

5G Verticals Workshop

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Native 5G broadcasting

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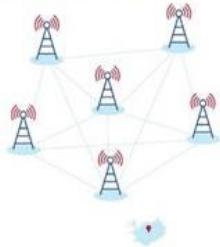
THE EBU COMMUNITY IN NUMBERS

The European Broadcasting Union is the world's leading alliance of Public Service Media



www.ebu.ch
tech.ebu.ch

COMPOSED OF



119
MEMBER ORGANIZATIONS

IN **56**
COUNTRIES



PROVIDING CONTENT IN



162
LANGUAGES

OPERATING

489



TV CHANNELS

720



RADIO STATIONS

560



LOCAL WINDOWS



1124

ONLINE SIMULCAST CHANNELS AND STATIONS



240

EXCLUSIVE ONLINE LINEAR SERVICES

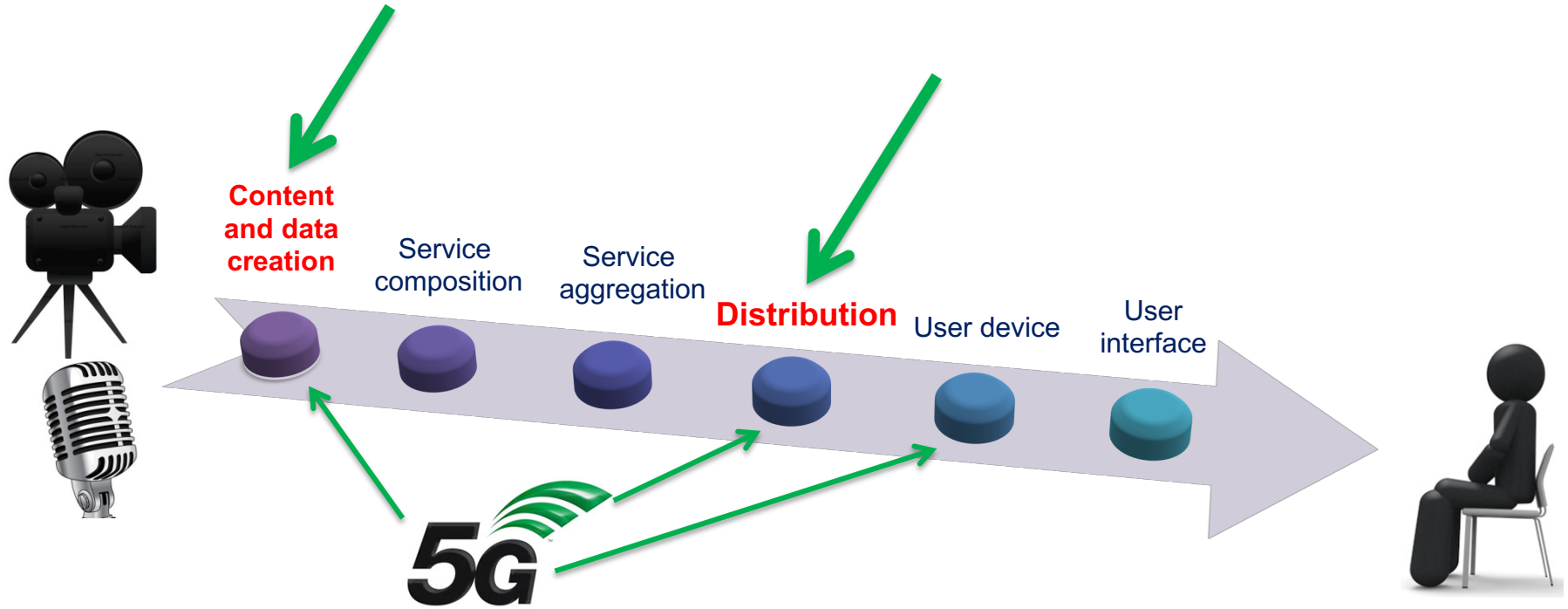
TO A POTENTIAL AUDIENCE OF

1.05

BILLION PEOPLE



Potential impact of 5G in the media sector



What do broadcasters need from 4G and 5G?

*In **distribution**, critical requirements for broadcasters are*

- Large network coverage, high reliability, resilience, and scale
- Suitable business models
 - Compliant with specific broadcast regulation
 - Sustainable
 - Low costs, affordable for both the broadcasters and the end users
- Unconstrained access to the audience and audience data

*How do we
address all
these aspects ?*

*In **content production** broadcasters are looking for*

- operational flexibility
- reduced complexity
- new capabilities
- lower costs

The distribution challenge

The goal: ***Delivery of the whole range of content and services***

- to all interested users
- at the right time
- at the right place
- on the right device
- with the desired quality
- for the right price

Balancing act between

- Optimising the user experience
- Resource management
- Business objectives
- Regulatory requirements and constraints

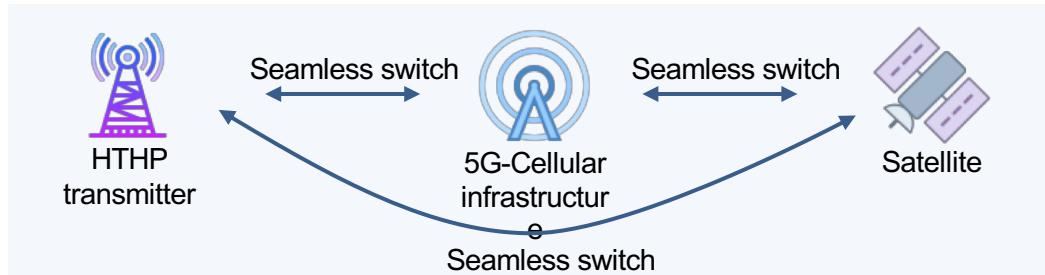
Public broadcasters are subject to additional regulatory requirements:

- **Universal availability** (on all relevant platforms, everywhere, different user devices)
- **Free to view / listen** (no recurring charges for access to services)
- The ability to **reach the population in emergency situations**
- Regulated business models

Combining 5G cellular & broadcast networks

Vision

- Joining the forces of '5G' and combining them in a smart way
 - the cellular mobile networks with
 - terrestrial broadcast transmitters and
 - satellite transmitters
- Matching the operational mode to the requirements of the provided services and the number of users who want the same content at the same time



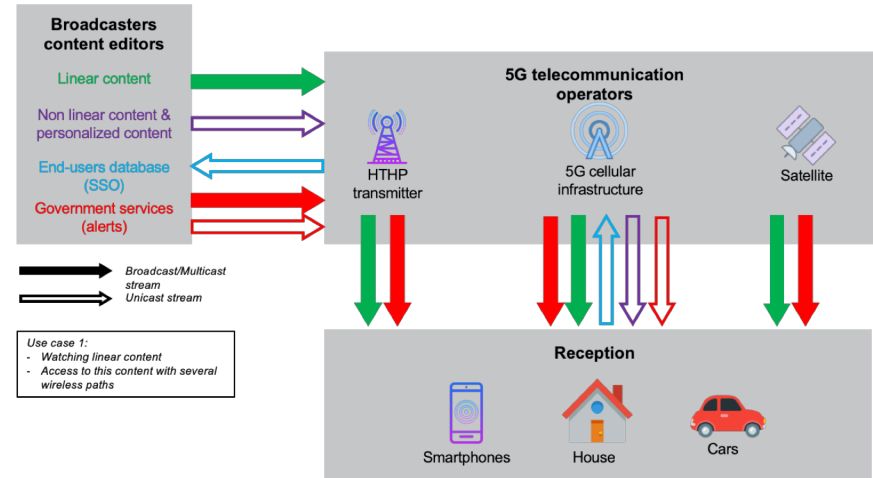
Combining 5G cellular & broadcast networks

Value proposition

- A 5G infrastructure complemented with broadcast networks serves end customers with **the best technology** according to the situation, **optimising network use and minimising overall investments (cellular + broadcasting)**.
- An **orchestration with broadcasting** infrastructures will guarantee large capacity and coverage in a **shorter time** frame while **absorbing peaks of traffic** for contents addressing large number of users (e. g. live sport and news events)
- 5G exclusive cellular coverage for sub-urban and rural areas could be economically difficult to sustain while **a mix of technologies facilitates and accelerates** this process bringing 5G services to the entire population at a reduced cost
- Orchestrating heterogeneous network will provide **flexibility and optimization of resources**, 5G broadcasting will reach the entire population and territory while 5G mobile infrastructures will progressively cover with unicast services.

Using the laws of physics where they work best

- Make use of the power of broadcasting to **serve an infinite number of users** combined with the speed and capacity of 5G Internet to provide interactive and personalised services to individual users.
- Make use of a satellite's coverage to serve places where it is **inefficient to provide terrestrial services.**
- **Intelligence in the user's receiver** will select the best option for service, quality and availability.
- Using **cooperative networks**, 'orchestrated' in this way, will also be energy-efficient in a coming world where this will be much needed.



Optimizing 5G in media distribution – *the ideal scenario*

AV media services

TV channels
radio channels

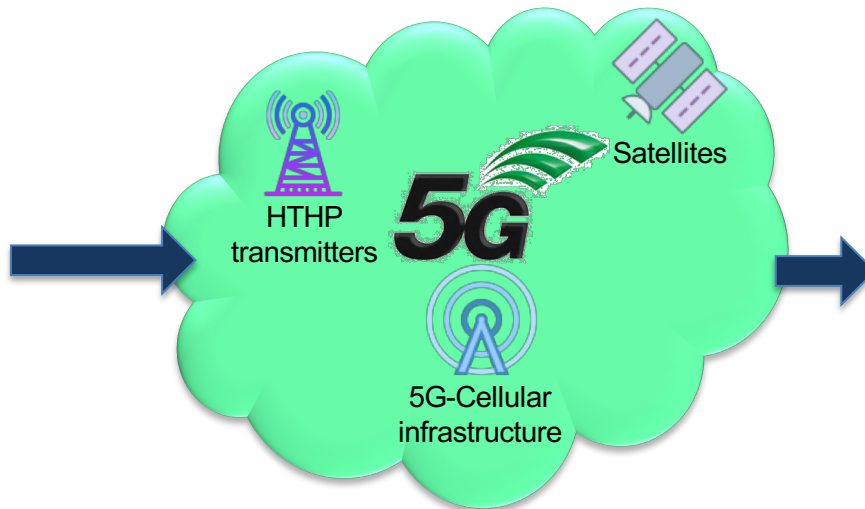
on-demand
time shifted
interactive
personalised
multi-view
...

hybrid TV
second screen
cross-platform
social media
...

user
generated
content

virtual
reality
augmented
reality
...

Smart Distribution
infrastructure



The audience



Serving the vehicular market : entertainment services & much more

- Applications will extend beyond **providing** high quality media services for '**information, entertainment, and education**'
- The proposed solution will allow multiple services for manually driven and future self-driven (autonomous).
- Cars will need continuous and highly reliable access to services not only to occupy the car passengers' new leisure time but also to provide other services such as **guaranteed and timely delivery of critical data to large number of vehicles** such as traffic-related information and navigation support, including also alerts and alarms.
- The proposed solution address today's limitations on media and data delivery and interactivity that are affected by where and how you move and live, lifting the ceiling, so **citizens can freely choose how to move, and where to work and live their lives.**



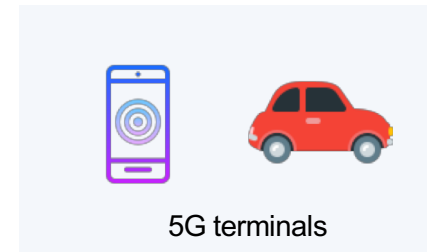
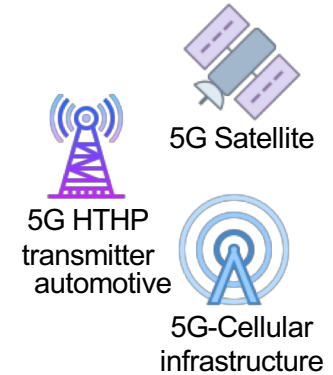
automotive



5G terminals

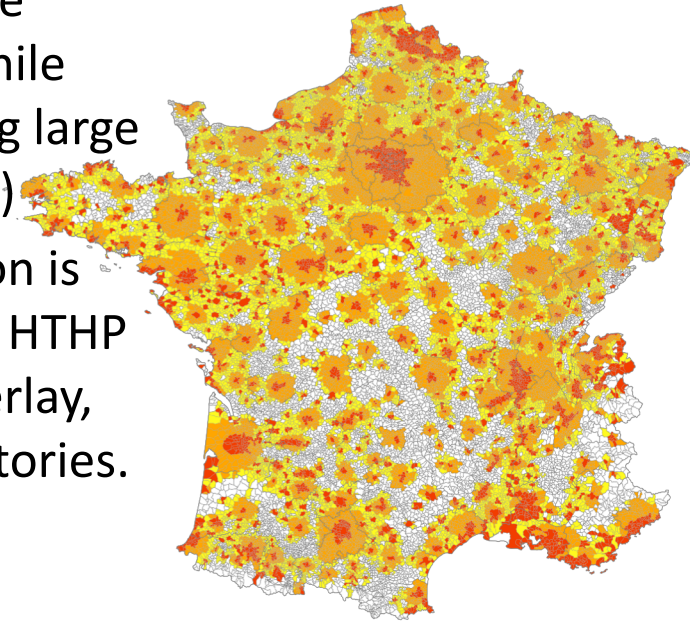
Conclusions (1)

- **Collaborative 5G infrastructure:** providing services over a wide area using a cooperative network with three 5G 'layers' –cellular, high tower terrestrial and satellite.
- **Enhanced user experience:** creation of a delivery system able to effectively meet the evolving user requirements for access to media services :
 - from **highly personalised** and interactive to **highly popular live** events
 - in a technically and **cost-efficient** way, optimising the investments and the use of radio frequency spectrum.
- **Intelligent receivers:** that can optimise the reception of the provided services.



Conclusions (2)

- **Orchestration with broadcasting** guarantees large capacity and coverage in a **shorter time** frame while **absorbing peaks of traffic** for contents addressing large number of users (e. g. live sport and news events)
- **Green technology:** The cost & power consumption is optimized combining cellular ‘base stations’ with HTHP broadcast transmitters, covered by a satellite overlay, guaranteeing almost 100% area coverage of territories.
- **Reduced digital divide:** A system providing total inclusion will have the potential to lessen the ‘polarisation’ of European society by removing differences in opportunities for those in urban, suburban and rural areas.



5G Cellular + HTHP + Satellite

5G HTHP + Satellite

Satellite

When will **5G broadcast** become available?

As of today 5G only includes one-to-one (unicast) mode, no broadcast or multicast.

- 4G/LTE includes a broadcast/multicast distribution mode => often unused

It is necessary to standardize the 5G broadcast New Radio profile

- It will not be included in the next 3GPP technical specification (Release 16, due in 2019)
- Work is in progress to include it in Release 17 (due in 2020-2021) => depends on active support of 3GPP members

Standard's Finalization is necessary to have equipment supporting 5G broadcast.

Equipment usually become available 1-2 years after the adoption of a standard.

- Once approved in release 17 , 5G broadcast equipment should then be available on the market between 2022-2024.

Broadcasters need networks that cover very large areas (whole country if not more) and a high penetration of user equipment.

- By integrating a 5G broadcast profile, networks will be able to cover almost 100% of the population and of the territory in a much shorter period of time helping the deployment of 5G broadcast capable release 17 user devices

Thank You

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Back Up 5G standardization

What exists today ... Enhanced LTE eMBMS in 3GPP Release 14

Large inter-site
distances

Dedicated
eMBMS carrier

Shared eMBMS
network

Stand-alone
eMBMS network

Free-to-air
services

Receive-only
devices

Transport-only
mode

Support to
standard TV
formats


Standardised
xMB interface

New
MBMS-API

...

*the work
continues*

3GPP standardisation roadmap

- Release 15 mostly completed (*final specifications in Q1/2019*)
- Scope/Timeline of Release 16 agreed (*due Q1 / 2020*)
- As of Release 15 all 3GPP technologies are labelled **5G**
 - This is also the first release to include **5G New Radio** (5G NR), alongside LTE
- **Two parallel strands of development: LTE and 5G NR**
 - **LTE:**
 - Includes both *unicast* and *eMBMS* (*evolved **M**ultimedia **B**roadcast **M**ulticast **S**ervices*)
 - Enhancements to eMBMS in Release 14 (Q3/2017)
 - The work continues with '*Study on LTE-based 5G Terrestrial Broadcast*'
 - Report due in March 2019. To be followed by normative work.
 - **5G NR:**
 - Terrestrial networks
 - Non-terrestrial (satellite networks)
 - Only unicast (until and including Release 16)
 - **5G NR based broadcast and multicast to be included in release 17**

Back up
Recent LTE trials by broadcasters

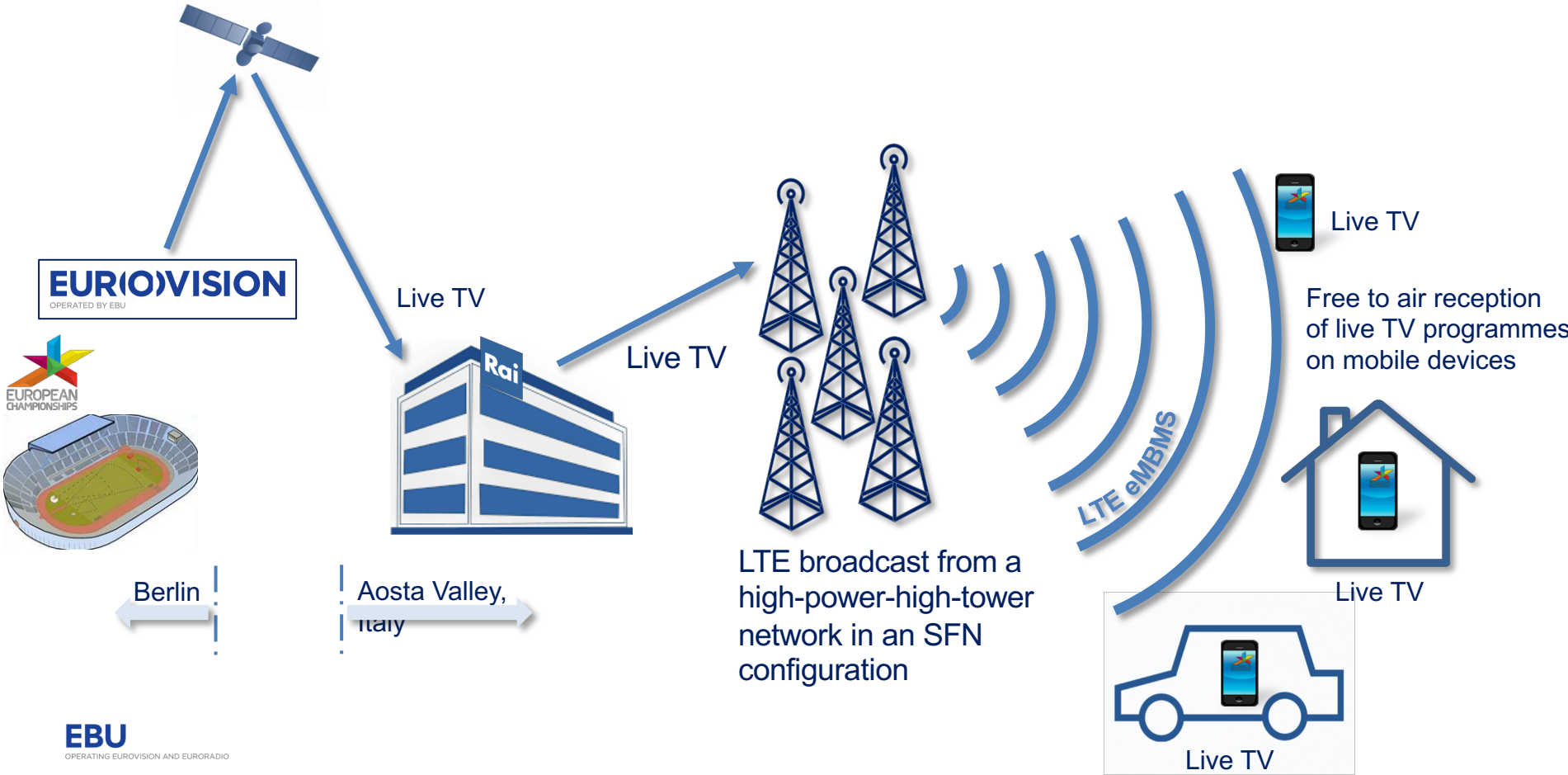


Horizon 2020 Project

Broadcast and Multicast Communication Enablers for the Fifth-Generation of Wireless Systems

- **Objectives:**
 1. Develop broadcast and multicast point-to-multipoint capabilities for 5G considering M&E, automotive, IoT, and PWS use cases, and evaluate spectrum options for 5G broadcast network deployments.
 2. Design a dynamically adaptable 5G network architecture with layer-independent network interfaces to dynamically and seamlessly switch between unicast, multicast, and broadcast modes or use them in parallel and exploit built-in caching capabilities.
 3. Experimentally demonstrate the 5G key innovations developed in the project.
- **18 project partners** including telecom operators and equipment vendors, broadcasters, R&D organisations, SMEs, and academia. Globally representative Advisory Board.
- Builds on the state-of-the-art mobile and fixed broadband, and broadcast technologies
- Synergies between M&E, Public Warning Systems, Automotive, and IoT applications.

The LTE broadcast trial in the Aosta Valley, Italy



LTE eMBMS features shown in the RAI trial

Large inter-site distances

Dedicated eMBMS carrier

Shared eMBMS network

Stand-alone eMBMS network

Free-to-air services

Receive-only devices

Transport-only mode

Support to standard TV formats

Standardised xMB interface

New MBMS-API