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Multimedia Content
Delivery Protocols

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THANK YOU!

Bitstem Fraunhofer FOKUS MOTION SPELL Qualcomm

5G MEDIA ACTION GROUP

Which specifications are under implementation?

- 5g-mag.github.io/Standards/pages/multimedia-content-delivery.html

Which reference implementations are made available?

- 5g-mag.github.io/Getting-Started/pages/multimedia-content-delivery/
- **Repositories**
- **Projects**

How can I play?

- **Tutorials**

5g-mag.com/store

Check our **Store** for **APKs**, **VMs** and other **components**

Note that these tools support media delivery for other projects:

- 5G Broadcast Hybrid Services
- DVB-I Services over 5G Systems

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- Support for **unidirectional media delivery protocols** in the 5G-MAG Reference Tools that make use of **multicast** to deliver content

- **FLUTE protocols** as defined in 3GPP

- Exploration of other protocols such as **ROUTE**

- Integration with **DVB-I over 5G** systems:
  - Basic broadcast distribution of **DVB-DASH** content
  - Low-latency distribution using **LL-DASH/CMAF** and **ROUTE**
  - Seamless **broadcast coverage extension** with **unicast fall-back**

1 ✓ **rt-libflute**
(FLUTE)
IETF | 5G-MAG PLv1.0

2 ✓ **gpac-route branch**
(ROUTE)
IETF | 5G-MAG PLv1.0 | GPAC

✓ Public release | ⚠ Early Access | Linux | Windows | Android | APK | Docker | Cloud | Postman API | Web Interface | Dependency | Code Licence
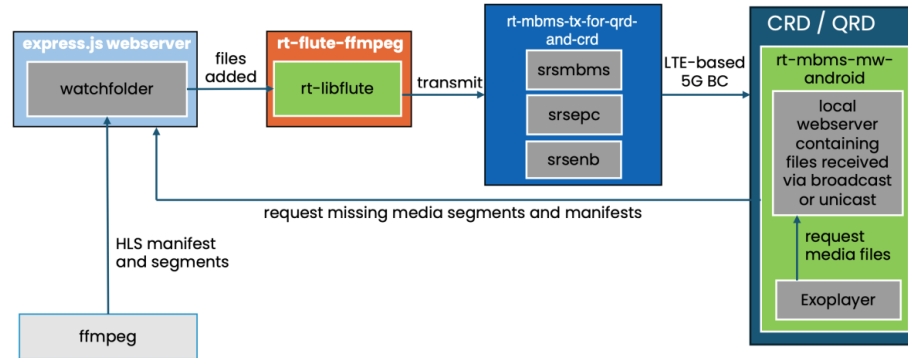
Projects

Support for FLUTE

- Implementation of **FLUTE (File Delivery over Unidirectional Transport)** library according to **IETF RFC 6726**
- With **FEC Rapor10** support


```
Internet Engineering Task Force (IETF)                    T. Paila
Request for Comments: 6726                                   Nokia
Obsoletes: 3926                                          R. Walsh
Category: Standards Track                               Nokia/TUT
ISSN: 2070-1721                                           M. Luby
                                       Qualcomm Technologies, Inc.
                                                          V. Roca
                                                            INRIA
                                                     R. Lehtonen
                                                       TeliaSonera
                                                   November 2012


                FLUTE - File Delivery over Unidirectional Transport

Abstract

   This document defines File Delivery over Unidirectional Transport
   (FLUTE), a protocol for the unidirectional delivery of files over the
   Internet, which is particularly suited to multicast networks.  The
   specification builds on Asynchronous Layered Coding, the base
   protocol designed for massively scalable multicast distribution.
   This document obsoletes RFC 3926.

Status of This Memo

   This is an Internet Standards Track document.

   This document is a product of the Internet Engineering Task Force
   (IETF).  It represents the consensus of the IETF community.  It has
   received public review and has been approved for publication by the
   Internet Engineering Steering Group (IESG).  Further information on
   Internet Standards is available in Section 2 of RFC 5741.

   Information about the current status of this document, any errata,
   and how to provide feedback on it may be obtained at
   http://www.rfc-editor.org/info/rfc6726.
```
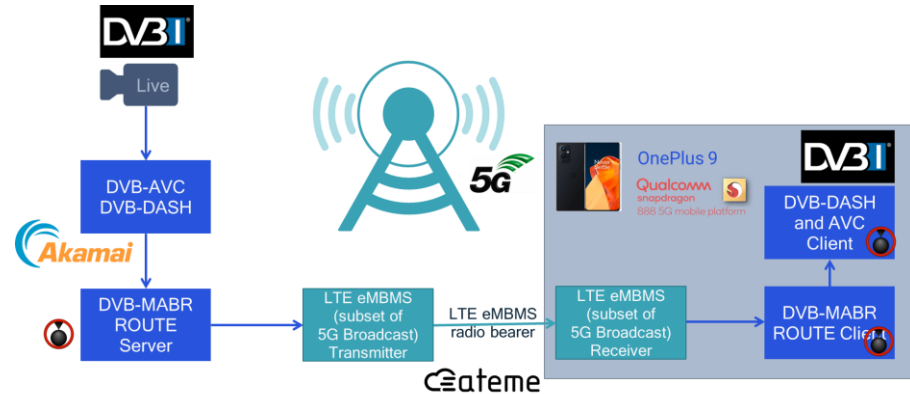
Projects

Support for ROUTE

- Implementation of **ROUTE (Real-time Transport Object delivery over Unidirectional Transport)** library to extract a DASH/HLS live filesystem from a ROUTE/IP session

What's implemented at the server side:

- ROUTE over multicast IP (UDP): generic ROUTE (RFC), ATSC3, DVB MABR - updates according https://www.ietf.org/rfc/rfc9223.html

- Not implemented: EXT_NOP/EXT_TIME, and optionally EXT_AUTH if used; Congestion; FEC (RAPTORQ as in RFC 6330)

What's implemented at the client side:

- ROUTE over multicast IP (UDP): generic ROUTE (RFC), ATSC3, ATSC3 Korean, DVB MABR - updates https://www.ietf.org/rfc/rfc9223.html; Skip repeated files; Low latency;

- Partially implemented: File repair simple option:
  - MPEG-2 TS: all lost ranges are adjusted to 188-bytes boundaries, and transformed into NULL TS packets.
  - ISOBMFF: all top-level boxes scanned, incomplete boxes are transformed in free boxes, except mdat.

- Not implemented: Reorder (with timeout); Choose service ID to bootstrap for ATSC 3.0 mode; FLUTE (as documented in in RFC 3926 and TS 26.346); Congestion; FEC (RAPTORQ as in RFC 6330)

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