Discovery Global Technical Specifications

Version Six

6.1.0 - June 28, 2021

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One - Introduction and Orientation

This specification document notifies Discovery's production partners of Discovery's technical requirements and standards for programs, graphic masters, program elements, and other media deliverables. Production partners are responsible for reading and understanding this specification and delivering products that meet its requirements. In this specification, "Discovery" or "the company" refers to any network owned by Discovery, Inc, as well as any of Discovery's joint ventures. The term "production partner" refers to the production company, distributor, or internal production team providing programs or elements to Discovery, whether through commission, co-production, or acquisition.

This version of the Discovery's Global Technical Specifications combines the specifications used by Discovery and those used by the former Scripps Networks. It's the first joint technical specification issued by our combined company.

Our goal for the Global Technical Specifications is to provide all our production partners with a document that puts forward our technical requirements clearly and directly. Where possible, we try and explain the reasoning behind our specifications and how we use the materials that come from our partners. This document is necessarily technical, but we strive to make it understandable and easy to use.

What's in this specification?

This specification includes Discovery's technical requirements for HD and UHD. It applies to programs (and their accompanying elements) delivered in any of the 14 video standards that Discovery accepts for program delivery:

HD

- 1080p 59.94
- 1080i 59.94
- 1080p 50
- 1080i 50
- 1080p 29.97
- 1080p 25
- 1080p23.98

UHD

- UHD-1 (3840 x 2160) 59.94p
- UHD-1 (3840 x 2160) 50p
- UHD-1 (3840 x 2160) 29.97p (Acquisitions Only)
- UHD-1 (3840 x 2160) 25p (Acquisitions Only)
- UHD-1 (3840 x 2160) 23.98p (Acquisitions Only)

SD

- NTSC (Acquisitions only)
- PAL (Acquisitions only)

Production partners must refer to their deliverables list on the Discovery Producer's Portal or Program Deliverables Exhibit of their contracts to determine which of these video standards Discovery requires for their program.

Application Revision

What's new in Version 6.1?

Version Six included some major changes to our specifications, listed below. Version 6.1 includes some minor changes (***marked in italics below***)

- New video file formats and changes to our accepted file formats
- New nonlinear deliverable types for some programs intended directly for web/social usage
- New and expanded Program Text Protection Area
- Standards for UHD HDR delivery
- Removal of LTO-based delivery options in favor of Producer's Portal uploads
- Clearer linkage between contract deliverables and program versions
- *Updates to Program Leader, Time Code, and Program Text sections to reflect changes for Discovery Nordic Networks*
- *Clarifications around the acceptable frame rates for UHD production (2.3.1), progressive encoding for XAVC files (5.3.1), and audio track encoding within video files (3.6).*

New Margin Call-outs

We've added a call-out in the margins to this version of the specifications. The call-out, shown as a circle in the margin, lets readers know how commonly specific sections or subsections apply to programs, and if we revised that section in Version 6. Sections can apply to All, Most, Some, or A Few programs. Remember that even if a section applies to just a few programs, it may apply to yours. Always refer to your contract. The call-out also indicates whether Discovery added or revised a section of the specs in Version 6.0 (relative to Version 5 of the Discovery Global Tech Specs).

Where can I find more information?

Discovery maintains a Production Guide within the Discovery Producer's Portal. The guide includes helpful information and more details about some of the topics covered in the Technical Specifications. Production Partners should turn to the Production Guide as their first source for answering technical and delivery questions. Production partners can find the Producer's Portal at http://producers.discovery.com.

Normative vs Informative Language

This specification contains both normative and informative language. The specification uses normative language to state Discovery's requirements. In this specification, the words "must" and "shall" are used to indicate that compliance is mandatory. Most of the language in this specification is normative, but the specification also uses some informative language. Words such as "should," "may," or any section preceded by "NOTE" indicate that a statement is informative. Informative sections provide background information and options but don't call out requirements.

Reference Standards

Discovery follows many common industry standards for video essence, audio essence, and file specifications for formatting and compatibility. All these components must comply with the relevant industry technical standards:

Common Standards

- **SMPTE ST 12-1:2014** Time and Control Code
- **SMPTE RP 218:2009** Specifications for Safe Action and Safe Title Areas for Television Systems
- **SMPTE ST 2046-1:2009** Specifications for Safe Action and Safe Title Areas for Television
- **SMPTE ST 323:2004** Channel Assignments and Levels on Multichannel 5.1 Audio Media
- **ITU-R BT.1702-2** Guidance for the reduction of photosensitive epileptic seizure caused by television

HD Standards

- **ITU-R BT.709-6** Parameter values for the HDTV standards for production and international programme exchange

UHD Standards

- **SMPTE ST 2036-1:2014** Ultra High Definition Television — Image Parameter Values for Program Production

UHD HDR Standards

- **ITU-R BT.2100-2** Image parameter values for high dynamic range television for use in production and international programme exchange
- **SMPTE ST 2084:2014** High Dynamic Range Electro-Optical Transfer Function of Mastering Reference Displays

Two - Video Essence

This section lays out the requirements for the video portion of programs and their elements.

2.1 - Common Standards for Video

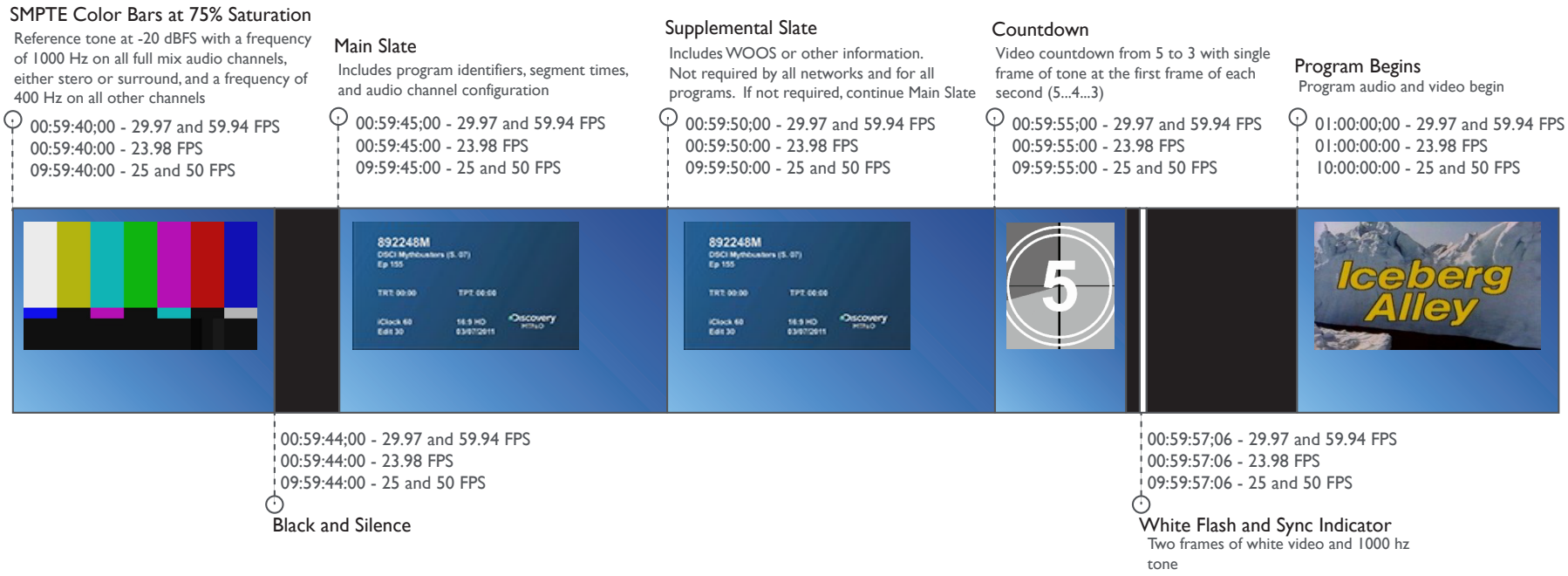
This section details the common standards for all Discovery video tracks, regardless of frame rate and resolution. Unless this document specifies otherwise, all video deliverables must meet the requirements in this section.

Most Revised

2.1.1. - Program Leader

Except for nonlinear master files, all Discovery programs must begin with a leader element. The leader must include industry-standard test signals (such as SMPTE Color Bars) as well as a slate that identifies the program and its components. Figure 2.1.1 shows the layout of the leader. The starting time code for the leader varies by frame rate. The start time code for 50 hertz programs follows the EBU convention, with the leader starting at 09:59:40:00 and the program beginning at 10:00:00:00, with the exception of programs delivering to Discovery's Nordic networks. The leader for those Nordic programs must begin at 00:00:00:00, with the program starting at 00:00:20:00. The start time code for 23.98, 29.97, and 59.94 hertz programs follows the SMPTE convention and has the leader starting at 00:59:40(;|:)00 and the program beginning at 01:00:00(;|:)00. Discovery exempts some nonlinear master file deliveries from the Program Leader requirements and may also allow those masters to deliver with a 00:00:00(;|:)00 starting time code. Production partners must check the deliverable exhibit of their contract and any Discovery-provided network clocks to confirm the leader requirements for their program.

Figure 2.1.1 - Program Leader Timeline



2.1.2 - Camera Requirements

Production partners must use only professional-grade cameras, recorders, media, and tools. Discovery has minimum requirements for cameras and recording systems. These requirements vary depending on the video format of the program. In the case of Ultra High Definition (UHD) programs, the requirements also vary based on the UHD Production Tier (One, Two). Cameras and recording systems used in Discovery productions must meet the requirements laid out in the table below. Discovery will treat any footage included in the final program that does not meet the requirements as upconverted content, counting towards the limits listed in Sections 2.2.1 and 2.3.2. At the request of the Discovery Production Management (PMD), partners must provide a production workflow for review. The production workflow must include a list of all proposed camera and recording systems. Discovery PMD must review and approve the production workflow before production can begin. Partners can download the Production Workflow Questionnaire from the Discovery Producer's Portal (http://producers.discovery.com).

Table 2.1.2 Detailed Camera Requirements for HD and UHD Production

		UHD Production Tiers	
	HD	Tier I	Tier II
Minimum Camera Capture Resolution	1920 x 1080 or greater	3840 x 2160 native or greater	
Minimum Camera Dynamic Range	**Unrestricted**	**13 Stops or greater**	
Minimum Required Recording Format	**Compressed HD allowed** • Compressed formats must preserve full HD resolution (1920x1080) • Compressed formats must have a bit rate of at least 50 Mb/s	**Raw recording only** • Camera native raw recording at 12 or 16 bit depth • Raw recording formats must preserve full resolution, dynamic range, and color space of the camera system • "Compressed Raw" is permitted in cameras where it is the only option (Redcode Raw, Sony F55, as examples)	**Compressed UHD allowed** • Compressed formats must preserve the full UHD resolution • Compressed formats must have a chroma subsampling method of no less than 4:2:2 • Compressed formats must record with at least 10 bits of depth in all video channels • Compressed formats must have a bit rate of 500 Mb/s or higher when recording at 59.94 frames per second • Compressed formats must record in manufacturer-designed log and extended gamut modes (SLOG, SGamut, VLog, Vgamut, as examples) to preserve as much dynamic range and color gamut as possible in these compressed formats
Minimum Lens Requirement	Must use lenses rated by the manufacturer for HD or higher resolution	Must use lenses rated by the manufacturer for UHD or higher resolution	

All
Revised

All
Revised

2.1.3 - Time Code

The program's time code must be continuous, valid, without error, and contain the appropriate flagging information in adherence to SMPTE 12-1:2014. All time code tracks, Ancillary Data Area (HANC or VANC) and time code metadata within the file's wrapper must match exactly. The starting values for time code vary by frame rate and region. 25 hertz (Hz) programs must begin at 10:00:00:00, except for delivery to Discovery's Nordic networks. All Nordic network programs must deliver with the program beginning at 00:00:20:00. 29.97 Hz programs must use SMPTE drop frame time code and begin at 01:00:00;00. 23.98 Hz programs must use SMPTE non-drop frame time code and begin at 01:00:00:00. Nonlinear master files and other deliverables following the nonlinear specs in Section 2.4 can begin at 00:00:00[:;]00.

2.1.4 - Title Safe and Program Text Protected Area

Production partners must place all program text elements in the text safe area defined by the current SMPTE standard (SMPTE ST 2046-1: 2009). Discovery requires a 90% horizontal and 90% vertical title safe for all 16:9 programs in HD and UHD.

Figure 2.1.4 Program Text Protection Area

Discovery also maintains a protected area for program text. Discovery keeps this area free from program overlays during broadcast, ensuring that text inside of the area is readable. The only exception to this policy is for overlays governed by local regulation, such as the NCTA Program Parental Ratings system used in the United States. These overlays may enter the protected area at certain points within the program, often at the beginning of each segment. Production partners must refer to guidelines provided by Discovery's regional networks for details on these regulatory overlays.

The Program Text Protection Area (PTPA) is different for HD and UHD video formats due to the different video raster of those formats. The PTPA for both formats is an irregular polygon that covers about two thirds of the total screen area.

In HD programs its upper left corner is at pixel location (96, 210). The upper right corner is at pixel location (1824,210). It extends vertically down to line 686, where a notch pulls the right edge back to horizontal pixel 1392. The PTPA then continues down to line 972. In UHD programs, its upper left corner is at pixel location (192, 420). The upper right corner is at pixel location (3648, 420). It extends vertically down to line 1372, where a notch pulls the right edge back to horizontal pixel 2784. The PTPA then continues down to line 1944.

The Discovery Nordic Networks apply further restrictions for program text, Because subtitling is so common for programming in that region, the PTPA for the Nordic networks does not include any portion of the screen below line 820 in HD or line 1640 in UHD.

Production partners must place all program text elements except for program opening sequences, credits, or segment bumps inside this protected area. This includes centered "disclaimer" cards and other centered text. The irregular shape of the PTPA allows for full-width text in the area around the vertical center of the screen. Program opening sequences, credits, and segment bumpers must still comply with the title safe requirements listed earlier in this section. Moving program text elements can begin their movement outside the protected area but must be fully inside the protected area when they stop moving. The PTPA rules do not apply to content delivered in an aspect ratio of 1:1 or 9:16. Discovery provides templates showing the Program Text Protected Area for HD and UHD video formats. These templates are available for download as full raster TIFF or PNG files from the Discovery Producer's Portal (http://producers.discovery.com).

All Unchanged

2.1.5 - Standards Conversion and Mixed Frame Rate Acquisition

Production partners must shoot, edit, and master programs and their elements in the single frame rate listed in their deliverables list on the Discovery Producer's Portal or in the Program Deliverables Exhibit of their contract. If partners have footage that is archival or historic and are unable to avoid using footage with different frame rates, then they must only use the highest quality conversion techniques and hardware to convert between frame rates. If they use such conversion techniques between two frame rates, they must alert their Discovery production manager of the specific time codes in the program where mixed frame rates appear. If converting footage between 50 hertz (Hz) and 60 Hz (between PAL and NTSC frequencies), producers must use standards conversion hardware or software with motion compensation and phase correlation. Programs and elements must not contain blurring, stuttering, de-interlacing artifacts, blended fields, or other artifacts of standards conversion.

All Revised

2.1.6 - Video Levels

The video levels for Standard Dynamic Range (SDR) HD and UHD programs and elements must fall within the limits defined by ITU-R BT.709-6. Those programs and elements must not have video levels above 700 millivolts (mv) or below 0 mv. Luminance levels must not fall below 0 mv or rise above 700 mv. Color difference signals (R-Y, B-Y) must not rise above 700 mv or fall below 0 mv when measured with a 350-millivolt offset, and all colors within the program must fall within the boundaries of the ITU-R BT.709-6 color volume. In a 4:4:4 RGB format the RGB components (R', G', B') must not have levels that exceed 700 mv or fall below 0 mv.

The video levels for High Dynamic Range (HDR) UHD grading masters must fall within the limits defined by ITU-R BT.2020-2. HDR grading masters must not have luminance levels that rise above 1000 nits when using a SMPTE 2084:2014 electro-optical transfer function (EOTF). Color difference signals (R-Y, B-Y) must not rise above 700 mv or fall below 0 mv when measured with a 350-millivolt offset, and all colors within the program must fall within the boundaries of the ITU-R BT.2020 color volume.

All Revised

2.1.7 - Gamma and Colorimetry

Production partners must master SDR HD and UHD programs and elements using the standard electro-optical transfer function (EOTF), primaries, and colorimetry for the ITU-R BT.709-6 color space. When creating HDR grading masters, production partners must use the SMPTE ST.2084:2014 EOTF and ITU-R BT.2100-2 color primaries and colorimetry.

Most Revised

2.1.8 - Photosensitive Epilepsy

All programs and elements that production partners deliver in 50 Hz (50 FPS, 25 FPS) or 23.98 Hz frame rates must not contain the flickering images or regular patterns that can trigger symptoms in viewers with Photosensitive Epilepsy (PSE). Many governments require broadcasters to certify that their content is free of the harmful patterns and flashing images that often trigger these symptoms. Discovery will use industry-standard software to test all incoming programs and elements to ensure they don't contain these triggers.

These software tests look for certain conditions in the video:

- More than three consecutive flashes that are less than 360 milliseconds apart. The level of contrast that counts as a flash varies based on the brightness level of the video
- A transition to or from a deeply saturated red color
- Patterns with regular and repeated transitions between bright and dark areas

Manufacturers design these software tests to follow the standards defined in ITU-R BT.1702, and that document provides more detailed information on how to evaluate video and avoid these triggers. The test standards are different for standard dynamic range (SDR) and high dynamic range (HDR) video, as the definition of "flashing" changes based on the relative brightness of the screen.

Discovery uses a two-test process to evaluate video for PSE triggers. If the content fails an initial test, Discovery will run a second test using different testing software to rule out test error or bias. If the content fails the second test, Discovery will return it to the production partner for correction or replacement.
If a program or element fails the PSE tests conducted by Discovery, production partners can provide their own passing PSE certificate to Discovery Media Logistics. Discovery will accept test certificates from any test system approved by the Digital Production Partnership (DPP). The DPP maintains a current list on their specifications website: https://www.thedpp.com/tech/delivery/uk/

All Revised

2.1.9 - Run-out or Post-roll

All programs and elements must end with at least one second of black video and silent audio. Discovery refers to this trailing black and silence as "run-out" or "post-roll." Discovery needs this run-out to trim files for broadcast and nonlinear distribution.

2.2 - Requirements for HD Programs

This subsection includes the requirements for programs delivered in the HD standards of 1080p 59.94, 1080i 59.94, 1080p 50, 1080i 50, 1080p 29.97, 1080p 25, and 1080p 23.98.

Most Unchanged

2.2.1 - Upconverted Materials in HD Programs

Content converted from SD sources to an HD format must not make up more than 15% of the program's content. Programs must not contain more than one contiguous minute of upconverted footage. When production partners upconvert footage with an aspect ratio other than 16:9, they must modify the footage so that it fills the 16:9 HD screen. Production partners may use zooming and cropping, hybrid stretching, and graphic treatments to modify the aspect ratio of upconverted footage.

Most Revised

2.2.2 - Acceptable Mastering Codecs for HD Programs

When creating the master, production partners must only use codecs that meet the following specifications:

- The codec must use 4:2:2 or 4:4:4 sub-sampling for the color difference (chroma) signals
- The video must have a minimum resolution of 1920 by 1080
- The codec must use only intra-frame compression
- The codec must have a minimum bit rate of 100 megabits per second (Mb/s) for video
- The codec must preserve audio with at least 20 bits of depth with 48 kHz sampling

These requirements apply to HD codecs used in nonlinear editing systems, recorders, or any other tool used to create the finished version of the program master. *Production partners may use other codecs for "offline" editing, if they use codecs meeting these requirements for their final "online" edit.* If production partners have questions about the qualifications of an editing system or codec, they should contact Discovery Production Management (PMD).

2.3 - Requirements for UHD Programs

This subsection includes the requirements for programs delivered in UHD video standards. Discovery has two tiers for UHD programs. Each tier has different requirements and restrictions. Tier I preserves the highest quality, resolution, and dynamic range. Tier II allows more flexibility while still preserving as much resolution and range as possible.

Some Revised

2.3.1 - Acceptable Frame Rates in UHD Programs

Production partners must shoot, master, and deliver only in the single format and frame rate allowed by the region of the Discovery entity commissioning or acquiring the program. Depending on the region, that format may be UHD-1 59.94p or UHD-1 50p. Discovery maintains high frame rates for UHD to provide enough temporal resolution to match UHD's spatial image resolution and to avoid objectionable judder and motion artifacts in UHD HDR programs. Because of this, Discovery does not accept the delivery of UHD-1 29.97p, UHD-1 25p, and UHD-1 23.98p programs for originally commissioned documentary and reality programs. The deliverables list on the Discovery Producer's Portal or the Program Deliverables Exhibit of the program contract will specify the required frame rate for each program. Specialized high-speed cameras may record at higher frame rates so long as the intended playback frame rate is the contracted frame rate. For example, a 50 frames per second (FPS) program can include high speed footage shot at 1000 FPS so long as the footage is played back at 50 FPS (yielding a 20:1 slow motion ratio). Table 2.3.1 lists the frame rate requirements for Tier I and Tier II.

Table 2.3.1

	UHD Production Tier	
	Tier I	**Tier II**
Allowable Frame Rates (US and other 59.94 Hz-based regions)	59.94 FPS	59.94 FPS Other frame rates allowed only for acquisition deals
Allowable Frame Rates (Europe and other 50 Hz-based regions)	50 FPS	50 FPS Other frame rates allowed only for acquisition deals

Some Revised

2.3.2 - Upconverted Materials in UHD Programs

Programs must not have more upconverted footage than Discovery allows. The allowable amount of upconverted materials is different for the two UHD program tiers. Footage from any camera that does not meet the requirements of its assigned tier is considered upconverted footage and counts towards the upconversion allowance for the program. Table 2.3.2 lists the restrictions for upconverted footage for each program tier.

Table 2.3.2

	UHD Production Tier	
	Tier I	**Tier II**
What Counts as Upconverted Footage	• Any footage sourced from SD or HD materials, shot with SD or HD cameras, or shot with cameras having a sensor resolution below 3840 x 2160 • Any footage scanned from film formats smaller than 35mm or scanned at a resolution of less than 3840 x 2160 • Any footage from a UHD camera not recorded in the camera's native RAW format (mildly compressed RAW is allowed) • Any footage captured by cameras that don't meet the specifications set out in Section 2.1.2	• Any footage sourced from SD or HD materials, shot with SD or HD cameras, or shot with cameras having a sensor resolution below 3840 x 2160 • Any footage scanned from film formats smaller than 35mm or scanned at a resolution of less than 3840 x 2160 • Any footage from a UHD camera not recorded in a log or RAW format with at least 10 bits of depth • Any footage captured by cameras that don't meet the specifications set out in Section 2.1.2
Upconverted Footage Allowance	• No more than 5% • No more than 30 seconds of contiguous upconverted footage allowed in the finished program	• No more than 10% • No more than one minute of contiguous upconverted footage allowed in the finished program

Some Revised

2.3.3 - Acceptable Mastering Codecs for UHD Programs

When creating the program master and its elements, production partners must only use codecs that meet the following specifications:

- The codec must use 4:4:4 or 4:2:2 sub-sampling for the color difference (chroma) signals
- The video must have a minimum resolution of 3840 by 2160
- The codec must use only intra-frame compression
- The codec must have a minimum bit rate of 300 megabits per second (Mb/s) for video
- The codec must preserve audio with at least 24 bits of depth with 48 kHz sampling
- The codec must have at least 10 bits of depth

These requirements apply to UHD codecs used in nonlinear editing systems, recorders, or any other tool used to create the finished version of the program master. *Production partners may use other codecs for "offline" editing, if they use codecs meeting these requirements for their final "online" edit*. If production partners have questions about the qualifications of an editing system or codec, they should contact Discovery Production Management.

Some New

2.3.4 - UHD HDR Grading Master

Discovery may require production partners to deliver a UHD HDR grading master for programs shot in UHD High Dynamic Range (HDR). The grading master allows Discovery to create and distribute HDR versions of UHD programs. In some situations, the production partner will deliver three different masters: an HD program master, a UHD Standard Dynamic Range (SDR) program master, and a UHD HDR grading master. The deliverables exhibit of each contract will list which of these masters Discovery requires.

The UHD HDR grading master is a finished HDR grade of the final program. Production partners must grade the program using the SMPTE ST 2084:2014 electro-optical transfer function (the PQ EOTF). The grading master must have a maximum luminance of 1000 cd/m^2 (nits). The grading master must use the color primaries and color space defined by ITU-R BT.2100-2. This color space is much wider than the ITU-R BT.709 color space used for HD masters.

Production partners must create the HDR grading master using a professional color grading application and a professional HDR grading monitor. The grading monitor must be able to faithfully represent both the BT.2100-2 color space and the 1000-nit luminance level of the master. Table 2.3.4 reinforces the parameters for the UHD HDR grading master.

Table 2.3.4

Parameter	Value
Electro-optical transfer function (EOTF)	SMPTE ST 2084:2014 (PQ)
Target maximum luminance	1000 cd/m^2 (nits)
Color primaries	ITU-R BT.2100-2

Some New

2.4 - Special Masters for Nonlinear Content

Discovery creates content that can entertain and fascinate viewers on every media platform. Content is content, and most of our content goes to every media platform where we find our viewers. However, sometimes it is appropriate to create content for a specific platform and a single moment in time. The temporary nature of this content allows Discovery to define different requirements. This section details those requirements and special considerations for masters intended solely for nonlinear platforms. Section Five, which details file specifications for all masters, includes some file types that Discovery only allows for these nonlinear masters. Production partners must refer to their contract and to their deliverables list on the Producer's Portal (http://producers.discovery.com) to determine whether they may deliver masters that meet these specifications. If the Producers Portal lists a deliverable as a "Nonlinear Master File," or if the deliverable begins with the prefix "NL," it can follow this simpler specification and use the specialized file types only allowed for nonlinear masters.

Some New

2.4.1 - Square and Vertical Aspect Ratio Masters

Some content platforms exclusively use square (1:1) or vertical (9:16) aspect ratios. If Discovery requires a production partner to deliver square or vertical aspect ratio masters, the production deliverables exhibit of the program contract will list those masters separately. Production partners must shoot square and vertical masters using professional cameras and production tools unless Discovery Production Management waives this requirement. Production partners can create square videos by cropping a 1080 x 1080 square from a 1920 x 1080 image. Section 5.3.3 details the master file specifications for square or vertical masters.

Some New

2.4.2 - Title Safe Considerations for Square and Vertical Aspect Ratios

Due to potential cropping in nonlinear platforms, production partners must maintain a 5% title safe margin between any text and the edge of the screen. Table 2.4.2 lists the title safe dimensions for both content with square or vertical aspect ratios. Discovery provides templates for square and vertical title safe within the Production Guide on the Producer's Portal.

Table 2.4.2

	Aspect Ratio	
	Square (1080 x 1080)	**Vertical (1080 x 1920)**
Total safe area	972 x 972	972 x 1728
Left edge of safe area (pixels from left screen edge)	54 pixels	54 pixels
Right edge of safe area (pixels from left screen edge)	1026 pixels	1026 pixels
Top edge of safe area (lines from top screen edge)	54 lines	96 lines
Bottom edge of safe area (lines from top screen edge)	1026 lines	1824 lines

Three - Audio Essence

This section of the specification details Discovery's requirements for the audio content of the program master, as well as any supplemental audio deliverables. These requirements apply to both HD and UHD programs and elements.

3.1 - Audio Phase

All Unchanged

Stereo channels within any program or element must be in coherent phase with each other. Stereo channels must not have an instantaneous coherence of less than 25% (where the two audio channels are more than 165 degrees out of phase). Discovery uses automated analysis to measure instantaneous phase. When the left and right channels of a stereo audio pair are summed to mono, there must be no audible phase cancellation or discernible change in fidelity. If production partners use stereo-enhancement software or hardware, they must use it to enhance the stereo experience without compromising mono playback in any way.

3.2 - Audio Synchronization with Picture

All Unchanged

The audio content of the program master and any program elements must stay in sync with the video content for the entire length of the program. There must be no perceptible lip sync errors or other signs that the audio content is out of sync with the video content. The audio content must not be more than 20 milliseconds ahead of the video content or more than 60 milliseconds behind the video content.

3.3 - Synchronization between Audio Tracks

All Unchanged

All audio tracks within the program or element must be synchronized with each other. Discovery will not accept programs or elements that contain audio tracks more than 15 milliseconds out of relative sync.

3.4 - Audio Levels

Discovery evaluates audio levels based on two measurements: loudness and true peak. The program's audio content must meet the following requirements for audio levels.

3.4.1 - Loudness Levels

All Revised

The full mix tracks of any program or element must have an average loudness level of -24 LKFS/LUFS (plus or minus one dB), as measured using a meter compliant with ITU-R BS.1770-3. If the program or element has multiple segments, each segment must have an average loudness level of -24 LKFS/LUFS (plus or minus one dB.)

Every mix must also have consistent short-term loudness levels. Short-term loudness levels must not vary more than four dB above or below the average loudness level of the program or program segment. Discovery derives short-term loudness levels using a continuous sliding window three seconds in duration, as specified in EBU Tech 3341. The short-term loudness level for each second is derived by calculating the average loudness level of the past three seconds, as measured using a meter compliant with ITU-R BS.1770-3. Discovery evaluates short-term loudness level measurements in context. If there is a long passage of quiet natural background sound without dialogue, the short-term loudness measurement of that passage will and should be lower than passages that contain dialogue as an anchor element.

Discovery combines these short-term loudness measurements with loudness range (LRA) measurements to evaluate the consistency of loudness levels throughout the mix. This specification addresses loudness range measurements in Section 3.5.2. Discovery does not use "dialogue intelligent" meters when evaluating the loudness levels of programs. While speech remains the "anchor element" of Discovery programming (see 3.5.1), Discovery will measure the loudness level of the entire program, not only the sections containing speech.

3.4.2 - Peak Levels

All Unchanged

The peak audio levels on any track in a program or element must never rise above -2 dBFS, when measured using a True Peak meter compliant with ITU-R BS.1770-3. *Production partners should only use audio peak levels above -6 dBFS in small areas of the program and only when needed for impact or emphasis in the audio mix. While digital delivery of television signals allows for high peak levels, older analog systems cannot allow peak levels above -10 dBFS. These older analog systems may use audio limiting to lower peak levels. To avoid the impact of excessive peak limiting production partners should use audio with high peak levels sparingly.*

All Unchanged

All Revised

All Revised

3.5 - Requirements for Audio Mixing

Discovery requires program audio mixes to provide a high-quality experience for the networks' viewers. To help meet that goal, Discovery's production partners must create audio mixes that meet the following requirements.

3.5.1 - Speech is the Anchor Element

Production partners must create audio mixes that allow Discovery's viewers to clearly hear and understand the dialogue, narration, and other spoken language. Music and effects in a program must not drown out spoken language or make it difficult for viewers to understand.

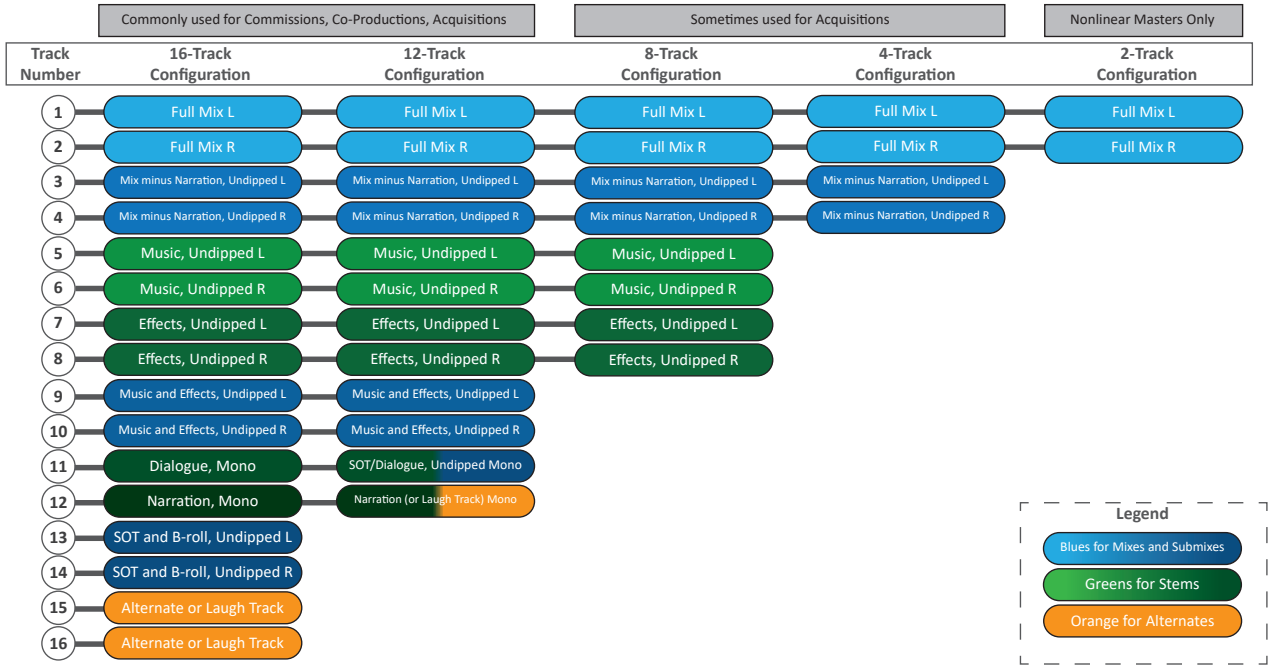
3.5.2 - Dynamic Range

Production partners must mix programs with a dynamic range that provides a comfortable experience for Discovery's viewers. Production partners must not use excessive dynamic compression to create programs with dense and fatiguing audio mixes. Production partners must also avoid creating mixes with excessive dynamic range or with an inconsistent dynamic range. Discovery uses the EBU loudness range (LRA) metric to measure dynamic range. EBU R128 and EBU Tech 3342 define this measurement. The loudness range (LRA) of a program or program element's full mix must not exceed 9 LU.

3.6 - Audio Track Configuration

Discovery has a few different audio track configurations for program masters and elements. Discovery will specify the required configuration in the deliverables list on the Producer's Portal or in the Program Deliverables Exhibit of the production partner's contract. Figure 2 shows the different audio track configurations for masters and elements. Production partners must include all required audio tracks within each program master file or element file. Production partners must encode all audio tracks delivered within a video file with one audio channel per logical audio track atom (multiple mono tracks, not a single multichannel track). If production partners do not have elements for a track, they must replace that track with silence (MOS). For example, a program without narration using the 12-track configuration would replace the 12th track with silence in both the audio essence and the metadata entry. In some situations (most commonly for nonlinear masters intended only for social media), Discovery may only require the production partners to deliver a stereo full mix.

Figure 2: 16-track, 12-track, 8-track, 4-track, and 2-track Audio Configurations



Few
Revised

All
Unchanged

3.6.1 - Full Mix Audio 5.1 Surround Sound

If a production partner's contract requires them to deliver a full mix in 5.1 surround sound, the production partner must deliver that mix as a single interleaved broadcast wave file. Production partners delivering a 5.1 full mix must also deliver a stereo full mix as well as the typical stereo stems. Discovery does not require producers to deliver stereo mixes that use Dolby Pro Logic or any other type of encoded surround audio. The 5.1 full mix must use the track order defined by SMPTE ST 323:2004: L,R,C,S (LFE), Ls, Rs.

3.7 - Audio Track Contents

Discovery's audio deliverables include a full program mix and up to nine different audio stems and submixes. These audio stems and submixes allow Discovery to modify the program audio, creating new mixes in other languages for distribution around the world. This section defines the contents of each of the audio stems and submixes. While these definitions address many of the common questions about how audio elements are grouped into stems, there will always be exceptions. When questions come up, production partners should use professional judgment to group audio elements logically while remembering that the main purpose of all stems is to create new audio mixes in different languages.

- **Narration**: This stem includes all voiceover recordings provided by the program's narrator or host. If the program has a host who appears on camera, only the host's off camera voiceover should be included in the narration stem. The narration stem also includes any voiceover language translation. In some track configurations, scripted series with laugh tracks must place laugh track audio on the narration stem.
- **Dialogue**: This stem includes any on-camera dialogue, including on-camera dialogue from a program's host, or any other dialogue that is meant to be heard and drives the program's story. The stem also includes any interviews, even when the interview subject is off camera. In reality-style programs the dialogue may be inseparable from background sound and ambience recorded in the field. Mixers must include field sound that drives the program story as part of the Dialogue stem. All other field sound must be placed on the Sound on Tape (SOT)/B-Roll stem. If the program's audio configuration does not include a Sound on Tape/B-Roll stem, then mixers should place background audio on the Effects stem.
- **Sound on Tape (SOT)/B-Roll**: This stem includes background audio recorded in the field, including background dialogue that doesn't drive the program's story. Background ambiance without spoken language should always be included in SOT/B-roll stem.
- **Effects**: The Effects stem includes all effects added in post-production, along with field recordings not included in the Dialogue or SOT/B-Roll stems. The Effects stem should also include any re-created ambiance or foley effects (with the exception of laugh tracks).
- **Music**: The music stem includes the program's musical soundtrack and any tonal sound effects (drum rolls, hits, etc) used to accentuate the soundtrack.
- **Mix Minus Narration**: This submix includes all the audio elements of the full mix except for the program's narration.
- **Music and Effects**: This submix includes all the audio elements of the full mix except for the narration and dialogue. This stem should be free of any spoken language used to drive the program story.
- **Laugh Tracks**: This stem contains the laugh tracks for any program or element that contains them.
- **Alternate Versions**: This stem contain alternate versions of other stems. Discovery occasionally requires production partners to deliver alternate narration, alternate music, or secondary language tracks.

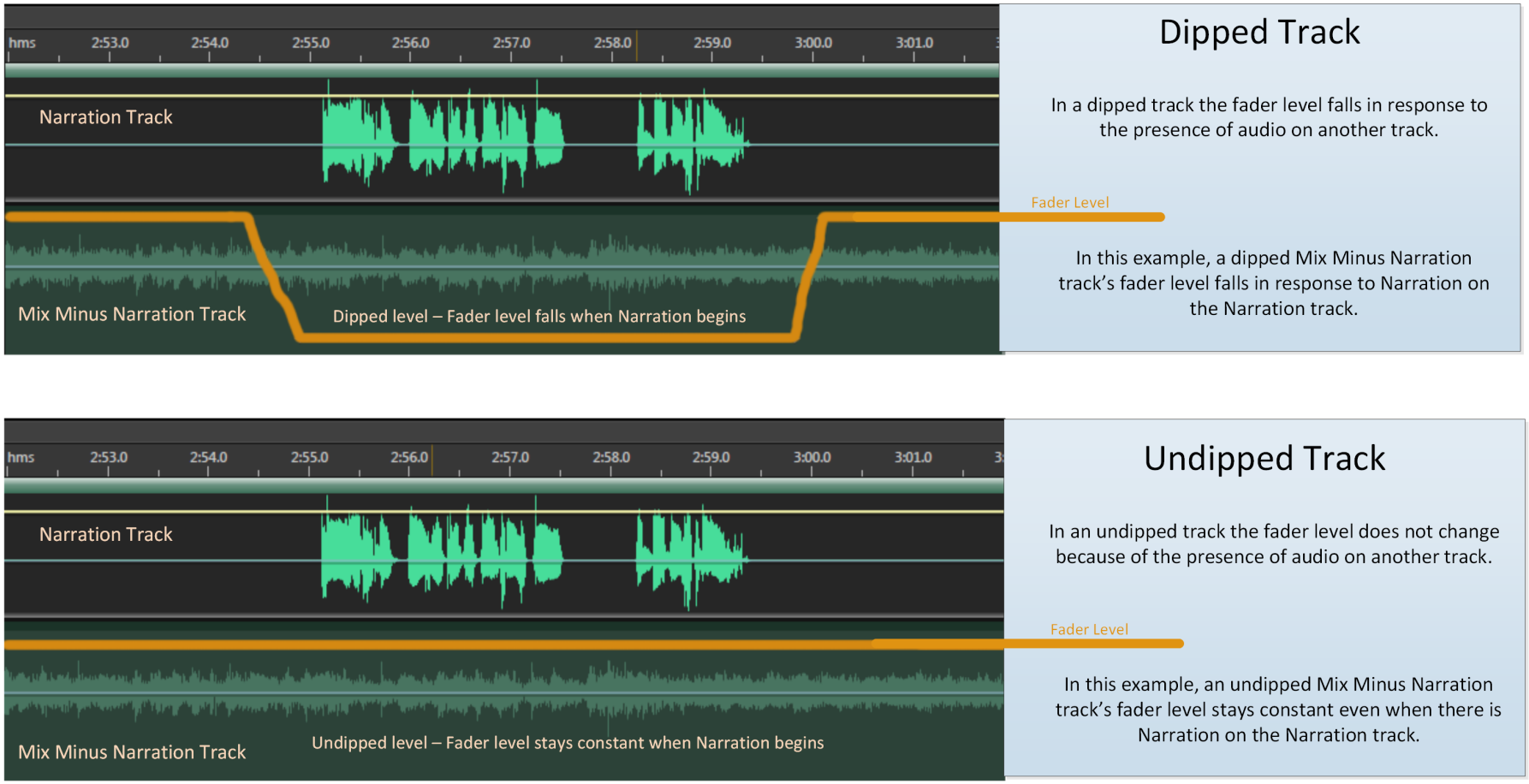
3.8 - Audio Dips

All audio stems and submixes must be "undipped." Discovery uses the term "undipped" to describe audio tracks that do not change level in response to the other elements that make up the program's mix. This is often referred to as "pre-fader level."

Undipped stems and submixes are essential to language customization work, as each language has its own timing and efficiency. For example, it often takes longer to say things in Spanish than it does in English. If the audio stems dip in response to the timing of the English language elements, then Discovery must painstakingly remove those dips in the stems when recreating the program in Spanish, or in any other language.

Undipped Mix Minus Narration submixes do not change level in response to the program narration. They continue at the same level as if no narration was present. Undipped Music and Effects stems do not change level in response to program narration or to program dialogue. They continue at the same level as if neither narration nor dialogue were present. Figure 3 illustrates this concept.

Figure 3: Dipped and Undipped Audio Tracks



All Unchanged

3.9 - Profanity, Confidential Information, and Bleeps on Audio Stems

Audio stems must not be bleeped or muted to cover profanity. This includes the Mix Minus Narration and Music and Effects stems. When production partners bleep or mute dialogue on the full mix to cover profanity, they must preserve the original dialogue on the audio stems. Production partners may still use bleeps or muting on all tracks (including audio stems) to protect confidential sources or personal information.

All New

3.10 - Emergency Alert System and other Emergency Alert Tones

Many countries and localities use emergency broadcast alerts to notify their residents of weather or security emergencies. Some of those countries, including the United States, have strict laws about the misuse of those emergency alert tones. There must not be any emergency alert tones, either real or simulated, in any program. This includes the header or attention tones of the US-based Emergency Alert System (EAS), Amber Alerts, Silver Alerts, or the tones and signals used by any other nation, state, or locality to notify the public of an emergency. **Production partners must not, under any circumstances, add real or simulated emergency alert tones to a program**. If the program includes recordings of naturally-occurring alert tones, the production partner must cover (bleep) or silence the emergency alert tones. For production partners unfamiliar with EAS tones, the US Federal Emergency Management Agency (FEMA) makes simulated training tones available on their website. https://www.fema.gov/media-library/assets/audio/132794.

Four - Graphics Masters, Captions, Subtitles, and Other Files

This section of the technical specifications details the requirements for the ancillary files that often accompany a finished program: graphics masters, caption files, subtitle files, and still images. Most program contracts require a graphics master at either the series or episode level. Some contracts, especially those for acquisitions, may require caption or subtitle files. Discovery often requires suppliers to deliver still images as well as video, as those still images become title and series art on nonlinear platforms.

4.1 - Graphics Masters

Graphics masters provide Discovery with all the elements needed to recreate a program's graphics in multiple languages. Discovery often requires production partners to provide a graphics master package in addition to the program.

A graphics master package must contain all the graphic elements that appear in the final program, alternate versions of the final program, and the snap in content. This includes all the following:

- Program Opens
- Lower Thirds
- Illustrations
- Backgrounds
- Bumps
- Maps
- Credit beds
- Any other graphic elements

Some Discovery contracts require production partners to deliver a separate graphics master package for each episode of a series. Other contracts require only a single graphics master package for an entire season. Production partners must refer to their deliverables list on the Producer's Portal or the Program Deliverables Exhibit of their contracts and deliver the appropriate type of graphics master package.

4.1.1 - Acceptable Graphics Elements Formats

Most Revised

Production partners must deliver the graphic elements that make up a graphic master in their original form, so long as that original form is something that Discovery can use. Today's graphic designers use a wide array of tools to create still and motion graphics. Discovery provides a dynamic online specification that lists all the software, project formats, plug-ins, and fonts that Discovery can use. Discovery will continue to update that online specification as software versions, fonts, and plug-in libraries change. Production partners can provide elements in any of the formats listed in that specification, using any of the plug-ins and fonts listed. Production partners can find the online graphics specification at http://pmd.discovery.com/techspecs/graphics/

If production partners create graphics elements that are incompatible with the dynamic online specification, they must provide the graphics as textless movies. The guidelines for textless movies are in Section 4.1.3 of this specification.

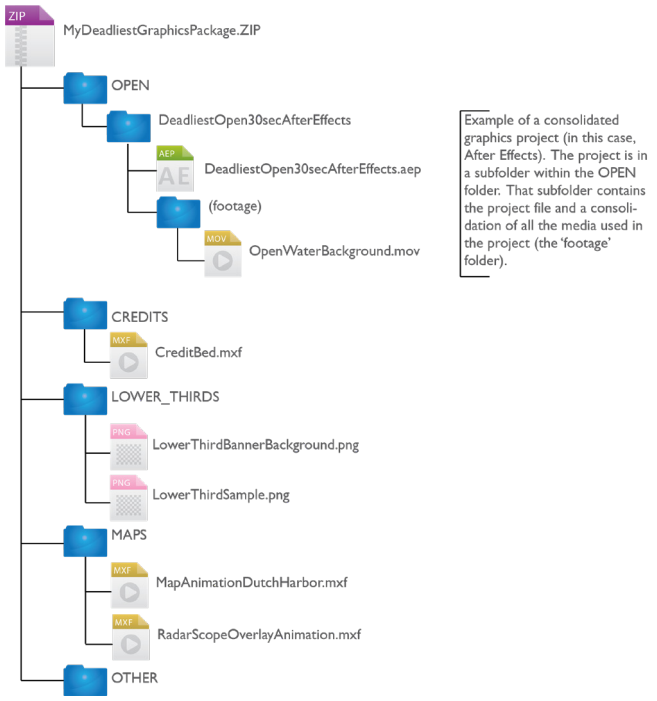
Most Unchanged

4.1.2 - Project Files

Production partners can deliver native project files for software and project formats listed in the online graphics specification. Discovery will use these project files to recreate programs and elements in new languages. Production partners must follow the guidelines below to make sure their project files are as useful as possible.

- The folder containing the project file must include all media files used by the project.
- Element and layer names must clearly reflect the object's purpose and properties
  - » *Example: Creating a layer with the name "Blue globe background," instead of "Layer 4"*
- Any layers or elements that include editable text must have the word TEXT in their label
- Any video files referenced in the project must be in a supported file type. The dynamic online specification lists the supported file types
- Any text layers within the project must use fonts with End User License Agreements (EULA) that allow for perpetual worldwide broadcast and video usage. This excludes many "free" fonts that have limited personal use licensing agreements
- Project files must match the resolution and frame rate of the program master
  - » *Example: If a program delivers in 1080p 25, any graphics project must also have a resolution of 1920 x 1080 and a frame rate of 25 frames per second*
- Project audio, if it exists, must have a sample rate of 48Khz

Figure 4: Sample of a Graphics Master Package



Most Unchanged

4.1.3 - Graphics Elements That Are Not Part of a Project File

If production partners create motion graphics elements, static elements, or still images using software and project formats not listed in the dynamic online specification they must provide those elements as flattened files. These flattened files must not contain any text layers. The files must contain an alpha channel if the graphics element includes layers with transparency. Production partners must provide the files in a supported file type that is listed in the dynamic online specification. Motion graphics must deliver in a supported video file format. Static graphics and images must deliver in a supported image file format. Production partners must give each file a clear name that reflects its purpose and properties.

Most Unchanged

4.1.4 - Organizing Files

Production partners must organize all the files contained in the graphics master package by their usage type. The usage type will be one of the five listed below:

- OPEN – this includes the program open and any accompanying elements
- CREDITS – this includes any credit beds, backgrounds, and credit text
- LOWER THIRDS- this includes all lower third backgrounds and banners and any example text
- MAPS – this includes all map graphics
- OTHER – this includes any graphic elements not captured by any other usage type

Each of these usage types becomes a primary folder within the graphics master package. Production partners must place each graphic element in the appropriate primary folder. Complex elements such as motion graphics projects and their elements can go inside subfolders within the primary folders. Like all files within the graphics master package, these subfolders must get a clear name that reflects their purpose and properties. Neither file nor folder names can exceed 50 characters in length. Production partners must not include any extraneous file in the graphics master package. It must not include documents, production stills, or other random files. Discovery will reject graphics master packages with poor organization. Figure 4 shows a sample graphics master package that includes a mix of the different acceptable file types.

Most Revised

Most Unchanged

Few New

Most New

4.1.5 - Delivering Graphics Master Packages

Production partners must deliver all graphics master packages using the Discovery Producer's Portal. Section 6.1 of this specification provides more detail on Producer's Portal delivery. Production partners must encapsulate the entire graphics master package into a single ZIP file for upload through the Producer's Portal. The ZIP file must retain the organization and folder structure of the graphics package. The ZIP file must comply with Version 6.33 of the PKWARE ZIP specification.

4.1.6 - Compatibility Report

When production partners upload a graphics master package, they must provide a compatibility report as part of their metadata. This compatibility report must list any software, plug-ins, and fonts used within the graphics elements that are not included in the dynamic online specification. This compatibility report helps Discovery's reversioning teams find and purchase any missing fonts or plug-ins or find alternatives. Providing this report helps production partners to ensure that their programs look as similar as possible as Discovery distributes them around the world.

4.2 - Caption and Subtitle Files

Discovery sometimes requires production partners to deliver closed caption or subtitle files. Production partners should refer to their deliverables list in the Producer's Portal or the Program Deliverables Exhibit in their contract to determine whether Discovery requires them to deliver caption or subtitles files. When contracted to deliver these files, production partners must follow the specifications in this subsection.

4.2.1 - Caption File Formatting

Discovery accepts closed caption files in the SCC, CAP, VTT, SRT, and TTML formats. All closed caption files must have time code values that match their accompanying video file. Closed caption files must also have a frame rate that matches the frame rate of their accompanying video file (unless the caption file format does not support a frame rate designation). Caption files must be well-formed and free of viruses or malware. The content of caption files must be accurate, synchronous, complete, and properly placed on the screen, in compliance with FCC guidelines (Title 47, Section 79.1). The SRT file format does not include screen placement information. Discovery only accepts files in the SRT format when they accompany nonlinear masters.

4.2.2 - Subtitle File Formatting

Discovery accepts subtitle files in the STL, XML, and PAC formats. All subtitle files must have time code values that match their accompanying video file. Subtitle files must also have a frame rate that matches the frame rate of their accompanying video file. Subtitle files must be well-formed and free of viruses or malware. The content of subtitle files must be accurate, synchronous, complete, and properly placed on the screen.

4.3 - Photography and Still Images

Discovery often requires production partners to deliver still images. Production partners should refer to their deliverables list in the Producer's Portal or the Program Deliverables Exhibit in their contract to determine whether Discovery requires them to deliver production photography or still images. These images are often photographs of the talent, hosts, locations, or production process. Production partners must deliver all still images as high quality and high-resolution JPEG files. Images must have a minimum resolution of 4000 pixels on their shortest dimension (for example a resolution of 5,334 pixels x 4000 pixels for a 4:3 image). Production partners must deliver images at their native camera resolution. All still images must be properly lit, well-framed, well-focused, and properly exposed.

Five - File Specifications

All Unchanged

5.1 - Viruses and Malware

All deliveries to Discovery must be free from viruses, malware, and other extraneous or harmful files. Discovery will destroy deliveries that contain viruses and malware. The production partner is responsible for providing an immediate virus-free replacement for any delivery that Discovery believes is compromised by viruses or malware.

5.2 - General File Requirements

Discovery receives file-based deliveries through the Discovery Producer's Portal. Section 6 has full information and detailed requirements for Producer's Portal deliveries. Discovery requires all file deliveries to meet the requirements listed in this section.

All Unchanged

5.2.1 - File Structure, Syntax, and Integrity

Discovery requires all file-based deliveries to be free from structural errors, syntax errors, undecodable essence, and file corruption. If Discovery cannot successfully decode and use a file with the tools used in the company's workflows, then Discovery will require the production partner to provide an error-free replacement.

All Revised

5.2.2 - File Naming Conventions

When production partners deliver through the Producer's Portal, Discovery will automatically rename all file-based deliveries to meet the company's specifications. If Discovery requires a production partner to deliver using another method, the partner must follow any instructions from Discovery regarding file names.

All Revised

5.2.3 - Time Code

All file-based deliveries must have valid SMPTE time code. The placement, structure, and properties of the time code will vary depending on the specifications and capabilities of each file type. However, every file must have continuous ascending time code and all time code references (wrapper, video essence, audio essence, and metadata) must match each other.

Most Revised

Most Revised

5.3 - Accepted File Types for Video Media

Discovery allows production partners to deliver a variety of file types for video programs and elements. The company allows different file types depending upon the standard, usage, and deal type for the program. Production partners must deliver the type of file specified in their deliverables list on the Producer's Portal or the Program Deliverables Exhibit of their contract. The common usages listed in Table 5.3.1 are for example only. Discovery may also ask producers to provide other types of files as part of a pilot program. If Discovery asks production partners to participate in a pilot program, then Discovery will provide new file specifications for the additional allowable file types.

5.3.1 - Accepted File Types for HD Programs and Elements

Discovery accepts two types of files for any and all HD programs or program elements:

- DNxHD MXF: DNxHD 8-bit (115-145 Mb/s, varied by frame rate) in an MXF Op1A wrapper
- XAVC HD MXF: XAVC HD 10-bit CBG Class 100 in an MXF Op1A wrapper (progressive only)

Discovery accepts an additional file type for some HD programs and elements depending on the contracted deal type.

- XDCAM HD MXF: MPEG-2 HD 8-bit at 50 Mb/s in an MXF Op1A wrapper, following the "XDCAM HD" standard

Production partners must refer to their deliverables list on the Producer's Portal or the Program Deliverables Exhibit of their contract to determine what file type they must deliver. Table 5.3.1 shows the detailed specifications for all HD file types.

Table 5.3.1

Parameter or Setting	DNxHD MXF	XAVC HD MXF	XDCAM HD MXF
Common Usage	HD Commission, Co-Pro, or Acquisition		HD Acquisition
File Wrapper	MXF OP1a		
File Endianness	Little-Endian		
Video Codec	DNxHD	XAVC	MPEG-2
Allowable Video Standards	• 1080i 59.94 | 50 (29.97 or 25 interlaced FPS) • 1080p 29.97 | 25 | 23.98	• 1080p 59.94 | 50 | 29.97 | 25 | 23.98	• 1080i 59.94 | 50 (29.97 or 25 interlaced FPS) • 1080p 29.97 | 25 | 23.98
Video Bit Depth	8	10	8
Video Bit Rate(s)	• 145 Mb/s (29.97/59.94 FPS) • 120 Mb/s (25/50 FPS) • 115 Mb/s (23.98 FPS)	• 228 Mb/s (59.94/50p) • 114 Mb/s (59.94i/29.97p, 50i/25p) • 90 Mb/s (23.98p)	50 Mb/s
Video Data Structure	All video must be in a single track and in a single data block within that track. There cannot be any mixing of codecs, frame rates, or bit rates within the file wrapper.		
Chroma Subsampling	4:2:2		
Aspect Ratio	16:9		
Pixel Aspect Ratio	1:1 (Square)		
Field Dominance	Top Field First(TFF)/Upper Field Dominant when providing interlaced content		
Gamma and Colorimetry	ITU BT.709		
Audio Codec	PCM (Uncompressed)		
Audio Track Coding	All audio channels must be encoded as a single channel per logical track, regardless of track type. For example, a 16-channel master would have 16 individual tracks, not one track with 16 channels		
Audio Sample Rate	48K		
Audio Bit Depth	24 bit		
Time Code	SMPTE/EBU time code track required		

Some Revised

5.3.2 - Accepted File Types for UHD Programs and Elements (SDR and HDR)

Discovery accepts a single file type for all standard dynamic range (SDR) and high dynamic range (HDR) UHD programs or program elements:

- XAVC UHD MXF: XAVC UHD 10-bit CBG Class 300 in an MXF Op1A wrapper

Production partners must refer to their deliverables list on the Producer's Portal or the Program Deliverables Exhibit of their contract to determine which file types they must deliver. Table 5.3.2 shows the detailed specifications for all UHD file types.

Table 5.3.2

Parameter or Setting	XAVC HD MXF SDR	XAVC HD MXF HDR
Common Usage	UHD SDR Commission, Co-Pro, and Acquisition	UHD Grading Master for HDR Commission, Co-Pro, and Acquisition
File Wrapper	MXF OP1a	
File Endianness	Little-Endian	
Video Codec	XAVC Class 300 CBG (Constant Bytes Per GOP)	
Allowable Video Standards	• UHD-1p 59.94 • UHD-1p 50 • UHD-1p 29.97 (Allowed only with low frame rate contract waiver) • UHD-1p 25 (Allowed only with low frame rate contract waiver) • UHD-1p 23.98 (Allowed only with low frame rate contract waiver)	
Video Bit Depth	10 bits	
Video Bit Rate(s)	• 600 Mb/s (59.94 FPS) • 500 Mb/s (50 FPS) • 300 Mb/s (29.97 FPS, allowed only with low frame rate contract waiver) • 250 Mb/s (25 FPS, allowed only with low frame rate contract waiver) • 240 Mb/s (23.98 FPS, allowed only with low frame rate contract waiver)	
Video Data Structure	All video must be in a single track and in a single data block within that track. There cannot be any mixing of codecs, frame rates, or bit rates within the file wrapper.	
Chroma Subsampling	4:2:2	
Aspect Ratio	16:9	
Pixel Aspect Ratio	1:1 (Square)	
Colorimetry	ITU BT.709	ITU Rec BT.2100-2
Gamma/EOTF	ITU BT.709	SMPTE ST 2084 (PQ)
Peak Luminance (brightness)	Not applicable	1000 cd/m^2
Audio Codec	PCM (Uncompressed)	
Audio Track Coding	All audio channels must be encoded as a single channel per logical track, regardless of track type. For example, a 16-channel master would have 16 individual tracks, not one track with 16 channels	
Audio Sample Rate	48K	
Audio Bit Depth	24 bit	
Time Code	SMPTE/EBU time code track required	

Some New

5.3.3 - Accepted File Types for Nonlinear Programs and Elements

Discovery may allow production partners to deliver using specialized file types for nonlinear masters. These formats allow for program masters in non-standard aspect ratios. Discovery does not permit all nonlinear programs and elements to use these file types, and often requires production partners to deliver programs intended for nonlinear in one of the HD or UHD standard file types. As always, production partners must follow the requirements listed in the Producer's Portal or in the deliverables exhibit attached to their contract. Discovery accepts two possible formats for nonlinear programs or elements.

- MPEG4 HD MP4: H.264 HD 8-bit long-GOP at 30 Mb/s in an MP4 wrapper
- DNxHR HD MXF: DNxHR SQ 8-bit (115-145 Mb/s, varied by frame rate) in an MXF Op1A wrapper

Table 5.3.3 shows the detailed specifications for nonlinear file types

Table 5.3.3

Parameter or Setting	DNx HR MXF 16:9	DNx HR MXF 1:1	DNx HR MXF 9:16	MPEG4 HD MP4 16:9	MPEG4 HD MP4 1:1	MPEG4 HD MP4 9:16
Common Usage	Digital Originals 16:9	Digital Originals Square	Digital Originals Vertical	Web/Social 16:9	Web/Social Square	Web/Social Vertical
File Wrapper	MXF OP1a			MP4		
File Endianness	Little-Endian					
Video Codec	DnX HR SQ			H.264		
Video Width	1920	1080	1080	1920	1080	1080
Video Height	1080	1080	1920	1080	1080	1920
Video Bit Depth	8 bits					
Video Bit Rate(s)	115-291 Mb/s (based on FPS)	75-165 Mb/s (based on FPS)	115-291 Mb/s (based on FPS)	30 Mb/s		
Video Data Structure	All video must be in a single track and in a single data block within that track. There cannot be any mixing of codecs, frame rates, or bit rates within the file wrapper.					
Chroma Subsampling	4:2:2			4:2:0		
Aspect Ratio	16:9	1:1	9:16	16:9	1:1	9:16
Pixel Aspect Ratio	1:1 (Square)					
Field Dominance	Progressive					
Gamma and Colorimetry	ITU BT.709					
Audio Codec	PCM (Uncompressed)			AAC CBR at 128 Kb/s stereo, 64 Kb/s mono		
Audio Track Coding	All audio channels must be encoded as a single channel per logical track, regardless of track type. For example, a 16-channel master would have 16 individual tracks, not one track with 16 channels			All audio channels must be encoded with a single channel per logical track when there are more than two channels in the file. Files with only two channels may use a single audio track that contains both channels in the stereo pair.		
Audio Sample Rate	48K					
Audio Bit Depth	24 bit			16 bit or 24 bit		
Time Code	SMPTE/EBU time code track required			MP4 files must include either a valid SMPTE/EBU time code track and/or a valid start time code in their file header		

5.4 - Accepted File Types for Audio-Only Media

Discovery may require production partners to provide Broadcast WAVE files for some or all the audio channels within a program or program element. Broadcast WAVE files must be 24 bits in depth, with a sample rate of 48 kHz. Mono files must be properly gain compensated by +3dB: that is, a narration track, metering -20 dbFS when panned to center on a stereo meter, would have a mono equivalent of -17 dBFS. This will result in mono files that produce audio levels identical to their stereo counterparts when paired together.

Broadcast WAVE files must contain reference tone and the alignment sync indicator. The tone must align in time with its program master file bars/tone equivalent, usually 20 seconds before program start, or 00:59:40;00 (09:59:40:00 for 50 FPS programs). WAVE files must also include the sync indicator (a two-frame burst of 1k tone) at 00:59:57;06 (09:59:57:06 for 50 FPS programs).

Six - Delivery Methods

Discovery requires production partners to deliver all media through the Discovery Producer's Portal. This includes all programs, program elements, graphics masters, and still images.

All
Revised

6.1 - Uploading Media Deliverables and Their Elements

Production partners can upload media deliverables and elements using the Producer's Portal application. Table 6.1 lists the possible types of media deliverables. Production partners must refer to their deliverables list in the Producer's Portal or the Program Deliverables Exhibit of their contract to determine what types of media deliverables Discovery requires them to deliver. Media Deliverables are often grouped by version, called a "case" in the Discovery inventory model. Each version/case has a primary video file. This primary file is either a Program Master File or a Nonlinear Master File. Versions often contain other elements that match to the primary file (textless material, snap in content, additional audio, and others). Table 6.1 lists the available Media Deliverables. Many media deliverables have a "non-linear" variant. While the description of those deliverables remains the same, non-linear (NL) variants are held to the nonlinear requirements detailed in Section 5.3.3 of this specification. Discovery's list of deliverables changes more frequently than this Technical Specification document. Production partners can always find the latest list and definitions for deliverables in the Production Guide on the Discovery Producer's Portal.

Table 6.1

Media Deliverable	Parent	Description
Program Master File	Case/Version	This is the core of the program content. The Program Master begins with the program leader and ends after the closing credits
Non-linear Master File	Case/Version	This is an alternate format for the core program content, primarily used for nonlinear platforms. Nonlinear Masters begin with the program content and do not need a leader or credits
Program Master File EU *Non-linear Master File EU*	Episode	This is a second version of the program master used for European language and graphics customization
Textless Material *NL Textless Material*	Case/Version	Textless material used to replace texted material in program (textless clean cover shots or a fully textless version of the entire program)
Snap In Content *NL Snap In Content*	Case/Version	Discovery uses Snap In Content in customization work both domestically and internationally. Domestically Discovery uses this content for program reloads, Discovery Onboard (in-flight entertainment), and as bonus content for nonlinear outlets. Internationally the company uses the content to add time to the program, making programs a suitable length for international clocks. International editors also use Snap Ins as a source of extra content when they need to remove some of the program's original content for cultural sensitivity reasons
Textless Snap In *NL Textless Snap In*	Case/Version	If the Snap In Content contains text then Discovery may require partners to deliver a textless copy of that Snap In
Audio Elements (Additional)	Case/Version	Additional audio elements are audio tracks provided as discrete broadcast WAV files
Program Graphics Master	Episode or Season	The graphics master contains all graphic elements used to create a program. The graphics master provides Discovery with all the elements needed to recreate the graphic elements of the program in multiple languages
In Program Features *NL In Program Features*	Episode	Segment bumpers or other treatments added to the program. Includes trivia cards

Media Deliverable	Parent	Description
Teases *NL Teases*	Episode	Promo material or "Coming up next time." Includes "Super Teases"
Alternate Credits *NL Alternate Credits*	Episode	Separate credits over black or tease credits, promo credits
Alternate Opens *NL Alternate Opens*	Episode	An alternate opening sequence for the program
Web Tosses *NL Web Tosses*	Episode	Additional program content that directs viewers to the network or program websites. Example: On-camera talent does a stand-up with this copy: "For more of Fixer Upper, including behind the scenes content, go to HGTV.com/FixerUpper"
Talent Shout Outs *NL Talent Shout Outs*	Episode	A short message from the program's talent recommending content
Companions *NL Companions*	Season	Short form content for use online or on mobile, usually accompanying or referencing a long form program
Sponsorship Messages *NL Sponsorship Messages*	Episode	Additional content or additional version of the program that includes sponsorship information
Program Music Elements	Episode	Audio files for original music composed for the program
Promo Material	Episode	Promo Material provides the marketing groups with host elements, standups, or selects from material not found in the program
Production Stills & Log	Episode	Photography taken during production of key shooting, sets, and talent, along with a log file that lists each image and its contents
Captions and Subtitles	Case/Version	Caption or subtitle file that matches the Program Master File or Nonlinear Master File for the version/case

All Revised

6.1.1 - Material Types

Some Media Deliverables require production partners to indicate the Material Type of that deliverable when uploading. The Material Type indicates how each deliverable can be used. Discovery uses three different types of material: full, insert, and independent. Not every Material Type is available for every Deliverable Type. The Material Type field will not appear in the upload dialogue when Discovery only accepts a single Material Type for the deliverable the production partner has selected.

- **Full**: deliverables with this Material Type are full copies of the program. For example, a Textless Material deliverable with a Material Type of "Full" is a fully textless copy of the program
- **Insert**: deliverables with this Material Type are small segments that can be inserted into a full copy of the program. When production partners choose this Material Type, they must enter the insert time codes in the Producer's Portal. For example, a Web Toss delivered with a Material Type of "Insert" would include the time codes in the matching Program Master File where the Web Toss can be inserted
- **Independent**: deliverables with this Material Type are independent elements with no relation to the full program (like Companions) or elements with insertion instructions that are too complex for simple insert points (like Textless Material delivered as textless clean cover shots)

Most Revised

6.1.2 - Textless Material

Discovery often requires production partners to deliver textless material. Discovery accepts two different formats for textless material: a fully textless program master or textless clean cover shots. Production partners must refer to their deliverables list in the Producer's Portal or the Program Deliverables Exhibit of their contract to determine which format Discovery requires for their program. When production partners deliver fully textless program masters, they must use the appropriate "Textless Material" deliverable and choose "Full" as the material type. When delivering textless clean cover shots production partners must use the "Textless Material" deliverable, instead choosing the "Independent" material type.

All Revised

6.1.3 - First Step: Discovery File Sniff

Each deliverable goes through an initial file sniff to determine if it is usable. The file sniff determines if the deliverable can continue through the automated workflow to its destination for QC and eventual broadcast. This initial sniff checks for the presence of viruses. It also inspects the basic structure and properties of the deliverable file. The file sniff checks for agreement between the metadata production partners provide in the upload forms and the technical properties of the file. For example, the file sniff will reject a file if it contains 12 tracks of audio but the production partner has only listed 10 tracks of audio in their metadata. If the sniff finds viruses or malware or finds the file doesn't meet Discovery's requirements, then the status of the deliverable in the Producer's Portal will change to show that Discovery has rejected it. The Producer's Portal will provide a status message that summarizes the problems the file sniff discovered. Production partners are responsible for providing a replacement file. The Production Guide on the Producer's Portal (http://producers.discovery.com) provides more detail on the file sniff and its rejection messages.

All Revised

6.1.4 - Segment Times

When production partners upload any type of program master or any element where the Producer's Portal user interface asks for segment times, they must enter segment timing information (HH:MM:SS:FF). This applies even when the program is composed of a single segment. The upload dialogue for some deliverables may ask production partners to enter the location of slates and credits. Production partners must refer to the clock sheet provided by their production manager or executive producer to answer any questions about the program's length, segment count, or credit requirements. All production partners must follow the conventions listed below when calculating segment times.

- All segments must be timed with the "in" point marked as the first frame of video levels above black or audio levels above -65 dBFS, whichever is earlier
- All segments must be timed with the "out" point marked as the last frame of video levels above black or audio levels above -65 dBFS, whichever is later

Most Revised

6.1.5 - Windows of Opportunity (WOO) Entry

If Discovery requires production partners to provide times for the Windows of Opportunity for network branding (WOOs), then production partners must also enter those times into the Producer's Portal when they upload the deliverable file. This requirement is most common for programs delivering to Discovery's US-based networks. WOOs are times within each segment where Discovery can add pop-on banners or other branding without covering text within the program or disrupting the program narrative. The minimum duration for a WOO is 40 seconds. Producers must choose times for WOOs that are free of lower third text, as the banners will likely cover that portion of the screen. The producer should also choose times when banners will least affect the narrative. They should not occur during critical plot elements or emotional scenes. The producer may enter as many WOOs as needed. Discovery usually requires producers to identify two WOOs per program segment, but different Discovery networks have different requirements. The upload dialogue within the Producer's Portal (http://producers.discovery.com) will automatically provide production partners with two WOO entry fields per segment. If the network doesn't require two WOOs in a segment, production partners can use the red X button to remove the WOO field from the segment. Production partners must enter WOOs as HH:MM:SS:FF values, just as they would for segment times.

All Revised

6.1.6 - Uploading Replacement Files

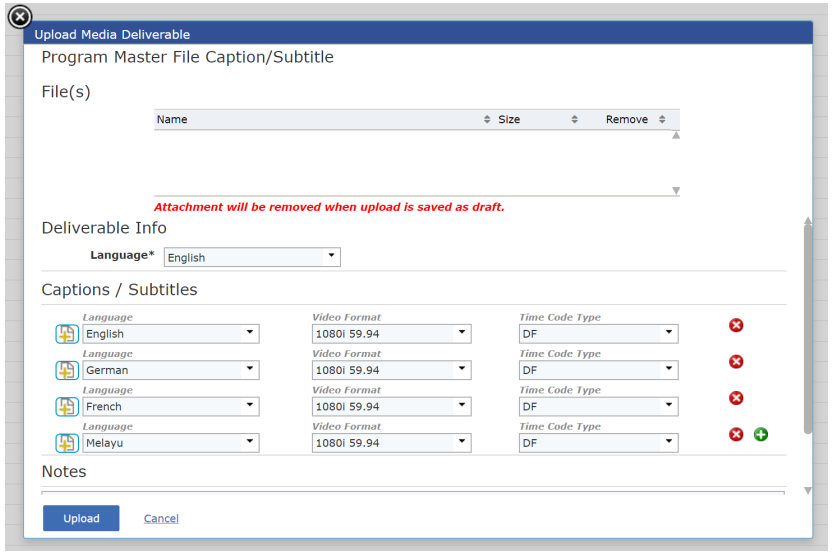
Any files uploaded as replacements must arrive with metadata that tells Discovery why the file was replaced. The Producer's Portal requires production partners to enter a replacement reason (technical, legal, editorial) and provide notes about why they replaced the file and what changes they made, including the time codes of those changes.

Few New

6.1.7 - Caption or Subtitle Delivery

Discovery sometimes requires production partners to deliver caption or subtitle files that match finished programs. This is most common in acquisition deals. If Discovery requires a caption or subtitle files, the production partner must upload them to the "Program Master File Caption/Subtitle" deliverable in the Producer's Portal. The Portal requires the production partner to enter the language, video format, and time code type for each caption or subtitle file they upload. The Producer's Portal allows production partners to upload multiple caption or subtitle files from a single upload dialogue box. Figure 5 shows the upload dialogue for caption and subtitle files.

Figure 5: Producer's Portal Caption Upload Screen



Most New

6.1.8 - Still Image Delivery

Discovery often requires production partners to deliver still photography and images. Discovery uses these images for press, public relations, marketing, promotions, social media, on network websites, and in consumer-facing applications like Discovery Go. If Discovery requires this deliverable, production partners must upload a ZIP file containing the still images and the photo caption log to the Producer's Portal under the "Production Stills & Log" or the "Production Stills & Log (Scripps)" deliverable. The photo caption log template is available in the Production Guide section of the Producer's Portal.

Few New

6.2 - Source Footage Delivery

Discovery sometimes requires production partners to deliver the original source footage for their program. This deliverable is most common for commissioned programs. Discovery is transitioning from an LTO-based footage delivery system to a new, cloud-based delivery system. Production partners can find the details on footage delivery in the "File Based Footage Delivery" policy document on the Discovery Producer's Portal.

Seven - Acquisitions

The standards and requirements in this document apply to all programs and elements delivered to Discovery. However, Discovery allows a broader set of requirements for programs and elements acquired through distributors. This section defines those broader requirements for HD and SD programs. All Distributors of UHD programs must comply with the full Technical Specifications, and this section does not include any broader requirements for UHD. Unless this section calls out a broader requirement, Distributors must follow standards and requirements listed in Sections 1 to 6 of this specification.

Some Revised

7.1 - File Formats for Acquired SD and HD Programs and Elements

Discovery allows lower quality file formats for acquired programs and elements. Discovery also allows distributors to provide some programs and elements in Standard Definition (SD). Distributors must refer to their deliverables list in the Producer's Portal or the Program Deliverables Exhibit of their contract to determine what video format (HD or SD) Discovery requires for their program. Table 7.1 details the additional allowable file formats for acquired programs and elements. Distributors may also choose to deliver in any of the file formats listed in Table 5.3.1.

Table 7.1 (Supplement to Table 5.3.1, only for Acquired Programs and Elements)

Parameter or Setting	ProRes HD 422 MOV	ProRes HD 422 HQ MOV	IMX 50 SD MXF
File Wrapper	MOV		MXF OP1a
File Endianness	Little-Endian		
Video Codec	Apple ProRes 422	Apple ProRes 422 HQ	MPEG-2 Intraframe
Allowable Video Standards	Refer to the deliverables list on the Producer's Portal or your program contract, as allowable standards for acquisitions vary from region to region. General guidelines: • US: Native Frame Rate • Latin America: Native Frame Rate • Europe: 1080i 50 • Asia: 1080i 59.94 or 1080i 50		Refer to program contract, as allowable standards for acquisitions vary from region to region. General guidelines: • US: Native Frame Rate • Latin America: Native Frame Rate • Europe: PAL • Asia: NTSC or PAL
Video Bit Depth	8	10	8
Video Bit Rate(s)	117 to 147 Mb/s, based on frame rate	176 to 220 Mb/s, based on frame rate	50 Mb/s
Video Data Structure	All video must be in a single track and in a single data block within that track. There cannot be any mixing of codecs, frame rates, or bit rates within the file wrapper.		
Chroma Subsampling	4:2:2		
Aspect Ratio	16:9		16:9 or 4:3, based on original aspect ratio of the content
Pixel Aspect Ratio	1:1 (Square)		11:10 (NTSC), 12:11 (PAL)
Field Dominance	Top Field First(TFF)/Upper Field Dominant when providing interlaced content		
Gamma and Colorimetry	ITU BT.709		ITU BT.601
Audio Codec	PCM (Uncompressed)		
Audio Track Coding	All audio channels must be encoded as a single channel per logical track, regardless of track type. For example, a 16-channel master would have 16 individual tracks, not one track with 16 channels		
Audio Sample Rate	48K		
Audio Bit Depth	24 bit		20 bit or 24 bit
Time Code	SMPTE/EBU time code track required, based on frame rate		

7.2 - Standards for SD Video Essence

Discovery allows some acquired programs and elements to deliver in SD. The subsections below detail some of the technical requirements specific to SD delivery.

Few
Unchanged

7.2.1 - Aspect Ratio for SD Acquired Programs and Elements

There are two primary aspect ratios for SD program masters that Discovery accepts: 16:9 and 4:3.
The distributor must format a 16:9 program in SD as a full height anamorphic image within the 4:3 frame. When the 16:9 image is formatted in a full height anamorphic image, it's squeezed horizontally by 33%, distorting the image.

The resolution of a 16:9 image fit within the 4:3 frame is preserved as much as possible. Programs must not contain a mix of different aspect ratios.
If the deliverables list on the Producer's Portal or the Program Deliverables Exhibit of a distributor's contract requires delivery of the program as a 16:9 letterbox, the letterbox must meet these requirements:

- NTSC letterbox images must be 181 scan lines in height in each field. The top of the image must be at line 50. The bottom of the image must be at line 233.
- PAL letterbox images must be 216 scan lines in height in each field. The top of the image must be at line 58. The bottom of the image must be at line 275.

Few
Unchanged

7.2.2 - Video Levels for SD

The program's luminance levels must not exceed 100% or fall below the legal black level. NTSC programs must not have luminance levels above 100 IRE or below 7.5 IRE. PAL programs must not have luminance levels above 700 millivolts (mv) or below 0 mv.
Program chrominance levels must not exceed 120% of the maximum luminance level. Discovery measures the chrominance of SD programs as encoded composite waveforms using a flat filter. NTSC programs must not have encoded chrominance levels above 120 IRE. PAL programs must not have encoded chrominance levels above 840 mv.

All color saturation values within the program must stay within the legal gamut for a composite analog signal. A vector scope set to 75% shows the outer edge of legal gamut as the outer ring on the scope's graticule. The program's color saturation levels must never extend beyond this outer ring. The legal gamut for NTSC is different from the legal gamut for PAL. SMPTE 170M defines the legal gamut of composite NTSC signals. In NTSC some colors, most notably yellow, cyan, and green, are outside the legal gamut when saturated at 100%. ITU-R BT.624.4 defines the legal gamut of composite PAL signals.

Few
Revised

7.2.3 - Mastering Codecs for SD

When creating the master, production partners must only use codecs that meet the following specifications:

- The codec must use 4:2:2 or 4:4:4 sub sampling for the color difference (chroma) signals
- The video must have a minimum resolution of 720 x 480 (NTSC) or 720 x 576 (PAL)
- The codec must use only intra-frame compression
- The codec must have a minimum bit rate of 50 megabits per second (Mb/s) for video
- The codec must preserve audio with at least 20 bits of depth with 48 kHz sampling

These requirements apply to codecs used in nonlinear editing systems, recorders, or any other tool used to create the finished version of the program master.
Production partners may use other codecs for "offline" editing, if they use codecs meeting these requirements for their final "online" edit. If production partners have questions about the qualifications of an editing system or codec, they should contact Discovery Production Management or Discovery Business Affairs.

Few
Unchanged

7.2.4 - Title Safe and Program Text Protected Area for SD

Production partners must place program text elements within the text safe area defined in SMPTE RP 218 (2009). The safe area defined in RP 218 is more conservative than the current SMPTE standard (SMPTE S 2046).

Discovery has created a protected area for program text to prevent on air branding and network identifiers (bugs) from covering text elements in programs. Production partners must place all program text elements except for program opening sequences, credits, or segment bumps inside this protected area. Moving program text elements can begin their movement outside of the protected area but must be fully inside the protected area when their movement is complete.

Distrtibutors can find SD versions of the downloadable templates for the Text Protected Area as full raster TIFF or PNG files on the Discovery Producer's Portal: (http://producers.discovery.com)

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