

# Parallel Context Processing for Significance map using Block-based context updates

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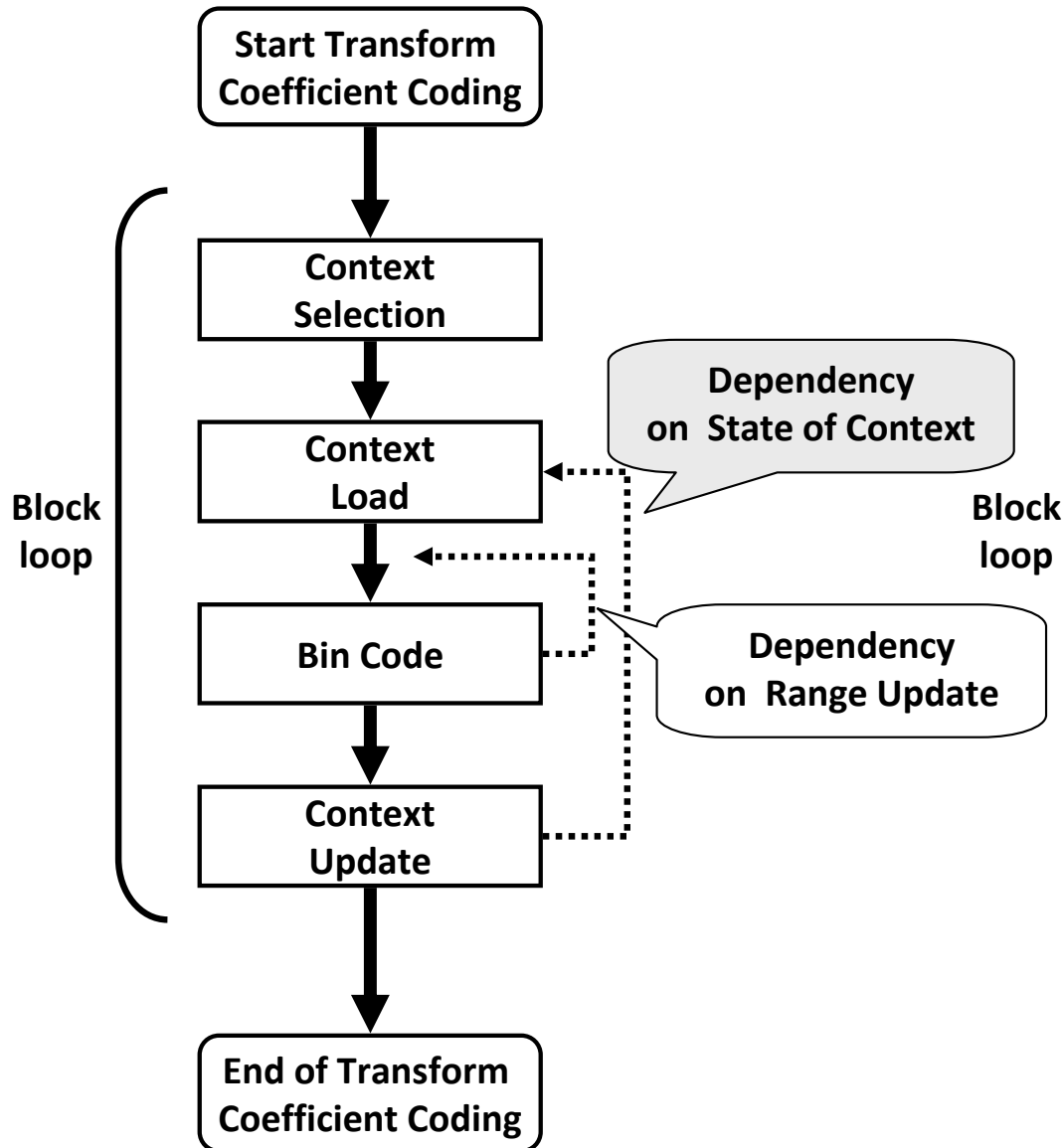
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## Motivation

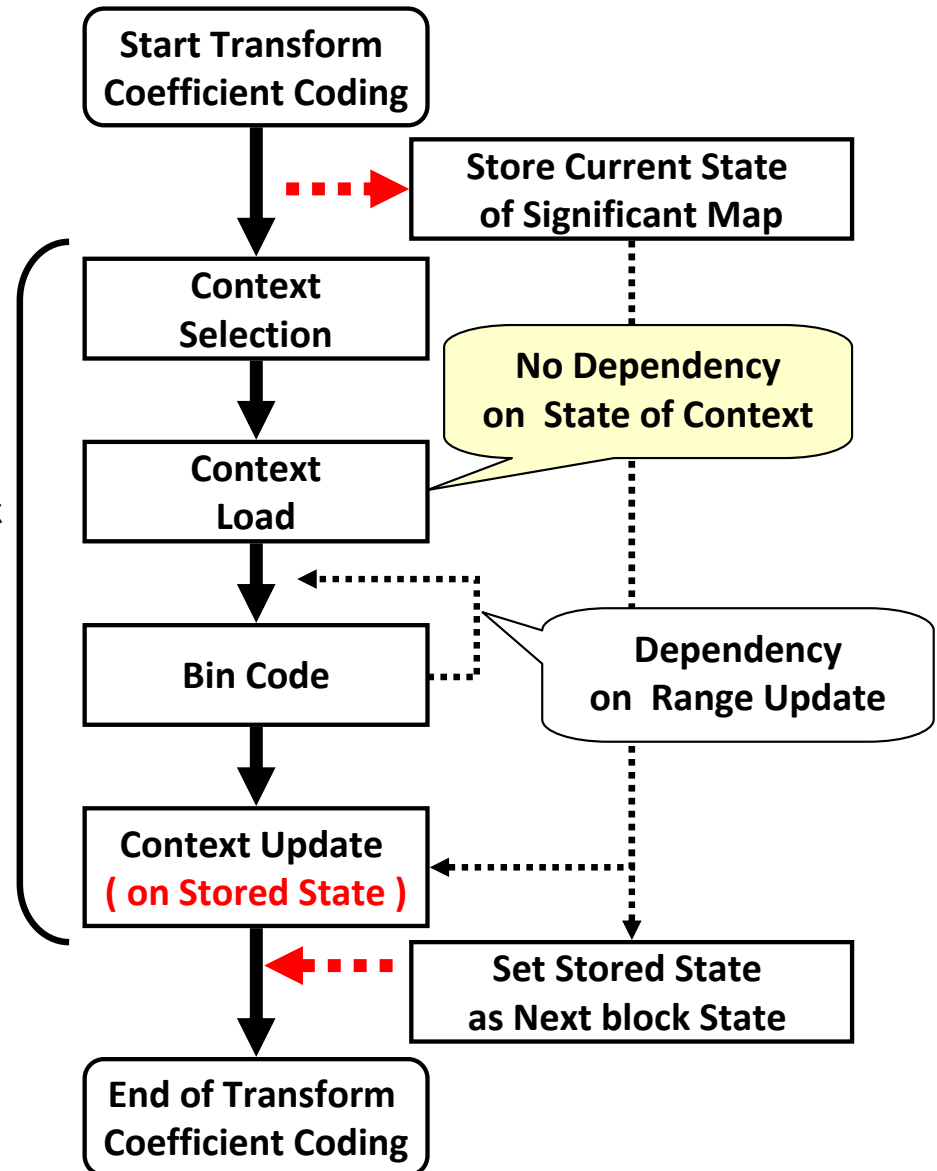
CABAC feedback loop is one of main issue for parallel processing due to high serial dependency.

- ✓ In current HEVC CABAC, same contex index is used continuously.  
e.g, significant\_coeff\_flag in high frequency, last\_flag...
  - ✓ Significance Map (significant\_coeff\_flag and last\_flag ) of them is major part of bin throughput (**36%-43%** of total, as reported in CE11)
- Block-based context updates brings possibility of parallel processing.

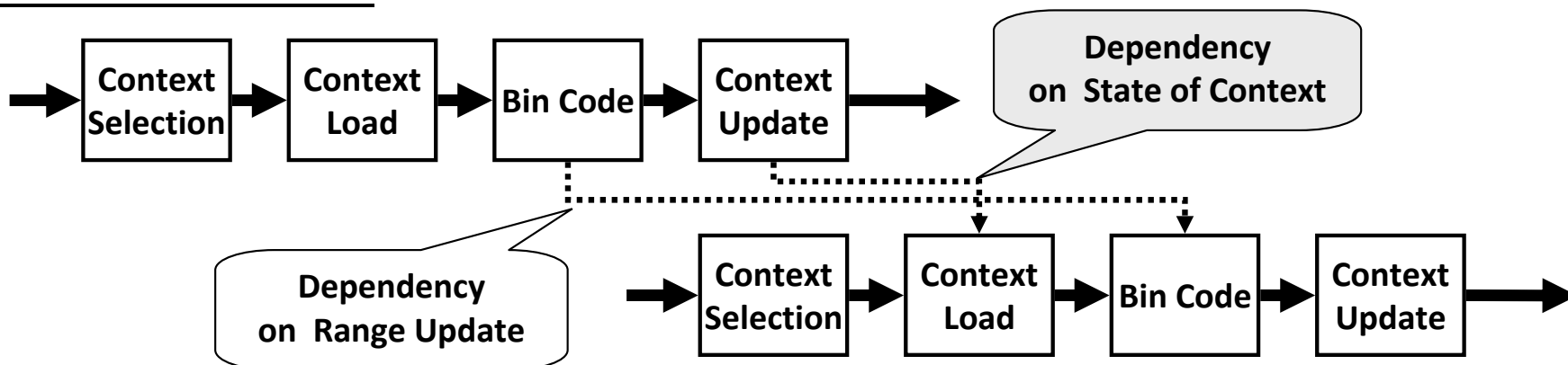
## Current HEVC CABAC



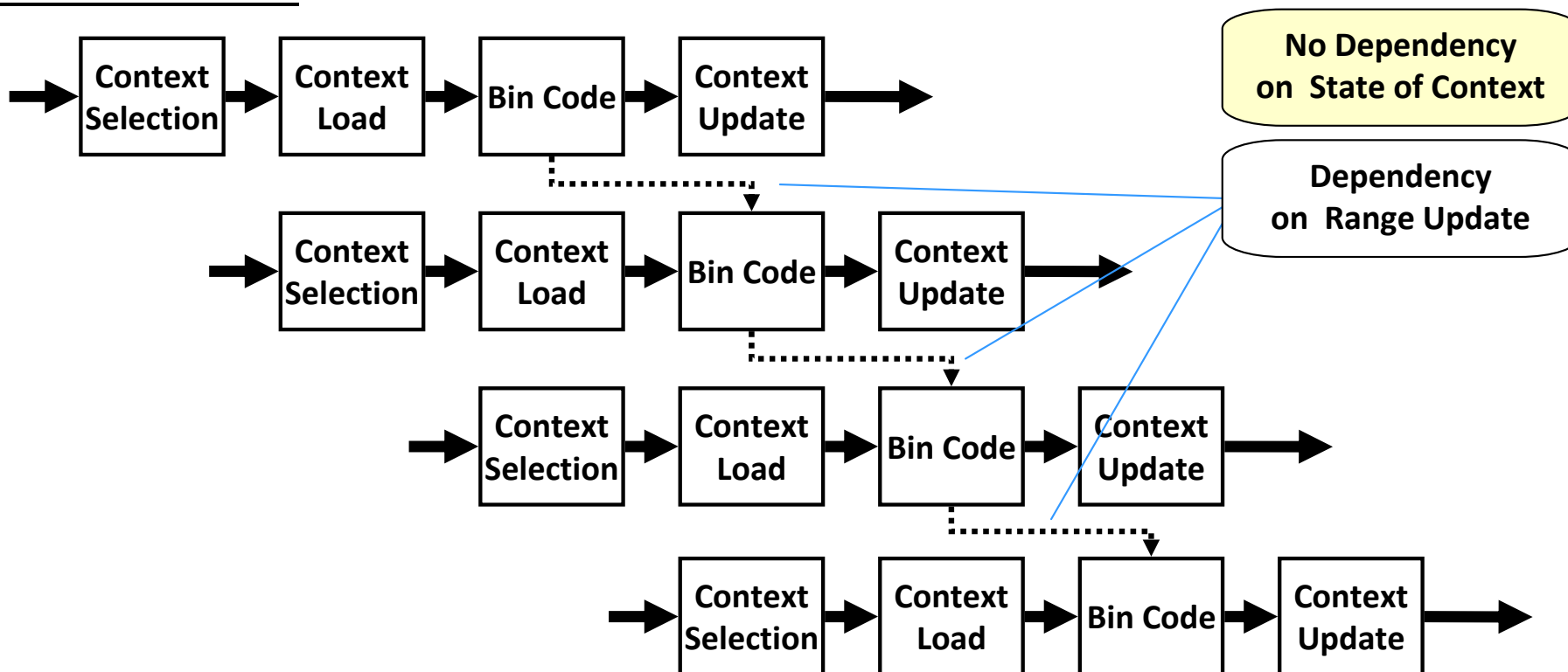
## Proposed Solution



## Current HEVC CABAC



## Proposed Solution



## BD-Bit Rate → cross checked by TI (JCTVC-E430)

	Intra			Random access			Low delay		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
All average	0.19	0.31	0.29	0.16	0.12	0.06	0.17	-0.08	-0.01
Enc Time[%]	101%			101%			101%		
Dec Time[%]	102%			97%			96%		

In addition, the combination of another significance map coding (JCTVC-D262/E338) is also tested.

## BD-Bit Rate

*vs. HMv2*

	Intra			Random access			Low delay		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
All	0.13	0.23	0.23	0.11	-0.91	-0.85	-0.06	-1.68	-1.83
Enc Time[%]	101%			102%			102%		
Dec Time[%]	99%			99%			99%		

*vs. D262 / E338*

	Intra			Random access			Low delay		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
All	0.16	0.26	0.24	0.10	0.02	-0.10	0.04	0.27	0.03
Enc Time[%]	101%			101%			101%		
Dec Time[%]	100%			100%			100%		

**Our proposal could increase the possibility for parallel processing for CABAC with limited (less than 0.2%) performance drop.**

**Additionally, the combined solution with JCTVC-D262 (E338) is also tested.**

**It shows our proposal has robustness for „significance map“ coding method.**

## **Recommendation**

**To be considered this proposal in CE.**