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**Information technology — Generic coding  
of moving pictures and associated audio  
information —**

**Part 1:  
Systems**

**AMENDMENT 3: Carriage of green  
metadata in MPEG2 systems**

*Technologies de l'information — Codage générique des images  
animées et du son associé —*

*Partie 1: Systèmes*

*AMENDEMENT 3: Transport des métadonnées vertes dans les  
systèmes MPEG2*

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## Foreword

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INTERNATIONAL STANDARD  
ITU-T RECOMMENDATION**Information technology – Generic coding of moving pictures and  
associated audio information: Systems****Amendment 3****Carriage of green metadata in MPEG-2 systems****1) Clause 1.2.3***In clause 1.2.3 add*

- ISO/IEC 23001-11:2015, *Information technology – MPEG systems technologies – Part 11: Energy-efficient media consumption (Green Metadata)*.

**2) Clause 2.1.128***Add the following clause after clause 2.1.127*

**2.1.128 Green access unit** – An access unit that contains dynamic metadata as defined in clause 6.2.1 of ISO/IEC 23001-11.

**Table 2-31***Replace Table 2-31 with the following***Table 2-31 – Table\_id assignment values**

Value	Description
0x00	program_association_section
0x01	conditional_access_section (CA_section)
0x02	TS_program_map_section
0x03	TS_description_section
0x04	ISO_IEC_14496_scene_description_section
0x05	ISO_IEC_14496_object_descriptor_section
0x06	Metadata_section
0x07	IPMP_Control_Information_section (defined in ISO/IEC 13818-11)
0x08	ISO_IEC_14496_section
0x09	Green access unit (ISO/IEC 23001-11) section
0x0A-0x37	Rec. ITU-T H.222.0   ISO/IEC 13818-1 reserved
0x38-0x3F	Defined in ISO/IEC 13818-6
0x40-0xFE	User private
0xFF	Forbidden

Table 2-34

In Table 2-34, add the following:

0x2C	Green access units carried in MPEG-2 sections
0x2D-0x7E	Rec. ITU-T H.222.0   ISO/IEC 13818-1 reserved

3) **Clause 2.6.90**

Replace Table 2-105 with:

Table 2-105 – Extension descriptor

Syntax	No. of bits	Mnemonic
<pre> Extension_descriptor () {     <b>descriptor_tag</b>     <b>descriptor_length</b>     <b>extension_descriptor_tag</b>     if ( extension_descriptor_tag == 0x02) {         <b>ObjectDescriptorUpdate()</b>     }     else if ( extension_descriptor_tag == 0x03) {         <b>HEVC_timing_and_HRD_descriptor()</b>     }     else if ( extension_descriptor_tag == 0x04) {         <b>af_extension_descriptor()</b>     }     else if ( extension_descriptor_tag == 0x05) {         <b>HEVC_operation_point_descriptor()</b>     }     else if ( extension_descriptor_tag == 0x06) {         <b>hierachy_extension_descriptor()</b>     }     else if ( extension_descriptor_tag == 0x07) {         <b>Green_extension_descriptor ()</b>     }     else {         for ( i=0; i&lt;N; i++) {             <b>reserved</b>         }     } }                     </pre>	<p>8</p> <p>8</p> <p>8</p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p>8</p>	<p><b>uimsbf</b></p> <p><b>uimsbf</b></p> <p><b>uimsbf</b></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p><b>bslbf</b></p>

4) **Clause 2.6.91**

Add the following immediately before Table 2-106:

**Green\_extension\_descriptor()** – This structure is defined in 2.6.104 and 2.6.105.

Replace Table 2-106 with:

Table 2-106 – Extension descriptor tag values

Extension_descriptor_tag	TS	PS	Identification
0	n/a	n/a	Reserved
1	n/a	X	Forbidden
2	X	X	ODUpdate_descriptor
3	X	n/a	HEVC_timing_and_HRD_descriptor()
4	X	n/a	af_extensions_descriptor()
5	X	n/a	HEVC_operation_point_descriptor()
6	X	n/a	hierarchy_extension_descriptor()
7	X	n/a	Green_extension_descriptor()
8-255	n/a	n/a	Rec. ITU-T H.222.0   ISO/IEC 13818-1 Reserved

## 5) Clause 2.6.103

Add the following clauses after 2.6.103

### 2.6.104 Green extension descriptor

The syntax of the green extension descriptor containing static metadata is shown in Table 2-111<sup>quinqies</sup>.

Table 2-111<sup>quinqies</sup> – Green extension descriptor

Syntax	No. bits	Mnemonic
Green_extension_descriptor() {		
<b>descriptor_tag</b>	<b>8</b>	<b>uimsbf</b>
<b>num_constant_backlight_voltage_time_intervals</b>	<b>2</b>	<b>uimsbf</b>
<b>reserved</b>	<b>6</b>	<b>bslbf</b>
for (i=0; i < num_constant_backlight_voltage_time_intervals; i++) {		
constant_backlight_voltage_time_interval[i]	<b>16</b>	<b>uimsbf</b>
}	<b>2</b>	<b>uimsbf</b>
<b>num_max_variations</b>		
<b>reserved</b>	<b>6</b>	<b>bslbf</b>
for (j=0; j < num_max_variations; j++) {		
max_variation[j]	<b>16</b>	<b>uimsbf</b>
}		
}		

### 2.6.105 Semantics for green extension descriptor

Semantics for all the syntax elements above are specified in clause 6.4 of ISO/IEC 23001-11.

## 6) Clause 2.18

Add the following clauses after clause 2.18:

### 2.18 Carriage of green access units

#### 2.18.1 Carriage of green access units in MPEG-2 sections

Green access units are carried using the MPEG-2 private section syntax with the section\_syntax\_indicator element set to '0'.

Table 2-111*sexies* – Green access unit section syntax

Syntax	Bits	Mnemonic / description
Green_access_unit_section_message(){		
<b>table_ID</b>	8	<b>uimsbf</b>
<b>section_syntax_indicator</b>	1	<b>bslbf</b>
<b>private_indicator</b>	1	<b>bslbf</b>
<b>reserved</b>	2	<b>bslbf</b>
<b>private_section_length</b>	12	<b>uimsbf</b>
'00100	4	<b>bslbf</b>
Display_in_PTS [32..30]	3	<b>bslbf</b>
marker_bit	1	<b>bslbf</b>
Display_in_PTS [29..15]	15	<b>bslbf</b>
marker_bit	1	<b>bslbf</b>
Display_in_PTS [14..0]	15	<b>bslbf</b>
marker_bit	1	<b>bslbf</b>
Green_Au()		
CRC_32	32	<b>rpchbf</b>
}		
}		

2.18.2 Semantics of green access unit section

**table\_id** – This shall be set to 0x09.

**section\_syntax\_indicator** – This shall be set to '0'.

**Display\_in\_PTS** – This is the 33-bit PTS specified similar to that defined in the PES header and is used with the associated video access unit.

**Green\_Au()** – Defined in 2.18.3.

2.18.3 Green access unit

The format of the green access unit is defined in Table 2-111*septies*. Green access units contain dynamic metadata and are carried in MPEG private section format.

Table 2-111*septies* – Green access unit

Syntax	No. bits	Mnemonic
Green_Au {		
<b>num_quality_levels</b>	4	<b>uimsbf</b>
reserved	4	<b>bslbf</b>
for (k=0; k < num_constant_backlight_voltage_time_intervals; k++) {		
for (j=0; j < num_max_variations; j++) {		
lower_bound	8	<b>uimsbf</b>
if (lower_bound > 0)		
upper_bound	8	<b>uimsbf</b>
<b>rgb_component_for_infinite_psnr</b>	8	<b>uimsbf</b>
for (i=1; i <= num_quality_levels; i++){		
<b>max_rgb_component</b>	8	<b>uimsbf</b>
scaled_psnr_rgb	8	<b>uimsbf</b>
}		
}		
}		

As explained in clause 6.4 of ISO/IEC 23001-11, each combination of constant\_backlight\_voltage\_time\_interval and max\_variation is associated with contrast-enhancement metadata and a set of quality levels defined in Table 2-111*septies*.

The metadata in the Green\_AU is applicable to the presentation subsystem until the next Green\_AU containing metadata arrives.