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JCTVC-P0118: REXT HLS: PICTURE REFERENCING ACROSS CRA PICTURES

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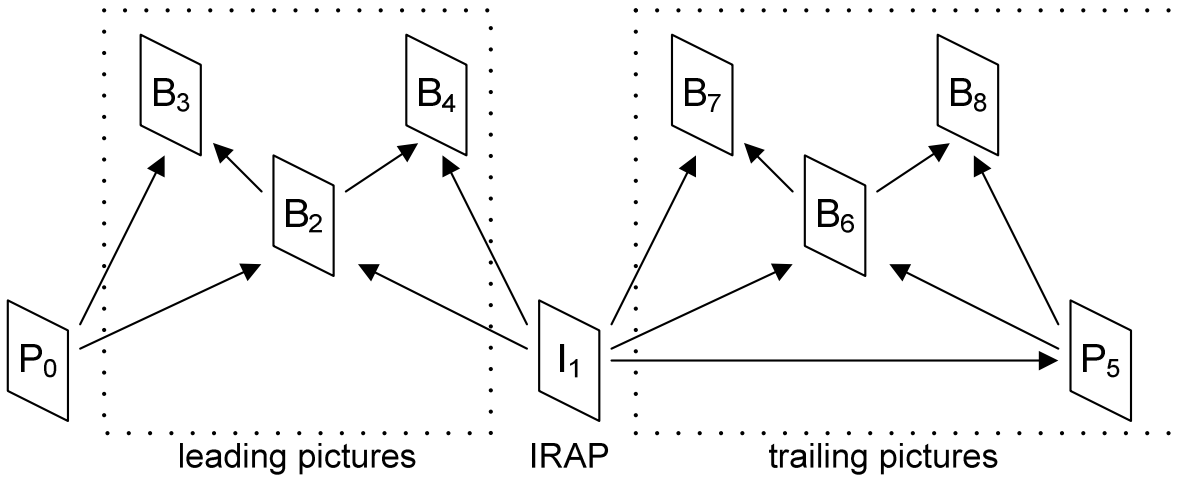
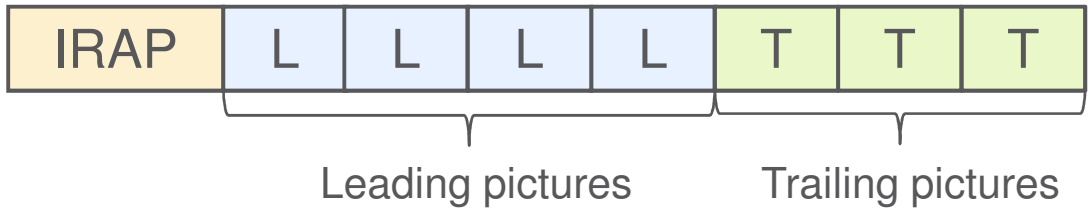
BACKGROUND

- In HEVC, pictures can be categorized into three types:
  - IRAP pictures
    - IDR, BLA, CRA pictures
    - Provide random access points
  - Leading pictures
    - Follows an (associated) IRAP in decoding order, precedes the IRAP in output order
  - Trailing pictures
    - Follows an associated IRAP in both decoding and output order



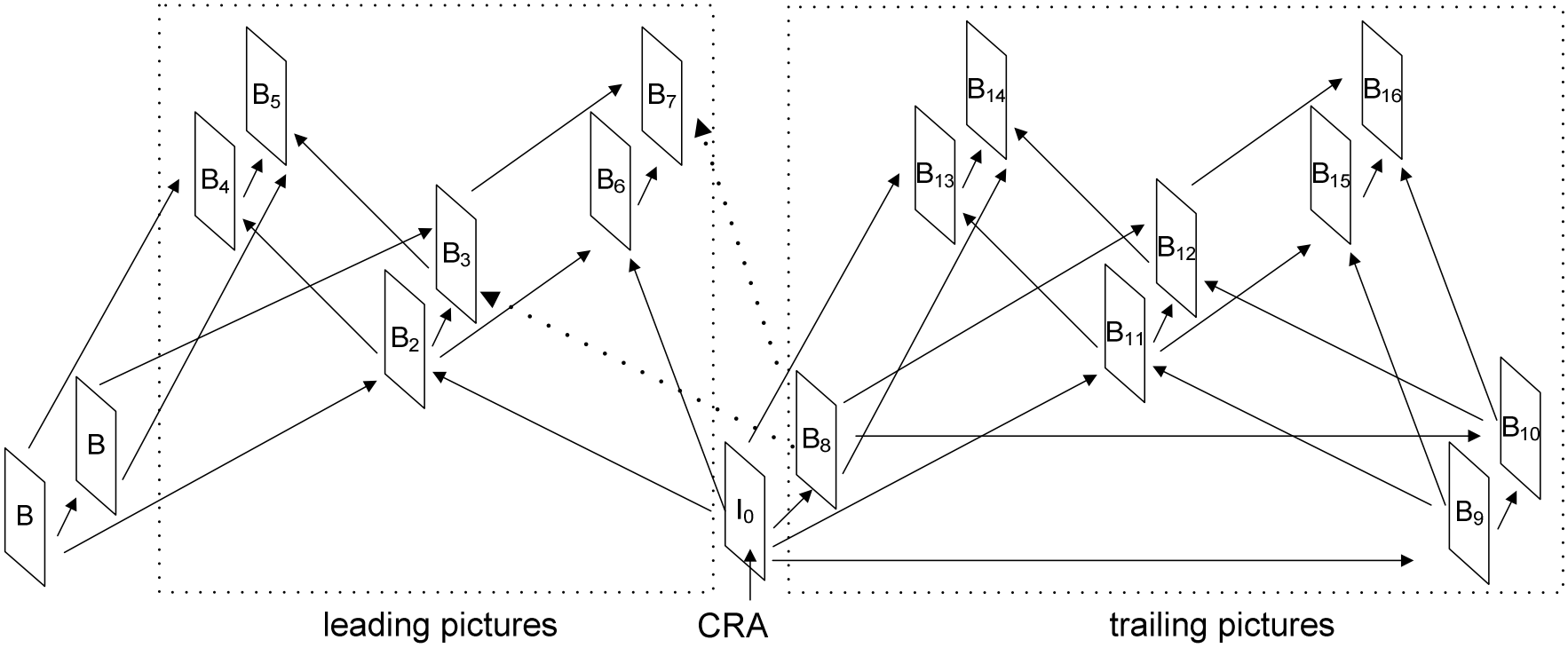
BACKGROUND

- In HEVC, there are restrictions associated with IRAP pictures. One is:
  - When a picture is a leading picture, it shall precede, in decoding order, all trailing pictures that are associated with the same IRAP picture.
- This means that the decoding order is always: IRAP, leading, trailing
- The purpose of this rule is to enable a network node to easily discard the leading pictures in a stream
- Without the rule, a leading picture may appear long after the IRAP picture in decoding order



PROBLEM

- A problem with the rule is that some desirable picture structures are not allowed. For instance, the example the dashed predictions in the field coding structure below are not allowed

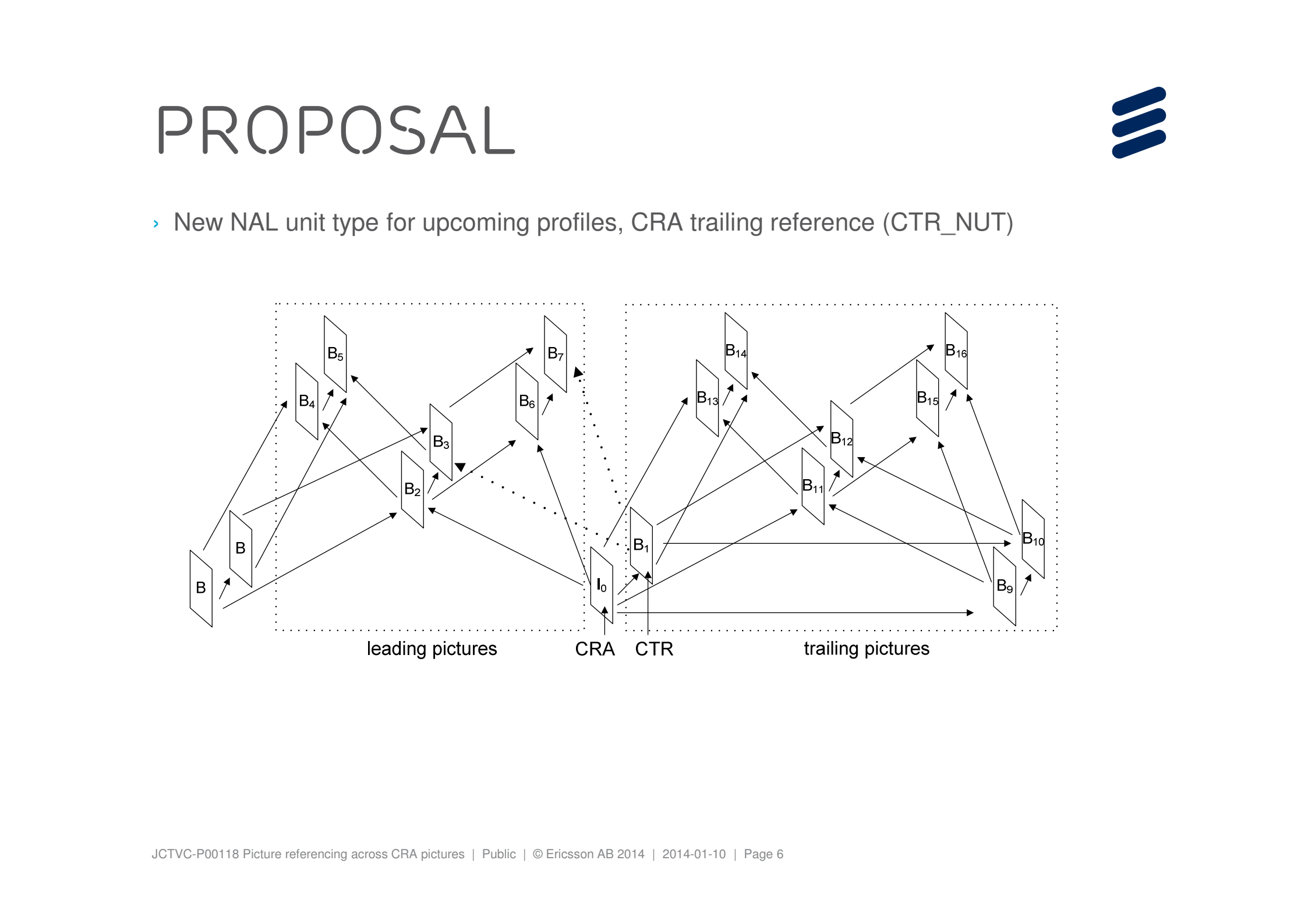


SIMULATION RESULTS

- A compression efficiency test was done to see the impact of the restriction
  - HM-12.1+RExt-5.0rc1 was used as code base
  - All four publically available sequences used within MPEG AHG were used
  - CRA picture every 32th field
  - Code patches available in contribution
  - Average bit-rate reduction by allowing full prediction is 1.56%

Sequence	BDR
MusicHD1_1088_300	-2.39%
CheersHD2_1088_300	-0.36%
CheersHD4_1088_300	-0.61%
MadHD1_1088_300	-2.87%
Average	-1.56%

PROPOSAL



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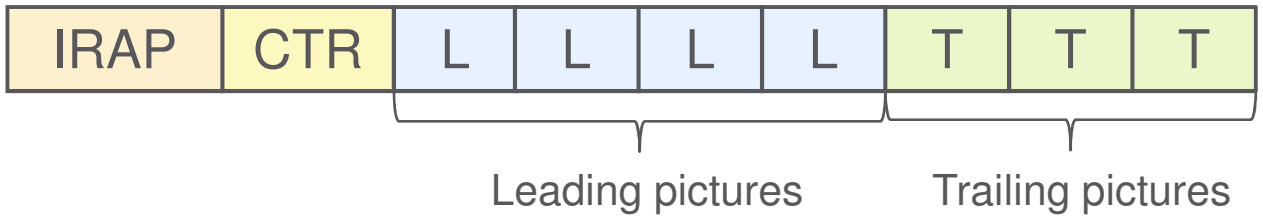
nal_unit_type	Name of nal_unit_type	Content of NAL unit and RBSP syntax structure	NAL unit type class
11	CTR_NUT	Coded slice segment of a CTR picture slice_segment_layer_rbsp( )	VCL
~~11~~ 13 15	~~RSV_VCL_R11~~ RSV_VCL_R13 RSV_VCL_R15	Reserved non-IRAP sub-layer reference VCL NAL unit types	VCL

When a picture is a leading picture, it shall precede, in decoding order, all trailing pictures with nal_unit_type not equal to CTR_NUT that are associated with the same IRAP picture.

Any CTR picture associated with an IRAP picture shall precede any leading picture associated with the IRAP picture in decoding order.



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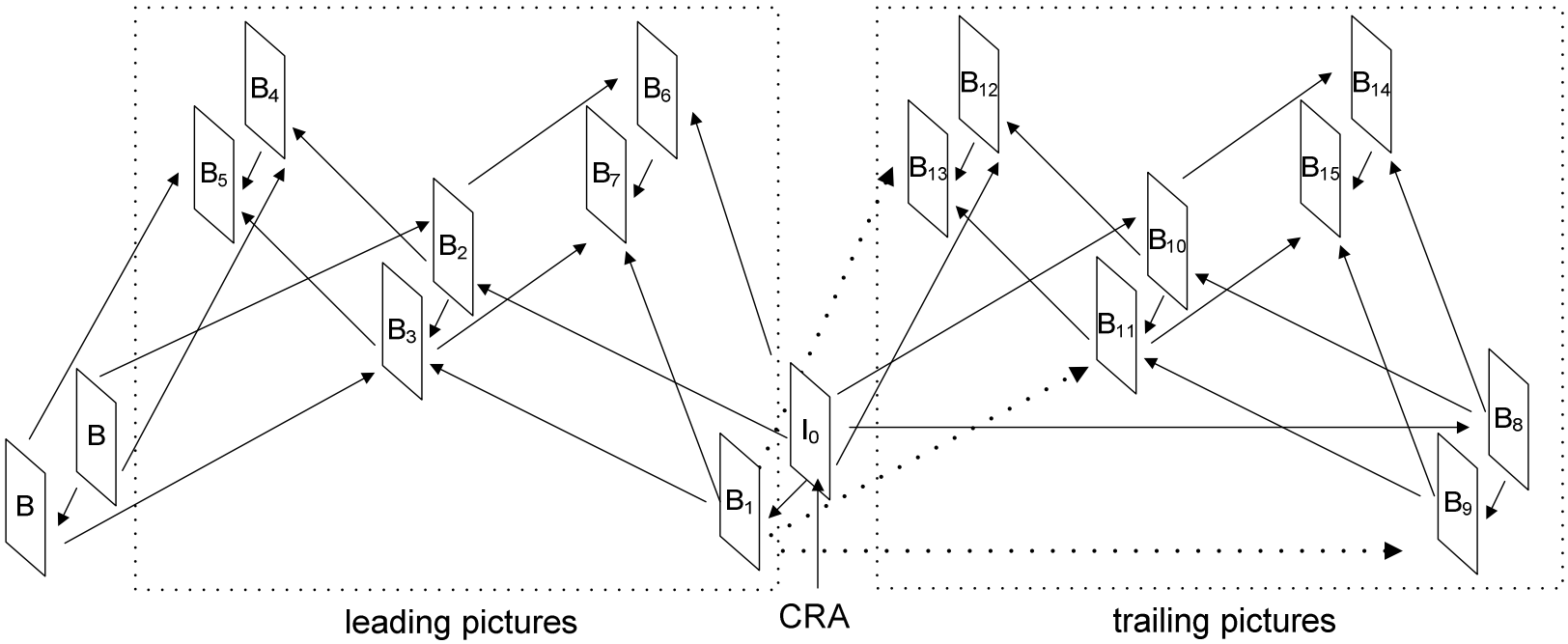
SWAPPING FIELD CODING ORDER

Clause 8.3.2:

”When the current picture is a trailing picture, there shall be no picture in the RPS that precedes the associated IRAP picture in output order or decoding order.”