Video Compression and Communications: From Basics to H.261, H.263, H.264, MPEG2, MPEG4 for DVB and HSDPA-Style Adaptive Turbo-Transceivers

by

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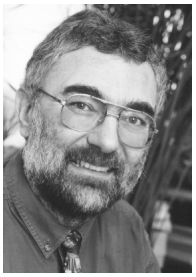

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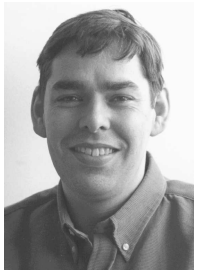

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[1] For detailed contents and sample chapters please refer to http://www-mobile.ecs.soton.ac.uk

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Glossary

16CIF	Sixteen Common Intermediate Format Frames are sixteen times as big as CIF frames and contain 1408 pixels vertically and 1152 pixels horizontally
2G	Second generation
3G	Third generation
3GPP	Third Generation Partnership Project
4CIF	Four Common Intermediate Format Frames are four times as big as CIF frames and contain 704 pixels vertically and 576 pixels horizontally
AB	Access burst
ACCH	Associated control channel
ACELP	Algebraic Code Excited Linear Predictive (ACELP) Speech Codec
ACF	autocorrelation function
ACL	Autocorrelation
ACO	Augmented Channel Occupancy matrix, which contains the channel occupancy for the local and surrounding base stations. Often used by locally distributed DCA algorithms to aid allocation decisions.
ACTS	Advanced Communications Technologies and Services. The fourth framework for European research (1994–98). A series of consortia consisting of universities and industrialists considering future communications systems.
ADC	Analog–to–Digital Converter
ADPCM	Adaptive Differential Pulse Coded Modulation
AGCH	Access grant control channel
AI	Acquisition Indicator
AICH	Acquisition Indicator CHannel
ANSI	American National Standards Institute
ARIB	Association of Radio Industries and Businesses
ARQ	Automatic Repeat Request, Automatic request for retransmission of corrupted data
ATDMA	Advanced Time Division Multiple Access
ATM	Asynchronous Transfer Mode

AUC Authentication center

AV.26M A draft recommendation for transmitting compressed video over error-prone channels, based on the H.263 [258] video codec

AWGN Additive White Gaussian Noise

B-ISDN Broadband ISDN

BbB Burst-by-Burst

BCCH Broadcast control channel

BCH Bose-Chaudhuri-Hocquenghem, a class of forward error correcting codes (FEC)

BCH Codes Bose-Chaudhuri-Hocquenghem (BCH) Codes

BER Bit error rate, the fraction of the bits received incorrectly

BN Bit number

BPSK Binary Phase Shift Keying

BS A common abbreviation for base station

BSIC Base station identifier code

BTC Block Truncation Coding

CBER Channel bit error rate, the bit error rate before FEC correction

CBP Coded block pattern, a H.261 video codec symbol that indicates which of the blocks in the macroblock are active

CBPB A fixed-length codeword used by the H.263 video codec to convey the coded block pattern for bidirectionally predicted (B) blocks

CBPY A variable-length codeword used by the H.263 video codec to indicate the coded block pattern for luminance blocks

CC Convolutional Code

CCCH Commom control channel

CCITT Now ITU, standardization group

CCL Cross-correlation

CD Code Division, a multiplexing technique whereby signals are coded and then combined in such a way that they can be separated using the assigned user signature codes at a later stage

CDF Cumulative density function, the integral of the probability density function (PDF)

CDMA Code Division Multiple Access

CELL_BAR_ACCESS Boolean flag to indicate whether the MS is permitted

CIF Common Intermediate Format Frames containing 352 pixels vertically and 288 pixels horizontally

CIR Carrier to Interference Ratio, same as SIR

COD A one-bit codeword used by the H.263 video codec that indicates whether the current macroblock is empty or nonempty

CPICH Common PIlot CHannel

CT2 British Second Generation Cordless Phone Standard

CWTS China Wireless Telecommunication Standard

DAB Digital Audio Broadcasting

DAC Digital-to-Analog Convertor

DAMPS	Pan-American Digital Advanced Phone System, IS-54
DB	Dummy burst
DC	Direct Current, normally used in electronic circuits to describe a power source that has a constant voltage, as opposed to AC power in which the voltage is a sine wave. It is also used to describe things that are constant, and hence have no frequency component.
DCA	Dynamic Channel Allocation
DCH	Dedicated transport CHannel
DCS1800	A digital mobile radio system standard, based on GSM but operating at 1.8 GHz at a lower power
DCT	A discrete cosine transform that transforms data into the frequency domain. Commonly used for video compression by removing high-frequency components of the video frames
DECT	A Pan-European digital cordless telephone standard
DL	Down-link
DPCCH	Dedicated Physical Control CHannel
DPCH	Dedicated Physical CHannel
DPCM	Differential Pulse Coded Modulation
DPDCH	Dedicated Physical Data CHannel
DQUANT	A fixed-length coding parameter used to differential change the current quantizer used by the H.263 video codec
DS–CDMA	Direct Sequence Code Division Multiple Access
DSMA-CD	Digital Sense Multiple Access-Collision Detection
DTTB	Digital Terrestrial Television Broadcast
DVB-T	Terrestrial Pan-European Digital Video Broadcast Standard
EIR	Equipment identity register
EMC	Electromagnetic Compatibility
EOB	An end-of-block variable-length symbol used to indicate the end of the current block in the H.261 video codec
EREC	Error-Resilient Entropy Coding. A coding technique that improves the robustness of variable-length coding by allowing easier resynchronization after errors
ERPC	Error-Resilient Position Coding, a relative of the coding scheme known as Error-Resilient Entropy Coding (EREC)
ETSI	European Telecommunications Standards Institute
EU	European Union
FA	First Available, a simple centralized DCA scheme that allocates the first channel found that is not reused within a given preset reuse distance
FACCH	Fast associated control channel
FACH	Forward Access CHannel
FAW	Frame Alignment Word
FBER	Feedback error ratio, the ratio of feedback acknowledgment messages that are received in error
FCA	Fixed Channel Allocation

FCB Frequency correction burst

FCCH Frequency Correction Channel

FD Frequency Division, a multiplexing technique whereby different frequencies are used for each communications link

FDD Frequency-Division Duplex, a multiplexing technique whereby the forward and reverse links use a different carrier frequency

FDM Frequency Division Multiplexing

FDMA Frequency Division multiple access, a multiple access technique whereby frequency division (FD) is used to provide a set of access channels

FEC Forward Error Correction

FEF Frame Error Flag

FER Frame error rate

FH Frequency hopping

FIFO First-In First-Out, a queuing strategy in which elements that have been in the queue longest are served first

FN TDMA frame number

FPLMTS Future Public Land Mobile Telecommunication System

fps Frames per second

FRAMES Future Radio Wideband Multiple Access System

GBSC Group of blocks (GOB) start code, used by the H.261 and H.263 video codecs to regain synchronization, playing a similar role to PSC

GEI Functions similar to PEI but in the GOB layer of the H.261 video codec

GFID A fixed-length codeword used by H.263 video codec to aid correct resynchronization after an error

GMSK Gaussian Mean Shift Keying, a modulation scheme used by the Pan-European GSM standard by virtue of its spectral compactness

GN Group of blocks number, an index number for a GOB used by the H.261 and H.263 video codecs

GOB Group of blocks, a term used by the H.261 and H.263 video codecs, consisting of a number of macroblocks

GOS Grade of Service, a performance metric to describe the quality of a mobile radio network

GP Guard Period

GPS Global Positioning System

GQUANT Group of blocks quantizer, a symbol used by the H.261 and H.263 video codecs to modify the quantizer used for the GOB

GSM A Pan-European digital mobile radio standard, operating at 900MHz

GSPARE Functions similar to PSPARE but in the GOB layer of the H.261 video codec

H.261 A video coding standard [257], published by the ITU in 1990

H.263 A video coding standard [258], published by the ITU in 1996

HC Huffman Coding

HCA Hybrid Channel Allocation, a hybrid of FCA and DCA

HCS Hierarchical Cell Structure

HDTV	High-Definition Television
HLR	Home location register
HO	Handover
HTA	Highest interference below Threshold Algorithm, a distributed DCA algorithm also known as MTA. The algorithm allocates the most interfered channel, whose interference is below the maximum tolerable interference threshold.
IF	Intermediate Frequency
IMSI	International mobile subscriber identity
IMT-2000	International Mobile Telecommunications-2000
IMT2000	Intelligent Mobile Telecommunications in the Year 2000, Japanese Initiative for 3rd Generation Cellular Systems
IS-54	Pan-American Digital Advanced Phone System, IS-54
IS-95	North American mobile radio standard, that uses CDMA technology
ISDN	Integrated Services Digital Network, digital replacement of the analogue telephone network
ISI	Intersymbol Interference, Inter-Subcarrier Interference
ITU	International Telecommunications Union, formerly the CCITT, standardization group
ITU-R	International Mobile Telecommunication Union – Radiocommunication Sector
JDC	Japanese Digital Cellular Standard
JPEG	"Lossy" DCT-based Still Picture Coding Standard
LFA	Lowest Frequency below threshold Algorithm, a distributed DCA algorithm that is a derivative of the LTA algorithm, the difference being that the algorithm attempts to reduce the number of carrier frequencies being used concurrently
LIA	Least Interference Algorithm, a distributed DCA algorithm that assigns the channel with the lowest measured interference that is available.
LODA	Locally Optimized Dynamic Assignment, a centralized DCA scheme, which bases its allocation decisions on the future blocking probability in the vicinity of the cell
LOLIA	Locally Optimized Least Interference Algorithm, a locally distributed DCA algorithm that allocates channels using a hybrid of the LIA and an ACO matrix
LOMIA	Locally Optimized Most Interference Algorithm, a locally distributed DCA algorithm that allocates channels using a hybrid of the MTA and an ACO matrix
LP filtering	Low-pass filtering
LP-DDCA	Local Packing Dynamic Distributed Channel Assignment, a locally distributed DCA algorithm that assigns the first channel available that is not used by the surrounding base stations, whose information is contained in an ACO matrix
LPF	Low-pass filter
LSB	Least significant bit
LSR	Linear Shift Register
LTA	Least interference below Threshold Algorithm, a distributed DCA algorithm that allocates the least interfered channel, whose interference is below a preset maximum tolerable interference level
LTI	Linear Time-invariant

MA Abbreviation for Miss America, a commonly used head and shoulders video sequence referred to as Miss America

Macroblock A grouping of 8 by 8 pixel blocks used by the H.261 and H.263 video codecs. Consists of four luminance blocks and two chrominance blocks

MAI Multiple Access Interference

MAP Maximum–A–Posteriori

MB Macroblock

MBA Macroblock address symbol used by the H.261 video codec, indicating the position of the macroblock in the current GOB

MBS Mobile Broadband System

MC Motion Compensation

MCBPC A variable-length codeword used by the H.263 video codec to convey the macroblock type and the coded block pattern for the chrominance blocks

MCER Motion Compensated Error Residual

MDM Modulation Division Multiplexing

MF-PRMA Multi-Frame Packet Reservation Multiple Access

MFlop Mega Flop, 1 million floating point operations per second

MODB A variable-length coding parameter used by the H.263 video codec to indicate the macroblock mode for bidirectionally predicted (B) blocks

MPEG Motion Picture Expert Group, also a video coding standard designed by this group that is widely used

MPG Multiple Processing Gain

MQUANT A H.261 video codec symbol that changes the quantizer used by current and future macroblocks in the current GOB

MS A common abbreviation for Mobile Station

MSC Mobile switching center

MSE Mean Square Error

MSQ Mean Square centralized DCA algorithm that attempts to minimize the mean square distance between cells using the same channel

MTA Most interference below Threshold Algorithm, a distributed DCA algorithm also known as HTA. The algorithm allocates the most interfered channel, whose interference is below the maximum tolerable interference level.

MTYPE H.261 video codec symbol that contains information about the macroblock, such as coding mode, and flags to indicate whether optional modes are used, like motion vectors, and loop filtering

MV Motion vector, a vector to estimate the motion in a frame

MVD Motion vector data symbol used by H.261 and H.263 video codecs

MVDB A variable-length codeword used by the H.263 video codec to convey the motion vector data for bidirectionally predicted (B) blocks

NB Normal burst

NCC Normalized Channel Capacity

NLF Nonlinear filtering

NMC Network management center

NN	Nearest-Neighbor centralized DCA algorithm; allocates a channel used by the nearest cell, which is at least the reuse distance away
NN+1	Nearest-Neighbor-plus-one centralized DCA algorithm; allocates a channel used by the nearest cell, which is at least the reuse distance plus one cell radius away
OFDM	Orthogonal Frequency Division Multiplexing
OMC	Operation and maintenance center
OVSF	Orthogonal Variable Spreading Factor
P-CCPCH	Primary Common Control Physical CHannel
PCH	Paging CHannel
PCM	Pulse code modulation
PCN	Personal Communications Network
PCPCH	Physical Common Packet CHannel
PCS	Personal Communications System, a term used to describe third-generation mobile radio systems in North America
PDF	Probability Density Function
PDSCH	Physical Down-link Shared CHannel
PEI	Picture layer extra insertion bit, used by the H.261 video codec, indicating that extra information is to be expected
PFU	Partial Forced Update
PGZ	Peterson-Gorenstein-Zierler (PGZ) Decoder
PHP	Japanese Personal Handyphone Phone System
PI	Page Indicator
PICH	Page Indicator CHannel
PLMN	Public land mobile network
PLMN_PERMITTED	Boolean flag to indicate, whether the MS is permitted
PLMR	Public Land Mobile Radio
PLR	Packet-Loss Ratio
PP	Partnership Project
PQUANT	A fixed-length codeword used by the H.263 video codec to indicate the quantizer to use for the next frame
PRACH	Physical Random Access CHannel
PRMA	Packet Reservation Multiple Access, a statistical multiplexing arrangement contrived to improve the efficiency of conventional TDMA systems, by detecting inactive speech segments using a voice activity detector, surrendering them and allocating them to subscribers contending to transmit an active speech packet
PRMA++	PRMA System allowing contention only in the so-called contention slots, which protect the information slots from contention and collisions
PSAM	Pilot symbol-assisted modulation, a technique whereby known symbols (pilots) are transmitted regularly. The effect of channel fading on all symbols can then be estimated by interpolating between the pilots.
PSC	Picture start code, a preset sequence used by the H.261 and H.263 video codecs, that can be searched for to regain synchronization after an error
PSD	Power Spectral Density

PSNR Peak Signal to Noise Ratio, noise energy compared to the maximum possible signal energy. Commonly used to measure video image quality

PSPARE Picture layer extra information bits, indicated by a PEI symbol in H.261 video codec

PSTN Public switched telephone network

PTYPE Picture layer information, used by H.261 and H.263 video codecs to transmit information about the picture, e.g. Resolution, etc.

QAM Quadrature Amplitude Modulation

QCIF Quarter Common Intermediate Format Frames containing 176 pixels vertically and 144 pixels horizontally

QMF Quadrature Mirror Filtering

QN Quater bit number

QoS Quality of Service

QT Quad-Tree

RACE Research in Advanced Communications Equipment Programme in Europe, from June 1987 to December 1995

RACH Random Access CHannel

RC filtering Raised-cosine filtering

RF Radio frequency

RFCH Radio frequency channel

RFN Reduced TDMA frame number in GSM

RING A centralized DCA algorithm that attempts to allocate channels in one of the cells, which is at least the reuse distance away that forms a “ring” of cells

RLC Run-Length Coding

RPE Regular pulse excited

RS Codes Reed-Solomon (RS) codes

RSSI Received Signal Strength Indicator, commonly used as an indicator of channel quality in a mobile radio network

RTT Radio Transmission Technology

RXLEV Received signal level: parameter used in hangovers

RXQUAL Received signal quality: parameter used in hangovers

S-CCPCH Secondary Common Control Physical CHannel

SAC Syntax-based arithmetic coding, an alternative to variable-length coding, and a variant of arithmetic coding

SACCH Slow associated control channel

SB Synchronization burst

SCH Synchronization CHannel

SCS Sequential Channel Search distributed DCA algorithm that searches the available channels in a predetermined order, picking the first channel found, which meets the interference constraints

SDCCH Stand-alone dedicated control channel

SF Spreading Factor

SINR	Signal-to-Interference plus Noise ratio, same as signal-to-noise ratio (SNR) when there is no interference.
SIR	Signal-to-Interference ratio
SNR	Signal-to-Noise Ratio, noise energy compared to the signal energy
SPAMA	Statistical Packet Assignment Multiple Access
SQCIF	Sub-Quarter Common Intermediate Format Frames containing 128 pixels vertically and 96 pixels horizontally
SSC	Secondary Synchronization Codes
TA	Timing advance
TB	Tailing bits
TC	Trellis Coded
TCH	Traffic channel
TCH/F	Full-rate traffic channel
TCH/F2.4	Full-rate 2.4 kbps data traffic channel
TCH/F4.8	Full-rate 4.8 kbps data traffic channel
TCH/F9.6	Full-rate 9.6 kbps data traffic channel
TCH/FS	Full-rate speech traffic channel
TCH/H	Half-rate traffic channel
TCH/H2.4	Half-rate 2.4 kbps data traffic channel
TCH/H4.8	Half-rate 4.8 kbps data traffic channel
TCM	Trellis code modulation
TCOEFF	An H.261 and H.263 video codec symbol that contains the transform coefficients for the current block
TD	Time Division, a multiplexing technique whereby several communications links are multiplexed onto a single carrier by dividing the channel into time periods, and assigning a time period to each communications link
TDD	Time-Division Duplex, a technique whereby the forward and reverse links are multiplexed in time.
TDMA	Time Division Multiple Access
TFCI	Transport-Format Combination Indicator
TIA	Telecommunications Industry Association
TN	Time slot number
TPC	Transmit Power Control
TR	Temporal reference, a symbol used by H.261 and H.263 video codecs to indicate the real-time difference between transmitted frames
TS	Technical Specifications
TTA	Telecommunications Technology Association
TTC	Telecommunication Technology Committee
TTIB	Transparent tone in band
UHF	Ultra high frequency
UL	Up-link

UMTS	Universal Mobile Telecommunications System, a future Pan-European third-generation mobile radio standard
UTRA	Universal Mobile Telecommunications System Terrestrial Radio Access
VA	Viterbi Algorithm
VAD	Voice activity detection
VAF	Voice activity factor, the fraction of time the voice activity detector of a speech codec is active
VE	Viterbi equalizer
VL	Variable length
VLC	Variable-length coding/codes
VLR	Visiting location register
VQ	Vector Quantization
W-CDMA	Wideband Code Division Multiple Access
WARC	World Administrative Radio Conference
WATM	Wireless Asynchronous Transfer Mode (ATM)
WLAN	Wireless Local Area Network
WN	White noise
WWW	World Wide Web, the name given to computers that can be accessed via the Internet using the HTTP protocol. These computers can provide information in a easy-to-digest multimedia format using hyperlinks.

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