IMF Plugfest Test Vector – IRT & FOX (v. 1.1)

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1 Source Essence

1.1 Overall

Please create your IMF Packages using the image, audio and subtitle essences that will be provided on the IRT server. After registration for the face to face plugfest, IRT will provide the detailed access credentials for the IRT server. The following essences shall only be used for IMF Package creation:

1.2 Image

The image sources will be provided as DPX frames regarding the requested IMF Application for this plugfest.

- **IMF Application #2:**
  - **IRT subtitle test:**
    - **DPX:** 1920x1080, RGB, BT.709, 10 Bit, **50 FPS**, progressive
  - **FOX subtitle test:**
    - **DPX:** 1920x1080, RGB, BT.709, 10 Bit, **24000/1001** FPS, progressive
- **IMF Application #2e:**
  - **DPX:** 3840x2160, RGB, BT.2020, 10 Bit, 50 FPS, progressive
- **IMF Application #4:**
  - **DPX:** 3840x2160, RGB, 16 Bit, 50 FPS, progressive
- **IMF Application ProRes (RDD 45):**
  - **DPX:** 3840x2160, RGB, BT.2020, 10 Bit, 50 FPS, progressive (**please use the DPX frames provided for IMF Application #2e**)

The following clips are provided:

- **clip name: „SCRAPER“:**
  - description: The sequence „SCRAPER“ is specialized image content with an overlay, that shows the actual EditUnit number and the actual timecode. The scene shows some persons, drop off a car and walking over the red carpet.
  - frame range: 1 - 3000
  - total duration in frames: 3000



Figure 1: screenshot scraper

- **clip name: „FRUITS“:**
  - description: The sequence „FRUITS“ is specialized image content with an overlay, that shows the actual EditUnit number and the actual timecode. The scene shows some rotating fresh fruits.
  - frame range: 1 - 500
  - total duration in frames: 500



Figure 2: screenshot fruits

- **clip name: „BACKPLATE-FOX“:**
  - Only required for FOX subtitle test
  - description:
    - Backplate without any subtitles.
    - Yellow Crosses: The corners of the region.
    - Red Arrows: The text flow placement and direction.
    - Frame Numbers at the bottom of the screen: Timing for begin and end of each event.
  - frame range: 1 - 6048
  - total duration in frames: 6048

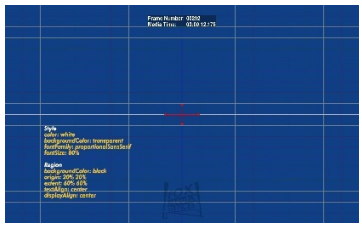


Figure 3: screenshot backplate-fox

- **clip name: „FOX-REFERENCE-PROXY.mov“:**
  - Only required for FOX subtitle test **as a reference**
  - Not intended to be used as a source!
  - description:
    - Reference example of how the FOX subtitles should appear.
  - frame range: 1 - 6048
  - total duration in frames: 6048

1.3 Audio

- **„SCRAPER“:**
  - The audio essence consists of:
    - 48kHz
    - 24 Bit
    - 50 FPS
    - delivered as individual .wav files.
  - The following clips are provided:
    - english, 5.1 mix, total duration: 60 seconds (6 indivual .wav files)
    - english, 2.0 mix, total duration: 60 seconds (2 indivual .wav files)

- german, 5.1 mix, total duration: 60 seconds (6 indivual .wav files)
- german, 2.0 mix, total duration: 60 seconds (2 indivual .wav files)

- **„FOX-MOS“:**
  - Please note, that this audio source contains silence and it **shall only be used to create the IMF Package regarding the FOX subtitle test (see section 4.3)**

  - The audio essence consists of:
    - 48kHz
    - 24 Bit
    - 24000/1001 FPS
    - delivered as single .wav file

  - The following clip is provided:
    - english, 2.0 mix, total duration: 252 seconds (1 indivual .wav file containg 2 channels)

1.4 Subtitles

The following subtitle essence is provided:

- IRT subtitle test sequence
  - IRT IMSC1 subtitle file “subtitle1-irt”
  - language: english
  - contains several subtitles to test different test categories

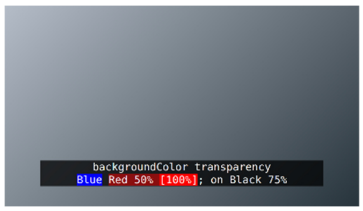


Figure 4: rendered sample of subbtitle1-irt

- FOX subtitle test sequence
  - FOX IMSC1 subtitle file “subtitle2-fox”
  - language: english
  - contains several subtitles to test different test categories



Figure 5: rendered sample of subtitle2-fox

Please note, to get an impression of the provided subtitles you can render the provided subtitle files by using the *IMSC1 Renderer* on:

`https://sandflow.com/imsc1proc/index.html`

2 Essence / Allowed IMF Applications

For the creation of the IMF Packages **only** the provided sources of section 1 shall be used.

Further for the IMF PlugFest the participants shall create only IMF Packages that are compliant with the following IMF Applications.

Please note, that a participant don´t have to create IMF Packages for all the mentioned IMF Applications below. This simply depends on the capabilities of each device and implementation.

2.1 IMF Application #2 (2016)

REQ 1 The IMF Packages shall be compliant to IMF Application #2 (2016).

REQ 2 The image characteristics of IMF Application #2 shall conform to Table 1 or Table 2.

Table 1: IMF Application #2 image characteristics (IRT subtitle test)

Image Frame Width	1920
Image Frame Height	1080
Pixel Bit Depth	10
Frame Structure	Progressive
Stereoscopy	Monoscopic
Frame Rate	**50**
Sampling	4:2:2
Quantization	QE.1
Color Components	Y'Cb'Cr
Colorimetry	COLOR.3 (BT.709)
Profile	Broadcast Contribution Single Tile, Level 5

Table 2: IMF Application #2 image characteristics (FOX subtitle test)

Image Frame Width	1920
Image Frame Height	1080
Pixel Bit Depth	10
Frame Structure	Progressive
Stereoscopy	Monoscopic
Frame Rate	**24000/1001**
Sampling	4:2:2
Quantization	QE.1
Color Components	Y'Cb'Cr
Colorimetry	COLOR.3 (BT.709)
Profile	Broadcast Contribution Single Tile, Level 5

2.2 IMF Application #2e (2016)

REQ 3 The IMF Packages shall be compliant to IMF Application #2e (2016).

REQ 4 The image characteristics of IMF Application #2e shall conform to Table 3.

Table 3: IMF Application #2e image characteristics

Image Frame Width	3840
Image Frame Height	2160
Pixel Bit Depth	10
Frame Structure	Progressive
Stereoscopy	Monoscopic
Frame Rate	50
Sampling	4:2:2
Quantization	QE.1
Color Components	Y'Cb'Cr
Colorimetry	COLOR.5 (BT.2020)
Profile	4k IMF Single/Multitile reversible, Main Level 6

2.3 IMF Application #4

REQ 5 The IMF Packages shall be compliant to IMF Application #4.

REQ 6 The image characteristics of IMF Application #4 shall conform to Table 4.

Table 4: IMF Application #4 image characteristics

Image Frame Width	3840
Image Frame Height	2160
Pixel Bit Depth	16
Frame Structure	Progressive
Stereoscopy	Monoscopic
Frame Rate	50
Sampling	4:4:4
Quantization	QE.APP4.1
Color Components	XYZ
Colorimetry	XYZ
Profile	4K IMF, Multi Tile, Reversible, Level 7, Sublevel

2.4 IMF Application ProRes (SMPTE RDD 45, SMPTE/DPP SP ProRes)

REQ 7 The IMF Packages shall be compliant to IMF Application ProRes RDD 45.

REQ 8 The image characteristics of IMF Application ProRes shall conform to Table 5.

Table 5: IMF Application ProRes image characteristics

Image Frame Width	3840
Image Frame Height	2160
Pixel Bit Depth	10
Frame Structure	Progressive
Stereoscopy	Monoscopic
Frame Rate	50
Sampling	4:2:2
Quantization	QE.1
Color Components	Y'Cb'Cr
Colorimetry	COLOR.5 (BT.2020)
Profile	422 HQ Profile

2.5 Audio

REQ 9 The audio sampling rate shall be 48 kHz.

REQ 10 The audio bit depth shall be 24 bit.

2.6 Subtile / Data essence

REQ 11 The provided subtitle files decribed in section 0 shall be used. The Data essence shall conform to the IMSC1 Text Profile, and preserve all stylistic choices described in the source IMSC subtitle files.

3 Track Files

3.1 Image

REQ 12 The Image Track File shall not use any provision of SMPTE ST 429-6 (D-Cinema Packaging - MXF Track File Essence Encryption).

REQ 13 The Display Rectangle and Stored Rectangle and Active Area Rectangle shall be identical to the Image Frame dimensions.

3.2 Audio

REQ 14 Each Audio Track File shall contain exactly one of the soundfields listed in Table 6.

REQ 15 Audio channels shall be stored in the order listed in Table 6.

Table 6. Audio Soundfield Groups and Channels.

Soundfield Group	Channel Index					
	1	2	3	4	5	6
Lt-Rt	Lt	Rt				
5.1	L	R	C	LFE	Ls	Rs

4 Composition

4.1 General

This test vector specifies **5** Compositions, as listed in Table 7.

Please note that each composition (CPL) belongs to a specific requested IMF Package (see section 5).

Table 7: Compositions

Composition	Annotation	EIDR Title (Level 1)	EIDR Edit (Level 2) ID	Region
CPL 1	IRT-Subtitle-Test	None	None	None
CPL 2	FOX-Subtitle-Test	None	None	None
CPL 3	Original-Version	urn:eidr:10.5240/1462-2676-9AAB-A911-F258-Q	urn:eidr:10.5240/44C7-EFBF-92FB-15F5-1D15-9	None
CPL 4	Original-Version (Supplemental)	urn:eidr:10.5240/1462-2676-9AAB-A911-F258-Q	urn:eidr:10.5240/44C7-EFBF-92FB-15F5-1D15-9	None
CPL 5	Version-File	urn:eidr:10.5240/1462-2676-9AAB-A911-F258-Q	urn:eidr:10.5240/4052-B887-D0D4-F00B-040C-B	None

4.1.1 /CompositionPlaylist/Creator

REQ 16 The /CompositionPlaylist/Creator element shall be present and contain the name and version of your product.

4.1.2 /CompositionPlaylist/ContentTitle

REQ 17 The /CompositionPlaylist/ContentTitle element shall be set to

a. CPL 1: "IMF Plugfest 2018 – IRT-Subtitle-Test"

b. CPL 2: "IMF Plugfest 2018 – FOX-Subtitle-Test"

c. CPL 3: "IMF Plugfest 2018 – OV"

d. CPL 4: "IMF Plugfest 2018 – OV (Supplemental)"

e. CPL 5: "IMF Plugfest 2018 – VF"

4.1.3 /CompositionPlaylist/ContentOriginator

REQ 18 The /CompositionPlaylist/ContentOriginator element shall be set to "IRT&FOX".

4.1.4 /CompositionPlaylist/Annotation

REQ 19 The /CompositionPlaylist/Annotation element shall be set according to Table 7

4.1.5 /CompositionPlaylist/Issuer

REQ 20 The /`CompositionPlaylist/Issuer` element shall be set to `"IRT"`.

4.1.6 /Application Identification

REQ 21 The /Application Identification shall be set as specified:

a. IMF Application#2 (2016): `http://www.smptera.org/schemas/2067-20/2016`

b. IMF Application 2e (2016): `http://www.smptera.org/schemas/2067-21/2016`

c. IMF Application 4: `http://www.smptera.org/schemas/2067-40/2016`

d. IMF Application ProRes (RDD45): `tag:apple.com,2017:imf:rdd45:2017`

4.1.7 /CompositionPlaylist/ContentVersionList

REQ 22 The EIDR Title (Level 1) ID and the EIDR Edit (Level 2) IDs shall be set for the different CPLs as defiend in Table 7. Please use the `ContentVersion` element as defined in the example below to set the EIDR IDs:

```
<ContentVersion>
        <Id> urn:eidr:10.5240/1462-2676-9AAB-A911-F258-Q</Id>
        <LabelText>EIDR Title (Level 1)</LabelText>
</ContentVersion>
<ContentVersion>
        <Id>urn:eidr:10.5240/44C7-EFBF-92FB-15F5-1D15-9</Id>
        <LabelText>EIDR Edit (Level 2)</LabelText>
</ContentVersion>
```

Figure 6: Example using EIDR IDs in the ContentVersionList element

4.1.8 Compositions segments

REQ 23 The CPLs shall have the segments as specified:

a. CPL 1: one segment (per image, audio and data) (“IRT-Subtitle-Test”)

b. CPL 2: one segment (per image, audio and data) (“FOX-Subtitle-Test”)

c. CPL 3: one segment (per image, audio) (“OV”)

d. CPL 4: one segment (per image, audio) (“Supplemental”)

e. CPL 5: two segments for image, one segement for audio (“VF”)

4.2 CPL 1 Composition (“IRT-Subtitle-Test”)

REQ 24 The Composition shall contain the Virtual Tracks specified in Figure 7.

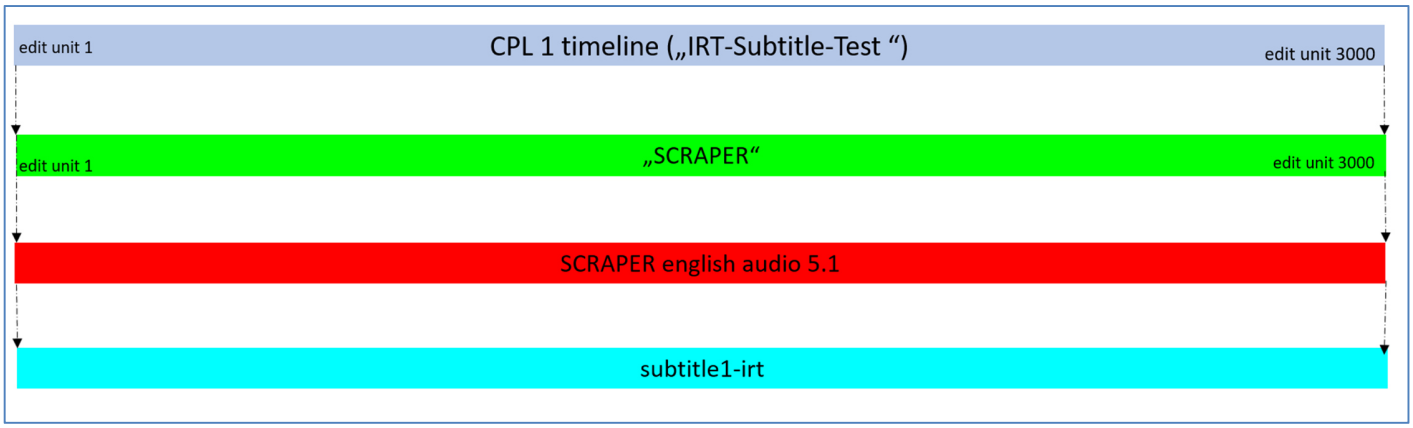


Figure 7: CPL 1 Composition Timeline

Please note, that the CPL 1 shall only be used for the “IRT-Subtitle-Test” IMF Package. Please see also section 5 for further details.

4.3 CPL 2 Composition (“FOX-Subtitle-Test”)

REQ 25 The Composition shall contain the Virtual Tracks specified in Figure 8.

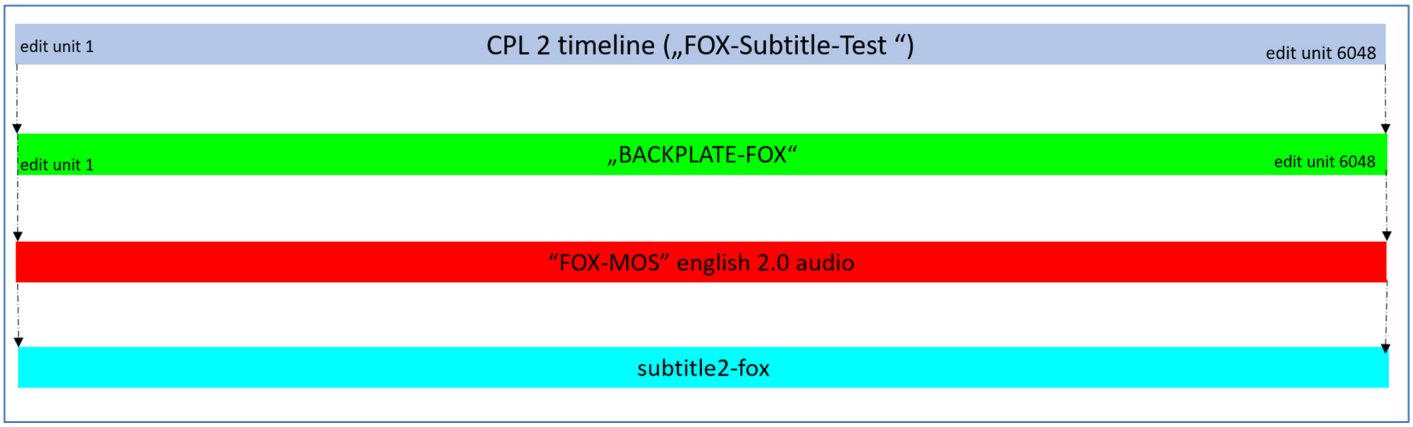


Figure 8: CPL 2 Composition Timeline

Please note, that the CPL 2 shall only be used for the “FOX-Subtitle-Test” IMF Package. Please see also section 5 for further details.

4.4 CPL 3 Composition (“OV”)

REQ 26 The Composition shall contain the Virtual Tracks specified in Figure 9.

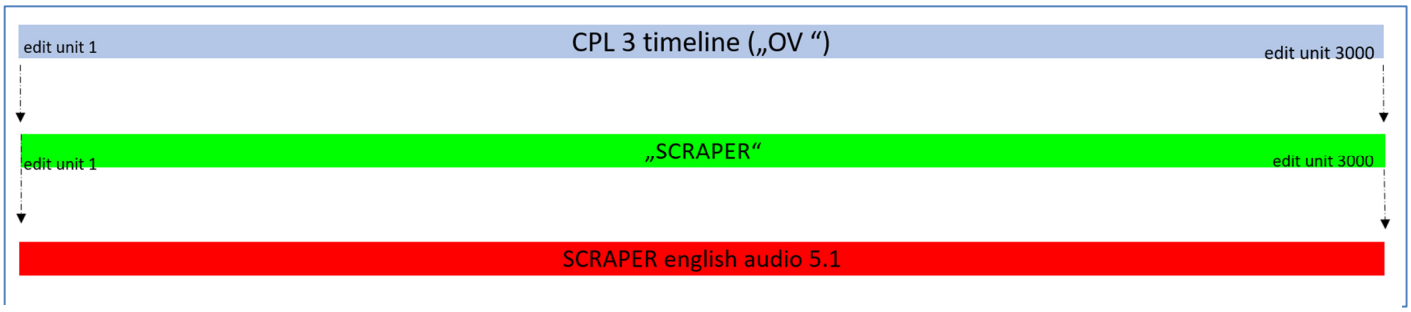


Figure 9: CPL 3 Composition Timeline

Please note, that the CPL 3 shall always be used for the “OV” IMF Package. Please see section 5 for further details.

4.5 CPL 4 Composition (“Supplemental”)

REQ 27 The Composition shall contain the Virtual Tracks specified in Figure 9.

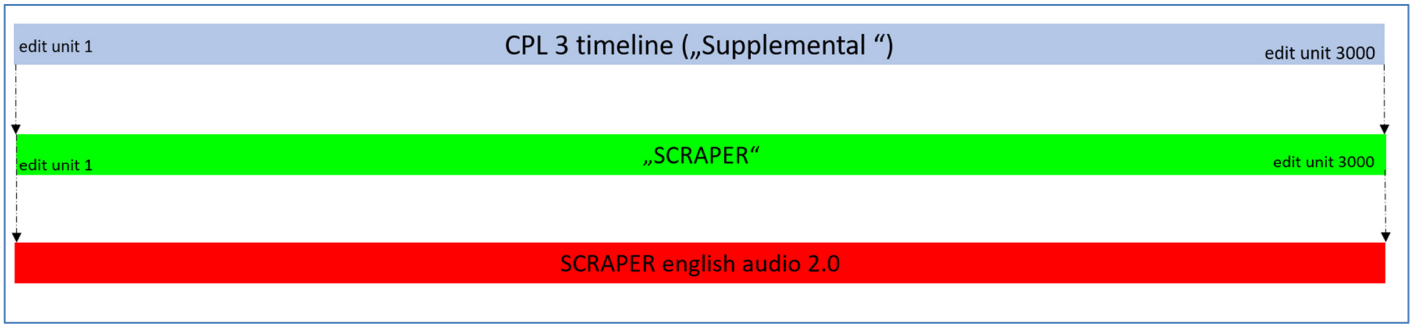


Figure 10: CPL 4 Composition Timeline

Please note, that the CPL 4 shall always be used for the “OV-Supplemental” IMF Package. Please see section 5 for further details.

4.6 CPL 5 Composition (“VF”)

REQ 28 The Composition shall contain the Virtual Tracks specified in Figure 11.

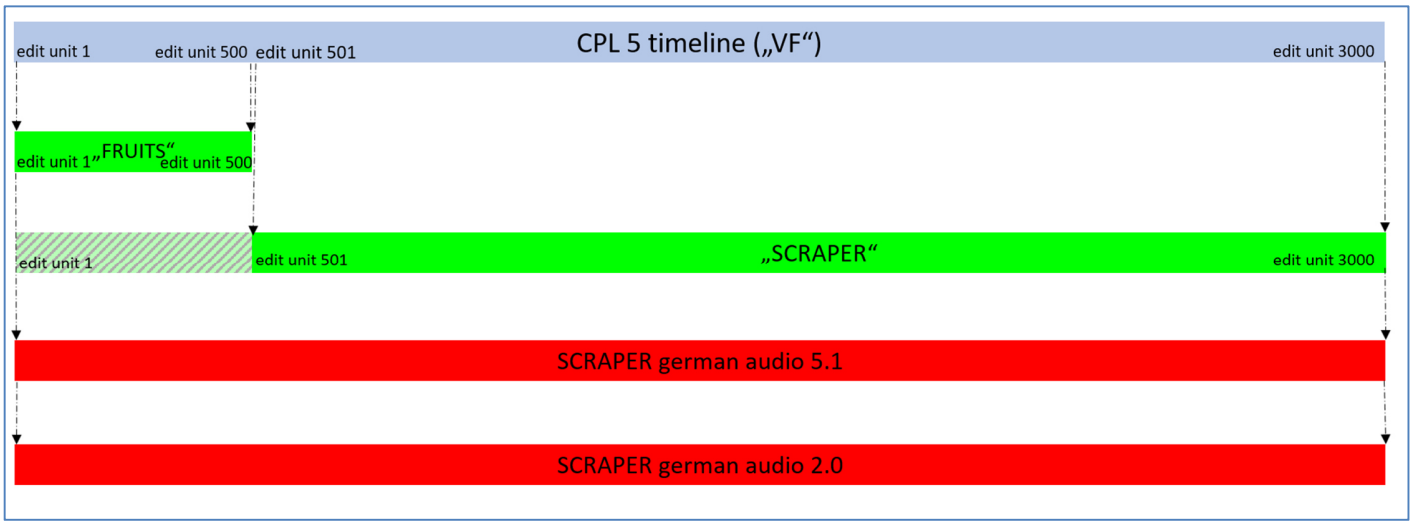


Figure 11: CPL 5 Composition Timeline

Please note, that the CPL 5 shall always used for the “VF” IMF Package. Please see section 5 for further details.

5 Package restrictions

5.1 General

For practical reasons, the amount of IMF Deliveries resp. IMF Packages which will be part of the whole IMF PlugFest is restricted. The following restrictions will apply for each participant of this PlugFest:

- **IMF Application #2:**
  - **1 "IRT-Subtitle-Test" IMF Package**
  - **1 "FOX-Subtitle-Test" IMF Package**

- **IMF Application #2e:**
  - **1 "OV" IMF Package**
  - **Optional: 1 "Supplemental" IMF Package**
  - **Optional: 1 "VF" IMF Package**

- **IMF Application #4:**
  - **1 "OV" IMF Package**

- **IMF Application #ProRes (RDD 45):**
  - **1 "OV" IMF Package**

5.2 IMP1 ("IRT-Subtitle-Test")

REQ 29 The "IRT-Subtitle-Test" IMF package is a complete IMP that shall contain the assets listed in Table 8.

Table 8: "IRT-Subtitle-Test" IMF Package Assets

CPL 1 (duration 60 seconds)
Image Track File "SCRAPER"
en, 5.1 Audio Track File
IMSC 1 subtitle file "subtitle1-irt"

5.3 IMP2 ("FOX-Subtitle-Test")

REQ 30 The "FOX-Subtitle-Test" IMF package is a complete IMP that shall contain the assets listed in Table 9.

Table 9: "FOX" IMF Package Assets

CPL 2 (duration 252 seconds)
Image Track File " BACKPLATE-FOX"
english 2.0 "MOS Audio Track File"
IMSC 1 subtitle file "subtitle2-fox

5.4 IMP3 (“OV)”

REQ 31 The “OV” IMF package is a partial IMP that shall contain the assets listed in Table 10.

Table 10: “OV” IMF Package Assets

CPL 3 (duration 60 seconds)
Image Track File “SCRAPER”
en, 5.1 Audio Track File

5.5 IMP4 (“Supplemental)”

REQ 32 The “Supplemental” IMF package is a partial IMP that shall contain the assets listed in Table 11. The image is referenced from the “OV” IMF package and are not part of the Supplemental” IMF Package.

Table 11: “Supplemental” IMF Package Assets.

CPL 4 (duration 60 seconds)
en, 2.0 Audio Track File

5.6 IMP5 (“VF)”

REQ 33 The “VF” IMF package is a complete IMP that shall contain the assets listed in Table 12.

Table 12: “VF” IMF Package Assets.

CPL 5 (duration 60 seconds)
Image Track File “SCRAPER”
Image Track File “FRUITS”
ger, 5.1 Audio Track File
ger, 2.0 Audio Track File

6 Specific restrictions

6.1 IMF folder structure

All participants shall use the following folder structure regarding each created IMF Package resp the used IMF Application. This folder structure is related to the restrictions in section 5.

6.1.1 Root Folder– naming conventions

Please name your **root folder** regarding the following naming schema:

- `COMPANY-PRODUCT-APP#X-NUMBER`
- Example: `IRT-IMF_Generator-App#2e-01`

6.1.2 IMF Application #2

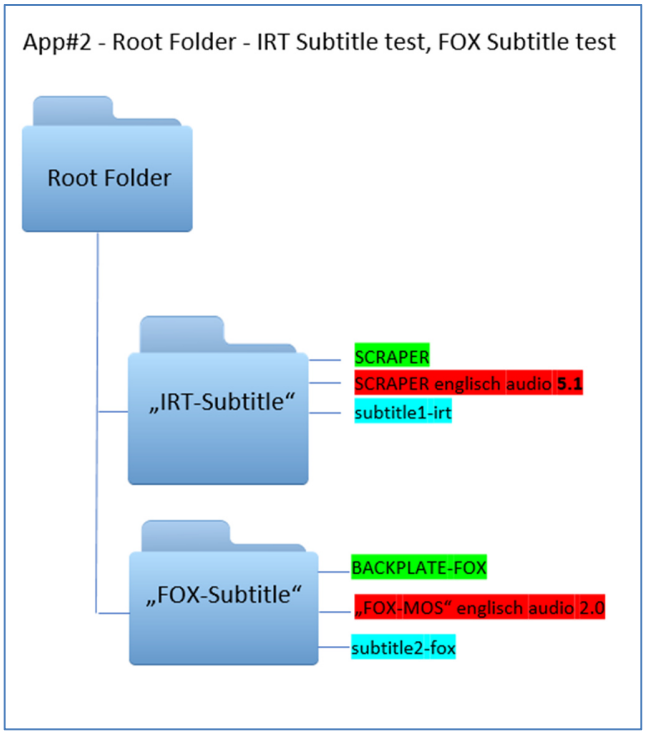


Figure 12: App#2 – requested folder structure

Please create and name one folder “**IRT-Subtitle**” for the IMF Package contaning the IRT subtitle test inside the root folder.

Please create and name one folder “**FOX-Subtitle**” for the IMF Package containing the FOX subtitle test inside the root folder.

6.1.3 IMF Application #2e

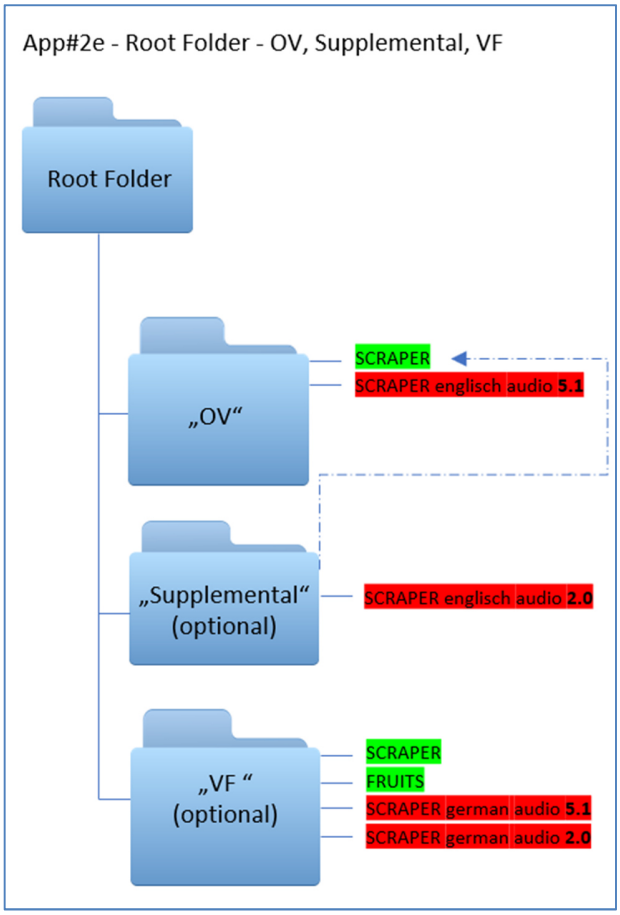


Figure 13: App#2e – requested folder structure

Please create and name one folder “**OV**” for the IMF Package (original version) inside the root folder.

Optional, create and name one folder “**Supplemental**” for the supplemental IMF Package inside the root folder.

Optional, create and name one folder “**VF**” for the IMF Package (version file) inside the root folder.

6.1.1 IMF Application #4 and IMF Application #ProRes

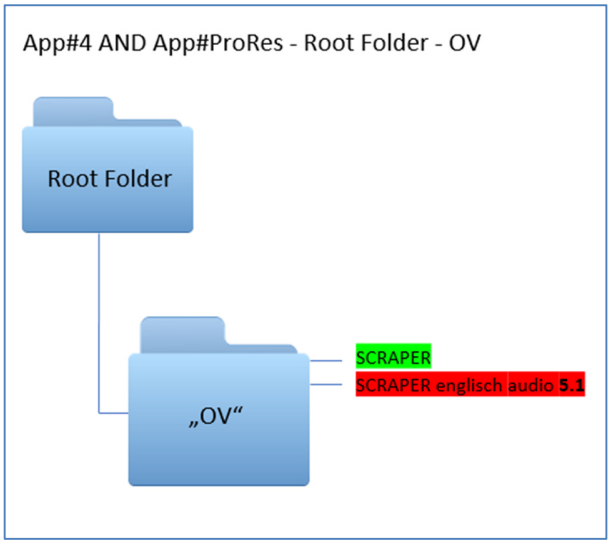


Figure 14: App#4 and App#ProRes – requested folder structure

Please create and name one folder “**OV**” for the IMF Package (original version) inside the root folder.

7 Test scope

7.1 General test categories

All tests will be performed for each participant together with a staff person of IRT. The results for each test will be recorded into an interoperability matrix. The detailed analyzed results will be individually documented in a report for each participant.

Each created IMF Package will be tested regarding the following test categories:

- ***Import***
  - The device under test must open a CPL to import a specific IMF Package
  - Assessment: ***Yes, No***

- ***Video***
  - If the import was successful it will be verified if the video content can be played back and processed without any obvious errors
  - Assessment: ***Yes, With Errors, Not at all***

- ***Audio***
  - If the import was successful it will be verified if the audio content can be played back and processed without any obvious errors
  - Assessment: ***Yes, With Errors, Not at all***

- ***Subtitle (only for App#2)***
  - A focus of this PlugFest is also again the test of the contained subtitles (IMSC 1). This PlugFest will include two different subtitle tests from IRT and from FOX.

  - IRT subtitle test categories:
    - subtitle alignment (Assessment: ***Yes, No***)
    - positioning (Assessment: ***Yes, No***)
    - font size (Assessment: ***Yes, No***)
    - colors (Assessment: ***Yes, No***)
    - timing (Assessment: ***Yes, No***)
    - background color transparency (Assessment: ***Yes, No***)
    - cell resolution (Assessment: ***Yes, No***)
    - text styling (Assessment: ***Yes, No***)
    - style association (Assessment: ***Yes, No***)
    - forced display (Assessment: ***Yes, No***)

  - FOX subtitle test categories:
    - region placement (Assessment: ***Yes, No***)
    - text placement/styling (Assessment: ***Yes, No***)
    - color/text outline (Assessment: ***Yes, No***)
    - font sizes (Assessment: ***Yes, No***)
    - time expression/drifting (Assessment: ***Yes, No***)

    The provided proxy file (“FOX-REFERENCE-PROXY.mov”) is a reference which shows how the subtitles (“subtitle2-fox.xml) should composite over the source asset (BACKPLATE-FOX).

7.2 Supplemental Package test (only for App#2e)

If supported also supplemented IMF Packages will be tested during the IMF PlugFest. That means an original version (OV) should be improved by adding additional essence tracks. Therefore, the supplemental Package contains only the trackfiles which are not already present in the OV Package. All other trackfiles are just referenced in the CPL.

Further details on the requested supplemental Package can be found in section 5. Also, on the supplemental Packages the described test vectors of section 7.1 will apply.

7.3 Multi-segment playout (CPL) test (only for App#2e)

Beside a simple playout which means all referenced track files (video, audio, subtitle) are completely referenced by just one segment in a CPL also a more complex playout should be tested during the PlugFest. That means a CPL references multiple segments of different video trackfiles for instance to build the playout timeline. This could be necessary in production to create a version file (VF) based on an OV Package.

Further details on the requested multi-segment CPL Package (VF) can be found in section 5. Also, on the multi-segment CPL Packages the described test vectors of chapter 7.1 will apply.

7.4 Standard compliance test

Additional to the interoperability tests all provided IMF Packages will be validated against IMF standard compliance by using IRT´s IMF Analyser. The validation reports will be provided to the participants afterwards together with the interoperability report.