Server and Network Assisted DASH (SAND) for 3GPP Multimedia Services

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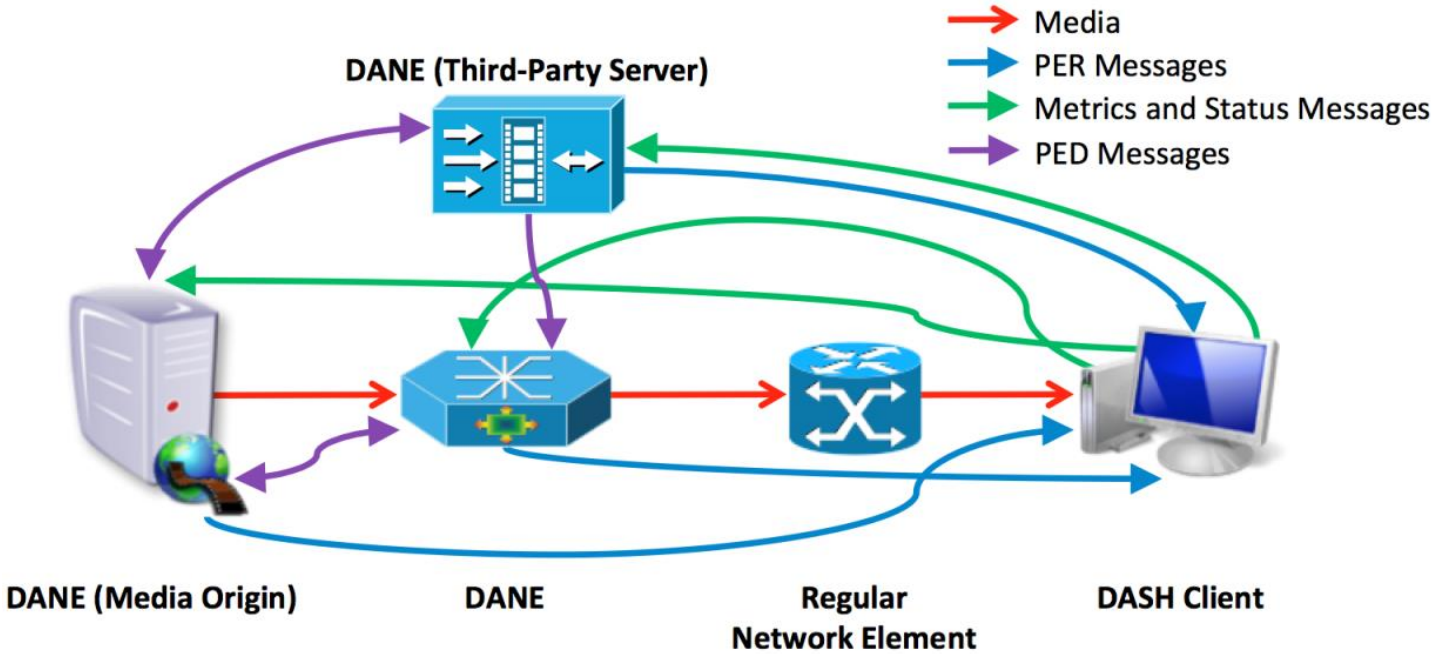
Overview of MPEG's Server And Network Assisted DASH (SAND)



DANE: DASH-assisting network element
PER: Parameters for enhancing reception
PED: Parameters for enhancing delivery

- Specified in ISO/IEC 23009-5: SAND is Part 5 of MPEG DASH specification
- Defines message formats and interfaces among server, client, edge proxy and network elements toward enhancing streaming QoE.
- SAND messages describe real time operational characteristics of networks, servers, proxies, edge caches, CDNs as well as DASH client's performance.

Industry Participants: Microsoft, Huawei, Ericsson, Cisco, Qualcomm, Samsung, Technicolor, TNO, Arris, Interdigital, Intel, etc.

Overview of MPEG SAND

- Metrics and Status Messages
  - QoE metrics from DASH Part 1
  - AnticipatedRequests
  - SharedResourceAllocation
  - AcceptedAlternatives
  - AbsoluteDeadline
  - MaxRTT

Client informs edge server about requested bandwidth / quality, RAN information, anticipated DASH segments, acceptable alternative content, etc.
=> Leads to intelligent caching and real-time media processing at the edge server

- PER Messages (from proxy / server to client)
  - ResourceStatus
  - DaneResourceStatus
  - SharedResourceAssignment
  - MPDValidityEndTime
  - Throughput
  - AvailabilityTimeOffset
  - QoSInformation
  - DeliveredAlternative

Edge server informs client about cached segments, alternative segment availability, timing information for delivery, network throughput/QoS, etc.
=> Leads to intelligent DASH client adaptation

- PED Messages (across servers/proxie
  - BwInformation

Servers exchange information on bandwidth requirements of the DASH content to enable content-aware QoS and network provisioning

Overview of MPEG SAND

- SAND messages are carried using XML format and transported using HTTP protocol.
- The Server and Network assisted DASH (SAND) addresses:
  - Unidirectional/bidirectional, point-to-point/multipoint communication with and without session (management) between servers/CDNs and DASH clients,
  - Mechanisms for providing content-awareness and service-awareness towards the underlying protocol stack including server and/or network assistance
  - Various impacts on elements of the existing Internet infrastructure such as servers, proxies, caches and CDNs,
  - QoS and QoE support for DASH-based services,
  - Scalability in general and specifically for logging interfaces, and
  - Analytics and monitoring of DASH-based services.

Applicability of SAND to 3GPP Multimedia Services

- SAND is relevant for:
  - 3GPP DASH / PSS: SAND support for DASH in PSS toward enhancing unicast streaming
  - 3GPP MBMS: SAND support for DASH delivery over eMBMS to enable enhanced streaming over broadcast-only as well as unicast-broadcast usages

- Latest SAND specification liaised to 3GPP SA4 in S4-160011 -> this is the FDIS text of ISO/IEC 23009-5

Proposed Work in 3GPP SA4

- The objective is to enable streaming QoE improvements for 3GPP DASH and introduce the following functionality:
  - Streaming enhancements via intelligent caching and real-time media processing on the server side, based on feedback from clients on anticipated DASH segments, accepted alternative content, requested bandwidth, etc.
  - Improved adaptation on the client side, based on network/server-side information such as cached segments, alternative segment availability, network throughput/QoS, etc.
- As a potential candidate solution to fulfil these objectives, MPEG SAND can be considered. Relevant actions here are:
  - Identify relevant SAND features to be adopted into 3GPP DASH to fulfil the above objectives
  - Based on the identified features, define suitable SAND profiles in TS 26.247
  - Address deployment guidelines and implementation aspects on clients, servers and network elements