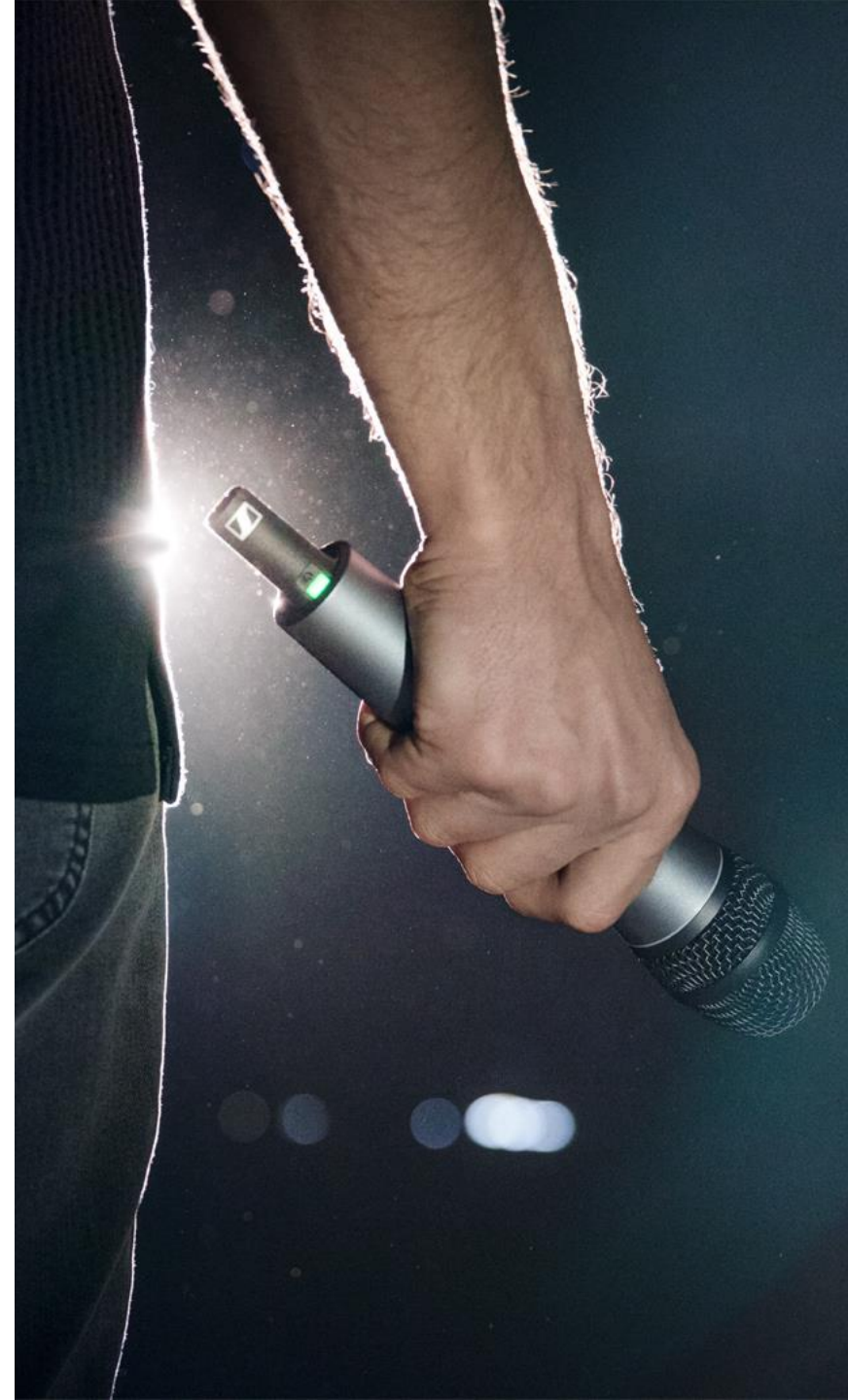




DR. MARÍA DOLORES (LOLA) PÉREZ GUIRAO

Audio PMSE and 5G

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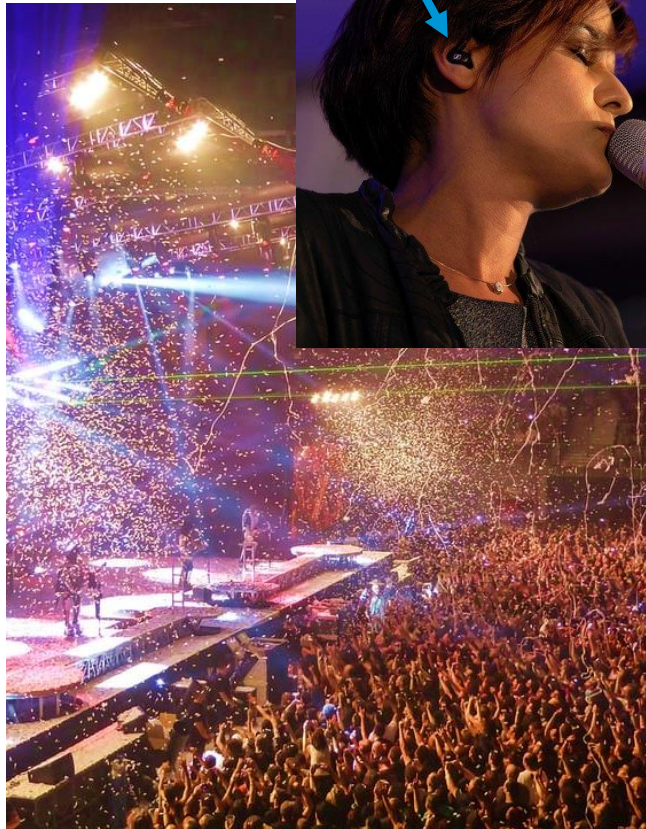


Audio PMSE: Selected Use Cases



Wireless
In-Ear Monitor

Wireless
Microphone



Live Music



Ad-hoc



Studio



Electronic News Gathering

Ad-hoc



Installed



Conferences

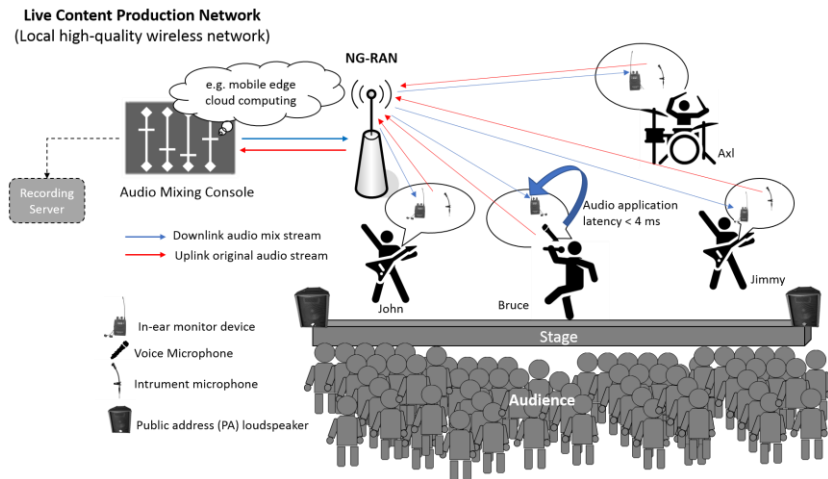


Audio for Video (e.g. Vlogger)

3GPP Audio Use Cases - Key Requirements



Audio Streaming in Live Performances

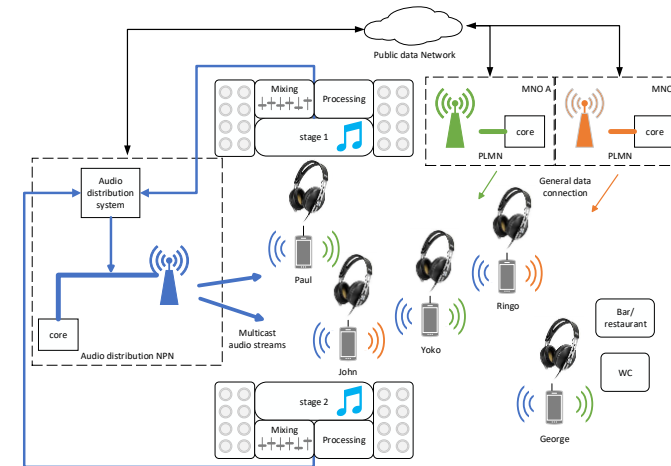


Ultra Low latency Reliable Communication

Clock synchronization service

Deterministic Service

Live production with integrated audience services



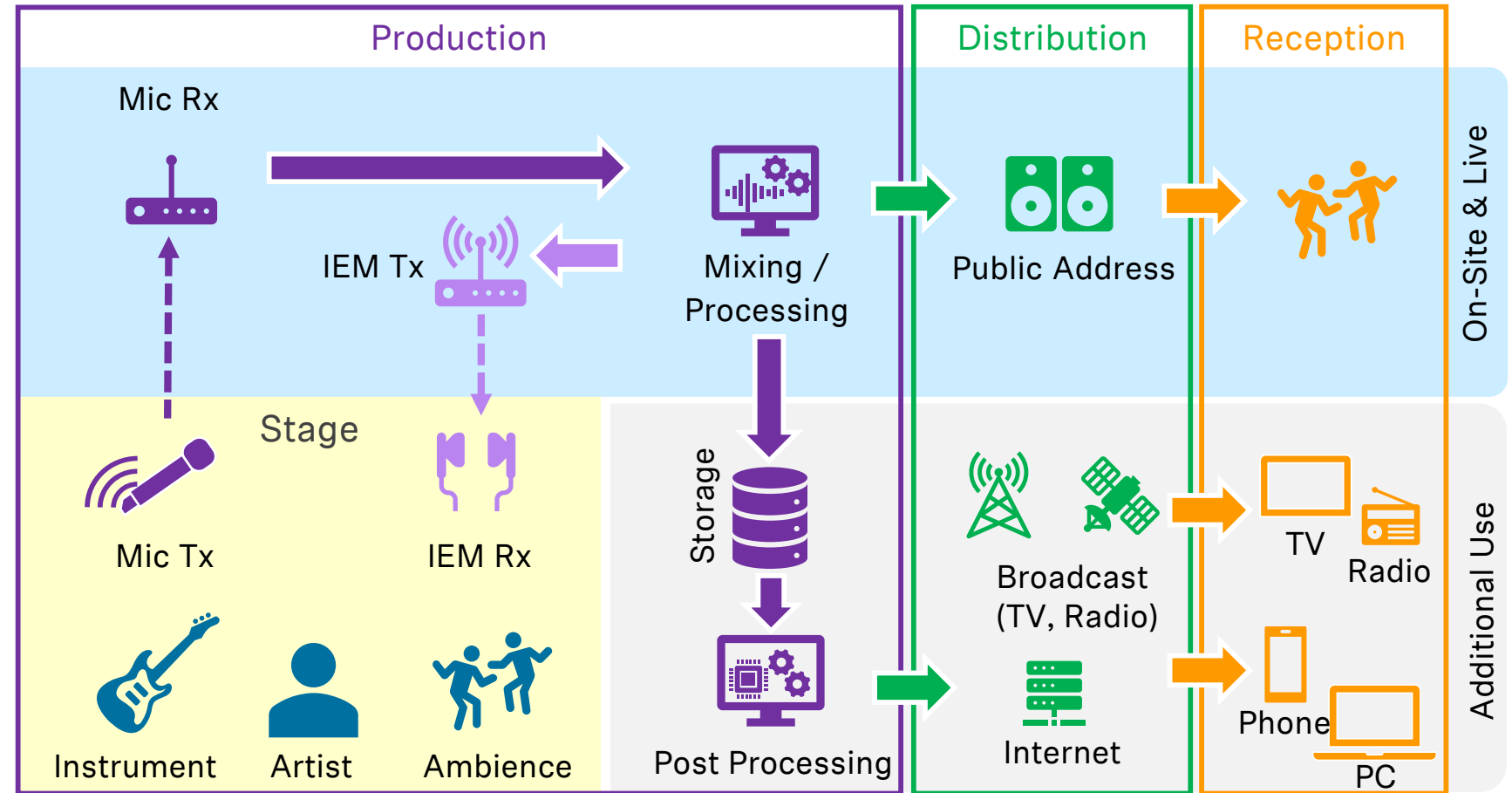
Low latency multicast service

Simultaneous multi-network connectivity

Production, Distribution and Reception: On-Site & Live plus Additional Use



- ▶ Pick-up of sound of each instrument, artist and ambience with specific microphones.
- ▶ IEM enable the artist to perform.
- ▶ On-site mixing of all audio sources happens for the Public Address (PA) and monitoring.
- ▶ Arranging / Post Processing for additional uses (broadcast, streaming) is based on a **Master Record** of the event.



Potential Value-Add by 4G/5G and IT

Production, Distribution and Reception:



► Convergence of production and distribution networks

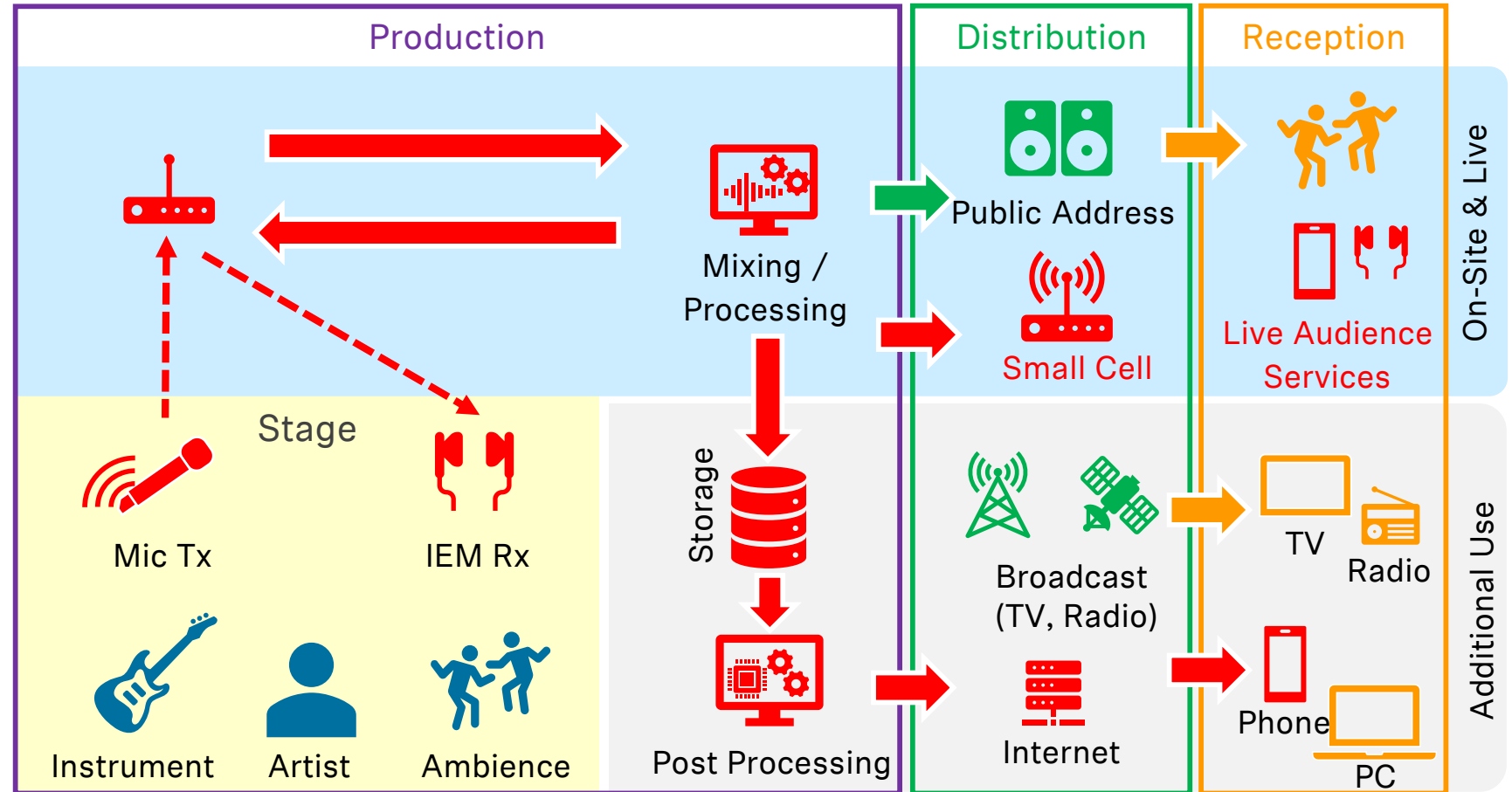
- Less interfacing, simplification of setups

► 5G for Remote Production

- Wireless Wide Area Network; Cloud-Services for computing and storage

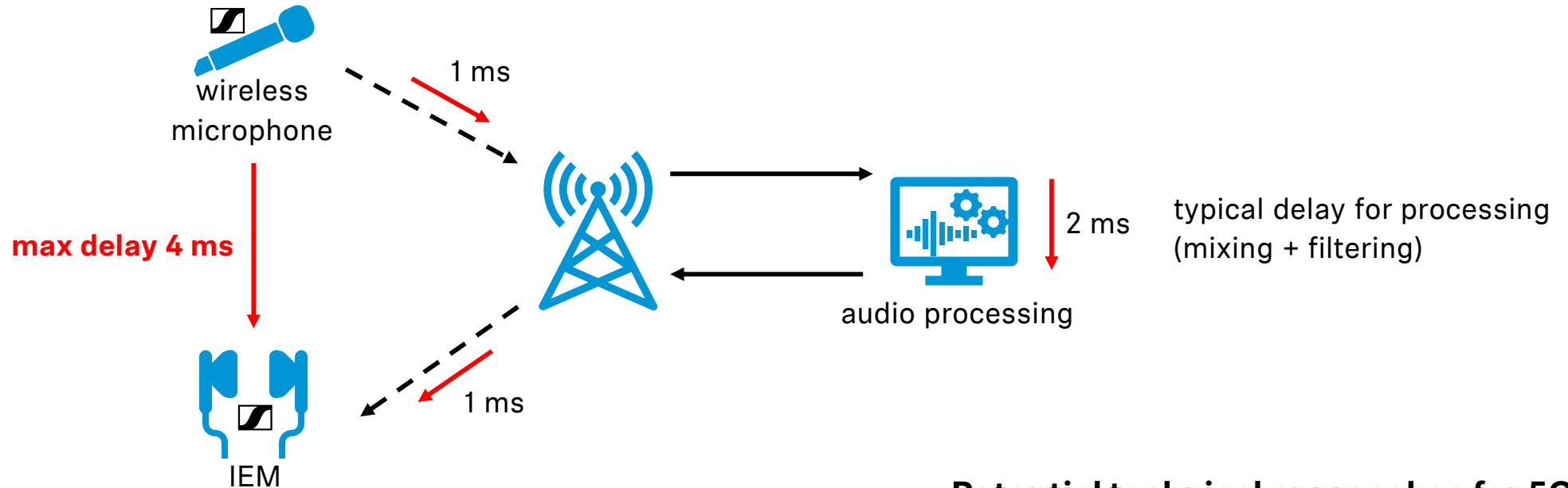
► Wireless Mic and IEM in 5G?

- 5G UEs in public or non-public network?
- Next generation of PMSE networks interworked with 5G networks?



Technical challenges for 5G NR used within **professional audio production**

Example: latency

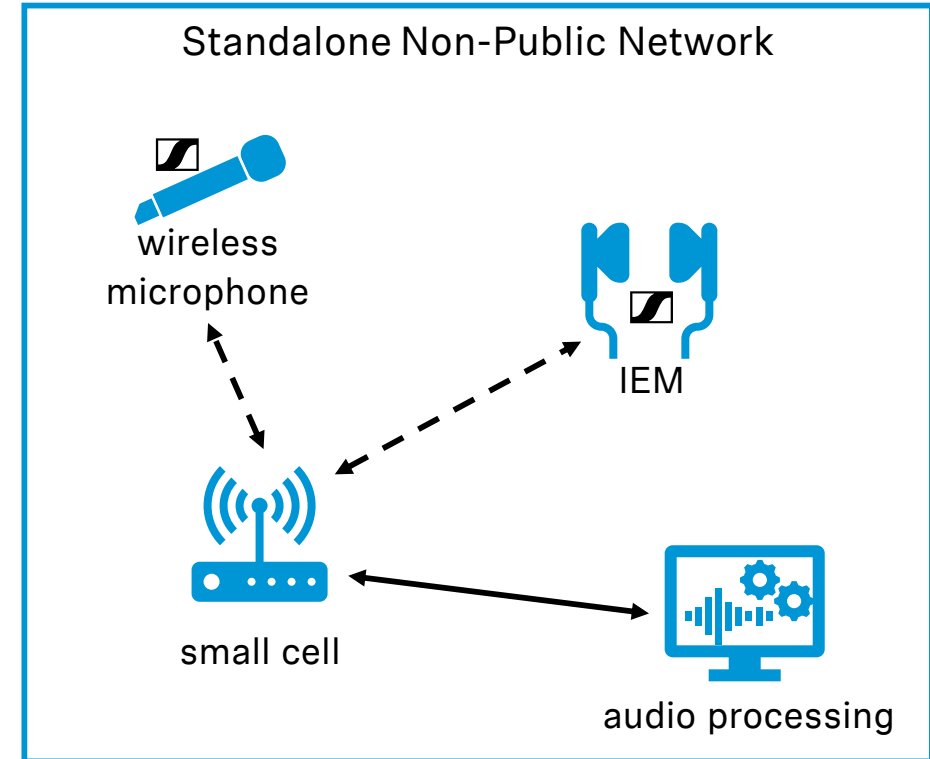
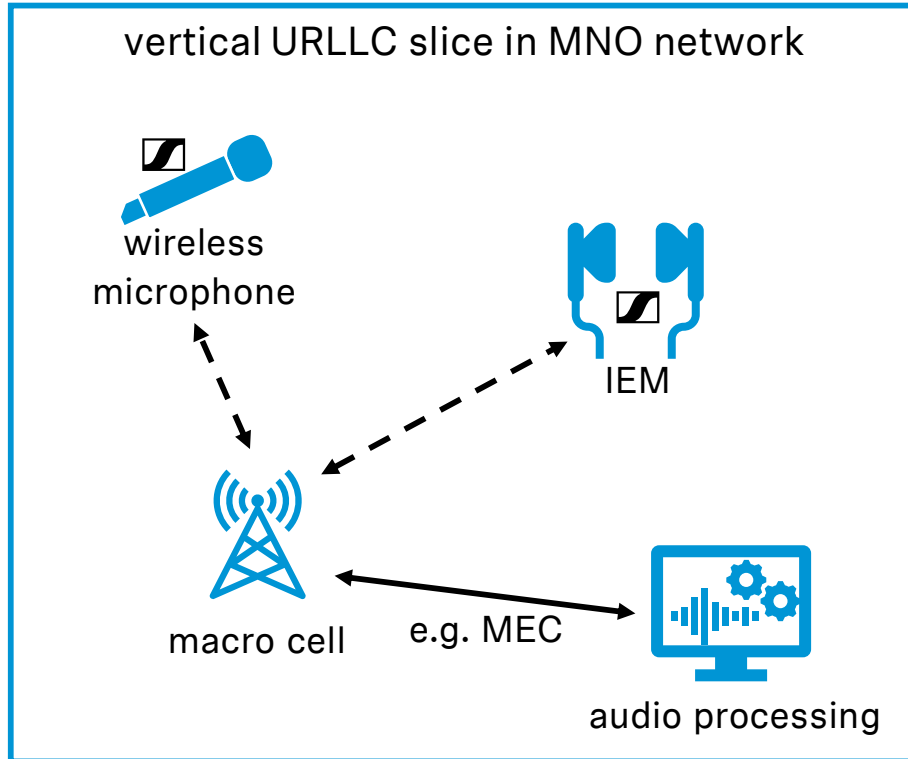


Less than 1 ms for the wireless transmission (end-2-end) in one direction.

Potential technical approaches for 5G NR

- Reduction of slot duration
- Utilization of mini-slots
- SPS (semi persistent scheduling)
- Time alignment of radio and audio systems to reduce scheduling time

Potential deployments of professional audio production in 5G



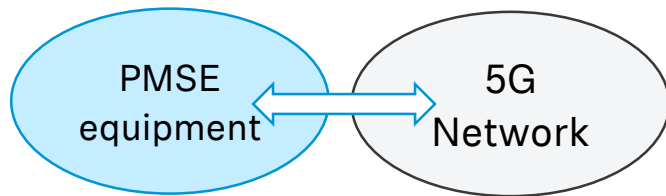
Considerations

- QoS
- Spectrum access
- Setup effort and costs
- Privacy (e.g. Lawful interception)
- Network availability
- Scalability with number of UEs

Integration of PMSE and 5G in production workflows

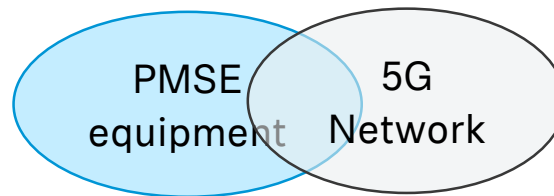


Connected



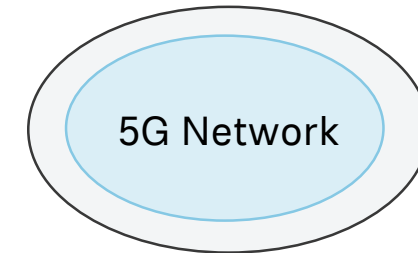
- PMSE equipment can be connected to a 5G network via a gateway and Internet Protocol (IP).

Interworking



- PMSE devices can interact directly with the 5G network via trusted or untrusted profiles.
- A device in the PMSE network can call a service of the 5G network.
- A device in the 5G network can call a service in the PMSE network.
- Devices and Services can interwork with each other.

Fully Integrated



- PMSE devices are 5G devices.
- PMSE services are 5G services.

Sennheiser Activities on 3GPP Technologies (4G/5G/...)



▶ **Research:**

- PMSE-xG (German BMVI co-funded):
Early Feasibility Study on Use Case Level, Business Roles, Gaps Identified!
- LIPS (German BMWi co-funded)
AV Services, which can be envisioned for an 5G eco-system, demonstration target for 2020
- 5G RECORDS (H2020-ICT-2018-20)
Development, integration, validation and demonstration of 5G components for professional media content production
- COOPERATION with NOKIA
Whitepaper to appear soon on „5G URLLC and Professional Audio Transmission“

▶ **Standardisation:**

- in 3GPP SA1/SA2 and with stakeholders of mobile industry.

▶ **Business models still unclear**

Standalone NPN by Verticals + Licensed Local Area Spectrum Access

- **Unknown target date for implementation in technical specifications of 3GPP, in the availability of solutions for PMSE and in the deployment!**





Thanks. Questions?



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