Glossary of Terms

Abbreviations

AM	Amplitude Modulation
AS	Additive Synthesis
ASIC	Application-Specific Integrated Circuit
CD	Compact Disk (16-bit stereo audio at f_s=44.1kHz)
CMOS	Complimentary Metal Oxide Semiconductor
CORDIC	COordinate Rotation DIgitial Computer
CPU	Central Processing Unit
DFT	Discrete Fourier Transform
EC	Envelope Cache
FBP	Filterbank Processor
FFT	Fast Fourier Transform
FFT^{-1}	IFFT AS Synthesis Technique proposed by (Rodet and Depalle, 1992)
FIFO	First-In First-Out Buffer
FIR	Finite Impulse Response
FM	Frequency Modulation
IDFT	Inverse Discrete Fourier Transform
IFFT	Inverse Fast Fourier Transform
IFT	Inverse Fourier Transform
IIR	Infinite Impulse Response
IPC	Inter-Processor Communication
LUT	Look-Up Table

MAS	Multirate Additive Synthesis
MASC	Multirate Additive Synthesis Coprocessor
MOB	Multirate Oscillator Bank
NMOS	N-channel Metal Oxide Semiconductor
OD	Oscillator Descriptor
OLA	Overlap-Add
PA-IIR	Polyphase Allpass IIR QMF stage design
PC	Personal Computer
PEF	Physical Exclusion (of Δ_f) Filterbank
PM-FIR	Parks-McClellan equiripple FIR QMF stage design
PWL	Piecewise Linear
Q	As documented in section 3.1.4
QMF	Quadrature Mirror Filterbank
RMS	Root Mean Square
ROM	Read Only Memory
S/N	Signal to Noise Ratio
SHARC	Sandell Harmonic Archive (Sandell, 1994)
SM	Shared Memory
SMS	Spectral Modelling Synthesis (Serra and Smith, 1990)
SSB	Single Side Band
STFT	Short-Time Fourier Transform
TOB	Traditional Oscillator Bank as defined in section 1.3.2
VLSI	Very Large Scale Integration

Commonly Used Mathematical Symbols

S	Number of oscillators in an AS application
$A_i[n]$	Time series of amplitude envelope values for i^{th} oscillator of S oscillators
$F_i[n]$	Time series of frequency envelope values for i^{th} oscillator of S oscillators
$\phi_i[n]$	Time series of phase envelope values for i^{th} oscillator of S oscillators
$\Phi_i[n]$	Time series of phase accumulator values for i^{th} oscillator of S oscillators
$\Omega_i[n]$	Subband normalised form of $F_i[n]$
f_s	An industry-standard digital audio sampling rate e.g. CD at 44.1kHz
$f_{opt}(x)$	The optimum time-invariant sampling rate for alias-free synthesis of x
$f_{max}(x)$	The upper frequency bound of of x during its lifecycle
$f_{min}(x)$	The lower frequency bound of of x during its lifecycle
x	An arbitrary sinusoidal oscillator allocated to a partial in note-based AS
T_{max}	Latency tolerance for real-time synthesis
I	Interpolation factor
D	Decimation factor
δ_p	Filter passband ripple
δ_s	Filter stopband ripple
Δ_f	Filter transition width
K	Number of subbands, Depth of QMF subband hierarchy
$s_{k,l}$	Subband set of subband hierarchy
k	Depth in subband hierarchy ($0 \leq k \leq K$)
l	Integer-subband index at level k in subband hierarchy ($1 \leq l \leq 2^k$)
$T_{fb}(k)$	QMF filterbank latency from level k
λ	PEF filterbank oversampling factor

M	Latency of an FIR QMF stage
u_{mas}	Unit cost of an oscillator from a MOB
u_{as}	Unit cost of an oscillator from a TOB
$v(K)$	Unit cost of a filterbank (as a function of K)
n_k	Number of oscillators allocated to subband k
ε	Ratio of included to excluded partial power
τ	Pitch modulation range ($\pm\tau$) required by a note in semitones
$E1$	Benchmarked AS / MAS control bandwidth requirements ratio
$E2$	Benchmarked AS / MAS multiplication requirements ratio
$f_s(x)$	Sample rate of oscillator x
N_{burst}	Length of standard (non-extended) MOB burst
T_{frame}	Duration of a MASC frame
T_{part}	Duration of a filterbank partition in MASC frame
T_{tot}	Total latency of a MAS synthesiser
$T_{fb}(K)$	Maximum latency of a QMF-style filterbank i.e. that from level K