



Rai – Radiotelevisione Italiana S.p.A.

TECHNICAL FILE DELIVERY SPECIFICATIONS FOR HD TV COMMERCIALS

February 2021

SUMMARY

1	Introduction	3
2	Glossary	3
3	Accepted video recording formats	3
3.1	HDTV Profile MXF/XDCAM HD422 1080i25	3
3.2	MOV/ProRes422HQ 1080i25 HDTV Profile	4
4	File delivery of audio/video content.....	4
5	Image composition.....	5
5.1	Safe area for action and titles.....	5
5.2	Video bugs and channel graphics.....	6
5.3	Video vertical blanking interval content	6
5.4	Video levels, gamut errors, and not permitted signals	6
6	Audio signal requirements	7
6.1	Audio channels mapping	7
6.2	Loudness	7
7	Quality requirements.....	7
7.1	ANTI-PSE.....	8
8	Packaging video/audio files	8
8.1	Video file contents	8
8.2	Start and end tails – delivery the material by web portal	8
9	Standards, Recommendations and Technical Regulations	8

1 Introduction

This document describes the technical specifications for the delivery of audio video files related to the commercials to be broadcast on Rai distribution platforms.

Television commercials must be delivered to Rai only in high definition (HD) according to the formats indicated below.

Rai will systematically submit all television commercials received to a technical quality control; all commercials that do not meet the technical requirements of sound and image quality specified below will be qualified as non-transmittable and rejected.

All references to international recommendations and regulations (EBU, ITU, ISO) mentioned in this document are related to the most recent public versions of these documents.

The requirements below are essential and mandatory and represent the minimum level required.

2 Glossary

ANCILLARY DATA - auxiliary data transported within the deletion intervals required by video standards

ATC-VITC, ATC-LTC – time code information inserted into the ancillary data of the video signal

European Broadcasting Union (EBU)

GAMUT – a set of colors that the device or the peripheral can produce, reproduce, or capture, and is a subset of visible colors (<https://it.wikipedia.org/wiki/Gamut>).

ISO - International Organization for Standardization

IEC – International Electrotechnical Commission

Itu - International Telecommunication Union

LTC – longitudinal timecode

ProRes™ - Coding technology developed by Apple®

SMPTE - Society of Motion Picture and Television Engineers

COMMERCIAL – short television advertising message

VIDEO BUG –small graphic image on the video image

XDCAM™ HD422, a recording format introduced by Sony based on MPEG-2

3 Accepted video recording formats

3.1 HDTV Profile MXF/XDCAM HD422 1080i25

The Table summarizes the main features of *the HDTV profile MXF/XDCAM HD422 1080i25* based on the specifications indicated in the SMPTE RDD9:2013 document.

HDTV Profile MXF/XDCAM HD422 1080i25

MXF Operational Pattern	Op-1a
Essence Container	MPEG ES Mapping, AES-BWF Mapping Generic Essence Multiple Mapping
Video	1920x1080 pixels, 25 frames per second, interlaced scan, YCbCr, 4:2:2, 8 bits MPEG-2 Long GOP, 50Mbit/s
Audio	8 mono PCM channels, 48KHz, 24-bit
Specific regulatory references	
SMPTE RDD 9:2013	MXF Interoperability Specification of Sony MPEG Long GOP Products
ISO/IEC 13818-2	Generic coding of moving pictures and associated audio: Part 2: Video

3.2 MOV/ProRes422HQ 1080i25 HDTV Profile

The Table summarizes the main features of the *MOV/ProRes 1080i25 HDTV profile* based on the Apple ProRes™ compression.

HDTV Profile MOV/ProRes422HQ 1080i25

Essence Container	Apple Quicktime
Video	1920x1080 pixels, 25 frames per second, interlaced scan, upper field, RGB, 4:2:2, 10 bits Apple ProRes™ 422HQ⁽¹⁾
Audio	8 mono PCM channels, 48KHz, 24-bit

(1) https://www.apple.com/final-cut-pro/docs/Apple_ProRes_White_Paper.pdf

NOTE: The acceptance of content in formats other than those specified above will be possible only by a specific agreement with Rai.

4 File delivery of audio/video content

Each commercial must be sent at least 4 (four) business days before its air date to allow Rai to perform the control operations. Rai is committed to keep in its systems for one year all commercials received and judged transmittable; if it is deemed necessary to use a commercial spot beyond this date, it must be considered as a new one and must be re-sent.

Rai accepts the contents through the Rai web platform, <http://pubblicita.raitrade.it/> where every user, once registered, can:

- get a delivery identification code

- add a description and other metadata
- add, if expected, the Auditel tracking code
- send the video file to be aired.

To use the web platform, please refer to the user manual published on the website www.controllopubblicita.rai.it.

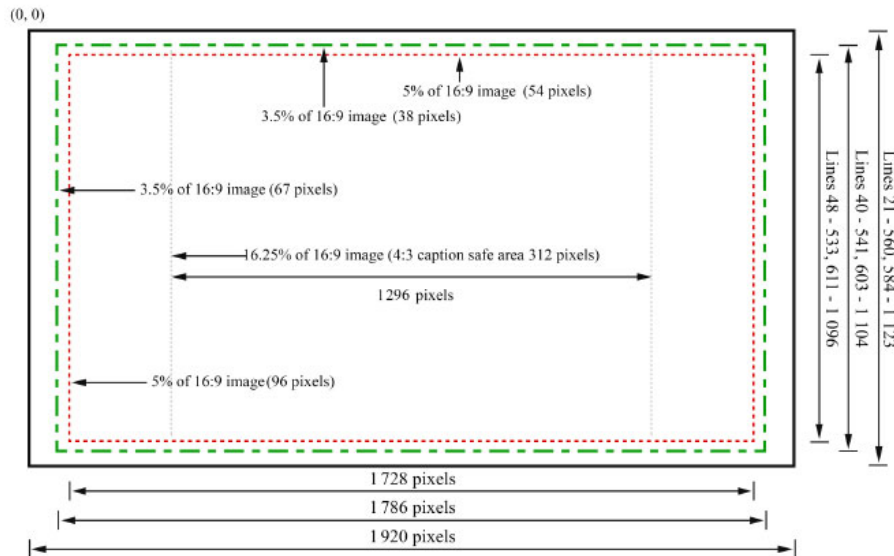
Rai provides also an automatic interface reserved to advertising delivery companies, accredited on Rai systems, that operate at national or international level.

5 Image composition

5.1 Safe area for action and titles

Figure 1 specifies the area of the television image useful for the action ("safe action area"), into which the most important parts of the image must fall, and the area useful for the titles ("safe title area").

Scanning raster 1080i and 1080psf 16:9 safe areas for 16:9 presentation
Image format: 16:9 Full Format



* The total number of lines is 1125 (active lines from 21 to 560 and 584 to 1123 inclusive = 1080 lines).

Figure 1

The following areas are highlighted in the figure (Ref. EBU Recommendation R95):

- Green: useful area for the action
- Red: useful area for titles

The images of the TV commercials provided must comply with Figure 1.

5.2 Video bugs and channel graphics

During the broadcast of the advertising, the channel logo and the advertising logo are located according to the positions shown in the following figure. Therefore it is recommended that there are no written content, video bugs or other elements that overlap with the channel graphics in the shown positions.



Figure 2

5.3 Video vertical blanking interval content

Rai reserves the use of the vertical blanking interval and ancillary data. Therefore any information inserted in these positions in the delivered files will be deleted by the preparation systems.

5.4 Video levels, gamut errors, and not permitted signals

HDTV signals will be measured according to the ITU-R BT.709 recommendation. Video levels must fall within specific limits so that the program can be used without further processing.

Any signal outside the specified limits is considered a gamut error. Using traditional representations where the nominal level of black is represented at 0 mV (or 0%) and the nominal white level is represented at 700 mV (or 100%) RGB components are required to comply with EBU Recommendation R 103, i.e.:

- Components R, G, and B fall between -35 mV and 735 mV (-5% and 105% respectively)

- The luma (Y) component falls between -7 mV and 721 mV (-1% and 103% respectively)

Considering the difficulty in controlling transients, a margin of error quantified in 1% of the number of pixels is allowed. Only video frames with more than 1% of pixels outside the specified bounds will be considered as gamut errors.

6 Audio signal requirements

6.1 Audio channels mapping

All commercials must be delivered with a stereo soundtrack.

The number of audio channels must comply with the video standard (see paragraph 3). The first two must contain the soundtrack, all the others must contain audio silence.

6.2 Loudness

Commercial audio shall be normalized using the measurement methodologies provided for by the current EBU recommendations.

Specifically, it is required that measurements of *Program Loudness Level*, *Maximum Short Term Loudness* and *Maximum True Peak Level* are made on the audio signal and that these measurements comply with the values shown in the following table:

Program Loudness Level	-23.0 LUFS ±0.2 LU
Maximum Short Term Loudness	-18.0 LUFS ±0.2 LU
Maximum True Peak Level	-2.0 dBTP ± 0.3 dBTP

These measures are defined in the EBU R128, EBU R128s1, ITU-R BS.1770 recommendations and in the EBU Tech 3341.

The Measure of *the Loudness Level Program* must refer to the entire duration of the commercial from the first video frame excluding the technical head and tail signals.

7 Quality requirements

Rai carries out a quality check during the acceptance of the audio/video file, relating both the image and the sound and requires that these have "excellent" quality i.e. grade 5 on the evaluation scale of the ITU-BT 500-14 Recommendation.

7.1 ANTI-PSE

Flashes of light, intermittent lights and certain types of repetitive visual patterns can cause problems for viewers with photosensitive epilepsy (PSE). Television is, by its very nature, an intermittent light source and therefore it is not possible to completely eliminate the risk of causing seizures in subjects suffering from this form of epilepsy; however, some precautions are possible to reduce the risk, especially when free and unnecessary. It is advisable to consult the website of the Independent Television Commission (www.ofcom.org.uk) for some basic guidelines on this issue.

8 Packaging video/audio files

8.1 Video file contents

Each video file must contain only one commercial.

8.2 Start and end tails – delivery the material by web portal

Each video file must include the appropriate start and end tails.

The contents of the start and end tails are summarised in Table 1.

Table 1

Program section	Duration (sec)	Video	Audio
Identification tails	5" (minimum)	Video identification	Audio identification or silence
Start tail	3"	Black	Silence
Program	Program duration	Video program	Audio of the program
End tail	3" (minimum)	Black	Silence

Please note that the time code track should preferentially mark 10:00:00:00 at the beginning of the commercial (first serviceable video frame) and in any case must be continuous and uninterrupted. The black and audio silence of the tails are used by Rai to trim the clip with 5 (five) video frames of black necessary for the separation between the individual commercials on air.

9 Standards, Recommendations and Technical Regulations

Riferimento -	Title
ITU-R BT.500	Methodology for the subjective assessment of the quality of television pictures
ITU-R BT.1702	Guidance for the reduction of photosensitive epileptic seizures caused by television
ITU-R BS.1770	Algorithms to measure audio program loudness and true-peak audio level
ITU-R BT.709-6	Parameter values for the HDTV standards for production and international programme exchange
EBU R95	Safe Areas for 16:9 Television Production

EBU R128	loudness normalization and permitted maximum level of audio signals
EBU R128 s1	Loudness parameters for short-form content (adverts, promos, etc.)
EBU Tech. 3341	Loudness metering: Ebu mode metering to supplement EBU R128 Loudness normalization