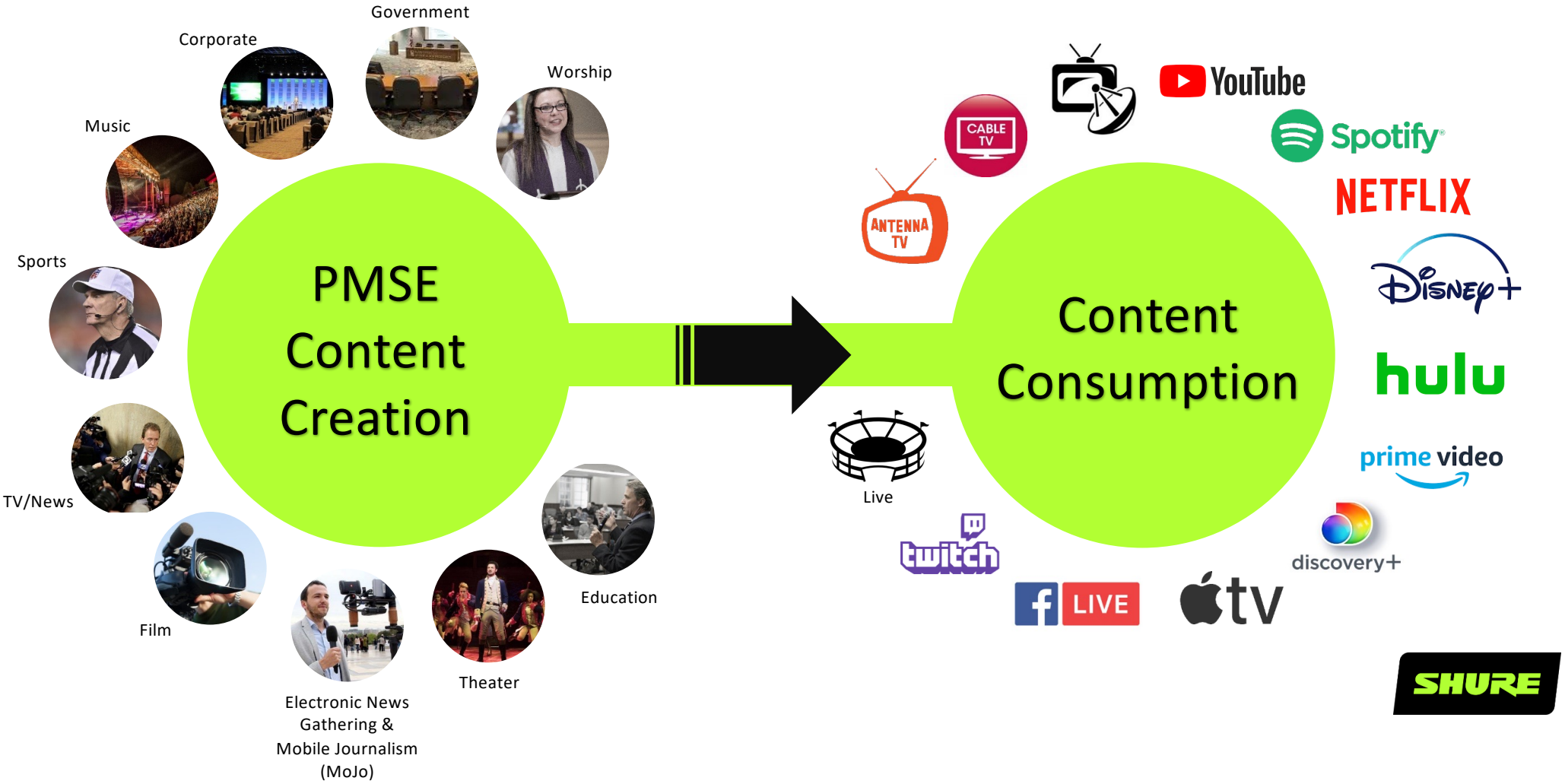
PMSE : WHAT IS IT?

Bringing people together, entertaining, informing, educating, sharing ……

Enhancing and influencing our everyday lives

Enabling our society to be what it is today

Content Creation Enables Consumption



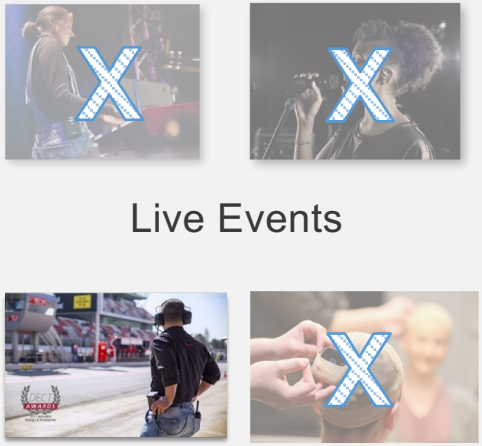
PMSE Wireless Products

Intercom / Talkback

Microphone & In-ear Monitor

PMSE : Market Segments

Studio & Film Production



Live Events

Conference / Presentation

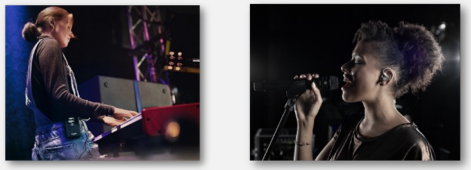
ENG / MoJo

DECT &
DECT Evolution
PMSE Market
Penetration Today

Wireless PMSE : Market Segments

Studio & Film Production

Penetrate



Live Events

Explore

Conference / Presentation

Dominate

ENG / MoJo

Penetrate

Possible Market Penetration assisted by ….

Requirements of Audio in PMSE

Requirement	Implementation
Ultra-low latency	• Latency-optimized RF transmission • Real-time data processing • Low latency audio codec
Very high transmission reliability	• Robust RF transmission • Interference free operation in predictable RF environment • Use of spectrum with optimal propagation conditions • Spectrum monitoring
Very high audio quality	• High quality audio codec • High-end transducer
High spectrum efficiency	• Optimized RF channel separation • High density mode

Audio PMSE has unique requirements

UK Theatre : 2018 Theatre sales - 34 million tickets

UK Film and TV

- UK industry spend £3.6Bn in 2019
- Globally, Netflix alone projecting $26Bn in 2026
- Disney – budgeting $33Bn in 2022

UK Music & Festivals

Live Gigs : 2019 - 30 million fans / £4.5bn to the UK economy

Live Streaming : 800 million people per day

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Use of DECT Today

In PMSE

Benefits of DECT

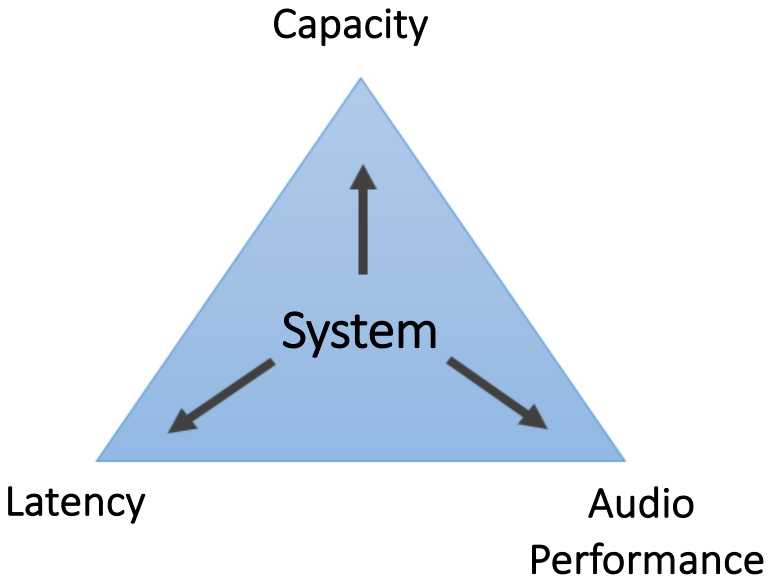
- Self-Organizing Frequency Management
  - Ease of implementation
  - “Anywhere, at any time, by anyone”
- Extreme High Quality of Service
  - Automatic Interference Management
  - Protected band with strict implementation rules
- Handover capabilities
  - Cell-to-cell (multicell system)
  - Slot-to-slot (interference management)

Benefits of DECT

- Audio quality designed for speech
  - Wideband audio possible = 7kHz
  - Super-extended wideband possible = 20KHz
- Latency acceptable for standard audio transmission
  - Typical 15-20ms per link
  - Suitable for Intercom, mid-range microphones for conference use
- Operation range
  - Up to 250m free line of site with 24dBm/250mW

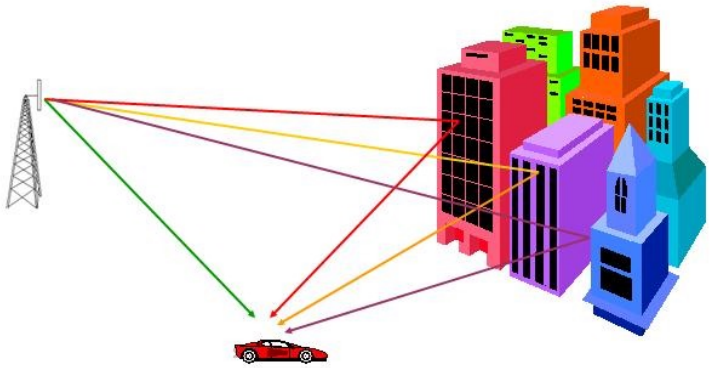
Limitations of legacy DECT

- Audio Latency – Capacity – Audio Performance
  - Capacity of max. 120 channels not enough for intercom and conference
  - Latency and audio quality not suitable for Live Event Microphones



Limitations of Legacy DECT

- Multipath – delay spread
  - Standard DECT is vulnerable to multi-path interference
  - Multipath effects or phase shifts create artefacts
  - Poor radio reliability
  - Audio dropouts



Multipath interference is where a wave from a source travels to a detector via two or more paths and components of the wave interfere.
Multipath interference is a common cause of "ghosting" in transmission systems.

Limitations of legacy DECT

- Not global
  - Legacy DECT band is not worldwide available

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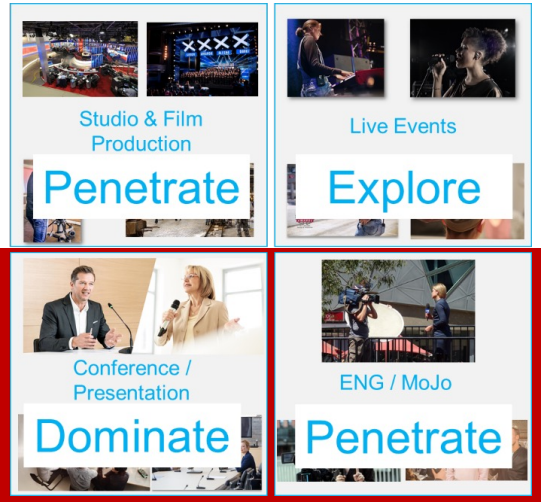


Addressing opportunities with NR+

- Advanced Technology Foundation with Ease of Use
- Further Spectrum Access to manage growing demand for audio PMSE
- Retaining Sovereignty - Anywhere, Anytime and by Anyone

Advanced Technology Foundation as Enabler

- NR+ delivers a flexible, but powerful technology foundation
  - **State of the art wireless** based on OFDM TDD TDMA/FDMA.
  - **Scalable bandwidth and flexible time structure** to adopt to specific application demands.
  - **Fading and multi-path robustness**, so it can be used in large venues.
  - **Application-driven network topologies –** cable replacement, star, cellular, mesh tree
  - **Multiple Antenna Support** for increased reliability or enhanced data-rate.
  - **Support of low latency streaming and guaranteed QoS applications**.
  - **Support of multiple concurrent URLLC users**
  - **Ease of Use** as known from classic DECT and hassle-free deployment.

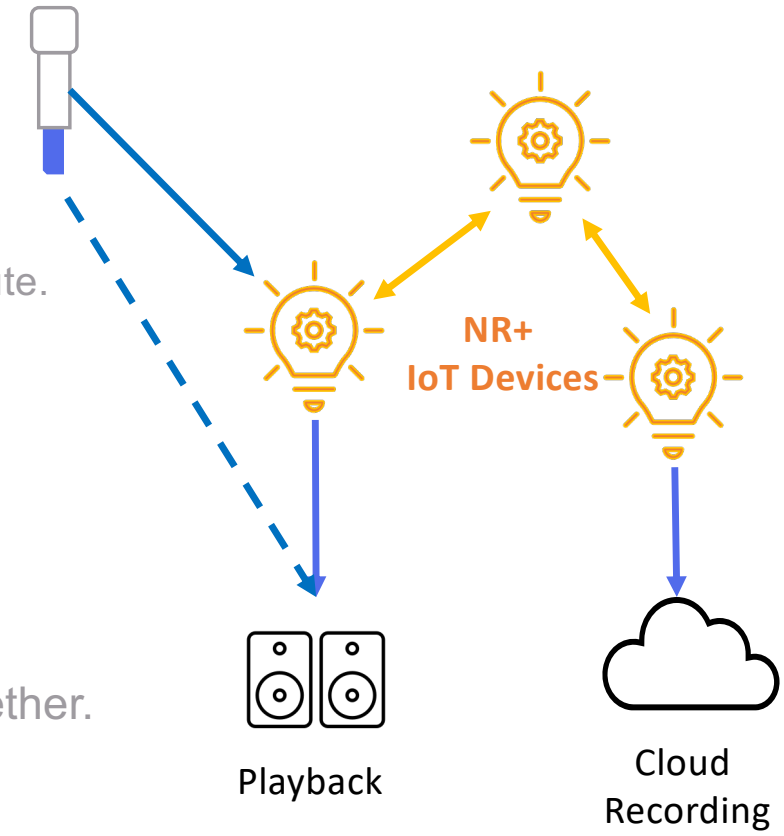
Further Spectrum Access as Enabler

- NR+ delivers an opportunity
  to re-liberalize access to radio spectrum globally

  - **NR+ is designed to support (m)any frequency bands below 6 GHz.**
  - **NR+ is a user-deployed IMT-2020 a radio technology.**
  - **NR+ is member of the DECT family of standards.**
  - **NR+ can support**
    - Dedicated, license-exempt frequency bands in 1.9 GHz
    - License-exempt bands (e.g. ISM, RLAN)
    - Site Licensed bands / Campus Network bands (e.g. 3.7 - 3.8 GHz, 3.8 – 4.2 GHz)
    - Licensed shared bands via eLSA/CBRS
    - Licensed bands

Retaining Sovereignty

- NR+ is defined as DECT-2020 NR by ETSI.
  - All technical specifications can be freely accessed.
  - Everyone can get member of ETSI and is welcome to contribute.
- NR+ is a technology foundation
  - an enabler to chip-based solutions for the radio.
  - an enabler to application-driven business and innovation.
  - an enabler for cooperation or just for yourself.
- NR+ brings research, standardization, and applications together. Ideas are key.



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