ROUTE Overview

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Outline

• Brief Summary: Adaptive Streaming, Real-time object delivery and ROUTE
  • DASH
  • DASH over IP Multicast
  • DASH for eMBMS
  • DASH over ROUTE in ATSC
    • Brief summary of technical features
    • ROUTE for DVB

• Status of ROUTE I-D
  • Standards track vs. independent submission

• Outlook
Adaptive Streaming, Real-time object delivery and ROUTE
Background: Adaptive Streaming

• Here we use DASH, applicable to HLS

DASH for IP Multicast

• Why, how?
  1. DASH is designed for client driven HTTP in contrast to Multicast push delivery
  2. The notion of “adaption” of quality is a bit alien to Multicast delivery

• Motivation
  • On high level: to exploit commonality of ecosystem
  • In human speak: being able to reuse
    • Content (allows common unicast and multicast formats, major headache of content providers), and
    • Players, reusing the code base

• Answers to
  • How#1: We need to support the different architecture with a different protocol stack
  • How#2: In most basic deployment, let’s just pick one quality of audio/video
Case scenario DASH over (e)MBMS

- Already existing FLUTE-File Delivery over Unidirectional Transport at the time
  - For IP multicast delivery of *files*
  - DASH is basically an ensemble of files (segments, MPD)

- DASH built for reliable HTTP: FLUTE FEC + Unicast repair
ROUTE - Real-time Transport Object delivery over Unidirectional Transport

• In context of further interest, ATSC 3.0, ROUTE was developed by extending FLUTE
  • FLUTE designed for large files (OTA and the likes) ➔ Heavy on amount of metadata per file
    • For DASH live streaming, ~1 audiovisual file per second, 3600 files in 1 hours
    • Real-time delivery, e.g. latency optimizations for a live streaming event

• ROUTE optimization principles
  • Reduction in metadata frequency using template mechanism
  • Enhanced metadata embedding in (ROUTE) packet header
    • Alleviating needs to know file sizes before start of sending to optimize end to end latency
  • …

ROUTE technical details

- Using ROUTE for hybrid unicast/broadcast delivery
ROUTE technical details (contd)

- ROUTE Functional Blocks and Metadata

  - Metadata
    1. LCT Packet header, header extensions
    2. File (Application object) related metadata (location, size)
      a. LCT packet payload as HTTP formatted header
      b. Separate file: eFDT
    3. Service signaling to set up session
ROUTE further standardization

- ROUTE profile adapted by DVB:
  - "Digital Video Broadcasting (DVB); Adaptive media streaming over IP multicast", ETSI TS 103 769 V1.1.1

- During standardization phase, the standardization group in DVB noted that ATSC Annex is not the best independent reference to ROUTE
  - It is heavily linked to ATSC A/331 service layer, while DVB has its own service layer
  - Addressed at the time by carefully profiling and referencing exact subclauses, reproducing text where needed
  - ➔ Clear motivation for an independent, referenceable document, in IETF
ROUTE I-D status
Overview

• As noted in the previous slides, using ROUTE in various SDOs gave rise to need for this I-D as a reference.

• Current draft in 2\textsuperscript{nd} revision: draft-zia-route-02 (ietf.org)

• Currently receiving, reviewing, and integrating feedback
  • From IETF (via usual review cycle)
  • From ATSC on random access aspects
  • Independent feedback from individual contributors
## Feedback/Implementation Status

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Why not standards track?

- The purpose of ROUTE I-D is to gather ROUTE delivery object protocol aspects *already specified in ATSC* in a clean, referenceable standalone document.

- ATSC ROUTE has already been commercially deployed in products by various companies: we should not change ROUTE in IETF, otherwise it breaks compatibility with deployed protocols.
  - Qualcomm continues to coordinate in such SDOs and keeps ensuring interoperability

- Not an independently deployable “Internet Standard” per-se: does not specify a service layer beyond giving some recommendations, so cannot be deployed on its own. A *service-layer* is needed (examples are the ATSC and DVB specifications).
Next steps

• Complete integrating reviews and follow publication process in IETF as an informational RFC
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