

## **5G for Content Production**

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### Cambridge Wireless – Webina 02.12.2020

### **EBU (EUROPEAN BROADCASTING UNION)**

> The EBU is the world's largest association of public service media

- > EBU members together provide around 2000 TV & radio channels and online services and reach more than 1 billion people
- > Corporate website: www.ebu.ch
- > Technical website: tech.ebu.ch

## EBU & 5G



... to influence 5G standardisation, to make 5G suitable to be used by EBU members, to influence the market of devices, and to help EBU members in adoption of 5G

## **5G - INSIGHT**

- > 5G aims to serve many different sectors
- Current deployments are focused on mobile broadband and telco-centric business models -Limited added value to the media sector
- > It is necessary to adapt 5G to the needs of the media organizations and their audiences
- 5G is still being developed There is an opportunity for the media industry to influence the technological and regulatory solutions for 5G for media organizations
- > Theoretical targets for 5G netowrk performances are available to guide research and standardization & for technology evaluation
- Currently, there are no defined targets for 5G network performance (e.g., coverage, capacity, throughtput, latency, reliability)

## **5G ROLE IN THE MEDIA SECTOR**



## **PRODUCTION USE-CASES**

## > News gathering

> Broadcast of a live event

remote live TV production, live commentary

### > On-site live events

wireless microphone, in-ear monitors, telemetry and remote control

### > Wireless studio

> Non live production

> Media file transfer



## **EBU TECHNICAL REPORTS**

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#### EBU OPERATING EUROVISION AND EURORADIO

#### TR 056

5G FOR PROFESSIONAL MEDIA PRODUCTION AND CONTRIBUTION

**TECHNICAL REPORT** 

Geneva October 2020

## NON PUBLIC NETWORK (NPN)

- It is a network dedicated to a specific set of devices which identify themselves using a dedicated set of credentials. Networks can be tuned for performance (very low latency, highly robust services, business critical data privacy, ...)
- It supports nomadic and ad-hoc audiovisual content production applications and workflows, independently of PLMN coverage availability
- > NPNs could be used to support the front end of the production and still require a connection to a backbone network, which could be wired data links or satellite connections
- They are currently under standardization in 3GPP, with the first functionalities specified in Release 16
- Non-public networks may require spectrum licences when deployed (dependent on deployment options and local conditions

## 5G-RECORDS HORIZON 2020 PROJECT









5G key technology enablers for emerging media content production services

> ICT-42-2020 5G core technologies innovation

## 1. Project Overview

- 5G-RECORDS is about the development, integration, validation and demonstration of 5G components for professional media content production.
  - Developed within previous 5G-PPP projects and earlier R&D investments
  - To be deployed specifically for content production
  - Business-to-business (B2B) perspective

#### • 3 end-to-end 5G infrastructures:

- 5G Core (5GC)
- Radio Access Network (RAN)
- End devices

#### • 3 use cases:

- Live audio production
- Multiple camera wireless studio
- Live immersive media production
- Duration: 24 months
  - Sept. 2020 Aug. 2022
- **Budget**: ~7.4 M€





 x7 high-tech SMEs, x2 5G infrastructure providers, x1 MNO, x2 media vendors, broadcasters, x3 research centres and universities.

## 2. Consortium

#### 11 countries 18 partners





x4



## 3. Project Objectives

#### Main objective:

5G-RECORDS aims to develop, integrate, validate and demonstrate 5G components in end-toend 5G infrastructures for professional AV media content production.

#### **Specific objectives:**

- 1. Design and develop 5G components based on 3GPP Rel-15, 16 and beyond.
- 2. Integrate the developed 5G components into end-to-end 5G infrastructures.
- 3. Validate the 5G components in the context of the considered use cases.
- **4. Demonstrate** the potential value that 5G brings to the content production sector.
- **5.** *Maximize* the impact of the project results and influence standardisation and regulation bodies through test-beds, demonstrations and technical solutions.

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## 5. Use case Live audio production

• Main partners:



- In a live audio production setup (e.g. music concerts, music festivals, TV shows), the artists are equipped with professional Programme Making and Special Events (PMSE) equipment
  - 5G wireless microphones
  - In-Ear Monitor (IEM) systems
  - Control tools and gateways between 5G and traditional audio infrastructure domains.

#### • 4 main areas of work:

- Capturing of live audio data
- Temporary spectrum access
- Automatic setup of wireless equipment
- Use of a local NPN
- Requirements:
  - End-to-end delay < 4 ms
  - User data rate ~500 kbps
  - Synchronization of all audio sources ± 500 ns



# 5. Use case Multiple camera wireless studio

• Main partners:



- The best of an IP studio combined with the super-fast and highly reliable wireless 5G connections
- 5G will facilitate new types of workflows addressing 3 core requirements:
  - Flexibility and reduction cost in setting up productions
  - Scalability from small to large events
  - Shareability of content along the production chain and between creative stages
- 2 sub use-cases:
  - 1. Multiple cameras (~5) in a wireless studio. Wired/wireless functionalities will be combined using a fully IP system
  - 2. Outdoor production scenario with 2 or more 5G-enabled cameras and sound capture devices connected to NPN
- Requirements:
- Bandwidth: 40/50 Mbps (compressed per camera)
- Latency: ideally less than 40ms
- High reliability is expected



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## 5. Use case live immersive media

• Main partners:



 Real-time end-to-end free-viewpoint video (FVV) system that includes capturing, 5G contribution, virtual view synthesis on an edge server, 5G delivery and visualization on user terminals.

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- The 5G connectivity allows a portable FVV system to operate in real time with reduced deployment cost and high flexibility.
- Video workflow in 3 stages:
  - Capturing.
  - Encoding and transmission.
  - Synthesis and visualization.
- Requirements:
  - Media acquisition: up to 1.5 Gbps per camera.
  - Radio uplink speeds of 20-200 Mbps.
  - Downlink speeds of 2-20 Mbps per user.
  - Connected end-users: 10-100 per 1000 m<sup>2</sup>.
  - Reliability: 1 error every 10 min.



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## 5G-RECORDS WIRELESS CAMERAS ZOOM-IN

### **PROFESSIONAL CONTENT PRODUCTION** (O) SPORT EVENTS, NEWSGATHERING, ETC

- > DVB-T based transmitter:
  - > Bandwidth: 30/40Mbps
  - > Latency: >= 20ms
  - UHF link for the «camera» controls

- > Bonded cellular systems:
  - > Bandwidth: depends from the number of aggregated modems; 30-70 Mbps
  - > Latency: >=700ms- 1s
  - Some of them capable to deal with return video, tally and intercom (separate solutions)
  - > Plug & Play/vendor lock-in

## CAMERAS – NOT ONLY AUDIO AND VIDEO





## **CAMERAS – NOT ONLY AUDIO AND VIDEO**



#### ... moving to IP

## **BANDWIDTH/LATENCY/QUALITY**

- > NR Midband (3.8GHz) 100MHz: around 120Mbps 200Mbps
- > 4-5 «wireless» cameras 5G enabled: around 30/40 Mbps each
  - > Codecs: H.264/**HEVC**
  - > Latency (end +dec): from 30ms to 100ms depending from the configurations
  - > Quality: **?**

Codecs assessment, including multiple generations to simulate also the «emission» path

## **ORCHESTRATION & GATEWAY**



GATEWAY RTP <-> ST2110 RTP<->RIST RIST <->ST2110 RIST <->RTP

## CONCLUSIONS

- > 5G is a promising technology that could fit in the IP-based production workflows
- > The media community needs to stay engaged to influence the standards and the regulation to meet the complex production requirments
- Public networks are note well-suited for the demanding production usecases – they might be adequate for some newsgathering, radiocontribution, singlge source video
- > NPN will be needed in addition for public networks these networks require new business models, a stable regulatory environment, access to spectrum
- > 5G-Based solution will coexist with conventional wireless production tools for many years – this also means that radio spectrum for PMSE needs to preserved in the long term

# Thank you!

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