

JVT-T053: Improving inter-layer prediction

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research & development

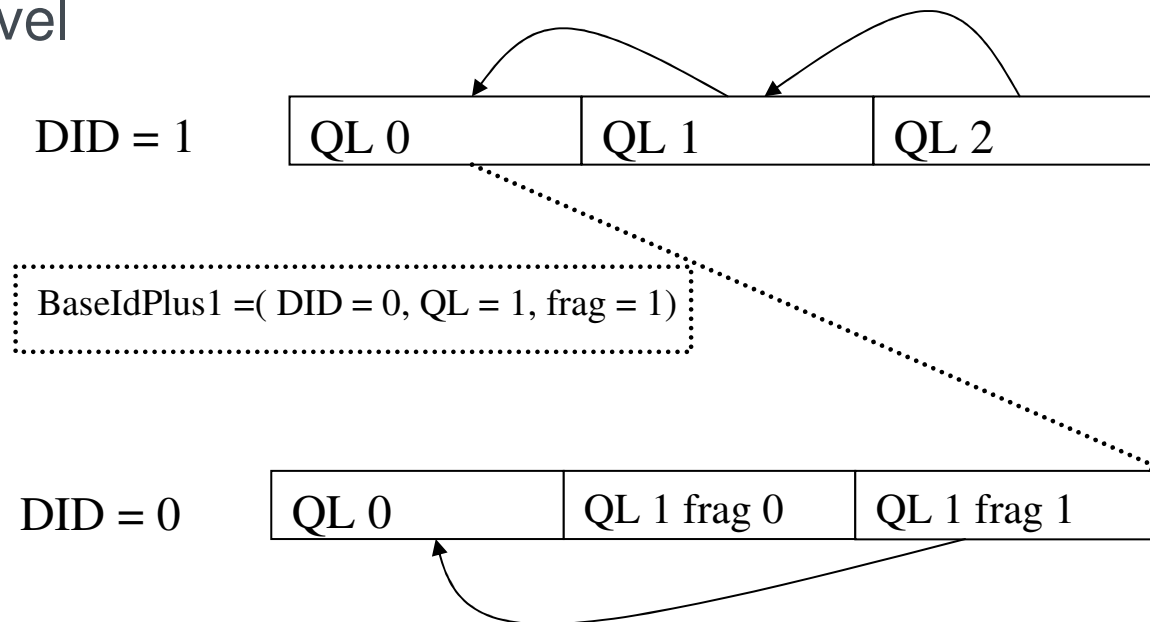


Outlines

- Inter-layer prediction in SVC
- Proposed scheme
- Results
- Recommendations

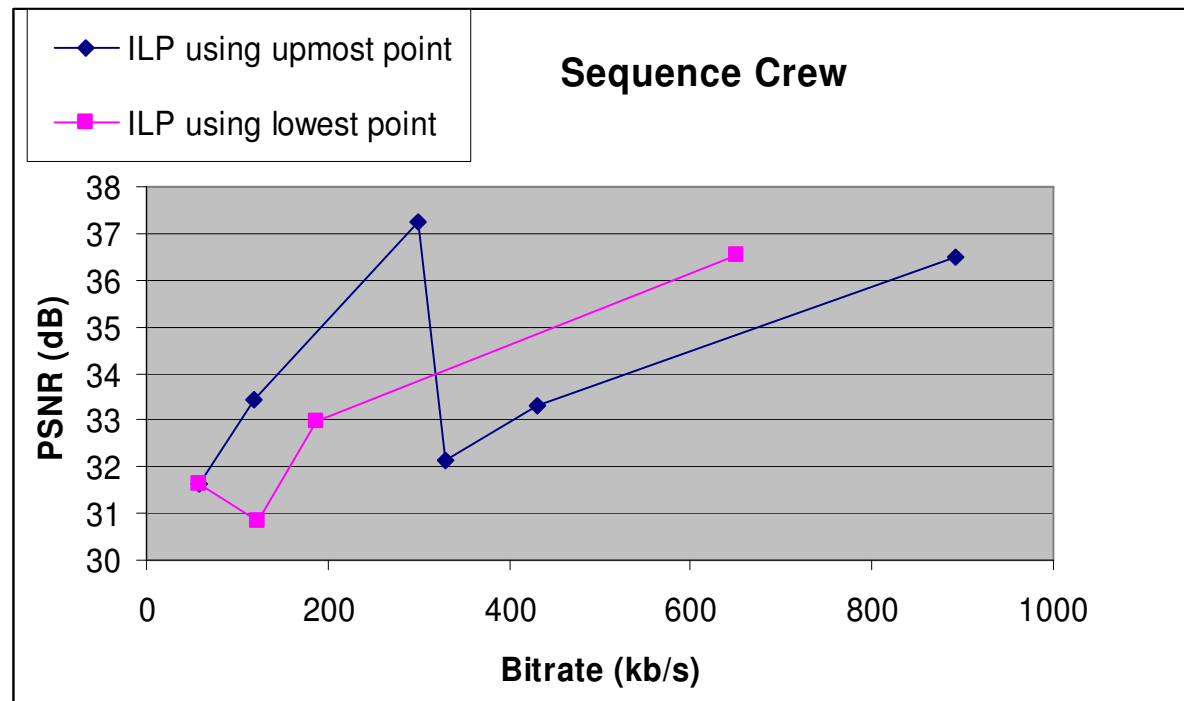
Inter-layer prediction in SVC

- Inter-layer prediction between layers
 - Syntax element BaseIdPlus1
- Intra-layer prediction between levels
- Inter-layer prediction for one layer is fixed by ILP of lower level



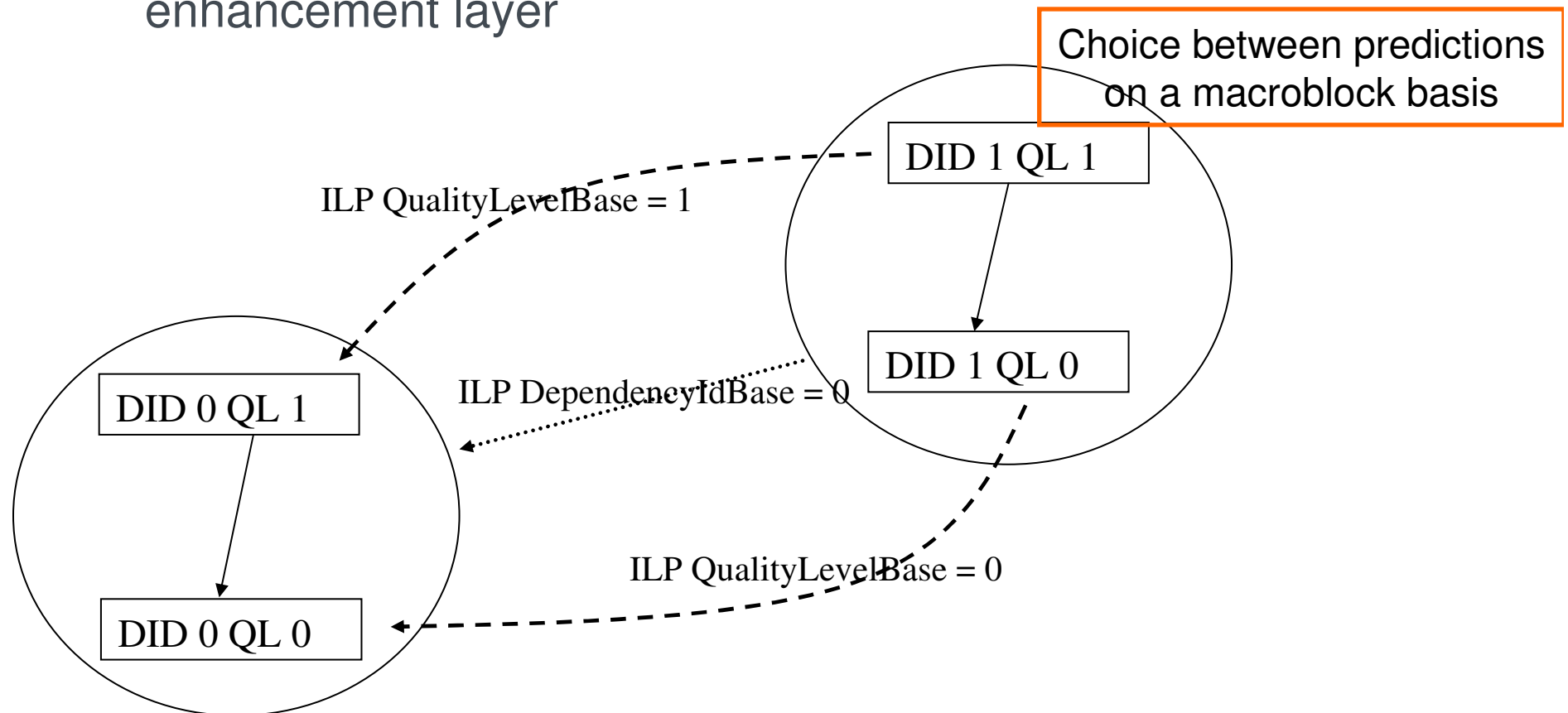
Inter-layer prediction in SVC

- Benefits of ILP using low point of base layer to predict low point of enhancement layer: gain in bitrate
- Decrease of scalability performances



Proposed scheme

- Allow a different inter-layer prediction for high points of the enhancement layer



Syntax modification

■ In slice layer in scalable extension

- If `quality_level > 0`
 - *Updated_quality_level_base*
 - *Updated_fragment_order_base*
- Define the inter-layer prediction point from the base layer
 - Base layer (`base_dependency_id`) is the same as for slice with `quality_level = 0`

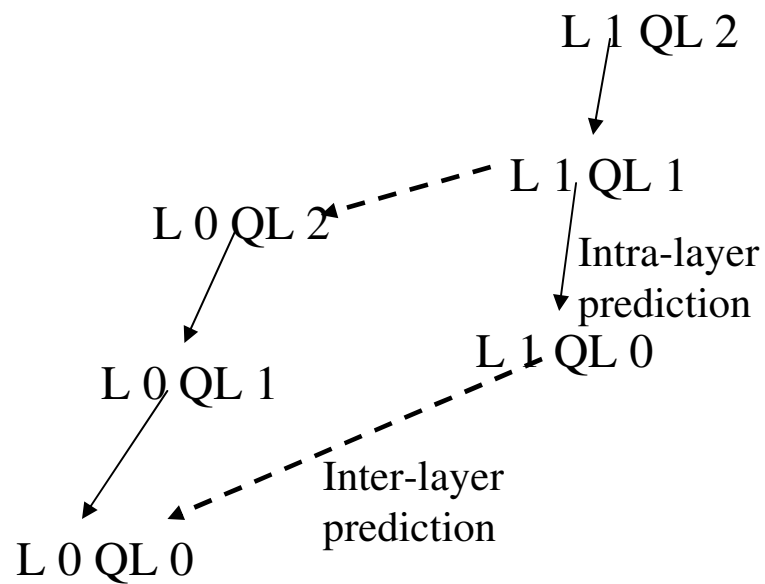
■ In macroblock layer in scalable extension

- If `quality_level > 0`
 - `new_pred_flag`
- Indicates whether intra or inter prediction is used

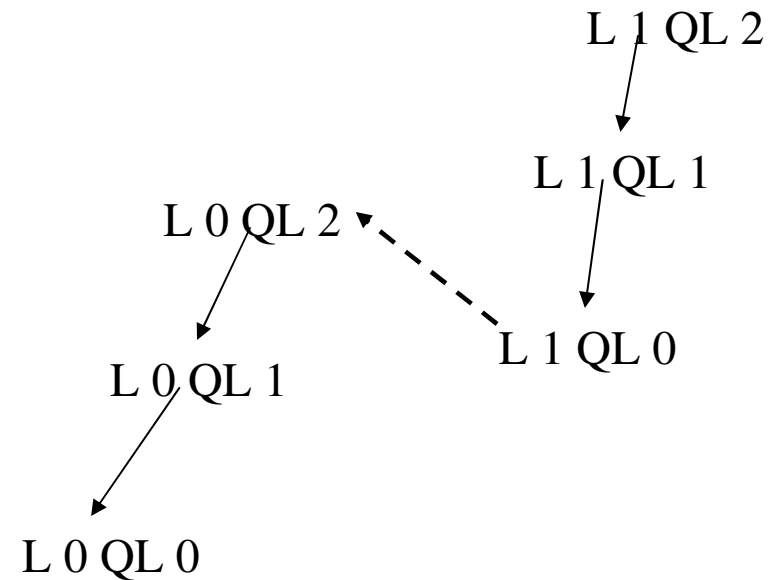
Experiments

- Performed on CGS configuration with CGS refinements of a same spatio-temporal resolution coded as SNR refinements with `quality_level > 0` (JVT-S044, JVT-T054)
- 2 layers: QCIF and CIF at 15Hz with two SNR refinements
- Three schemes:
 - Original JSVM
 - Proposed modified ILP
 - Discardable case:
 - CIF low point predicted by QCIF low point and CIF high point predicted by CIF low point
 - QCIF high points could be embedded in the stream (sort of simulcast) or not

Schemes dependencies

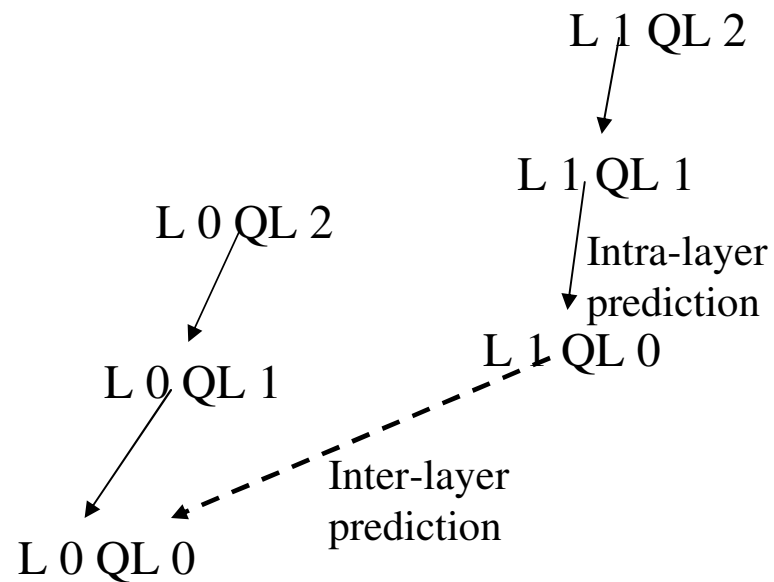


Proposed ILP



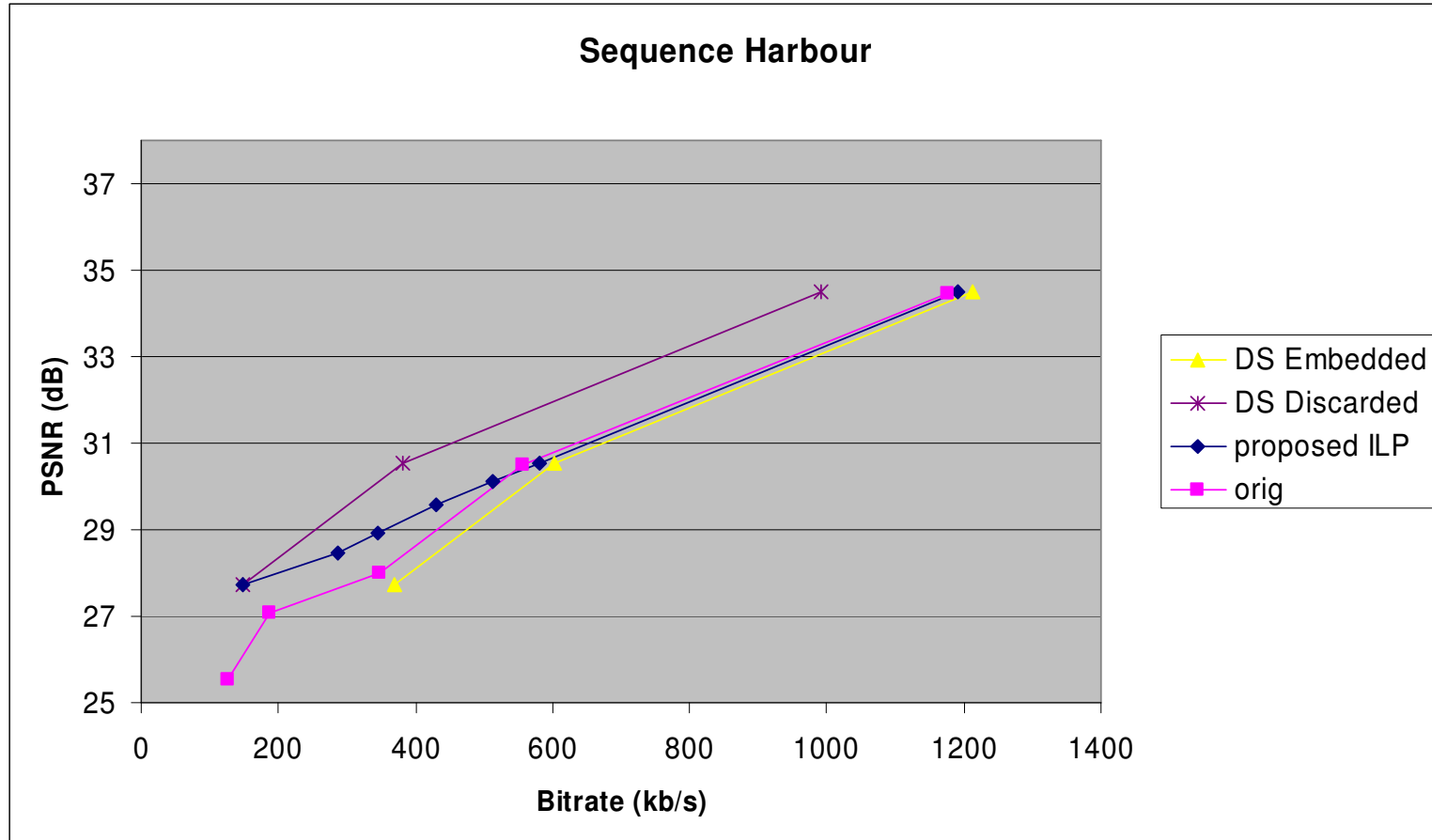
Original JSVM ILP

Schemes dependencies



Discardable case

Results



Results

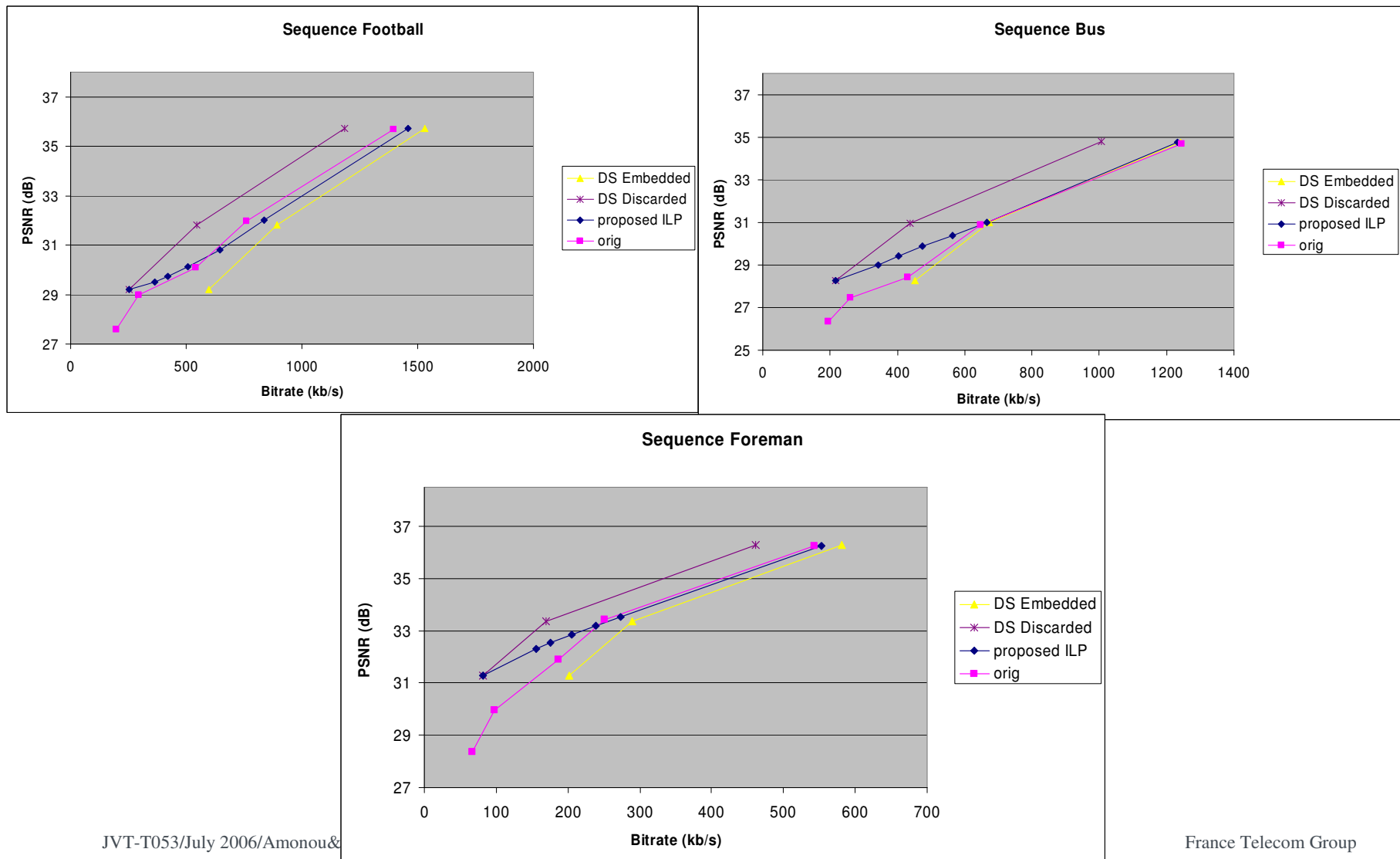
■ Obtention of the set of test points

- For the original JSVM ILP, lower points than CIF QL=0 obtained by discarding high points of QCIF
- For our proposed ILP, intermediate points between QL0 and QL1 obtained by successively adding SNR refinements with increasing temporal level

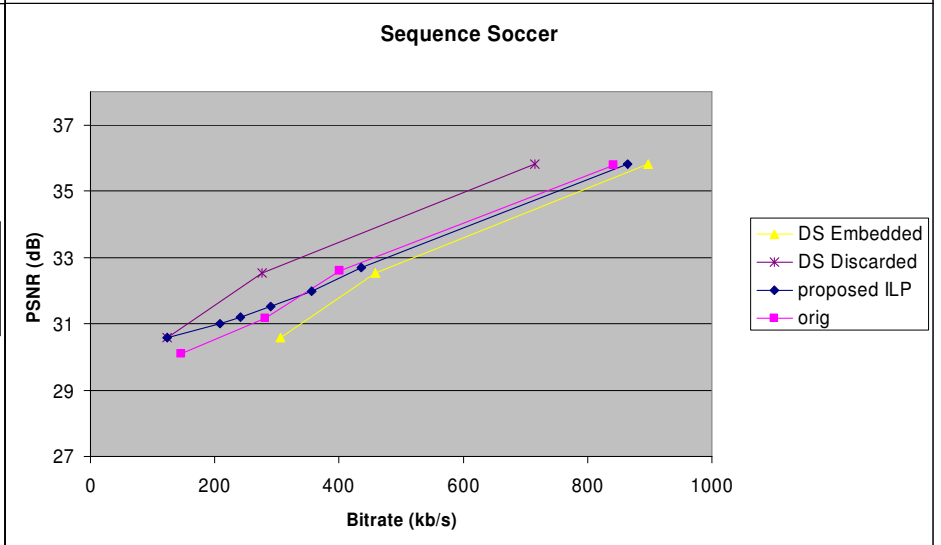
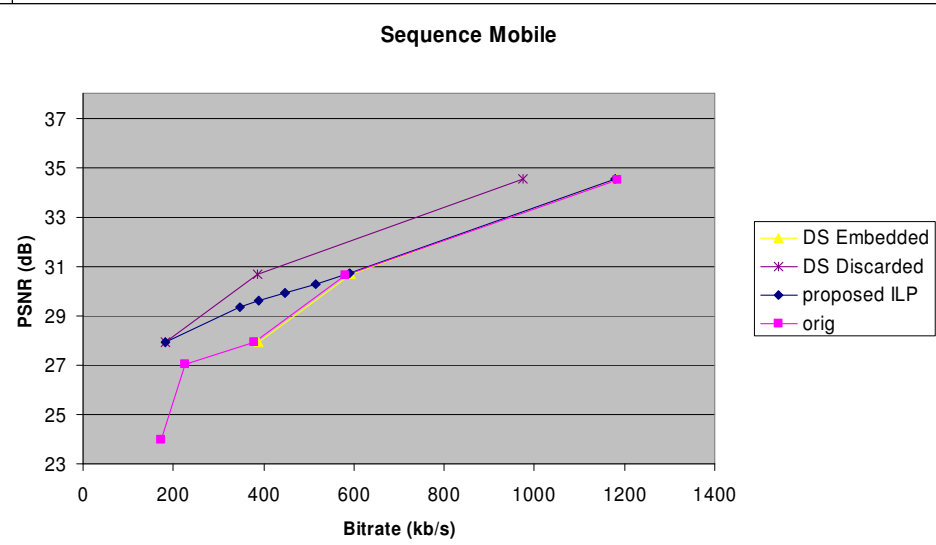
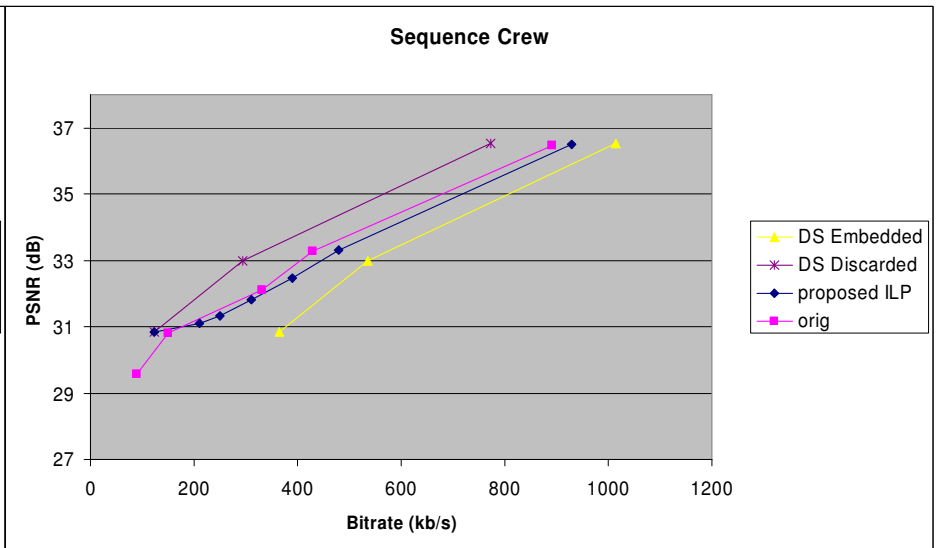
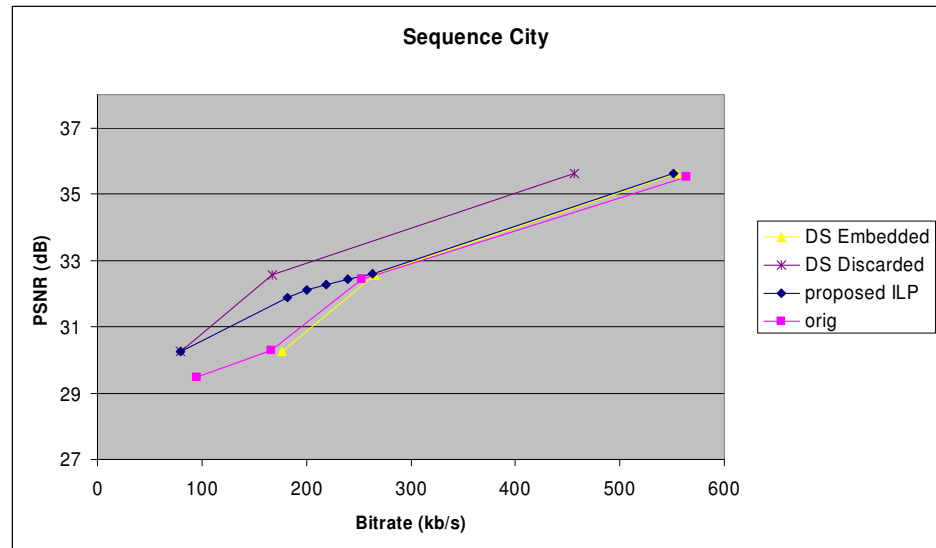
■ Results

- low points of a high layer are improved by using a lower inter-layer prediction point and discarding the higher points of the base layer.
- high points of the higher layer are also improved by using higher point for inter-layer prediction
 - A gain of up to 12% in bitrate

Results



Results



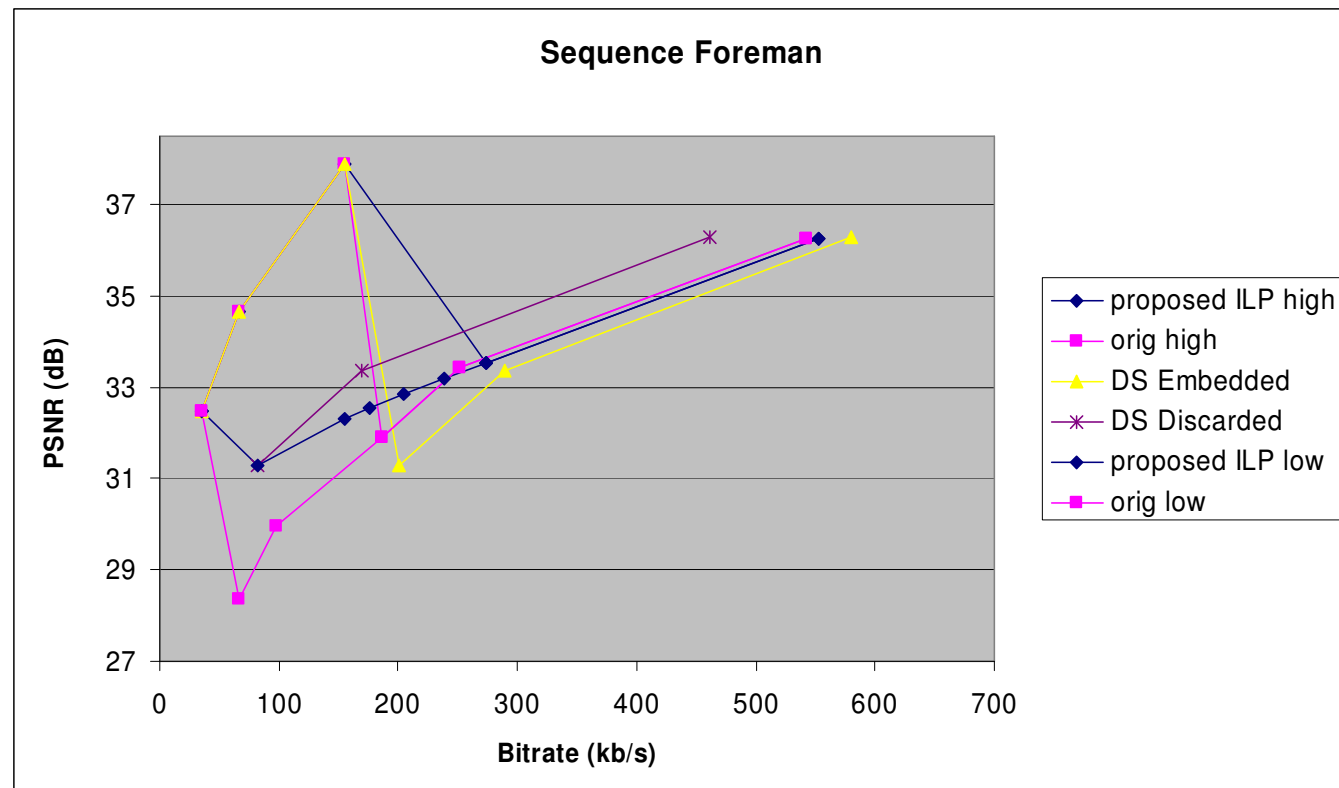
Results

- Gain compared to an embedded discardable stream

Sequences	Bitrate gain (%) (QL1-QL2)	PSNR differences (dB)
Bus	1.2-0.71	-0.02 +0.00
Foreman	6-5.10	+0.16 -0.00
Football	6.5-4.9	+0.18 -0.00
City	0.76-0.55	+0.02 -0.00
Crew	12-9.19	+0.34 -0.02
Harbour	3.47-1.77	-0.02 -0.00
Soccer	5.33-3.81	+0.16 -0.00
Mobile	0.18-0.19	0.00 0.00

Preserving scalability

- Extraction paths possible and corresponding rate/distortion curves



Recommendations

- Adopt the proposed ILP in the JD
 - Gain in bitrate at all levels (low and high)
 - Minor syntax modification