

## INTRODUCTION

The video streaming on  
the internet will surpass  
**90%**  
by 2023 [1].



### Versatile Video Coding



VVC is expected to be  
used by 20% of  
developers by 2022 [2].

Significantly higher  
**computational cost**. 50% savings on video  
compression compared to  
HEVC [3].

energy cost = need for research

### Approximate Storage



Reduction of  
energy  
consumption



Loss of  
coding  
efficiency

## OBJECTIVE

Assess **memory resilience** levels in video  
encoding with **VVC** exploring the use of  
**approximate storage** techniques in specific  
encoding modules.

[1] CISCO. Cisco Annual Internet Report (2018–2023) White Paper.

[2] FRANCIS, A. Top Video Technology Trends 2022: The Future of Streaming is About Device Reach. BITMOVIN, 11 jan. 2022.

[3] FRAUNHOFER. Fraunhofer HHI is proud to present the new state-of-the-art in global video coding: H.266/VVC brings video transmission to new speed. 6 jul. 2020.

## METHODOLOGY

### Coding modules

Intra-Frame Prediction

Fractional Motion  
Estimation (FME)

Transforms

Integer Motion  
Estimation (IME)

### Parameters for the experiment

QPs: 22, 27, 32, 37

Repetitions: 5

Video: RaceHorses  
(416x240 pixels)

Error rates:  $10^{-7}$ ,  $10^{-6}$ ,  $10^{-5}$ ,  $10^{-4}$ ,  $10^{-3}$



### Software Tools

Versatile Video Encoder (VVenC)



Intel PIN Tool

## RESULTS AND CONCLUSIONS

**Higher error rates = lower coding efficiency**

- Transform module has the lowest error resilience (**89%**).
- In the other modules, losses reach **0.48%** (FME), **0.31%** (IME) and **0.45%** (Intra Prediction).
- The use of **errors**  $10^{-7}$  and  $10^{-6}$  **can be tolerated**.
- Future work: Profiling more detailed resiliency and analyzing the impact of reducing power consumption on VVC codecs.

