INHALT

1. GENERAL NOTES

1.1 PRODUCER RESPONSIBILITY

It is the responsibility of the producer (i.e. "Production Partner" or "Production Company") to ensure that all delivered assets comply with all ServusTV quality standards and requirements. Producer acknowledges that it is the producer's responsibility to communicate regularly with Red Bull Media House Quality Management.

ServusTV reserves the right to refuse delivery of otherwise finished video assets in cases where dropped and/or duplicated frames (freeze frames) and/or other serious deficiencies are found even if deficiencies originate in sources obtained from ServusTV. ServusTV may require the producer to bear any costs resulting from the producer's failure to comply with the timely instructions of Red Bull Media House Quality Management.

Deficient programs that fail the ServusTV quality control process may be considered 'not delivered.'

The specifications outlined in this document are applicable to all commissioned and in-house productions.

Any delivery in a format or specification not explicitly listed in this document will require prior written approval by Red Bull Media House Quality Management.

*Servus*TV
Einfach gut fernsehen.

2. DELIVERY

2.1 PROGRAM MASTER (HD)

One copy of each of the following must be delivered:

- **MASTER #1 DIRTY**
  including all graphics and text (final program master);
  all graphics have to be in the same language as the agreed audio version

- **MASTER #2 CLEAN**
  without overlay graphics and text; time code and duration identical to dirty version; a detailed definition of "clean" can be found in **Annex: Clean Version**.

XDCAM HD422 in .mxf container (MXF standard OP1a: SMPTE 378M) is the desired format/codec for all program master deliveries.

The following resolution / frame rate combination is acceptable:

Delivery Format	Frame Size *	Frame Rate	Field Rate	Scan Type
1080i/25	1920 x 1080	25	50	Interlaced

* Aspect Ratio must be 16:9 full frame height (1.78:1) for all resolutions
   (letterboxing and pillarboxing is not allowed).

The audio included in the Dirty and Clean MXF files must be delivered as discrete PCM channels at 48 kHz sample rate, in sync with the picture, in phase, and with a depth of 24 bits in the following channel layout.

Audio levels of each Full Mix must be compliant with EBU R128 (follow practical guidelines EBU Tech Doc 3341, 3342, 3343 and 3344)

For further explanations on audio channel naming and contents please refer to the section **Annex: Audio Glossary** at the end of this document.

Channel	Dirty Version		Clean Version		5.1 Dirty Version [3]	
01	Full Mix (German)	Stereo L	Full Mix	Stereo L	Full Mix	Stereo L
02	Full Mix (German)	Stereo R	Full Mix	Stereo R	Full Mix	Stereo R
03	Full Mix (original language) [1]	Stereo L	Effects / NAT & GFX	Stereo L (undipped) [2]	Full Mix	5.1. L
04	Full Mix (original language) [1]	Stereo R	Effects / NAT & GFX	Stereo R (undipped) [2]	Full Mix	5.1 R
05	Full Mix excl. VO (IT)	Stereo L	Music	Stereo L (undipped)	Full Mix	5.1 C
06	Full Mix excl. VO (IT)	Stereo R	Music	Stereo R (undipped)	Full Mix	5.1 LFE
07	Empty		Voice Over	Mono	Full Mix	5.1 Ls
08	Empty		Interview / OT	Mono	Full Mix	5.1 Rs

[1] Optional! Please leave those channels silent if they are not applicable to your production.
[2] Mono audio is acceptable if the source material was recorded in mono.
[3] For 5.1 productions this version has to be delivered additionally to the regular "Dirty Version"

2. DELIVERY

2.2 PROGRAM MASTER (UHD)

One copy of each of the following must be delivered:

- **MASTER #1 DIRTY**
  including all graphics and text (final program master);
  all graphics have to be in the same language as the agreed audio version

- **MASTER #2 CLEAN**
  without overlay graphics and text; time code and duration identical to dirty version; a de-tailed definition of "clean" can be found in **Annex: Clean Version**.

XAVC QFHD Long422 200 (aka XAVC-L) in .mxf container (MXF standard OP1a: SMPTE 378M) is the desired format/codec for all program master deliveries. Upon prior written approval or request by Red Bull Media House Quality Management, Apple ProRes 422 (HQ) in .mov QuickTime container is also acceptable.

The following resolution / frame rate combination is acceptable:

Delivery Format	Frame Size *	Frame Rate	Scan Type
2160p/50	3840 x 2160	50	progressive

* Aspect Ratio must be 16:9 full frame height (1.78:1) for all resolutions

(letterboxing and pillarboxing is not allowed).

The audio channels must be delivered as discrete PCM channels at 48 kHz sample rate, in sync with the picture, in phase, and with a depth of 24 bits in the following channel layout (clean and dirty versions have the same channel layout).

Audio levels of each Full Mix must be compliant with EBU R128 (follow practical guidelines EBU Tech Doc 3341, 3342, 3343 and 3344)

For further explanations on audio channel naming and contents please refer to the section **Annex: Audio Glossary** at the end of this document.

Channel	Channel Name	Channel Typ
01	Full Mix (German)	Stereo L
02	Full Mix (German)	Stereo R
03	Full Mix excl. Voice Over	Stereo L (undipped) [1]
04	Full Mix excl. Voice Over	Stereo R (undipped) [1]
05	Effects / NAT	Stereo L (undipped) [2]
06	Effects / NAT	Stereo R (undipped) [2]
07	GFX	Stereo L (undipped) [2]
08	GFX	Stereo R (undipped) [2]
09	Music	Stereo L (undipped) [2]
10	Music	Stereo R (undipped) [2]

Channel	Channel Name	Channel Typ
11	Voice Over	Stereo L [3]
12	Voice Over [optional] *	Stereo R [3]
13	Interviews / OT	Stereo L [3]
14	Interviews / OT [optional] *	Stereo R [3]
15	Full Mix	5.1 L [4, 5]
16	Full Mix	5.1 R [4, 5]
17	Full Mix	5.1 C [4, 5]
18	Full Mix	5.1 LFE [4, 5]
19	Full Mix	5.1 Ls [4, 5]
20	Full Mix	5.1 Rs [4, 5]

[1] Undipped: For "Full Mix excluding Voice Over" only adjustments made to accommodate Voice Over should be removed but adjustments for Interviews / OT should remain unchanged.

[2] Undipped: Any adjustments made to accommodate Voice Over or Interviews / OT should be removed but cross-fades between different sources as well as any EQ effects should be preserved.

[3] Mono audio is acceptable if the source material was recorded in mono.

[4] If 5.1 audio is not applicable to the production, the delivery can be made with 14 audio channels.

[5] For Dolby Atmos productions an additional 5.1 mix is also required.

2. DELIVERY

2.3 TEMPORARY DELIVERY (HD)

If, due to limited bandwidth, a fast delivery of the Program Master is not possible and if fast distribution is necessary, a file in the following format has to be provided.

Nevertheless, the Program Master has to be delivered within 7 days
(see section **Program Master (HD)** for details).

The following resolution / frame rate combination is acceptable:

Delivery Format	Frame Size *	Frame Rate	Scan Type
1080p/25	1920 x 1080	25	progressive

*   Aspect Ratio must be 16:9 full frame height (1.78:1) for all resolutions
    (letterboxing and pillarboxing is not allowed).

VIDEO

Container: .MOV or .MP4
Video Codec: H.264 or H.265
Video Bit Rate (HD):   15 Mbit/s or higher

AUDIO

Channel	Channel Name	Channel Typ
01	Full Mix (German)	Stereo L
02	Full Mix (German)	Stereo R

Audio Codec: AAC
Audio Bit Rate: 256 kbit/s or higher
Audio Sample Rate: 48 kHz
Audio Loudness: -1 dBTP / -23 LUFS
                    (same as Program Master; see section **Audio Levels** for details)

2. DELIVERY

2.4 TEMPORARY DELIVERY (UHD)

If, due to limited bandwidth, a fast delivery of the Program Master is not possible and if fast distribution is necessary, a file in the following format has to be provided.

Nevertheless, the Program Master has to be delivered within 7 days
(see section **Programm-Master (UHD)** for details).

The following resolution / frame rate combination is acceptable:

Delivery Format	Frame Size *	Frame Rate	Scan Type
2160p/50	3840 x 2160	50	progressive

* Aspect Ratio must be 16:9 full frame height (1.78:1) for all resolutions
(letterboxing and pillarboxing is not allowed).

VIDEO

Container: .MOV or .MP4
Video Codec: H.264 or H.265
Video Bit Rate (UHD):   30 Mbit/s or higher

AUDIO

Channel	Channel Name	Channel Typ
01	Full Mix (German)	Stereo L
02	Full Mix (German)	Stereo R

Audio Codec: AAC
Audio Bit Rate: 256 kbit/s or higher
Audio Sample Rate: 48 kHz
Audio Loudness: -1 dBTP / -23 LUFS
                    (same as Program Master; see section **Audio Levels** for details)

2. DELIVERY

2.5 LIVE PROGRAM

If live content is delivered via satellite feed or IP network the following specs apply.

Material delivered as Live Program must maintain the following specifications:

Delivery Format	Frame Size *	Frame Rate	Field Rate	Scan Type
1080i/25	1920 x 1080	25	50	interlaced, top field first

* Aspect Ratio must be 16:9 full frame height (1.78:1) for all resolutions (letterboxing and pillarboxing is not allowed).

AUDIO

Channel	Channel Name	Channel Typ
01	Full Mix	Stereo L
02	Full Mix	Stereo R
03	Full Mix excl. VO (IT)	Stereo L
04	Full Mix excl. VO (IT)	Stereo R
05	Effects / NAT	Stereo L [1,2]
06	Effects / NAT	Stereo R [1,2]
07	Voice Over	Mono [1]
08	Interviews / OT	Mono [1]

[1] Only required if technical circumstances of satellite transmission permit more than 4 channels.

[2] Mono audio is acceptable if the source material was recorded in mono.

2.5.1 RECORDING

Upon request of Red Bull Media House a high quality recording of the Live Program must be delivered as XDCAM in .mxf Container ('Live Program' audio layout applies; all other technical details must comply with section Delivery > Program Master (HD))

2.5.2 TRANSMISSION VIA SATELLITE

Modulation	Encoding
Bandwidth: 9 MHz Modus: DVB-S2 FEC: 3/4 Roll Off: 20 % Symbol rate: 7,5 Pilot: On Info rate: 16,33 Mbit/s	Standard: 1080i/25 Codec: MPEG 4 CBR: enabled Entropy: CABAC Color Sampling: 4:2:0 Bit depth: 8 Hiera. B frames: enabled Delay Mode: standard GOP Structure: 2 GOP length: 24 Closed GOP: enabled adaptive GOP: disabled HRD: enabled IDR Pictures: enabled Number of Stereo pairs: 1-4 Audio (Stereo): MPEG1, 256 kbps (Sport/Entertainment) MPEG1, 384 kbps (Music)

2. DELIVERY

2.5.3   TRANSMISSION - UNCOMPRESSED VIA OPTICAL FIBRE

1.485 Gb/s HD-SDI connection, SMPTE 292M, [often known as 1.5Gbs HD-SDI].
This remains uncompressed along its route to the point of delivery.

Wherever possible, practical, or cost-effective, program should use an
uncompressed 1.485Gbs HD-SDI connection.
In all instances where the signal can be carried uncompressed,
stereo audio for the program should be carried as discrete linear.

2.5.4   TRANSMISSION - COMPRESSED VIA OPTICAL FIBRE

Links that provide a 1.5Gbs HD-SDI connection at the point of delivery,
but which use compression/decompression along their route.

Compression Codecs:

- **JPEG2000, 4:2:2** – min. 100 Mbps, ideal > 140 Mbps

- **H.264, 4:2:2** – min. 16 Mbps, ideal > 25 Mbps

- **H.265, 4:2:2** – min. 12 Mbps, ideal > 20 Mbps

- **MPEG2, 4:2:2** – min. 60 Mbps

2.5.5   PRE EVENT PROCEDURE - LINEUP WITH MCR

1. Feeds need to be identified visually during Line-up e.g. with different graphics,
   if more than one feed will be transmitted.

2. Tone identification to separate audio channels on each feed in alignment with MCR.

3. Lip-sync verification with Vistek Valid or MatchBox Valid via complete signal path to MCR.

2.5.6   TALKBACK COMMUNICATION TO MCR

Intercom communication to on-site (OB Van) is mandatory for live events. Different possibilities
available on MCR end: ISDN, telephone POTS, SIP, Skype interface. Type of communication
needs to be discussed and organized in advance with Production Management.

2.5.7   CONTACT MCR RED BULL MEDIA HOUSE (AT)

Email: mcr@redbull.com
Tel: +43 662 224028626
Mobile: +43 664 2650850

2. DELIVERY

2.6 SOCIAL MEDIA

For content that is intended for distribution on Social Media platforms other than Youtube (which must follow program master specifications in section 2.1) only, a file in the following format must be provided.

The following resolution / frame rate combinations are acceptable:

Frame Size	Frame Rate	Aspect Ratio	Scan Type
1920 x 1080	25	16:9	progressive
1920 x 1080	50	16:9	progressive
1080 x 1920	25	9:16	progressive
1080 x 1920	50	9:16	progressive
1080 x 1620	25	2:3	progressive
1080 x 1620	50	2:3	progressive
1080 x 1350	25	4:5	progressive
1080 x 1350	50	4:5	progressive
1080 x 1080	25	1:1	progressive
1080 x 1080	50	1:1	progressive

VIDEO

Container: .MOV or .MP4
Video Codec: H.264
Video Bit Rate: 15 Mbit/s or higher

AUDIO

Channel	Channel Name	Channel Typ
01	Full Mix (German)	Stereo L
02	Full Mix (German)	Stereo R

Audio Codec: AAC
Audio Bit Rate: 256 kbit/s or higher
Audio Sample Rate: 48 kHz
Audio Loudness: max. -1 dbFS

Any further technical details specified in the sections **Video** and **Audio** are not mandatory for Social Media deliveries.

3. AUDIO

3.1 AUDIO LEVELS

Program true peak levels of each Full Mix must not exceed -1 dBTP (True Peak) with an Integrated Program Loudness of -23 LUFS and a Loudness Range (LRA) of 15 LU or less. Upon written approval, we also accept LRA higher than 15 LU. All measurements must be determined in compliance with the recommendations of EBU R128.

This specification applies to any Full Mix in Stereo, 5.1 und Dolby Atmos.

3.2 DOLBY ATMOS

A Dolby Atmos Home Theater Master must be delivered as a separate BWAV ADM file with the following specs:

- Dolby Atmos BWAV ADM File
- 48 kHz, 24-bit
- Single or multiple bed(s) are acceptable
- Tracks 1-128 may be used for objects or beds
- Loudness measurement must be performed on a 5.1 re-render
- FFOA must not be set

A Dolby Atmos for Home Studio certification is required for all Home Atmos mix rooms. The mix must be a dedicated nearfield mix. Timecode and duration of the Dolby Atmos Master must match final picture length exactly.

4. VIDEO

4.1 VIDEO LEVELS, GAMUT AND COLOR SPACE

Video files have to be delivered in **Rec.709** (ITU-R BT.709) color space with studio range levels (not "full range" levels). Tolerances of video levels (luma, chroma, RGB gamut) must comply with the recommendations of EBU R103-2020, i.e., luminance (Y) must be **within -1% and 103%** (-7mV and 721 mV) RGB components **within -5% and 105%** (-35mV and 735mV), with errors being registered if the total out-of-gamut elements exceed 1% of picture area. Videos that meet these requirements are considered "broadcast safe". These requirements do not apply to deliveries of source material.

These rules apply to HD and UHD.

Please note that Rec.709 and EBU R103-2020 also apply to the delivery of graphics.

4.2 SAFE AREAS

All graphics must fall within the revised high definition 16:9 title safe areas as specified in SMPTE ST 2046-1-2009, with protection of **90% area / 5% margins for titles** and **93% area / 3,5% margins for action**.

4.3 TIMECODE / PROGRAM START AND END

Start Timecode: 00:00:00:00

Continuous timecode.

If program starts in black, audio signal must be present. If program fades to black, last frame must be completely black. Slates, additional black frames or color bars prior to the first frame of action or following the last frame of action are **not permitted**.

5. ANNEX: CLEAN VERSION

IMPORTANT:
Time code and duration of the Clean version must be identical to the Dirty version.

Color Grading:
Footage in the Clean version must have the same color grading as in the Dirty version.

Clean files MAY contain:

- show Open (if applicable), VFX, animations or CGI, assuming any transitions that alter or otherwise compromise surrounding footage are removed (such transitions include dissolves, wipes, or morphs, for example)
- full screen graphics or images that do not overlay any footage
- black gaps, where graphics had to be removed

Clean files SHALL NOT contain:

- lower thirds, including lower third backgrounds
- any graphics overlaying footage
- corner bugs, including any show or series packaging graphics
- open captions (burned in subtitles)
- bumpers
- credit rolls

General Notes:

- As it may be difficult in certain cases to determine whether or not certain elements should be removed, please consult Red Bull Media House Quality Management during the creation of animations and other graphic elements, should you have any questions or concerns.
- For graphic elements that overlay other footage during transitions (overlay graphic with alpha channel; e.g. show open), any underlying material that is visible during the transition must be present in the Clean version.

6. ANNEX: AUDIO GLOSSARY

This section provides further explanations and synonyms for our audio channel terminology.

Channel Name	Explanation / Synonyms
Full Mix	The final mix of the program that includes all audio channels incl. Voice Over / Narration. Must comply with -23LUFS Integrated Loudness and -1dbTP True Peak levels.
Full Mix excluding Voice Over	Also known as 'Mix Minus' or 'IT'.
Effects / NAT	Atmosphere or Ambient sound as recorded on set; also known as Production Sound, Natural Sound (NAT), Original Sound or On-location Sound. Additionally includes effects intended to be indistinguishable from NATs. e.g., artificial ambient sounds, Foley and background sound effects; no SFX, no Music, no Voice Over / Narration, no Interviews.
Music	Any and all music contained in the program, including pre-mixed, recurring elements in a series, e.g. open, close.
GFX	Graphical Sound Effects not related to the footage, e.g. sounds complementing graphic overlays, transitions or animations; not to be confused with "Effects".
Interviews / OT	Also known as Dialog.
Voice Over	Also known as Commentary or Narration; abbreviation: VO

Term	Explanation
undipped	Any adjustments made to accommodate Voice Over or Interviews / OT should be removed but cross-fades between different sources as well as any EQ effects should be preserved; For Full Mix excluding Voice Over only adjustments made to accommodate Voice Over should be removed but adjustments for Interviews / OT should remain unchanged.
dipped	dipped stems must constitute the full final mix when combined

7. ANNEX: CHANGELOG

Version	Date	Changes
2.0	2021-04-01	Initial Release of STV Technical Specifications for Delivery 2.0 Changes to previous STV Specifications: • Added "Program Master (UHD)" with 20 channel audio layout • Added "Social Media" • Added "Temporary Delivery (HD) & (UHD)" • Added "Live Program" • Added "Dolby Atmos" • Detailed specification for Video Levels & Safe Area • Precise definition for "Clean Version" • Audio Glossary