

CREATE  
CONNECT  
LIVE

*inspire*

# M53594 On bitwise based binary coding of occupancy code

MPEG130, April 2020

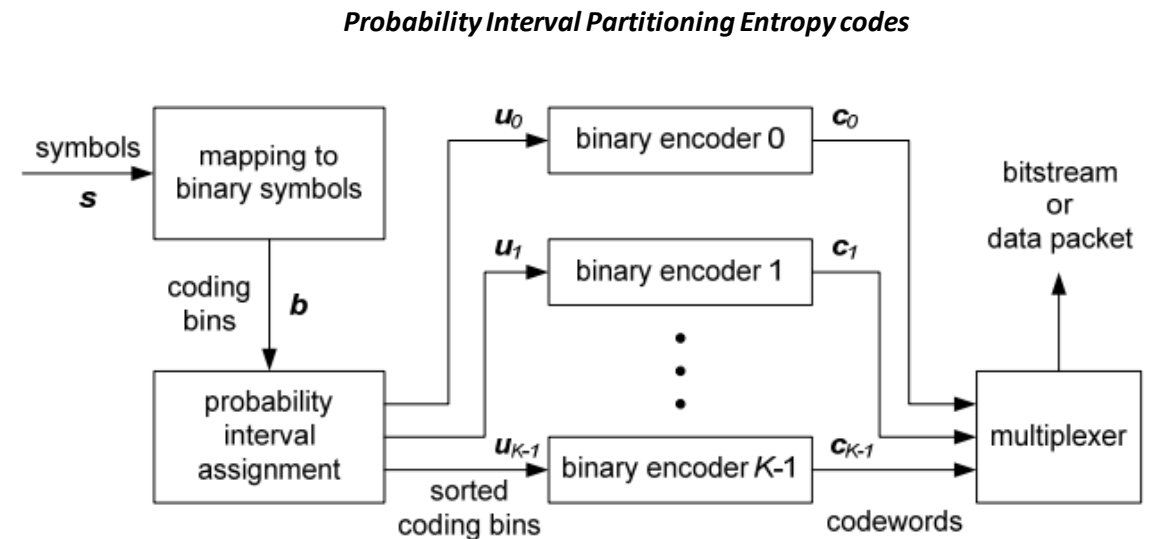
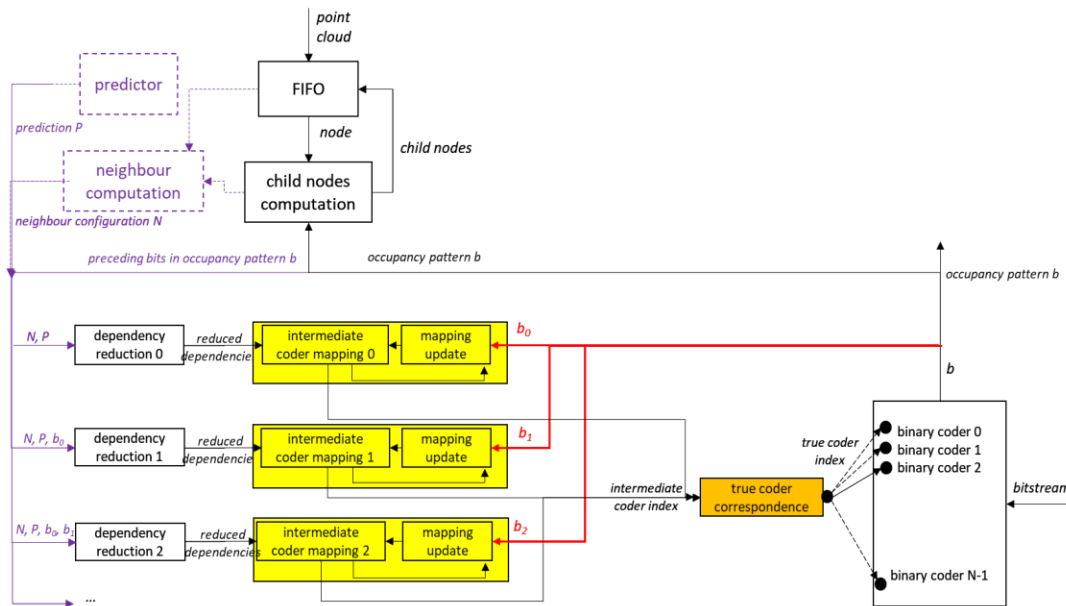


interdigital™



# Motivation

- Intent: understanding G-PCC geometry architecture
- OBUF looks like PIPE (proposed in HEVC)



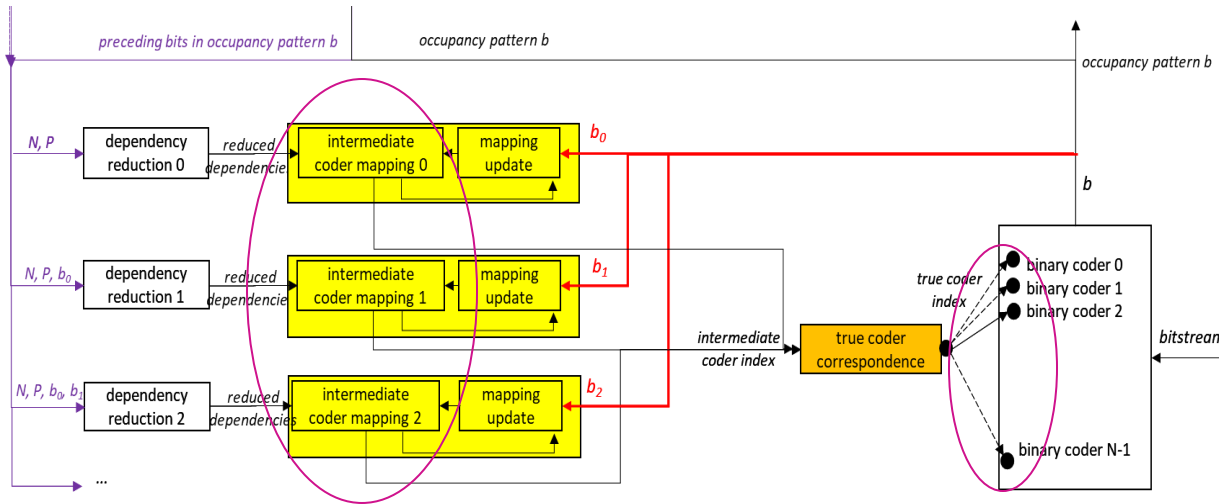
Credits: HHI

- Comparison with “classical” CABAC implementation (video)

# Scheme comparison

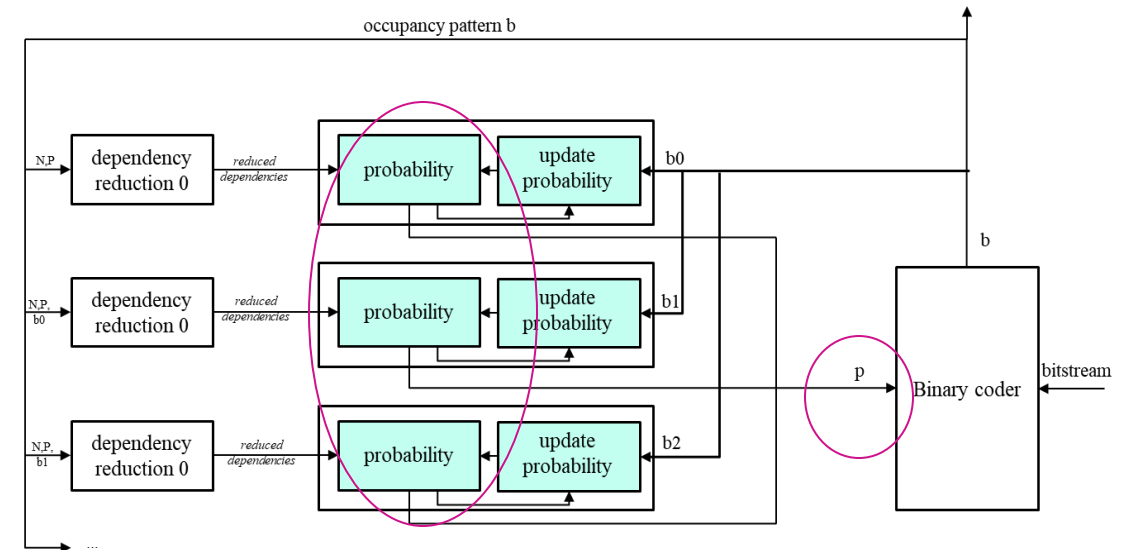


## OBUF (G-PCC)



- Addressing « different » CABAC (states)... but  $b_i$  dependency
- 2-stage context/probability update
- Update probability inside to the binary coder

## CABAC (tested)



- Addressing one CABAC
- 1-stage context/probability update
- Update probability externally to the binary coder

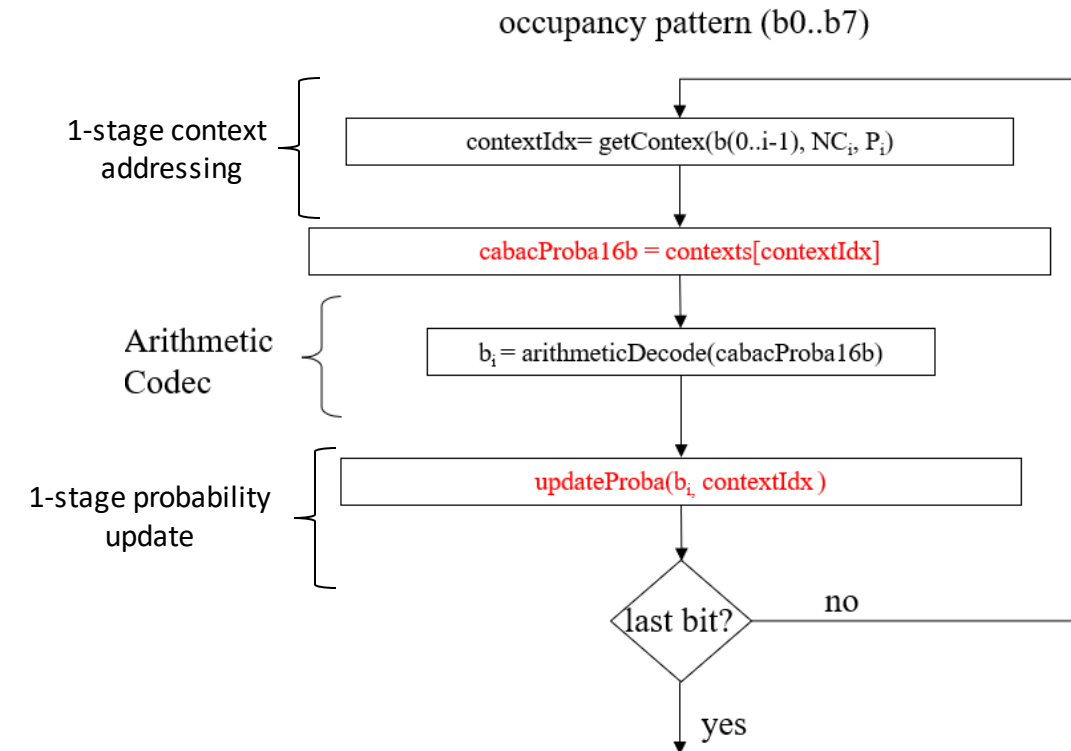
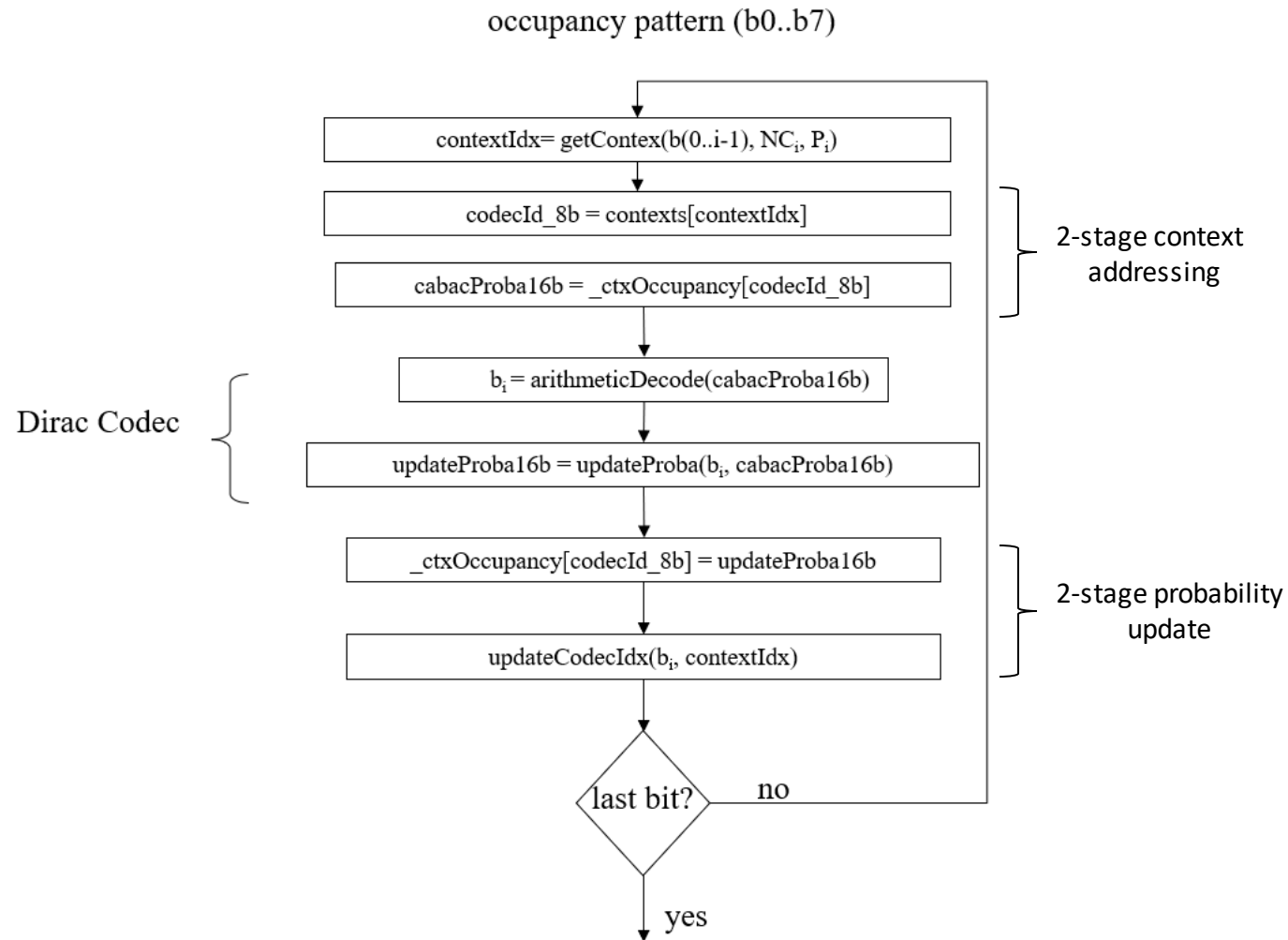
Same number of contexts

# Process comparison



## OBUF (G-PCC)

## CABAC (tested)



# Results & complexity



## 16-bit probability precision

### All Intra

C1_ai	lossless geometry, lossy attributes [all intra]				Geom. BD-TotGeomRate [%]	
	End-to-End BD-TotalRate [%]				Geometry	Total
	Luma	Chroma Cb	Chroma Cr	Reflectance		
Cat1-A average	-0.9%	-0.9%	-0.9%		-1.1%	-0.4%
Cat1-B average	-0.8%	-0.8%	-0.8%		-0.6%	-0.4%
Cat3-fused average	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.1%
Cat3-frame average					-0.3%	-0.3%
<b>Overall average</b>	-0.8%	-0.8%	-0.8%	-0.3%	-0.6%	-0.3%

C2_ai	lossy geometry, lossy attributes [all intra]				Geom. BD-TotGeomRate [%]	
	End-to-End BD-TotalRate [%]				D1	D2
	Luma	Chroma Cb	Chroma Cr	Reflectance		
Cat1-A average	0.2%	0.7%	0.7%		0.7%	0.8%
Cat1-B average	-0.5%	-0.5%	-0.7%		-0.4%	-0.5%
Cat3-fused average	-0.7%	-0.6%	-0.6%	-0.7%	-0.9%	-0.9%
Cat3-frame average				-0.5%	-0.6%	-0.6%
<b>Overall average</b>	-0.2%	0.0%	0.0%	-0.5%	0.0%	0.0%

CW_ai	lossless geometry, lossless attributes [all intra]			
	bpip ratio [%]			
	Geometry	Colour	Reflectance	Total
Cat1-A average	98.9%	100.0%		99.6%
Cat1-B average	99.4%	100.0%		99.6%
Cat3-fused average	99.8%	100.0%	100.0%	99.9%
Cat3-frame average	99.7%		100.0%	99.7%
<b>Overall average</b>	99.4%	100.0%	100.0%	99.7%

tested CABAC requires 2KiB (10-bit) to 10KiB (16-bit) extra-cost  
... to be compared to 16MiB for occupancy values...