

Naty Sidaty, Wassim Hamidouche, Pierrick Philippe and Olivier Deforges
 INSA Rennes, IETR & Orange Labs, CNRS 6164, Rennes, France

Context

- **HEVC** standard: enable a rate-distortion gain up to 50% compared to H.264/AVC;
- Emerging video applications: Virtual Reality (VR 360) , High Dynamic Range (HDR), High resolution (4K, 8K) are a new veritable challenge for video coding community;
- New coding tools have been integrated within the HEVC reference software (**HM**);
- Goal of this platform, called **JEM** (Joint Exploration Model): provide a bit rate saving between **25-30%**.

- Main tools included in the **JEM** software:
- Expected total BD-rate gain: **32%**.

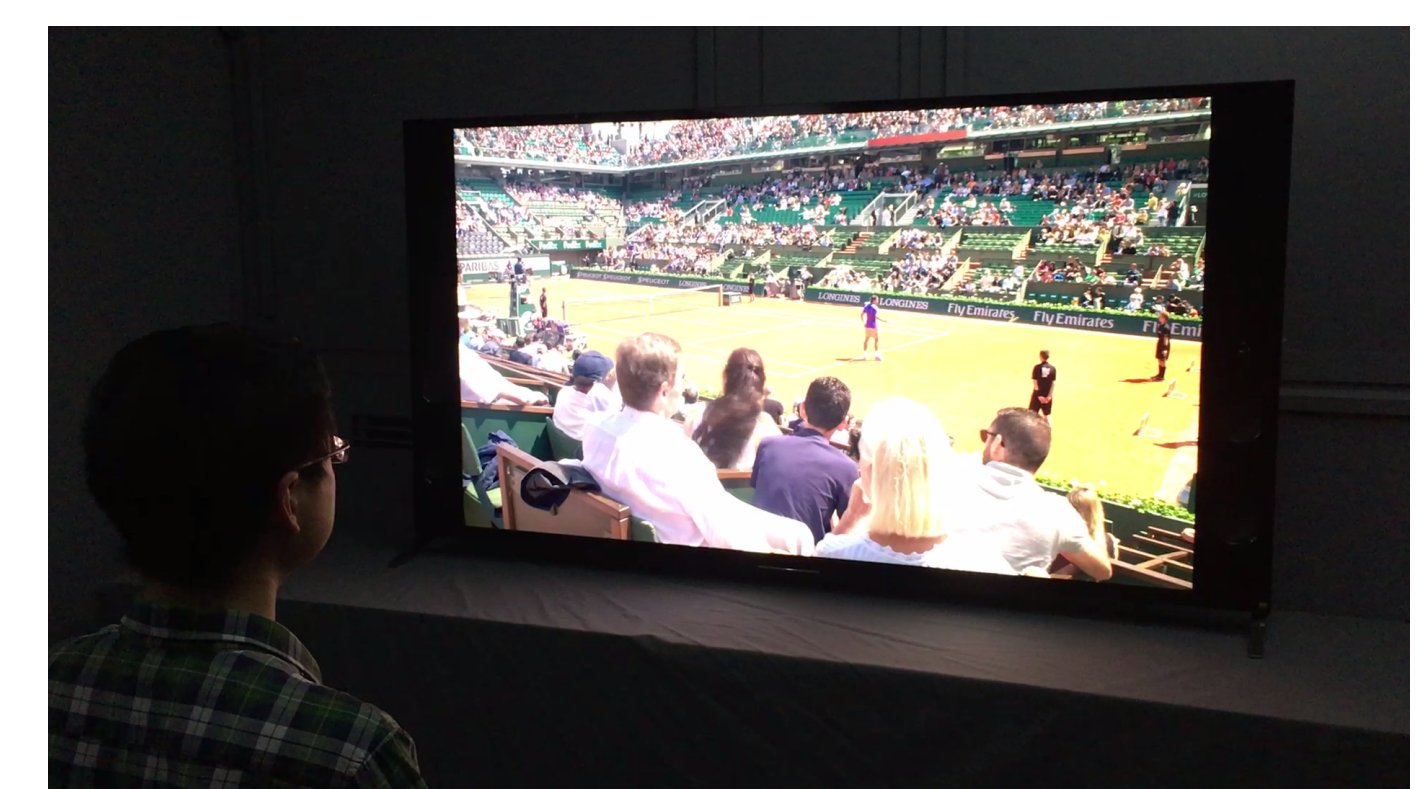
Acronym	Tool name	Gain
AMT	Adaptive Multiple Transforms	5%
PMMVD	Pattern Matched Motion Vector Derivation	5%
QTBT	Quad-Tree Plus Binary Tree	4%
ALF	Adaptive Loop Filters	4%
BIO	Bidirectional Optical Flow	2%
NSST	Secondary Transforms	2%
AMVR	Adaptive Motion Vector Resolution	2%
OBMC	Overlap Block Motion Compensation	2%

Subjective Quality Assessment

- **Purpose:** Evaluating the quality of two codecs (HM, JEM) for HD and 4K resolutions

Experimental environment:

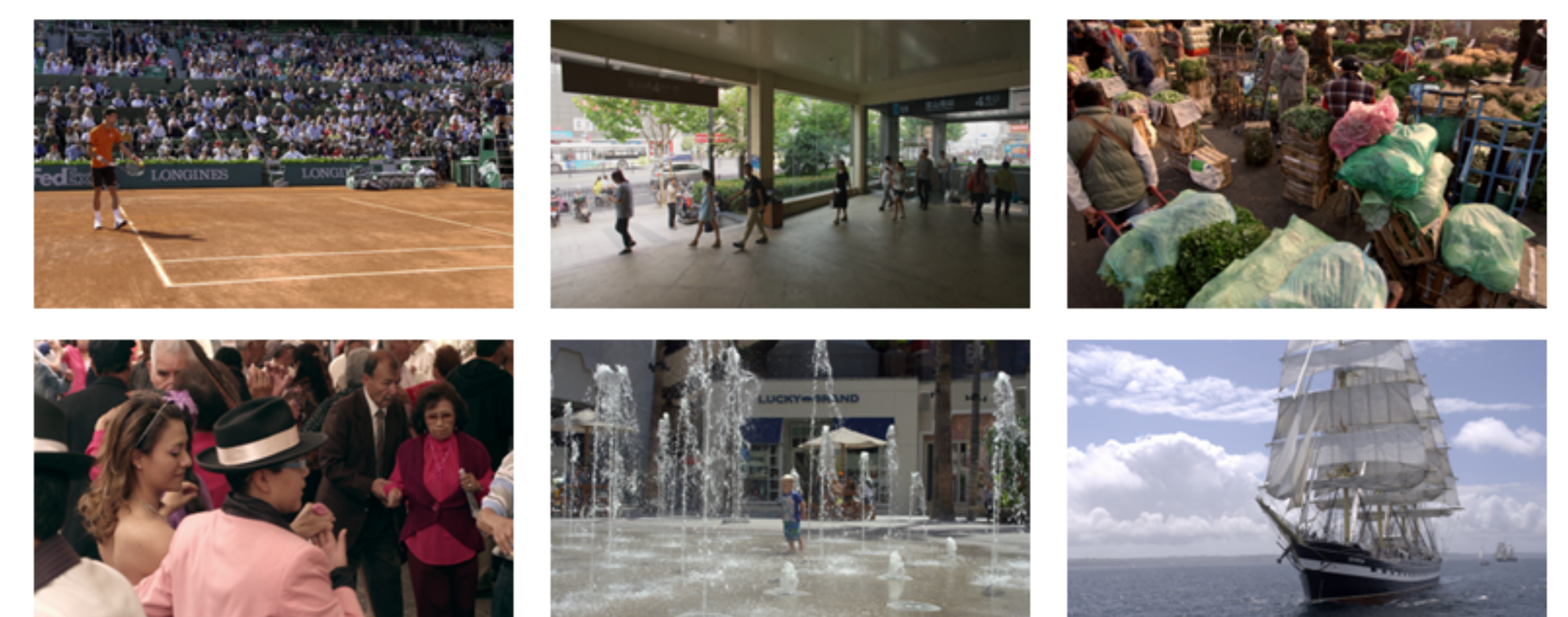
- IETR lab. psycho-visual room, complying with the ITU-R BT.500;
- 18 participants (10 men & 8 women, aged from 18 to 44 years);
- An UHD 75" Sony HDR TV KD-75X9405C.



Psycho-Visual Room.

Sequences:

- Six video sequences from MPEG and 4EVER databases ;
- A total of 96 videos: 6 (original) x 4 (BR) x 2 (codec) x 2 (HD,4K).

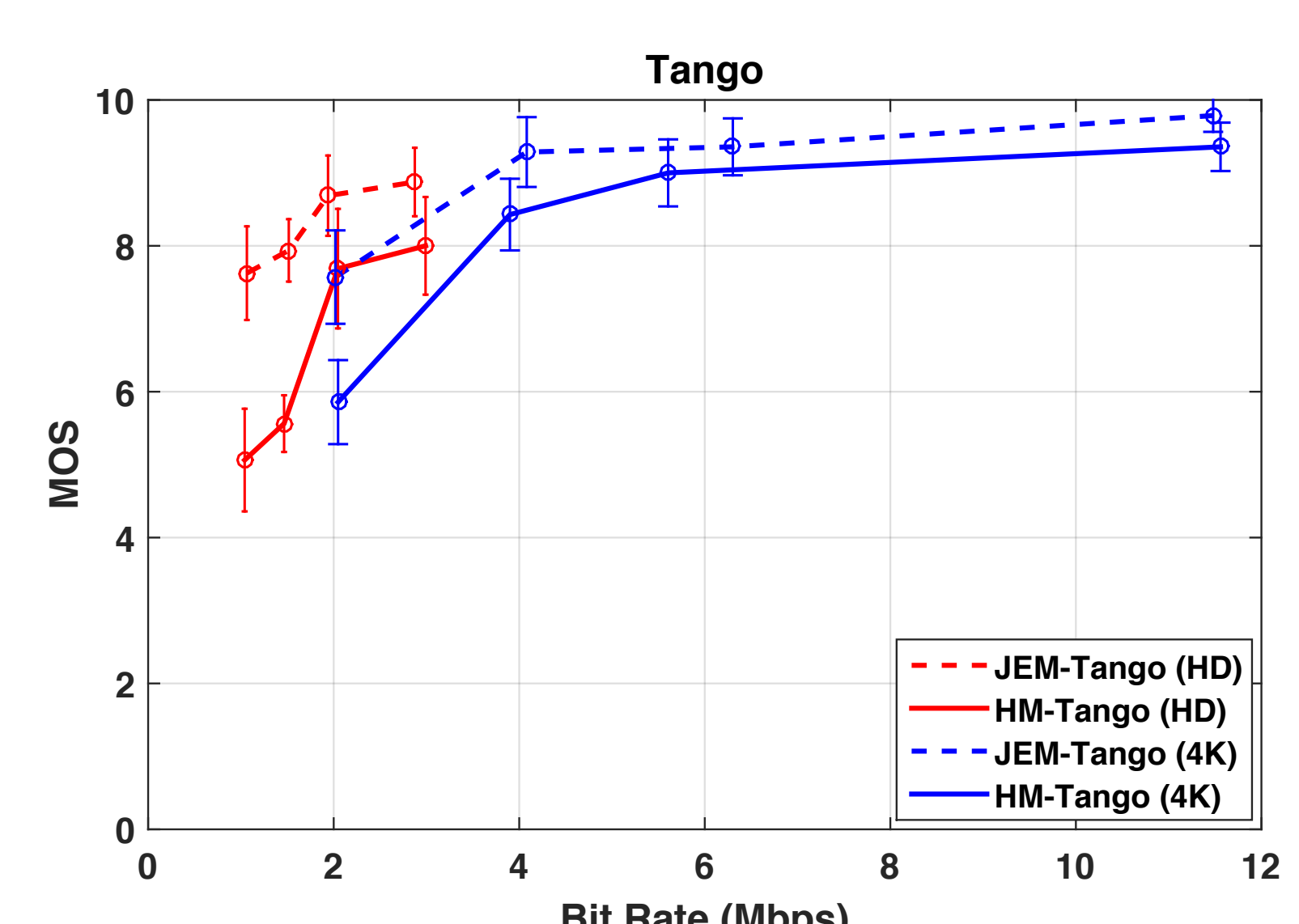
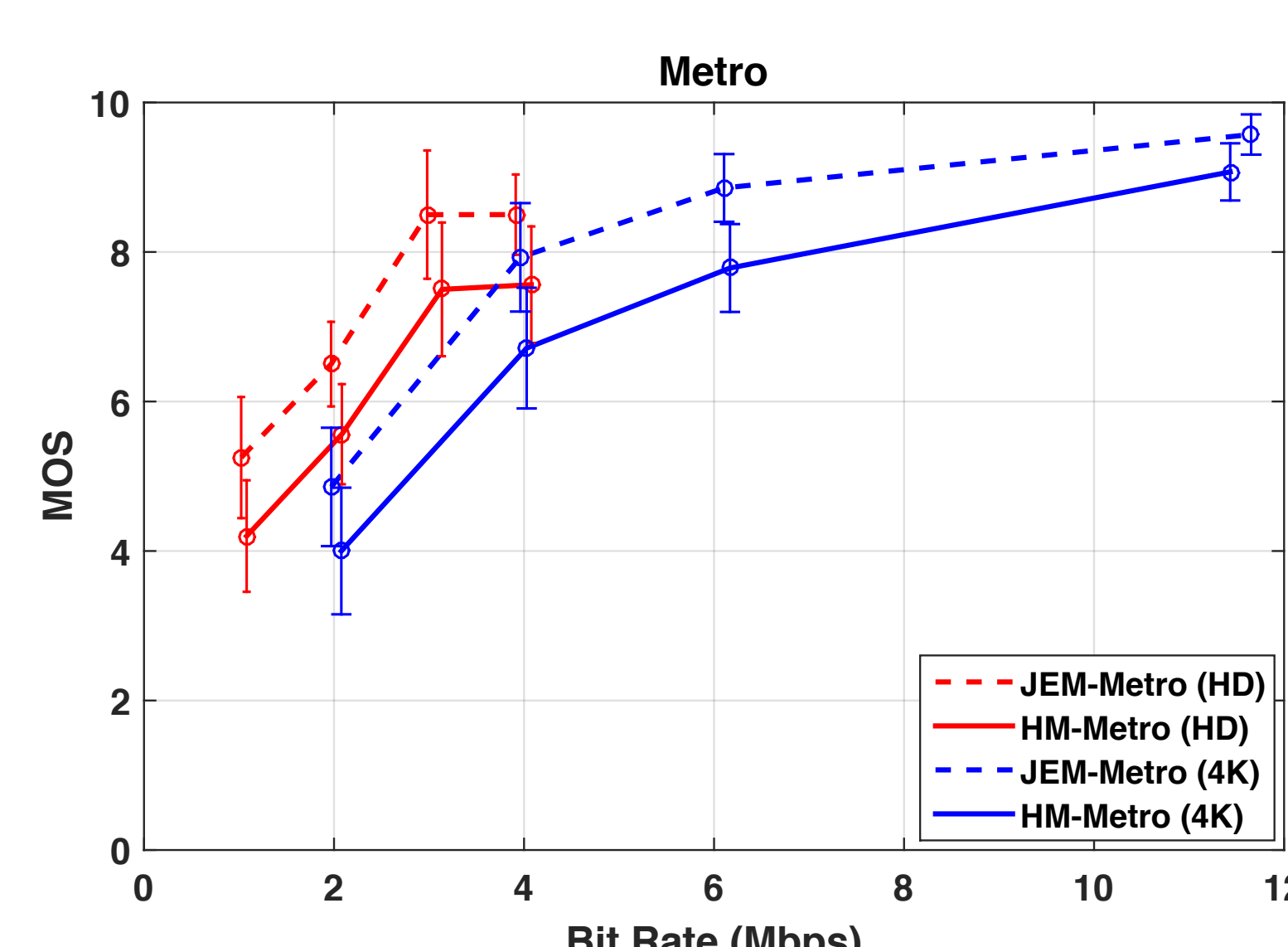
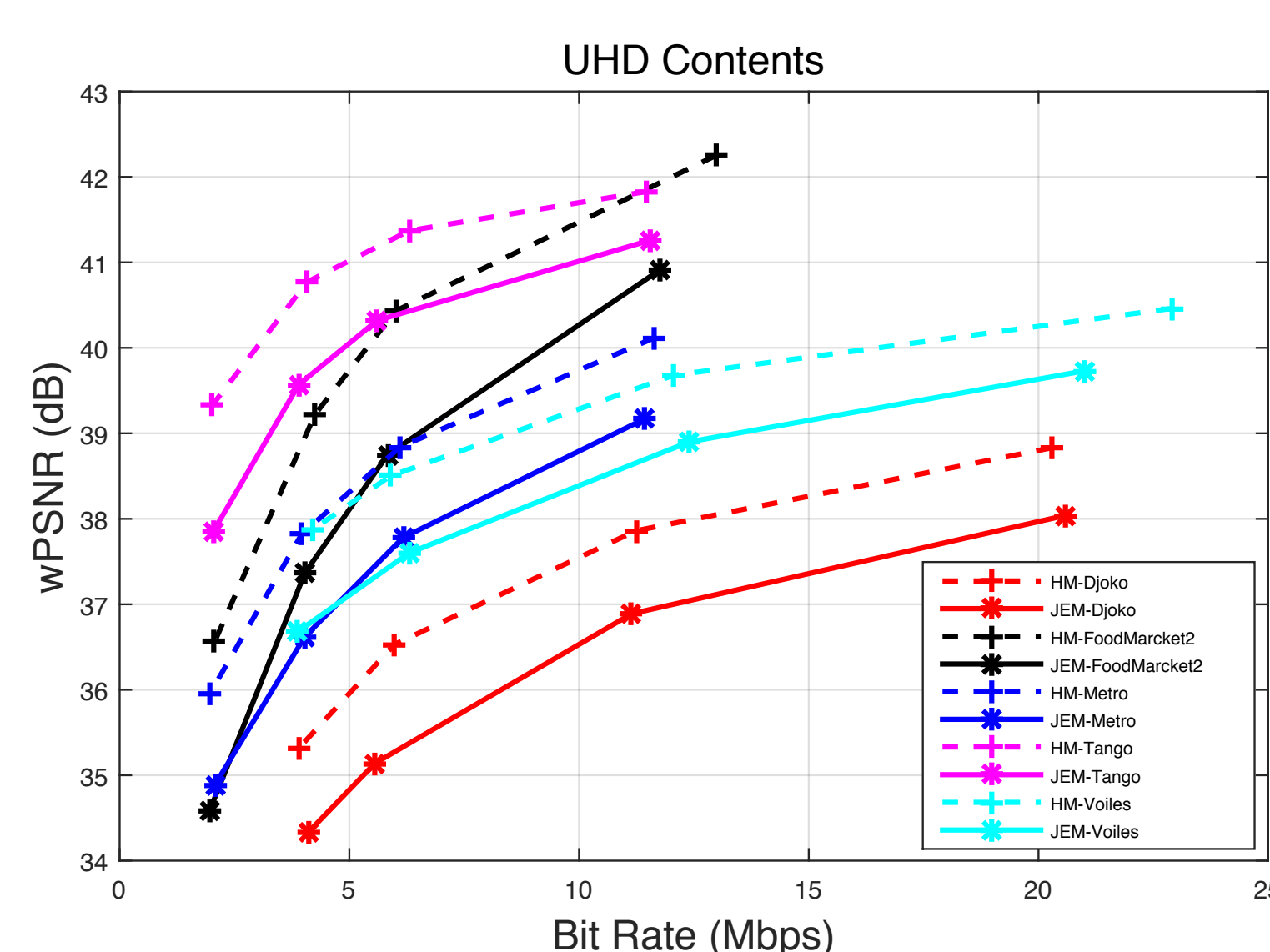
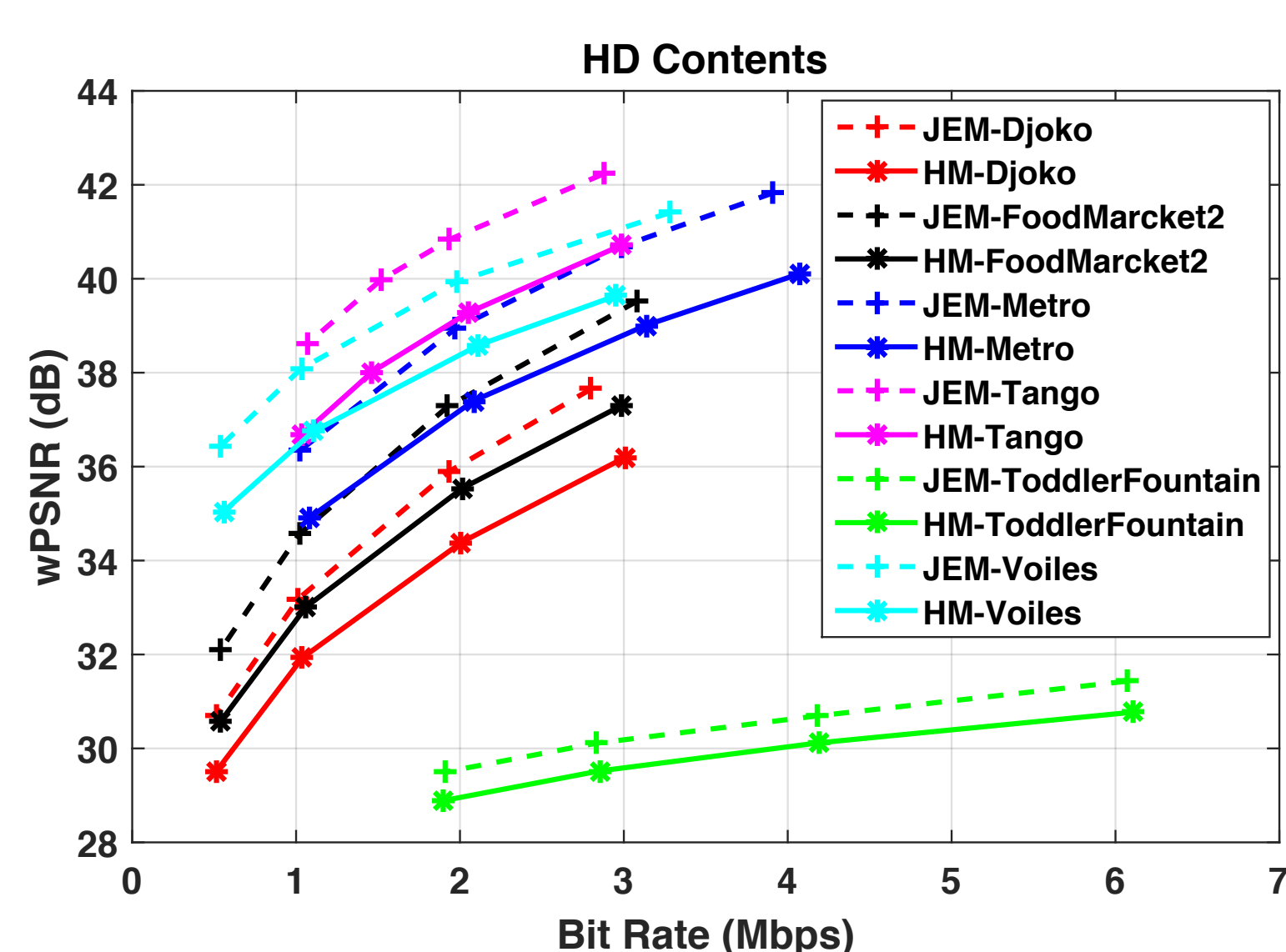


Video sequences used in the experiment.

Evaluation procedure:

- Used method: **DCR** (Degradation Category Rating);
- Collected Mean Opinion Score (**MOS**).

Results



Objective results: comparison-based PSNR.

Subjective results: comparison-based MOS.

- JEM codec enables a significant subjective quality improvement compared to the HM reference software;
- At high bitrates, the HM codec enables a high video quality and reaches the quality of the video coded with the JEM;
- Bit rate savings of about **25%** can be achieved by the JEM codec for the same perceived video quality, depending on video content and resolution.