

Digital Video Broadcasting (DVB); Uniform Resource Identifiers (URI) for DVB Systems



Reference

RTS/JTC-DVB-292

Keywords

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Foreword

This Technical Specification (TS) has been produced by Joint Technical Committee (JTC) Broadcast of the European Broadcasting Union (EBU), Comité Européen de Normalisation ELECTrotechnique (CENELEC) and the European Telecommunications Standards Institute (ETSI).

NOTE: The EBU/ETSI JTC Broadcast was established in 1990 to co-ordinate the drafting of standards in the specific field of broadcasting and related fields. Since 1995 the JTC Broadcast became a tripartite body by including in the Memorandum of Understanding also CENELEC, which is responsible for the standardization of radio and television receivers. The EBU is a professional association of broadcasting organizations whose work includes the co-ordination of its members' activities in the technical, legal, programme-making and programme-exchange domains. The EBU has active members in about 60 countries in the European broadcasting area; its headquarters is in Geneva.

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The Digital Video Broadcasting Project (DVB) is an industry-led consortium of broadcasters, manufacturers, network operators, software developers, regulatory bodies, content owners and others committed to designing global standards for the delivery of digital television and data services. DVB fosters market driven solutions that meet the needs and economic circumstances of broadcast industry stakeholders and consumers. DVB standards cover all aspects of digital television from transmission through interfacing, conditional access and interactivity for digital video, audio and data. The consortium came together in 1993 to provide global standardisation, interoperability and future proof specifications.

Introduction

In its current strict technical meaning, a URL (Uniform Resource Locator) is a URI (Uniform Resource Identifier) which, "in addition to identifying a resource, [provides] a means of locating the resource by describing its primary access mechanism (e.g. its network 'location')." RFC 3986 [14].

Often, the term "URL" is used even though a URI is being referred to. Before RFC 1630 [i.1] formally defined the term URI as a generic term best suited for the concept in June 1994, "Uniform Resource Locator" was used widely for designating network-retrievable documents which were the core idea of the World Wide Web. This imprecise use of the term has continued until to date.

"Uniform Resource Names (URNs) [on the other hand] are intended to serve as persistent, location-independent resource identifiers and are designed to make it easy to map other namespaces (that share the properties of URNs) into URN-space. Therefore, the URN syntax provides a means to encode character data in a form that can be sent in existing protocols, transcribed on most keyboards, etc." RFC 2141 [i.2].

So a URN globally refers to an entity regardless from where and how it may be retrieved, whilst a URL globally refers to a location without implying anything about the object that can be retrieved from that location. Both URNs and URLs are subsets of URI.

1 Scope

The present document specifies the syntax, semantics and encoding of the Uniform Resource Identifier (URI) schemes for use with DVB systems. The following URI schemes are covered:

- dvb:
- exit:

These URI schemes shall be used to refer to locations on DVB networks from both, within DVB networks and from outside of DVB networks.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are necessary for the application of the present document.

- [1] ISO/IEC 13818-1: "Information technology - Generic coding of moving pictures and associated audio information: Systems".
- [2] ISO/IEC 13818-2: "Information technology - Generic coding of moving pictures and associated audio information: Video".
- [3] ISO/IEC 13818-3: "Information technology - Generic coding of moving pictures and associated audio information - Part 3: Audio".
- [4] ISO/IEC 13818-4: "Information technology - Generic coding of moving pictures and associated audio information - Part 4: Conformance testing".
- [5] ISO/IEC 13818-6: "Information technology - Generic coding of moving pictures and associated audio information - Part 6: Extensions for DSM-CC".
- [6] ISO/IEC 13818-9: "Information technology - Generic coding of moving pictures and associated audio information - Part 9: Extension for real time interface for systems decoders".
- [7] ISO/IEC 13818-10: "Information technology - Generic coding of moving pictures and associated audio information - Part 10: Conformance extensions for Digital Storage Media Command and Control (DSM-CC)".
- [8] ETSI EN 300 468: "Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems".
- [9] ETSI TS 102 812: "Digital Video Broadcasting (DVB); Multimedia Home Platform (MHP) Specification 1.1.1".
- [10] ISO/IEC 8601 (2002): "Data elements and interchange formats - Information interchange - Representation of dates and times".

- [11] IETF RFC 5328 (September 2008): "A Uniform Resource Name (URN) Namespace for the Digital Video Broadcasting Project (DVB)", A. Adolf and P. MacAvock.
- [12] ETSI EN 301 192: "Digital Video Broadcasting (DVB); DVB specification for data broadcasting".
- [13] IETF RFC 2234: "Augmented BNF for Syntax Specifications: ABNF".
- [14] IETF RFC 3986: "Uniform Resource Identifier (URI): Generic Syntax".

2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] IETF RFC 1630: "Universal Resource Identifiers in WWW A Unifying Syntax for the Expression of Names and Addresses of Objects on the Network as used in the World-Wide Web".
- [i.2] IETF RFC 2141: "'URN Syntax".
- [i.3] IETF RFC 791: "Internet Protocol - DARPA Internet Program Protocol Specification".
- [i.4] IETF RFC 2838: "Uniform Resource Identifiers for Television Broadcasts".
- [i.5] Digital Audio-Visual Council (DAVIC) (1999): "DAVIC 1.4.1 Specification Part 9 - Information Representation".
- [i.6] UK Digital TV Group (UK DTG) (May 2003): "Digital Terrestrial Television MHEG-5 Specification".
- [i.7] ETSI TR 102 679: "Digital Video Broadcasting (DVB); Register of DVB URNs and Classification Schemes".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in EN 300 468 [8] apply.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AIT Application Information Table

NOTE: See TS 102 812 [9].

ABNF Augmented Backus-Naur Form

NOTE: See RFC 2234 [13].

BCG Broadband Content Guide
BNF Backus-Naur Form

NOTE: See RFC 2234 [13].

EPG Electronic Programme Guide

NOTE: See EN 300 468 [8].

ESG Electronic Service Guide

DAVIC	Digital Audio Video Council
NOTE:	www.davic.org
DSI	DownloadServerInitiate
NOTE:	See EN 301 192 [12]
DVB	Digital Video Broadcasting
NOTE:	www.dvb.org
ECG	Electronic Content Guide
ESG	Electronic Service Guide
IETF	Internet Engineering Task-Force (www.ietf.org)
IP	Internet Protocol
NOTE:	See RFC 791 [i.3].
NIT	Network Information Table
NOTE:	See EN 300 468 [8].
NSAP	Network Service Access Point
RFC	Request for Comments (published by IETF)
NOTE:	See www.faqs.org .
SD&S	Service Discovery and Selection
SDT	Service Description Table
NOTE:	See EN 300 468 [8]
SI	Service Information
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
URN	Uniform Resource Name
UTC	Universal Time, Co-ordinated

4 URL Schemes for Access to DVB Services

DVB has - as of this writing - defined two environments for broadcast, interactive and on-demand services:

- The "Phase 1" environment which is based on MPEG-2 Transport Stream ISO 13818 [1] to [7].
- The "Phase 2" environment which separates the transport from the encoding and is based on the IP protocol RFC 791 [i.3].

DVB defines the following general format of the URLs:

```
<protocol> : //<server>/<node1>/.../<nodeN>/<object>
```

The *protocol* part of the URL identifies that it is a DVB service. All DVB defined *protocol* tags begin with the string "dvb".

The *server* part of the URL points to the network service access point (NSAP) as services are the basic element that is carried in DVB networks. The rest of the URL specifies the individual component relative to the respective NSAP.

The format of the *object* part is dependent on the type of the service. This part is not needed if the URL points to the whole service.

5 Encoding of URI strings and the use of non-Latin characters

The URI format (see RFC 3986 [14]) consists of a sequence of a limited range of Latin characters plus a limited number of graphical characters (e.g. '@', '=', etc. but not including a space character). In order for non-Latin characters to be used in URIs, a standard mapping from those non-Latin characters is defined.

All characters not within the range of characters allowed in a URI must be encoded into UTF-8 and included in the URI as a sequence of escaped octets. An escaped octet is encoded as a character triplet, consisting of the percent character "%" followed by the two hexadecimal digits representing the octet code.

6 The "dvb:" URL Scheme

DVB defines a specific Uniform Resource Locator (URL) format which provides a general addressing mechanism intended to access broadcast services from interactive applications or services.

DVB URLs may be used from an interactive application to address any of the following:

- A DVB service.
- One or more components of a DVB service - for example video, audio or subtitle elementary streams.
- An event in a DVB service.
- A transport stream in a DVB network.
- A file carried in a DSM-CC object carousel.
- Another interactive application.

Which of these can be used and how they are used should be defined in the specification for the technology in which the interactive application is written or distributed.

DVB broadcast networks carry Service Information (SI) which contains globally unique parameters for locating services in the broadcast networks. The URL format, defined by DVB to access such services is based on these parameters as they provide an addressing mechanism in a physical network independent way. The same services may be carried simultaneously in many physical networks, but the parameters in the SI will remain the same and they can thus be used by the clients to locate the services regardless of the actual physical network.

6.1 Syntax of the "dvb:" URL Scheme

An extended format of the DAVIC DVB URL [i.5] shall be used for addressing DVB-SI entities as well as files within object carousels. This extension of the DAVIC locator is backwards compatible with both the original DAVIC locator as well as the UK DTG extension [i.6]. The main extensions are support for multiple component tags for specifying a subset of the components of a service, and a specified way of referencing files in an object carousel within a service.

The following locator formats shall be used:

- `dvb://<original_network_id>.[<transport_stream_id>][.<service_id>[.<component_set>[$<dvb_carousel_id>]][<dvb_event_constraint>]][<path-absolute>]`
- `dvb:// '<textual_service_identifier>' [.<component_set>[$<dvb_carousel_id>]][<dvb_event_constraint>][<path-absolute>]`

A more formal specification of the DVB dvb: URL expressed in BNF (as used in RFC 3986 [14]) is presented in table 1.

Table 1: Syntax of the dvb: URL

dvb_url	=	dvb_scheme ":" dvb_hier_part
dvb_scheme	=	"dvb"
dvb_hier_part	=	dvb_net_path dvb_abs_path
dvb_abs_path	=	path-absolute (see note 2)
dvb_net_path	=	"/" (dvb_entity [dvb_abs_path]) dvbapp_entity (see note 1)
dvb_entity	=	dvb_transport_stream dvb_service dvb_service_component
dvb_transport_stream	=	original_network_id "." transport_stream_id
dvb_service	=	dvb_service_without_event [dvb_event_constraint (see note 3)]
dvb_service_component	=	dvb_service_without_event "." component_set ["\$" dvb_carousel_id] [dvb_event_constraint (see note 3)]
dvb_service_without_event	=	original_network_id "." [transport_stream_id] "." service_id "" textual_service_identifier ""
dvb_carousel_id	=	transaction_id (see note 5)
component_set	=	component_tag_set qualified_component_set fully_qualified_component_set
component_tag_set	=	component_tag *("&" component_tag)
qualified_component_set	=	qualified_component *("&" qualified_component)
qualified_component	=	component_type "=" component_id
component_type	=	"video" "audio" "data" "subtitle" "teletext" "dvbst"
component_id	=	component_string "default" "current" "hearing_impaired" "visually_impaired" "none"
component_string	=	iso639_language_code component_tag
fully_qualified_component_set	=	fully_qualified_component *("&" fully_qualified_component)
fully_qualified_component	=	"fqc=" stream_content_and_component_type "," component_tag ["," iso639_language_code]
stream_content_and_component_type	=	hex_string (see note 6)
original_network_id	=	hex_string
transport_stream_id	=	hex_string
service_id	=	hex_string
component_tag	=	hex_string
event_id	=	hex_string

transaction_id	=	hex_string
textual_service_identifier	=	host (see note 4)
iso639_language_code	=	3 ("A-Z" "a-z")
hex_string	=	1 * hex
hex	=	digit "A" "B" "C" "D" "E" "F" "a" "b" "c" "d" "e" "f"
digit	=	"0" "1" "2" "3" "4" "5" "6" "7" "8" "9"
NOTE 1: See clause "6.3.1 Application format specific locator".		
NOTE 2: path-absolute as defined in RFC 3986 [14].		
NOTE 3: See clause "6.4 EPG, BCG and ESG Specific Locators".		
NOTE 4: host as defined in RFC 3986 [14].		
NOTE 5: See clause "10 Data carousels" in EN 301 192 [12].		
NOTE 6: 12-bit hex string (3 hex chars) which is the stream_content followed by the component_type from the component descriptor EN 300 468 [8].		

It should be noted that this syntax is fully compliant with the generic syntax of URIs as specified in RFC 3986 [14] and uses the registry-based naming authority version of that. Furthermore, all generic definitions specified in [14] shall be valid for the DVB URL as well (e.g. escaping of special characters within file names, etc.).

RFC 3986 [14] defines methods for path segments to include parameters (introduced with a semicolon character ";"). The present document currently makes no use of such parameters. Implementations conforming to the present document shall ignore any such parameters to ensure compatibility with future specifications.

When a path is present in a URL where the `dvb_entity` part identifies a DVB service, the path references an object in an object carousel within the service. If there are multiple object carousels within the same service, the rule on how to select the default one is to be defined.

6.2 URLs including path references

When a path is present in a URL where the `dvb_entity` part identifies one component of a DVB service and that component carries an object carousel stream, the path references an object in an object carousel whose root (i.e. DSI message) is sent within that component. Note that the referenced object itself is not necessarily carried in the component identified in the URL, but the component in the URL identifies only the component carrying the root of the object carousel in which the referenced object is carried.

The semantics when the path is present in the URL and where the `dvb_entity` part identifies something else than the two cases described above is not defined in the present document and is reserved for future use.

When the `dvb_net_path` part is missing and only the `dvb_abs_path` is present, the URL refers to a file in a default object carousel within the current service. The current service is dependent on the usage context.

6.2.1 `dvb_entity = dvb_service`

When a path is present in a URL where the `dvb_entity` part identifies a DVB service, the path references an object in an object carousel within the service. If the `dvb_service_component` element is not present there shall only be one Object Carousel in the DVB service.

6.2.2 `dvb_entity = dvb_service_component`

When a path is present in a URL where the `dvb_entity` part identifies one component of a DVB service and that component carries an object carousel stream, the path references an object in an object carousel whose "root" (i.e. DSI message) is sent within that component. In this case the component tag set shall only contain one element.

The semantics when the path is present in URL where the `dvb_entity` part identifies something else than the two cases described above are not specified in the present document.

6.2.3 dvb_hier_part = dvb_abs_path

When the `dvb_net_path` part is missing and only the `dvb_abs_path` is present, the URL refers to a file in a default object carousel within the current service. The "current" service is dependent on the usage context.

6.2.4 dvb_abs_path

The following restrictions apply to the `dvb_abs_path` part of a name:

- The total length of pathnames, separators and file name shall be less than or equal to 254 bytes long.
- The following characters are not allowed in file names and pathnames: character null (0xC080), byte zero.
- The encoding of the file name is in UTF-8.
- The directory separator character shall be a slash character (0x2F).
- An absolute file name starts with a slash character (as indicated in the BNF above).

6.2.5 dvb_entity = dvb_transport_stream

At least the numeric identifiers `original_network_id`, `transport_stream_id` and `service_id`, if present, shall be matched against the corresponding fields in DVB-SI.

6.2.6 Reserved Names

File names starting with the characters "dvb." (dee-vee-bee-dot) are reserved for use as "well known" files defined in the present document or future specifications.

Authors shall not use file names with this form to avoid possible collision with standards defined files.

6.3 Interactive application specific locators

Two specific formats of locators are defined which have defined semantics only in the context of specific formats for interactive applications:

- The extended form of the DVB locator (see clause 6.3.1)
- The exit locator used for application self termination (see clause 6.3.5)

6.3.1 Extended Application Locator

The formal specification of the URL form expressed in BNF is given in the extension in table 2 to the "dvb:" locators defined in table 1 in clause 6.1.

Table 2: Extended Application URL syntax

dvbapp_entity (note 1)	=	dvb_service_contextual dvb_service_component_contextual ait_specifier
dvb_service_contextual	=	"current" "original"
dvb_service_component_contextual	=	"current.audio" "current.video" "current.av"
ait_specifier	=	ait_filter "." ait_abs_path
ait_filter	=	"current" dvb_service_without_event
ait_abs_path	=	"/" ait_entity
ait_entity	=	ait_root_directory ait_application
ait_root_directory	=	"app_root"
ait_application (note 2)	=	org_id_part "." app_id_part ["?" ait_params]
ait_params (note 3)	=	"arg_" 1*digit "=" *uric ["&" ait_params]
NOTE 1: See table 1.		
NOTE 2: For org_id_part and app_id_part see TS 102 812 [9].		
NOTE 3: For digit and uric see RFC 3986 [14].		

6.3.2 TV Locators

A locator for a DVB Service or service component can be a full dvb: locator, as defined in table 1 in clause 6.1, or one of the specific forms defined in table 3.

Table 3: Extended TV locators

Locator	Meaning
dvb://current	The service currently selected by the application.
dvb://current.av	The Audio and Video being presented on the background video device.
dvb://current.audio	The Audio being presented in association with the background video device.
dvb://current.video	The Video being presented on the background video device.
dvb://original	Originating service for this application (place of birth).
NOTE: Content authors who, in other systems, use the "tv:" locator, as defined in RFC 2838 [i.4], may use the equivalent "dvb://current.av" locator to reference the default audio and video component within the service.	

6.3.3 Application Locator

A locator for an application in the current service can be identified by the specific forms in table 4. Only applications that are visible in the application database using the current service filter can be found by this locator.

Selecting this locator will launch the application, with the associated parameters. If the service indicated is not the current service, a service selection will be required. After successful service selection, the application will be launched with the associated parameters.

Table 4: Application locator

Locator	Meaning
dvb://current.ait/orgid.appid?param1=val1&...	An application in the service currently selected by the application.
dvb://dvb_service_without_event.ait/orgid.appid?param1=val1&...	An application in the specified service.

6.3.4 AIT Locators

The root directory or the icon representation of the current application can be referenced by the specific forms in table 5.

Table 5: AIT locators

Locator	Meaning
<code>dvb://current.ait/app_root</code>	The root directory path as found in the application location descriptor for the application.
<code>dvb://current.ait/app_icon</code>	The icon found in the application icons descriptor for the application.

6.3.5 Exit Locator

In the context of some application formats, actioning a link in the defined element, attribute context with the following form of locator shall cause an application to terminate:

`exit:`

The formal specification of the URL is given in the BNF in table 6.

Table 6: Exit locator syntax

<code>exit_url</code>	=	<code>exit_scheme ":" *uric</code>
<code>exit_scheme</code>	=	<code>"exit"</code>

Activating such a link shall request that the application manager move the current application into the Killed state. Any possible characters following the ":" shall be ignored in this version of the present document (see RFC 3986 [14]).

6.3.6 Server Domain

The domain part of an application format specific locator shall be one of:

- The domain name of the server that served the document if it can be identified.
- An empty string ("") for a page with a "dvb:" locator.

NOTE: Such pages cannot therefore be in the same domain as any page delivered via http.

- Null otherwise.

6.4 EPG, BCG and ESG Specific Locators

6.4.1 DVB Event Constraint

For use in EPGs and ESGs, the `dvb_event_constraint` shall be encoded as defined in table 7.

Table 7: EPG/BCG/ESG specific DVB URL syntax

dvb_event_constraint	=	event_id_mode tva_id_only_mode time_constraint
event_id_mode	=	" ; " event_id [" ; " TVA_id] [time_constraint]
tva_id_only_mode	=	" ; ; " TVA_id [time_constraint]
time_constraint	=	" ~ " time_duration
TVA_id	=	1*hex
time_duration	=	start_time " - - " duration
start_time	=	date "T" time "Z"
duration	=	"PT" hours "H" minutes "M" [seconds "S"]
date	=	year month day
time	=	hours minutes [seconds]
year	=	digit digit digit digit
month	=	digit digit
day	=	digit digit
hours	=	digit digit
minutes	=	digit digit
seconds	=	digit digit

The format of the time_duration string is compatible with ISO/IEC 8601 [10]. Note that the time and duration fields must be separated by two "-" characters rather than by "/" (see clause 5.5.2 in [11]).

EXAMPLE: 20060908T091500Z—PT00H30M00S

Use of the "Z" qualifier is mandatory, indicating that the start time of the programme is defined with respect to UTC.

6.4.2 Restrictions of EPG, BCG and ESG Specific Locators

When referencing a DVB service, the DVB locator shall be restricted like so:

- dvb : //<original_network> . [<transport_stream>] . <service_id>

When referencing an item of content the DVB locator shall be restricted to any of the following:

- To reference an item of content via an event_id carried in EIT:
dvb : //<original_network_id> . [<transport_stream>] . <service_id> ; <event_id> [~time_duration]
- To reference an item of content via a TVA_id carried in EIT:
dvb : //<original_network_id> . [<transport_stream>] . <service_id> ; ; <TVA_id> [~time_duration]
- To reference an item of content via a TVA_id carried in PES:
dvb : //<original_network_id> . [<transport_stream>] . <service_id> . <component_tag> ; ; <TVA_id> [~time_duration]
- To reference an item of content via both, an event id and a TVA_id carried in EIT:
dvb : //<original_network_id> . [<transport_stream>] . <service_id> ; <event_id> ; <TVA_id> [~time_duration]
- To reference an item of content via both, an event id and a TVA_id carried in PES:
dvb : //<original_network_id> . [<transport_stream>] . <service_id> . <component_tag> ; <event_id> ; <TVA_id> [~time_duration]
- To reference an item of content by its scheduled time for broadcast:
dvb : //<original_network_id> . [<transport_stream>] . <service_id> ~time_duration

6.4.3 Locators in Metadata

A metadata fragment may contain a DVB locator referencing a file in an object carousel. When this occurs and the file is delivered in the same object carousel as the metadata service delivering the metadata fragment, the following syntax may be used for the DVB locator:

- `dvb : <path-absolute>`

This path shall be interpreted as being an absolute path, that is one that is relative to the ServiceGateway for the object carousel carrying the metadata service.

If a metadata fragment references a file delivered in a different object carousel to the metadata service delivering that metadata fragment, the following syntax shall be used for the DVB locator:

- `dvb : //<original_network_id> . [<transport_stream_id>] . <service_id> . <component_tag> { &<component_tag> } [$ <dvb_carousel_id>] <path-absolute>`

6.5 Resolution

When resolving references to a DVB service, the numeric identifiers `original_network_id`, `transport_stream_id` and `service_id`, if present, shall be matched against the corresponding fields in the SDT.

When resolving references to a transport stream, the numeric identifiers `original_network_id` and `transport_stream_id` shall be matched against the corresponding fields in the NIT.

7 The "urn:dvb" Scheme

In RFC 5328 [11], DVB defines a specific Uniform Resource Name (URN) scheme which provides a general naming mechanism intended to uniquely identify DVB Schemas and Classification Schemes.

7.1 Management of the "urn:dvb" URL Scheme

Table 8 defines the structure for metadata definitions within the "urn:dvb" namespace RFC 5328 [11]. A register of assigned DVB URNs can be found in [i.7].

Table 8: URN Namespace Management

URN	Description
<code>urn:dvb:metadata</code>	Root of all DVB metadata URNs
<code>urn:dvb:metadata:schema</code>	All DVB generic schemas
<code>urn:dvb:metadata:cs</code>	All DVB classification schemes
<code>urn:dvb:metadata:xxx</code>	DVB Schemas organised by application area ("xxx" replaced by application designation as registered with the DVB Project Office)

7.2 "urn:dvb" Syntax and Naming Convention

All URNs in the "urn:dvb" namespace shall be composed according to table 9 and shall be registered in TR 102 679 [i.7].

Table 9: urn:dvb Naming Convention

dvb_urn	=	"urn:dvb:metadata:" (classification_scheme schema) ":" year ["-" revision]
classification_scheme	=	"cs:" cs_name
cs_name	=	string "CS"
schema	=	[application_designation ":"] (mixed_case+ ":") * mixed_case+
application_designation	=	lower_case+
year	=	digit digit digit digit
revision	=	digit+
digit	=	"0" "1" "2" "3" "4" "5" "6" "7" "8" "9"
lower_case	=	"a" ... "z"
upper_case	=	"A" ... "Z"
mixed_case	=	lower_case upper_case

Annex A (informative): Bibliography

IETF RFC 791: "Internet Protocol".

NOTE: See <http://www.faqs.org/rfcs/rfc791.html>

IETF RFC 1737 (December 1994): "Functional Requirements for Uniform Resource Names", K. Sollins/L. Masinter.

NOTE: Available at <http://www.faqs.org/rfcs/rfc1737.html>.

IETF RFC 1738 (December 1994): "Uniform Resource Locators (URL)", T. Berners-Lee/L. Masinter/M. McCahill (Editors).

NOTE: Available at <http://www.faqs.org/rfcs/rfc1738.html>.

IETF RFC 2396 (August 1998): "Uniform Resource Identifiers (URI): Generic Syntax", T. Berners-Lee/R. Fielding/L. Masinter.

NOTE: Available at <http://www.faqs.org/rfcs/rfc2396.html>.

IETF RFC 2717 (November 1999): "Registration Procedures for URL Scheme Names", R. Petke/I. King.

NOTE: Available at <http://www.faqs.org/rfcs/rfc2717.html>.

IETF RFC 2718 (November 1999): "Guidelines for new URL Schemes", L. Masinter/H. Alvestrand/D. Zigmond/R. Petke.

NOTE: Available at <http://www.faqs.org/rfcs/rfc2718.html>.

IETF RFC 2732 (December 1999): "Format for Literal IPv6 Addresses in URL's", R. Hinden/B. Carpenter/L. Masinter.

NOTE: Available at <http://www.faqs.org/rfcs/rfc2732.html>.

IETF RFC 3305 (August 2002): "Report from the Joint W3C/IETF URI Planning Interest Group: Uniform Resource Identifiers (URIs), URLs, and Uniform Resource Names (URNs): Clarifications and Recommendations", M. Mealling/R. Denenberg (Editors).

NOTE: Available at <http://www.faqs.org/rfcs/rfc3305.html>.

ETSI TS 102 323: "Digital Video Broadcasting (DVB); Carriage and signalling of TV-Anytime information in DVB transport streams".

History

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