MPEG2 to H.263 Transcoding

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Motivation

- Digital video is already being delivered via broadcast and cable television and DVDs.

- There is a trend in the video on demand (VOD) market toward serving the internet community.

- Transcoding between high bandwidth and low bandwidth standards would allow media companies to broadcast in a single format to provide both services.

MPEG2 vs. H.263

MPEG2

- 4CIF Resolution – 704x576

- I, P, and B frames.

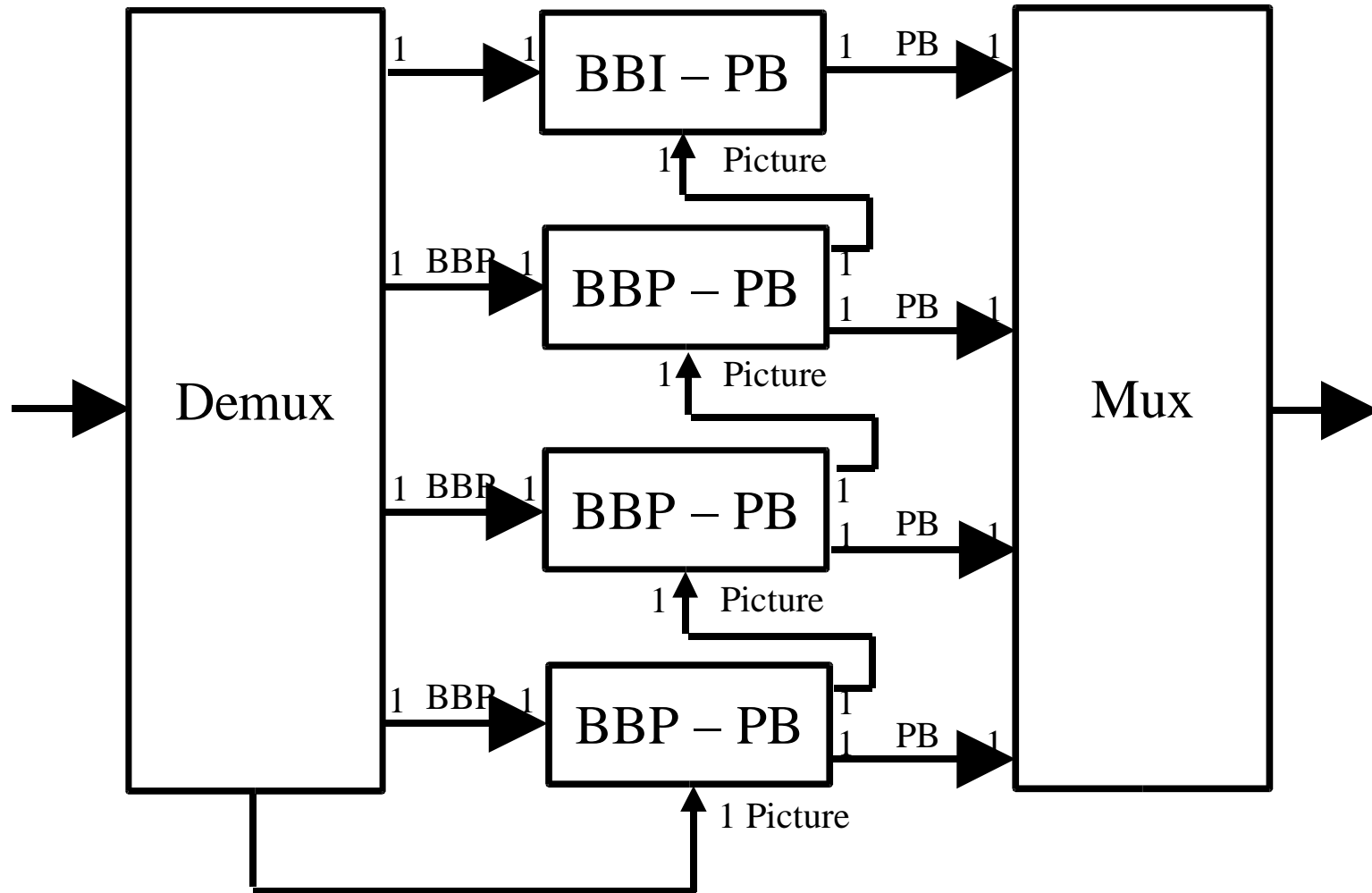- Quantization matrix.

- I frames sent every 12–15 frames.

H.263

- CIF Resolution – 352x288

- Only I and P frames or I and PB frames. (First version of Standard)

- Single quantization factor.

- I blocks sent every 132 frames.

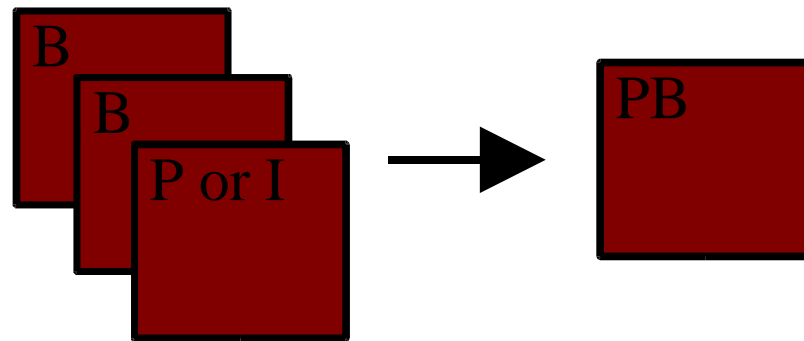- Both standards use DCT based compression of image data and motion estimation.

SDF Model of Parallel Systems
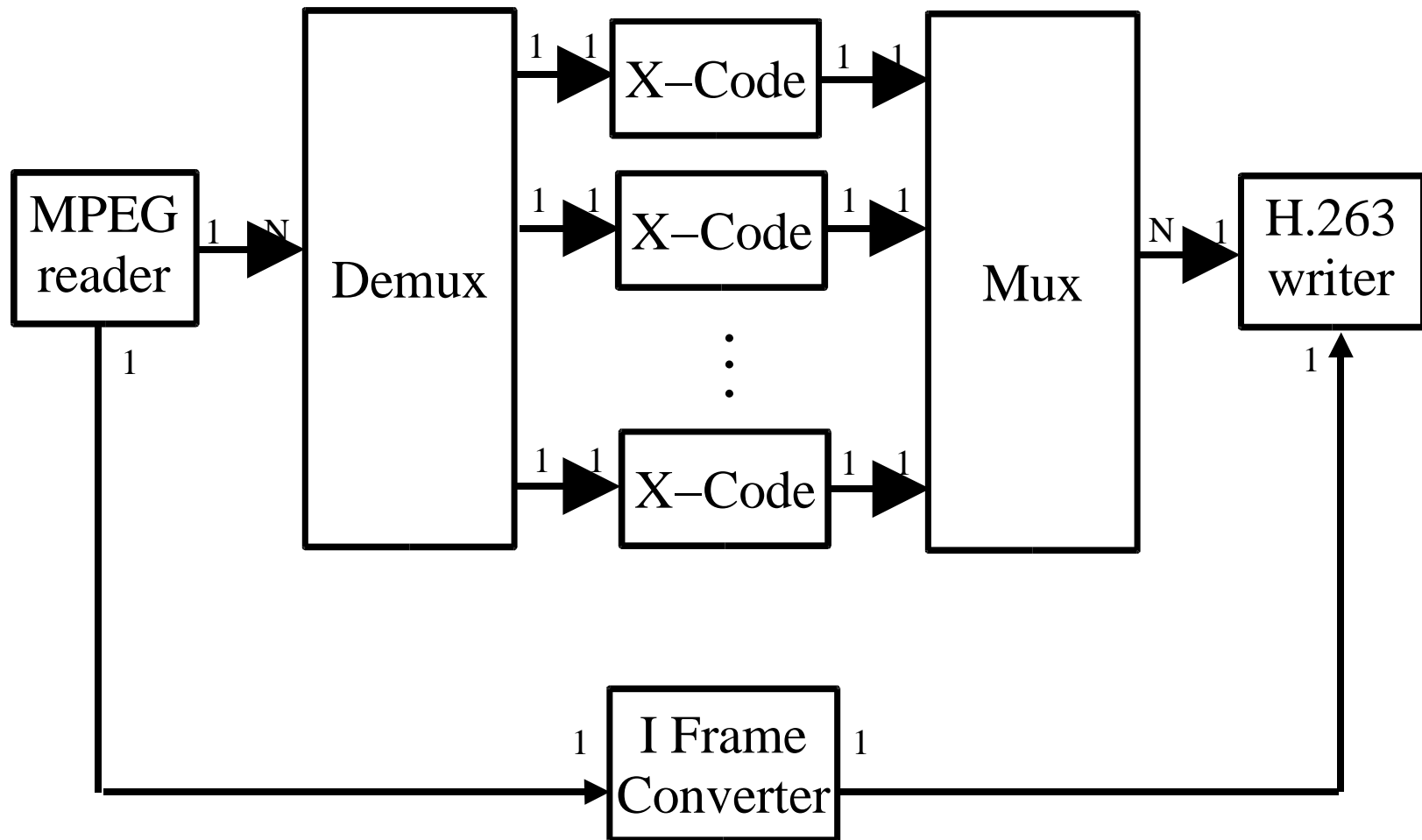
SDF Model of Transcoder

Converting BBP/BBI to PB

♦ Two B frames must be converted to one B frame.

♦ All intracoded information from B frames is dropped.

♦ Motion estimation is used to convert I blocks to P blocks. Some I blocks left for forced updating.
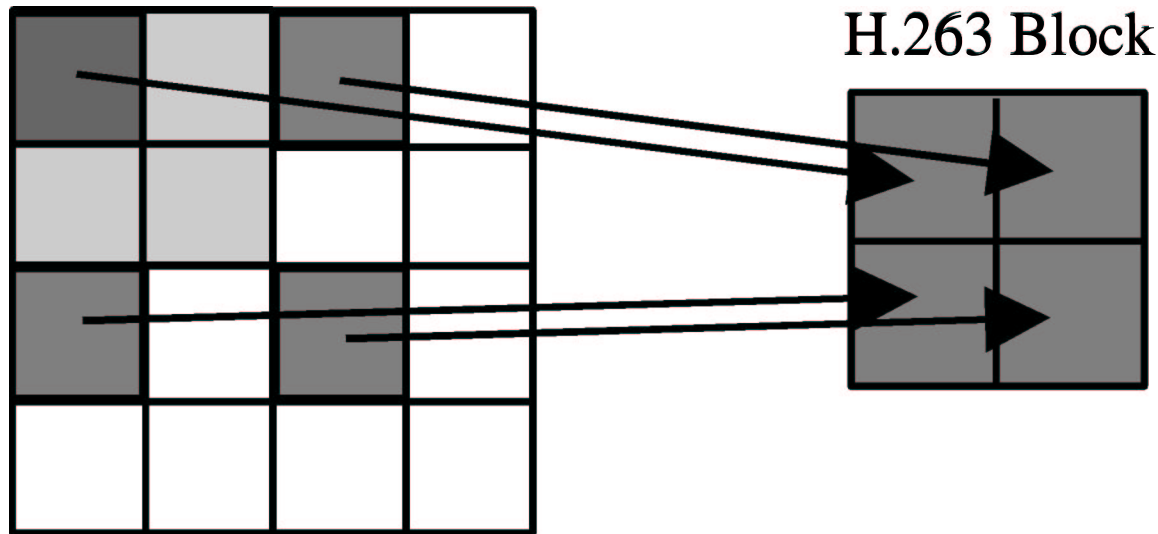
Recalculating Motion Vectors

- Weighted average used to compute new motion vector.

$$\overline{m} = \frac{1}{2} \frac{\sum\limits_{i=1}^{4} \overline{m}_i A_i}{\sum\limits_{i=1}^{4} A_i}$$

- Weights determined using DCT residue energy.

Calculating New DCT Coefficients

MPEG2 Macroblock

H.263 Block

4x4 IDCT computed of upper left corner of each block. Four of these put together make up single block in H.263 macroblock.

Conclusions

◆ MPEG2 to H.263 transcoding can be arbitrarily parallelized due to the frame structure of MGEG2.

◆ The basic H.263 PB frame structure is not sophisticated enough to emulate MPEG2 B frames.

◆ For future work, H.263 version 2 with improved PB frames and B frames should be considered.