System Modeling and Implementation of MPEG4 Encoder Using Fine-Granular-Scalability Framework

EE 382C Embedded Software Systems

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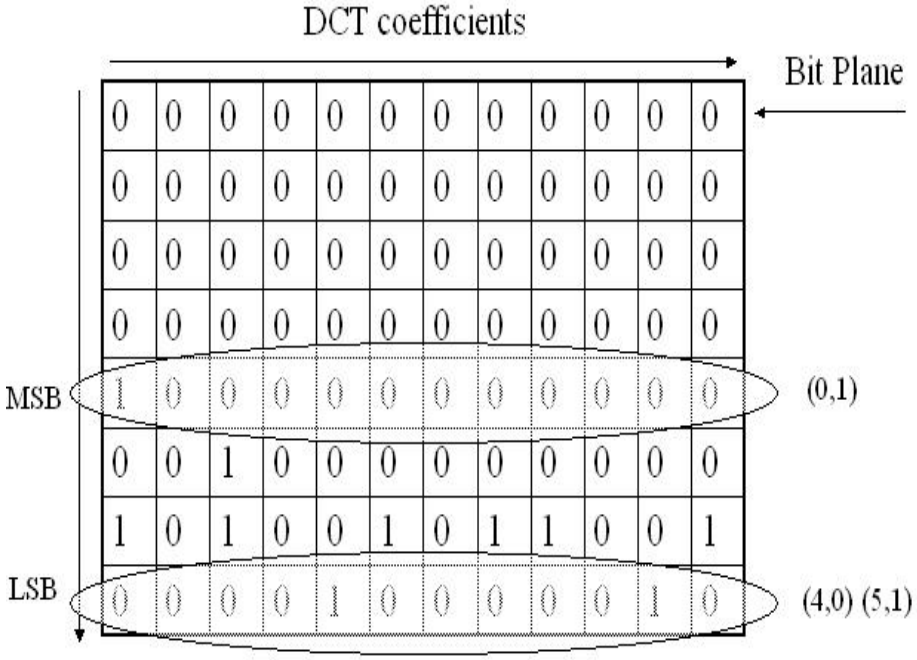
Scalability of Streaming Media Over the Internet

- **Purpose**
  - provide quality of service through channels with various bandwidths
  - provide quality of service to receivers with different processing capabilities
  - provide quality of service over best-effort IP network
- **Scalable profiles in MPEG2 (base layer & enhancement layer)**
  - data partitioning
  - SNR Scalability
  - spatial Scalability
  - temporal Scalability
- **FGS framework in MPEG4**
  - FGS: fine granular scalability
  - Being able to enhance base layer using partial information from enhancement layer
  - Key issue: bit-plane encoding

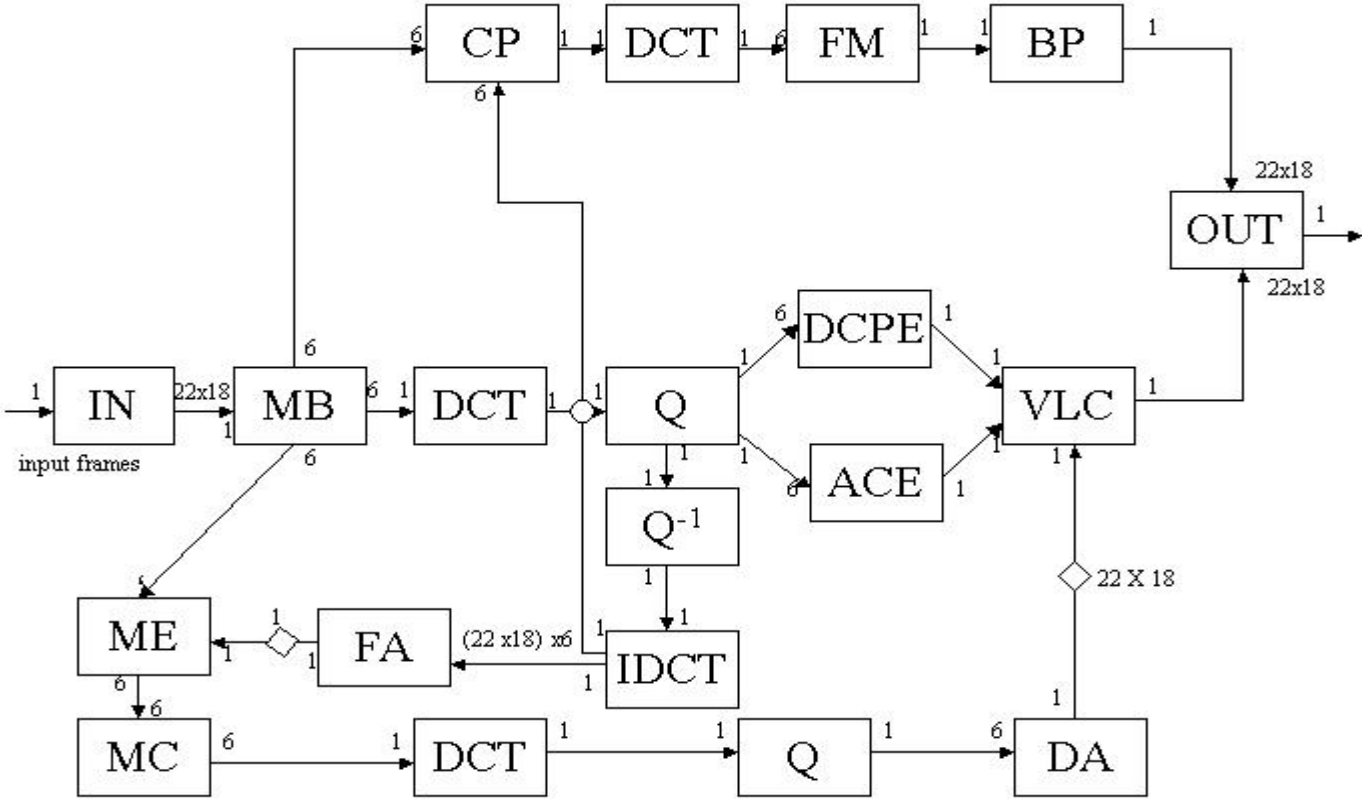
Bit-plane Encoding

Compare to run-level encoding

- Coded content is scalable
  - Based on bit plane
- Coding is more efficient
  - Do not need to code the highest all zero bit planes
  - Bit plane is more suitable for VLC coding



Synchronous Data Flow (SDF) Model for MPEG4 with SNR Scalability Profile Using FGS Framework



Target: QCIF (176 X 144)

DCT: discrete cosine transform (8 x 8); **IDCT**: inverse discrete cosine transform; **Q**: quantization; **Q^{-1}**: inverse quantization; **CP**: clipping; **FM**: find maximum significant bit in bit-plane; **BP**: bit-plane VLC; **IN**: input block, frame is input data type ; **OUT**: output block, an encoded bit stream for two frames; **MB**: macroblock, prepare for DCT; **DCPE**: DC coefficient predication encoding block; **ACE**: AC coefficients coding block; **FA**: frame accumulation block; **ME**: motion estimation block; **MC**: motion compensation block; **DA**: DC/AC coefficient encoding block