PROGRAM DELIVERY SPECIFICATIONS AND REQUIREMENTS FOR NOVA TV

Ver.17 / August 2019

I. INTRODUCTION

Document Objectives

This document defines the technical standards for programmes that have been commissioned or contracted by **NOVA TV** for broadcasting.

The document is a compact reference for all those charged with delivering programmes - production staff, including technicians and producers, independent production companies and distributors providing programmes for **NOVA TV**. It set outs the technical requirements for delivery to ensure that delivered material is of a satisfactory standard.

Technical Acceptance Procedures. QAR (Quality Assessment Review)

All materials delivered to **NOVA TV** for transmission must be subject to a Quality Assessment Review prior to delivery.

As well, from **NOVA TV** side, a Quality Control will be performed to every delivered material to ensure it meets the requirements set out in this document.

NOVA TV retains the right to final acceptance or rejection of any materials delivered which does not pass the Quality Assessment Review, whether measured or subjectively assessed.

Any programme failing to meet the required technical standards, will be referred back to the supplying production company.

Programme must be delivered to **NOVA TV** at least 48 hours prior its programmed transmission in order to have enough time for rectification.

In case of issues about any programme which does not fit the minimum acceptable technical requirement described in this document and there is not possibility to be fixed by the company-producer, then **NOVA**'s in-house team will try to fix the material. In this case additional charges of 100 euro /material would be applied to the company supplier.

If programme is committed to be broadcasted by third part companies an additional requirement are described in appropriate appendix at the end of this document.

Technical Liaison (Contacts):

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II. GENERAL TECHNICAL REQUIREMENTS

Technical Quality Grading

The ITU / CCIR 5 point grading scale is used to assess materials for quality for television transmission.

Overall quality of sound and vision shall be not less than Grade 4 of the ITU 5-point Quality Grading Scale:

ITU-R Quality and Impairment Scale:

Quality	Impairment
5 - Excellent	5 - Imperceptible
4 - Good	4 - Perceptible, but not annoying
3 - Fair	3 - Slightly annoying
2 - Poor	2 - Annoying
1 - Bad	1 - Very annoying

Grade 3 is a borderline pass where there are valid reasons for technical exemption, in which case details should be clearly stated on the recording report. Grades 1 and 2 are automatic fails.

File Delivery Formats

	NOVA TV
VIDEO	**SD**
Video Resolution	720 x 576
Aspect Ratio	**16 : 9, DV PAL Widescreen (1.77777)**
Frame Rate	25fps
Field Order Dominance	Lower Field First
Format/Codec/Profiles	File Extension: .mov DV PAL QuickTime (MOV), DV25

Bitrate	25 Mb/s - Constant Bit Rate

AUDIO

Codec	uncompressed
Channels	2 Track 1 (CH1) – Left Mix (Stereo) Track 2 (CH2) – Right Mix (Stereo)
Sample rate	48 kHz
Format	16-bit integer Little Endian
Bit rate	*
Audio Levels	**Max Peak:-9 dBFs;** **Program loudness -23LUFS+/-1db (EBU R 128);**

	NOVA TV
VIDEO	**HD**
Export	MXF OP1a
Codec	**XDCAM HD 50 PAL (4:2:2)**
Resolution	1920x1080
Frame Rate	25
Field	Upper First
Aspect	Square Pixels (1.0) Advanced
MXF Settings	Default Use Maximum
Render Quality Metadata	None

AUDIO

Audio Codec	Uncompressed; Sample
Channels	Ch.: 1-1 stereo track Chs.: 2 to 8 – non-present

Sample rate	48 kHz
Format	16-bit
Audio Levels	**Max Peak:-9 dBFs**

WALKING BUG/CUT IN HD

Targa sequence + Alpha - 1920x1080 Full frame
Frame per second "FPS" - 25

Recording Reports

Every submitted material (tape or file) must be accompanied by a recording report, which must contain the following information:

Recording Report for video tape delivery:

- Title;
- Subtitle, version or additional info about the spot if relevant;
- Video and Color Standard (SD, PAL);
- Time Code Start;
- Duration;
- Audio Channels information;
- Details of the programme supplier and recording facility house (name; tel., email).

The Recording Report must be affixed to the top of the cassette as printed label version.

Recording Report for file delivery:

- Title;
- Subtitle, version or additional info about the spot if exist;
- Video and Color Standard (SD, PAL);
- File format (wrapper), Codec, bitrate;
- Duration (Start Of Message (SOM=first active frame of the spot) should be always 00:00:00:00);
- Audio Channels information;
- Details of the programme supplier and recording facility house (name; tel., email).

The Recording Report must be a text file (.txt) in the same directory where the programme spot is located.

If the material does not include a Recording Report it will automatically fail QAR.

Time Code:

For tape delivered material, both longitudinal timecode (LTC) and vertical interval timecode (VITC on VBI lines pairs 19 and 21 and 332 and 334) must be recorded throughout the line-up and programme and comply with EBU specification. N12-1994.

Tape Line-up Test signal and Leaders

The tape recording should start by a countdown clock/line-up tone in the following format:

Item	Time-code	Duration
0 dB (PPM 4) 1 kHz tone [- 18dbfs for Digital tone]	09:58:40:00	00.01.00
Countdown clock / Slate	09:59:40:00	00.00.17
Black & Silence	09:59:57:00	00.00.03
1st Frame of Programme	10:00:00:00	

Nevertheless a programme is delivered on tape or on file, the duration should be measured from the start of active video to the end of active video.

General Video Requirement

The picture is to be well lit and sharp unless specifically required otherwise to meet special artistic/production requirements. Skin tones should be natural with realistic color rendition, unless artistic considerations dedicate otherwise.

Ensure the details in darker parts of the picture are visible.

The video signal shall be free of excessive black crushing and highlight compression. Transient response shall be such that ringing, smear and echoes are not noticeable. Moiré and other patterning shall not be visible. Hum, cross talk and other spurious signals should not be apparent.

All blanking, timings, amplitudes and bandwidths of video material shall not violate the relevant CCIR/ITU System specification.

If electronic titles are present, they must be placed within the picture "safe area" defined as 80% of the picture width and height to accommodate differences in picture areas displayed on domestic receivers compared to those on professional monitors.

The use of any video equipment, e.g. digital effects devices or overlay graphics must not introduce unintentional changes to neither luminance and chrominance levels nor cause perceptible timing shifts on entry levels or exit from the digital effect.

Technical Video Requirements

Although the bulk of materials generally is now produced and delivered digitally, the signals must still be compliant with analogue Video/Audio standards.

Nova TV accepts PAL, Standard Definition (SD), 625 lines, 25 frames/sec materials according to Recommendation ITU-R BT.601-5.

Aspect Ratio

The Aspect Ratio format must be **16:9**

Safe Areas for Action and Captions

Action Safe Area – 90% of active width and 90% of height;
Caption Safe Area – 80% of active width and 80% of height;

Video Level and Gamut (illegal signals)

Video levels including any line-up shall be received within the standard limits, so that the programme material can be broadcasted without any additional adjustment and corrections. Video levels/color signals must be legal in PAL and YUV domains meeting the PAL specifications. We require that signals meet the easier EBU Recommendation R103-2000:
Luminance limits: -1% and 103%

Chrominance 105% max - RGB values to not exceed limits -5% to +105%.
This means black shall lie no more than 1% below nominal black level.
Peak White shall lie no higher than 3% above nominal white level.
When decoded to RGB each component signal must not lie above 105% or below -5%.

SMPTE/EBU N10 Component Analog Video Standard (CAV) Level Specification for 100% Color Bars:

Luminance:	
100%	700 mV
Max	700 mV
Min	0 mV
Range	700 mV

Chrominance:	
Max	350 mV
Min	-350 mV
Range	700 mV

Sync Pulse Level	-300 mV
P-P	1 V

Composite Video Levels:	
Luminance Level Max	700 mV
*Comb. Chroma & Luminance Max	934 mV
Sync Pulse level	300 mV
Set-Up	0 mV *

*Please note that peak levels for combined chrominance and luminance are the maximum levels allowable per SMPTE/ EBU specifications and are intended only for spike peaks within program. Average program levels should remain near 800 mV.

General Audio Requirements:

The audio shall be free of spurious signals such as noise, hum and cross talk. Sibilance and distortion wow and flutter shall not be apparent. The audio shall not show dynamic and frequency response artefacts as a result of the action of noise reduction or low bit rate-coding systems

No programmes with a dynamic range suited to Theatrical presentation (Cinema audio mix) will be accepted, as these are not suitable for the audio range required for broadcast. Audio signals must be suitable for reproduction in a domestic environment. Dynamic range should be restricted and changes in loudness controlled so that the viewer has no need to adjust volume during or between programmes and programmes.

Loudness leveling must meet the requirements in EBU-R128

Mono recordings and live feeds must be in correct phase.

Dynamic range shall not be excessive but at the same time excessive compression is strictly not acceptable. It shall be suitable for the whole range of domestic listening.

Normal speech should peak at around +4dBu (-14 dBFS; -5 DIN PPM), with shouting, loud music and/or effects peaking but not exceeding around +9dBu (-9 dBFS; 0 DIN PPM).

Many viewers still listen in mono. Programme makers must check that the programme sound will be compatible with monophonic reception, particularly that the dialogue is fully comprehensible.

Care should be taken to ensure sufficient separation between dialogue and M&E (music and effects). Many listeners have hearing deficiencies that make dialogue difficult to follow if the level of M&E is too high.

The end of the programme sound shall occur 0.5 seconds before the end of active video.

Sound to Vision Synchronisation (Lip-synchronisation)

The relative timing of sound to vision shall not exhibit any perceptible error. As defined in ITU Rec. 562-3 (Ref: 6), audio shall not lead vision by more than 1 field (20ms) nor lag by more than 40ms. (40ms = 1 frame).

Audio Levels - Reference Level (Line-up tone), Permitted Maximum Level, Measurement:

Audio levels, Line-up level and the Maximum Permitted Audio Level should conform to EBU R.68-2000, EBU Tech 3304, ITU-R BS.645-2 technical recommendations.

Measurement:

Audio Levels shall always be measured by Program Peak Meters (PPM).
Nova TV is using 2 types of– Type I DIN PPM scale (IEC 60268-10) and Digital PPM Scale (IEC 60268-18).

Reference Level:

Reference (Alignment, Line-up) Level is a 0dBu 1khz tone signal placed on the headers of the recordings.
In digital domain, the Reference Level is defined as 18 dB bellow the digital peak (which is the maximum possible codding value (-18 dBFS) of the digital system, irrespective of the total number of bits available).

As different types of PPM scale are used, for your convenience, down below is shown the Ref Level reading on most popular PPM scales:

	Digital Domain	Audio Domain		
	Digital Scale IEC 60268-18	Type I (DIN PPM) IEC 60268-10	Type IIa (British PPM) IEC 60268-10	Type IIb (EBU scale) IEC 60268-10
0dBu, 1kHz, Ref. Tone Level	-18 dBFS	-9 dB	Mark 4	Test

Permitted Maximum Level:

The permited maximum of Peak Audio Level shall never exceed 9 dBu above the audio reference level. It means the programme audio peaks should not exceed -9 dBFS on the Digital PPM Scale (=0dB on DIN PPM).

Audio Channels:

Programmes must be delivered in StereoMix format on CH1/CH2.
Nevertheless the delivered programme is on tape, on file or live feed, the audio tracks must conform to the following standard:

Track 1 (CH1) – Stereo Mix- left;
Track 2 (CH2) – Stereo Mix-right;

Track 2 must be in phase coherent with Track 1.
The recording report should state if the material is in mono mix format.

Due to the rapid rate of technical development, use of specific equipment is constantly under review. This document will be subject to periodic updates to reflect this reality, but please consult your resource provider or persons given above for advice on specific issues.

Specification for Loudness Leveling:

Referred to Nova's channels and all channels in Appendix 1

Loudness leveling must meet recommendation EBU-R128 detailed in Appendix 2.

Target Level for Program Loudness:	**-23 LUFS (0LU)**
Maximum momentary loudness:	**-15 LUFS (+8LU)**
Maximum short term loudness:	**-20 LUFS (+3LU)**

The permitted deviation from the Target Level shall generally not exceed ±1.0 LU for programmes where an exact normalisation to Target Level is not achievable practically (for example, live programmes);

For a details concerning loudness audio measurement and adjustment 4 documents that include all aspects of the new standards can be found at http://tech.ebu.ch/loudness:
EBU Tech 3341 Metering specification ('EBU mode')
EBU Tech 3342 Loudness Range descriptor
EBU Tech 3343 Practical Guidelines

EBU Tech 3344 Distribution Guidelines

APPENDIX 1:

File Delivery specifications for DISNEY CHANNEL

1. Option: 1 video file + 1 audio file

Video:

MPEG-2 Program Stream

625/50 PAL

50 Mbps CBR I frame only

Profile: 422P@ML

Colour Sampling: 4:2:2

(4:2:0 will not be accepted)

Video Size: 720 x 576

(608 inc VBI – VITC on lines 19 & 21)

Field: Upper field first (odd)

Apple Pro Res HQ

25 fps

Profile: HQ

Video Size: 720x576 (16x9 Header)

Quicktime Uncompressed

Codec:Quicktime Blackmagic 8 Bit / Uncompressed 8 Bit 4:2:2

Colour Sampling: 4:2:2 (YUV)

Field: Upper field first (odd)

Audio:

Wav file

Sample rate: 48Khz

Sample size: 16bit

ch1-ch2: full stereo mix

ch3-ch4: M+E

2. Option: 1 video file with 4 ch audio

Video:

MPEG-2 Transport Stream

625/50 PAL
50 Mbps CBR I frame only
Profile: 422P@ML
Colour Sampling: 4:2:2
(4:2:0 will not be accepted)
Video Size: 720 x 576
(608 inc VBI – VITC on lines 19 & 21)
Field: Upper field first (odd)

Audio:
MPEG Audio Layer-2
Bitrate: 384kbps
Sample Rate: 48khz
ch1-ch2: full stereo mix
ch3-ch4: M+E

MXF OP1A D10 Container
PAL
Bitrate: 50 Mbps
Aspect ratio: 16:9
Audio: 4 track
Sample size: 16bit
ch1-ch2: full stereo mix
ch3-ch4: M+E

3. Option 1 video file with 2 ch audio (this will be mono, not stereo)
MPEG-2 Program Stream
625/50 PAL
50 Mbps CBR I frame only
Profile: 422P@ML
Colour Sampling: 4:2:2
(4:2:0 will not be accepted)
Video Size: 720 x 576
(608 inc VBI – VITC on lines 19 & 21)
Field: Upper field first (odd)
Audio: MPEG Audio Layer-2
Bitrate: 384kbps

Sample Rate: 48khz
Ch1 Full Mix ; Ch2 M+E

Apple Pro Res HQ
25 fps
Profile: HQ
Video Size: 720x576 (16x9 Header)
Audio: Integer (Little Endian) PCM
Sample rate: 48Khz
Sample size: 16bit
Ch1 Full Mix ; Ch2 M+E

Quicktime Uncompressed
Codec:Quicktime Blackmagic 8 Bit / Uncompressed 8 Bit 4:2:2
Colour Sampling: 4:2:2 (YUV)
Field: Upper field first (odd)
Audio: Integer (Big / Little Endian)
Sample Rate: 48Khz
Sample Size: 16bit
Ch1 Full Mix ; Ch2 M+E

File Delivery specifications for FOX Networks Group, Viacom International Media Networks, AXN and City TV

VIDEO	All channels HD
Video Resolution	1920 x 1080
Aspect Ratio	**16 : 9**
Frame Rate	50i
Field Order Dominance	Interlaced Upper Field First
Format/Codec/Profiles	File Extension: .mxf XDCAM HD422 Chroma Sampling: 4:2:2 MIME Type: MPEG-2 4:2:2 @HL Long GOP
Bitrate	50 Mb/s - Constant Bit Rate
AUDIO	
Codec	*
Channels	8 CH1&CH2 Full Original Mix (Stereo) CH3&CH4 Full Original Mix (Stereo) CH 5 to 8 silence
Sample rate	48 kHz
Format	24 bit integer
Bit rate	*
Audio Levels	**Max Peak:-9 dBFs** **Program loudness -23LUFS+/-1db (EBU R 128);**

HD VIDEO:

Format/Codec: XDCAM HD422

Picture Size: 1920x1080

Chroma Sampling: 4:2:2

File Extension: .mxf

MIME Type: MPEG-2 4:2:2 @HL Long GOP

Video rate: 50i

Compressor: 50 Mbps (CBR)

Field Dominance: Interlaced Upper Field First

Aspect Ratio: 16:9

Video Level Signal: 100% Luminance; 75% Chrominance

Embedded start TC 23:00:00:00

AUDIO

Compliant with ITU-R.BS1770 and Target Loudness level:- (minus) 23LUFS

Audio recording: 8 ch

CH1&CH2 Full Original Mix (Stereo)

CH3&CH4 Full Original Mix (Stereo)

CH 5 to 8 silence

Audio Sample 48 kHz

Audio Sample size: 24 bit integ

Any duration is acceptable but the files are required with length of full seconds and zero frames - hh/mm/ss/00.

APPENDIX 2:

EBU – Recommendation R 128

Loudness normalisation and permitted maximum level of audio signals

Status: EBU Recommendation

Geneva

August 2011

Audio loudness normalisation & permitted maximum level

Loudness normalisation and permitted maximum level of audio signals

EBU Committee	First Issued	Revised	Re-issued
Technical Committee	2010	2011	

Keywords: Audio levels, loudness, normalisation, permitted maximum level

The EBU has studied the needs of audio signal levels in production, distribution and transmission of broadcast programmes. It is of the opinion that an audio-levelling paradigm is needed based on loudness measurement.

In addition to the average loudness of a programme ('Programme Loudness') the EBU recommends that the measures 'Loudness Range' and 'Maximum True Peak Level' be used for the normalisation of audio signals, and to comply with the technical limits of the complete signal chain as well as the aesthetic needs of each programme/station depending on the genre(s) and the target audience.

The EBU, considering:

a) that peak normalisation of audio signals has led to considerable loudness differences between programmes and between broadcast channels;
b) that the resulting loudness inconsistencies between programmes and between channels are the cause of the most viewer/listener complaints;
c) that, when used to read peaks in the usual way, the QPPM (Quasi-Peak Programme Meter) specified in EBU Tech Doc 3205-E [1]does not reflect the loudness of an audio signal, and that the QPPM is not designed to indicate a long-term average;
d) that with the proliferation of digital production, distribution and transmission systems, the permitted maximum level of an audio signal specified in ITU-R BS.645 [2] is no longer appropriate;
e) that an international standard for measuring audio programme loudness has been defined in ITU-R BS.1770 [3], introducing the measures LU (Loudness Unit) and LUFS (Loudness Unit, referenced to Full Scale)1;
f) that a gated measurement of Programme Loudness (hence measuring 'Foreground Loudness') is advantageous to improve the loudness matching of programmes with a wide loudness range;

[1] LUFS' (which is compliant with international naming conventions) is equivalent to 'LKFS' (which is used in ITU-R BS.1770-2)

g) and that the measure ‘Loudness Range’ can be used to assess the need for loudness-range reduction to fit programmes to the tolerance window of the target audience.

recommends (see Note):
that the measures Programme Loudness, Loudness Range and Maximum True Peak Level shall be used to characterise an audio signal;

that the Programme Loudness Level shall be normalised to a Target Level of -23.0 LUFS. The permitted deviation from the Target Level shall generally not exceed ±1.0 LU for programmes where an exact normalisation to Target Level is not achievable practically (for example, live programmes);

that the audio signal shall generally be measured in its entirety, without emphasis on specific elements such as voice, music or sound effects;

that the measurement shall be made with a loudness meter compliant with both ITU-R BS.1770 and EBU Tech Doc 3341 [4];

that this measurement shall include a gating method as specified in ITU-R BS.1770 (summarised in EBU Technical Document 3341);

that Loudness Range shall be measured with a meter compliant with EBU Tech Doc 3342 [5];

that the Maximum Permitted True Peak Level of a programme during production shall be -1 dBTP (dB True Peak), measured with a meter compliant with both ITU-R BS.1770 and EBU Tech Doc 3341.

The EBU further recommends

that loudness metadata shall be set to indicate -23 LUFS for each programme that has been loudness normalised to the Target Level of -23 LUFS;

that loudness metadata shall always correctly indicate the actual programme loudness, even if for any reason a programme may not be loudness normalised to -23 LUFS;

that audio processes, systems and operations concerning production and implementation should be made in compliance with EBU Tech Doc 3343 [6];

that audio processes, systems and operations concerning distribution should be made in compliance with EBU Tech Doc 3344 [7].

EBU R 128-2011	Audio loudness normalisation & permitted maximum level

Definitions:

Programme:	An individual, self-contained audio-visual or audio-only item to be presented in Radio, Television or other electronic media. An advertisement (Program), trailer, promotional item (‘promo’), interstitial or similar item shall be considered to be a programme in this context;
Programme Loudness:	The integrated loudness over the duration of a programme - Programme Loudness Level is the value (in LUFS) of Programme Loudness;
Loudness Range (LRA):	This describes the distribution of loudness within a programme;
Maximum True Peak Level:	The maximum value of the audio signal waveform of a programme in the continuous time domain.

Note

At the publication time of this recommendation, measurement instruments compliant with ITU-R BS.1770 [3] and EBU Tech Doc 3341 [4] have only recently become available. As the switch to loudness normalisation is a substantial change in audio signal levelling, aligning and production procedures as described in the EBU Tech Docs 3343 [6] and 3344 [7] will have an economical and organisational impact. Therefore a transition phase may be necessary by some broadcasters before this recommendation can be fully implemented;

Broadcasters should in any case aim to make the transition as quickly as is practically possible.

References

EBU Tech Doc 3205-E ‘The EBU standard peak-programme meter for the control of international transmissions’

ITU-R BS.645 ‘Test signals and metering to be used on international sound programme connections’

ITU-R BS.1770 ‘Algorithms to measure audio programme loudness and true-peak audio level’

EBU Tech Doc 3341 ‘Loudness Metering: ‘EBU Mode’ metering to supplement loudness normalisation in accordance with EBU R 128’

EBU Tech Doc 3342 ‘Loudness Range: A measure to supplement loudness normalisation in accordance with EBU R 128’

EBU Tech Doc 3343 ‘Practical Guidelines for Production and Implementation in accordance with EBU R 128’

EBU Tech Doc 3344 ‘Practical Guidelines for Distribution of Programmes in accordance with EBU R 128’