Multi-Profile Ultra High Definition (UHD) AVC and HEVC 4K DASH Datasets

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Summary

Goal: Provide the wide range of video content required for validating DASH QoE delivery over networks, ranging from constrained cellular and satellite systems to future high speed architectures such as the proposed 5G mmwave technology.

Approach: Convert three existing well-known open-source UHD video content to six DASH profiles across thirteen representation rates over eight resolutions, and five segment durations using open-source code: ffmpeg, x264/x265 and MP4Box.

Contribution: Three DASH datasets that can be used for: Real-time streaming, Simulated trace-based streaming and for future research based Dataset modification and adaptation.

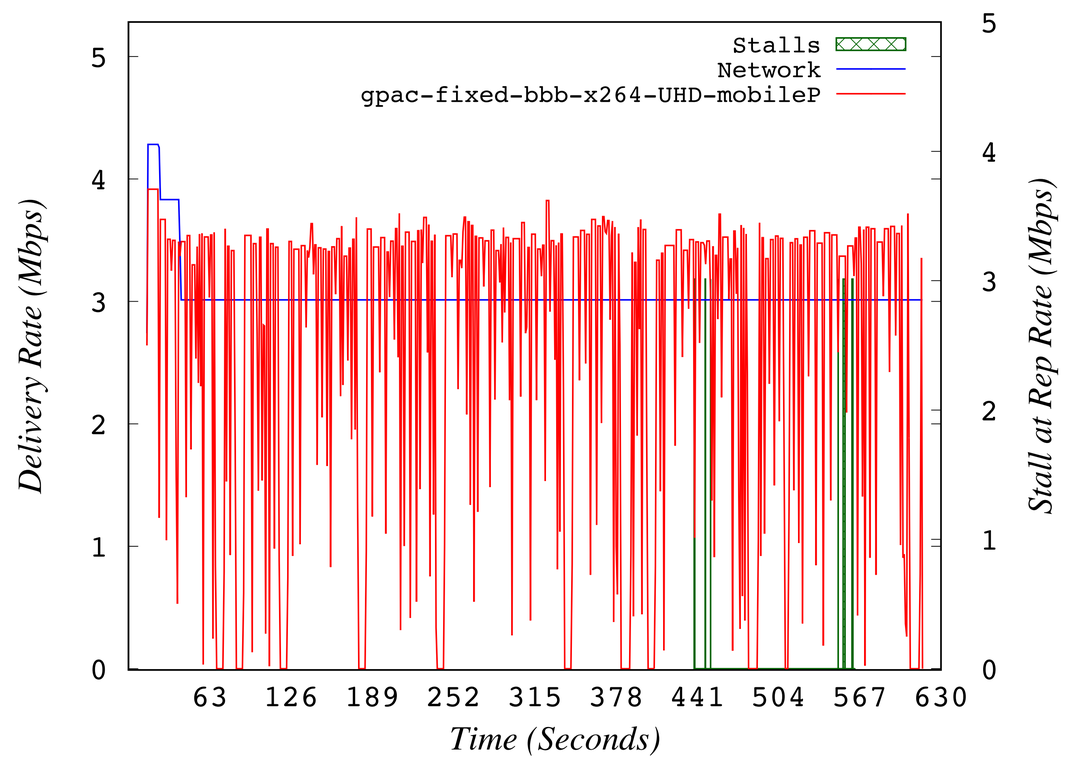
UHD DASH Dataset

- 4K/UHD DASH dataset composed of both AVC (H.264) and HEVC (H.265) video content
- Generated from three well known open-source 4K video clips:
  - Big Buck Bunny - 10min and 34sec - 60fps
  - Sintel -14min and 48sec - 24fps
  - Tears of Steel - 12min and 14sec - 24fps
- Dataset resolution ranging from 40Mbps in 4K down to 235kbps in 320x240
- 13 representation rates across 8 resolutions
- 6 DASH Profiles: Full, Full Byte Range (BR), Live, Main, Main BR, and onDemand BR

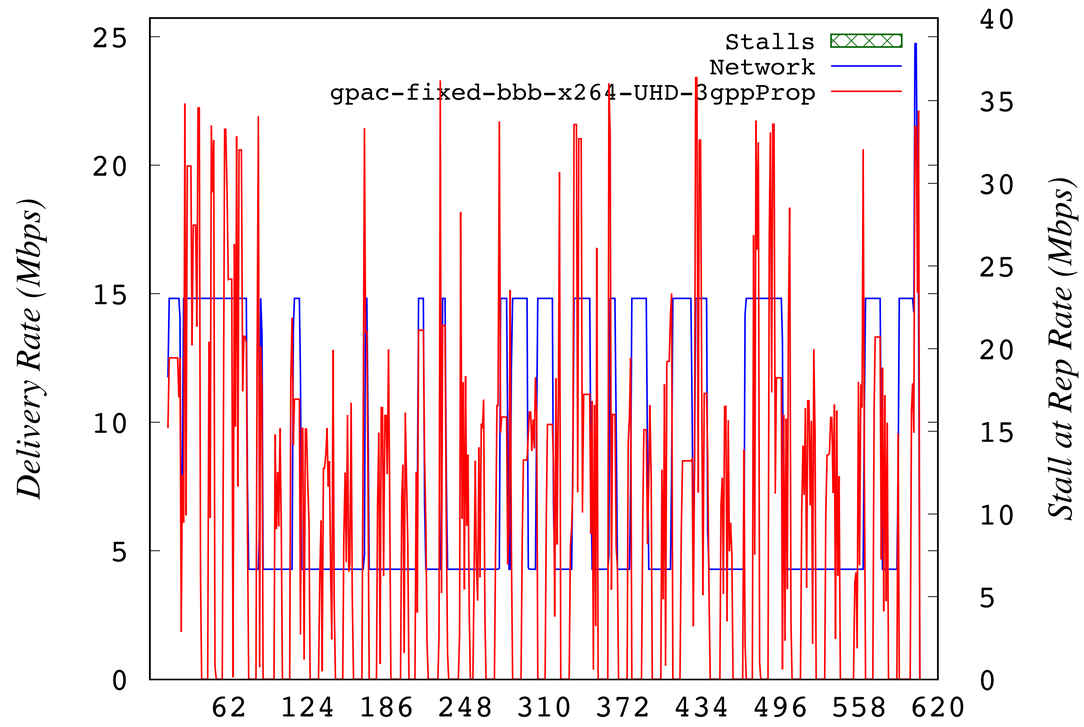
Dataset	Feature	Settings
(1)	Real-Time	Decodable Content Adaptive Algorithm Agnostic Evaluation over Physical Devices
(2)	Simulation	ns-2/ns-3 trace-based evaluation Extracted segment distribution PSNR values per frame
(3)	Creation	Original non-DASH MP4 files Multi-profile DASH creation script: onDemand Byte Range, Live, Main, Full, Main Byte Range, Full Byte Range

Dataset Use Case

- Evaluation conducted over a modified version of our D-LiTE video streaming platform testbed
- Simulated air-interface using NS3:
  - LENA module for LTE/4G
  - mmWave module for 5G
- Physical hardware DASH server
- GPAC (MP4Client) video player on Raspberry Pi hardware
- a simplified network of two clients, located 150m from the cell tower, results shown for one client



NS3 4G LTE Real-Time Simulation



NS3 5G mmWave Real-Time Simulation

	40Mbps	25Mbps	15Mbps	4.3Mbps	3.85Mbps	3Mbps	2.35Mbps	1.75Mbps	1.05Mbps	750Kbps	560Kbps	375Kbps	235Kbps
BBB	3840x2160	3840x2160	3840x2160	1920x1080	1920x1080	1280x720	1280x720	720x480	640x480	512x384	512x384	384x288	320x240
Sintel	3840x1744	3840x1744	3840x1744	1920x872	1920x872	1280x582	1280x582	720x328	640x292	512x234	512x234	384x174	320x146
TSOS	3840x1714	3840x1744	3840x1744	1920x858	1920x858	1280x572	1280x572	720x322	640x286	512x228	512x228	384x172	320x142
16:9	3840x2160	3840x2160	3840x2160	1920x1080	1920x1080	1280x720	1280x720	736x414	640x360	512x288	512x288	384x216	320x180

Further information and build instructions available at 'www.cs.ucc.ie/misl/research/datasets/ivid_uhd_dataset'

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