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Study Group 15
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Title: **Telecommunication levels for the Next profile**

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Introduction

The need for telecommunications level in the Next profile has been outlined in MPEG93/.... (Telecommunication requirements for the Next profile). This document outlines the different levels which can be identified for the telecommunication purposes.

Telecommunications levels in the Next profile

In the telecommunications profile a number of levels can be identified:

1. MAIN level, for TV reception and database retrieval
2. (Wide screen) SCIF level, for level 1 + high quality video conferencing

Next profile at MAIN level

The reception of TV signals and interactive database retrieval are important features of the future telecommunications terminal. The transmission format will be CCIR 601 for this level or level.

1. The image format for TV reception and database retrieval could be:

	pixels	lines	frame rate
Highest level, 25 Hz	'601'-25		
luminance	720	576	25
chrominance	360	288	25
Highest level, 29.97 Hz	'601'-30		
luminance	720	480	29.97
chrominance	360	240	29.97
Lowest level, 25 Hz	SIF-25		
Luminance	352	288	25
Chrominance	176	144	25
Lowest level, 29.97 Hz	SIF-30		
Luminance	352	240	29.97
Chrominance	176	120	29.97

The lowest level is MPEG1 coded, the highest level is MPEG2 coded, spatial scalable or compatible with the lowest level.

2 MPEG1 (IS 11172) compatible (this includes video, audio and systems)
3 Cell loss resilient, *with peak error rate of 10^{-2} allmost no visible effects*
4 Bitrate range from 64 kbits/s to about 10 Mbits/s

Next profile at (wide screen) SCIF level

An important initial telecommunications application will be a high quality video conferencing system. The transmission format can be SCIF or a wide screen version of SCIF for this level, in addition all MAIN level requirements should be fulfilled at this level. During the capabilities exchange wide screen or standard screen size can be signaled.

The additional requirements of the level are listed:

1 The image format for SCIF video conferencing for 4*3 aspect ratio:

	pixels	lines	frame rate
Highest level	SCIF		
luminance	704	576	59.94
chrominance	352	288	59.94
Lowest level	CIF		
Luminance	352	288	29.97
Chrominance	176	144	29.97

The image format for wide screen SCIF video conferencing for 16*9 aspect ratio:

	pixels	lines	frame rate
Highest level	SCIF		
luminance	960	576	59.94
chrominance	480	288	59.94
Lowest level	CIF		
Luminance	352	288	29.97
Chrominance	176	144	29.97

The lowest level is H.261 coded, the highest level is MPEG2 coded, spatial scalable or compatible with the lowest level. The SCIF signal is embedded in the total data stream, so interworking between SCIF and wide screen SCIF videoconferencing systems is garanteed.

2 H.320 inter working (this includes video, audio, multiplexing, call control, etc.)
3 H.261 compatible
4 Low end to end delay, less then about 150 ms
5 Cell loss resilient, *with peak error rate of 10^{-2} allmost no visible effects*
6 Bitrate range from 64 kbits/s to several tens of Mbits/s

Annex: Syntax elements in the Next profile

All elements currently listed in the WD (version of April 30, 1993) will be part of the next profile.

Some but not all elements of the Test Model (version 5.2) will be part of the next profile. The selected elements for the next profile are marked with a double bar.

It should be noted that the syntax and syntactical elements are still under development, and that the indicated items may change.

9.2 Sequence spatial extension

sequence_spatial_extension() {	No. of bits	Mnemonic
extension_start_code	32	bslbf
extension_start_code_identifier	4	uimsbf
subsampling_ratio	3	uimsbf
compatible_mtype	2	uimsbf
decoder_memory_configuration	1	uimsbf
low_resolution_prediction_horizontal_dimension	15	uimsbf
low_resolution_prediction_vertical_dimension	15	uimsbf
next_start_code()		
}		

9.4 Picture spatial extension

picture_spatial_extension() {	No. of bits	Mnemonic
extension start code	32	bslbf
extension start code identifier	4	uimsbf
lower picture reference	10	uimsbf
load prediction weighting matrix	1	uimsbf
if (load_prediction_weighting_matrix) {		
prediction weighting matrix[8]	4*8	uimsbf
}		
overlap horizontal left upper offset	15	uimsbf
overlap horizontal left upper offset	15	uimsbf
if (interlaced &&		
(picture_structure == frame_structure)) {		
overlap horizontal left upper offset	15	uimsbf
overlap horizontal left upper offset	15	uimsbf
}		
next_start_code()		
}		

9.8 Spatial Macroblock layer

macroblock() {	No. of bits	Mnemonic
if (<sequence extension was not present>)		
while (nextbits() == '0000 0001 111')		
macroblock_stuffing	11	vlclbf
while (nextbits() == '0000 0001 000')		
macroblock_escape	11	vlclbf
macroblock_address_increment	1-11	vlclbf
macroblock_type	1-8	vlclbf
if (macroblock_compatible && picture_coding_type != 1 && compatible_mtype != '10')		
prediction_weight_code	1-3	vlclbf
if (macroblock_motion_forward ||		
macroblock_motion_backward) {		
if (picture_structure == 'frame') {		
if (frame_pred_frame_dct == 0)		
frame_motion_type	2	uimsbf
} else {		
field_motion_type	2	uimsbf
}		
}		
if ((picture_structure == 'frame') &&		
(frame_pred_frame_dct == 0) &&		
(macroblock_intra || macroblock_pattern))		
dct_type	1	uimsbf
if (macroblock_quant)		
quantizer_scale	5	uimsbf
if (macroblock_motion_forward ||		
(macroblock_intra && concealment_motion_vectors))		
forward_motion_vectors()	...	...
if (macroblock_motion_backward)		
backward_motion_vectors()	...	...
if (macroblock_intra && concealment_motion_vectors)		
marker_bit	1	
if (macroblock_pattern)		
coded_block_pattern()	...	...
if (!chroma_scalable) {		
block_count_start = 0;		
block_count_end = block_count;		
} else {		
block_count_start = 4;		
if (chroma_format == 4:2:2) {		
block_count_end = 8;		

} else if (chroma_format == 4:4:4) {		
block_count_end = 12;		
}		
}		
for (i=block_count_start; i<block_count_end; i++) {		
if (compatible_mtype == "10" && !macroblock_pattern) {		
snr_block(i)		
} else {		
block(i)		
}		
}		
if (picture_coding_type == 4)		
end_of_macroblock	1	"1"
}		

Conclusion

A proposal for a next profile, telecommunication levels and a specific SCIF telecommunications level have been made.

END