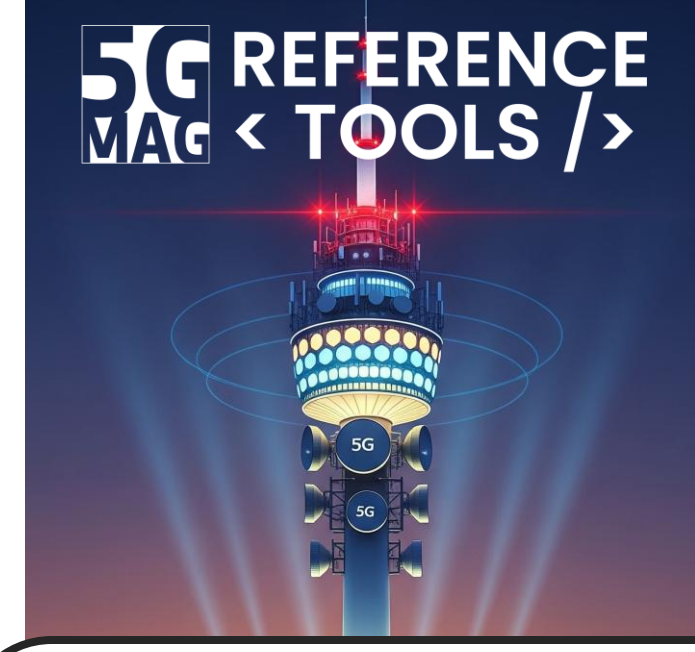
5G Broadcast

TV and Radio Hybrid Services



ETSI

3GPP™
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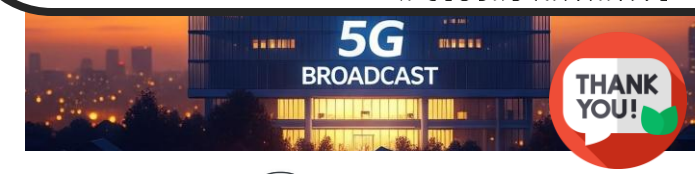


Bitstem

Fraunhofer FOKUS

ors group

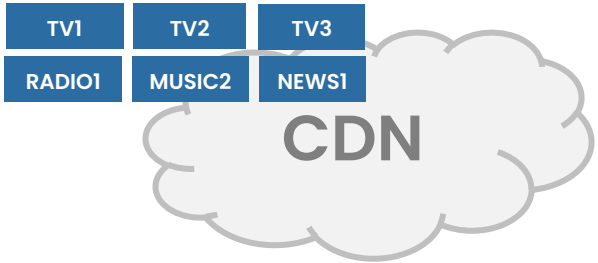
Qualcomm

UNIVERSITAT POLITÈCNICA DE VALÈNCIA

5G Broadcast: TV and Radio Hybrid Services

Reference Tools, what is being implemented?

- **5G Broadcast** as part of the internet delivery chain
- Integration of 5G Broadcast Core with **CDN-based delivery**
- Integration of **streaming applications** with MBMS client
- **Dynamic provision of broadcast services** according to user demand, coverage, availability,
- Premium content insertion, targeted advertising, local and regional services,...



Unicast

Broadcast

Linear TV and Radio

Emergency alerts

Interactive services

File delivery

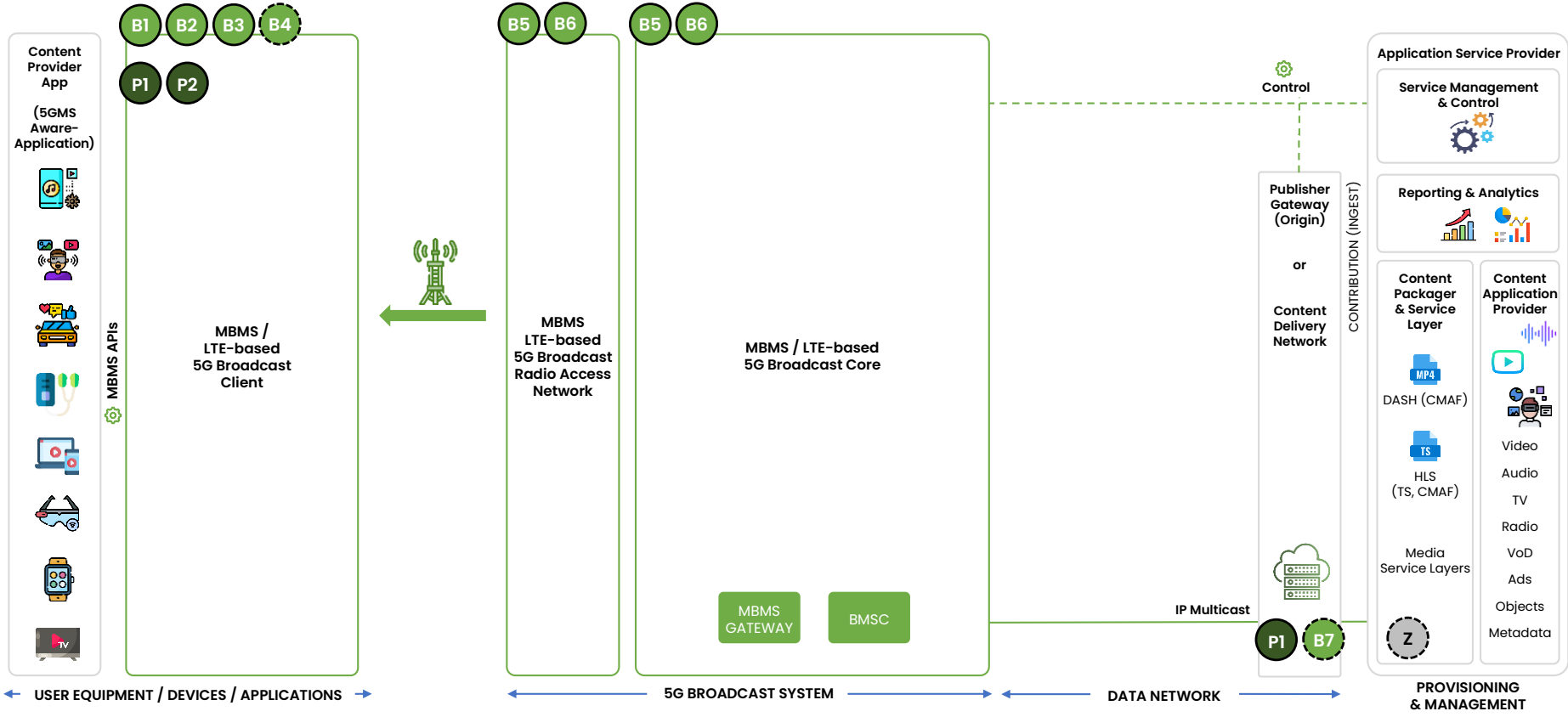
WHERE TO LOOK AT?

All the Technical Resources
Information on Standards
Reference Tools available:

- Project: 5G Broadcast TV and Radio Hybrid Services

5G Broadcast: TV and Radio Hybrid Services

Reference Tools, what is being implemented?



B — MBMS / LTE-based 5G Terrestrial Broadcast

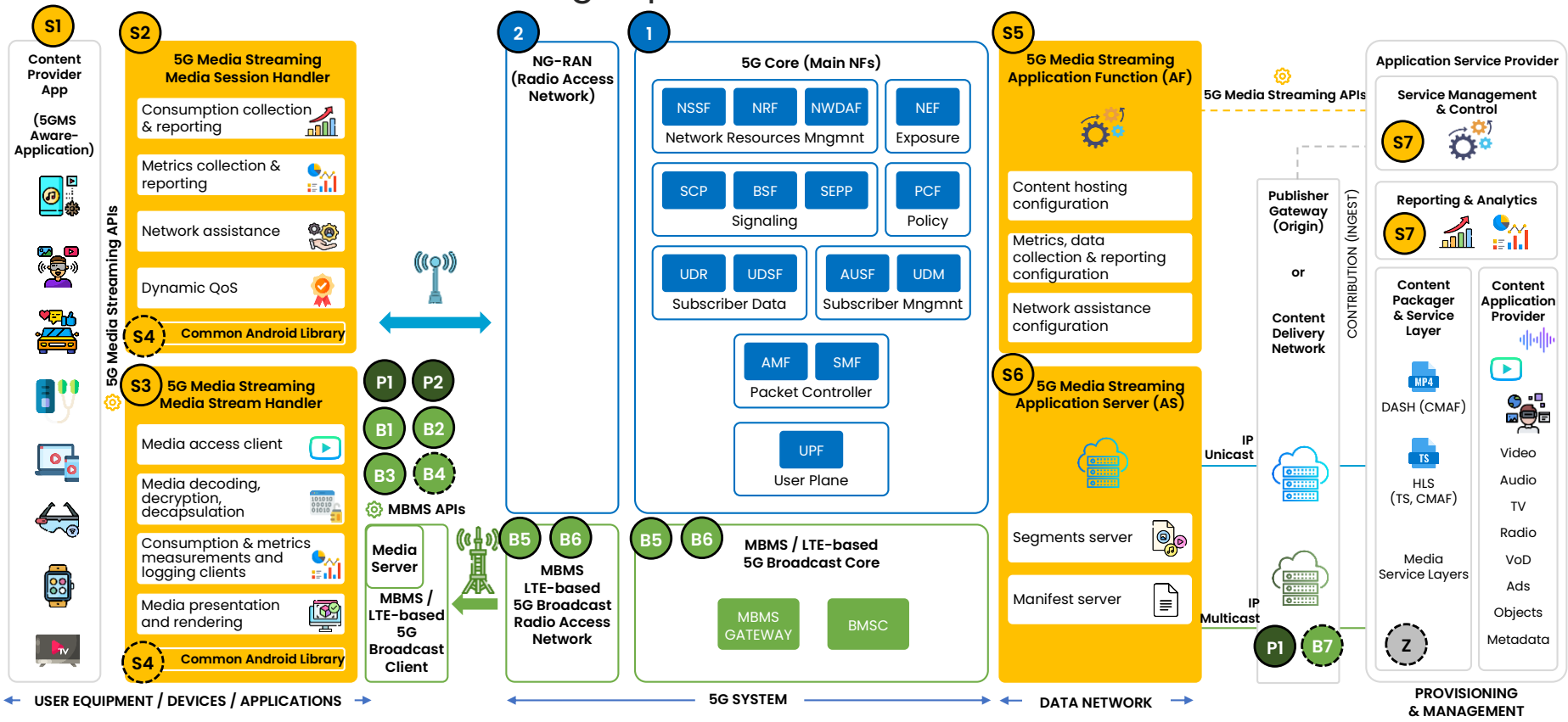
P — Multimedia Content Delivery Protocols

3GPP RAN and Core Platforms

Z — Common Tools

5G Broadcast: TV and Radio Hybrid Services

Reference Tools, what is being implemented?



S 5G Media Streaming

B MBMS / LTE-based 5G Terrestrial Broadcast

P Multimedia Content Delivery Protocols

3GPP RAN and Core Platforms

Z Common Tools

5G Broadcast: TV and Radio Hybrid Services

Reference Tools, what is being implemented?

#	Repository	Standards	License	Dependencies	Software
B1	**rt-mbms-mw-android** (MBMS Android Middleware)	3GPP	AGPLv3.0		APK, Android
B2	**rt-mbms-mw** (MBMS Middleware)	3GPP	5G-MAG PLv1.0		Docker, Linux
B3	**rt-mbms-modem** (MBMS Modem)	3GPP	AGPLv3.0	srsRAN srsue	Docker, Linux
B4	**rt-mbms-wui** (MBMS Web User Interface)		5G-MAG PLv1.0	NGINX	Docker, WWW
B5	**rt-mbms-tx** (5G Broadcast Transmitter + basic MBMS gw)	3GPP	AGPLv3.0	srsRAN srsenb srsepc srsmbms	Cloud, Linux
B6	**rt-mbms-tx-for-qrd-and-crd** (5G Broadcast Transmitter for QRD and CRD)	3GPP	AGPLv3.0	srsRAN srsenb srsepc srsmbms	Cloud, Linux
B7	**rt-mbms-examples** (MBMS Examples)		5G-MAG PLv1.0		Cloud, Linux

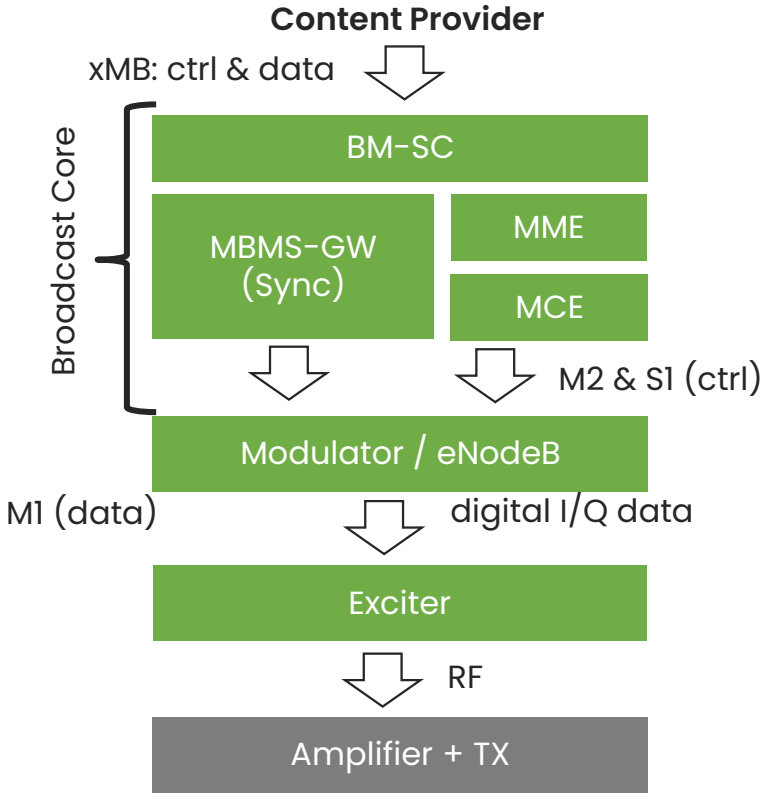
Operating System: (Linux, Windows, Android) **Packages:** (APK, Docker) **Cloud Installation Support** **API Tool Support** **Web Interface Support**

5G Broadcast: TV and Radio Hybrid Services

Reference Tools, what is being implemented?

Stationary reception
Application
Middleware
Modem (HW)

Reception on mobile
Application
Middleware (Android)
Baseband (HW)



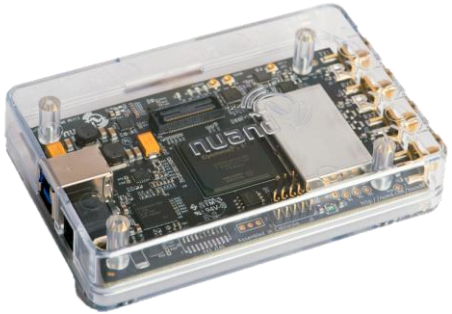
5G Broadcast: TV and Radio Hybrid Services

Reference Tools, what is being implemented?

Software-defined Radio Modems

- SDR- based modem with support of Receive-only mode services within a mixed carrier (support of Rel-14 ROM)
- SDR-based modem with Receive-only mode services in a dedicated carrier (support of Rel-14, Rel-16 and Rel-17 features) with the following features:
  - Increased CAS robustness (PBCH repetition; Semi-static CFI in MIB; New PDCCH format 4: 16 CCEs / 144 REGs)
  - New subcarrier spacings 0.37 kHz, 1.25 kHz and 2.5 kHz
  - Support for 6/7/8 MHz MBSFN subframes

- Other improvements:
  - Improved MIB decoding for dedicated cells, was getting confused by MBSFN symbols
  - Speed up startup/synchronisation: SDR is only retuned if parameters have changed
  - Fixed PDSCH resource allocation for 1.4MHz / 6 PRB



5G Broadcast: TV and Radio Hybrid Services

Reference Tools, what is being implemented?

Software-defined Radio Transmitters

- Adaptation of Rel-12 eMBMS eNodeB to deliver services to Qualcomm Reference Design (QRD) and Commercial Research Devices (CRD).

- Standalone transmitter for ROM SDR Modem compliant with the following 3GPP Releases:

RELEASE 14	rt-mbms-tx	rt-mbms-modem
MBSFN subframes using Df = 1.25 kHz	Yes	Yes
MIB-MBMS	Yes	Yes
SIB1-MBMS	Yes	Yes
MBMSInterestIndication RRC signalling procedure	No	No

RELEASE 16	rt-mbms-tx	rt-mbms-modem
MBSFN subframes using Df = 0.37 kHz	No	No
MBSFN subframes using Df = 2.5 kHz	No	No
PDCCH enhancements: CFI indication in MIB to avoid the need to decode PCFICH	No	No
PDCCH enhancements: New aggregation level 16;	No	No
Repetition of PBCH	No	No

RELEASE 17	rt-mbms-tx	rt-mbms-modem
PMCH bandwidth of 30, 35 and 40 PRBs (corresponding to 6/7/8MHz)	No	Yes

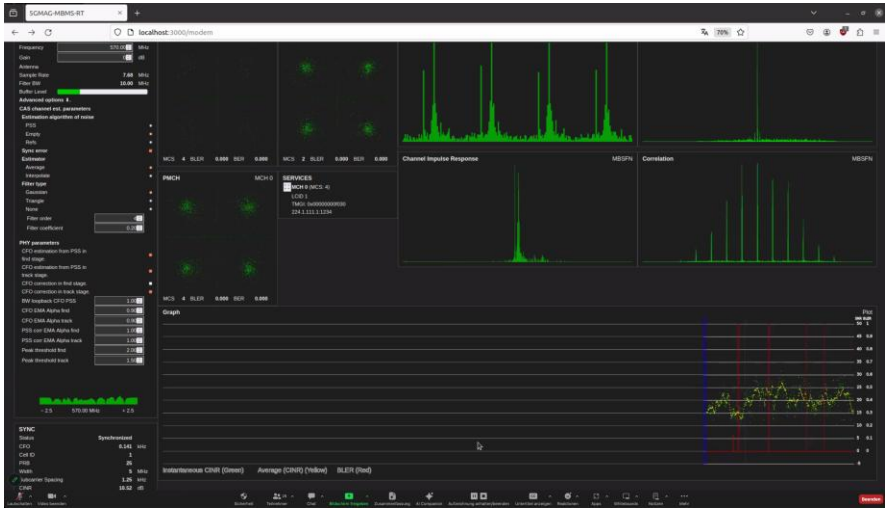
5G Broadcast: TV and Radio Hybrid Services

Reference Tools, what is being implemented?

Web User Interface for SDR Modems

- Interfaces via RESTful API to rt-mbms-modem and rt-mbms-mw
- Useful for checking basic reception parameters
- Middleware file list and service announcement
- Contains HLS and DASH players

- New features added for visualization of advanced parameters

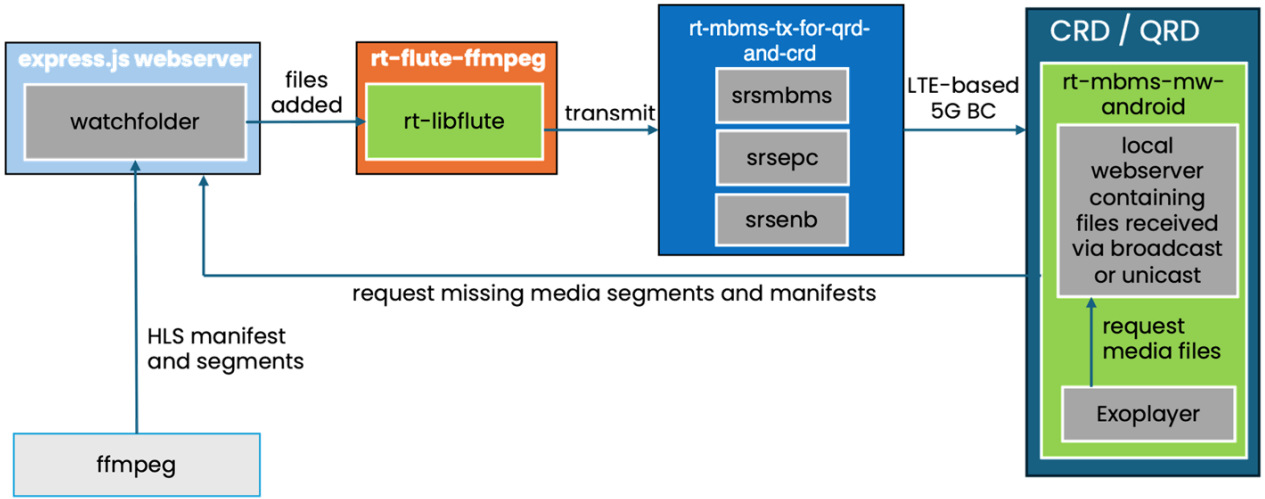


5G Broadcast: TV and Radio Hybrid Services

Reference Tools, what is being implemented?

Implementation of Android Middleware with additional capabilities

- Implementation of seamless switching between broadcast and OTT/unicast content delivery as a baseline for services that can be dynamically provisioned when the demand is there
- Initial support for HLS, with DASH under inverstigation

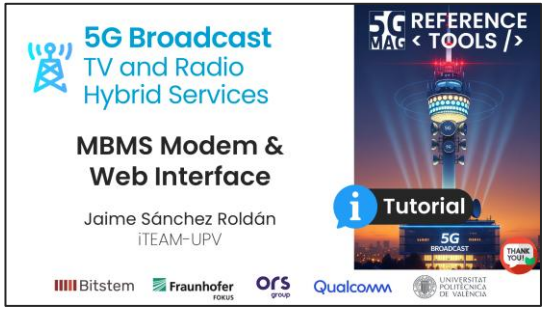


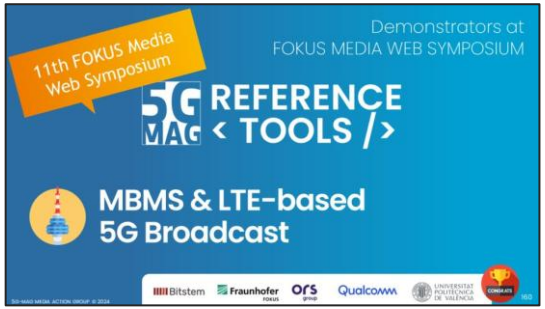
5G Broadcast: TV and Radio Hybrid Services

Reference Tools, what is being implemented?

Check our Tutorials and join the Developer Community

How to use the tools? Check the GitHub Tutorials

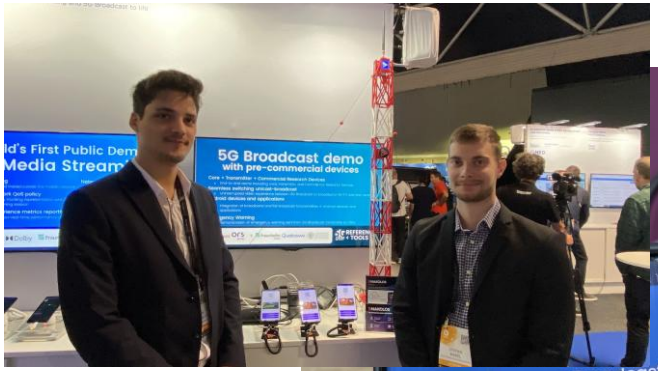


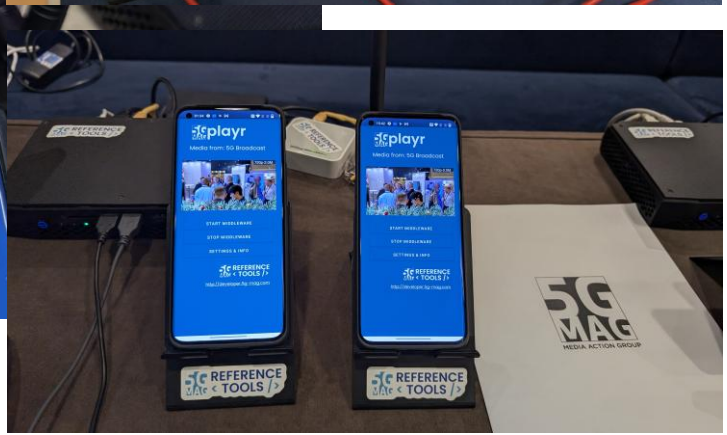


5G Broadcast: TV and Radio Hybrid Services

Reference Tools, what is being implemented?

5G-MAG Reference Tools in action





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