Multicast, DASH and 5G

Dr. Thomas Stockhammer
Director Technical Standards
Qualcomm Technologies
MBMS/LTE eMBMS/enTV History

Building upon a strong 3GPP technology foundation

- **eMBMS defined for LTE starting in Rel-8/Rel-9**, improving coverage and efficiency
- **eMBMS enhancements in Rel-12 include MOOD² and expansion to MCPTT³**
- **Enabling terrestrial broadcast and expanding to new services; Meeting 7/10**
  - **5G Broadcast requirements⁴ in Rel-14**
- **Further enhancements⁵ to fully satisfy 5G broadcast requirements**

**Target market**
- **focused on Cellular operators**
- **expanded to Broadcasters**

3GPP Rel-14 (completed)
- Enabling terrestrial broadcast and expanding to new services; Meeting all 5G Broadcast requirements⁴ in Rel-16

3GPP Rel-16 (on the way)
Terrestrial broadcast for next-gen digital TV delivery
enTV\(^1\) – part of 3GPP Rel-16 – meets terrestrial TV broadcast requirements

Radio access enhancements

- **Longer range**
  - New 1-symbol numerology with longer 200us CP\(^2\) to support 15 km ISD\(^3\)

- **More broadcast capacity**
  - Supports dedicated broadcast network with 100% eMBMS carrier allocation

- **More deployment flexibility**
  - Single network for mobile and fixed devices with enhanced support for rooftop reception

- **Better efficiency**
  - New subframe design reduces overhead in dedicated broadcast transmissions

System layer enhancements

- **Receive only mode**
  - Delivery of free-to-air content to devices without SIM/service subscription

- **Transport only service**
  - TV broadcasters can deliver content in native format without transcoding

- **Standardized interface**
  - Content providers can deliver media over LTE with a unified framework

- **Shared broadcast**
  - Multiple operators can serve users on a common broadcast carrier

Rel-16 adds in addition
- ~15km ISD (optimized for higher speeds, e.g. audio)
- 50km ISD+ (rooftop reception, limited outdoor depending on Tx power)
- 250km ISD (TBC)
ETSI JTC Broadcast

ETSI TS 103 720: 5G Broadcast System for linear TV and radio services

- A single overview and system specification that profiles and restricts existing 3GPP specifications in the context of 5G in order to enable the deployment of linear TV and radio services.
- The work item is aligned with ongoing 3GPP standardization work, in particular the "LTE-based 5G terrestrial broadcast

- Main features
  - radio network comprising only MBMS-dedicated cells as transmitters;
  - Receive-Only-Mode (ROM) devices and UEs supporting FeMBMS [x23.246] as receivers;
  - A down-striped EPS dedicated to TV and Radio Services with E-UTRAN;
  - A down-striped MBMS User Service [x26.346] dedicated to TV and Radio Services;
  - A set of MBMS-APIs [x26.347] that permits to use third-party service layers.
# Rel-17 Multicast Broadcast Considerations

## LTE MBMS

<table>
<thead>
<tr>
<th>Initial Service Targeted</th>
<th>Multiple Services Targeted</th>
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</thead>
<tbody>
<tr>
<td>- Video Content and Streaming</td>
<td>- C2VX, public safety, I-IoT, IP Multicast</td>
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<table>
<thead>
<tr>
<th>Focus on one type of service</th>
<th>Multiple Services with different characteristics</th>
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<tbody>
<tr>
<td>- Joint Transport/Service Layer</td>
<td>- Common Transport/Separate Service Layer</td>
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<tr>
<th>Service independent of unicast</th>
<th>Service have unicast and broadcast components</th>
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<tbody>
<tr>
<td>- Separate core network</td>
<td>- Transport integrated with 5GS unicast</td>
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<tr>
<th>Service oriented architecture</th>
<th>Enable high reliability + low latency</th>
</tr>
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<tbody>
<tr>
<td>- Functionality at the core network</td>
<td>- Functionality provided at the transport</td>
</tr>
<tr>
<td>- Reliability, unicast/Broadcast decision</td>
<td>- RAN Reliability, unicast/Broadcast decision</td>
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<tr>
<td>- Security also on application layer</td>
<td>- Security: encryption at either RAN or UPF</td>
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<th>Service oriented architecture</th>
<th>Transport oriented architecture</th>
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<tbody>
<tr>
<td>- Flow identified by TMGI (service)</td>
<td>- Flow identified by MB-QoS flow ID</td>
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<tr>
<td>- Maps to MBMS bearer</td>
<td>- Maps to Radio Bearer in RAN</td>
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5G Study Mission Report Scenarios
Low-Latency and Multicast

Low-Latency DASH output
- CMAF Chunks are aggregated into Segments
- How to signal presence and position of Random Access in Segments on MPD level?

CMAF Fragments – each 1 second
- CMAF Chunks
  - Fragment Chunks
  - Random Access Chunks
  - Regular Chunks

How to find random access?

How to map this to ROUTE Sending?
- Fragments start a new object
- Random Access Chunks may be signalled on ROUTE level
More fun ...

- Multicast Broadcast
- Low Latency Live
- Targeted Ad Insertion
- DRM
- HLS/DASH
- Unicast
- HTTPS

- DVB
- ABR Multicast - DOA or RTB?
- 3GPP
- MBMS again?
- DASH-IF
- Anything to be done?