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Production and Post-Production Requirements v2.1

Netflix Originals: Production and Post-Production Requirements v2.1

Scope

Provide a set of technical requirements for production and post-production workflows to ensure that a high level of quality is maintained throughout the lifecycle of a project from capture to archive. This serves the purpose of future-proofing the content as the Netflix platform and viewing experience continue to evolve.

Please see the [Originals FAQ](#) for additional information.

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Camera Requirements

4K Resolution:

- Camera must have a true 4K sensor (equal to or greater than 4096 photosites wide).

Recording Format:

- Minimum of 16-bit Linear or 10-bit Log processing
- Bitrate of at least 240 Mbps (at 23.98/24 fps) recording
- Recording format must be set to either:
 - RAW (uncompressed or lightly compressed sensor data)
 - Log color space (i.e. S-Log3, V-Log, CanonLog3, REDLogFilm, BMDLog, LogC)

- No looks or color corrections should be baked into the original camera files.
- Files must maintain all metadata (i.e. Tape Name, Timecode, Frame Rate, ISO, WB, etc.)

Aspect Ratio / Framing:

- Aspect ratios greater than 2.00:1 must be evaluated and discussed with Netflix for approval.
- Framing chart must be shot before principal photography begins, and processed through the dailies pipeline which will be shared with editorial, post-production, and VFX.

Secondary Cameras:

- Any cameras other than the primary camera (crash, POV, drone, underwater, etc.) must be approved by Netflix.
- Test footage should be shot and provided to dailies and post-production to ensure compatibility with primary camera.

Approved Cameras:

		Effective Pixels	Recording Format
Canon C300 Mk II		4K: 4096 x 2160	Canon RAW XF-AVC (4K)
Canon C500		4K: 4096 x 2160	Canon RAW XF-AVC (4K)
Canon C700		4K: 4096x2160 4.5K: 4512 x 2376	Canon RAW XF-AVC (4K) ProRes HQ (4K)
Panasonic VariCam 35		4K: 4096 x 2160	V-Raw AVC-Intra4K
Panasonic VariCam LT		4K: 4096 x 2160	V-Raw AVC-Intra4K
RED Dragon		6K: 6144 x 3160	REDCODE RAW (up to 6:1)
RED Weapon		8K: 8192 x 4320	REDCODE RAW (up to 6:1)
RED Helium		8K: 8192 x 4320	REDCODE RAW (up to 6:1)
Panavision DXL		8K: 8192 x 4320	REDCODE RAW (up to 6:1)
Sony F55		4K: 4096 x 2160	F55RAW XAVC (4K)
Sony F65		4K: 4096 x 2160	F65RAW F65RAW-LITE XAVC (4K)
Sony FS7		4K: 4096 x 2160	XAVC (4K)
ARRI Alexa 65		6K: 6560 x 3100	ARRIRAW
Blackmagic Design URSA Mini 4.6K		4.6K: 4608 x 2592	CinemaDNG RAW (up to 4:1)
Blackmagic Design URSA 4.6K		4.6K: 4608 x 2592	CinemaDNG RAW (up to 4:1)

Color Pipeline Requirements

It is important to ensure that images are stored in the widest possible color space until the very final stages of the color pipeline. This is easily achieved by using ACES, which keeps images in a high dynamic range, wide color gamut space, and allows the user to simply select the Output Transform for the target viewing display. This can also be achieved while working in the dominant camera color space with careful, pro-active color management and the use of conversion and viewing LUTs. Both methods are outlined below. Please contact us with any questions.

Color pipeline documentation must be shared with production and post-production ahead of the first day of photography.

For Non-ACES Pipelines (Camera Native + Show LUT):

- Working Color Space must be defined and communicated to all departments.
 - Examples: Sony SLog3-SGamut3.CINE, REDLogFilm-DragonColor, Panasonic V-Log-V-Gamut, CanonLog3-CinemaGamut
- Output / Show LUT must be defined and shared between all departments.

For ACES Pipelines:

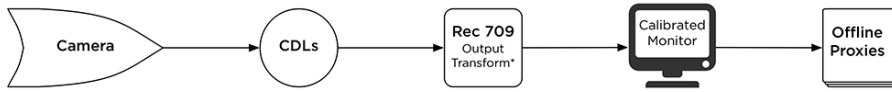
- ACES Version (i.e. v1.0.2) should be defined and shared between all departments.

On-Set & Dailies Color:

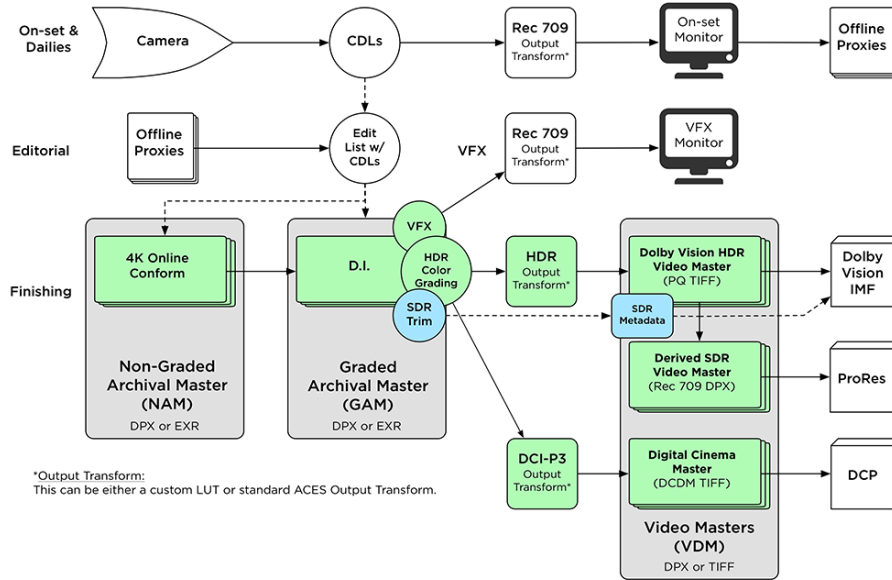
- CDLs only
 - No secondaries, keys, or power windows to ensure compatibility in post.
- Order of operations is critical
 - CDLs must be applied before Output Transform.
 - See diagram below.
- On-set and dailies monitors must be calibrated to the Rec.709 / BT.1886 standard, or equivalent HDR standard (i.e. PQ /

SMPTE ST.2084)

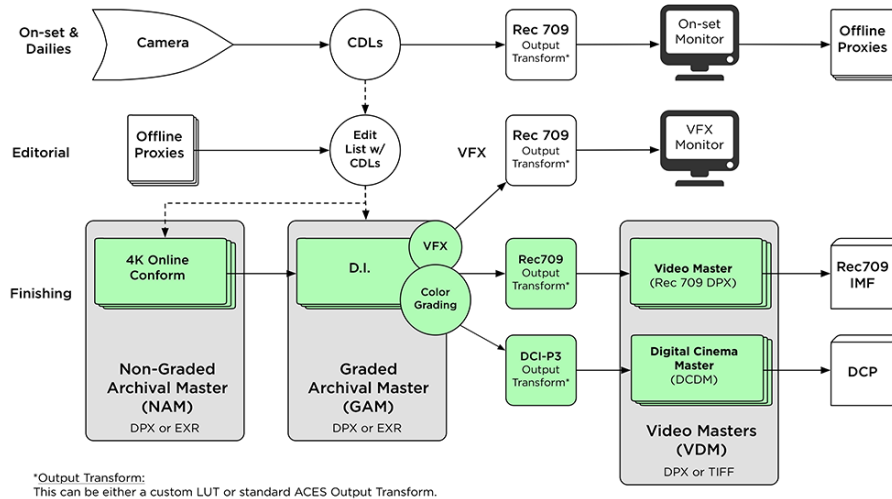
Order of Operations



Example Color Pipeline (Dolby Vision)



Example Color Pipeline (SDR)



Dailies Requirements

For all scripted projects, on-set or near-set dailies services are required in order to provide efficiency for downstream processes.

Color & Sync:

- Production sound must be synced to camera footage for editorial media.
- Color should be applied, following the color pipeline defined above.
 - If CDLs exist, they must be applied before the LUT.
 - No secondaries, power windows, or keys in dailies.
- Grading monitor must be calibrated to Rec.709 / BT.1886 standard, or equivalent HDR standard (i.e. SMPTE ST.2084).

Editorial and Review Proxies & Metadata:

- ALEs / BINs must be generated with all camera and sound metadata including columns with CDLs and LUT names.
- Editorial media and proxy deliverables must be generated from original camera RAW files, not from a secondary proxy.

Back-up / Data Verification:

- Two or more back-up copies of all original camera footage and audio with MD5 checksums must be generated.
- Footage must be QC'd for possible issues, referencing camera reports with scene/take information.
- Archival of camera RAW footage, audio, and color information should maintain original directory structure, filenames, and metadata that were created by the cameras, audio recording devices, and dailies software to one or more of the following:
 - LTO-5, LTO-6 or LTO-7 tape in LTFS format
 - Netflix's cloud-based Content Hub
 - High-speed RAID-protected external hard-drive
- Once multiple backups are complete and verified at another location, the camera magazines / recording media may be cleared.

Post-Production Requirements

Conform & VFX

- Framing chart must be placed at the head of all timelines (per episode / reel).
- Conform and VFX pulls must be:
 - Minimum resolution of 4K.
 - One of the following file formats:
 - 16-bit EXR (.exr) in ACES, or camera's Linear color space
 - 10-bit DPX (.dpx) in the camera's Log color space
- VFX pulls should include CDLs, LUT (if any), and dailies color reference.
 - Round-trip tests should be run to verify dailies color match between VFX and editorial.
- EDLs, AAFs, or XMLs should reference back to original 4K files for the online conform.
- Proxy or intermediate files should only be used for reference during editing, previews, and/or audio-dub/timed-text generation.

IMF Master

- IMF must be generated from a final uncompressed Video Master (i.e. DPX, EXR, or TIFF) and not from a compressed file (i.e. ProRes, DNX).
- Resolutions supported:
 - UHD: 3840x2160
 - 4K: 4096x2160 (if finished in 4K or higher)

See our [Originals Delivery Specifications](#) for full IMF specifications.

Archival Elements

- Framing chart must be placed at the head of all archival masters (per episode / reel).
- Textless sections must be provided for all archival masters.
- **Picture:**
 - NAM - Non-graded Archival Master
 - Ungraded in Working Color Space (Log or Linear)

- GAM - Graded Archival Master
 - Please see Color Pipeline diagram above for details on this asset.
 - Graded in Working Color Space (Log or Linear)
 - LUTs or ACES Version must be included in archival package
- VDM - Video Display Master
 - Graded in Display Color Space (Rec.709, PQ, DCDM)
- Color grading projects (Example: Resolve .drp, Baselight .blscene)
- Audio:
 - All final sound mixes (near-field 5.1 and 2.0), Stems, M&Es
 - Additional pre-dubs and other elements as negotiated or upon request
 - 48kHz/24-bit minimum, 96kHz/24-bit preferred
 - Audio mixing/mastering projects (Pro Tools sessions)
- Editorial projects (Avid bins, EDL/AAFs, Final Cut Pro .fcp/.fcpx, Premiere Pro .prproj, etc.)
 - Editor's assembly
 - Director's cut
 - Any preview cuts
 - Final cut

The above is not a full list of required deliverables.

For a full deliverables list, please contact your Content Distribution Specialist.

*For delivery methods and naming conventions, see our **Content Hub Delivery Specifications**.*

Change Log:

2017-03-03

- Unified Spec: With version 2.1, we made the decision to unify the two previously separate Features/Series and Docs/Coms documents into one overall set of requirements. This was done

due to organizational changes which caused enough overlap in content type for us to feel comfortable with one spec for all verticals. We feel this simplifies the requirements and extends the freedom and responsibility to each team to stay within the requirements while being sensible about cost and workflow implications.

- Cameras:
 - Added Canon C700
 - Added RED Helium
 - Added Panavision DXL
 - Added ARRI Alexa 65 (6K)
 - Added Sony FS7
- Color Pipeline:
 - Added context in introduction
 - Added Dolby Vision HDR workflow diagram
 - Added On-set CDL order-of-operations diagram
- Dailies:
 - Require dailies only for scripted content to accommodate unscripted workflows
- Back-up / Data:
 - Unified data management requirements into dedicated section
- Post-Production:
 - Relaxed to 10-bit DPX for certain Log workflows
 - Reworded 4K vs. UHD IMF language based on feedback
 - Updated to reference [Content Hub Delivery Specifications](#)

