

Version 2.5.e
Latest update : June 1, 2008
Last modifications : translation to English, further explanations

Functional and signal specifications for HD DTT (TNT)

1. Introduction

The current document is aimed at being the reference document for broadcast and reception of the following channels: TF1 HD, France 2 HD, M6 HD. It has been initiated under the HD Forum authority by the editors of above channels that will be the first to be broadcast in HD over the French DTT network (aka TNT). Here is described how these editors plan to broadcast their channel and how they expect the signal and data to be handled; due to the complexity of the vast collection of norms to be implemented at receivers' level, the editors have decided to make more explicit their expectations about how receivers should work. Though, the document does not define a restrictive scheme for functions of HD DTT receivers but to create a set of recommendations and reminders. This is to be understood rather as a code of good practice for HD TV receivers for DTT market.

2. Exec summary

The following specifications are based on European norms (IEC 62216-1 applied to DVB-T receivers) and over the legal decisions of French government and regulation authorities (document CTE - TNT/GT3 - 03, version 2.6 of 2006, March 31). Both documents are concurrently updated to integrate the constraints of HD broadcast on DTT. The IEC 62216-1 updated is currently processed by IEC¹ with the help of the joint working group composed of Simavelec and HD Forum. The aim of the specifications of the present document is to make more explicit the norms on which the editors will base their operations so that to reach their goals of quality, comfort and ease of use for their viewers.

The full set of specifications is in chapter 3 of the current document. Chapter 4 provides extra details on topics of chapter3

This document includes:

- Video and audio formats to be supported
- Numbering mechanisms
- Service signaling and updates

¹ International Electrotechnical Commission : Commission internationale de l'électronique, principal organisme international de normalisation pour les appareils de réception de télévision.

HD Forum also wants to highlight the following points:

2.1. SD / HD channels swap

- In order to ease the access to HD channels, editors expect that HD receivers that receive a channel broadcast both in HD and SD, will number the HD channel with the usual number of the SD channel. For example, TF1 HD (resp. France2 and M6 HD) should be numbered 1 (reps. 2 and 6) whereas TF1 will be placed at the number of TF1 HD on SD receivers or HD receivers that are not covered with HD. In order to do so, the editors will broadcast an additional descriptor with the SD and HD channels to swap: HD_simulcast_LCN. Chapter 3 and 4 will give more details on how to use it at receivers' level.

2.2. Audio

- For every HD channels, various audio streams will be broadcast (French Version, Original Version, and audio description). These audio streams may be very different: mono, stereo, multi-channel. Chapter 3 lists the combinations or codecs to be supported and the way receivers should use these streams. It is important to note that, for multichannel audio, support of both Dolby Digital+ and HE-AAC is requested, which means that the downmixing of these streams should be implemented for receivers that are not connected to Home Cinema equipments.
- The transcoding of a multichannel HE-AAC component to Dolby Digital or DTS is mandatory only from Dec. 31, 2009 on.

2.3. Service signaling

- This document is the opportunity to stress again how critical it is that DVB is fully implemented. In particular, It is important to note that the NIT for French DTT network will grow and will be segmented in two or more sections.
- Here are also described the DVB mechanisms to be used regarding subtitling, services for hearing-impaired and visually impaired and other descriptors and values..

3. Feature list

type	Description	Remarks	SATUS	Reference
1. Services	1.1. Support of service signaling profile SD/ HD MPEG-2/ MPEG-4 – Service type 0x01; 0x16 0x19	see note	MANDATORY	EN62216 (JWG update)
	1.2 Support of both SD and HD on the same channel (with clean switching) – Support of Linkage descriptor type 5 (service replacement service) – Support of SDT_other	See note	MANDATORY	EN62216
	1.3 Support of component sharing (audio, sub-title, teletext, audio description) for services carried on the same multiplex	same PID used by several PMT	MANDATORY	DVB SI
	1.4 Support of service with both SD and HD video streams. Automatic selection of the component that best fits usage (HD by default)		OPTION	EN62216 (JWG update)
	1.5 Support of Logical Channel numbering SD/HD (LCN)	Support for several occurrence of the same descriptor in the second loop of the NIT	MANDATORY	EN62216 (JWG update) + GT-3
	1.6 Support of HD Simulcast Logical channel number (HD_Simulcast_LCN) – During scan process, an HD receiver must swap the SD channel with the HD channel after checking the quality of the HD service is sufficient and the two services have the same Network_ID. – when trouble reception, an alert should inform user of the availability of the SD version on another logical number.	See Note	MANDATORY	EN62216 (JWG update)

type	Description		Remarks	SATUS	Reference
	1.7 Selection of main network (especially on borders) – By default, the channels that do not belong to "main network" are numbered after channels of "main network" (e.g. on German border, for receivers that selected France as the main network, the German channels numbers come after the French channels)			MANDATORY	DVB SI
2. services discovery	2.1 Automatic or semi-automatic re-scanning for a local modification of network (e.g. coverage extension, new local channel...) – support of descriptor « Network_change_notify » and « Network_change_information »		The implementation should be mandated only when the specifications are completed by DTG. See note	SUSPENDED	D-Book (pending)
	2.2 Automatic or semi-automatic rescanning for national-wide network modifications (multiplex changes, new channel declaration) – triggered when NIT version number is incremented		This recommendation is valid only when no other advanced mechanism is in place See note	MANDATORY	
	2.3 full support of SI Table over multiple sections		(cf issues on NIT double section experienced on sept 2007)	MANDATORY	EN62216
3. Video	3.1. SD	3.2 HD			
	3.1.1 MPEG-2 MP @ ML (max 15 Mbits/s) - Resolution : 720x576, 704x576, 544x576, 480x576, 352x576	3.2.1 MPEG-4 HP @ L.4 (max 20 Mbits/s) - Resolution : 1920x1080i, 1440x1080i, 1280x720p		MANDATORY	EN62216 (JWG update)
	3.1.2 MPEG-4 MP @ L.3 (max 10 Mbits/s) - Resolution : 720x576, 704x576, 544x576, 480x576, 352x576			MANDATORY	

type	Description		Remarks	SATUS	Reference
3. Video	3.3 Management of advanced format information (SD/HD) – Aspect ratio (4/3 ; 16/9) – AFD (4/3; 16/9; 14/9) frame-accurate management (the data may be found at various location in the stream sequence: GOP, frame, for MPEG-2 and VUI area for H,264...)		See note	MANDATORY	EN62216
	3.4 Respect of Display Aspect Ratio for UP/Down conversion		See note	MANDATORY	EBU R92-1999
4. Audio	4.1 Audio Mono / stereo				
	Input. Support of :	Expected output			
	4.1.2. MPEG1 layer I et II (Musicam) & MPEG-2 layer II	Analogue stereo		MANDATORY	
		S/PDIF PCM stereo	If S/PDIF output is available	MANDATORY	
		HDMI PCM stereo	Mandatory for STB	MANDATORY	
	4.1.3. HE-AAC (channel configuration 1/0 and 2/0)	Analogue stereo		MANDATORY	
		S/PDIF PCM stereo	If S/PDIF output is available	MANDATORY	
		HDMI PCM stereo	Mandatory for STB	MANDATORY	
	4.1.4. Dolby Digital (mode 2/0) - use of metadata for audio level alignment	S/PDIF PCM stereo		MANDATORY	
		HDMI PCM stereo	Mandatory for STB	MANDATORY	
		S/PDIF Dolby Digital 2/0	If S/PDIF output is available and if reciever configured with "Home cinema" audio output	MANDATORY	

type	Description		Remarks	SATUS	Reference
4. Audio		HDMI PCM stereo	Mandatory for STB	MANDATORY	
		HDMI Dobby Digital (mode 2/0)	Mandatory for STB with "Home cinema" audio output activated	MANDATORY	
	4.1.5.Dolby Digital Plus (mode 2/0) - use of metadata for audio level alignment - support of descriptor Audio_Description	Analogue stereo		MANDATORY	
		S/PDIF PCM stereo		MANDATORY	
		S/PDIF Dolby Digital 2/0 Dolby Digital transcoding	Mandatory for STB with "Home cinema" audio output activated	MANDATORY	
		HDMI PCM stereo	Mandatory for STB	MANDATORY	
		HDMI Dobby Digital mode 2/0 Dolby Digital transcoding	Mandatory for STB with "Home cinema" audio output activated	MANDATORY	
	4.2 Multichannel				
	Input. Support of :		output		
	4.2.1.Dolby Digital (mode 3/2) - smooth switching between mode 3/2 and mode 2/0 - use of metadata for audio level alignment	Analogue stereo Downmix stereo		MANDATORY	
		S/PDIF PCM stereo Downmix stereo	If S/PDIF output is available	MANDATORY	
		S/PDIF Dolby Digital (mode 3/2)	If S/PDIF output is available and reciever configured in mode « Home Cinema »	MANDATORY	
		HDMI PCM stereo Downmix stereo	Mandatory for STB	MANDATORY	
		HDMI Dolby Digital (mode 3/2)	Mandatory for STB with "Home cinema" audio output activated	MANDATORY	

type	Description		Remarks	SATUS	Reference
4. Audio	4.2.2. Dolby Digital Plus (mode 3/2) - smooth switching between mode 3/2 and mode 2/0 - use of metadata for audio level alignment - support of descriptor Audio_description	Analogue stereo Downmix stereo		MANDATORY	
		S/PDIF PCM stereo Downmix stereo	If S/PDIF output is available	MANDATORY	
		S/PDIF Dolby Digital (mode 3/2) Dolby Digital transcoding	If S/PDIF output is available and receiver configured in mode « Home Cinema »	MANDATORY	
		HDMI PCM stereo Downmix stereo	Mandatory for STB	MANDATORY	
		HDMI Dolby Digital (mode 3/2) Dolby Digital transcoding	Mandatory for STB with "Home cinema" audio output activated	MANDATORY	
	4.2.3. HE-AAC Mulicanal (channel configuration 3/2 or 3/2+LFE) - smooth switching between mode 3/2 and mode 2/0 - use of metadata for audio level alignment	Analogue stereo Downmix stereo		MANDATORY	
		S/PDIF PCM stereo Downmix stereo	If S/PDIF output is available	MANDATORY	
		S/PDIF Dolby Digital (mode 3/2) Dolby Digital transcoding or DTS	Mandatory from 2009/12/31, If S/PDIF output is available and receiver configured with "Home Cinema" audio output	MANDATORY	
		HDMI PCM stereo Downmix stereo	Mandatory for STB	MANDATORY	

type	Description		Remarks	SATUS	Reference
4. Audio		HDMI Dobby Digital (mode 3/2) Dolby Digital transcoding or DTS	Mandatory from 2009/12/31, If S/PDIF output is available and receiver configured with "Home Cinema" audio output	MANDATORY	
	4.3. Alignment of audio levels – use of metadata – use of Dolby recommendations – by user		See note	MANDATORY	EN62216 JWG update
	4.5. Audio/video synchronization – maximum +5ms (audio in advance) or -15ms (video in advance)			MANDATORY	EBU R37-2007
	4.6. Original version for audio - Support of QAA as value of descriptor ISO_639_language_descriptor (with meaning equal to original version)		When receiver finds a component with language equal to "QAA", it must be translated into "V.O.". It must also be coherent with choice of preferred language in user-interface.	MANDATORY	
	4.7. Audio Description (additional audio stream for the visually impaired) - 2 modes must be supported. In mode 1, audio_description component is premixed. In mode 2, audio_description component must be mixed with regular audio component (identified by the same language code) – mode 2 must be 5.1-DD+ compatible if main audio is multichannel the audio-description mixed output should remain multichannel			OPTION	EN62216 + GT3 (CSA)
5. Metadata	5.1. Support and display of DVB-TXT (teletext EN300 472)			OPTION	EN62216

type	Description	Remarks	SATUS	Reference
5. Metadata	5.2. support an display of subtitle Original version and French Version – DVB-Sub (HD version) –>support of descriptor Display Definition Segment		MANDATORY	EN62216 JWG update
	5.3. Support and rendering of hearing impaired sub-titles – DVB-SUB –>Descriptor "Hearing impaired"		MANDATORY	EN62216 JWG update
	5.4. Support of EIT P/F		MANDATORY	EN62216
6. software download	6.1. Support of DSM-CC and DVB OUI – Editors strongly recommend the implementation of over-the-air software download. These mechanisms should be able to address the biggest part of the embedded software. In particular, as, downmixing of HE-AAC multi-channel will be available only later in 2009, the download mechanisms should enable the update of such codecs.		OPTION	EN62216 + GT3 (CSA)
7. Audio/video output	7.1.Feed of all audio and video outputs with the proper signal – in particular, downmixing for stereo audio output	TV + STB	MANDATORY	EN62216 JWG update
	7.2. S/PDIF output – support of AC-3 (Dolby Digital), DTS and PCM – User interface must allow S/PDIF to be fed with PCM whatever the original source	TV + STB	MANDATORY	EN62216 JWG update

type	Description		Remarks	SATUS	Reference
7. Audio/video output	7.3. HDMI connector – HDCP – compressed audio: Dolby Digital – Support of metadata CEA-861-D (AFD format information) – Automatic lip synch correction		STB	MANDATORY	HDMI
8. RF input	8.1. Reminder of RF details Where UHF IV and V bands are used, the centre frequencies f_c of the incoming DVB-T RF signals are: $f_c = 474 \text{ MHz} + (N - 21) \times 8 \text{ MHz} + \text{offset}$ $N = \{21, \dots, 69\}$ (UHF channel number) In France, offset is - 1/6 MHz, 0 MHz, + 1/6 MHz, + 1/3 MHz or + 1/2 MHz.			MANDATORY	EN62216 + GT3 (CSA)

4. Notes and detailed explanations of features

Ref. 1.1. handling of SD/ HD MPEG-2/ MPEG-4 service signaling

- Service type 0x01; 0x16 0x19

According to updated norm EN 62216-1 (chap. 9.2.7.2.1 Service type - IEC Version EBook_V2_Inc_HD_080108.pdf)

The HD-compatible receiver must support both SD and HD services that are encoded in MPEG-2 (SD) and MPEG-4 (HD). The descriptor « service_type » in the SDT and in the NIT (“service_list”) gives information about the codec and the format as following :

Format / Codec	Service Type
SD / Mpeg-2 (Only)	0x01
SD / Mpeg-2 and Mpeg-4 (e.g. pay TV channels with free windows)	0x01
SD / Mpeg-4 (Only)	0x16 / 0x01
HD Mpeg-4 (Only)	0x19 / 0x01
SD/HD / Mpeg-2 and Mpeg-4 (e.g. pay TV channels with free windows)	0x01

A service can be in HD, SD, MPEG2 (SD), MPEG4 (SD/HD) and switch from one to the other at any time of the day. These format/codec changes over time should not be noticeable to end user.

Note that the implementation of this feature is very important so that SD MPEG2 receivers can display pay TV channels that have free-to-air windows on their schedule.

Note: services with service_type = 0x01 may carry video encoded in different type of codecs, including HD and advanced codecs. This is defined in EN 300 468 and TR 101 211. The video codec used for the service may even vary over time. It is however a reasonable expectation that basic receivers will not be able to decode services with service_type = 0x0A, 0x16 or 0x19.

Ref. 1.2 switching from SD to HD (and vice versa) on the same channel

- Support of Linkage_descriptor type 5 (service replacement service)
- Support of SDT_other

Extract of updated version of EN 62216-1 (chapitre 9.2.7.1.4 Linkage descriptor - IEC Version EBook_V2_Inc_HD_080108.pdf)

Linkage descriptor

Linkage type 5 is the “service replacement service” linkage. Broadcasters may include this descriptor for part time HD simulcast service

- The current service is not broadcast all of the time but there is a suitable alternative service that can be used instead, e.g. a regional variant of a service that has a linkage descriptor pointing to its parent service.
- The current service is an HD simulcast of an SD service, in which case the linkage descriptor points at the SD service.

While displaying the replacement service, the receiver shall monitor the status of the original service through the running_status in SDT_{actual} or SDT_{other}. When the running_status of the original service changes to “running”, the receiver shall switch back to this original service immediately.

Ref. 1.6 Support of HD Simulcast Logical channel number (HD_Simulcast_LCN)

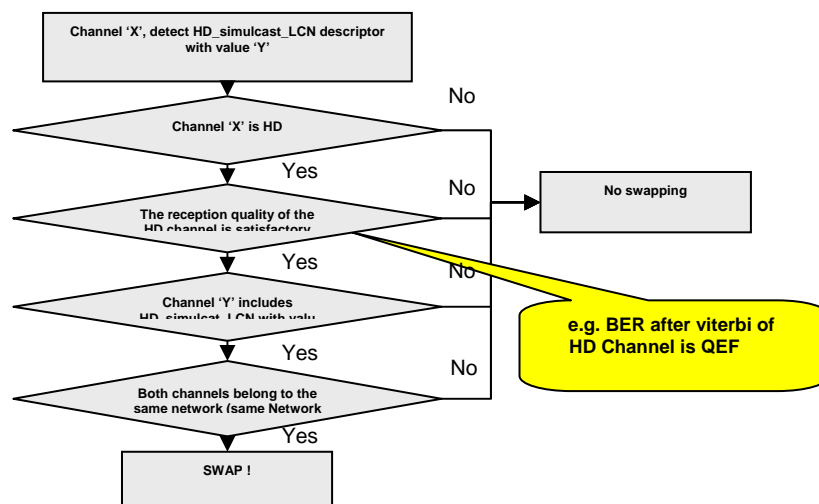
- During scan process, an HD receiver must swap the SD channel with the HD channel after checking the quality of the HD service is sufficient and the two services have the same Network_ID.
- when trouble reception, an alert should inform user of the availability of the SD version on another logical number.

The HD Simulcast Logical Channel Descriptor provides a means to override the default channel number label of services for an advanced receiver. This information is quasi-static. The HD simulcast logical channel descriptor may be inserted in the second descriptor loop of the NIT. The descriptor may appear more than once in this location.

During the scanning process, if an LCN_Simulcast_HD descriptor is linked to a service, then two possibilities :

1. the service is an SD. No action, just saving both LCN and LCN_Simulcast_HD value.
2. the service is HD.(remember that an HD service could have a service type 0x01), then the following process should be done:
 - a. Receiver should ensure to have a good quality for the HD service. (e.g. quality test could be Bit Error rate (BER) after viterbi is Quasi Error Free (QEF))
 - b. Receiver should extract the number allocated by the HD_Simulcast_Descriptor of the HD service.
 - c. Receiver should detect which service is already linked to this number. (It must be an SD service so there is no need to analyze it)
 - d. Receiver should check if the two services have the same Network_Id.
 - e. Then, the swapping of both services could be done. (In general when broadcasting SD and HD simulcast services both would have a LCN_Simulcast_HD descriptor, with value swapped from their own LCN value)

During current operations, when the HD channel has bad quality (e.g. casual incident on the broadcast network), it is recommended to display a message that explains that another version of the channel is available on another number.



Example of Algorithm (this is a suggestion and receivers manufacturers are

Ref. 2.1 Automatic or semi-automatic Re-scanning for local network modification

- support of descriptors « Network_change_notify » and
« Network_change_information »

Important: This feature is not yet mandated as the specification edited by DTG is not completed.

According to « DTG_autoretune_proposal » proposed by DTG to ease switch-off operation or any local network modification.

These descriptors are used to notify a « local » modification of the services signaling and that needs a rescanning to be taken into account. This includes coverage extension of new multiplex (e.g. R5 multiplex in France) or adding of a new local channel or frequency changes for a multiplex.

The mechanism uses the CELL_ID specific to each transmitter (which means that it is also specific to each multiplex). These CELL_ID are attributed by the French regulation authority, the CSA. By being associated with CELL_ID, the descriptor « Network_change_notify » and « Network_change_information » can target the only receivers covered by a selection of transmitters. This selection will have to best fit the geographical zone where the rescanning is needed.

The DTG guideline adaptation to include this mechanism is still in progress, but this mechanism should be implemented (or downloaded on deployed receivers) once it is completed.

Ref. 2.2 Automatic or semi-automatic Re-scanning for multiplex reorganization or nation-wide network modification

- triggered by incrementing of Version Number in the NIT

The increment of the version should be interpreted by receivers as a notification of nation-wide network modification that needs rescanning. Such nation-wide network modifications are reorganization of multiplexes, addition or deletion of national channel. Upon detection of such modifications, receivers should either make/propose a rescanning of all the channels when it is best for users.

This recommendation is to be understood as a default mechanism: many receivers have implemented more complex and efficient mechanisms to detect change in the network and update the channels list.
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Ref. 3.3 Management of advanced format information (SD/HD)

- Aspect ratio (4/3 ; 16/9)
- AFD (4/3; 16/9; 14/9) frame-accurate management (the data may be found at various location in the stream sequence: GOP, frame in MPEG-2 or in VUI area in H.264...)

Extract of the updated version of norm EN 62216-1 (chap 6.4.3.2 Manufacturer rule - IEC Version EBook_V2_Inc_HD_080108.pdf)

The data about format that are included in the DVB streams are at two levels.

Aspect ratio is used for the coding format (4/3 or 16/9) whereas AFD indicate what is the zone of the picture to be used. For example, if an HD program, which is 16/9 by default, is actually an up-conversion of a 4/3 program, the AFD will carry this information.

It is to be noted that the AFD data value is different according to the codec.

Aspect ratio information is related to GOP (12 to 35 pictures on average), whereas AFD can be frame-accurate (and the information may lie at different part of the stream)

Receivers will interpret the changes as soon as they are detected so as not to impact transitions.

AFD value code must be translated into WSS on SD analogue output (SCART, YUV,RGB,...).

Table of mandatory AFD values :

Active_format	Aspect ratio of the "area of interest"	implementation
0000	AFD unknown (see below)	
0001	Reserved	
0010	box 16:9 (top)	
0011	box 14:9 (top)	
0100	box > 16:9 (centre)	Mandatory
0101 – 0111	Reserved	
1000	Active format is the same as the coded frame	Mandatory
1001	4:3 (centre)	Mandatory
1010	16:9 (centre)	Mandatory
1011	14:9 (centre)	Mandatory
1100	Reserved	
1101	4:3 (with shoot & protect 14:9 centre)	Mandatory
1110	16:9 (with shoot & protect 14:9 centre)	Mandatory
1111	16:9 (with shoot & protect 4:3 centre)	Mandatory

Ref. 3.4 Respect of Display Aspect Ratio for UP/Down conversion

According to updated norm EN 62216-1 (chap 5.3.5 Video Alignment – IEC Version EBook_V2_Inc_HD_080108.pdf)

Reference to norms EBU BT 470 related to formats.

For a down-conversion operation to feed SD outputs, the HD signal must be reduced to resolution 702x576 and centered on the window of the SD video output.

For an up-conversion operation to feed an HD output, this is the centered 702x576 clipping of the SD picture that must be up-converted to create the HD signal.

Moreover, the following table describes the conversion rules with the AFD.

Conversion SD 4/3 (associated to AFD) to HD (with respect of Display Aspect Ratio)

	SD Aspect Ratio 4/3		Conversion HD 16/9			
Code AFD	Vertical active size	Horizontal active size	Vertical active size	Horizontal active size	Vertical scaling to fill active area	Horizontal scaling to fill active area
4/3	576	702	1080	1440 (center)	45/24 (1080/576)	80/39 (1440/702)
14/9	494 (center)	702	1080	1680 (center)	540/247 (1080/494)	280/117 (1680/702)
16/9	430 (center)	702	1080	1920	108/43 (1080/430)	320/117 (1920/702)

Conversion SD 16/9 to HD (with respect of Display Aspect Ratio)

	SD Aspect Ratio 16/9		Conversion HD 16/9			
Code AFD	Vertical active size	Horizontal active size	Vertical active size	Horizontal active size	Vertical scaling to fill active area	Horizontal scaling to fill active area
4/3	576	702	1080	1920	45/24 (1080/576)	320/117 (1920/702)
14/9						
16/9						

The conversion rules in the table above do not take AFD code into account

Conversion HD (associated to AFD) to SD 4/3 (with respect of Display Aspect Ratio)

	HD Aspect Ratio 16/9		Conversion SD 4/3			
Code AFD	Vertical active size	Horizontal active size	Vertical active size	Horizontal active size	Vertical scaling to fill active area	Horizontal scaling to fill active area
4/3	1080	1440 (center)	576 (center)	702	24/45 (576/1080)	39/80 (702/1440)
14/9	1080	1680 (center)	494 (center)	702	247/540 (494/1080)	117/280 (1680/702)
16/9	1080	1920 (center)	430 (center)	702	43/1080 (430/1080)	117/320 (702/1920)

Conversion HD to SD 16/9 (with respect of Display Aspect Ratio)

	HD Aspect Ratio 16/9		Conversion SD 16/9			
Code AFD	Vertical active size	Horizontal active size	Vertical active size	Horizontal active size	Vertical scaling to fill active area	Horizontal scaling to fill active area
4/3	1080	1920	576	702	24/45 (576/1080)	117/320 (702/1920)
14/9						
16/9						

The conversion rules in the table above do not take AFD code into account.

More details :

In digital SD, there is a difference between the video broadcast and the useful, active area of the video, due to analogue video history. This difference doesn't remain in HD.

The digital SD video signal as it is produced from the norm D1 specifies an active line duration of 53,3µs, equivalent to 720 pixels, whereas the SD PAL norm specifies an active line duration of 52 µs equivalent to 702 pixels. This difference translates into 9 pixels on the right side of the picture and 9 pixels on the left side. These 9+9 pixels must be ignored as per the recommendations of EBU.

This is treated by the SD receivers for a digital => analogue conversion according to the EN 62216 norm-1, as follows.

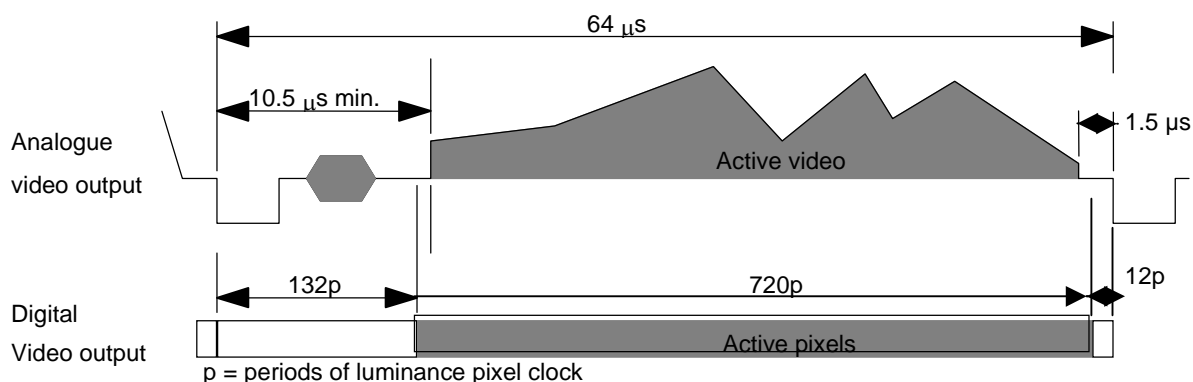


Figure 1 – Relationship between digital video and analogue video

Ref. 4.3. Alignment of audio levels

- use of metadata
- use of Dolby recommendations
- by user

According to updated version of EN 62216-1 (chap 7.2.3 Audio metadata - IEC Version EBook_V2_Inc_HD_080108.pdf)

The audio level of a stereo component is not the same as the level of a multichannel audio component. For the comfort of the viewers, these levels must be adjusted by the receivers so that

when the viewer goes from a multichannel audio program to a stereo audio program, there is no unpleasant sound gap.

In France, audio levels in digital broadcast for stereo will be modified in 2008 from -12 dB FS to -18 dB FS in order to get closer to Other European countries. A multichannel audio component is aligned to -31dB FS.

Audio level alignment must be done through **3 combined means**:

1. The metadata
 - The signal carries metadata associated to multichannel codecs and audio-description component. These metadata must be interpreted and applied by the receiver.
2. Dolby recommendations
 - If the receiver is equipped with a multichannel audio output (S/PDIF or HDMI with DD/DTS option) ; then the Dolby recommendations must be implemented and applied.
3. By user
 - There must be the appropriate option in the receiver user-interface, so that user can adjust the audio levels between stereo and multichannel.
 - The user must be able to adjust the audio level for mixing of audio description.
 - For TV sets, the user must be able to adjust audio level for an analogue reception (warning : stereo on analog network remain at -12 dB FS).

Ref. 7.3. HDMI 1.3 connector

- HDCP
- compressed audio: Dolby Digital
- Support of metadata CEA-861-D (AFD format information)
- Automatic lip synch correction

The Automatic lip synch correction feature is key in case of a usage of HD screen and external HD equipment that manage separately the audio (e.g. DTT HD STB, Satellite HD STB, Blu-Ray etc...).

Video screens are processing a lot of video treatment with their video input that generate a delay that may impact the viewers with a de-synchronization of audio and video.

The lip synch correction is managed by the exchange of information through HDMI about audio and video delay between the TV screen (and potentially audio device) and each element of the chain up to the receiver/player. The receiver/player must delay the audio on the analog and SPDIF output of the corresponding amount of time to guaranty the synchronization of the audio and video. This delay shall not be applied for audio conveyed through HDMI.

Delay shall be applied by each device of the chain when the output of the video (through HDMI) and audio (through analog or SPDIF) are separated.

The HDMI lipsynch mechanisms must be implemented at different levels:

- The STBs must be able to receive and treat the data from screen to adjust the playing of audio on the SPDIF and analog output.
- Audio device equipped with HDMI input must be able to receive and treat the data from screen to adjust the playing of audio.
- The TV must be able to send accurate data about the delay generated by video processing so that the equipment that plays audio (esp. Home Cinema Amplifiers) receives the audio in the proper time-frame.

The compressed audio mode enables users with Home cinema system with the lipsynch option to not use a dedicated audio cabling to benefit of multichannel audio.