5G-MAG Reference Tools "Target 2023"

5G Media Streaming

Richard Bradbury
BBC Research & Development

OSMART Workshop #2

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What is the goal of 5G Media Streaming?

Driving effective collaboration between mobile media applications and mobile networks

What is 5G Media Streaming?

- 3GPP asked itself whether **better media streaming Quality of Experience** could be achieved by content providers **collaborating** more actively with mobile networks.
- The result is a set of technical specifications collectively referred to as **5G Media Streaming** (5GMS).
  - Main contributors in **3GPP SA4**: Qualcomm, Ericsson, Sony, Enensys, KPN/TNO and BBC.
  - Both **downlink** (content distribution) and **uplink** (content contribution) directions are in scope.
    - *(Uplink is still being worked on in 3GPP Release 18.)*
- 5GMS is also aligned with the mobile industry's current direction of travel on **Network Exposure**.
  - GSM Alliance **Open Gateway** initiative and the Linux Foundation's closely related **Camara** project exposing higher-level service APIs to external parties.

5G Media Streaming: Key features *(3GPP Rel-16)*

1. Content Hosting

- Segment-based CDN deployed inside/outside the mobile network.
- Encrypted URL tokens.
- Geofencing.

2. Network Assistance

- **Throughput estimation** (bit rate recommendation).
- Temporary **delivery boost**.
- ***(Rel-18)*** **Background data transfer** (e.g., zero-rated).

3. Dynamic network QoS policy

- Automatically tracking representation switching during a streaming session.

4. Quality of Experience metrics reporting

- Supporting non-real-time performance auditing.

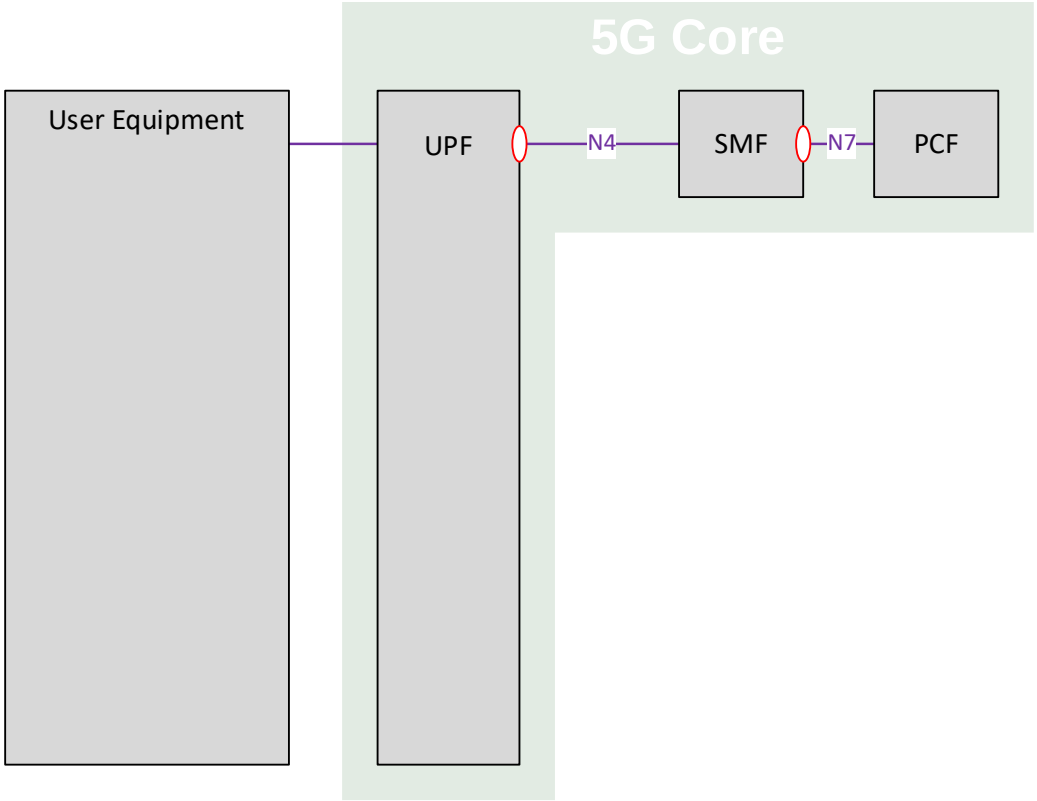
5. Consumption reporting

- Including exposure of CDN access logs.

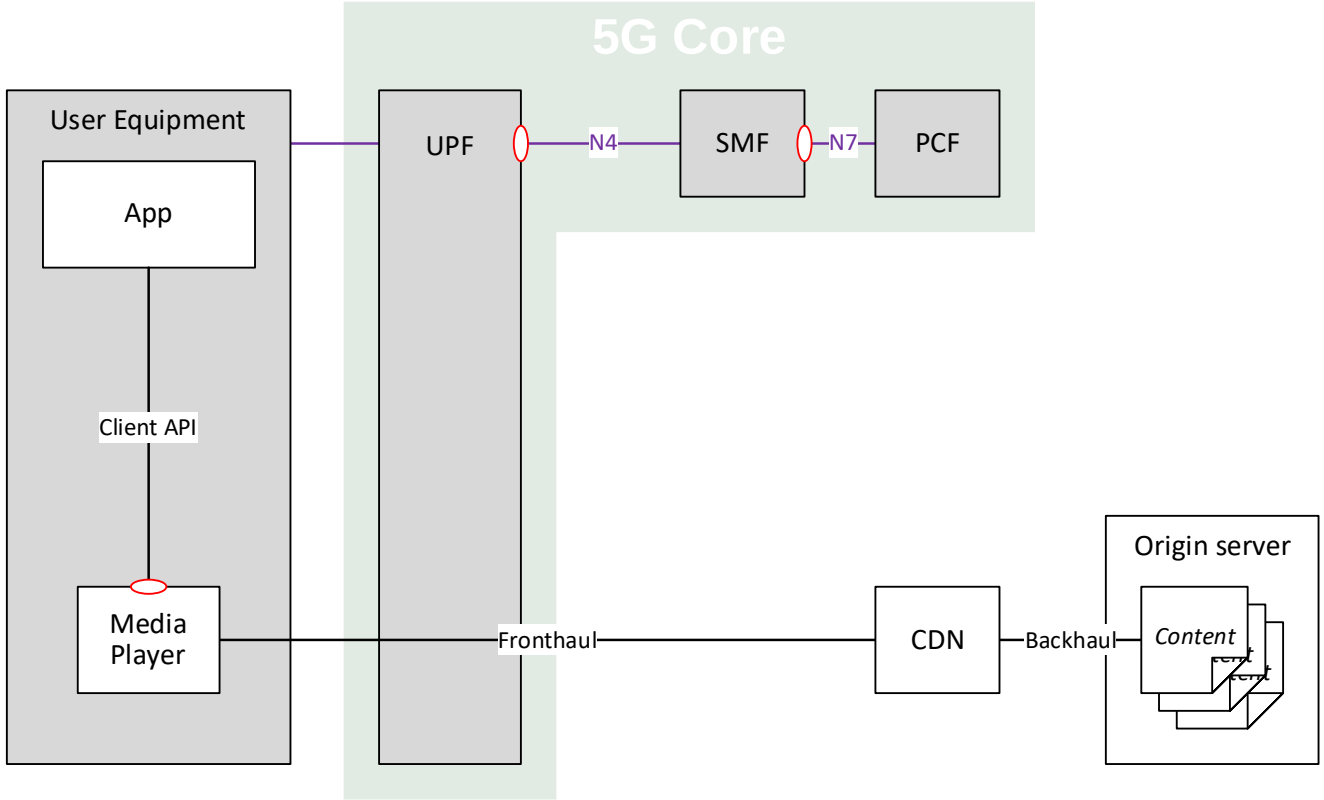
How does 5G Media Streaming work?

A little bit of architecture

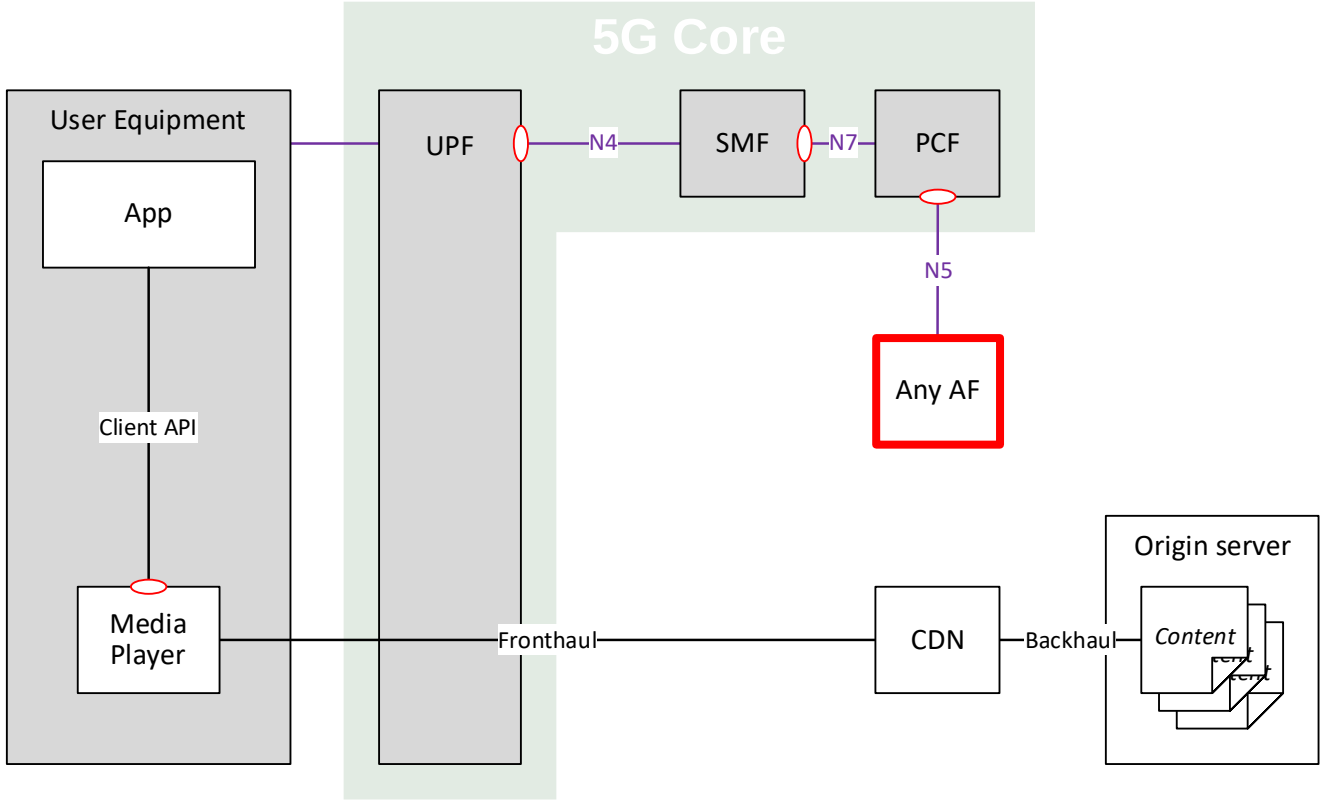
The 5G System *(3GPP Release 15 onwards)*



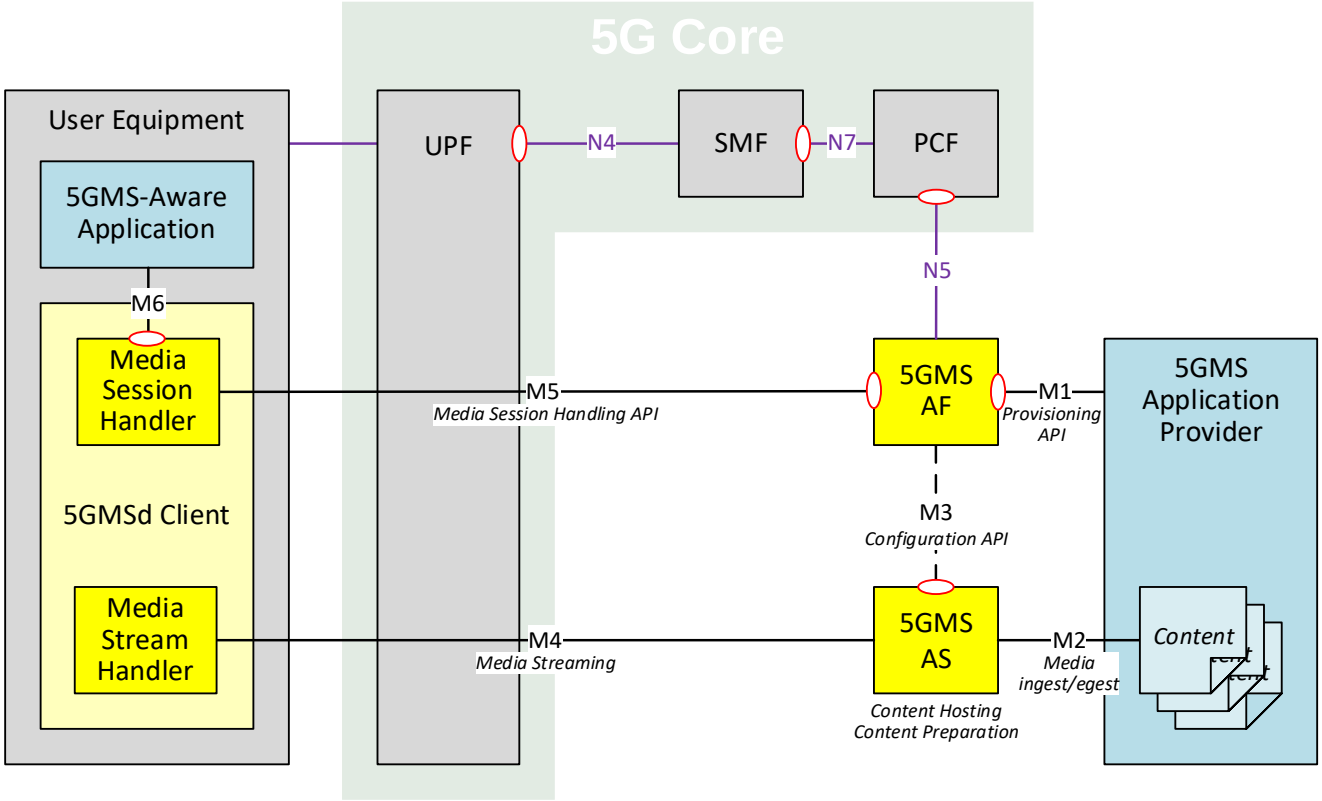
Over-the-top media streaming (eMBB)



Collaboration opportunity



5G Media Streaming architecture *(3GPP Rel-16)*



5G-MAG's role

5G-MAG is a **3GPP Market Representation Partner** (MRP) representing the **media industry vertical**.

1. MRP status gives it some influence over the **3GPP standardisation road map**.
2. 5G-MAG curates a **Reference Tools initiative** implementing relevant 3GPP specifications as Open Source software.
   - As well as contributing to the 3GPP technical specifications for 5G Media Streaming, we also want to convince ourselves that they are deployable in practice.
   - Working alongside fellow travellers **Fraunhofer FOKUS**, **Qualcomm** and **Dolby**, **BBC R&D** has spent the past year bringing the 5G Media Streaming specifications to life by creating a working reference implementation that we are demonstrating on the EBU Stand.
3. Practical implementation experience gives 5G-MAG a useful role in **providing constructive feedback on 3GPP standards**.

5G-MAG Reference Tools “Target 2023” Use Cases

BBC — Reliable Video-on-Demand over Mobile Networks with 5GMS

Dolby — Premium and Targeted Content Insertion with 5GMS

Qualcomm — DVB-I over 5GMS

Qualcomm — DVB-I Hybrid Service over 5G Broadcast and 5GMS

ORS group / Bitstem — 5G Broadcast-on-Demand with 5GMS

5G-MAG Reference Tools: Development

5G Media Streaming network components developed so far:

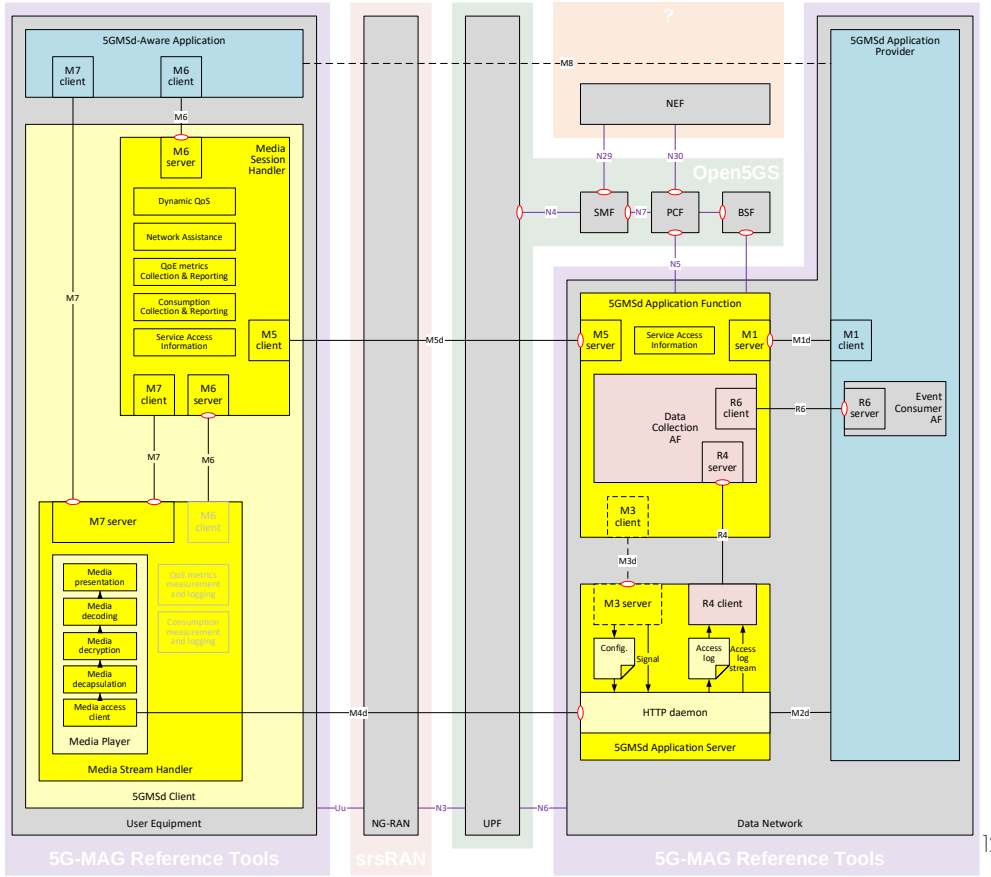
- 5GMS Application Server
  - Wrapping **OpenResty** (Nginx)
- 5GMS Application Function
  - Built in the **Open5GS** framework.

5G Media Streaming Client components developed so far on Android:

- 5GMS-enabled Media Player
  - Wrapping **ExoPlayer**.
- Media Session Handler
  - Background service.
- 5GMS-Aware Application
  - App, optionally incorporating the Media Player component.

5G-MAG Reference Tools – 5G Media Streaming (downlink) functional map

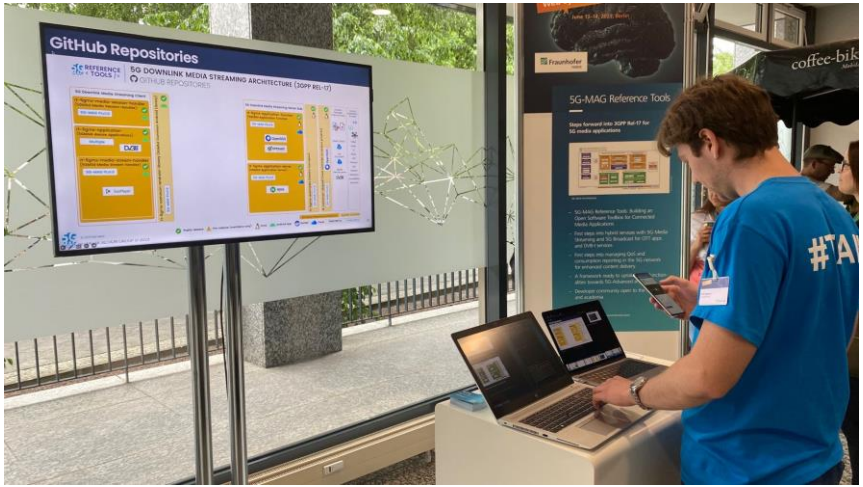
<Richard.Bradbury@bbc.co.uk> [2.March.2023]

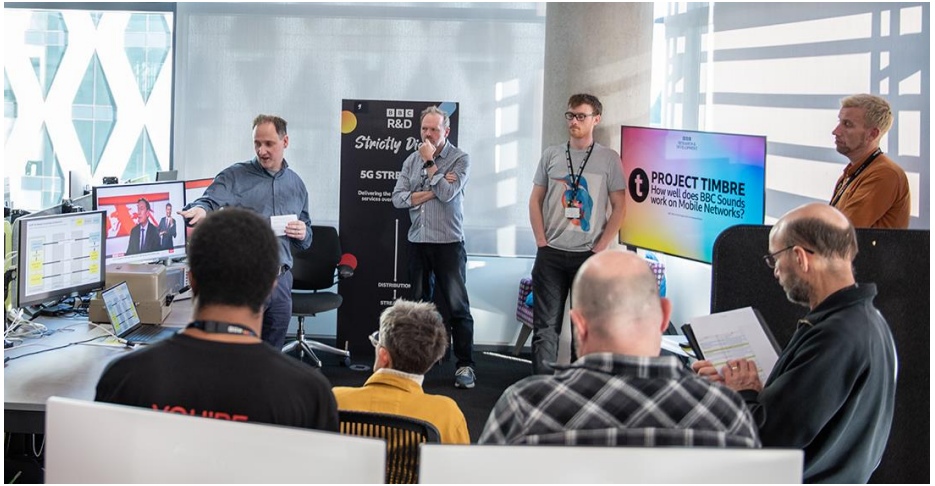


Under development: 5GMS Features (Update: November'23)

5G Media Streaming feature	5GMS Application Function		5GMS Client
	Provisioning (M1)	Usage (M5)	
Content hosting	Pull-based ✅	Done ✅	Done ✅
QoE metrics reporting	Done ✅	Pending release ☑	Done ✅
Consumption reporting	Done ✅	Done ✅	Pending release ☑
Network Assistance			
Delivery boost	*Not applicable*	Pending release ☑	**To do**
Throughput estimation	*Not applicable*	**To do**	**To do**
Dynamic Policies	Pending release ☑	Pending release ☑	**To do**

5G-MAG Reference Tools Demos 2023





FOKUS Media Web Symposium 2023

BBC R&D Open Day 2023

IEEE International Symposium on Broadband Multimedia Systems and Broadcasting (BMSB) 2023

www.5g-mag.com/events

5G-MAG Reference Tools @ IBCShow 2023

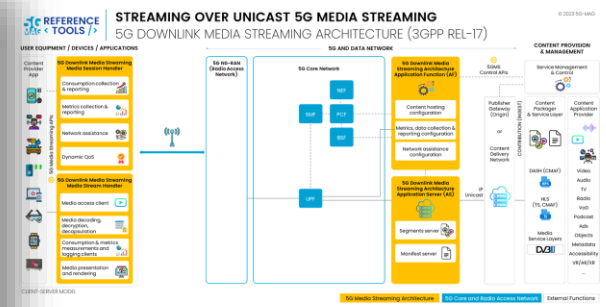
BRINGING 5G MEDIA STREAMING TO LIFE

5G-MAG DEMO POWERED BY 5G-MAG REFERENCE TOOLS

VISIT US AT BOOTH 10.D21 (EBU)

DEMO SETUP BY BBC R&D

CONTRIBUTIONS FROM: Fraunhofer FOKUS, Qualcomm, Dolby and BBC R&D

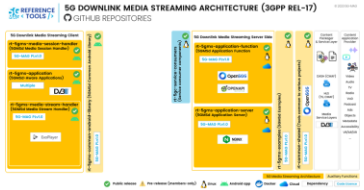


5G Media Streaming (5GMS) is a set of technical specifications defined in 3GPP with the aim to achieve better media streaming Quality of Experience by effective collaboration between content providers and mobile networks. Key features under development include:

- Content Hosting
  - CDN deployed inside/outside the mobile network.
- Dynamic network QoS policy
  - Automatically tracking representation switching during a streaming session.
- Quality of Experience metrics reporting
  - Supporting non-real-time performance auditing.
- Network Assistance
  - Throughput estimation (bit rate recommendation).
  - Temporary delivery boost.
- Consumption reporting
  - Including exposure of CDN access logs.

The demo is using some of the 5G-MAG Reference Tools available in our GitHub. In particular the following:

- 5GMS Application Function
- 5GMS Application Server
- 5GMS Media Session Handler
- 5GMS Media Stream Handler
- 5GMS Application
- 5GMS Common Android Library
- 5GC Service Consumers



Note that this demo is partially supported by third-party components (srsRAN gNodeB and Open5GS 5GCore)

Get more details and join the Developer Community

developer.5g-mag.com

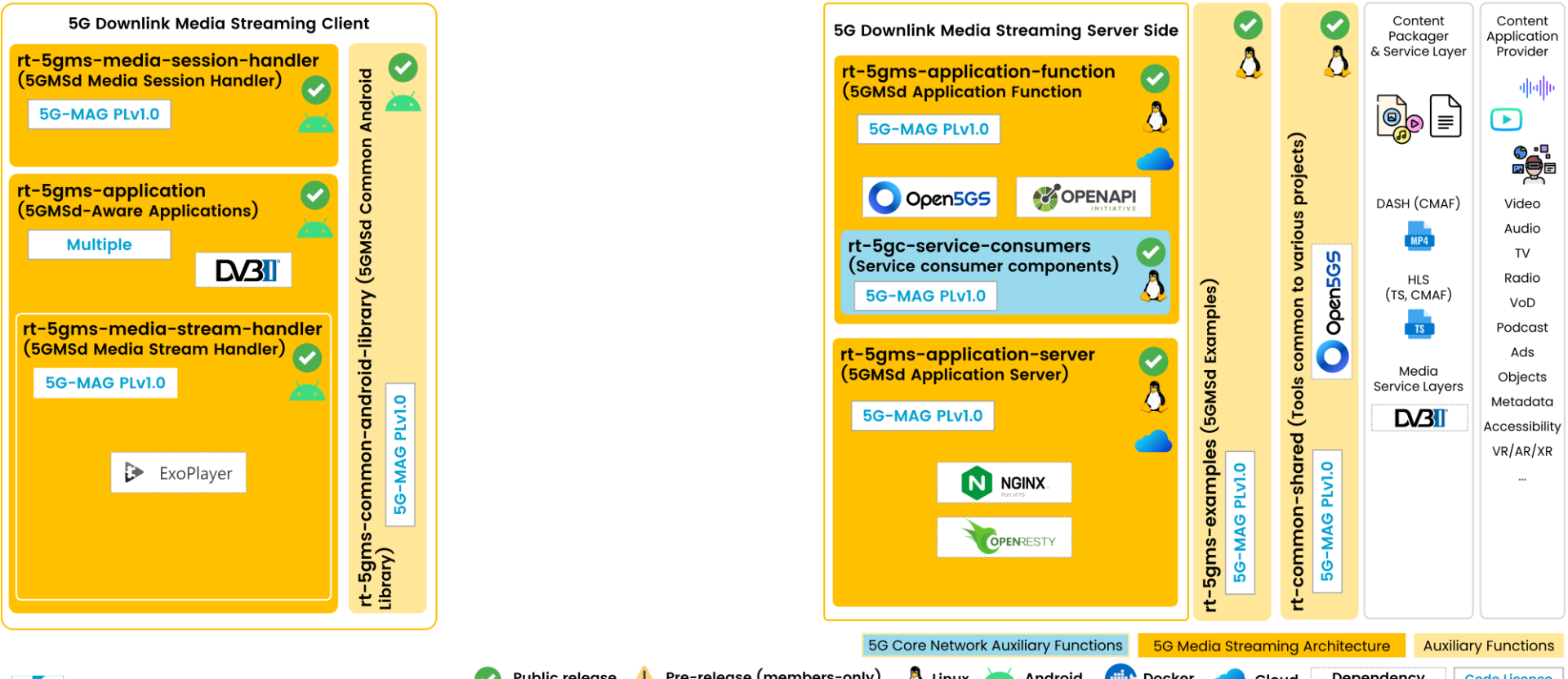
5G-MAG Reference Tools: What next for 5GMS?

1. Having integrated the 5GMS Application Function with the Policy Control Function (PCF) of the 5G Core, we are keen to test it out on **real 5G Cores**.
2. We have started to prototype a new launch mechanism for 5G Media Streaming based on a Rel-18 **Service URL** and Android **intent filters**.
3. As the specifications for **uplink media streaming** become more complete in 3GPP Rel-18, colleagues in 5G-MAG WG2 will assess their suitability for **content production** and **contribution** Use Cases.
4. We're working to combine the simple test application on show with a **DVB-I Client** for Android already contributed by Dolby.
5. We want to implement the missing **Data Collection, reporting and event exposure** feature to expose metrics and consumption reports.

How can I get involved?

5G DOWNLINK MEDIA STREAMING ARCHITECTURE (3GPP REL-17)

GITHUB REPOSITORIES



Participate

slack

tinyurl.com/join5gmagslack

Discussions around development of features and resolving issues. Dedicated channels for each project

Calls

5g-mag.com/community

Public Calls

- Last Friday of the month
- 13:00 - 14:30 CEST

Internal Calls

- Fridays - every other week
- 13:00 – 14:30 CEST

Groups

tinyurl.com/join5gmaggroup

Announcements of upcoming meetings, new release candidates and new releases

Contribute

GitHub

- All development is happening on Github
- Dedicated **project boards** for each new feature: https://github.com/orgs/5G-MAG/projects
- **Getting started guide** for each topic, e.g., 5G Downlink Media Streaming: https://github.com/5G-MAG/Getting-Started/wiki
- All information at https://github.com/5G-MAG

Thank you

Richard Bradbury
BBC R&D
richard.bradbury@rd.bbc.co.uk

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