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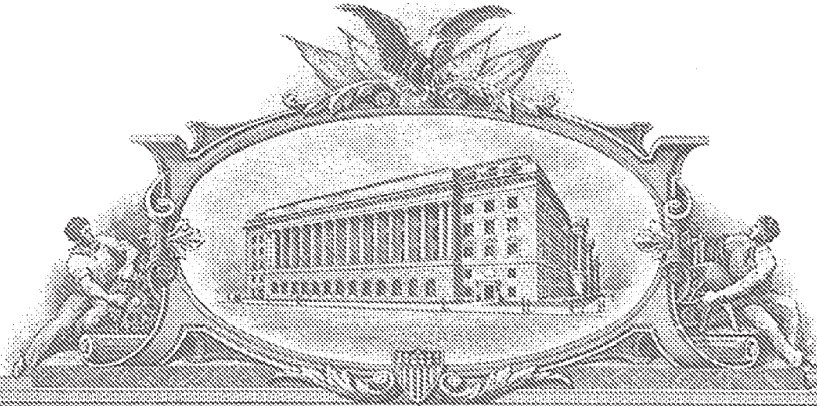
Application number: 62087035

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December 28, 2015

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APPLICATION NUMBER: *62/087,035*
FILING DATE: *December 03, 2014*

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS *US62/087,035*



Certified by

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Under Secretary of Commerce
for Intellectual Property
and Director of the United States
Patent and Trademark Office

PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(e)

INVENTOR(S)		
Given Name (first and middle (if any))	Family Name or Surname	Residence (City and either State or Foreign Country)
Virginie	DRUGEON	Darmstadt, Germany
Tadamasa	TOMA	Osaka, Japan
Takahiro	NISHI	Nara, Japan
☐ Additional inventors are being named on the separately numbered sheets attached hereto		
TITLE OF THE INVENTION (280 characters max)		
VIDEO FORMAT SIGNALLING METHOD AND APPARATUS		
CORRESPONDENCE ADDRESS		
Direct all correspondence to: ☐ Customer Number _____ - _____ Type Customer Number here Place Customer Number Bar Code Label here		
OR		
CORRESPONDENCE ADDRESS	/Michael S. Huppert/ By: 2014.12.03 16:38:34 -05'00' Michael S. Huppert Registration No. 40,268 WENDEROTH, LIND & PONACK, L.L.P. 1030 15 th Street, N.W., Suite 400 East Washington, D.C. 20005-1503 Phone:(202) 721-8200 Fax:(202) 721-8250 December 3, 2014	
CUSTOMER NO. 52349		
ENCLOSED APPLICATION PARTS (check all that apply)		
☒ Specification	Number of Pages [12]	☐ CD(s), Number _____
☐ Drawings	Number of Sheets []	☒ Other, (specify) <u>Application Data Sheet</u>
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISION APPLICATION FOR PATENT (check one)		
☐ Applicant claims small entity status. See 37 CFR 1.27.		
☐ A check or money order is enclosed to cover the filing fees of \$		
☐ The Commissioner is hereby authorized to charge filing fees or credit any overpayment to Deposit Account No. <u>23-0975</u> . Filing Fee Amount \$		
☒ Please charge my Credit Card in the amount of <u>\$260.00</u> to cover the above fees.		
The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.		
☐ No.		
☐ Yes, the name of the U.S. Government agency and the Government contract number are: _____		

The USPTO is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16, 1.17, and 1.492, which may be required by this paper and for the entire pendency of the present application to Deposit Account No. 23-0975, except fees for multiple dependent claims.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	PR14-1587A
		Application Number	
Title of Invention	VIDEO FORMAT SIGNALLING METHOD AND APPARATUS		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2

☐	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
--------------------------	---

Inventor Information:

Inventor 1					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Virginie		DRUGEON		
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service					
City	Darmstadt	Country of Residence i	DE		
Mailing Address of Inventor:					
Address 1		c/o Panasonic R&D Center Germany GmbH			
Address 2		Monzastrasse 4C			
City	Langen	State/Province			
Postal Code	63225	Country i	DE		
Inventor 2					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Tadamasa		TOMA		
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service					
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City	Osaka	State/Province			
Postal Code	571-8501	Country i	JP		
Inventor 3					Remove
Legal Name					

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	PR14-1587A
		Application Number	
Title of Invention	VIDEO FORMAT SIGNALLING METHOD AND APPARATUS		

Prefix	Given Name	Middle Name	Family Name	Suffix
	Takahiro		NISHI	
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service				
City	Nara	Country of Residence i	JP	
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Address 1	c/o Panasonic Corporation			
Address 2	1006, Oaza Kadoma, Kadoma-shi			
City	Osaka	State/Province		
Postal Code	571-8501	Country i	JP	
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. Add				

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
☐ An Address is being provided for the correspondence information of this application.			
Customer Number	00513		
Email Address	wlp@wenderoth.com	Add Email	Remove Email

Application Information:

Title of the Invention	VIDEO FORMAT SIGNALLING METHOD AND APPARATUS		
Attorney Docket Number	PR14-1587A	Small Entity Status Claimed	☐
Application Type	Provisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	0	Suggested Figure for Publication (if any)	

Filing By Reference :

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country i

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	PR14-1587A
		Application Number	
Title of Invention	VIDEO FORMAT SIGNALLING METHOD AND APPARATUS		

Publication Information:

☐	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐	Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.			
Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	52349		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78. When referring to the current application, please leave the application number blank.			
Prior Application Status		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).			
Remove			
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (if applicable)

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	PR14-1587A
		Application Number	
Title of Invention	VIDEO FORMAT SIGNALLING METHOD AND APPARATUS		
Additional Foreign Priority Data may be generated within this form by selecting the Add button. Add			

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

- ☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
- NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices
If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application. In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application. In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	PR14-1587A
		Application Number	
Title of Invention	VIDEO FORMAT SIGNALLING METHOD AND APPARATUS		

Applicant 1				Remove	
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.					
Clear					
☒ Assignee		☐ Legal Representative under 35 U.S.C. 117		☐ Joint Inventor	
☐ Person to whom the inventor is obligated to assign.			☐ Person who shows sufficient proprietary interest		
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:					
Name of the Deceased or Legally Incapacitated Inventor :					
If the Applicant is an Organization check here. ☒					
Organization Name		Panasonic Corporation			
Mailing Address Information:					
Address 1		1006, Oaza Kadoma, Kadoma-shi			
Address 2					
City		Osaka	State/Province		
Country ⁱ	JP	Postal Code		571-8501	
Phone Number		Fax Number			
Email Address					
Additional Applicant Data may be generated within this form by selecting the Add button. Add					

Assignee Information including Non-Applicant Assignee Information:

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Assignee 1	
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.	
Remove	
If the Assignee or Non-Applicant Assignee is an Organization check here. ☐	

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	PR14-1587A
		Application Number	
Title of Invention	VIDEO FORMAT SIGNALLING METHOD AND APPARATUS		

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		State/Province	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

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Signature:

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NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications

Signature	/Michael Huppert/		Date (YYYY-MM-DD)	2014-12-03	
First Name	Michael	Last Name	Huppert	Registration Number	40268

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This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Signalling of HDR/SDR Compatible OETF

Signalling of HDR OETF for backwards compatibility to
existing SDR OETFs (e.g. BT. 709, BT. 1886 and BT. 2020)

Virginie Drugeon, Takahiro Nishi, Tadamasa Toma

1

Signalling of transfer function

- The transfer function is currently signalled using **transfer_characteristics** in the Video Usability Information, included in the Sequence Parameter Set of HEVC and AVC video coding standards
- Only the OETF (Opto-Electrical Transfer Function) is signalled, not the EOTF

vui_parameters() {	Descriptor
...	
colour_description_present_flag	u(1)
{ if colour_description_present_flag }	
{	
colour_primaries	u(8)
transfer_characteristics	u(8)
matrix_coeffs	u(8)
}	
...	
}	

Semantics of **transfer_characteristics**

Value	Transfer Characteristic	Informative Remark
0	Reserved	For future use by ITU-T ISO/IEC
1	$V \approx \alpha * L_e^{\gamma-1} - (\alpha - 1)$ for $1 \geq L_e \geq \beta$ $V \approx 4.500 * L_e$ for $\beta > L_e > 0$	Rec. ITU-R BT.709-5 Rec. ITU-R BT.1361 conventional colour gamut system (functionally the same as the values 6, 14, and 15)
...		
14	$V \approx \alpha * L_e^{\gamma-1} - (\alpha - 1)$ for $1 \geq L_e \geq \beta$ $V \approx 4.500 * L_e$ for $\beta > L_e > 0$	Rec. ITU-R BT.2020 (functionally the same as the values 1, 6, and 15)
...		
18..255	Reserved	For future use by ITU-T ISO/IEC

Values for existing SDR (Standard Dynamic Range) OETFs supported by DVB UHD phase 1 receivers

Example of extension for new OETFs

Value	Transfer Characteristic	Informative Remark
0	Reserved	For future use by ITU-TT J1604B/C
1	$V = q^{1/2} L^{0.5} \cdot (L+1)$ for $L \geq 1$, $L > 0$ $V = 4.589 \cdot L$ for $L > 0$, $L < 1$	Rec. ITU-R BT.709-5 Rec. ITU-R BT.1561 (concerned colour space system) (historically the same as the values 6, 12, and 15)
...		
14	$V = q^{1/2} L^{0.7} \cdot (L+1)$ for $L \geq 1$, $L > 0$ $V = 4.589 \cdot L$ for $L > 0$, $L < 1$	Rec. ITU-R BT.2020 (historically the same as the values 1, 6, and 15)
...		
18	$V = q^{1/2} \log_2(p) \cdot p$ for $L \geq 1$, $L > 0$ $V = \sqrt{q^2}$ for $L < 1$, $L > 0$ with $q = 4$ and p, q and p being the solution to the equations: $q = p^4 \cdot \log_2(p^4 + (1 + \sqrt{q^2 - 1})) = 4$ $p = \sqrt{q^2 - 1}$ $p = \sqrt{q^2 - 1} \cdot (1 + \log_2(q))$	IBC Hybrid Gamma OETF with $q = 4$ as proposed in document ITU-R BT.2446-0 (Nov. 30/November 2014)
19	$V = q^{1/2} \log_2(p) \cdot p$ for $L \geq 1$, $L > 0$ $V = \sqrt{q^2}$ for $L < 1$, $L > 0$ with $q = 5$ and p, q and p being the solution to the equations: $q = p^4 \cdot \log_2(p^4 + (1 + \sqrt{q^2 - 1})) = 5$ $p = \sqrt{q^2 - 1}$ $p = \sqrt{q^2 - 1} \cdot (1 + \log_2(q))$	IBC Hybrid Gamma OETF with $q = 5$ as proposed in document ITU-R BT.2446-0 (Nov. 30/November 2014)
20	$V = q^{1/2} \log_2(p) \cdot p$ for $L \geq 1$, $L > 0$ $V = \sqrt{q^2}$ for $L < 1$, $L > 0$ with $q = 8$ and p, q and p being the solution to the equations: $q = p^4 \cdot \log_2(p^4 + (1 + \sqrt{q^2 - 1})) = 8$ $p = \sqrt{q^2 - 1}$ $p = \sqrt{q^2 - 1} \cdot (1 + \log_2(q))$	IBC Hybrid Gamma OETF with $q = 8$ as proposed in document ITU-R BT.2446-0 (Nov. 30/November 2014)
21..255	Reserved	For future use by ITU-TT J1604B/C

- HEVC and AVC standards have some of reserved values for future extension.
- Problem: the legacy receivers do not recognise the new values, which used to be „reserved“
→ NOT backwards compatible even if the new value represents an SDR compatible HDR (High Dynamic Range) OETF such as BBC Hybrid Gamma OETF

Example of extension for new HDR OETFs which may be SDR compatible

1st Example of Signalling in Video Coding Layer

- **transfer_characteristics** stays equal to 1 (BT. 709) or 14 (BT. 2020)
- The presence of the **HDR hybrid gamma SEI message** signals that the content is HDR coded with the HDR/SDR compatible OETF such as BBC hybrid gamma OETF
- The HDR hybrid gamma SEI message may only be present in IRAP NAL units or I pictures and may be valid for the remainder of the coded video sequence
- It could be a prefix or a suffix SEI message

HDR_hybrid_gamma(payloadSize) {	Descriptor
HDR_transfer_characteristics	u(8)
/* The SEI message could convey other information about the HDR content if necessary */	
}	

HDR_transfer_characteristics is used to signal the HDR transfer function, which shall be compatible transfer function with SDR transfer function signalled by corresponding transfer_characteristics

- The presence of this SEI message can be made mandatory with a fixed value of HDR_transfer_characteristics in application standardization bodies

2nd Example of Signalling in Video Coding Layer

- **transfer_characteristics** stays equal to 1 (BT. 709) or 14 (BT. 2020)
- The presence of the **HDR hybrid gamma SEI message** signals that the content is HDR coded with the HDR/SDR compatible OETF such as BBC hybrid gamma OETF
- The HDR hybrid gamma SEI message may only be present in IRAP NAL units or I pictures and may be valid for the remainder of the coded video sequence
- It could be a prefix or a suffix SEI message

HDR_hybrid_gamma(payloadSize) {	Descriptor
dynamic_range_increase	u(2)
maximum_average_picture_level	u(7)
/* The SEI message could convey other information about the HDR content if necessary */	
}	

dynamic_range_increase is used to calculate the value of κ as follows and shall only be equal to 0, 1 or 2:

$$\kappa = 2 * \text{dynamic_range_increase} + 4$$

maximum_average_picture_level signals the maximum, over all the pictures of the sequence, of the average picture level, the average picture level being the average pixel luminance expressed in percentage of the maximum luminance

- Differences from SDR, such as dynamic range and maximum average picture level, are signalled for flexibility
- The presence of this SEI message can be made mandatory with a fixed value of κ in application standardization bodies (for example $\kappa = 4$ for DVB and $\kappa = 8$ for BDA)

5

3rd Example for signalling in Video Coding Layer

- Extend the Sequence Parameter Set:

seq_parameter_set_extension()	Descriptor
...	
sps_extension_present_flag	a(1)
if (sps_extension_present_flag) {	
sps_range_extension_flag	a(1)
sps_multilayer_extension_flag	a(1)
sps_hdr_hybrid_gamma_extension_flag	a(1)
sps_extension_SpHls	a(1)
}	
if (sps_range_extension_flag) {	
sps_range_precision	
if (sps_multilayer_extension_flag) {	
sps_multilayer_extension	/* specified in Annex F */
if (sps_hdr_hybrid_gamma_extension_flag) {	
sps_hdr_hybrid_gamma_extension	
if (sps_extension_SpHls) {	
while (more_sps_data) {	
sps_extension_data_flag	a(1)
}	
}	

sps_hdr_hybrid_gamma_extension()	Descriptor
dynamic_range_increase	u(2)
maximum_average_picture_level	u(7)
/* The SPS extension could convey other information about the HDR content if necessary */	
!	

dynamic_range_increase is used to calculate the value of κ as follows and shall only be equal to 0, 1 or 2:

$$\kappa = 2 * \text{dynamic_range_increase} + 4$$

maximum_average_picture_level signals the maximum, over all the pictures of the sequence, of the average picture level, the average picture level being the average pixel luminance expressed in percentage of the maximum luminance

1st Example of Signalling in Multiplexing Layer

- Signalling at the MPEG2-TS level with a new descriptor

Syntax	No. Of bits	Mnemonic
HDR_hybrid_gamma_descriptor() {		
descriptor_tag	8	uimsbf
descriptor_length	8	uimsbf
HDR_hybrid_gamma_OETF_flag	1	bslbf
reserved	7	bslbf
if (HDR_hybrid_gamma_OETF_flag == '1') {		
HDR_transfer_characteristics	8	uimsbf
/* The descriptor could convey other information about the HDR content if necessary */		
}		

- If **HDR_hybrid_gamma_OETF_flag** is equal to 1, then the content is HDR coded with the HDR/SDR compatible OETF such as BBC hybrid gamma OETF
- This descriptor could be located within:
 - PMT (Program Map Table): specified by MPEG
 - Descriptor applying to the video elementary stream only
 - However, broadcasters might not have much control to modify the PMT
 - SDT (Service Description Table): specified by DVB in DVB-SI standard
 - Applies to a whole service, so that it might be better not to change the descriptor too often
 - EIT (Event Information Table): specified by DVB in DVB-SI standard
 - Best place for a descriptor that can be changed on an event basis

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2nd Example of Signalling in Multiplexing Layer

- Signalling at the MPEG2-TS level with a new descriptor

Syntax	No. Of bits	Mnemonic
HDR_hybrid_gamma_descriptor() {		
descriptor_tag	8	uimsbf
descriptor_length	8	uimsbf
HDR_hybrid_gamma_OETF_flag	1	bslbf
reserved	7	bslbf
if (HDR_hybrid_gamma_OETF_flag == '1') {		
dynamic_range_increase	2	uimsbf
maximum_average_picture_level	7	uimsbf
reserved /* or any other information about the HDR content */	7	uimsbf
}		bslbf
}		

- If **HDR_hybrid_gamma_OETF_flag** is equal to 1, then the content is HDR coded with the HDR/SDR compatible OETF such as BBC hybrid gamma OETF
- This descriptor could be located within:
 - PMT (Program Map Table): specified by MPEG
 - Descriptor applying to the video elementary stream only
 - However, broadcasters might not have much control to modify the PMT
 - SDT (Service Description Table): specified by DVB in DVB-SI standard
 - Applies to a whole service, so that it might be better not to change the descriptor too often
 - EIT (Event Information Table): specified by DVB in DVB-SI standard
 - Best place for a descriptor that can be changed on an event basis

3rd Example of Signalling in Multiplexing Layer

- Signalling at the MPEG2-TS level by using one of the reserved values of HEVC_video_descriptor

Syntax	No. Of bits	Mnemonic
HEVC_descriptor() { ... temporal_layer_subset_flag HEVC_still_present_flag HEVC_24hr_picture_present_flag reserved if(temporal_layer_subset_flag == '1') { reserved temporal_id_min reserved temporal_id_max }	 1 1 1 5 5 3 5 3	 bslbf bslbf bslbf bslbf bslbf uimsbf bslbf uimsbf

replace
with →

Syntax	No. Of bits	Mnemonic
HEVC_descriptor() { ... hdr_hybrid_gamma_coded_content_flag if(hdr_hybrid_gamma_coded_content_flag == '1') dynamic_range_increase else reserved reserved ... }	 1 2 2 2	 bslbf uimsbf bslbf bslbf

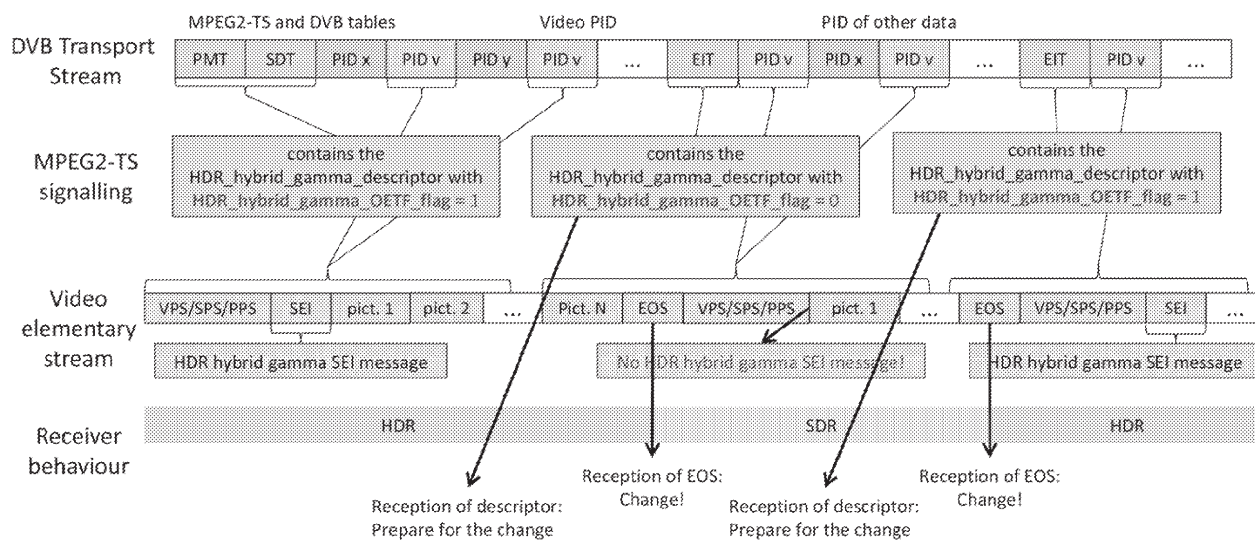
- A similar extension to the AVC_video_descriptor is possible

Example of Combined Signalling

- The HDR hybrid gamma descriptor can be used in combination with video elementary stream OETF signalling (such as the HDR hybrid gamma SEI message) to signal the parameter change in advance to the receiver (see next slide):
 - The HDR hybrid gamma descriptor with the appropriate HDR_hybrid_gamma_OETF_flag starts to be sent a few seconds ahead of the actual change
 - This enables the receiver to prepare for the change
 - EOS (End Of Sequence) is inserted in the video stream to signal that the parameter change becomes active and the following RAP contains or not the HDR hybrid gamma SEI message to confirm the previously signalled HDR hybrid gamma descriptor
 - The receiver detects the EOS and the presence or non-presence of the HDR hybrid gamma SEI message and makes the appropriate changes

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Example of Signalling and Receiver behaviour



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Electronic Acknowledgement Receipt	
EFS ID:	20857094
Application Number:	62087035
International Application Number:	
Confirmation Number:	1765
Title of Invention:	VIDEO FORMAT SIGNALLING METHOD AND APPARATUS
First Named Inventor/Applicant Name:	Virginie DRUGEON
Customer Number:	52349
Filer:	Michael S. Huppert/pam veazey
Filer Authorized By:	Michael S. Huppert
Attorney Docket Number:	PR14-1587A
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Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$ 260
RAM confirmation Number	3565
Deposit Account	230975
Authorized User	HUPPERT, MICHAEL S.
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal of New Application	ATTACHA_TRN.pdf	326504	no	1
			afa920adac5840e2003745c22fef385a0869a16a		
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Information:					
2	Application Data Sheet	ATTACHB_ADS.pdf	1561039	no	7
			21ae61b4bc869ccc56bbeed84c1c8d5cc21c4aad		
Warnings:					
Information:					
3	Specification	ATTACHC_APP.pdf	3090686	no	12
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Summary

- An SEI message to signal HDR transfer characteristics in addition to transfer characteristics signalled in VUI in order to signal that the content is HDR coded with the HDR/SDR compatible OETF such as BBC hybrid gamma OETF
- Signalling in Multiplexing Layer using a descriptor in order to signal that the content is HDR coded with the HDR/SDR compatible OETF such as BBC hybrid gamma OETF
- Combination of a new SEI message with a new descriptor to signal the change between HDR and SDR in advance to the receiver