

MPEG-4 Audio Coding

Jerry D. Gibson

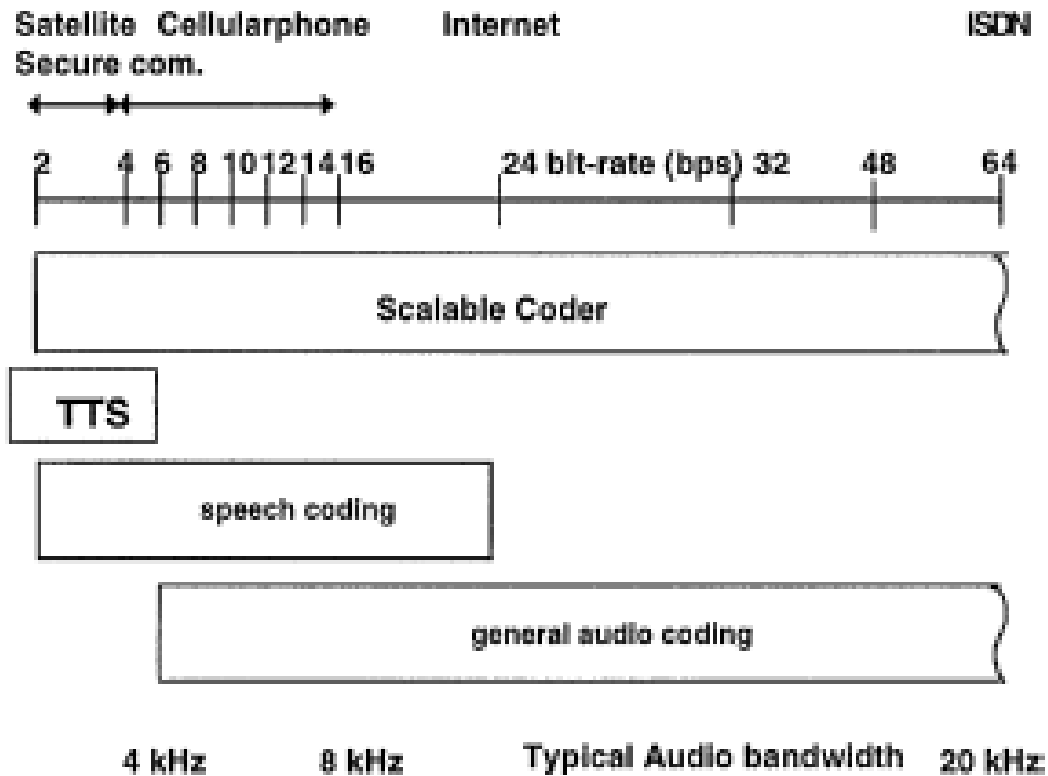
ECE 241

List of MPEG-4 Audio Coding Tools

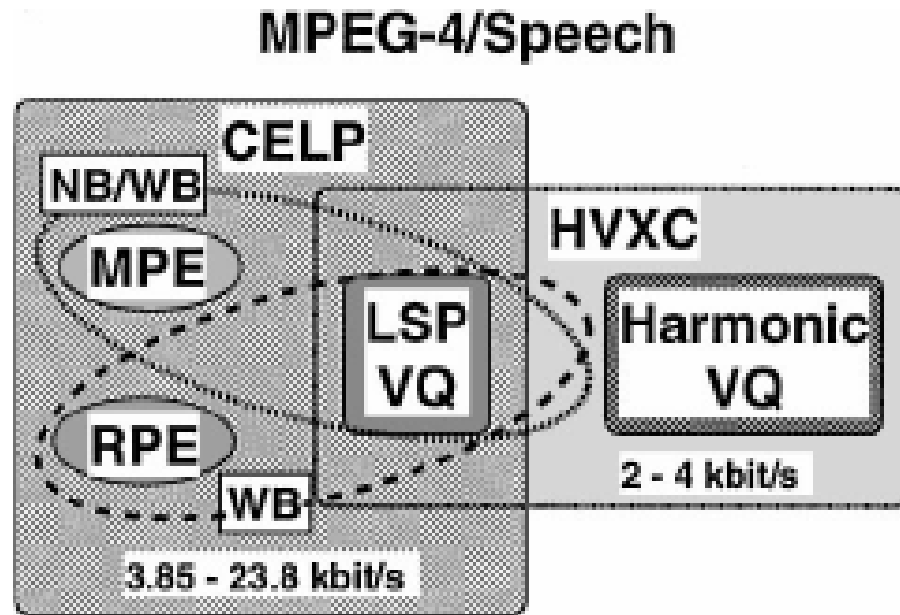
Table 1. Key MPEG-4 Audio coding tools

Category	Audio Tools
Speech	Code Excited Linear Prediction (CELP) Harmonic Vector Excitation Coding (HVXC) Text to Speech Interface (TTS) Variable Bitrate HVXC Silence Compression
General Audio	MPEG-2 AAC Main MPEG-2 AAC Low Complexity (LC) MPEG-2 AAC Scalable Sampling Rate (SSR) Low Delay (LD) AAC Perceptual Noise Substitution (PNS) Long Term Prediction (LTP) Harmonic and Individual Lines plus Noise (HILN) TwinVQ
Scalability Synthesis	Bit-Sliced Arithmetic Coding (BSAC) Tools for Large Step Scalability (TLSS) Synthetic Audio (SA) Tools Structured Audio Sample Bank Format (SASBF)
Error Protection	MIDI Error Robustness Tools

MPEG-4 Codecs and Bit Ranges

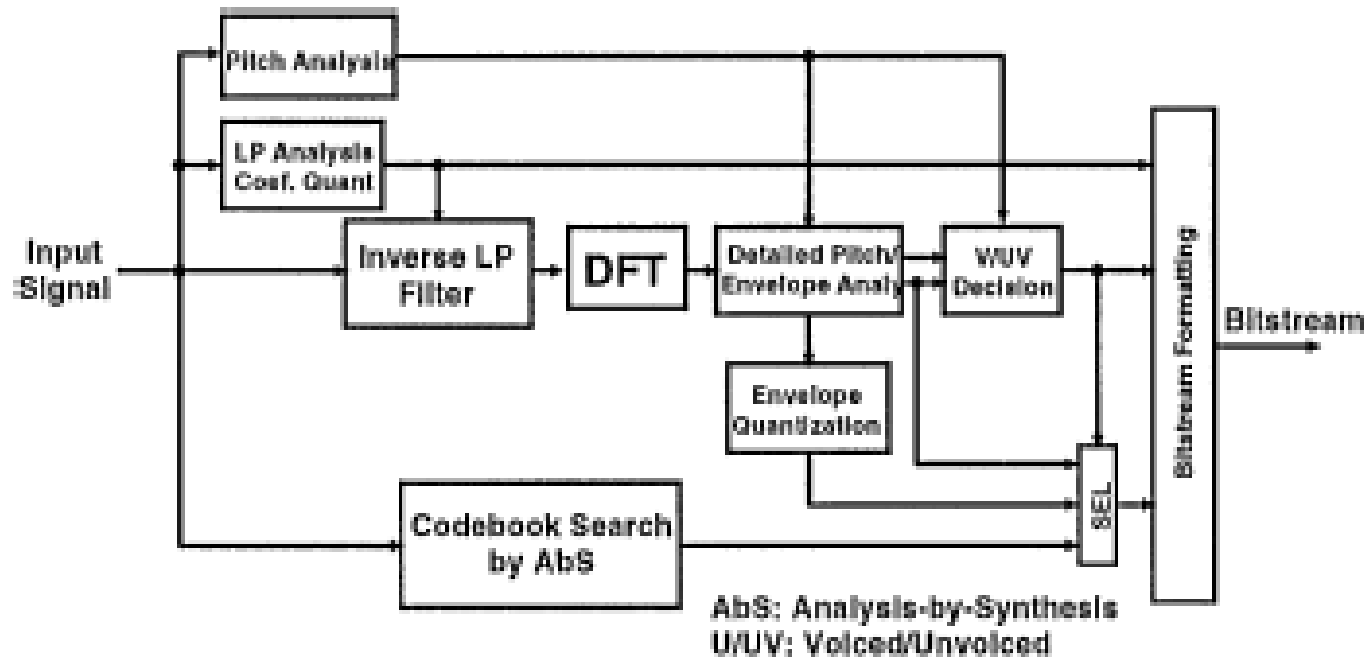


MPEG-4 Natural Speech Coding Tool Set



NB: Narrow Band RPE: Regular Pulse Excitation
WB: Wide Band MPE: Multipulse Excitation
VQ: Vector Quantization

HXVC

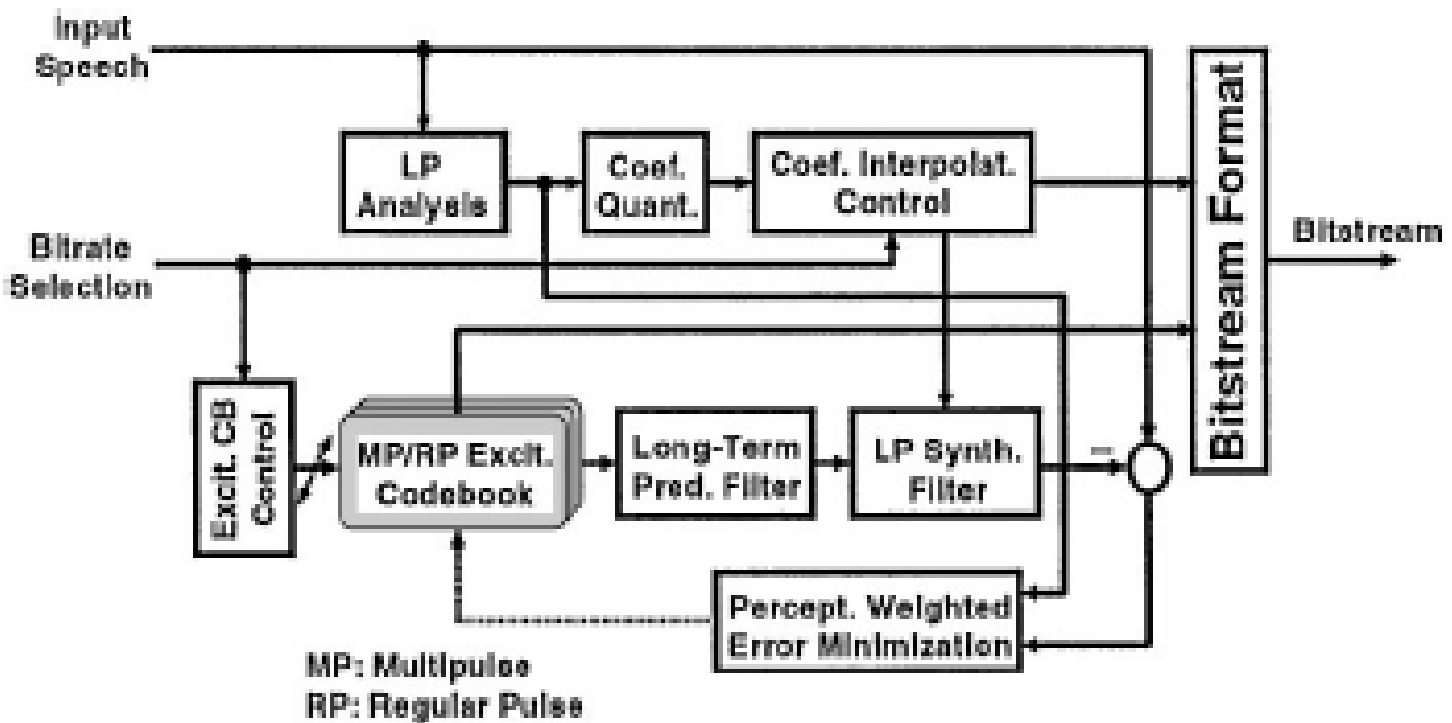


HVXC Natural Speech Coding Tool

HVXC

Sampling frequency	8 kHz
Bandwidth	300–3400 Hz
Bit-rate (bit/s)	2000 and 4000
Frame size	20 ms
Delay	33.5–56 ms
Features	Multi-bit-rate coding Bit-rate scalability

CELP

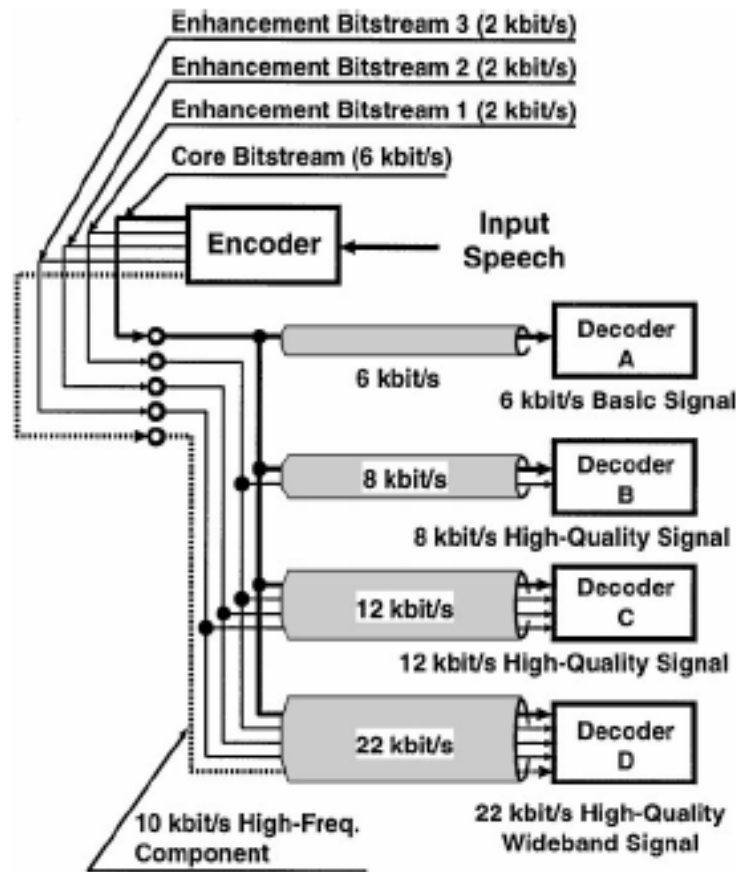


CELP Natural Speech Coding Tool

CELP

Sampling frequency	8 kHz	16 kHz
Bandwidth	300–3400 Hz	50–7000 Hz
Bit-rate (bit/s)	3850–12 200 (28 bit-rates)	10 900–23 800 (30 bit-rates)
Frame size	10–40 ms	10–20 ms
Delay	15–45 ms	15–26.75 ms
Features	Multi-bit-rate coding Bit-rate scalability Bandwidth scalability	

MPEG-4 Scalability Options

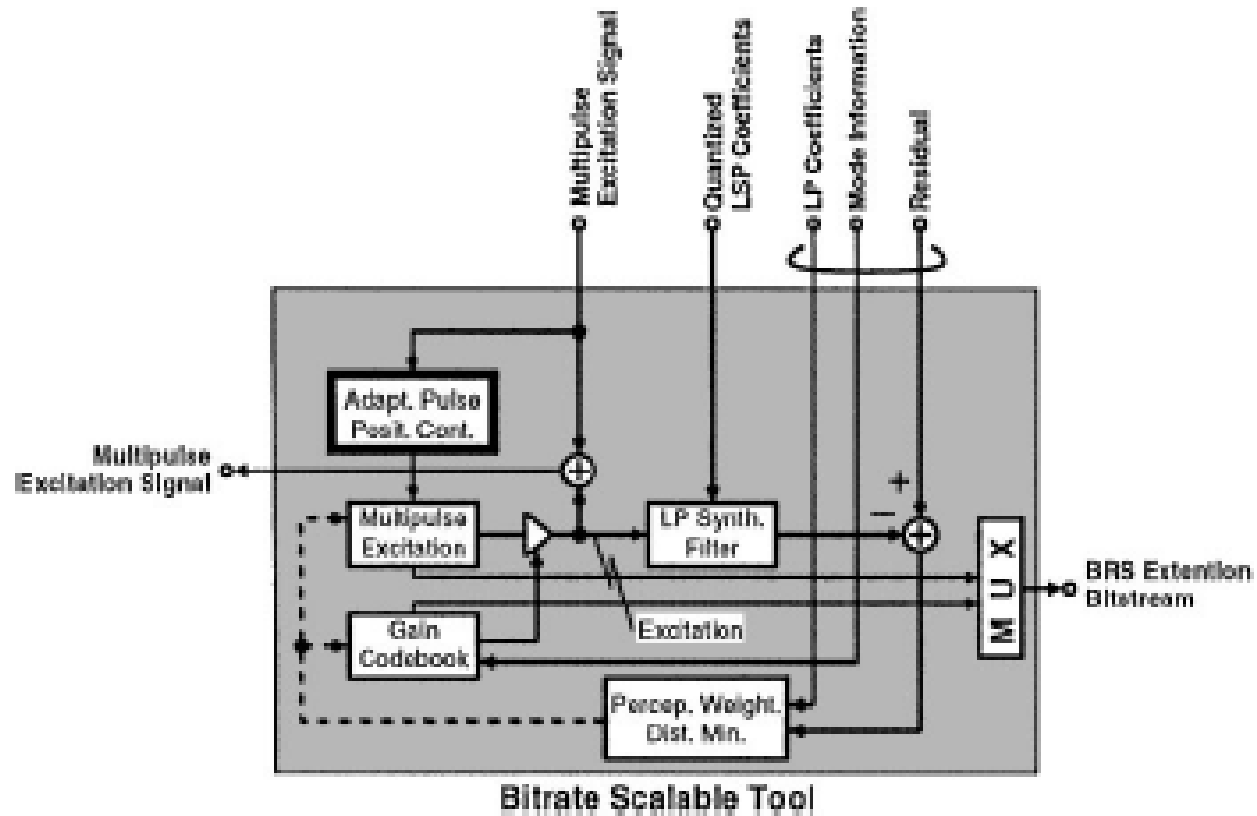


Bandwidth Scalable Bit Rates

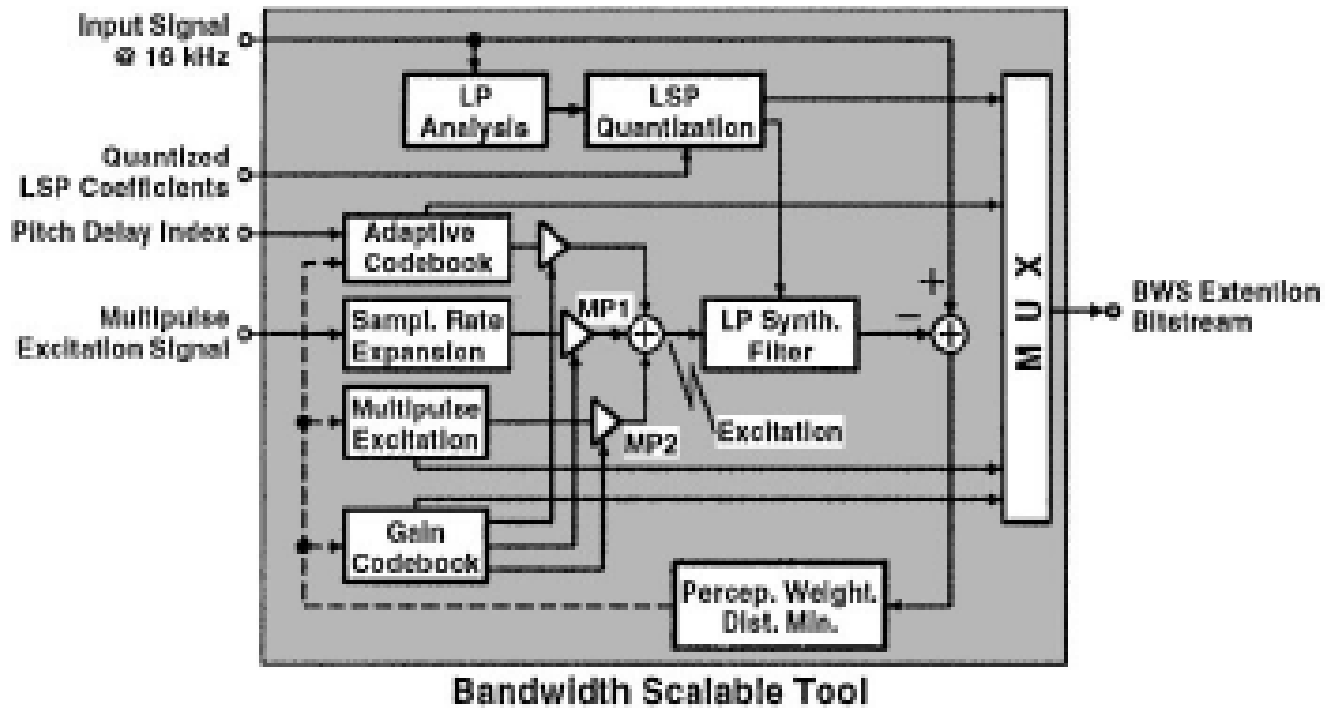
Bandwidth scalable bit-streams

Core bit-stream (bit/s)	Enhancement bit-stream (bit/s)
3850–4650	9200, 10 400, 11 600, 12 400
4900–5 500	9467, 10 667, 11 867, 12 667
5700–10 700	10 000, 11 200, 12 400, 13 200
11 000–12 200	11 600, 12 800, 14 000, 14 800

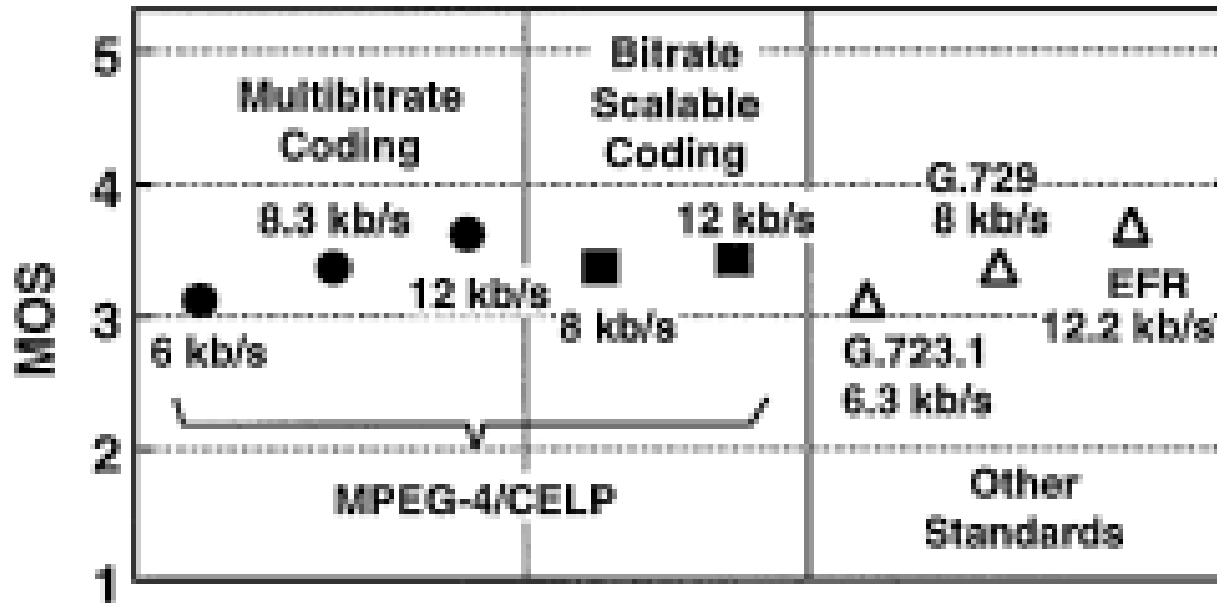
Bit Rate Scalable Tool



Bandwidth Scalable Tool



MOS Values of Speech Coders



(a) Coding Quality of MPEG-4/CELP (Narrowband)