



NETFLIX, INC.

Netflix

4K Source Delivery

Version 4K-1-1
April 6, 2013



Table of Contents

1	Introduction	3
2	Requirements	3
2.1	Primary Digital 4K Assets	3
2.1.1	Digital 4K Video Prerequisites.....	4
2.1.2	Digital Audio Prerequisites	5
3	Primary Digital Asset 4K Specifications	6
3.1	4K DPX Image Sequence Specifications	6
3.1.1	4K (UHD 4K and Native 4K) DPX Image Sequence	6
4	File-Naming Conventions	7
4.1	Primary 4K Image Sequence Asset File-Naming	7
4.1.1	Example filenames for Primary 4K Image Sequence Files	7
4.2	Primary Audio Asset File-Naming	8
4.2.1	Example filenames for Primary Audio Files	8
5	Appendix	9
5.1	Language Codes	9



1 Introduction

Netflix will determine the appropriate source for its encoding. Examples of sources are listed below. If Content Provider does not have the source Netflix requests, then Netflix and Content Provider will mutually agree upon the source.

Per the agreement, it is the Content Provider's obligation to deliver Source Material compliant with the specifications below to Netflix.

2 Requirements

2.1 Primary Digital 4K Assets

File Type (in order of preference)
1. Native 4K (4096x2160) - DPX 10-bit linear RGB
2. Ultra HD 4K (3840x2160) - DPX 10-bit linear RGB

For 4K material we accept DPX image sequences. For a given title, only one contiguous DPX image sequence can be delivered. Titles cannot be delivered as multi-part sequences, i.e., if a title is 90 minutes in duration, a contiguous DPX image sequence with a 90-minute duration must be delivered. Two (2) sequences with 45-minute durations will not be accepted. Below in section 3 *Primary Digital Asset 4K Specifications* are the technical details for the acceptable formats.

Please ensure that all image sequences do not contain bars and tones, advertisements, slates, ratings cards, FBI warning cards, placards, overlay branding or website link callouts before, during and/or after the program. Also, no commercial blacks can be contained in the program. There are no exceptions to these requirements. All image sequences must consist of the feature program with one (1) second of black at the head and tail of the program.



2.1.1 Digital 4K Video Prerequisites

For 4K video content delivery we require full resolution with a 1:1 PAR. The following information and table specify the priority order in which Netflix will accept content.

1. 4K sources must be in progressive format.
2. 4K sources must have a Pixel Aspect Ratio (PAR) of 1:1 (aka Square Pixels)
3. Please refer to the table below for quick reference.

Format	PAR	Frame Rates	Scan Type
Native 4K 4096x2160 NOTE: Width must = 4096 Height can be <= 2160 depending on active video's aspect ratio.	1:1	23.976	Progressive
		24	
		25	
		29.97	
		30	
		50	
		59.94	
		60	
Ultra HD 4K 3840x2160 NOTE: Width must = 3840 Height can be <= 2160 depending on active video's aspect ratio.	1:1	120	Progressive
		23.976	
		24	
		25	
		29.97	
		30	
		50	
		59.94	
		60	
		120	



2.1.2 Digital Audio Prerequisites

Titles with surround sound require 5.1 audio. When 5.1 audio is supplied an additional 2-channel Left Total + Right Total mix (2-channel stereo mix) must be supplied as well. We require a single audio track for every channel of audio (6 channels for the 5.1 and 2 channels for the LT/RT mix would require 8 files for delivery).

If a conformed 5.1 audio source is not available, stereo audio (or dual-channel mono audio if the program is an old black-and-white movie, documentary, etc., as long as the original source was mono) will be accepted.

We use standard channel assignments as shown below:

- 1. 5.1 audio + 2.0 audio channel assignments**
 - a. Channel 1 – Left
 - b. Channel 2 – Right
 - c. Channel 3 – Center
 - d. Channel 4 – LFE
 - e. Channel 5 – Left Surround
 - f. Channel 6 – Right Surround
 - g. Channel 7 – Left Total
 - h. Channel 8 – Right Total
- 2. Stereo Comp audio only**
 - a. Channel 1 – Left Total
 - b. Channel 2 – Right Total
- 3. Mono Comp audio** (usually old black-and-white movies, etc.)
 - a. Channel 1 – Mono Comp
 - b. Channel 2 – Mono Comp



3 Primary Digital Asset 4K Specifications

3.1 4K DPX Image Sequence Specifications

3.1.1 4K (UHD 4K and Native 4K) DPX Image Sequence

1. **Image Format:** Digital Picture Exchange (DPX)
2. **Bit Depth:** 10-bit
3. **Color Space:** Linear RGB
 - a. Rec.709 or Rec.2020
4. **Resolution:**
 - a. 4096x2160 (Native 4K)
 - i. Width must = 4096
 - ii. Height can be $\leq$ 2160 dependent on active video's aspect ratio.
 - b. 3840x2160 (Ultra HD 4K)
 - i. Width must = 3840
 - ii. Height can be $\leq$ 2160 dependent on active video's aspect ratio.
5. **Pixel Aspect Ratio:** 1:1 Square Pixels
6. **Scan Type:** Progressive by default
7. **Frame rate:** *(frame rate should match source)*
 - a. 23.976
 - b. 24
 - c. 25
 - d. 29.97
 - e. 30
 - f. 50
 - g. 59.94
 - h. 60
 - i. 120
8. **Audio Codec:** Uncompressed PCM in WAV container
 - a. **Bit-depth:** 16-bit or 24-bit
 - b. **Sample Rate:** 48 kHz
 - c. **5.1 surround mix + 2.0 stereo down mix**
 - i. Channel Mapping
 1. Channel 1 – Left
 2. Channel 2 – Right
 3. Channel 3 – Center
 4. Channel 4 – LFE
 5. Channel 5 – Left Surround
 6. Channel 6 – Right Surround
 7. Channel 7 – Left Total
 8. Channel 8 – Right Total
 - d. **2.0 Stereo Assignment** (if 5.1 surround does not exist)
 - i. Channel Mapping
 1. Channel 1 – Left Total
 2. Channel 2 – Right Total



4 File-Naming Conventions

4.1 Primary 4K Image Sequence Asset File-Naming

The file-naming convention for a single DPX image file of a primary sequence is as follows:

[PackageID]_[frame_rate]_[width]_[height]_primary_[total_images_in_sequence]_[image_seq_number].dpx

[PackageID] – This is the package identifier and it provides a way of identifying a group of conformed assets. A unique ID will be provided by Netflix for each set of conformed assets per title.

[frame_rate] – Acceptable frame rates: 23976, 24, 25, 2997, 30, 50, 59.94, 60, 120

[width] – Acceptable widths: 4096, 3840

[height] – Acceptable heights: <= 2160

[total_images_in_sequence] – The total number of images in the whole sequence. Must be zero padded up to 6 digits. Example: 042341

[image_seq_number] – The number of the image in relation to the whole sequence. First frame should start as 1 and all numbers must be zero padded up to 6 digits. Example: 000001

4.1.1 Example filenames for Primary 4K Image Sequence Files

First image in sequence:

3214561_23976_4096_2160_primary_052318_000001.dpx

Second image in sequence:

3214561_23976_4096_2160_primary_052318_000002.dpx

...

Second to last image in sequence:

3214561_23976_4096_2160_primary_052318_052317.dpx

Last image in sequence:

3214561_23976_4096_2160_primary_052318_052318.dpx



4.2 Primary Audio Asset File-Naming

The file-naming convention for a single audio file is as follows:

[PackageID]_[frame_rate]_[langCode]_primary_[channel_assignment].wav

[PackageID] – This is the package identifier and it provides a way of identifying a group of conformed assets. A unique ID will be provided by Netflix for each set of conformed assets per title.

[frame_rate] – Acceptable frame rates: 23976, 24, 25, 2997, 30, 50, 59.94, 60, 120 (this MUST match the frame rate of the DPX image sequence)

[langCode] – Used to specify the language of the audio track. Please follow the language codes exactly as defined in Appendix section 5.1 *Language Codes*.

[channel_assignment] – Acceptable channel assignments are one of: L, R, C, LFE, LS, RS, LT, RT

4.2.1 Example filenames for Primary Audio Files

When 5.1 surround mix + 2.0 stereo down mix are available:

3214561_23976_en_primary_L.wav
3214561_23976_en_primary_R.wav
3214561_23976_en_primary_C.wav
3214561_23976_en_primary_LFE.wav
3214561_23976_en_primary_LS.wav
3214561_23976_en_primary_RS.wav
3214561_23976_en_primary_LT.wav
3214561_23976_en_primary_RT.wav

When ONLY 2.0 stereo mix is available:

3214561_23976_en_primary_LT.wav
3214561_23976_en_primary_RT.wav

When ONLY mono is available:

Note that in the case of mono, we still expect a 2-channel delivery so the mono track should be the same for both LT and RT.

3214561_23976_en_primary_LT.wav
3214561_23976_en_primary_RT.wav



5 Appendix

5.1 Language Codes

Please note that if the desired language code is not found in the table below please contact Netflix Operations.

Language Name	Language Code
Acoli	ach
Afrikaans	af
Albanian	sq
Arabic	ar
Aramaic	arc
Armenian	hy
Bambara	bm
Bashkir	ba
Bengali	bn
Bosnian	bs
Bulbovian	XA
Bulgarian	bg
Burmese	my
Catalan	ca
Chechen	ce
Cheyenne	chy
Chinese Cantonese	yue
Chinese Mandarin	zh
Chinese Simplified	zh-Hans
Chinese Traditional	zh-Hant
Croatian	hr
Czech	cs
Danish	da
Dari	fa-AF
Dinka	din
Dutch	nl
Dzongkha	dz
Efik	efi
Elamite	elx
English	en
English (UK)	en-GB
Esperanto	eo
Estonian	et
Faroese	fo



Filipino	fil
Finnish	fi
Flemish	nl-BE
French	fr
French-Canadian	fr-CA
Gaelic	ga
Georgian	ka
German	de
Greek	el
Gujarati	gu
Hawaiian	haw
Hebrew	he
Hindi	hi
Hokkien	nan
Hungarian	hu
Icelandic	is
Indonesian	id
Inuktitut	iu
Italian	it
Jamaican Patois	jam
Japanese	ja
Javanese	jv
Kannada	kn
Kazakh	kk
Khmer	khm
Kikuyu	ki
Kinyarwanda	rw
Kirghiz	ky
Korean	ko
Kurdish	ku
Lango	laj
Latin	la
Latvian	lv
Lebanese	ar-LB
Lingala	ln
Lithuanian	lt
Maasai	mas
Macedonian	mk
Malagasy	mg
Malay	ms

Malayalam	ml
Maltese	mt
Marathi	mr
Maya	myn
Mende	men
Mongolian	mn
Nepali	ne
Newari	new
None	zxx
Norwegian (Bokmål)	nb
Norwegian (Nynorsk)	nn
Pashtu	ps
Persian	fa
Polish	pl
Portuguese (Brazilian)	pt-BR
Portuguese	pt
Punjabi	pa
Romanian	ro
Romansh	rm
Romany	rom
Russian	ru
Sami	smi
Sanskrit	sa
Scottish Gaelic	gd
Serbian	sr
Sinhala	si
Slovak	sk
Slovenian	sl
Somali	so
Songhai	son
Spanish (Castilian)	es-ES
Spanish (Neutral)	es
Swedish	sv
Swiss-German	gsw
Tagalog	tl
Tamashek	tmh
Tamil	ta
Telugu	te
Thai	th
Tibetan	bo



Tonga	to
Turkish	tr
Tuvan	tyv
Ugaritic	uga
Ukrainian	uk
Urdu	ur
Vietnamese	vi
Welsh	cy
Wolof	wo
Xhosa	xh
Yiddish	yi
Zapotec	zap
Zulu	zu