

EXPERIMENT ON POLYPHASE SUBSAMPLED SEQUENCE CODING

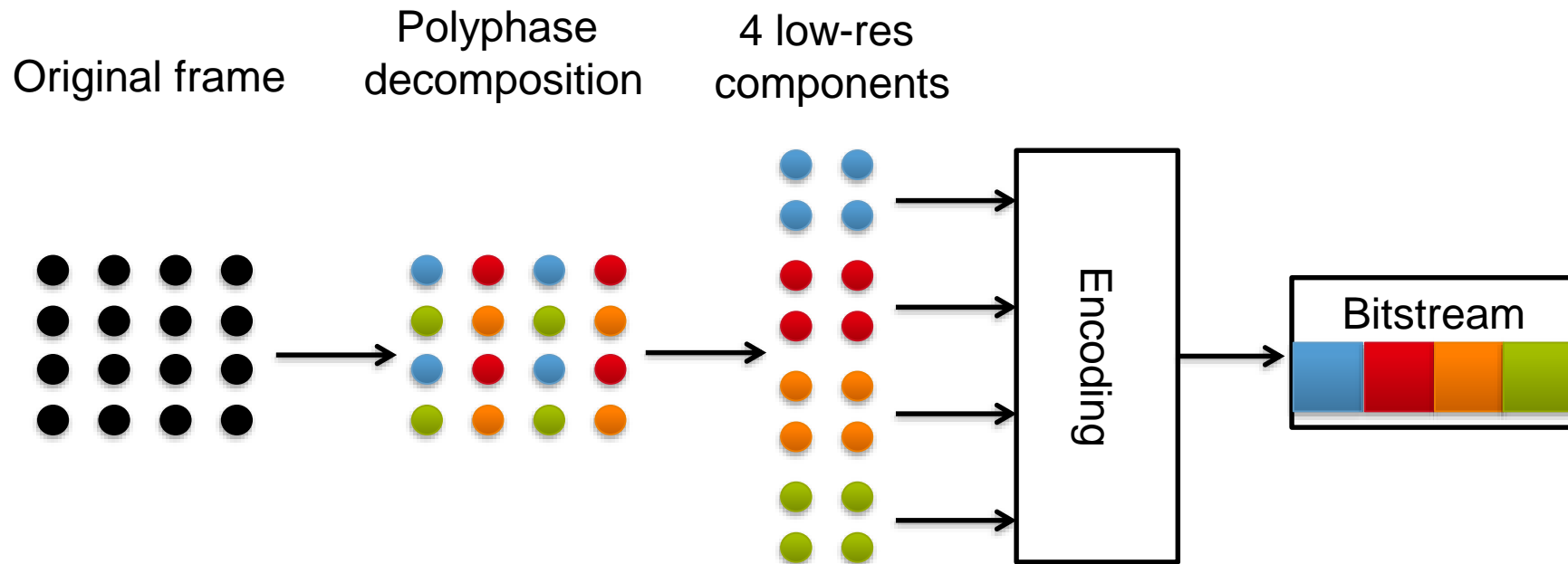
JVET-C0032 | Emmanuel Thomas

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OUTLINE

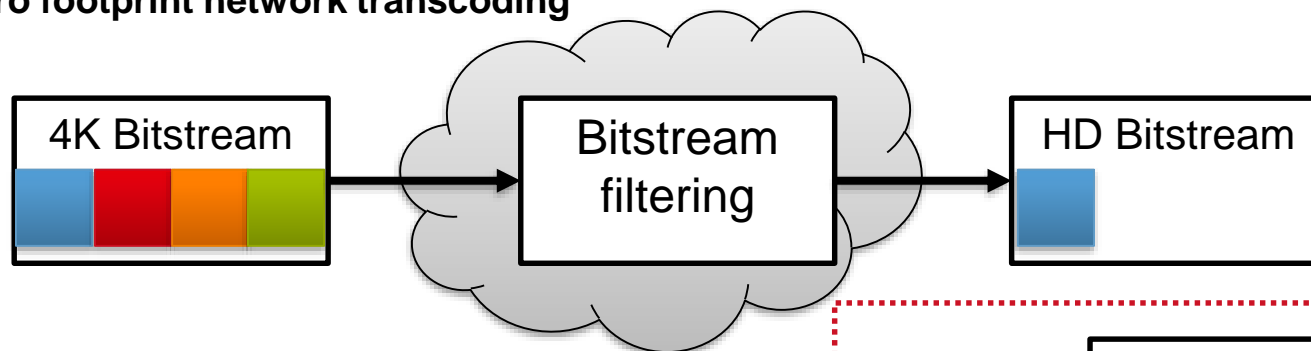
1. **R**eminder of polyphaser decomposition technique
2. **T**emporal multiplexing of resolution components experiment
3. **P**artial results

POLYPHASE DECOMPOSITION TECHNIQUE

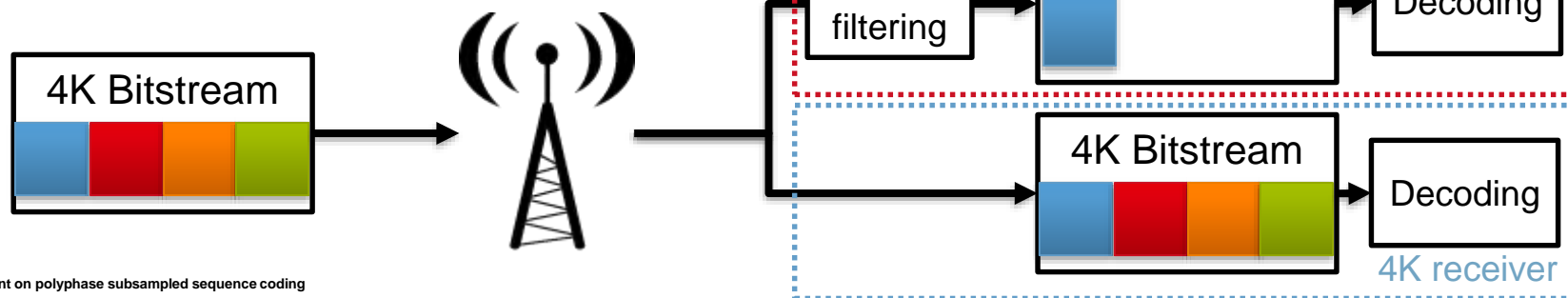


POLYPHASE DECOMPOSITION TECHNIQUE

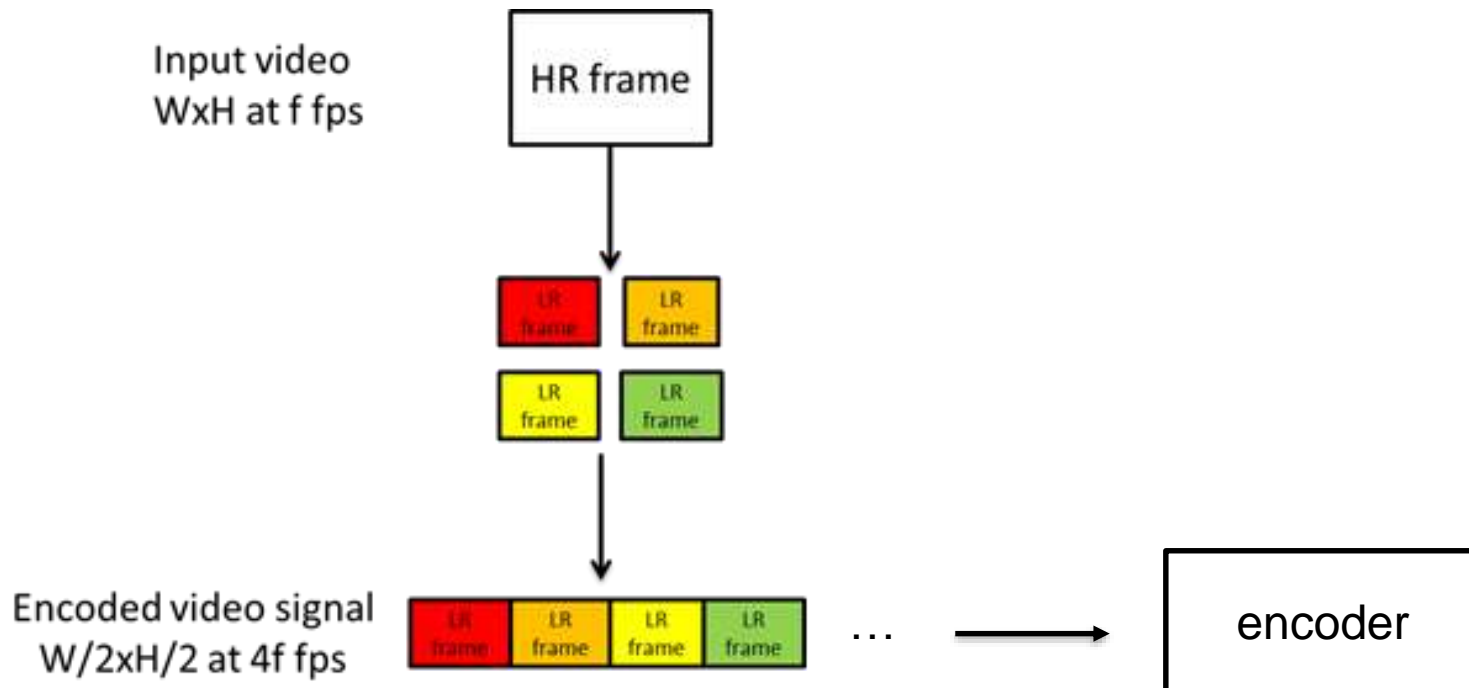
Zero footprint network transcoding



Single Full HD / 4K broadcast channel



TEMPORAL MULTIPLEXING OF RESOLUTION COMPONENTS EXPERIMENT



TEMPORAL MULTIPLEXING OF RESOLUTION COMPONENTS EXPERIMENT

3 test sets

A

- JVET CTC sequences

B

- JVET CTC sequences
- Downsampled by half (bicubic)

C

- JVET CTC sequences
- Temporal multiplexing of resolution components



(A)



(B)



(C)

TEMPORAL MULTIPLEXING OF RESOLUTION COMPONENTS EXPERIMENT

› Encoding runs

1. Encode A according to CTC (CTC reference)
2. Encode B according to CTC + ConformanceWindowMode=1
3. Encode C according to CTC + ConformanceWindowMode=1

› Notes

- › This is the **minimum** amount of modifications of CTC. The experiment provides a **worst-case** scenario results.
- › ConformanceWindowMode accommodate resolutions which are not multiple of the min CU size (8).
- › For Intra configuration, the temporal subsampling (1/8) should be disabled.

TEMPORAL MULTIPLEXING OF RESOLUTION COMPONENTS EXPERIMENT

› Decoding runs

- › Each encoded sequence of B and C is decoded

› Post processing

- › Each decoded sequence of C is re-composed in a original frame

› BD-rate comparison

- › Comparison against simulcast
- › High resolution sequences from C is compared against the simulcast of sequences from A and B
- › $\text{PSNR}(A) = f(\text{bitrate}(A) + \text{bitrate}(B))$ vs $\text{PSNR}(C_{\text{hr}}) = f(\text{bitrate}(C_{\text{hr}}))$

Cross-check : JVET-C0078, P. Philippe (Orange), V. Lorcy, T. Biatek (Bcom)

PARTIAL RESULTS

Random access			
	Y	U	V
Class C	37,22%	24,97%	44,38%
Class D	101,98%	58,81%	62,16%

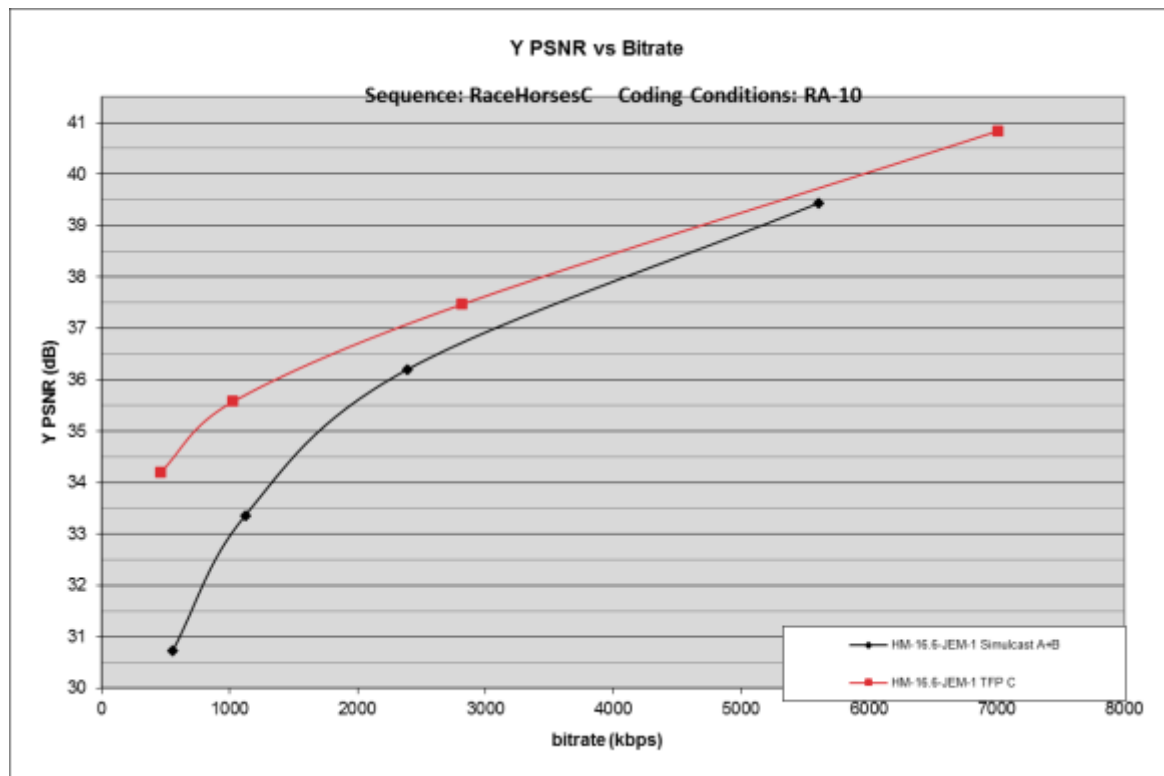
Low-delay P			
	Y	U	V
Class D	64,11%	102,73%	117,46%

Low-delay B			
	Y	U	V
Class D	66,53%	92,92%	117,60%

PARTIAL RESULTS

Random access		BD-rate (piecewise cubic)			BD-rate (cubic)		
		Y	U	V	Y	U	V
Class C	BasketballDrill	14,69%	33,16%	80,77%	15,32%	38,84%	100,08%
WVGA	BQMall	46,18%	14,82%	29,73%	48,16%	15,85%	31,10%
	PartyScene	121,93%	69,29%	89,25%	115,46%	76,87%	96,47%
	RaceHorses	-33,91%	-17,37%	-22,24%	-32,84%	-14,30%	-19,90%
Class D	BasketballPass	-2,17%	-2,26%	8,72%	-0,52%	-0,06%	12,43%
WQVGA	BQSquare	293,55%	160,36%	151,86%	262,85%	162,56%	152,36%
	BlowingBubbles	122,24%	76,43%	85,31%	129,15%	85,87%	92,78%
	RaceHorses	-5,71%	0,70%	2,76%	-3,52%	4,77%	5,58%

PARTIAL RESULTS



PROPOSAL FOR AN EE

- › All pre and post processing scripts have been released with this contribution for future use in EE
- › Even in a worst-case scenario, the technique shows potential to compete with simulcast.
- › **Investigations**
 - › Revisit GOP structure in order to better match the polyphase decomposition nature
 - › Consider QP hierarchy during coding
 - › Make Intra Period consistent among coding scenarios
 - › Study impact of visual artefacts in the “base layer” due to polyphase subsampling, especially per class