**Data Types - Abstract Specification**

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**EncapsulatedData (ED) specializes** [**ANY**](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-ANY)

**Definition:** Data that is primarily intended for human interpretation or for further machine processing outside the scope of HL7.

This includes unformatted or formatted written language, multimedia data, or structured information as defined by a different standard (e.g., XML-signatures). Instead of the data, an *ED* may contain only a reference (see [TEL](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-TEL)). Note that [ST](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-ST) is a specialization of *ED* where the [mediaType](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#prop-ED.mediaType) is fixed to text/plain and several other properties are constrained to null.

| Table 13: Property Summary of EncapsulatedData | | |
| --- | --- | --- |
| **Name** | **Type** | **Description** |
| data | BIN | The binary content of the *ED* |
| mediaType | CS | The type of the encapsulated data. |
| charset | CS | An Internet Assigned Numbers Authority (IANA) Charset Registered character set and character encoding for character-based media types. |
| language | CS | The human language of the content. |
| compression | CS | The compression algorithm, if any, used on the raw byte data. |
| reference | TEL.URL | A URL the target of which is taken as the binary content of the ED. |
| integrityCheck | BIN | A checksum calculated over the binary data. |
| integrityCheckAlgorithm | CS | The algorithm used to compute the integrityCheck value. |
| description | ST | An alternative description of the media where the context is not suitable for rendering the media. |
| thumbnail | ED | An abbreviated rendition of the full data. |
| translation | DSET<ED> | Alternate renditions of the same content translated into a different language or a different mediaType. The translation property is a set of *ED* that each translate the first rendition into a different language or use a different mediaType. Each element of the translation set SHALL be a translation of the *ED* value. Translations SHALL NOT contain translations. |
| length | INT | The length of the content in the *ED*. |

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| type EncapsulatedData alias ED specializes ANY {  BIN data;  CS mediaType;  CS charset;  CS language;  CS compression;  TEL.URL reference;  BIN integrityCheck;  CS integrityCheckAlgorithm;  ST description;  ED thumbnail;  DSET<ED> translation;  INT length;  ED subPart(INT start, INT end);  }; |

Encapsulated data can be present in two forms, inline or by reference. Inline data is communicated or moved as part of the encapsulated data value, whereas by-reference data may reside at a different (remote) location. The data is the same whether it is located inline or remote.

**4.2.1 Binary Data (data) :** [**BIN**](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-BIN)

**Definition:** The binary content of the *ED*

*ED* acts as a wrapper of binary content. Operations performed against the *ED* directly are mediated by the mediatype and, if so indicated by the mediatype, the character set. For example, two [BIN](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-BIN) values are equal if they have the same sequence of bits in their content. However the *ED* are only equal if they have the same sequence of logical items. For instance, if the media type is a kind of text, then the sequence of characters indicated by the character set and the binary content must be equal. Similarly, the length of an ED is the number of component parts as indicated by the mediatype. For application and image media types, the length of *ED* is the same as the length of the *data*. Note that operations may also be performed directly upon the binary content by using *data*.

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| invariant(ED x)  where x.nonNull {  x.data.nonNull;  }; |

Although data SHALL be nonNull if the *ED* is not null, it need not be contained in-line in the instance; instead, the binary content, along with some other properties, MAY be defined by the [reference](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#prop-ED.reference) property.

**4.2.2 Media Type (mediaType) :** [**CS**](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-CS)

**Definition:** The type of the encapsulated data.

The default mediaType is text/plain. The type of the encapsulated data may help identify a method to interpret or render the data.

*mediaType* is a mandatory property, i.e., every non-NULL instance of *ED* SHALL have a non-NULL *mediaType* property.

|  |
| --- |
| invariant(ED x)  where x.nonNull {  x.mediaType.nonNull;  }; |

The IANA defined domain of media types is established by the Internet standard RFC 2045 [<http://www.ietf.org/rfc/rfc2045.txt>] and 2046 [<http://www.ietf.org/rfc/rfc2046.txt>]. RFC 2046 defines the media type to consist of two parts:

1. top level media type, and
2. media subtype

However, this specification treats the entire media type as one atomic code symbol in the form defined by IANA, i.e., top level type followed by a slash "/" followed by media subtype. Currently defined media types are registered in a database [<http://www.iana.org/assignments/media-types/index.html>] maintained by IANA. Currently several hundred different MIME media types are defined, with the list growing rapidly. In general, all those types defined by the IANA MAY be used.

To promote interoperability, this specification prefers certain media types to others. This is to define a greatest common denominator on which interoperability is not only possible, but that is powerful enough to support even advanced multimedia communication needs.

[Table](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#domain-mediaType) below assigns a status to certain MIME media types, where the status means one of the following:

* **required**: Every HL7 application SHALL support at least the required media types if it supports a given kind of media. One required media-type for each kind of media exists. Some media types are required for a specific purpose, which is then indicated as "required for ..."
* **recommended**: Other media types are recommended for a particular purpose. For any given purpose there should be only very few additionally recommended media types and the rationale, conditions and assumptions of such recommendations must be made very clear.
* **indifferent**: This status means, HL7 neither forbids nor endorses the use of this media type. All media types not mentioned in [Table](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#domain-mediaType) have status indifferent by default. Since there are one required and several recommended media types for most practically relevant use cases, media types of this status should be used very conservatively.
* **deprecated**: Deprecated media types SHOULD NOT be used, because these media types are flawed, because there are better alternatives, or because of certain risks. Such risks could be security risks, for example, the risk that such a media type could spread computer viruses. Not every flawed media type is marked as deprecated, though. A media type that is not mentioned in Table 6, and thus has status indifferent, may well be flawed.

| Table 14: Concept Domain MediaType. ValueSet OID: 2.16.840.1.113883.11.14824. CodeSystem "MediaType", OID: 2.16.840.1.113883.5.79, Owner: IANA | | | |
| --- | --- | --- | --- |
| **code** | **name** | **status** | **definition** |
| text/plain | Plain Text | required | For any plain text. This is the default and is used for a character string (ST) data type. |
| text/x-hl7-ft | HL7 Text | recommended | For compatibility, this represents the HL7 v2.x FT data type. Its use is recommended only for backward compatibility with HL7 v2.x systems. |
| text/html | HTML Text | recommended | For marked-up text according to the Hypertext Mark-up Language. HTML markup is sufficient for typographically marking-up most written-text documents. HTML is platform independent and widely deployed. |
| application/pdf | PDF | recommended | The Portable Document Format is recommended for written text that is completely laid out and read-only. PDF is a platform independent, widely deployed, and open specification with freely available creation and rendering tools. |
| text/xml | XML Text | indifferent | For structured character based data. There is a risk that general SGML/XML is too powerful to allow a sharing of general SGML/XML documents between different applications. |
| text/x-hl7-text+xml | HL7 Sturctured Narrative | recommended | The content described by the CDA Narrative Block (not just used by CDA). |
| multipart/x-hl7-cda-level1 | CDA Level 1 Multipart | recommended | The HL7 clinical document Architecture, Level 1 MIME package. |
| text/rtf | RTF Text | indifferent | The Rich Text Format is widely used to share word-processor documents. However, RTF does have compatibility problems, as it is quite dependent on the word processor. May be useful if word processor edit-able text should be shared. |
| application/msword | MSWORD | deprecated | This format is very prone to compatibility problems. If sharing of edit-able text is required, text/plain, text/html or text/rtf should be used instead. |
| audio/basic | Basic Audio | required | This is a format for single channel audio, encoded using 8bit ISDN mu-law [PCM] at a sample rate of 8000 Hz. This format is standardized by: CCITT, Fascicle III.4 -Recommendation G.711. Pulse Code Modulation (PCM) of Voice Frequencies. Geneva, 1972. |
| audio/mpeg | MPEG audio layer 3 | required | MPEG-1 Audio layer-3 is an audio compression algorithm and file format defined in ISO 11172-3 and ISO 13818-3. MP3 has an adjustable sampling frequency for highly compressed telephone to CD quality audio. |
| audio/k32adpcm | K32ADPCM Audio | indifferent | ADPCM allows compressing audio data. It is defined in the Internet specification RFC 2421 [ftp://ftp.isi.edu/in-notes/rfc2421.txt]. Its implementation base is unclear. |
| image/png | PNG Image | required | Portable Network Graphics (PNG) [http://www.cdrom.com/pub/png] is a widely supported lossless image compression standard with open source code available. |
| image/gif | GIF Image | indifferent | GIF is a popular format that is universally well supported. However GIF is patent encumbered and should therefore be used with caution. |
| image/jpeg | JPEG Image | required | This format is required for high compression of high color photographs. It is a "lossy" compression, but the difference to lossless compression is almost unnoticeable to the human vision. |
| application/dicom | DICOM | recommended | Digital Imaging and Communications in Medicine (DICOM) MIME type defined in RFC3240 [http://ietf.org/rfc/rfc3240.txt]. |
| image/g3fax | G3Fax Image | recommended | This is recommended only for fax applications. |
| image/tiff | TIFF Image | indifferent | Although TIFF (Tag Image File Format) is an international standard it has many interoperability problems in practice. Too many different versions that are not handled by all software alike. |
| video/mpeg | MPEG Video | required | MPEG is an international standard, widely deployed, highly efficient for high color video; open source code exists; highly interoperable. |
| video/x-avi | X-AVI Video | deprecated | The AVI file format is just a wrapper for many different codecs; it is a source of many interoperability problems. |
| model/vrml | VRML Model | recommended | This is an openly standardized format for 3D models that can be useful for virtual reality applications such as anatomy or biochemical research (visualization of the steric structure of macromolecules) |

The set of required media types is very small so that no undue requirements are forced on HL7 applications, especially legacy systems. In general, no HL7 application is forced to support any given kind of media other than written text. For example, many systems just do not want to receive audio data, because those systems can only show written text to their users. It is a matter of application conformance statements to say: "I will not handle audio". Only if a system claims to handle audio media, then it must support the required media type for audio.

**4.2.3 Charset (charset) :** [**CS**](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-CS)

**Definition:** An Internet Assigned Numbers Authority (IANA) Charset Registered character set and character encoding for character-based media types.

The charset SHALL be identified by an Internet Assigned Numbers Authority (IANA) Charset Registration [<http://www.iana.org/assignments/character-sets>] in accordance with RFC 2978 [<http://www.ietf.org/rfc/rfc2978.txt>]. The IANA source specifies names and multiple aliases for most character sets. For HL7's purposes, use of multiple alias names is not allowed. The standard name for HL7 is the one marked by IANA as "preferred for MIME." If IANA has not marked one of the aliases as "preferred for MIME" the main name SHALL be the one used for HL7.

[Table 15](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#domain-Charset) lists a few of the IANA defined character sets that are of interest to current HL7 members.

| Table 15: Concept Domain Charset. ValueSet OID: 2.16.840.1.113883.11.14853. CodeSystem "CharSet", OID: 2.16.840.1.113883.5.21, Owner: IANA | | | |
| --- | --- | --- | --- |
| **lvl** | **code** | **name** | **definition** |
| 1 | EBCDIC | EBCDIC | HL7 is indifferent to the use of this Charset. |
| 1 | ISO-10646-UCS-2 | ISO-10646-UCS-2 | Deprecated for HL7 use. |
| 1 | ISO-10646-UCS-4 | ISO-10646-UCS-4 | Deprecated for HL7 use. |
| 1 | ISO-8859-1 | ISO-8859-1 | HL7 is indifferent to the use of this Charset. |
| 1 | ISO-8859-2 | ISO-8859-2 | HL7 is indifferent to the use of this Charset. |
| 1 | ISO-8859-5 | ISO-8859-5 | HL7 is indifferent to the use of this Charset. |
| 1 | JIS-2022-JP | JIS-2022-JP | HL7 is indifferent to the use of this Charset. |
| 1 | US-ASCII | US-ASCII | Required for HL7 use. |
| 1 | UTF-7 | UTF-7 | HL7 is indifferent to the use of this Charset. |
| 1 | UTF-8 | UTF-8 | Required for Unicode support. |

**NOTE:** The above list is not complete let alone exclusive. In particular, international HL7 affiliates may make special recommendations about charsets to be used in their realm. These recommendations MAY add additional charsets and MAY reassign the recommendations status of a listed charset.

The charset property needs to be known where the data of *ED* is character type data in any form. If the data is provided in-line, then the charset SHALL be clearly conveyed. If the data is provided as a reference, and the access method does not provide the charset for the data, typically as a mime header, then the charset SHALL be conveyed as part of the *ED*.

Interested readers may also want to consult the "Character Model for the World Wide Web" [<http://www.w3.org/TR/charmod>] for a more complete discussion of character set and related issues.

**4.2.4 Language (language) :** [**CS**](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-CS)

**Definition:** The human language of the content.

The need for a language code for text data values is documented in RFC 2277, IETF Policy on Character Sets and Languages [<http://www.ietf.org/rfc/rfc2277.txt>]. Further background information can be found in Using International Characters in Internet Mail [<http://www.imc.org/mail-i18n.html>], a memo by the Internet Mail Consortium.

The principles of the code domain of this attribute are specified by the Internet standard RFC 3066 [<http://www.ietf.org/rfc/rfc3066.txt>]. The RFC 3066 coding scheme is principally constructed from a primary subtag component encoded using the language codes of ISO 639, with an optional second subtag component encoded using the two letter country codes of ISO 3166. Where this scheme does not provide a suitable code, RFC 3066 allows for other codes, mostly as defined by ISO or the Internet Assigned Names Authority [<http://www.iana.org/assignments/language-tags>].[13](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm" \l "fn13) This code domain is assigned the OID 2.16.840.1.113883.6.121.

While Language tags usually alter the meaning of the text, the language does not alter the meaning of the characters in the text.[14](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm" \l "fn14)

**NOTE:** Representation of language tags to text is highly dependent on the ITS. An ITS MAY use the native way of language tagging provided by its target implementation technology. Some may have language information in a separate component, e.g., XML has the xml:lang tag for strings. Others may rely on language tags as part of the binary character string representation, e.g., ISO 10646 (Unicode) and its "plane-14" language tags.

The language tag SHOULD NOT be mandatory if it is not mandatory in the implementation technology. Semantically, language tagging of strings follows a default-logic. In circumstances where a realm may support multiple langauges, it is up to the realm to define rules to handle language where none is specified when no language is specified. If no other rule is specified, the local language of the reader is assumed. If a language is set for an entire message or document, that language is the default. If any information element or value that is superior in the syntax hierarchy specifies a language, that language is the default for all subordinate text values.

If language tags are present in the beginning of the encoded binary text (e.g., through Unicode's plane-14 tags) this is the source of the language property of the encapsulated data value.

**4.2.5 Compression (compression) :** [**CS**](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-CS)

**Definition:** The compression algorithm, if any, used on the raw byte data.

| Table 16: Concept Domain CompressionAlgorithm. ValueSet OID: 2.16.840.1.113883.11.10620. CodeSystem "CompressionAlgorithm", OID: 2.16.840.1.113883.5.1009, Owner: HL7 | | | |
| --- | --- | --- | --- |
| **code** | **name** | **status** | **definition** |
| DF |  | required |  |
| GZ |  | indifferent |  |
| ZL |  | indifferent |  |
| Z |  | deprecated |  |
| BZ |  | indifferent |  |
| Z7 |  | indifferent |  |

* **required**: Every HL7 application SHALL support at least the required compression types.
* **indifferent**: This status means, HL7 neither forbids nor endorses the use of this compression algorithm.
* **deprecated**: Deprecated compression algorithms SHOULD NOT be used, because they are flawed, because there are better alternatives, or because of certain risks.

The compression applies to the data applied in line, not to data provided by reference, even if there is no data provided in line. Note that some compression formats allow multiple archive files to be embedded within a single compressed volume. Applications SHALL ensure that the decompressed form of the data conforms to the stated media type. The stated media type applies to the uncompressed data.

**4.2.6 Reference (reference) :** [**TEL.URL**](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-TEL.URL)

**Definition:** A URL the target of which is taken as the binary content of the ED.

A telecommunication address ([TEL](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-TEL)) is a URL (i.e. for HTTP or FTP) which will resolve to precisely the same binary data that could as well have been provided as inline data. The semantic value of an encapsulated data value is the same, regardless whether the data is present inline data or just by-reference. However, an encapsulated data value without inline data behaves differently, since any attempt to examine the data requires the data to be downloaded from the reference. An encapsulated data value MAY have both inline data and a reference.

If both reference and inline data are provided, the reference SHALL point to data identical to that provided inline. It is an error if the data resolved through the reference does not match either the integrity check or the in-line data.

The reference may contain a usablePeriod to indicate that the data may only be available for a limited period of time. Whether the reference is limited by a usablePeriod or not, the content of the reference SHALL be fixed for all time. Any application using the reference SHALL always receive the same data, or an error. The reference cannot be reused to send a different version of the same data, or different data.

By-reference encapsulated data may not be allowed depending on the attribute or component that is declared encapsulated data. Values of type [ST](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-ST) SHALL always be inline.

**4.2.7 Integrity Check (integrityCheck) :** [**BIN**](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-BIN)

**Definition:** A checksum calculated over the binary data.

The integrity check is a short binary value representing a cryptographically strong checksum that is calculated over the binary data. The purpose of this property, when communicated with a reference is for anyone to validate later whether the reference still resolved to the same data that the reference resolved to when the encapsulated data value with reference was created. It is an error if the data resolved through the reference does not match the integrity check.

The integrity check is calculated according to the [integrityCheckAlgorithm](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#prop-ED.integrityCheckAlgorithm). By default, the *Secure Hash Algorithm-1* (SHA-1) shall be used. The integrity check is binary encoded according to the rules of the integrity check algorithm.

The integrity check is calculated over the raw binary data that is contained in the data component, or that is accessible through the reference. No transformations are made before the integrity check is calculated. If the data is compressed, the Integrity Check is calculated over the compressed data.

**4.2.8 Integrity Check Algorithm (integrityCheckAlgorithm) :** [**CS**](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-CS)

**Definition:** The algorithm used to compute the integrityCheck value.

The default value is SHA-1.[15](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm" \l "fn15)

| Table 17: Concept Domain IntegrityCheckAlgorithm. ValueSet OID: 2.16.840.1.113883.11.17385. CodeSystem "IntegrityCheckAlgorithm", OID: 2.16.840.1.113883.5.1010, Owner: HL7 | | | |
| --- | --- | --- | --- |
| **lvl** | **code** | **name** | **definition** |
| 1 | SHA-1 | secure hash algorithm - 1 | This algorithm is defined in FIPS PUB 180-1: Secure Hash Standard. As of April 17, 1995. |
| 1 | SHA-256 | secure hash algorithm - 256 | This algorithm is defined in FIPS PUB 180-2: Secure Hash Standard. |

**4.2.9 Description (description) :** [**ST**](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-ST)

**Definition:** An alternative description of the media where the context is not suitable for rendering the media.

E.g. Short text description of an image or sound clip, etc. This attribute is not intended to be a complete substitute for the original. For complete substitutes, use the "translation" property. The intent of this property is allow compliance with disability requirements such as those expressed in American's with Disability Act (also known as "Section 508"), where there is a requirement to provide a short text description of included media in some form that can be read by a screen reader. This is similar to a very short thumbnail with mediaType = text/plain.

**4.2.10 Thumbnail (thumbnail) :** [**ED**](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-ED)

**Definition:** An abbreviated rendition of the full data.

A thumbnail requires significantly fewer resources than the full data, while still maintaining some distinctive similarity with the full data. A thumbnail is typically used with by-reference encapsulated data. It allows a user to select data more efficiently before actually downloading through the reference. Originally, the term thumbnail refers to an image in a lower resolution (or smaller size) than another image. However, the thumbnail concept can be metaphorically used for media types other than images. For example, a movie may be represented by a shorter clip; an audio-clip may be represented by another audio-clip that is shorter, has a lower sampling rate, or a lossy compression; or an abstract provided for a long document.

Thumbnails may not be allowed depending on the attribute or component that is declared encapsulated data. Values of type [ST](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-ST) SHALL NOT have thumbnails, and a thumbnail itself SHALL NOT contain a thumbnail.

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| invariant(ED x)  where x.thumbnail.nonNull {  x.thumbnail.thumbnail.isNull;  }; |

**NOTE:** ITS's SHOULD consider the case where the thumbnail and the original both have the same properties of type, charset and compression. In this case, these properties need not be represented explicitly for the thumbnail but might be "inherited" from the main encapsulated data value to its thumbnail.

**4.2.11 Translation (translation) :** [**DSET**](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-DSET)**<**[**ED**](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-ED)**>**

**Definition:** Alternate renditions of the same content translated into a different language or a different mediaType. The translation property is a set of *ED* that each translate the first rendition into a different language or use a different mediaType. Each element of the translation set SHALL be a translation of the *ED* value. Translations SHALL NOT contain translations.

The translations SHALL convey the same information, but in a different language or mediaType. The translations do not take part in the test for equality, so SHALL NOT introduce any new semantics to the value.

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| --- |
| invariant(ED x)  where x.nonNull {  forall(ED t) where x.translation.contains(t) {  t.description.isNull;  t.language.equals(x.language).not.or(t.mediaType.equals(x.mediaType).not);  t.translation.isEmpty;  }  }; |

**4.2.12 Length (length) :** [**INT**](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-INT)

**Definition:** The length of the content in the *ED*.

The length of the *ED* may not be the same as the length of the binary content of the *ED* in the [data](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-ED.data) property. The length is the number of items in the content where the kind of item is determined by the [mediaType](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-ED.mediaType). For instance, if the mediatype is a type of text, then the length of the *ED* is the number of characters found in the binary content, as specified by the [charset](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-ED.charset). For application, video, audio and image mediatypes, the length is the same as the length of the binary content.

|  |
| --- |
| invariant(ED x, INT y)  where x.nonNull.and(y.isZero) {  x.length.greaterThan(y);  }; |

nonNull *ED* SHALL always have some content, and *length* is greater than 0.

**4.2.13 SubPart (subPart) :** [**ED**](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-ED)

**Definition:** A contiguous sublist of the *ED* containing the content found from index start to end, inclusively.

As with length, the subPart of an ED may be different to a subList of the [data](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-ED.data). The offsets are determined based on the logical contents as determined by the [mediaType](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-ED.mediaType). For application, video, audio and image mediatypes, the offsets are the same as the offsets in the binary content. The content must then the re-rendered into some binary representation.

The [mediaType](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-ED.mediaType) and the [charset](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-ED.charset) of the return value are usually of the same type as the *ED*, but this may not always be the case.

If the internal content has some structure which makes the specified range inappropriate, the return value MAY be NULL.

**4.2.14 Equality (equal) :** [**BL**](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-BL)**, inherited from** [**ANY**](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#dt-ANY)

Two nonNull values of type *ED* are equal if and only if their mediaType and data are equal. For those *ED* values with compressed data or referenced data, only the de-referenced and uncompressed data counts for the equality test. The compression, thumbnail, translation and reference property themselves are excluded from the equality test. In addition the language property is excluded from the test, due to the problems this would introduce values of type *ED* where the language is not specified. If the [mediaType](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm#prop-ED.mediaType) is character based and the charset property is not equal, the charset property must be resolved through mapping of the data between the different character sets.[16](http://www.hl7.org/v3ballot/html/infrastructure/datatypes_r2/datatypes_r2.htm" \l "fn16)