

# AMWA AS-11

## *Technical Overview of AS-11* *Specifications*

Updated: 6 Nov 2017

*For the latest version of this document (and all the latest information about AS-11) please visit:*

<http://amwa.tv/projects/AS-11.shtml>

- Comparison of Specification properties
- Rules based construction of Specifications
- Using Multichannel Audio Labeling
- Descriptive Metadata embedded as an XML Document

# Comparison of Specification properties



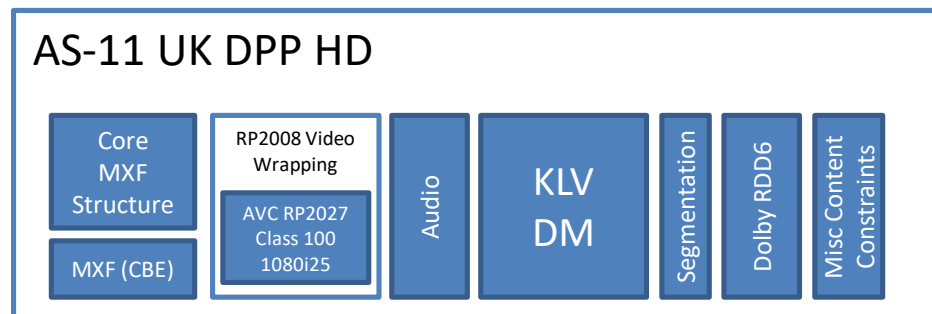
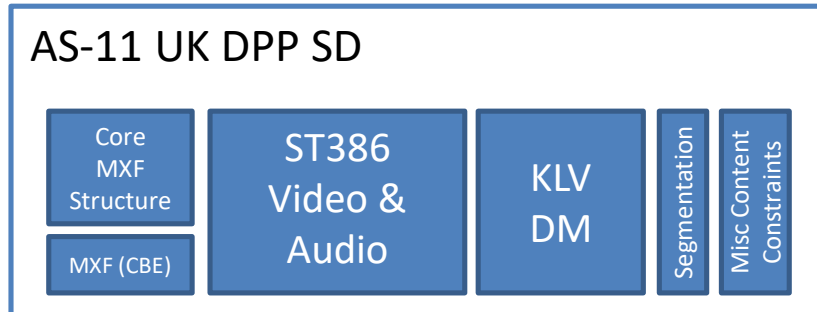
# Rules-based construction of Specifications

- The diagrams on the following pages give a *simplified* view of how the AS-11 Specifications are constructed from Blocks (the “building bricks” of Rules-based Specifications)
- Specifications are shown like this:

<Specification Name>

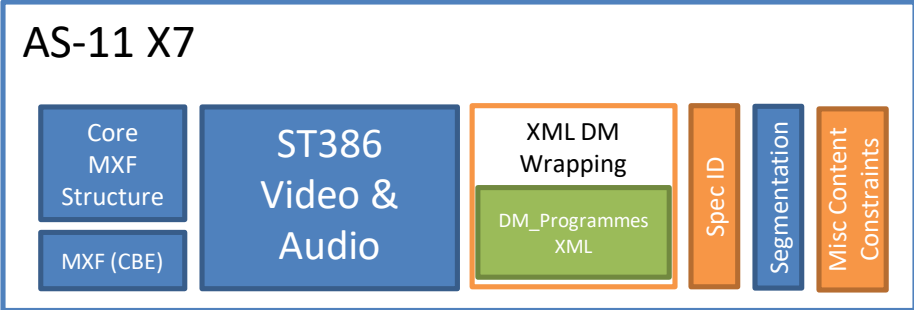
*The AS-11 X8 & AS-11 X9 Specifications are currently being updated and so diagrams for these Specifications are not shown for the time being*

## Rules-based representations of the original AS-11 DPP SD & HD Specifications



Some of these dark blue Blocks appear in the diagrams of newer AS-11 Specifications on the following pages. This indicates that these Blocks of the original Specifications have been re-used and are identical in the newer Specifications.

Rules-based representation of AS-11 X7 (MXF Program Contribution – SD)





# “Blocks File Format 0” – A re-usable MXF file architecture

## Re-usable file architecture “Blocks File Format 0”

### Supports:

- inter-coded and intra-coded
- variable bytes per element (VBE) and constant bytes per element (CBE)
- interlaced and progressive

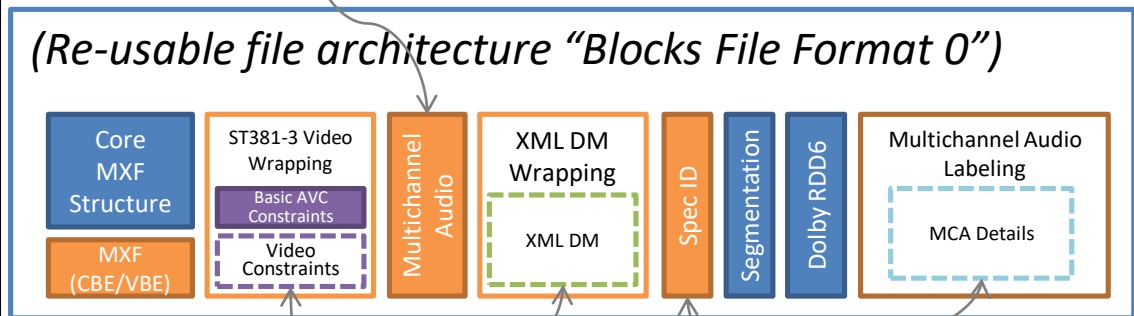
Inclusion of Dolby Metadata bitstreams (RDD6) is optional but a fully compliant device must support them. If present the defined mechanism must be used.

The use of Multichannel Audio (MCA) Labeling is optional but a fully compliant device must support it. If present the defined mechanism & Labels must be used.

If MCA Labeling is not used there is no means to signal audio layout, audio language, etc. If these details are required then MCA Labeling must be used.

A basic default two Sound Track layout (main mix: stereo & 5.1) will be available (additional Tracks are permitted but MCA Labeling must be used to signal what they contain). This default can be used with or without MCA Labeling. This default is designed to ensure that the file can at least be played-out with valid main audio during the transition to using MCA Labeling.

In this new configuration each MXF Sound Track contains all the audio channels for a “Soundfield Group” (for example: two audio channels for a stereo “Soundfield Group”)



A Specification using this architecture can choose compatible Blocks to insert in place of “Parameter Key Blocks”.

A Property (containing a Set of Labels) that is added to the MXF Preface – this can be used to identify which Specifications the file complies with

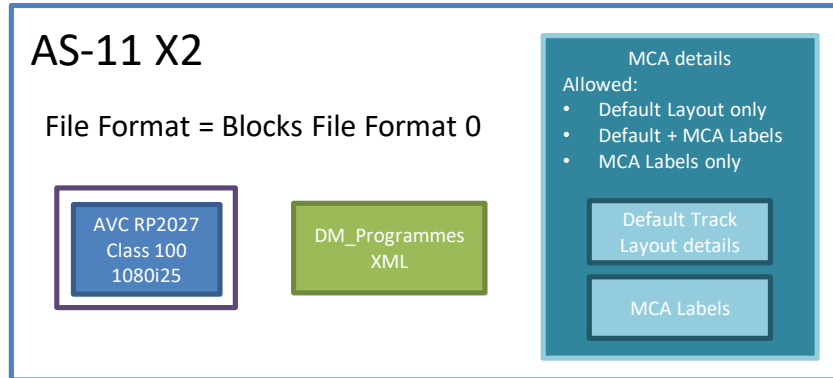
## “Blocks File Format 0” – Parameter Key Blocks and Specification Identifiers

“Blocks File Format 0” defines a common MXF file architecture to be used by a number of AS-11 Specifications. It defines everything that affects the structure of the MXF file / the capabilities a device must have to be able to read the MXF file. It uses “Parameter Key Blocks” to parameterise a few constraints (as illustrated) that affect the content of the MXF file.

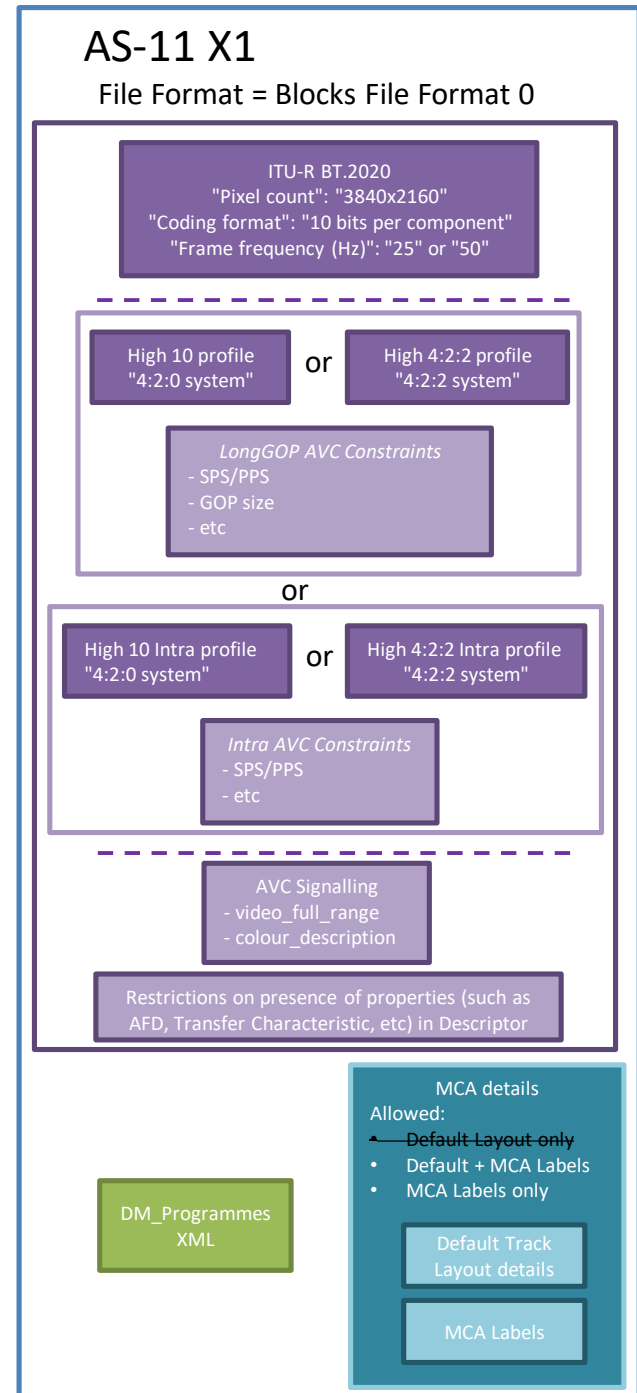
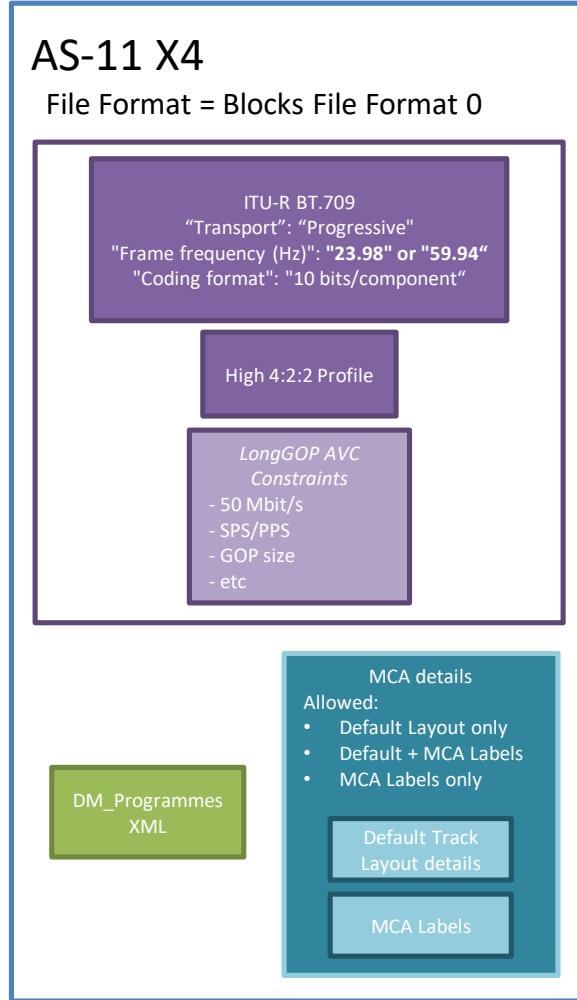
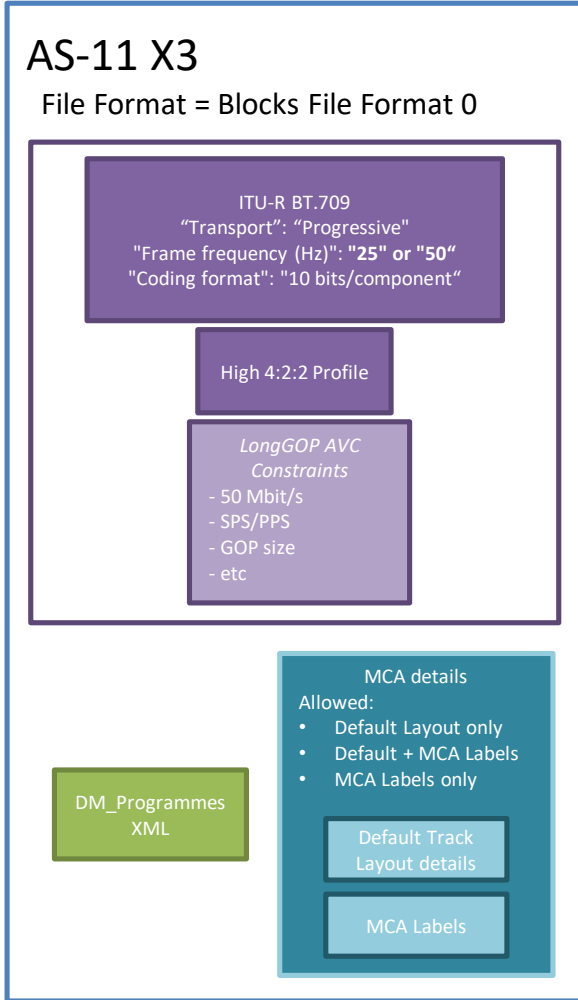
If an AS-11 Specification is constructed using “Blocks File Format 0” then a conformant MXF file will contain at least two values in the “Specification\_Identifiers” Element: one value identifying “Blocks File Format 0” and one value unique to the AS-11 Specification.

If a new Specification is developed using “Blocks File Format 0” then it will introduce a unique “Specification\_Identifiers” value. This will not be recognisable to an old device and so it will not know which AS-11 Specification the MXF file complies with. However, the old device will recognise the value identifying “Blocks File Format 0” and so will at least know how the MXF file is structured and what capabilities are needed to read it.

# Rules-based representation of AS-11 X2 (MXF Program Contribution – HD Intra)



# Rules-based representations of AS-11 X3, X4 and X1 (HD & UHD Program Contribution; all include AVC Long GOP)

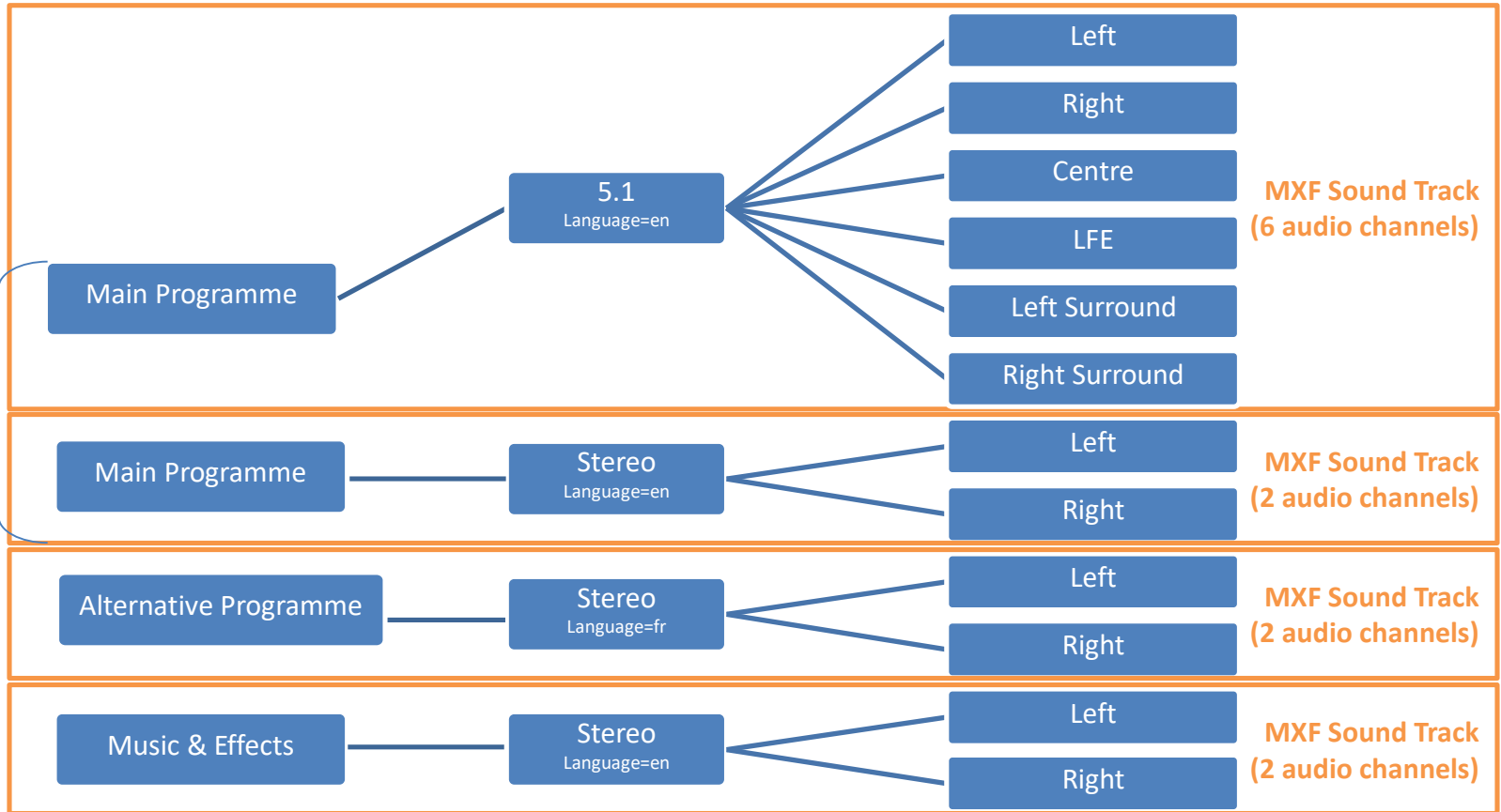


# Using Multichannel Audio Labeling

# Overview of MCA Labeling

- The principle is that only those Sound Tracks that are needed are put into the MXF file
- Each Sound Track contains all of the Audio Channels for a “Soundfield” (e.g. Stereo)
- The Multichannel Audio (MCA) Labeling is used to describe the Audio Channels, how they fit together, and their purpose
- Mapping audio to outputs is done intelligently by the decoder, rather than using agreed (or assumed) audio track layouts
- Three levels of description:
  - Audio Channels
  - Soundfield Groups
  - Groups of Soundfield Groups

# Multichannel Audio (MCA) Labelling Example



**Group of Soundfield Groups**

Labels the content / purpose of the Sound Track

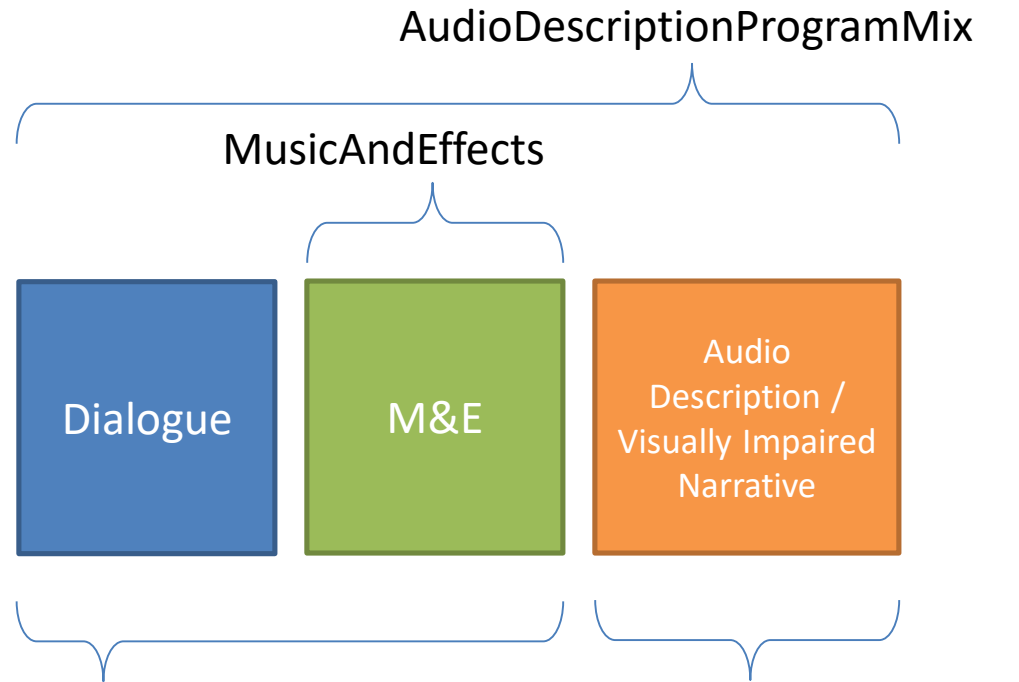
**Soundfield Group**

Labels the physical configuration of the Sound Track as well as its language

**Audio Channel**

Labels the function of each individual audio channel

## “Groups of Soundfield Groups” Labels – Simplistic Illustration of Audio Composition



SMTPE20678MainProgram or AlternativeProgram  
*(Normally the difference is just the language of the dialogue)*

AudioDescription

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*For each kind of Soundfield (principally Stereo and 5.1) the intention is that there is a maximum of one Sound Track that references a SMTPE20678MainProgram GroupOfSoundfieldGroups – in this way the “default” / “primary” audio can always be identified. However, exact usage is governed by a Delivery Document.*



# Descriptive Metadata embedded as an XML Document

# Split apart Technical Metadata & Descriptive Metadata and treat each appropriately

## Split apart Technical and Descriptive Metadata

### Technical Metadata

- Essential so that a decoder can understand what is in the MXF file: "Can this be decoded?" "How should I route the different components to the different (sub-) systems that I have available?"
- → *Best handled by standard MXF structures that are used across the industry*

### Descriptive Metadata

- Descriptive in nature and about the *content*. Much of this is only useful to a human or to systems operating at a higher (orchestration) level than an MXF decoder e.g. MAMs
- Often application specific
- Has a similar function to the label on a videotape or the VTRR paperwork – a place to capture a simplified snapshot of some of the key details about the content
- → *Best handled by containing in an embedded XML document*

# Move to XML-based Descriptive Metadata for new AS-11 Specifications

**Problem:** The Descriptive Metadata required nearly always needs to be different for each new application / scenario / workflow. This is problematic because:

- the MXF rules mean that for the existing (KLV) Descriptive Metadata even a very small change results in all of the metadata structure having to be regenerated

**Proposed solution:** Embed Descriptive Metadata as XML into the MXF file. This helps because:

- XML is a ubiquitous technology - it's easy to specify using standard tools and for OEMs to work with
- There is now a SMPTE mapping for XML into MXF (SMPTE RP 2057) – this did not exist in 2011 when the first AS-11 Specifications were developed
- XML is extensible and the mapping makes it easy to add multiple XML documents to an MXF file

# DM\_Programmes XML Schema

*The following AS-11 Specifications require that the MXF file contains an XML document conforming to the DM\_Programmes XML Schema: X1, X2, X3, X4, X7*

## **Property names, definitions, data types, length restrictions and optional / mandatory**

Many of these details are kept the same as in the KLV DM used in AS-11 UK DPP SD & HD, where possible

## **Language Properties**

All language properties (including for sign languages) use IETF BCP 47 language tags (the language tag format is specified in IETF RFC 5646)

- Note that BCP 47 tags use the shortest ISO language code. So, English is “en” not “eng”
- Language tags intro: <http://www.w3.org/International/articles/language-tags/>
- Tag registry: <http://www.iana.org/assignments/language-subtag-registry>
- Performing XML Schema validation on an XML instance document is insufficient to confirm that language tags are valid: additional checks need to be performed