



SMPTE Object Identification

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SMPTE 298M (ULs)

- Titled: "Universal Labels for Unique Identification of Digital Data"
- Uses ISO/IEC object identifiers as specified by 8824-1
 - Provides a hierarchy through a sequence of identification nodes - from 4 bytes upwards in length in increments of 4 bytes
 - SMPTE lies directly under ISO as "ISO:SMPTE"
- SMPTE defines all its ULs as 16 bytes in length
 - 0x06.0E.2B.34.[+12 further bytes]
- ULs are not widely used outside of SMPTE
- Within SMPTE, ULs provide for interoperability of essence (pictures, sound, data essence) and all kinds of metadata

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OIDs as Keys

- SMPTE Labels can be used both for data **identification** and for **data coding**
- Coding is the well know Key-Length-Value triplet used in many systems.
 - This is essentially a machine-level code
 - Highly efficient coding with minimal overhead
 - But not human-friendly
- Coding is enshrined in SMPTE 336M

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SMPTE 336M (KLV Coding)

- Defines SMPTE Keys as ULs that use short-form BER coding,
 - Result - every byte is a separate codeword in the range 0x01~0x7F
- Defines KLV coding for values that are categorised as:
 - Data Groups - multiple components of essence, metadata, control or other data where each component is a data element
 - Data Elements - single components of essence, metadata, control and other data
 - Data Types - identification and coding of information which defines the data representation of elements and groups
- It also defines other forms of coding, notably:
 - Labels - ULs that are to be used as values alone and may be used as values in a K-L-V triplet

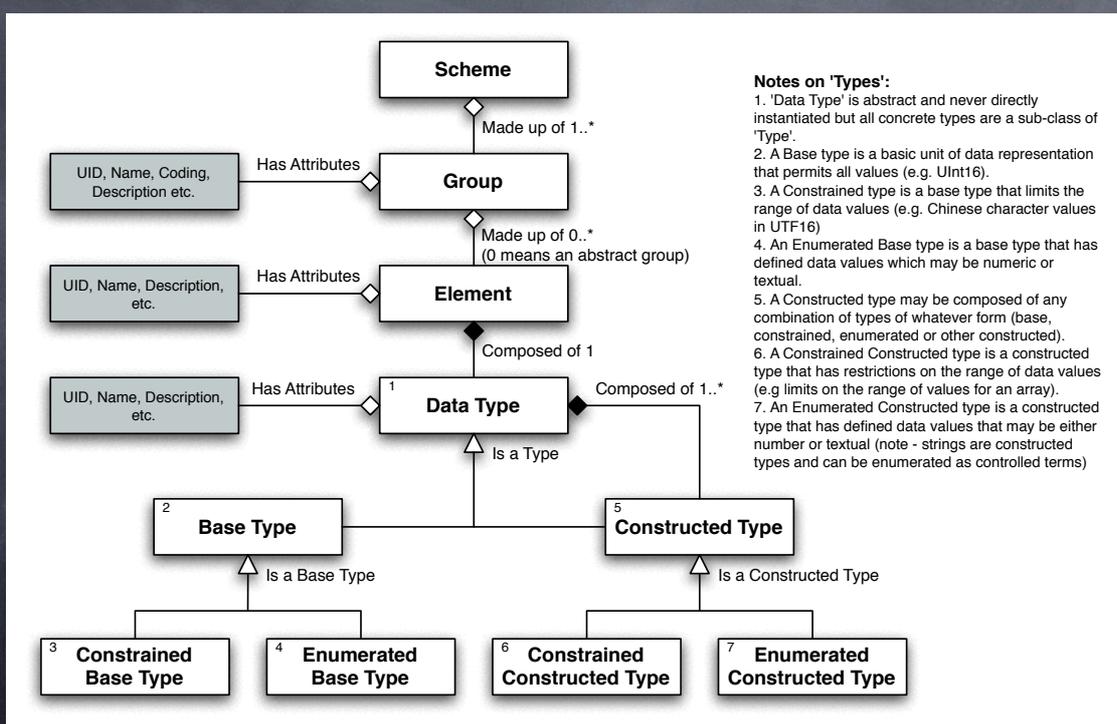
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SMPTE Registers

- SMPTE Registers define the usage of each SMPTE UL
- So there are registers for:
 - Groups (not much populated yet though)
 - Elements (well populated and well used)
 - Types (still in development)
 - Labels (well populated and well used)
 - And a prototype register for enumerated terms (textual and numeric enums)
- Each SMPTE is defined by:
 - A controlling standard that defines the structure of the register
 - The contents of the register (typically as Excel)
- All SMPTE registers are freely available on www.smpte-ra.org

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Generalised Registry Model (WiP)



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Register Structures

- The primary nodes of each register are defined as:
 - Class 1: Identification and Location (local and global scopes)
 - Class 2: Administration (business data including security)
 - Class 3: Interpretation (how a value is to be interpreted - thesauruses)
 - Class 4: Parametric (technical data for coding and compression)
 - Class 5: Process (identification of processes and device or processor settings)
 - Class 6: Relational (identification of how data relates to other data)
 - Class 7: Spatio-Temporal (time data and geo-spatial coordinates)
 - Class 12: Compound (not widely adopted)
 - Class 13: Public Organisationally Registered
 - Class 14: Private Organisation Registered
 - Class 15: Experimental (a sandpit for testing - not interoperable)
- SMPTE EG38 documents the full tree structure

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Nodes and Leaves

- Nodes do not contain useful values but are used for collecting related register items in one place
- Leaves contain the items that define the register

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Register Management

• SMPTE R30 Technical Committee

- Governs the process by which the SMPTE Registration Authority manage, store and disseminate the information contained by individual registers.
- Currently the registers are authored in spreadsheet form
- Publication is currently in spreadsheet form but R30 is looking to publish the register in a web-friendly form for access by web browsers
- Work is focussed on the automatic generation of web-based access through a publicly available (and free!) database solution

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Public and Private Org Spaces

- Public Organisation space (class 13) has been defined across all registers to allow organisations to register and publish their entries for open access
 - This space is free, but requires the organisation to publish all its uses of their register space
- Private Organisation space (class 14) requires a payment to the SMPTE-RA but does not require all entries to be published
 - POA to the SMPTE-RA, currently \$2500
- In each case, the organisation has a space of 6 bytes allocation permitting a total of approx 4×10^{12} values

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KLV Application Coding

- KLV Coding of elements and groups can be concatenated to provide a 'Scheme'
- Such a 'scheme' is MXF (Material eXchange Format)
- Now widely adopted throughout the professional content creation industries (both digital A/V and digital cinema)
- MXF is essentially built of the following KLV coded components:
 - KLV coded metadata
 - KLV coded audio-visual essence
 - KLV coded file indexing tools

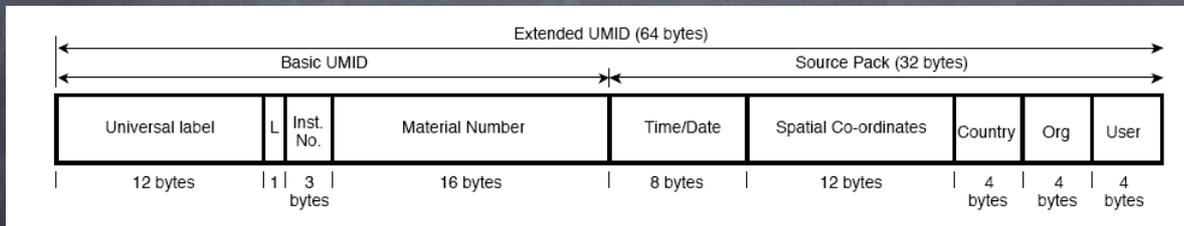
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SMPTE UMID

- UMID - Unique Material Identifier (SMPTE 330M)
 - "a unique identifier for audio-visual material which is locally created and globally unique"
- "Audio-visual material":
 - Any one or any combination of picture (or video) essences, sound (or audio) essences and data (or auxiliary) essences. This term is also frequently referred to simply as "material"
- Basic and extended UMIDs
 - A basic UMID which contains the minimum components necessary for unique identification
 - An extended UMID which attaches a packed metadata group (aka 'source pack') to the basic UMID

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UMID Data Structure



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XML Transformations

- KLV is wonderful for machines
 - Very fast, low overhead, efficient, +++
- But not so good for humans...
 - Humans do not read ULs in the same way as textual words (well, most humans!)
- To serve the need for exchange of KLV metadata and the world of XML, the registers are adding symbol names specifically to provide a unique name for each entry
 - Schemas are required to make sense of the relationship between KLV coded items at the scheme level
 - Work progresses...

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Summary

- All SMPTE work is now based on 16-byte Universal Labels for both identification and coding of data.
- This approach permits a consistency of coding for all data constructs - whether the data be simple elements, groups of elements or other data kinds.
- ULs are machine efficient but human antithetic
 - Mappings to human readable (XML) form now in progress
- All SMPTE register work is freely published by the registration authority at: www.smpte-ra.org
 - Currently the metadata and labels registers are listed