



ENGLISH TRANSLATION

**EXCHANGE FORMAT OF THE DIGITAL
CLOSED CAPTION FILE FOR DIGITAL
TELEVISION BROADCASTING SYSTEM**

(Second Generation)

ARIB STANDARD

ARIB STD-B69 Version 1.1

Version 1.1 March 24, 2017

Association of Radio Industries and Businesses

General Notes to the English Translation of ARIB Standards and Technical Reports

1. Notes on Copyright

- The copyright of this document is ascribed to the Association of Radio Industries and Businesses (ARIB).
- All rights reserved. No part of this document may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, without the prior written permission of ARIB.

2. Notes on English Translation

- ARIB Standards and Technical Reports are usually written in Japanese. This document is a translation into English of the original document for the convenience of convenience of users. If there are any discrepancies in the content, expressions, etc. between the original document and this translated document, the original document shall prevail.
- ARIB Standards and Technical Reports, in the original language, are made publicly available through web posting. The original document of this translation may have been further revised and therefore users are encouraged to check the latest version at an appropriate page under the following URL:
<http://www.arib.or.jp/english/index.html>.

Foreword

The Association of Radio Industries and Businesses (ARIB) investigates and summarizes the basic technical requirements for various radio systems in the form of “ARIB Standards”. These standards are developed with the participation of and through discussions amongst radio equipment manufacturers, telecommunication operators, broadcasting equipment manufacturers, broadcasters and users.

ARIB Standards include “government technical regulations” (mandatory standard) that are set for the purpose of encouraging effective use of frequency and preventing interference with other spectrum users, and “private technical standards” (voluntary standards) that are defined in order to ensure compatibility and adequate quality of radio equipment and broadcasting equipment as well as to offer greater convenience to radio equipment manufacturers, telecommunication operators, broadcasting equipment manufacturers, broadcasters and users.

This ARIB Standard is developed for the digital closed caption file Exchange Format (2nd Generation) in digital television broadcasting. In order to ensure fairness and transparency in the defining stage, the standard was set by consensus at the ARIB Standard Assembly with the participation of both domestic and foreign interested parties from radio equipment manufacturers, telecommunication operators, broadcasting equipment manufacturers, broadcasters and users.

ARIB sincerely hopes that this ARIB Standard will be widely used by radio equipment manufacturers, telecommunication operators, broadcasting equipment manufacturers, broadcasters and users.

NOTE:

Although this ARIB Standard contains no specific reference to any essential Industrial Property Rights relating thereto, the holders of such Essential Industrial Property Rights state to the effect that the rights listed in the Attachment 1 and 2, which are the Industrial Property Rights relating to this standard, are held by the parties also listed therein, and that to the users of this standard, in the case of Attachment 1, such holders shall not assert any rights and shall unconditionally grant a license to practice such Industrial Property Rights contained therein, and in the case of Attachment 2, the holders shall grant, under reasonable terms and conditions,

a non-exclusive and non-discriminatory license to practice the Industrial Property Rights contained therein. However, this does not apply to anyone who uses this ARIB Standard and also owns and lays claim to any other Essential Industrial Property Rights of which is covered in whole or part in the contents of the provisions of this ARIB Standard.

Contents

Chapter 1: General Terms	1
1.1 Objective	1
1.2 Scope	1
1.3 References	1
1.3.1 Normative references	1
1.3.2 Informative references	1
1.4 Definition of Terms	2
1.4.1 Definition	2
1.4.2 Abbreviation	3
Chapter 2: ARIB-TTML Closed caption Data	4
2.1 Filename	4
2.2 Data recording format of program	5
2.2.1 Recording of programs.....	5
2.2.2 Available character codes.....	6
2.2.2.1 Character encoding method	6
2.2.2.2 Character type	6
2.2.3 Namespace.....	6
2.2.4 Program division	6
2.2.5 Available expressions of closed caption page	6
2.2.6 Storing of closed caption file exchange information	7
2.3 Program management information	
(arib-ttp:ProgramManagementInformation element)	8
2.3.1 Closed caption data label (arib-ttp:CaptionDataLabel element).....	9
2.3.2 Program title (arib-ttp:ProgramTitle element)	11
2.3.3 Program Subtitle (arib-ttp:ProgramSubTitle element)	11
2.3.4 Production station (arib-ttp: ProductionStation element)	11
2.3.5 Material number (arib-ttp:MaterialCode element)	12
2.3.6 Material type (arib-ttp:MaterialType element)	12
2.3.7 Registration Mode (arib-ttp:RegistrationMode element).....	12
2.3.8 Total number of pages (arib-ttp:NumberOfPages element).....	13
2.3.9 Presence or absence of untime (arib-ttp:Untime element)	13
2.3.10 RT (real time) Timing type (arib-ttp:RTTimingType element).....	14
2.3.11 Initial time (arib-ttp:InitialTime element)	15
2.3.12 Available media (arib-ttp:AvailableMedia element).....	15
2.3.13 Available video (arib-ttp:AvailableVideoTypes element).....	16

2.3.14	Valid period (arib-ttex:ValidPeriod element).....	18
2.3.15	Creator / creation agency (arib-ttex:Creator element).....	18
2.3.16	Creation date (arib-ttex:CreationDate element).....	18
2.3.17	Air information (arib-ttex:AirInformation element).....	19
2.3.18	Memo (arib-ttex:Memo element).....	27
2.3.19	Completion flag (arib-ttex:CompletionFlag element)	27
2.4	Page management information (arib-ttex:PageManagementInformation element)	28
2.4.1	Page material type (arib-ttex:MaterialType element).....	29
2.4.2	Playout timing type (arib-ttex:PlayoutTimingType element)	29
2.4.3	Clear screen (arib-ttex:ClearScreenFlag element)	30
2.4.4	Designate page deletion (arib-ttex>DeleteFlag element)	30
2.4.5	Memo (arib-ttex:Memo element)	31
2.4.6	Page completion mark (arib-ttex:CompletionFlag element)	31
2.5	Transmission information (arib-ttex:TransmissionInformation element)	31
2.5.1	Additional identification information	
	(arib-ttex:AdditionalAribSubtitleInfo element)	34
2.5.1.1	Closed caption identification tag (arib-ttex:subtitle_tag element).....	35
2.5.1.2	Language code (arib-ttex:ISO_639_language_code element)	36
2.5.1.3	Closed caption type (arib-ttex:type element)	36
2.5.1.4	Closed caption description method identification (arib-ttex:subtitle_format element).....	37
2.5.1.5	Operation mode (arib-ttex: OPM element).....	37
2.5.1.6	Time control mode (arib-ttex: TMD element).....	38
2.5.1.7	Display mode (arib-ttex: DMF element).....	40
2.5.1.8	Display resolution (arib-ttex: resolution element).....	40
2.5.1.9	Compression method (arib-ttex:compression_type element).....	41
2.5.2	Transmission unit information (arib - ttex:Transmission Units element).....	42
Commentary 1	Type of closed caption	48
Commentary 2	Structure of ARIB-TTML closed caption file exchange	49
Commentary 3	XML diagram	53
1	Element symbol.....	53
2	Model symbol	53
Commentary 4	Transmission timing type.....	54
1	Sending timing and erasing timing	54
2	Priority of sending	57
Commentary 5	Extensibility to communication service	58
Annex 1	Description example of ARIB-TTML closed caption file exchange	59

Annex 2	Guidelines for converting digital closed captions to ARIB-TTML captions	63
1	Object	63
2	Display position	63
3	Character encoding	63
4	Character size	63
5	Display section	64
6	Layout transformation.....	64
7	Format	64
7.1	Color designation	66
7.2	Polarity reversal	66
7.3	Flushing	66
7.4	Underline	66
7.5	Edging	66
7.6	Enclosure.....	66
7.7	Scroll	67
7.8	Rubi.....	67
7.9	Horizontal writing, vertical writing	67
8	Erase screen	67
9	File exchange format	69
9.1	Closed caption data label.....	69
9.2	Program management information.....	69
9.3	Page management information	72
9.4	Setting transmission information	73
Annex 3	Desirable description example	74
1	Example of description by page	74
2	Description example for extracting ARIB-TTML document on page unit.....	75
Annex 4	Closed caption display area	76

Chapter 1: General Terms

1.1 Objective

This standard defines the exchange format of digital closed caption data files for digital television broadcasting compatible with the closed caption broadcasting system by second generation multimedia encoding system in digital broadcasting defined as the Japanese standard system.

1.2 Scope

This standard is applied in common to all closed caption data files created in accordance with ARIB standard STD-B62 "Multimedia Coding Specification for Digital Broadcasting (Second Generation)"

1.3 References

1.3.1 Normative references

The following standards cite some of the matters specified in the document in this standard.

- (1) ARIB STD-B60 "MMT-Based Media Transport Method in Digital Broadcasting Systems"
- (2) ARIB STD-B62 "Multimedia Coding Specification for Digital Broadcasting (Second Generation)"

1.3.2 Informative references

Related standard are as follows.

- (1) ARIB STD-B36 "Exchange Format of the Digital Closed Caption File for Digital Television Broadcasting System"
- (2) ARIB TR-B4 "Safety Zone for 16:9 Aspect Ratio Television Systems"
- (3) ARIB TR-B39 "Operational Guidelines for Advanced Digital Satellite Broadcasting"

1.4 Definition of Terms

1.4.1 Definition

In this standard, the following terms are defined

Term	Definition
ARIB-TTML closed caption	Digital closed caption file interchange format in the second generation digital television broadcasting in which information necessary for closed caption file exchange is added to the closed caption file of ARIB-TTML document stipulated in STD-B62.
DRCS	A method of transmitting of external character data by bitmap in digital closed caption.
Language type	Number that identifies multiple languages in material number, 1: first language, . . . 8: eighth language.
Closed caption	Characters such as actor's lines displayed on the screen in synchronization with the video.
Closed caption data	Character information such as actor's lines displayed on the screen in synchronization with the video, and management information collectively.
Closed caption page	Transmission unit (corresponding to one page) of closed caption data transmitted by one MPU.
Material number	Management code attached to each program.
Digital closed caption	Digital closed caption file interchange format for digital television broadcast regulated by STD-B36.
Program management information	Operation information (program name, broadcast date, etc.) related to closed caption program.
Display format	Format for identifying the display density of the screen, such as 8K or 4K.
Page	Unit of closed caption one screen.
Page management information	Management information for each page (page material type, erase screen, etc.)

1.4.2 Abbreviation

AIFF	Audio Interchange File Format
AIFF-C	Audio Interchange File Format – Compressed
DRCS	Dynamically Re-definable Character Sets
MFU	Media Fragment Unit
MMT	MPEG Media Transport
MPU	Media Processing Unit
PNG	Portable Network Graphics
SMPTE	Society of Motion Picture & Television Engineers
SMPTE-TT	SMPTE - Timed Text
SVG	Scalable Vector Graphics
TTML	Timed Text Markup Language
UCS	Universal multiple-octet coded Character Set
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
WOFF	Web Open Font Format

Chapter 2: ARIB-TTML Closed caption Data

In this chapter, define the exchange format of closed caption data created in accordance with ARIB standard STD-B62 " Multimedia Coding Specification for Digital Broadcasting (Second Generation)" In An ARIB-TTML document describing closed caption data defined by STD-B62 it adds an extended closed caption file exchange format to an ARIB-TTML document describing closed caption data is called an ARIB-TTML caption.

2.1 Filename

The filename of ARIB-TTML captions shall be the management code to be attached to each program (Material), and it is described as the combination of the material number specified in the program management information ,the display format code and language type specified in Table 2-1, and the extension which are connected with ".".

Each file name of external characters, images, and sounds are the combination of the same material number and display format code and language type as the ARIB - TTML caption file to be referenced, the file identifier specified in Table 2-2 and the serial number of three digits, and it expresses by connecting the extension with ".".

The material number shall be half-width alphanumeric characters (upper case letters, lower case letters), underscore (_), full-width (shift JIS) and shall be up to 27 characters..

The language type is a number for identifying multiple languages with one material number, 1: first language,... 8: eighth language. The extension of each file is shown in Table 2-3.

Table 2-1 Display format code

Display format code	Display format	Size of caption display area
2K	1920 x 1080	Horizontal 1920 x Vertical 1080
4K	3840 x 2160	Horizontal 3840 x Vertical 2160
8K	7680 x 4320	Horizontal 7680 x Vertical 4320

Table 2-2 File identifier

File type	File Identifier
external character File	F
Image file	I
Audio file	A

Table 2-3 File identifier

File type		Suffix
Closed caption	ARIB-TTML Caption file	ttml
External character	SVG file	svg
	WOFF file	woff
Image	PNG file	png
	SVG file	svg
Audio (Additional sound / Built-in sound)	AIFF-C file	aiff
	MP3 file	mp3
	MPEG-2 AAC file	aac
	MPEG-4 AAC file	aac

Example) ARIB-TTML caption file of material number A1234567

In case of the first language 8K material: A1234567.8K1.ttml

In case of the second language 4K material: A1234567.4K2.ttml

Example) Reference source ARIB-TTML Filename A1234567.8K1.ttml of caption file.

In case of the first specified external character file (SVG file): A1234567.8K1.F001.svg

In case of the third specified image file (PNG file): A1234567.8K1.I003.png

2.2 Data recording format of program

2.2.1 Recording of programs

Material files of the same program are all recorded under the same directory.

However, in case of using external files such as external character files, image files, audio files, etc., create directories shown in Table 2-4 directly below the directories and save them. Further, by dividing directories into program units, it is possible to record the material files of multiple programs on a single recording medium by dividing directories into program units.

Table 2-4 Directory name

File type	Directory name
External character file	font
Image file	image
Audio file	sound

2.2.2 Available character codes

2.2.2.1 Character encoding method

The character encoding method of ARIB-TTML caption is the character encoding method defined in Chapter 3, Part 3, Volume 1 STD-B62.

2.2.2.2 Character type

The character type used in ARIB - TTML caption is the character type defined in Chapter 3 of Part 3, Volume 1 STD-B 62.

2.2.3 Namespace

Use the namespace defined in Chapter 3, Part 3, Volume 1 STD-B62.

For the elements and attributes extended by this standard, use the prefix `arib-ttpex:` shown in Table 2-5.

Table 2-5 Namespace

Name	Prefix	Namespace
ARIB CaptionExchangeInformation	<code>arib-ttpex:</code>	<code>http://www.arib.or.jp/ns/arib-ttpmlex/v1_0</code>

2.2.4 Program division

A closed caption material file related to a program should not be divided into multiple recording media. Therefore, it is necessary to select recording media capable of storing all material files of the same program.

2.2.5 Available expressions of closed caption page

In closed caption data composed of plural pages in ARIB-TTML document, **p** elements and **div** elements for all pages are described under the **div** element immediately below **body** element, or **div** elements immediately below **body** element are used as page units are described repetitively. The image of the expression is shown in Table 2-6.

Table 2-6 Expressions of closed caption page

Description of all pages under the div element directly under the body element	
<pre> <body> <div> <p xml:id="p001"region="r001-01" begin="00:01:00.000">A B C D E</p> <p xml:id="p002-01"region="r002-01" begin="00:01:10.000">F G H I J</p> <p xml:id="p002-02"region="r002-02" begin="00:01:10.000">K L M N O</p> </div> </body> </pre>	
	1st page
	2nd page
Repeatedly describe the div element as page unit directly under the body element	
<pre> <body> <div xml:id="p001"begin="00:01:00.000"> <p region="r001-01" >A B C D E</p> </div> <div xml:id="p002"begin="00:01:10.000"> <p region="r002-01" begin="00:01:10.000">F G H I J</p> <p region="r002-02" begin="00:01:10.000">K L M N O</p> </div> </body> </pre>	
	1st page
	2nd page

2.2.6 Storing of closed caption file exchange information

In the metadata element of ARIB-TTML document stipulated in STD-B62 Volume1, Part3, Chapter3, only one arib-ttex: CaptionExchangeInformation element is placed, enabling the description of closed caption exchange information.

Figure 2-1 shows the document structure of ARIB-TTML caption including closed caption exchange information.

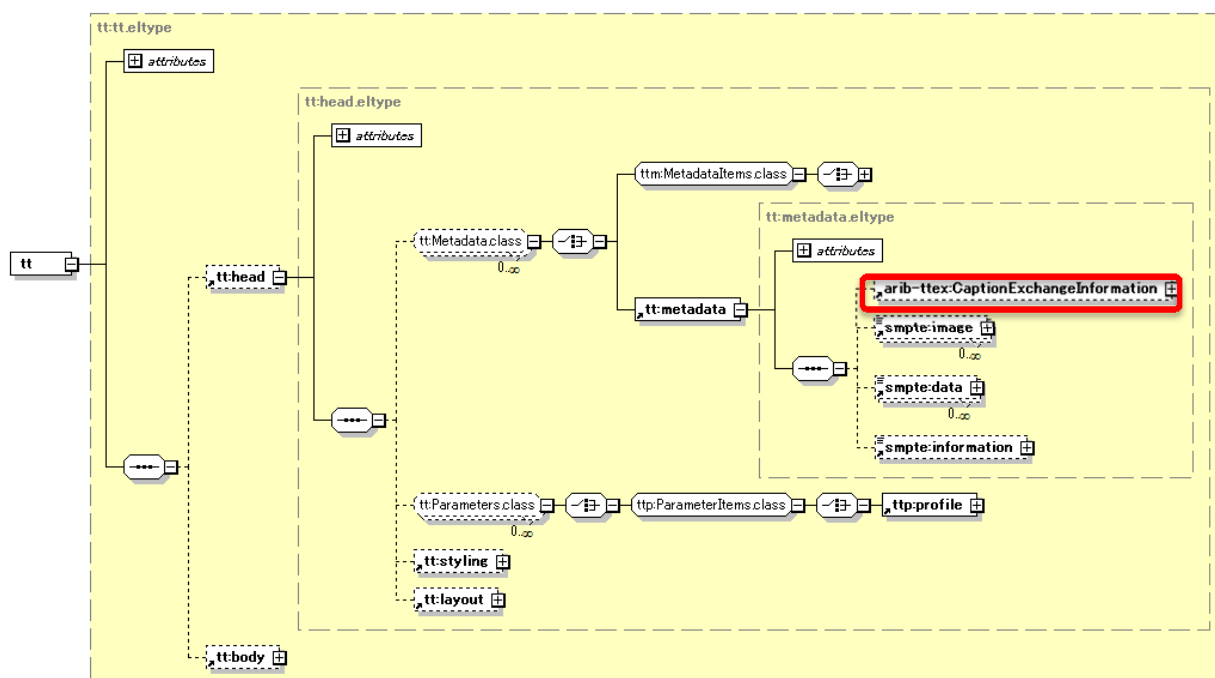


Figure 2-1 Document structure of ARIB-TTML caption including closed caption exchange information

arib-ttex:CaptionExchangeInformation element is composed of a program name using ARIB-TTML caption and a material number (program code) element indicating a management code of the program / material, arib-ttex:ProgramManagementInformation element which holds management information on programs such as broadcast date and time, an arib-ttex:PageManagementInformation element which holds management information for each page of closed caption material, and an arib-ttex:TransmissionInformation element which holds information necessary for transmitting arib-TTML caption document.

These elements can be placed only one each in arib-ttex:CaptionExchangeInformation element. The structure of arib-ttex:CaptionExchangeInformation element is shown in Figure 2-2. If each element is omitted, it is regarded as unset.

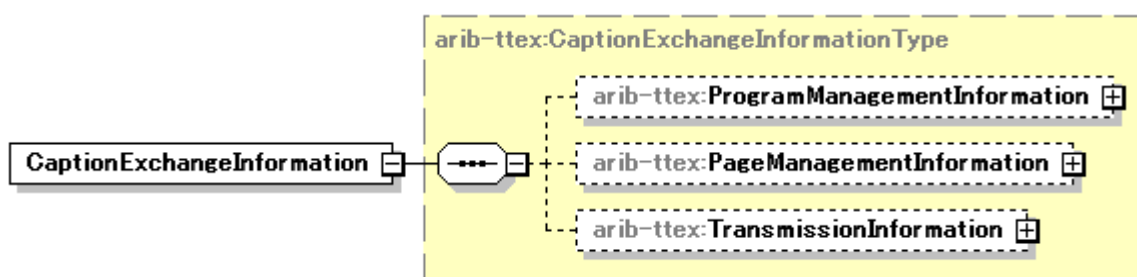


Figure 2-2 Structure of arib-ttex:CaptionExchangeInformation element

2.3 Program management information (arib-ttex:ProgramManagementInformation element)

The program management information is operation information to be added to the existing program, and as shown in 2.2.6, arib-ttex:Program ManagementInformation element is placed and described under arib-ttex:CaptionExchangeInformation element. The structure of the arib-ttex:ProgramManagementInformation element is shown in Figure 2-3.

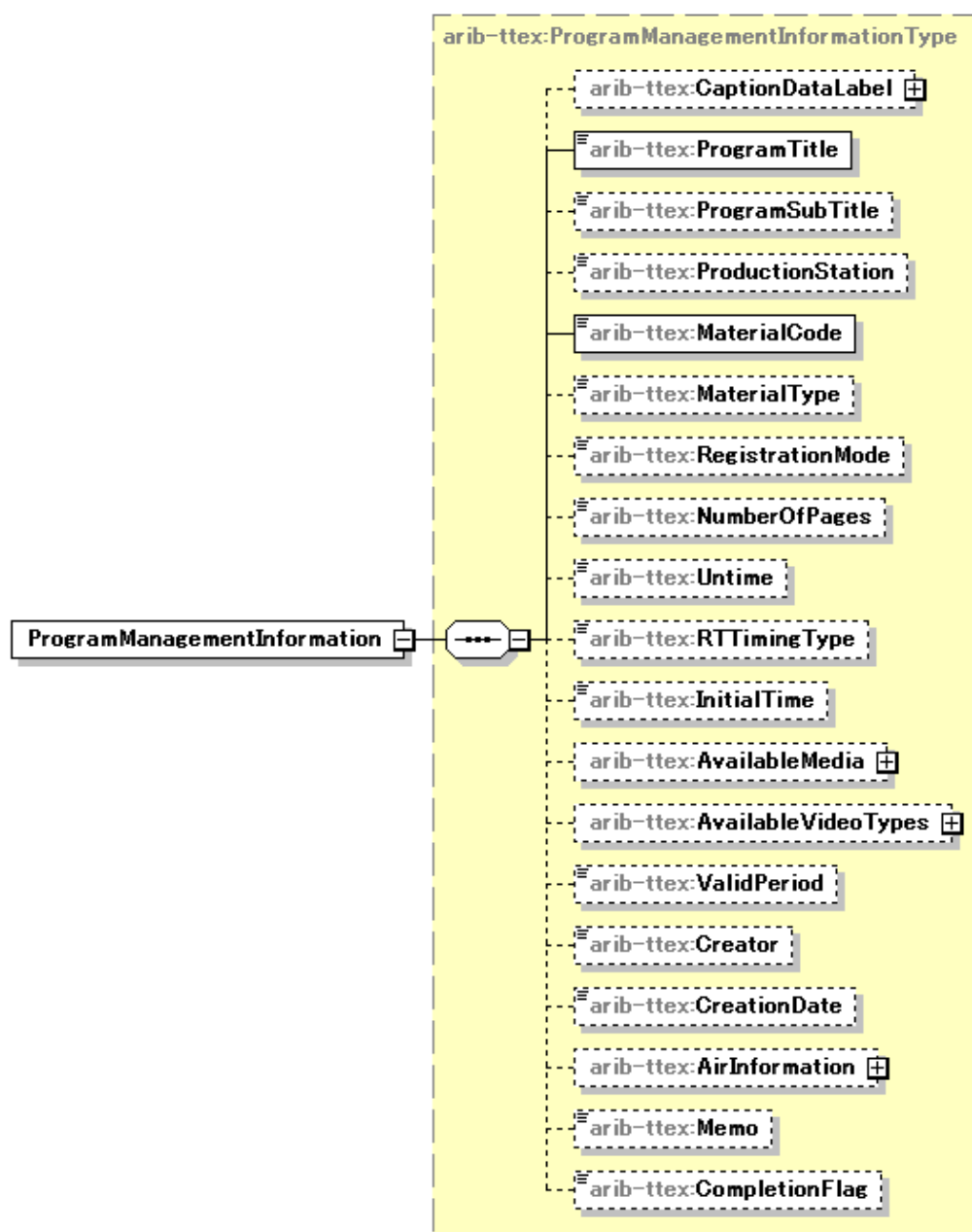


Figure 2-3 Structure of `arib-ttex:ProgramManagementInformation` element

2.3.1 Closed caption data label (`arib-ttex:CaptionDataLabel` element)

`arib-ttex:CaptionDataLabel` element is an element for specifying closed caption data label, and only one can be placed. `arib-ttex:Medium` element under the element is placed and the corresponding media of ARIB-TTML caption material and the corresponding closed caption

material to be converted to ARIB-TTML captions are specified. The syntax of `arib-ttex:CaptionDataLabel` element is shown in Table 2-7, and the document structure is shown in Figure 2-4. Table 2-8 shows possible values of `arib-ttex:Medium` element, and Table 2-9 shows description examples. If this element is omitted (or empty element), it is regarded as unset (null value).

Table 2-7 `arib-ttex:CaptionDataLabel` Element Syntax

```
<xsd:element name="CaptionDataLabel" type="arib-ttex:CaptionDataLabelType"/>

<xsd:complexType name="CaptionDataLabelType">
  <xsd:sequence>
    <xsd:element name="Medium" type="xsd:string" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
```

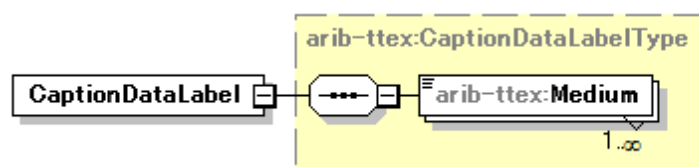


Figure 2-4 Structure of `arib-ttex:CaptionDataLabel` Element

Table 2-8 Supported media

Value	Meaning
DCAPTION	Caption data for terrestrial digital
BCAPTION	Caption data for BS / CS digital
MCAPTION	Caption data for mobile phone
UCAPTION	Caption data for advanced broadband satellite digital broadcasting
NCAPTION	Caption data for communication

Table 2-9 Description example of `arib-ttex:CaptionDataLabel` element

```
<arib-ttex:CaptionDataLabel>
  <arib-ttex:Medium>UCAPTION</arib-ttex:Medium>
```

<code></arib-rtex:CaptionDataLabel></code>
--

2.3.2 Program title (arib-rtex:ProgramTitle element)

arib-rtex:ProgramTitle element is an element for designating a program (material) name, and only one can be placed. Element value can specify arbitrary character string by the characters type shown in 2.2.2.2, and the maximum value is 40 characters. The syntax of arib-rtex:ProgramTitle element is shown in Table 2-10.

Table 2-10 Syntax of arib-rtex:ProgramTitle element

<code><xsd:element name="ProgramTitle" type="xsd:string"/></code>

2.3.3 Program Subtitle (arib-rtex:ProgramSubTitle element)

arib-rtex:ProgramSubTitle element is an element for specifying the program closed caption name, and only one can be placed. Element value can specify arbitrary character string by the characters type shown in 2.2.2.2, and the maximum value is 40 characters. The syntax of arib-rtex:ProgramTitle element is shown in Table 2-11.

If this element is omitted (or empty element), it is regarded as unset (null value).

Table 2-11 Syntax of arib-rtex:ProgramTitle element

<code><xsd:element name="ProgramSubTitle" type="xsd:string" minOccurs="0"/></code>
--

2.3.4 Production station (arib-rtex: ProductionStation element)

arib-rtex:ProductionStation element is an element for designating the abbreviation of the institution that issued the "material number" designated in 2.3.5, and only one can be placed. The element value is up to 6 characters and only in half-width alphanumeric characters (uppercase letters, lowercase letters), half-width hyphens (-), single-byte ampersand (&) can be used. The syntax of arib-rtex:ProductionStation element is shown in Table 2-12. If this element is omitted (or empty element), it is regarded as unset (null value).

Table 2-12 Syntax of arib-rtex:ProductionStation element

```
<xsd:element name="ProductionStation" type="xsd:string" minOccurs="0" />
```

2.3.5 Material number (arib-rtex:MaterialCode element)

arib-rtex:MaterialCode element is an element for designating a management code to be attached to a program (material) unit, and one must be placed. The element value is the same as the material number given to "File name". The element value is up to 27 characters and only in half-width alphanumeric characters, half-size underscore (_), full width can be used.

The syntax of arib-rtex:MaterialCode element is shown in Table 2-13.

Table 2-13 Syntax of arib-rtex: MaterialCode element

```
<xsd:element name="MaterialCode" type="xsd:string"/>
```

2.3.6 Material type (arib-rtex:MaterialType element)

arib-rtex:MaterialType element is an element for designating classification of programs (materials), and only one can be placed. The syntax of arib-rtex: MaterialType element is shown in Table 2-14, and possible values are shown in Table 2-15. If this element is omitted, it is regarded as unset (null value).

Table 2-14 Syntax of arib-rtex: MaterialType element

```
<xsd:element name="MaterialType" type="xsd:string" minOccurs="0"/>
```

Table 2-15 Material type

Value	Meaning
Program	Material composed of main part and CM
Main part	Material composed only of main part
CM	Material composed only of CM

2.3.7 Registration Mode (arib-rtex:RegistrationMode element)

arib-rtex:RegistrationMode element is an element for designating a mode to be registered in

the closed caption data server, and only one element can be placed. The syntax of arrib-ttex:RegistrationMode element is shown in Table 2-16, and the possible values are shown in Table 2-17. If this element is omitted, it is regarded as N (New registration).

Table 2-16 Syntax of arrib-ttex:RegistrationMode element

<xsd:element name="RegistrationMode" type="xsd:string" minOccurs="0"/>
--

Table 2-17 Registration mode

Value	Meaning
N	New registration: Registration of a program (material) using unregistered "material number"
R	Renewal registration: Register by program (material) by using already registered "material number"
A	Change registration : Registration that changes, adds, and deletes a part of the content of the program (material) by using "already registered" material number.

2.3.8 Total number of pages (arrib-ttex:NumberOfPages element)

arrib-ttex:NumberOfPages element is an element for storing the total number of pages, and only one can be placed. Element values are integers from 1 to 4,294,967,295, and only half-width numbers can be used. The number of pages also includes a page that is set to a page deletion (true) by a deletion screen, a page deletion designation of page management information, and a page which is set as a page completion mark to incomplete (false). The syntax of arrib-ttex:NumberOfPages element is shown in Table 2-18. If this element is omitted, it is regarded as unset (null value).

Table 2-18 Syntax of arrib-ttex: NumberOfPages element

<xsd:element name="NumberOfPages" type="xsd:unsignedInt" minOccurs="0"/>
--

2.3.9 Presence or absence of untime (arrib-ttex:Untime element)

arrib-ttex:Untime element is an element for designating whether there is a page ("page to which" UT "is designated in the sending timing type (arrib-ttex: PlayoutTimingType element)) for sending closed caption screens manually , and only one can be placed. The syntax of

arib-ttex:RTTimingType element is shown in Table 2-19, and the possible values are shown in Table 2-20. If this element is omitted, it is assumed to be "false" (no untime).

Table 2-19 Syntax of arib-ttex:Untime element

```
<xsd:element name="Untime" type="xsd:boolean" minOccurs="0"/>
```

Table 2-20 Presence or absence of untime

Value	Meaning
false	absence
true	presence

2.3.10 RT (real time) Timing type (arib-ttex:RTTimingType element)

If "RT" is designated for the transmission timing type (arib-ttex: PlayoutTimingType element), Only one arib-ttex:RTTimingType element can be placed. The syntax of arib-ttex:RTTimingType element is shown in Table 2-21, and the possible values are shown in Table 2-22. If this element is omitted, it is assumed to be "LT" (lap time).

Table 2-21 Syntax of arib-ttex:RTTimingType element

```
<xsd:element name="RTTimingType" type="xsd:string" minOccurs="0"/>
```

Table 2-22 Transmission timing type

Value	Meaning
TC	Time code (in the case where a specific video time code is taken as the start point of closed caption transmission and is taken as the lap time from the time code)
LT	Lap time (in the case where the sending start time of closed captions by the sending facility is set as reference and the lap time is defined from that time)

2.3.11 Initial time (arib-ttex:InitialTime element)

arib-ttex:ProgramManagementInformation element is an element intended to be used when a specific video time code is used as a start point of closed caption transmission, and when previewing closed captions in conjunction with proxy video at the time of producing closed caption data. In arib-ttex: ProgramManagementInformation element only one can be placed. For the element value, a value is specified with the time code in the format of "hh (hours): mm (minutes): ss (seconds) .fff (milliseconds)". The syntax of arib-ttex:InitialTime element is shown in Table 2-23. If this element is omitted (or empty element), it is regarded as unset (null value).

Table 2-23 Syntax of arib-ttex: InitialTime element

<pre><xsd:element name="InitialTime" type="xsd:ttd:timeCoordinate" minOccurs="0"/></pre>
--

2.3.12 Available media (arib-ttex:AvailableMedia element)

ttex:AvailableMedia element is an element for designating the effective medium of the closed caption material, and only one can be placed. arib - ttex:Medium element under the element is placed and designates the effective media of ARIB-TTML closed caption material and the effective media of the source closed caption material to be converted to ARIB - TTML closed captions.

The syntax of arib-ttex:AvailableMedia element is shown in Table 2-24, and the document structure is shown in Figure 2-5. The possible values of arib-ttex:Medium element are shown in Table 2-25, and the description examples are shown in Table 2-26. In case of this element is omitted, it is regarded as unset (null value).

Table 2-24 Syntax of arib-ttex:AvailableMedia element

<pre><xsd:element name="AvailableMedia" type="arib-ttex:AvailableMediaType"/> <xsd:complexType name="AvailableMediaType"> <xsd:sequence> <xsd:element name="Medium" type="xsd:string" minOccurs="1" maxOccurs="unbounded"/> </xsd:sequence> </xsd:complexType></pre>

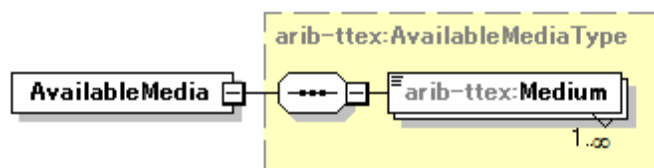


Figure 2-5 Structure of arib-ttp:AvailableMedia element

Table 2-25 Available media

Value	Meaning
Analog	Analog broadcasting
BS	BS digital broadcasting
CS	CS digital broadcasting
Terrestrial D	Terrestrial digital broadcasting
Mobile phone	Terrestrial digital broadcasting Mobile terminal service
UHD	Advanced broadband satellite digital broadcasting
Communication	Communication service

Table 2-26 Example of description of arib-ttp:AvailableMedia element

```

<arib-ttp:AvailableMedia>
  <arib-ttp:Medium>UHD</arib-ttp:Medium>
</arib-ttp:AvailableMedia>

```

2.3.13 Available video (arib-ttp:AvailableVideoTypes element)

Arib-ttp:AvailableVideoTypes element is an element for designating the corresponding image of the closed caption material, and only one can be placed. arib-ttp:VideoType element under the element is placed and designates the corresponding image of ARIB-TTML Smaterial and the compatible image of the source closed caption material to be converted to arib-TTML caption.

The syntax of arib-ttp:AvailableVideoTypes element is shown in Table 2-27, and the document structure is shown in Figure 2-6. The possible values of arib-ttp:VideoType element are shown

in Table 2-28, and the description example is shown in Table 2-29. In case of this element is omitted, it is regarded as unset (null value). In case of available image is 2K, designate HD.

Table 2-27 Syntax of arib-ttex:AvailableVideoTypes element

```
<xsd:element name="AvailableVideoTypes" type="arib-ttex:AvailableVideoTypesType"/>

<xsd:complexType name="AvailableVideoTypesType">
  <xsd:sequence>
    <xsd:element name="VideoType" type="xsd:string" minOccurs="1"
      maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
```

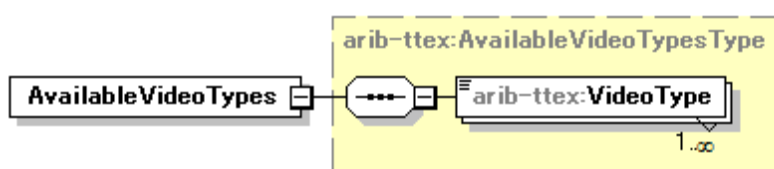


Figure 2-6 Structure of arib-ttex:AvailableVideoTypes element

Table 2-28 Supported images

Value	Meaning
8K	Broadcast screen of 7680 x 4320
4K	Broadcast screen of 3840 x2160
HD	Broadcast screen of 1920 x1080 or 1440 x1080
SD	Broadcast screen of 720 x480
SD wide	Broadcast screen of 16: 9
Mobile phone	Broadcast screen of 320 x180
Other	Images other than the above

Table 2-29 Example of description of arib-ttex:AvailableVideoTypes element

```
<arib-ttex:AvailableVideoTypes>
  <arib-ttex:VideoType>4K</arib-ttex:VideoType>
</arib-ttex:AvailableVideoTypes>
```

2.3.14 Valid period (arib-ttex:ValidPeriod element)

arib-ttex:ValidPeriod element is an element for designating the expiration date (end date) of this closed caption material, and only one can be placed. The element value is designated in the format of YYYY (year) - MM (month) - DD (day). The syntax of arib-ttex:ValidPeriod element is shown in Table 2-30. If this element is omitted, it is regarded as indefinite.

Table 2-30 Syntax of arib-ttex: ValidPeriod element

```
<xsd:element name="ValidPeriod" type="xsd:date" minOccurs="0"/>
```

2.3.15 Creator / creation agency (arib-ttex:Creator element)

arib-ttex:Creator element is an element for designating abbreviations of the creator in charge of creation of ARIB-TTML caption document and the authority to be created, and only one can be placed. An arbitrary character string based on the character type shown in 2.2.2.2 can be designated for the element value, and it is made up to 20 characters. The syntax of arib-ttex:Creator element is shown in Table 2-31. If this element is omitted (or empty element), it is regarded as unset (null value).

Table 2-31 Syntax of arib-ttex:Creator element

```
<xsd:element name="Creator" type="xsd:string" minOccurs="0"/>
```

2.3.16 Creation date (arib-ttex:CreationDate element)

arib-ttex:CreationDate element is an element for designating the last creation date and time of a program (material), and only one can be placed. The element value is designated in the form of YYYY (year) - MM (month) - DD (day) Thh (hour): mm (minute): ss (second). The syntax

of arib-rtex:CreationDate element is shown in Table 2-32. If this element is omitted, it is regarded as unset (null value).

Table 2-32 Syntax of arib-rtex:CreationDate element

<code><xsd:element name="CreationDate" type="xsd:dateTime" minOccurs="0"/></code>

2.3.17 Air information (arib-rtex:AirInformation element)

arib-rtex:AirInformation element is an element for designating broadcast information such as the broadcasting start / end date /day of the week, broadcasting start / end time, and only one can be arranged. Under the element, one or more arib-rtex: AirDate elements are placed and broadcast information is designated. Under arib-rtex:AirDate element there are elements shown in Table 2-33. The syntax of arib-rtex: AirInformation element is shown in Table 2-34, the document structure is shown in Figure 2-7, an example of description is shown in Table 2-35.

Table 2-33 Child element of arib-rtex:AirDate element

Element	Meaning
StartDate	Element that designates the start date of the broadcasting period, and it is necessary to place only one. The element value is designated in YYYY (year) - MM (month) - DD (day) format.
EndDate	Element that designates the end date of the broadcast period, and it can be allocated 0 or more. The element value is designated in YYYY (year) - MM (month) - DD (day) format. If the broadcast date is only one day, designate the same value as the StartDate element, and do not arrange this element if the end date is unknown or not designated.
DayOfWeek	Element that designates the broadcast day of week, and it can be arranged with 0 or more and 7 or less. In the element value, selected from each broadcast day of the week from "Mon" "Tue" "Wed" "Thu" "Fri" "Sat" "Sun" and designated. If this element is omitted (or empty element), it is regarded as unset (null value).

StartTime	Element that designates the start time of the broadcasting time frame, and it can be arranged at 0 or more. The element value is designated in hh (hour): mm (minute): ss (second) format. However, specification after 24 o'clock is also possible. It is also possible to not specify the start time, and if not designated, this element is not placed. In case of this element is an empty element, it is regarded as unspecified.
EndTime	Element that designates the end time of the broadcasting time frame, and it can be placed at 0 or more. The element value is designated in hh (hour): mm (minute): ss (second) format. However, designation after 24 o'clock is also possible. It is also possible not to designate the end time, and if not designated, this element is not placed. In case of this element is an empty element, it is regarded as unspecified.

Table 2-34 Syntax of arib-ttex: AirInformation element

```

<xsd:element name="AirInformation" type="arib-ttex:AirInformationType"/>

<xsd:complexType name="AirInformationType">
  <xsd:sequence>
    <xsd:element name="AirDate" type="arib-ttex:AirDateType" minOccurs="1"
      maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="AirDateType">
  <xsd:sequence>
    <xsd:element name="StartDate" type="xsd:date"/>
    <xsd:element name="EndDate" type="xsd:date" minOccurs="0"/>
    <xsd:element name="DayOfWeek" type="xsd:string" minOccurs="0"
      maxOccurs="7"/>
    <xsd:element name="StartTime" type="xsd:string" minOccurs="0"/>
    <xsd:element name="EndTime" type="xsd:string" minOccurs="0"/>
  </xsd:sequence>
</xsd:complexType>

```

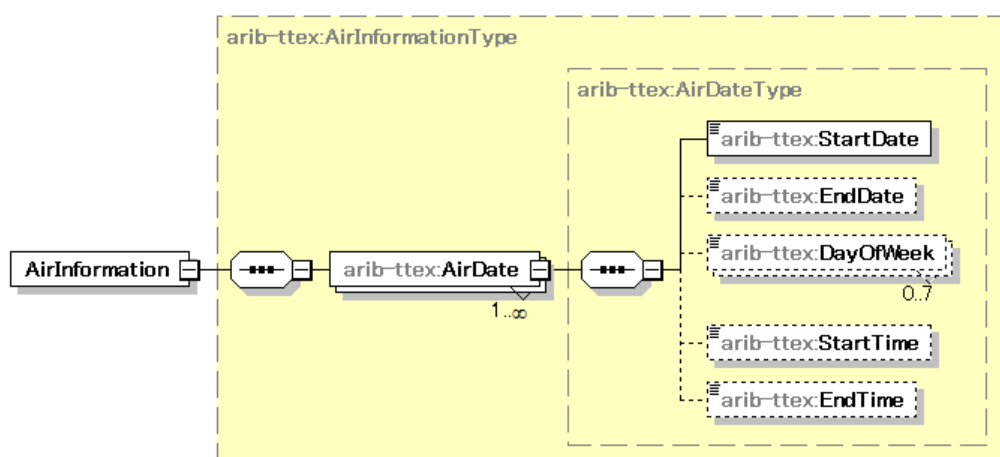


Figure 2-7 Structure of `arib-ttex:AirInformation` element

Table 2-35 Description Example of arib-rtex: AirInformation Element

In case of broadcasting at 8: 00 ~ 8: 15 every Monday, Wednesday and Friday from April 1, 2015 to September 30, 2015

```
<arib-rtex:AirInformation>
```

```
  <arib-rtex:AirDate>
```

```
    <arib-rtex:StartDate>2015-04-01</arib-rtex:StartDate>
```

```
    <arib-rtex:EndDate>2015-09-30</arib-rtex:EndDate>
```

```
    <arib-rtex:DayOfWeek>Monday</arib-rtex:DayOfWeek>
```

```
    <arib-rtex:DayOfWeek>Wednesday</arib-rtex:DayOfWeek>
```

```
    <arib-rtex:DayOfWeek>Friday</arib-rtex:DayOfWeek>
```

```
    <arib-rtex:StartTime>08:00:00</arib-rtex:StartTime>
```

```
    <arib-rtex:EndTime>08:15:00</arib-rtex:EndTime>
```

```
  </arib-rtex:AirDate>
```

```
</arib-rtex:AirInformation>
```

2.3.18 Memo (arib-ttex:Memo element)

arib-ttex:Memo element is an element for designating the notification items and notes, and only one can be placed. An arbitrary character string based on the character type shown in 2.2.2.2 can be designated as the element value. The syntax of arib-ttex:Memo element is shown in Table 2-36. If this element is omitted (or empty element), it is regarded as unset (null value).

Table 2-36 Syntax of arib-ttex:Memo element

<code><xsd:element name="Memo" type="xsd:string" minOccurs="0"/></code>

2.3.19 Completion flag (arib-ttex:CompletionFlag element)

arib-ttex:CompletionFlag element is an element for designating whether ARIB-TTML caption document is completed or under completion in each unit of programs (material), and only one can be placed. The syntax of arib-ttex:CompletionFlag element is shown in Table 2-37, and the possible values are shown in Table 2-38. If this element is omitted, it is regarded as "true" (completed).

Table 2-37 Syntax of arib-ttex:CompletionFlag Element

<code><xsd:element name="CompletionFlag" type="xsd:boolean" minOccurs="0"/></code>
--

Table 2-38 Completion mark

Value	Meaning
false	Under completion
true	Completion

2.4 Page management information (arib-ttex:PageManagementInformation element)

Arib-ttex:PageManagementInformation element is operation information (page management information) added to the page unit of the program, and only one can be placed. Under the element, arib-ttex:PageInfo element for all pages described under the body element must be placed and management information for each page must be designated. In addition, in arib-ttex:PageInfo element, it is also possible to designate the initial value of each page management information item which is common to all pages.

In the page management information designated for each page, the page attribute in arib-ttex:PageInfo element is placed, and the xml:id value of the element to be described as the tt/body/div element in the TTML document, or the xml:id value of all elements to be described as tt/body/div/p elements is designated. Even when there is no management information designated for each page, it is necessary to always output (output empty element).

The aim of the page management information indicating the initial value is to prevent the enlargement of arib-TTML caption file by holding all the management information for each page. In the page management information showing the initial value, arib-ttex:PageInfo element does not have arib-ttex:page attribute and a default attribute having a value of "true" is described, and it can be set only in arib-ttex:PageInfo element that appears first in arib-ttex:PageManagementInformation element. In case of initial value is described, it is possible to place only child elements having different values from common page management information in arib-ttex:PageInfo element for each page.

The structure of arib-ttex:PageManagementInformation element is shown in Figure 2-8.

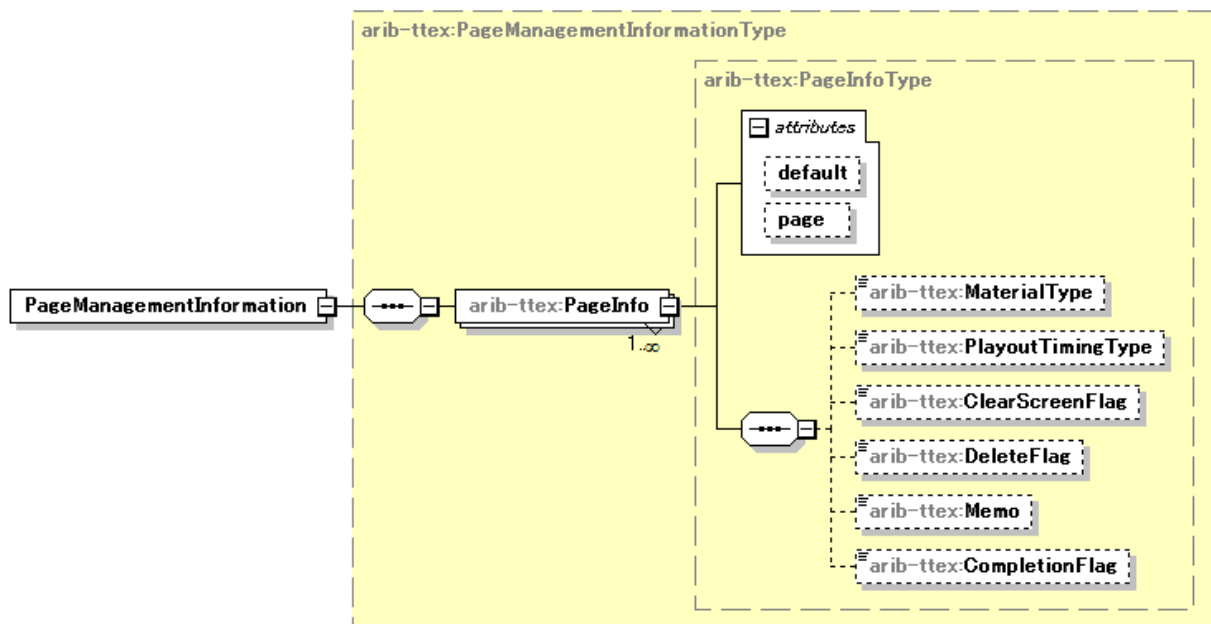


Figure 2-8 Structure of arib-ttex:PageManagementInformation element

2.4.1 Page material type (arib-ttex:MaterialType element)

Arib-ttex:MaterialType element is an element indicating the page material type, and only one can be placed. The syntax of arib-ttex:MaterialType element is shown in Table 2-39, and the possible values are shown in Table 2-40. In case this element is omitted and no initial value is designated, it is regarded as unset (null value).

Table 2-39 Syntax of arib-ttex:MaterialType element

<code><xsd:element name="MaterialType" type="xsd:string" minOccurs="0"/></code>

Table 2-40 Page Material Types

Value	Meaning
Program	Page composed of main part and CM
Main part	Page composed only of main part
CM	Page composed only of CM

2.4.2 Playout timing type (arib-ttex:PlayoutTimingType element)

Arib-ttex:PlayoutTimingType element is an element indicating the transmission timing type, and only one can be placed. The syntax of arib-ttex:PlayoutTimingType element is shown in Table 2-41, and the possible values are shown in Table 2-42. In case of this element is omitted and the initial value is not designated, it is assumed to be "RT" (real time). It is possible to mix a page designating RT (real time) and a page designating UT (untime) in the sending timing type within the same program (material).

Table 2-41 Syntax of arib-ttex:PlayoutTimingType element

<code><xsd:element name="PlayoutTimingType" type="xsd:string" minOccurs="0"/></code>
--

Table 2-42 Transmission timing type

Value	Meaning
RT	Real time (in case of displaying and deleting the video at the time designated in the begin attribute, and the end attribute)
UT	Untime (in case of video start by manual etc.)

2.4.3 Clear screen (arib-ttex:ClearScreenFlag element)

Arib-ttex:ClearScreenFlag element is an element indicating an erased screen, and only one can be placed. The syntax of arib-ttex:ClearScreenFlag element is shown in Table 2-43, and the possible values are shown in Table 2-44. In case of the value of this element is true, the sending facility does not transmit the closed caption text, the still picture and the sound designated on the current page, but sends the erased screen at the sending timing of the current page. In case of this element is omitted and the initial value is not specified, it is regarded as "false" (other than the erase screen).

Table 2-43 Syntax of arib-ttex:ClearScreenFlag element

```
<xsd:element name="ClearScreenFlag" type="xsd:boolean" minOccurs="0"/>
```

Table 2-44 Erase screen

Value	Meaning
true	clear screen
false	Other than clear screen

2.4.4 Designate page deletion (arib-ttex>DeleteFlag element)

Arib-ttex>DeleteFlag element is an element indicating a page deletion designation, and only one can be placed. The syntax of the arib - ttex>DeleteFlag element is shown in Table 2-45, and the possible values are shown in Table 2-4 6. In case of this element is omitted and the initial value is not designated, it is regarded as "false" (except for page deletion).

Table 2-45 Syntax of arib-ttex>DeleteFlag Element

```
<xsd:element name="DeleteFlag" type="xsd:boolean" minOccurs="0"/>
```

Table 2-46 Page delete designation

Value	Meaning
true	Delete page
false	Other than page deletion

2.4.5 Memo (arib-ttex:Memo element)

The arib-ttex:Memo element is an element indicating a note on a page basis, and only one can be placed. arib-ttex: The syntax of the Memo element is shown in Table 2-47. In case of this element is omitted (or empty element) and no initial value is designated, it is regarded as unset (empty value).

Table 2-47 Syntax of arib-ttex:Memo element

<xsd:element name="Memo" type="xsd:string" minOccurs="0"/>
--

2.4.6 Page completion mark (arib-ttex:CompletionFlag element)

Arib-ttex:CompletionFlag element is an element indicating a page completion mark, and only one can be arranged. The syntax of arib-ttex:CompletionFlag element is shown in Table 2-48, and the possible values are shown in Table 2-49. In case of this element is omitted and the initial value is not designated, it is regarded as "true" (completed).

Table 2-48 Syntax of arib-ttex:CompletionFlag Element

<xsd:element name="CompletionFlag" type="xsd:boolean" minOccurs="0"/>

Table 2-49 Page completion mark

T

Value	Meaning
true	completion
false	Under completion

2.5 Transmission information (arib-ttex:TransmissionInformation element)

As defined by Chapter 9 of STD-B 60, closed caption contains data of ARIB-TTML document, image file, audio file, external character file to be presented in a certain time range to the synchronous MPU, closed caption presentation processing is performed in units of MPU. If there are external resources (image files, audio files, external characters) to be referenced from ARIB-TTML document, ARIB-TTML document must always be placed in the first MFU included in the MPU and each MFU must be placed as a subsample of one MFU in the subsequent MFU. Transmission image of ARIB-TTML document is shown in Figure 2-9.

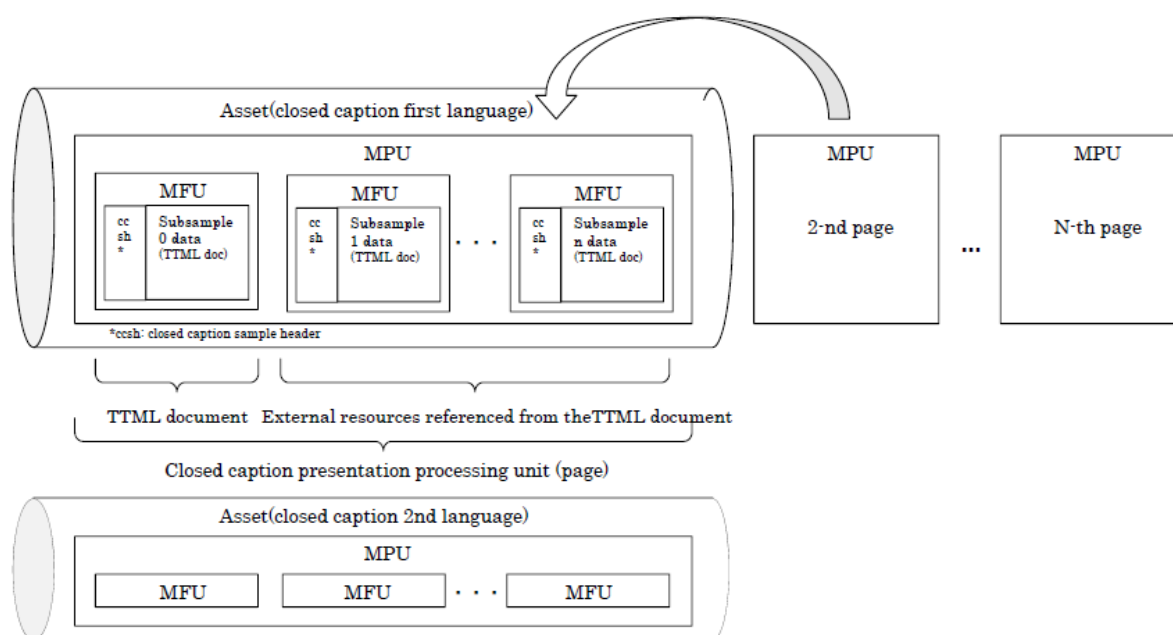


Figure 2-9 Transmission image of ARIB-TTML document

Because ARIB-TTML caption stores closed captions (multiple pages) presented in multiple time ranges, it is expected that transmission processing by MFU and MPU will be easy by holding information for extracting external resources to be referred from page-based ARIB-TTML document and ARIB-TTML document. By holding each value to be stored in "additional identification information of closed caption / superimpose transmission method" of MH-data coding scheme descriptor which is required for transmitting ARIB-TTML document, expect the simplification of closed caption registration processing. Therefore, as shown in 2.2.6, the information necessary for transmitting ARIB-TTML document with the broadcast wave is described by placing `arib-ttex:TransmissionInformation` element under `arib-ttex:CaptionExchangeInformation` element.

The syntax of `arib-ttex:TransmissionInformation` element is shown in Table 2-50, and the document structure is shown in Figure 2-10. It is composed of `arib-ttex:AdditionalAribSubtitleInfo` element and `arib-ttex:TransmissionUnits` element that describes transmission unit information holding MPU/MFU unit information.

Table 2-50 Syntax of `arib-ttex:TransmissionInformation` element

<pre> <xsd:element name="TransmissionInformation" type="arib-ttex:TransmissionInformationType"/> <xsd:complexType name="TransmissionInformationType"> <xsd:sequence> <xsd:element name="AdditionalAribSubtitleInfo" type="arib-ttex:AdditionalAribSubtitleInfoType" minOccurs="0"/> <xsd:element name="TransmissionUnits" type="arib-ttex:TransmissionUnitsType" minOccurs="0"/> </xsd:sequence> </xsd:complexType> </pre>

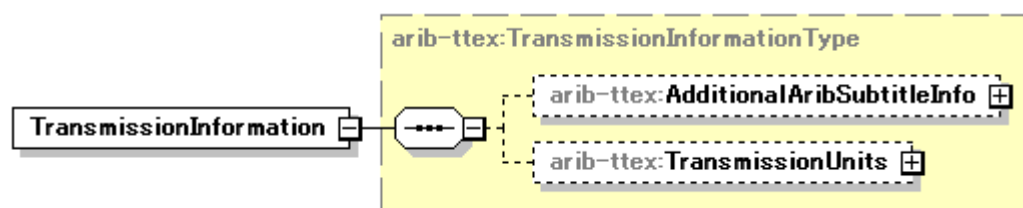


Figure 2-10 Structure of `arib-ttex:TransmissionInformation` element

2.5.1 Additional identification information (arib-ttex:AdditionalAribSubtitleInfo element)

Additional identification information to be stored in the MH-data coding scheme descriptor specified by STD-B60 (Additional_Arib_Subtitle_Info 0) is described under arib-ttex:AdditionalAribSubtitleInfo element. The syntax of arib-ttex:AdditionalAribSubtitleInfo element is shown in Table 2-51, and the document structure is shown in Figure 2-11.

Table 2-51 Syntax of arib-ttex:AdditionalAribSubtitleInfo element

```
<xsd:element name="AdditionalAribSubtitleInfo"
  type="arib-ttex:AdditionalAribSubtitleInfoType"/>

<xsd:complexType name="AdditionalAribSubtitleInfoType">
  <xsd:sequence>
    <xsd:element name="subtitle_tag" type="xsd:string" minOccurs="0"/>
    <xsd:element name="ISO_639_language_code" type="xsd:string" minOccurs="0"/>
    <xsd:element name="type" type="xsd:string" minOccurs="0"/>
    <xsd:element name="subtitle_format" type="xsd:string" minOccurs="0"/>
    <xsd:element name="OPM" type="xsd:string" minOccurs="0"/>
    <xsd:element name="TMD" type="xsd:string" minOccurs="0"/>
    <xsd:element name="DMF" type="xsd:string" minOccurs="0"/>
    <xsd:element name="resolution" type="xsd:string" minOccurs="0"/>
    <xsd:element name="compression_type" type="xsd:string" minOccurs="0"/>
  </xsd:sequence>
</xsd:complexType>
```

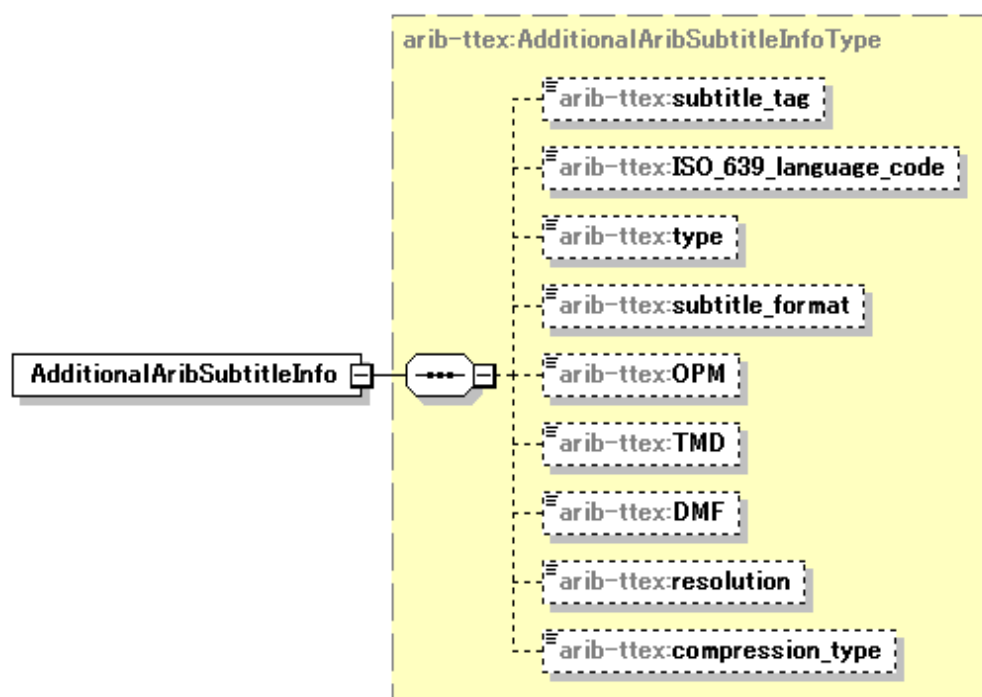


Figure 2-11 Structure of arib-ttex: AdditionalAribSubtitleInfo element

2.5.1.1 Closed caption identification tag (arib-ttex:subtitle_tag element)

Arib-ttex:subtitle_tag element is an element for designating a label for identifying a closed caption / character superimpose stream, and only one can be placed. The syntax of arib-ttex:subtitle_tag element is shown in Table 2-52. This element value is determined for each business operator and expressed in hexadecimal character string. However, it is necessary not to give a character (column) indicating that it is a hexadecimal character string notation such as "0x" at the head of a character string or "h" at the end, apply 0 to the beginning as necessary so that it becomes a fixed-length character string of length of 2. This element value is converted to 8-bit uimsbf notation, and subtitle_tag (closed caption identification tag) of Additional_Arib_Subtitle_Info () included in MH-data coding scheme descriptor, and it is stored in subtitle_tag (closed caption identification tag) of MFU (MFU_data_byte (). If this element is omitted (or empty element), it is regarded as unset (null value).

Table 2-52 Syntax of arib-ttex:subtitle_tag element

<pre><xsd:element name="subtitle_tag" type="xsd:string" minOccurs="0"/></pre>

2.5.1.2 Language code (arib-ttex:ISO_639_language_code element)

Arib-ttex:ISO_639_language_code element is an element for designating the language code for the language identified by the closed caption identification tag, and only one can be placed. The syntax of arib-ttex:ISO_639_language_code element is shown in Table 2-53. For each element value, designate each character of the language code ("jpn" in Japanese) represented by the alphabetic three-character code designated in ISO 639-2. This element value is stored in ISO_639_language_code (language code) of Additional_Arib_Subtitle_Info () included in the MH-data coding method descriptor with 24 bits coded by 8 bits according to ISO 8859-1. If this element is omitted (or empty element), it is assumed to be "jpn" (Japanese).

Table 2-53 Syntax of arib-ttex:ISO_639_language_code element

<code><xsd:element name="ISO_639_language_code" type="xsd:string" minOccurs="0"/></code>
--

2.5.1.3 Closed caption type (arib-ttex:type element)

Arib-ttex:type element is an element for designating the distinction between closed captions and superimposed characters, and only one can be placed. The syntax of arib-ttex:type element is shown in Table 2-54, and the possible values are shown in Table 2-55. This element value is stored in the type (closed caption type) of Additional_Arib_Subtitle_Info () included in the MH-data coding scheme descriptor. If this element is omitted, it is regarded as "00" (closed caption).

Table 2-54 Syntax of arib-ttex:type element

<code><xsd:element name="type" type="xsd:string" minOccurs="0"/></code>

Table 2-55 Closed caption type

Value	Meaning
00	closed caption
01	Character superimpose
10	Reserved for future use
11	Reserved for future use

2.5.1.4 Closed caption description method identification (arib-ttex:subtitle_format element)

Arib-ttex:subtitle_format element is an element for designating closed caption and character superimpose-description method including the version, profile, etc., and only one can be placed. The syntax of arib-ttex:subtitle_format element is shown in Table 2-56, and the possible values are shown in Table 2-57. This element value is stored in the closed caption format (closed caption description method identification) of Additional_Arib_Subtitle_Info () included in the MH-data coding scheme descriptor. If this element is omitted, it is assumed to be "0000" (ARIB-TTML description method).

Table 2-56 Syntax of arib - ttex:subtitle_format element

<code><xsd:element name="subtitle_format" type="xsd:string" minOccurs="0"/></code>
--

Table 2-57 Closed caption description method identification

Value	Meaning
0000	ARIB-TTML description method identified in the namespace designated by STD-B62
0001-1111	Reserved for future use

2.5.1.5 Operation mode (arib-ttex: OPM element)

Arib-ttex:OPM element is an element for designating the operation mode of the entire system including closed caption transmission and encoding, and only one can be placed. The syntax of arib-ttex:OPM element is shown in Table 2-58, and the possible values are shown in Table 2-59. This element value is included in the MH-data coding scheme descriptor. It is stored in OPM (operation mode) of Additional_Arib_Subtitle_Info (). If this element is omitted, it is regarded as "01" (segment mode).

Table 2-58 Syntax of arib-ttex:OPM element

<code><xsd:element name="OPM" type="xsd:string" minOccurs="0"/></code>
--

Table 2-59 Operation mode

Value	Meaning	Description
00	Live mode	Operation mode to update the TTML document in a short time. As a result, dependency relationships between TTML documents before and after update may occur. The same TTML document is transmitted only once. Application of live program is assumed.
01	Segment mode	Operation mode in which it is updated by separating it into independent operable TTML documents. Operation mode that can operate without any dependency on TTML documents before and after updating. The same TTML document is transmitted only once.
10	Program mode	Operation mode in which the same TTML document is repeatedly transmitted as an independently operable TTML document. Operation of transmitting TTML documents in program units is assumed.
11	Reserved for future use	

2.5.1.6 Time control mode (arib-ttpc: TMD element)

Arib-ttpc:TMD element indicates the time control mode at the time of reception and reproduction, and is used for designating the presentation time by the MPU time stamp added to the MPU, the time code described in ARIB-TTML document or other information Element, only one can be placed. The syntax of arib-ttpc:TMD element is shown in Table 2-60, and the possible values are shown in Table 2-61. This element value is stored in the TMD (time control mode) of Additional_Arib_Subtitle_Info () included in the MH-data coding scheme descriptor. If this element is omitted, it is assumed to be "0010" (reference start time point).

Table 2-60 Syntax of arib-ttpc:TMD element

<xsd:element name="TMD" type="xsd:string" minOccurs="0"/>

Table 2-61 Time control mode

Value	Meaning	Description
0000	TTML Description (UTC)	The time code in ARIB-TTML document is shown as UTC to indicate the presentation time.
0001	TTML Description (MH-EIT start time Starting point)	Starting from the MH-EIT starttime, the time is indicated by the time code in ARIB-TTML document.
0010	TTML Description (Reference start time point)	Starting from the reference start time of this descriptor, the time is indicated by the time code in ARIB-TTML document.
0011	TTML Description (MPU time stamp point))	The time is indicated by the time code in ARIB-TTML document starting from the MPU presentation time of the MPU time stamp.
0100	TTML Description (NPT)	The time code in ARIB-TTML document indicates the time corresponding to the NPT based on the UTC-NPT reference descriptor transmitted in the event message table (EMT)
1000	MPU Time stamp	Not comply the time code in ARIB-TTML document, and show the presentation time only by the MPU presentation time of the MPU time stamp descriptor.
1111	No time control	Not comply with the MPU timestamp descriptor nor the timecode in ARIB-TTML document, and sometimes use for closed caption and the occasion to which a character supermarket is shown immediately.

2.5.1.7 Display mode (arib-ttex: DMF element)

arib-ttex:DMF element designates the display mode of the closed caption text at the time of reception and recording operation, and only one can be placed. The syntax of arib-ttex:DMF elements is shown in Table 2-62, and the possible values are shown in Table 2-63. This element value is included in the MH-data coding scheme descriptor. It is stored in the DMF (display mode) of Additional_Arib_Subtitle_Info (). If this element is omitted, it is regarded as not set (null value).

Table 2-62 syntax of arib-ttex:DMF element

<code><xsd:element name="DMF" type="xsd:string" minOccurs="0"/></code>
--

Table 2-63 Display Mode

Display mode value		Meaning
b4b3	b2b1	
00		Automatic indication on reception
01		Automatic hide on reception
10		Selection indication on reception
11		Reserved for future use
	00	Automatic display on recording / playback
	01	Automatic hide on recording / playback
	10	Selection display on recording / playback
	11	Reserved for future use

2.5.1.8 Display resolution (arib-ttex: resolution element)

Arib-ttex: resolution element is an element for designating the initial state of the display resolution of the closed caption display screen, and only one can be placed. The syntax of arib-ttex:resolution element is shown in Table 2-64, and the possible values are shown in Table 2-65. This element value is stored in the resolution (display resolution) of Additional_Arib_Subtitle_Info () included in the MH-data coding method descriptor. If this element is omitted, it is regarded as unset (null value).

Table 2-64 Syntax of arib-ttex:resolution element

<code><xsd:element name="resolution" type="xsd:string" minOccurs="0"/></code>

Table 2-65 Display Resolution

Value	Meaning
0000	1920 x 1080
0001	3840 x 2160
0010	7680 x 4320
0011-1111	Reserved for future use

2.5.1.9 Compression method (arib-ttex:compression_type element)

Arib-ttex:compression_type element is an element for designating the compression method of closed caption data, and only one can be placed. The closed caption data to be compressed is only ARIB-TTML document which is placed first among the transmitted sample data. The syntax of arib-ttex:compression_type element is shown in Table 2-66. Possible values are the compression method of 4 bits, uimsbf notation shown in Table 2-67 designated by the operating regulations of the operator. This element value is stored in the compression_type (compression method) of Additional_Arib_Subtitle_Info () included in the MH-data coding scheme descriptor. If this element is omitted, it is regarded as unset (null value).

Table 2-66 Syntax of arib-ttex:compression_type element

<code><xsd:element name="compression_type" type="xsd:string" minOccurs="0"/></code>

Table 2-67 Compression method

Value	Meaning
0000	No compression
0001	Compression by EXI format
0010-1111	Reserved for future use

2.5.2 Transmission unit information (arib - ttex:Transmission Units element)

The transmission unit information is aimed at efficiently extracting data to be stored in each MFU on a MPU basis in a facility for registering and transmitting the completed ARIB-TTML caption file. This information includes the data type of the resource to be stored in the closed caption sample header of the MFU, the elements required for ARIB-TTML document to be stored in the subsample data, and the external resources referred to from ARIB-TTML document and the reference method. The image to be used is shown in Figure 2-12.

In the closed caption transmission facility, by extracting the element of the reference destination and its subordinate according to the description of the transmission unit information, it is possible to construct ARIB-TTML documents that can be easily transmitted, without analyzing styling element, layout element, and body element.

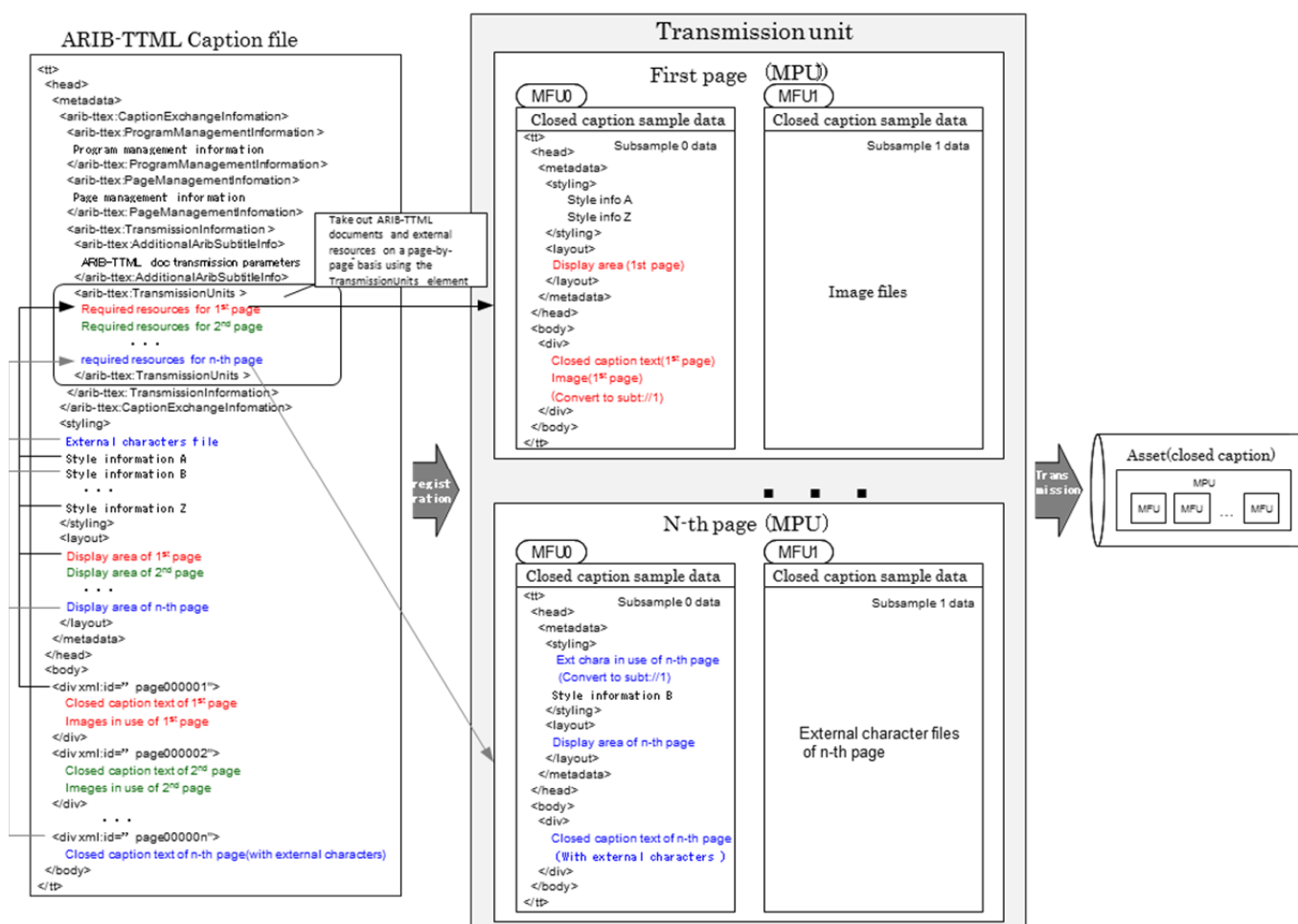


Figure 2-12 Usage example of Transmission Unit Information

Transmission unit information stores the closed caption data to be transmitted by MPU / MFU in each transmission unit (display page unit) in arib-ttex:Transmission Units element. The syntax of arib-ttex:TransmissionUnits element is shown in Table 2-68, and the document structure is shown in Figure 2-13.

Table 2-68 Syntax of arib-ttex:TransmissionUnits element

```
<xsd:element name="TransmissionUnits" type="arib-ttex:TransmissionUnitsType"/>

<xsd:complexType name="TransmissionUnitsType">
  <xsd:sequence>
    <xsd:element name="unit" type="arib-ttex:unitType" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="unitType">
  <xsd:sequence>
    <xsd:element name="resource" type="arib-ttex:resourceType"
      maxOccurs="unbounded"/>
  </xsd:sequence>
  <xsd:attribute ref="xml:id"/>
  <xsd:attribute name="timecode" type="ttd:timeCoordinate"/>
</xsd:complexType>

<xsd:complexType name="resourceType">
  <xsd:attribute name="datatype" type="xsd:string"/>
  <xsd:attribute name="inlineImage" type="xsd:IDREFS"/>
  <xsd:attribute name="font-face" type="xsd:IDREFS"/>
  <xsd:attribute name="keyframes" type="xsd:IDREFS"/>
  <xsd:attribute name="style" type="xsd:IDREFS"/>
  <xsd:attribute name="region" type="xsd:IDREFS"/>
  <xsd:attribute name="page" type="xsd:IDREFS"/>
  <xsd:attribute name="subtitle" type="xsd:IDREFS"/>
  <xsd:attribute name="image" type="xsd:IDREFS"/>
  <xsd:attribute name="audio" type="xsd:IDREFS"/>
  <xsd:attribute name="idref" type="xsd:IDREFS"/>
  <xsd:attribute name="srcpath" type="xsd:string"/>
  <xsd:attribute name="srcvalue" type="xsd:string"/>
  <xsd:attribute name="replaceto" type="xsd:string"/>
</xsd:complexType>
```

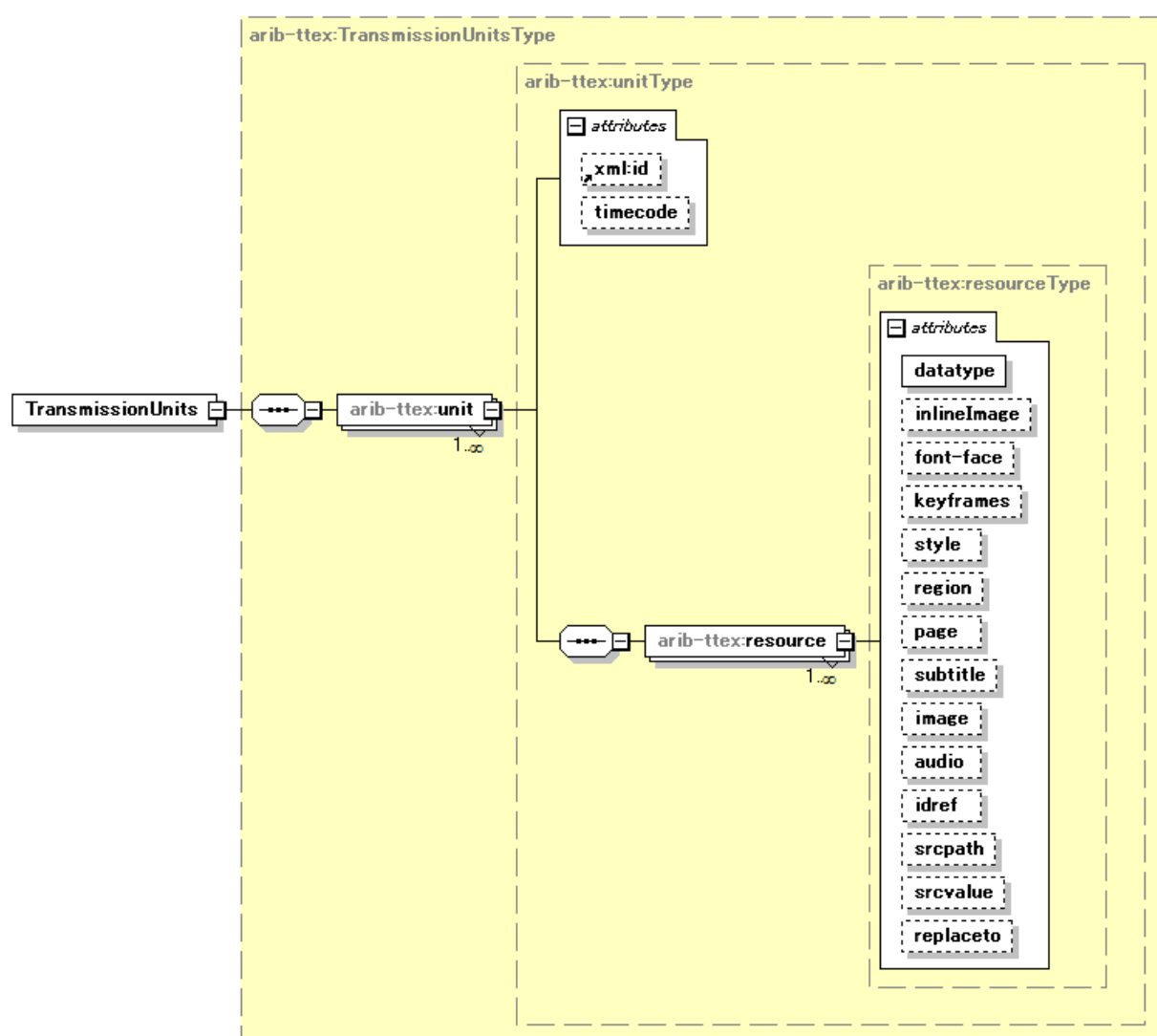


Figure 2-13 Structure of arib-ttex:TransmissionUnits element

2.5.2.1 MPU information (arib-ttex:unit element)

Arib-ttex: unit element is an element that describes MFU information to be stored in units of MPU, one or more elements are described, and it is repeatedly described by the number of MPUs. It is a timecode attribute and indicates the presentation time from the closed caption transmission reference time in the form of "hh (hour): mm (minute): ss (second) .fff (millisecond)" for the closed caption transmission unit. Based on the presentation time, the sending device can sequentially send closed captions. Under the subordinate, it has arib-ttex: resource element, extracts the constituent elements of ARIB-TTML document of page unit to be stored in the MFU, and describes the path of the external resource to be stored in the MFU and reference information at the time of transmission in MFU units. Attributes of arib-ttex: resource element are shown in Table 2-69.

Table 2-69 Attributes of arib-ttex:resource element

Attribute	Meaning																				
datatype	Attribute indicates the data type of the resource (ARIB-TTML document or external resource) to be stored in MFU. Possible values are values conforming to the meaning of Table 9.2 Data type in STD - B60, and are designated from the table below. <table> <tr> <th>Value</th><th>Meaning</th></tr> <tr> <td>0000</td><td>ARIB-TTML document file</td></tr> <tr> <td>0001</td><td>Image file of PNG format</td></tr> <tr> <td>0010</td><td>Image file of SVG format</td></tr> <tr> <td>0011</td><td>Audio file of PCM (AIFF-C) format</td></tr> <tr> <td>0100</td><td>Audio file of MP3 format</td></tr> <tr> <td>0101</td><td>Audio file of MPEG-4 AAC format</td></tr> <tr> <td>0110</td><td>Font file of SVG format</td></tr> <tr> <td>0111</td><td>Font file of WOFF format</td></tr> <tr> <td>1000-1111</td><td>Reserve for future use</td></tr> </table> In case of datatype = "0000", indicate ARIB-TTML document, information for indicating a set of elements necessary for generating an ARIB-TTML document fragmented from ARIB-TTML subtitles of the entire program is described by subsequent attribute values (@inlineImage,@font-face,@style,@region,@page,@subtitle,@image,@audio) . In case of datatype≠"0000", indicate external resource file to be referenced from ARIB-TTML document, external resource file path and information in the ARIB-TTML document that needs to be rewritten to the name space of broadcast transmission are described in subsequent attribute values(@ Idref, @ scrpath, @ srcvalue, @ replaceto). If describe arib-ttex:resource element, be sure to describe this attribute.	Value	Meaning	0000	ARIB-TTML document file	0001	Image file of PNG format	0010	Image file of SVG format	0011	Audio file of PCM (AIFF-C) format	0100	Audio file of MP3 format	0101	Audio file of MPEG-4 AAC format	0110	Font file of SVG format	0111	Font file of WOFF format	1000-1111	Reserve for future use
Value	Meaning																				
0000	ARIB-TTML document file																				
0001	Image file of PNG format																				
0010	Image file of SVG format																				
0011	Audio file of PCM (AIFF-C) format																				
0100	Audio file of MP3 format																				
0101	Audio file of MPEG-4 AAC format																				
0110	Font file of SVG format																				
0111	Font file of WOFF format																				
1000-1111	Reserve for future use																				
Attributes to be described when datatype = "0000"																					
inlineImage	It is an attribute indicating the xml:id value of the element to be described, as tt/head/metadata/smp:te:image element in ARIB-TTML document.																				
font-face	It is an attribute indicating the xml:id value of the element to be described, as tt/head/styling/ari:ib-tt:font-face element in ARIB-TTML document.																				
keyframes	It is an attribute indicating the xml:id value of the element to be described, as tt/head/styling/ari:ib-tt:keyframes element in ARIB-TTML document.																				
style	It is an attribute indicating the xml:id value of the element to be described, as tt/head/styling/style element in ARIB-TTML document.																				
region	It is an attribute indicating the xml:id value of the element to be described, as tt/head/layout/region element in ARIB-TTML document.																				
page	It is an attribute indicating the xml:id value of the element to be described, as tt/body/div element in ARIB-TTML document. If the page attribute is designated, do not designate closed caption attribute, image attribute, audio attribute.																				
closed caption	It is an attribute indicating the xml:id value of the element to be described, as tt/body/div/p element in ARIB-TTML document. Do not designate when page attribute is designated.																				

image	It is an attribute indicating the xml:id value of the element to be described, as tt/body/div/div element (for image display) in ARIB-TTML document. Do not designate when page attribute is designated.
audio	It is an attribute indicating the xml:id value of the element to be described, as tt/body/div/div element (including audio element) in ARIB-TTML document. Do not designate when page attribute is designated.
Attributes to described when datatype≠ "0000"	
idref	Attribute indicating element that contains external reference to a resource.
srcpath	The idref attribute with the element whose path in which external resources are described is indicated by XPath. In case of image files : @smpte:backgroundImage In case of audio files : arib-tt:audio/@src In case of external font : arib-tt:src/@url
srcvalue	Attribute indicating the value (content of resource file specification) of the attribute indicated by the srcpath attribute.
replaceto	Attribute indicates the value of the attribute indicated by the srcpath attribute replaced by the broadcast namespace when transmitting by broadcasting, the value of the srcvalue attribute is rewritten with the value of the replaceto attribute and transmitted.

Commentary 1 Type of closed caption

Table D1-1 is a classification table of closed caption data. It is categorized by data type and recording / transmission format. Shaded area in the table are defined by this standard.

Table D1-1 Classification table of closed caption data

	Closed caption data format	Data type	Exchange format closed caption data	Video recording closed caption data	Intra-office transmission closed caption data	Broadcast wave closed caption data	
ARIB-TTML closed caption data (ARIB TD-B62)	ARIB-TTML closed caption data	Closed caption management data / First language closed caption text / Second language closed caption text	ARIB formulation ARIB-TTML closed caption data (ARIB STD-B69)	—	—	MMT Packet data (ARIB STD-B60)	Advanced broadband satellite Digital broadcasting Operational stipulation (ARIB TR-B39)
Digital closed caption (ARIB STD-B24)	HD closed caption / SD closed caption / mobile closed caption	Closed caption management data / First language closed caption text / Second language closed caption text	ARIB formulation digital closed caption data (ARIB STD-B36)	Digital ANC closed caption data (ARIB STD-B37)	Digital ANC closed caption data (ARIB STD-B37)	TS packet data (ITU-TH.222)	BS / Broadband CS digital broadcasting (ARIB TR-B15)
					PES closed caption data (ARIB STD-B24)		Terrestrial digital broadcasting (ARIB TR-B14)
Text multiplex broadcast closed caption (analog closed caption) (Ministry of Posts and Telecommunications ordinance No.77)	Analog closed caption (4: 3 screen)	Program management data / page data / program index data	NAB formulated analog closed caption data (Technical Standard T027-1996 of the National Treasury) (Technical Standard of the Public Relations Committee T021-1996)	Text multiplex broadcasting closed caption (Ministry of Posts and Telecommunications No.77)	Text multiplex broadcasting closed caption (Ministry of Posts and Telecommunications No.77)	Text multiplex broadcasting closed caption (Ministry of Posts and Telecommunications No.77)	
Closed caption name		Contents					
ARIB formulation ARIB-TTML closed captio		ARIB – TTML closed caption data exchange format data (ARIB STD - B 69)					
ARIB formulated digital closed caption		Interchange format data of digital closed caption data (ARIB STD-B36)					
ARIB formulated analog closed caption		Interchange format data of analog closed caption data (Technical Standard of Commerce and Industry, T027-1996) (Technical Standard of Commerce No. T021-1996)					
Digital ANC closed caption		Digital closed caption data to be superimposed on the auxiliary data area of the video SDI, store digital closed caption exchange format data (ARIB formulated digital closed caption) and short form data. (ARIB STD-B37)					
Analog ANC closed caption		Analog closed caption data to be superimposed on the auxiliary data area of the video SDI, store short form data. (ARIB STD-B37)					
Character multiplex broadcasting caption		Analog caption packet data (postal ministerial ordinance No. 77) superimposed on 21 H of the vertical blanking period (VBI region) of video (NTSC signal) conforming to analog character multiplex broadcasting specifications					
PES closed caption		Digital closed caption data transmitted in PES data format (ARIB STD-B24)					
TS packet data		Digital closed caption packet data transmitted in TS packet format (ITU-TH.222)					
MMT packet data		Digital closed caption packet data transmitted in MMT packet format (ARIB STD-B60)					

Classification of closed caption content

Exchange format closed caption data	Closed caption material created with caption exchange format data (ARIB formulated digital closed caption data, NAB formulated analog closed caption data)
Real time closed caption data	Closed caption material created instantly with live program etc.

Commentary 2 Structure of ARIB-TTML closed caption file exchange

The setting values of each item prescribed in "Program management information" in chapter 2.3, "Page management information" in chapter 2.4, "Transmission information" in chapter 2.5 are used in digital closed caption. Set values not used in ARIB - TTML subtitles, setting values not used in general closed caption production / closed caption sending, or setting values difficult to discriminate from the contents of each item.

For each item of program management information, page management information, transmission information, by suggesting the setting contents and suggested values, in case of exchanging ARIB-TTML caption file between broadcasting stations and closed caption related devices, it can be operated so that there is no confusion in the creation, transmission, material management of closed captions. Table D2-1 shows the element names and attribute names prescribed by ARIB-TTML subtitle file exchange and the number of occurrences. Set values other than the recommended value are product planning, and it is desirable to confirm whether or not correspondence exists when exchanging ARIB - TTML caption file.

Table D2-1 Structure of ARIB-TTML closed caption file exchange

Element name / Attribute name	Number of occurrences	Use	Setting content / Recommended value
arib-ttex:CaptionExchangeInformation	0..1	ARIB-TTML subtitle file Exchange information	—
arib-ttex:ProgramManagementInformation	0..1	Program management information	—
arib-ttex:CaptionDataLabel	0..1	Closed caption data label	—
arib-ttex:Medium	1..∞	Media	UCAPTION
arib-ttex:ProgramTitle	1	Program name	Any value
arib-ttex:ProgramSubTitle	0..1	Program subtitle	Any value
arib-ttex:ProductionStation	0..1	Production station display	Any value
arib-ttex:MaterialCode	1	Material number (program code)	Any value
arib-ttex:MaterialType	0..1	Material type	0 or 1 or 2
arib-ttex:RegistrationMode	0..1	Registration mode	N
arib-ttex:NumberOfPages	0..1	Total number of pages	Calculate and store
arib-ttex:Untime	0..1	Presence of untime	false
arib-ttex:RTTimingType	0..1	RT (real time) timing type	LT
arib-ttex:InitialTime	0..1	Initial time	Any value
arib-ttex:AvailableMedia	0..1	Effective media	—
arib-ttex:Medium	1..∞	Media type	UHD
arib-ttex:AvailableVideoTypes	0..1	Available images	—
arib-ttex:VideoType	1..∞	Video type	4K or 8K
arib-ttex:ValidPeriod	0..1	Expiration date	Any value

arib-ttex:Creator	0..1	Author / Creating Organization	Any value
arib-ttex:CreationDate	0..1	Creation date	Any value
arib-ttex:AirInformation	0..1	Broadcast information	—
arib-ttex:AirDate	1..∞	On-air date	—
arib-ttex:StartDate	1	Start date	Any value
arib-ttex:EndDate	0..1	End date	Any value
arib-ttex:DayOfWeek	0..7	Broadcast day of the week	Any value
arib-ttex:StartTime	0..1	Broadcast start time	Any value
arib-ttex:EndTime	0..1	Broadcast end time	Any value
arib-ttex:Memo	0..1	Notes	Any value
arib-ttex:CompletionFlag	0..1	Finished mark	true
arib-ttex:PageManagementInformation	0..1	Page management information	—
arib-ttex:PageInfo	1..∞	Page information	—
@default	0..1		true * Initial value page Specify management information only
@page	0..1	Page designation	Xml: id value of the element under the body element designated for each page * Designated by page (other than page management information showing initial value)
arib-ttex:MaterialType	0..1	Page material type	0 or 1 or 2
arib-ttex:PlayoutTimingType	0..1	Transmission timing type	RT
arib-ttex:ClearScreenFlag	0..1	Erase screen	Any value
arib-ttex>DeleteFlag	0..1	Specify page deletion	true
arib-ttex:Memo	0..1	Notes	Any value
arib-ttex:CompletionFlag	0..1	Page completion mark	true
arib-ttex:TransmissionInformation	0..1	Transmission information	—
arib-ttex:AdditionalAribSubtitleInfo	0..1	Additional identification information	—
arib-ttex:subtitle_tag	0..1	Closed caption identification tag	Any value
arib-ttex:ISO_639_language_code	0..1	Language code	jpn
arib-ttex:type	0..1	Closed caption type	00
arib-ttex:subtitle_format	0..1	Closed caption description method identification	0000
arib-ttex:OPM	0..1	Operation mode	01
arib-ttex:TMD	0..1	Time control mode	0010 or 1111

arib-ttex:DMF	0..1	Display mode	0010 or 1010
arib-ttex:resolution	0..1	Display resolution	0000 or 0001 or 0010
arib-ttex:compression_type	0..1	Compression method	0000 or 0001
arib-ttex:TransmissionUnits	0..1	Transmission unit information	—
arib-ttex:unit	1..∞	MPU information	—
@xml:id	0..1		Any value * It is desirable that the relation with the page be easy to distinguish
@timecode	0..1	Presentation time from Closed caption transmission reference time	Any value
arib-ttex:resource	0..1	MFU information	—
@datatype	1	Data type of resource	Any value
Attributes described in case of datatype="0000"			
@inlineImage	0..1	Inline image	xml: id value of the element to be described as tt/heda/metadata/smpte:image element in the TTML document.
@font-face	0..1	External character file	xml: id value of the element to be described as tt/head/styling/arib-tt:font-face element in the TTML document.
@keyframes	0..1	Key frame	xml: id value of the element to be described as tt/head/styling/arib-tt:keyframes element in the TTML document.
@style	0..1	Style information	xml: id value of the element to be described as tt/head/styling/style element in the TTML document.
@region	0..1	Indicated Area	xml: id value of the element to be described as tt/head/layout/region element in the TTML document
@page	0..1	Page	If xml: id value of element to be

			described as tt/body/div element in TTML document is designated, @subtitle, @image and @audio are not specified.
@subtitle	0..1	Caption text	xml: id value of the element to be described as tt/body/div/p element in the TTML document
@image	0..1	Image file	xml: id value of the element to be described as tt/body/div/div element (for still image display) in the TTML document
@audio	0..1	Audio file	xml: id value of the element to be described as tt/body/div/div element (including audio element) in the TTML document
Attributes described in the case of datatype ≠ "0000"			
@idref	0..1	External resource Reference source	xml: id value of the element containing the resource's external reference
@srcpath	0..1	External resource path	In the case of image files, @smpte:backgroundIm age In the case of audio files, arib-tt:audio/@src In the case of external character font, arib-tt:src/@url
@srcvalue	0..1	External resource specification value	The value of the attribute indicated by srcpath (Content of resource file specification)
@replaceto	0..1	Reference method when transmitting external resources	Any value

Commentary 3 XML diagram

Explain the notation of the diagram used to express the structure of XML in this standard.

1 Element symbol

Optional elements by dotted lines, essential elements by solid lines, and elements with one or more occurrences by double lines are represented.

Table D3-1 Element symbol

		
Optional element	Essential element	Essential element (1 or more)
Min.occurrence = 0	Min.occurrence = 1	Min.occurrence = 1
Max.occurrence = 1	Max.occurrence = 1	Max.occurrence = unbounded

Content model of the element is displayed on the left or right side of the element box. Content model of the element is shown in Table D3-2.

Table D3-2 Element content model

			
Single type content	Composite Content	Composite content with child elements	Content without child elements

2 Model symbol

The model symbols are shown in Table D3-3.

Table D3-3 Model symbols

	A series of elements. Elements appear in the order shown in the schema.
	Selectable elements. One of child elements can be selected

Commentary 4 Transmission timing type

1 Sending timing and erasing timing

Depending on the combination of "transmission timing type", the contents of sending timing and erasing timing are different, the contents are shown in Table D4-1, the entry example when the sending timing type is RT is shown in Figure D4-1, the sending timing type is Figure D4-2 shows an example of entry in the case of UT, and Figure D4-3 shows an example of filling in cases where sending timing types are mixed.

Table D4-1 Sending (display) timing and erasing timing

Combination of transmission timing types		Transmission timing of the page concerned	Erase timing of the page concerned	Transmission timing of the next page
The page concerned	Next page			
RT	RT	Write the sending time (relative time from closed caption sending reference time) of the page in hours, minutes, seconds, and milliseconds in the begin attribute.	Write the deletion time (relative time from closed caption transmission reference time) of the page in hours, minutes, seconds, and milliseconds in the begin attribute, or do not describe the end attribute.	Write the sending time (relative time by closed caption transmission reference time) of the page in hours, minutes, seconds, and milliseconds in the begin attribute.
RT	UT			Do not describe the begin attribute.
UT	RT	Do not describe the begin attribute	Write in the end attribute in hour, minute, second, and millisecond the presentation time from the start of the page transmission (display) to the erase.	Write the sending time (relative time by closed caption transmission reference time) of the page in hours, minutes, seconds, and milliseconds in the begin attribute.
UT	UT			Do not describe the begin attribute.

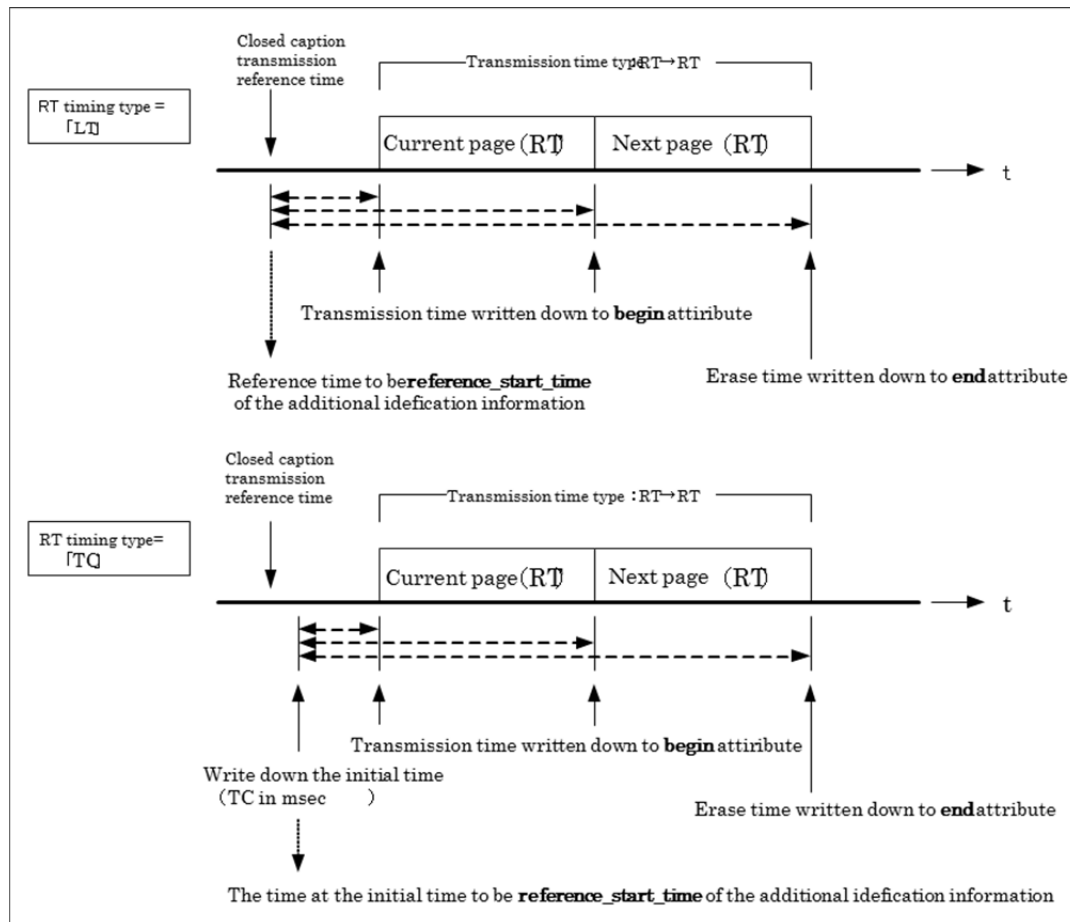


Figure D4-1 Example of entry when the transmission timing type is RT

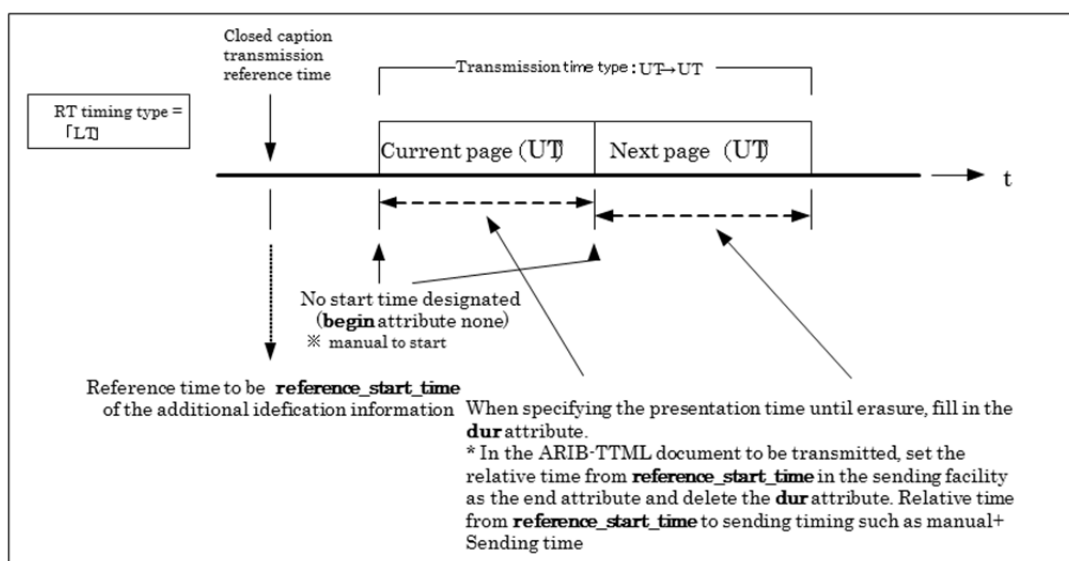


Figure D4-2 Example of entry when the transmission timing type is UT

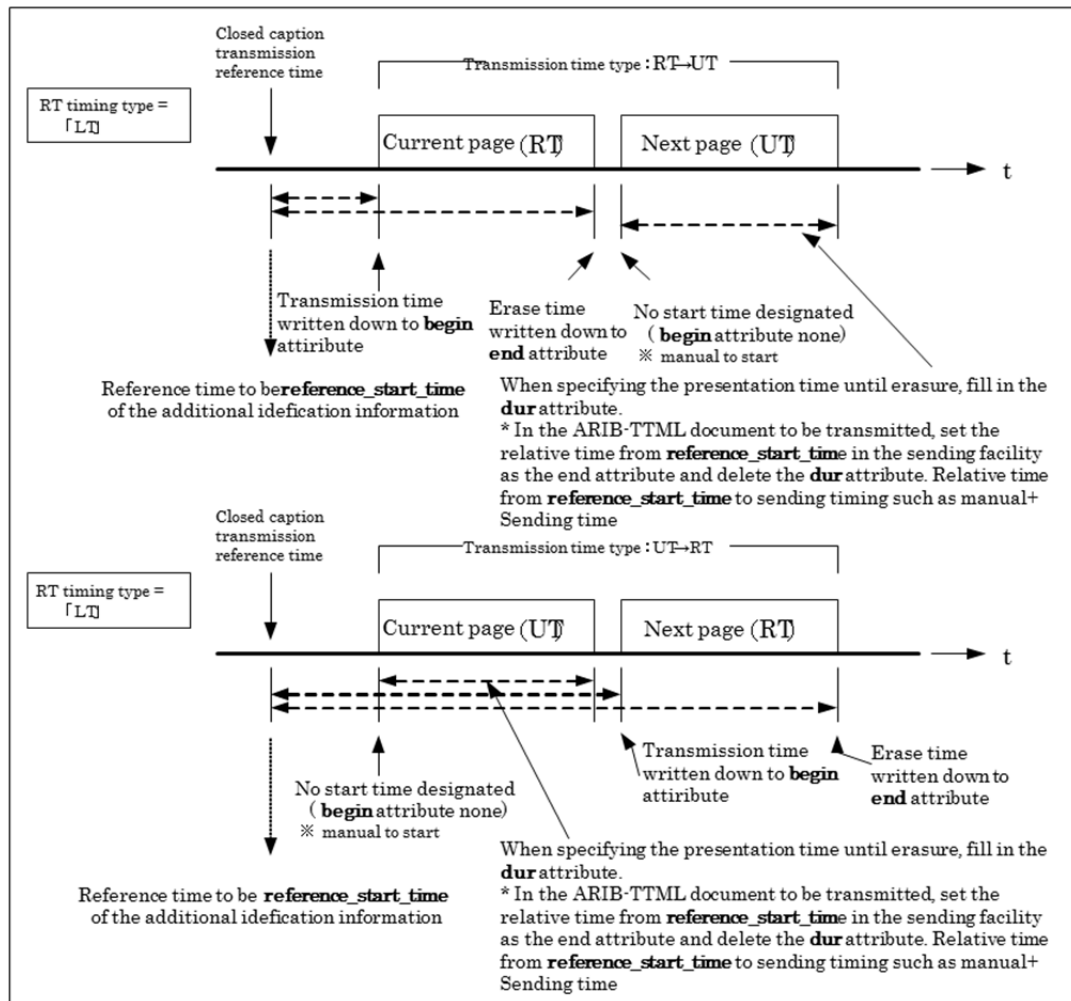


Figure D4-3 Example of entry when transmission timing types are mixed

2 Priority of sending

In case of transmission timing type is presenting the UT page, and while the sending timing type is the sending timing of the next page of RT, the page of RT is preferentially sent out. In addition, in case of transmission timing type is presenting the RT page, and while the sending timing type is the sending timing of the next page of UT, the page of UT is preferentially sent out. Figure D4-4 shows the priority when the next page is sent during the page presentation.

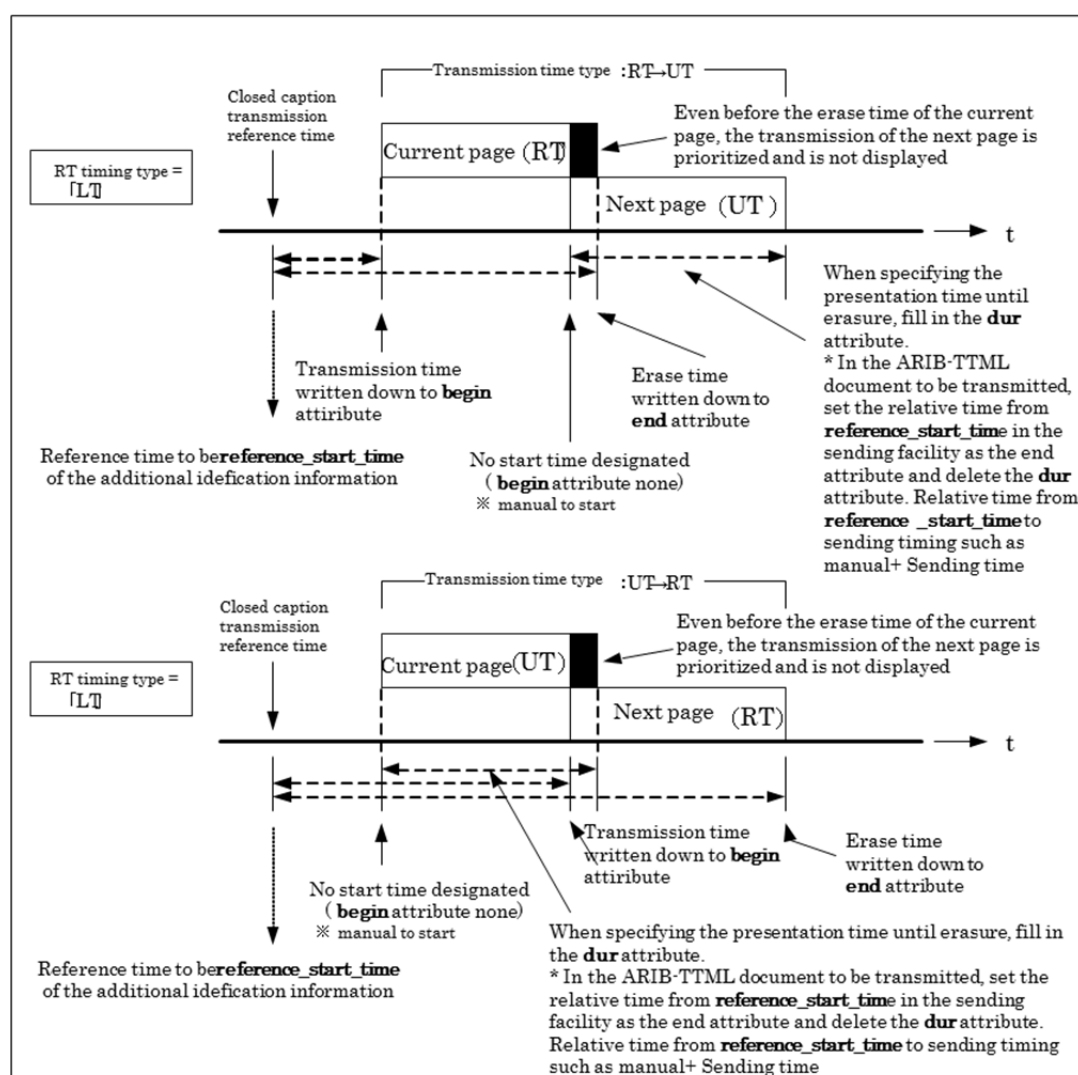


Figure D4-4 Priority in case of the next page is sent while presenting the relevant page

Commentary 5 Extensibility to communication service

Realization of multilingual closed captions etc., it is assumed that ARIB-TTML caption files are used in receivers or other devices using communication such as the internet. For this reason, as extensibility of using communication services, value corresponding to the communication service is defined, in the program management information shown in Table D5-1. The ARIB-TTML caption file having these values should be arranged on communication.

Table D5-1 Program management information corresponding to communication service

Program management information	Corresponding element	Value
Caption data label	arib-ttex:CaptionDataLabel/arib-ttex:Medium	“NCAPTION”
Effective media	arib-ttex:AvailableMedia/arib-ttex:Medium	"communication"

Annex 1 Description example of ARIB-TTML closed caption file exchange

Description example of ARIB-TTML closed caption file exchange is shown in Table G1-1.

Table G1-1 Description example of ARIB-TTML caption file exchange

```
<?xml version="1.0" encoding="utf-8"?>
<tt xml:lang="ja"
  xmlns="http://www.w3.org/ns/ttml"
  xmlns:ttml="http://www.w3.org/ns/ttml#metadata"
  xmlns:tts="http://www.w3.org/ns/ttml#styling"
  xmlns:ttp=http://www.w3.org/ns/ttml#parameter
  xmlns:smppte="http://www.smpte-ra.org/schemas/2052-1/2013/smppte-tt"
  xmlns:arib-tt="http://www.arib.or.jp/ns/arib-tt"
  xmlns:arib-ttex="http://www.arib.or.jp/ns/arib-ttmlex/v1_0">
<head>
  <metadata>
    <arib-ttex:CaptionExchangeInformation>

      <!-- Program management information -->
      <arib-ttex:ProgramManagementInformation>
        <arib-ttex:CaptionDataLabel>
          <arib-ttex:Medium>UCAPTION</arib-ttex:Medium>
        </arib-ttex:CaptionDataLabel>
        <arib-ttex:ProgramTitle> Natural Travel </arib-ttex:ProgramTitle>
        <arib-ttex:ProgramSubTitle> Hokkaido </arib-ttex:ProgramSubTitle>
        <arib-ttex:ProductionStation>ARIB</arib-ttex:ProductionStation>
        <arib-ttex:MaterialCode>1234567</arib-ttex:MaterialCode>
        <arib-ttex:MaterialType> Main part </arib-ttex:MaterialType>
        <arib-ttex:RegistrationMode>N</arib-ttex:RegistrationMode>
        <arib-ttex:NumberOfPages>4</arib-ttex:NumberOfPages>
        <arib-ttex:Untime>false</arib-ttex:Untime>
        <arib-ttex:RTTimingType>LT</arib-ttex:RTTimingType>
        <arib-ttex:InitialTime>10:00:00.000</arib-ttex:InitialTime>
        <arib-ttex:AvailableMedia>
          <arib-ttex:Medium>UHD</arib-ttex:Medium>
        </arib-ttex:AvailableMedia>
        <arib-ttex:AvailableVideoTypes>
          <arib-ttex:VideoType>4K</arib-ttex:VideoType>
        </arib-ttex:AvailableVideoTypes>
        <arib-ttex:ValidPeriod>2016-12-31</arib-ttex:ValidPeriod>
        <arib-ttex:Creator>ARIB</arib-ttex:Creator>
        <arib-ttex:CreationDate>2015-03-25T15:00:00</arib-ttex:CreationDate>
        <arib-ttex:AirInformation>
          <arib-ttex:AirDate>
            <arib-ttex:StartDate>2015-04-01</arib-ttex:StartDate>
```

```

    <arib-ttex:EndDate>2015-09-30</arib-ttex:EndDate>
    <arib-ttex:DayOfWeek>Monday</arib-ttex:DayOfWeek>
    <arib-ttex:DayOfWeek>Wednesday</arib-ttex:DayOfWeek>
    <arib-ttex:DayOfWeek>Friday</arib-ttex:DayOfWeek>
    <arib-ttex:StartTime>08:00:00</arib-ttex:StartTime>
    <arib-ttex:EndTime>08:15:00</arib-ttex:EndTime>
    </arib-ttex:AirDate>
  </arib-ttex:AirInformation>
  <arib-ttex:Memo>This caption material is awaiting final confirmation</arib-ttex:Memo>
  <arib-ttex:CompletionFlag>true</arib-ttex:CompletionFlag>
</arib-ttex:ProgramManagementInformation>

<!-- Page management information -->
<arib-ttex:PageManagementInformation>
  <!-- initial value -->
  <arib-ttex:PageInfo default="true">
    <arib-ttex:MaterialType>Main part</arib-ttex:MaterialType>
    <arib-ttex:PlayoutTimingType>RT</arib-ttex:PlayoutTimingType>
    <arib-ttex:ClearScreenFlag>false</arib-ttex:ClearScreenFlag>
    <arib-ttex>DeleteFlag>false</arib-ttex>DeleteFlag>
    <arib-ttex:CompletionFlag>true</arib-ttex:CompletionFlag>
  </arib-ttex:PageInfo>
  <!-- Management information for each page -->
  <arib-ttex:PageInfo page="c000001">
    <arib-ttex:ClearScreenFlag>true</arib-ttex:ClearScreenFlag>
    <arib-ttex>DeleteFlag>true</arib-ttex>DeleteFlag>
    <arib-ttex:Memo>This delete screen is subject to deletion</arib-ttex:Memo>
  </arib-ttex:PageInfo>
  <arib-ttex:PageInfo page="c000002"/>
  <arib-ttex:PageInfo page="c000003"/>
  <arib-ttex:PageInfo page="c000004">
    <arib-ttex:ClearScreenFlag>true</arib-ttex:ClearScreenFlag>
  </arib-ttex:PageInfo>
</arib-ttex:PageManagementInformation>

<!-- Transmission information -->
<arib-ttex:TransmissionInformation>
  <arib-ttex:AdditionalAribSubtitleInfo>
    <arib-ttex:subtitle_tag>30</arib-ttex:subtitle_tag>
    <arib-ttex:ISO_639_language_code>jpn</arib-ttex:ISO_639_language_code>
    <arib-ttex:type>00</arib-ttex:type>
    <arib-ttex:subtitle_format>0000</arib-ttex:subtitle_format>
    <arib-ttex:OPM>01</arib-ttex:OPM>
    <arib-ttex:TMD>0010</arib-ttex:TMD>
    <arib-ttex:DMF>1010</arib-ttex:DMF>
    <arib-ttex:resolution>0001</arib-ttex:resolution>
    <arib-ttex:compression_type>0001</arib-ttex:compression_type>

```

```

</arib-ttex:AdditionalAribSubtitleInfo>
<arib-ttex:TransmissionUnits>
  <arib-ttex:unit xml:id="u000001" timecode="00:00:00.000">
    <arib-ttex:resource datatype="0000" page="c000001" />
  </arib-ttex:unit>
  <arib-ttex:unit xml:id="u000002" timecode="00:00:10.000">
    <arib-ttex:resource datatype="0000" style="s000000 s000002-1 s000002-2"
      region="r000002-1 r000002-2" page="c000002" />
  </arib-ttex:unit>
  <arib-ttex:unit xml:id="u000003" timecode="00:00:30.000">
    <arib-ttex:resource datatype="0000" style="s000000 s000003-1"
      region="r000003-1" page="c000003" />
    <arib-ttex:resource datatype="0110" idref="f01" srcpath="arib-tt:src/@url"
      srcvalue="font/1234567.4K1.F001.svg " replaceto="subt://1" />
  </arib-ttex:unit>
  <arib-ttex:unit xml:id="u000004" timecode="00:00:45.000">
    <arib-ttex:resource datatype="0000" page="c000004" />
  </arib-ttex:unit>
</arib-ttex:TransmissionUnits>
</arib-ttex:TransmissionInformation>
</arib-ttex:CaptionExchangeInformation>
</metadata>

<!-- Style information -->
<styling>
  <arib-tt:font-face xml:id="f01" font-family="Round gothic style" unicode-range="U+F000">
    <arib-tt:src url="font/1234567.4K1.F001.svg" format="svg"/>
  </arib-tt:font-face>
  <style xml:id="s000000" tts:fontFamily=" Round gothic style " tts:fontSize="144px 144px"
    tts:backgroundColor="#000000" tts:color="#ffffff"
    tts:lineHeight="96px" arib-tt:letter-spacing="16px"/>
  <style xml:id="s000002-1" style="s000000" tts:color="#ffff00"/>
  <style xml:id="s000002-2" style="s000000"/>
  <style xml:id="s000003-1" style="s000000"/>
</styling>

<!-- Indicated Area -->
<layout>
  <region xml:id="r000002-1" tts:origin="**px **px" tts:extent="**px **px" style="s000002-1"
/>
  <region xml:id="r000002-2" tts:origin="**px **px" tts:extent="**px **px" style="s000002-2"
/>
  <region xml:id="r000003-1" tts:origin="**px **px" tts:extent="**px **px" style="s000003-1"
/>
</layout>
</head>

```

```
<!--Caption data -->
<body>
  <div xml:id="c000001" begin="00:00:00.000">
    <p><span /></p>
  </div>
  <div xml:id="c000002" begin="00:00:10.000">
    <p xml:id="p000002-1" region="r000002-1"><span>あいうえお</span></p>
    <p xml:id="p000002-2" region="r000002-2"><span>かきくけこ</span></p>
  </div>
  <div xml:id="c000003" begin="00:00:30.000">
    <p xml:id="p000003-1" region="r000003-1"><span>&#xF000;もしもし</span></p>
  </div>
  <div xml:id="c000004" begin="00:00:45.000" end="00:01:00.000">
    <p><span /></p>
  </div>
</body>
</tt>
```

Annex 2 Guidelines for converting digital closed captions to ARIB-TTML captions

1 Object

In case of converting digital closed captions to ARIB-TTML closed captions, recommend conversion from HD closed captions, and describing the conversion recommendation method from the next section. Conversion from closed captions other than HD closed captions, conversion from ARIB - TTML captions to digital closed captions is a product planning.

2 Display position

According as display format of HD closed captions, both the vertical direction and the horizontal direction are displayed at the position multiplied by the magnification as shown in Table G2-1.

Table G2-1 Display position magnification

Display format code	Display format	Size of subtitle display area	Magnification
2K	1920x1080	Horizontal 1920×Vertical 1080	2 times
4K	3840x2160	Horizontal 3840×Vertical 2160	4 times
8K	7680x4320	Horizontal 7680×Vertical 4320	8 times

3 Character encoding

Character encoding of closed caption text data, and Convert letter type according to STD-B62 Volume 1 Part 2 Chapter 5 Character encoding. DRCS converts directly to SVG, preparing SVG file corresponding to DRCS in advance and mapping, etc. Conversion method is product planning. Also, if the external character defined in DRCS is included in the symbol / character added in STD-B62, it is desirable to convert it into a character code without using external characters.

4 Character size

In the `tts:fontSize` attribute of style information, for HD closed caption (Standard, medium size, small size, vertical, horizontal, double and vertical) font size and vertical and horizontal magnification, it is 2 times if it is 2K and 4 times if it is 4K 8 times if it is 8K.

Description example:

When converting HD closed caption (standard: horizontal 36px vertical 36px) to 4K : `tts:fontSize = "144px 144px"`

When converting HD closed caption (medium size: horizontal 18px vertical 36px) to 4K : `tts:fontSize = "72px 144px"`

5 Display section

Follow the operation of the character display section in ARIB TR-B39 Part 1 Chapter 3 8.3.4. The character spacing / line spacing for HD closed captions are, 2 times for 2 K, 4 times for 4 K, 8 times for 8 K, it is desirable to adjust the character spacing with the @arib-tt:letter-spacing attribute and the line spacing with the @tts:lineHeight attribute. Recommended character sizes, letter spacing, line spacing and display section are shown in Table G2-2.

Table G2-2 Character size, character / line spacing, display section (unit : px)

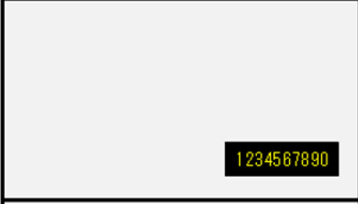
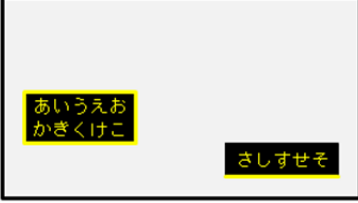
	HD		2K		4K		8K	
	Horizontal writing	Vertical writing	Horizontal writing	Vertical writing	Horizontal writing	Vertical writing	Horizontal writing	Vertical writing
Character size	36	36	72	72	144	144	288	288
Character spacing	4	12	8	24	16	48	32	96
Line spacing	24	24	48	48	96	96	192	192
Display section	40x60	60x48	80x120	120x96	160x240	240x192	320x480	480x384

6 Layout transformation

When multiple sentences exist on one closed caption screen, it is desirable to distinguish and display them. As a method of discriminating multiple sentences, A method of judging a block (strings constituting one context) of the same color adjacent in the character direction (horizontal) and the row direction as one sentence unit, and method of judging character blocks of the same color that are adjacent only in the character direction as a unit of a sentence. Regarding that, it is a product plan. When a character block composed of a plurality of lines is handled as one sentence, it is desirable to add
 at the end of the line and line by line except for the last line.

7 Format

It is necessary to convert the format of color, polarity reversal, flushing, underline, bordering, enclosure, scrolling, ruby, vertical writing / horizontal writing. Conversion example is shown in Figure G2-1.

Digital captions before conversion (Screen images)	converted ARIB-TTML captions (part)
00:01:00.000 <1 page >  00:01:10.000 <2 page >  00:01:20.000 <3 page >  00:01:30.000	<pre> <metadata> <arib-ttex:CaptionExchangeInformation> <arib-ttex:ProgramManagementInformation> . . . </arib-ttex:ProgramManagementInformation> <arib-ttex:TransmissionInformation> <arib-ttex:AdditionalAribSubtitleInfo> . . . </arib-ttex:AdditionalAribSubtitleInfo> <arib-ttex:TransmissionUnits> <arib-ttex:unit xml:id="u000001" timecode="00:01:00.000"> <arib-ttex:resource datatype="0000" style="s000001-1 s000001-2" region="r000001-1 r000001-2" page="c000001" /> </arib-ttex:unit> <arib-ttex:unit xml:id="u000002" timecode="00:01:10.000"> <arib-ttex:resource datatype="0000" style="s000002-1" region="r000002-1" page="c000002" /> </arib-ttex:unit> <arib-ttex:unit xml:id="u000003" timecode="00:01:20.000"> <arib-ttex:resource datatype="0000" style="s000003-1 s000003-2" region="r000003-1 r000003-2" page="c000003" /> </arib-ttex:unit> </arib-ttex:TransmissionUnits> </arib-ttex:TransmissionInformation> </arib-ttex:CaptionExchangeInformation> </metadata> <styling> <style xml:id="s000001-1" tts:fontFamily="丸ゴシック" tts:fontSize="72px 72px" tts:backgroundColor="#000000" tts:color="#ffffff" tts:lineHeight="48px" arib-tt:letter-spacing="8px" arib-tt:ruby="p000001-1-2" /> <style xml:id="s000001-2" tts:fontFamily="丸ゴシック" tts:fontSize="144px 144px" tts:backgroundColor="#000000" tts:color="#ffffff" tts:lineHeight="96px" arib-tt:letter-spacing="16px" /> <style xml:id="s000002-1" tts:fontFamily="丸ゴシック" tts:fontSize="72px 144px" tts:backgroundColor="#000000" tts:color="#ffff00" tts:lineHeight="96px" arib-tt:letter-spacing="16px" /> <style xml:id="s000003-1" tts:fontFamily="丸ゴシック" tts:fontSize="144px 144px" tts:backgroundColor="#000000" tts:color="#ffff00" tts:lineHeight="96px" arib-tt:letter-spacing="16px" arib-tt:border="solid 4px #FFFF00FF" /> <style xml:id="s000003-2" tts:fontFamily="丸ゴシック" tts:fontSize="144px 144px" tts:backgroundColor="#000000" tts:color="#ffff00" tts:lineHeight="96px" arib-tt:letter-spacing="16px" tts:textDecoration="underline" /> </styling> <layout> <region xml:id="r000001-1" tts:origin="**px **px" tts:extent="**px **px" style="s000001-1" /> <region xml:id="r000001-2" tts:origin="**px **px" tts:extent="**px **px" style="s000001-2" /> <region xml:id="r000002-1" tts:origin="**px **px" tts:extent="**px **px" style="s000002-1" /> <region xml:id="r000003-1" tts:origin="**px **px" tts:extent="**px **px" style="s000003-1" /> <region xml:id="r000003-2" tts:origin="**px **px" tts:extent="**px **px" style="s000003-2" /> </layout> <body> <div xml:id="c000001" begin="00:01:00.000"> <p xml:id="p000001-1" region="r000001-1">でんぱさんぎようかい</p> <p xml:id="p000001-2" region="r000001-2">電波産業会</p> </div> <div xml:id="c000002" begin="00:01:10.000"> <p xml:id="p000002-1" region="r000002-1">1 2 3 4 5 6 7 8 9 0</p> </div> <div xml:id="c000003" begin="00:01:20.000" end="00:01:30.000"> <p xml:id="p000003-1" region="r000003-1">あいうえお
かきく</p> <p xml:id="p000003-2" region="r000003-2">さしすせそ</p> </div> </body> </pre>

samples in conditions

< xml:id >

div: under body : "c" + page number

p: "p" + page number + p ser-nos in a page

region: "r" + page number + region ser-nos in a page

style: "s" + page number + style ser-nos in a page

unit: "u" + page number

< Style information >

Example of simply converting to page unit, it is desirable to combine redundant style information and reduce weight

< Coordinates of Display section >

Notation in "** px" (** is the value of coordinates)

Figure G2-1 Example of Conversion from Digital Subtitle

7.1 Color designation

Convert according to operation of color designation in ARIB TR-B39 Part 1 Chapter 3 8.5.6.4. In the ARIB-TTML document, it is not designated because it can not use the former intermediate color / back neutral color.

7.2 Polarity reversal

Convert by inverting text color and background color. Therefore, designate the character color as the `tts: backgroundColor` attribute and the background color as the `tts: color` attribute.

7.3 Flushing

Convert by flushing operation in ARIB TR-B39 Part 1 Chapter 3 8.5.6.10.

7.4 Underline

Convert by underline operation in ARIB TR-B39 Part 1 Chapter 3 8.5.6.5. Designate "underline" for the `tts:textDecoration` attribute as the style attribute of style element or region element. For details, refer to see ARIB TR-B39 Part 1 Chapter 3 8.5.5.10 `tts:textDecoration` attribute.

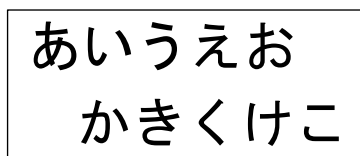
7.5 Edging

Convert according to the operation of bordering in ARIB TR-B39 Part 1 Chapter 3 8.5.6.6. Designate border color and the border width for `tts:textOutline` attribute as the style attribute of style element or region element. Designated value of the width of the edging, the designation of the blurring width of the edging and the specified value are product planning. For details, refer to see ARIB TR-B39 Part 1 Chapter 3 8.5.5.11 `tts:textOutline` attribute.

7.6 Enclosure

Convert according to character enclosure operation in ARIB TR-B39 Part 1 Chapter 3 8.5.6.7. Which of the drawing types shown in Figure G2-2 is to be used is a product plan.

Drawing style surrounding the
entire character drawing area



Drawing format surrounding only the area
where characters are drawn

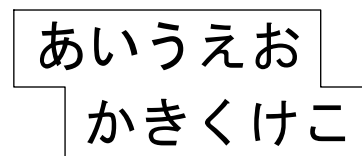


Figure G2-2 Character Enclosure Conversion Example

7.7 Scroll

Convert according to scroll operation in ARIB TR - B 39 Part 1 Chapter 3 8.5.6.11.

7.8 Rubi

In digital closed caption, ruby (furigana) is displayed pseudo as character size is small. As with other closed caption sentences, Conversion and of vertical and horizontal rate are, 2 times for 2 K, 4 times for 4 K, 8 times for 8 K. In ARIB-TTML closed caption it is possible to explicitly designate that the string is ruby using the `arib-tt:ruby` attribute. Whether to set the closed caption sentence expressed as ruby in digital closed caption to the `arib-tt:ruby` attribute of ARIB-TTML caption is a product plan.

7.9 Horizontal writing, vertical writing

As the style attribute of the style element or region element, in `tts:writingMode` attribute, designate "lrtd" if it is horizontal writing and "tbrl" if it is vertical writing. For details, refer to ARIB TR-B39 Part 1 Chapter 3 8.5.5.12 `tts:writingMode` attribute.

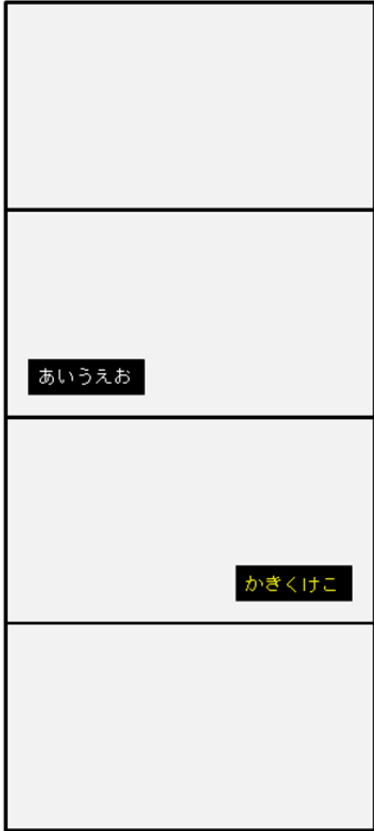
8 Erase screen

If the page management information includes an erase screen, empty span elements are described under p elements as shown in Table G2-3. An example of conversion of closed caption data including an erase screen is shown in Figure G2-3.

Table G2-3 Erase screen

In case of describing all pages under the div element immediately under the body element.	In case of repeatedly describe the div element directly under the body element as a page unit.
<code><p xml:id="pNNNNNN-001"></p></code>	<code><div xml:id="cNNNNNN"> <p></p> </div></code>

*NNNNNN is the page number

Digital captions before conversion((screen image)	Converted ARIB-TTML captions (part)
00:00:00.000 <1 page > 00:01:00.000 <2 page > 00:01:10.000 <3 page > 00:01:20.000 <4 page > 	<pre> <metadata> <arib-ttex:CaptionExchangeInformation> <arib-ttex:ProgramManagementInformation> . . . </arib-ttex:ProgramManagementInformation> <arib-ttex:TransmissionInformation> <arib-ttex:AdditionalAribSubtitleInfo> . . . </arib-ttex:AdditionalAribSubtitleInfo> <arib-ttex:TransmissionUnits> <arib-ttex:unit xml:id="u000001" timecode="00:00:00.000"> <arib-ttex:resource datatype="0000" page="c000001" /> </arib-ttex:unit> <arib-ttex:unit xml:id="u000002" timecode="00:01:00.000"> <arib-ttex:resource datatype="0000" style="s000002-1" region="r000002-1" page="c000002" /> </arib-ttex:unit> <arib-ttex:unit xml:id="u000003" timecode="00:01:10.000"> <arib-ttex:resource datatype="0000" style="s000003-1" region="r000003-1" page="c000003" /> </arib-ttex:unit> <arib-ttex:unit xml:id="u000004" timecode="00:01:20.000"> <arib-ttex:resource datatype="0000" page="c000004" /> </arib-ttex:unit> </arib-ttex:TransmissionUnits> </arib-ttex:TransmissionInformation> </arib-ttex:CaptionExchangeInformation> </metadata> <styling> <style xml:id="s000002-1" tts:fontFamily="丸ゴシック" tts:fontSize="144px 144px" tts:backgroundColor="#000000" tts:color="#ffffff" tts:lineHeight="96px" arib-tt:letter-spacing="16px" /> <style xml:id="s000003-1" tts:fontFamily="丸ゴシック" tts:fontSize="144px 144px" tts:backgroundColor="#000000" tts:color="#ffff00" tts:lineHeight="96px" arib-tt:letter-spacing="16px" /> </styling> <layout> <region xml:id="r000002-1" tts:origin="**px **px" tts:extent="**px **px" style="s000002-1" /> <region xml:id="r000003-1" tts:origin="**px **px" tts:extent="**px **px" style="s000003-1" /> </layout> <body> <div xml:id="c000001" begin="00:00:00.000"> <p></p> </div> <div xml:id="c000002" begin="00:01:00.000"> <p xml:id="p000002-1" region="r000002-1">あいうえお</p> </div> <div xml:id="c000003" begin="00:01:10.000"> <p xml:id="p000003-1" region="r000003-1">かきくけこ</p> </div> <div xml:id="c000004" begin="00:01:20.000" end="00:01:30.000"> <p></p> </div> </body> </pre>

samples in conditions
xml:id

div under body : "c" + page number
p: "p" + page number + p ser/no. in a page
region: "r" + page number + region ser/no. in a page
style: "s" + page number + style ser/no. in a page
unit: "u" + page number

< Style Information>
Example of simply converting to page unit, it is desirable to combine redundant style information and reduce weight

< Coordinates of Display section>
Notation in "** px" (** is the value of coordinates)

Figure G2-3 Conversion example of closed caption data including erase screen

9 File exchange format

9.1 Closed caption data label

It is recommended that closed caption data labels included in digital closed captions be stored in the Medium element value under the arib-ttp:CaptionDataLabel element.

Also, add one arib-ttp:Medium element and store "UCAPTION" in the element value and the closed caption data label value of the conversion source.

(Example) When the source HD closed caption is "terrestrial digital closed caption data"

```
<arib-ttp:CaptionDataLabel>
  <Medium>DCAPTION</Medium>
  <Medium>UCAPTION</Medium>
</arib-ttp:CaptionDataLabel>
```

9.2 Program management information

As shown in Table G2-4 it is recommended that each item of program management information included in digital closed captions be converted.

Table G2-4 Recommended conversion of program closed caption program management information

Item name	Recommended conversion to ARIB-TTML closed caption
Production station display	If it is not a space, inherit directly to the arib-ttp:ProductionStation element.
Material number (program code)	Inherit directly to the arib-ttp:MaterialCode element.
Program name	Convert character code to UTF - 8 and store it in the arib-ttp:ProgramTitle element.
Program closed caption	If it is not a space, convert character code to UTF - 8 and store it in arib-ttp:ProgramSubTitle element.
Material type	If it is not space, convert it to arib-ttp:MaterialType element and store it.
Registration mode	If it is not a space, inherit directly to arib-ttp:RegistrationMode element.
Language code	Inherit directly to arib-ttp:ISO_639_language_code element.
DMF reception display	Upper 1 byte is represented by 2 bits, convert to display mode b4b3. However, 3: if Specific condition automatic display / non-display is selected 10 : It is selected display when receiving. Lower 1 byte is represented by 2 bits, convert to display mode b2b1. Store the converted b4b3b2b1 in the arib-ttp:DMF element.
Independence / Complement / Closed captions	It is not used in ARIB-TTML subtitles.
Presence or absence of sound	It is not used in ARIB-TTML subtitles.
Total number of pages	Convert to integer and store it in arib-ttp:NumberOfPages element.
Program data volume	It is not used in ARIB-TTML subtitles.

Presence or absence of UT (untime)	Convert to false for spaces, true for *, and store them in arib-ttp:Untime element.
RT (real time) timing type	Inherit directly to the arib-ttp:RTTimingType element.
Timing unit designation	It is not used in ARIB-TTML subtitles.
Initial time	Convert to hh (hour): mm (minute): ss (seconds) .fff (milliseconds) format and store it in arib-ttp:InitialTime element.
Synchronization mode	In TR-B 14, subtitle is P: Program Synchronization Fixed, so it is not used in ARIB-TTML.
Time control mode (TMD)	In the case of FR, it is converted to "1111", for OF, it is converted to "0010", and store it in arib-ttp:TMD element.
Extendability	Place arib-ttp:Medium element for each byte position where * is set under the arib-ttp: AvailableMedia element, convert and store in the character string of the valid media against byte position where * is set. If there is * in the 5-8th byte, convert it to "spare". However, regardless of the number of *, "spare" is only one. Also add the arib-ttp:Medium element with the value of "UHD". (Example) When conversion source HD closed caption is "_ * _ * _ _" and it is also available for 4 K and 8 K <pre> <arib-ttp:AvailableMedia> <arib-ttp:Medium>BS</arib-ttp:Medium> <arib-ttp:Medium>地上 D</arib-ttp:Medium> <arib-ttp:Medium>UHD</arib-ttp:Medium> </arib-ttp:AvailableMedia> </pre>
AvailableVideo	Place arib-ttp:VideoType element for each byte position where * is set under the arib-ttp:AvailableVideoTypes element, convert and store in the character string of the valid media against byte position where * is set. If there is * in the 4-8th byte, convert it to "spare". However, regardless of the number of *, "spare" is only one. Also add arib-ttp:VideoType element of "4K" when it is available for 4K and "8K" when it is available in 8K. (Example) When conversion source HD closed caption is "* _ _ _ _ _" and it is also available for 4 K and 8 K <pre> <arib-ttp:AvailableVideoTypes> <arib-ttp:VideoType>HD</arib-ttp:VideoType> <arib-ttp:VideoType>4K</arib-ttp:VideoType> <arib-ttp:VideoType>8K</arib-ttp:VideoType> </arib-ttp:AvailableVideoTypes> </pre>
Expiration date	It converts to YYYY (Year) - MM (Month) - DD (Day) format and stores it in arib-ttp:ValidPeriod element.
Author / Creating Organization	Convert character code to UTF-8 and store it in arib-ttp: Creator element.
Created date, hour, minute	Convert it to the format YYYY (Year) - MM (Month) - DD (Day) Thh (hour): mm (minute): ss (second) and store it in arib-ttp:CreationDate element. However, since it has no value for seconds, it is set to "00".

On-air date	Convert the upper 8 bytes to date in YYYY (Year) - MM (Month) - DD (Day) and store it in arib-ttex:StartDate element. Convert the upper 8 bytes to date in YYYY (Year) - MM (Month) - DD (Day) and store it in arib-ttex:EndDate element. However, if lower 8 bytes are spaces, do not convert, and is not described arib-ttex:EndDate element.
Broadcast day of the week	Below arib-ttex:AirDate element under arib-ttex:AirInformation element, place arib-ttex:DayOfWeek element for each byte position where * is set, * is converted into the character string of the day of the week for the set byte position and stored. If 7 bytes are all spaces, is not described arib-ttex:DayOfWeek element. (Example) In case of "* _ _ _ _ _" at conversion source HD closed caption <arib-ttex:AirInformation> <arib-ttex:AirDate> <arib-ttex:DayOfWeek>月</arib-ttex:DayOfWeek> </arib-ttex:AirDate> </arib-ttex:AirInformation>
Broadcasting time frame	Upper 6 bytes are converted into time in hh (hour): mm (minute): ss (second) and stored in arib-ttex:StartTime element. However, if upper 6 bytes are spaces, do not convert, and is not described arib-ttex:EndTime element. Lower 6 bytes are converted into time with hh (hour): mm (minute): ss (second) and stored in arib-ttex:EndTime element. However, if lower 6 bytes are spaces, do not convert, and is not described arib-ttex:EndTime element.
Notes	Convert the character code to UTF - 8, and it is stored in arib-ttex:Memo element under arib-ttex:ProgramManagementInformation element.
Spare	It is not used in ARIB-TTML subtitles.
Completion mark	Convert to false for spaces, true for *, and store them in the arib-ttex:CompletionFlag element under the arib-ttex:ProgramManagementInformation element.
User's area identification	It is not used in ARIB-TTML closed captions.
User's Area	It is not used in ARIB-TTML closed captions.

9.3 Page management information

It is recommended that each item of page management information included in digital closed captions be converted as shown in Table G2-5.

Table G2-5 Recommended conversion of HD closed caption page management information

Item name	Recommended conversion to ARIB-TTML closed caption
Page number (page code)	Transport to xml: id attribute of the div element immediately under p element or the body element. In case of p element, "p" + page number (NNNNNN) + "-" + branch number is recommended, and in case of div element immediately under body element, "c" + page number (NNNNNN) is recommended.
Page material type	Convert into arib- ttex: MaterialType element under the arib- ttex:PageInfo element and store it.
Transmission timing type	"RT" for RT space and "UT" for UT are stored in arib- ttex: PlayoutTimingType element.
Timing unit designation	It is not used in ARIB-TTML closed captions.
Transmission timing	To the begin attribute of the element indicating relevant page, converts it into hh:mm:ss.fff format as the relative time from closed caption sending reference time and stores it.
Erase timing	To the end attribute of the element indicating relevant page, converts it into hh:mm:ss.fff format as the relative time from closed caption sending reference time and stores it.
Time control mode (TMD)	It is not used in ARIB-TTML closed captions.
Erase screen	Convert to true for OFF, false for space, and store it in arib- ttex: ClearScreenFlag element.
Display format	Convert only Vertical writing and horizontal writing, designate it as page unit with tts: writingMode attribute.
Display image effective ratio	It is not used in ARIB-TTML closed captions.
Window display area	It is used to derive the display position of closed caption text.
Scroll	It is used for describing the scroll shown in 7.7, and not stored as a value.
Scroll direction	It is used for describing the scroll shown in 7.7, and not stored as a value.
Presence or absence of sound	It is not used in ARIB-TTML closed captions.
Page data amount	It is not used in ARIB-TTML closed captions.
Designate page deletion	Convert to false for spaces, true for ERS, and store them in the arib- ttex: DeleteFlag element.
Notes	Convert character code to UTF-8 and store it in the arib- ttex: Memo element under arib- ttex: PageInfo element.
Spare	It is not used in ARIB-TTML closed captions.
Page completion mark	Convert to false for spaces, true for *, and store them in arib- ttex: CompletionFlag element under arib- ttex: PageInfo element.
User's area identification	It is not used in ARIB-TTML closed captions.

User's area	It is not used in ARIB-TTML closed captions.
-------------	--

9.4 Setting transmission information

Although not essential, Table G2-6 shows items and recommended settings that is desirable to set for transmission information.

Table G2-6 Items that is desirable to set for transmission information, and recommended settings

Item name	Recommended setting for ARIB-TTML closed caption
Closed caption identification tag	In arib- <i>ttex</i> : <i>subtitle_tag</i> element, store the value of 8 bits defined by each broadcaster as a hexadecimal character string. A character (column) indicating that it is a hexadecimal character string notation such as "0x" at the head of the character string or "h" at the end is not added, and apply 0 to the beginning as necessary so that it becomes a fixed-length character string of length 2. (Example: 0F)
Closed caption type	arib- <i>ttex</i> : <i>type</i> element value is fixed to "00" (closed caption).
Closed caption description method identification	The arib- <i>ttex</i> : <i>subtitle_format</i> element value is fixed to "0000" (ARIB-TTML description method).
Action mode	arib- <i>ttex</i> : <i>OPM</i> element value is fixed to "01" (segment mode).
Compression method	Whether to compress in the EXI format depends on the judgment of each broadcasting company.

Annex 3 Desirable description example

In the ARIB-TTML document, as described in "2.2.5 Expression method of closed caption page", the following two descriptions are possible.

- Place only one div element immediately under the body element and describe all p elements (closed caption text) and div elements (images and sounds) under them.
- Repeatedly describing the div element immediately under the body element as a page unit

In this standard, as a method of designating the extraction of ARIB-TTML document to be stored in MFU, the method of designating the constituent element by the closed caption attribute, image attribute, audio attribute of arib-rtex:resource element respectively and it is prescribed how to designate div elements in page units with the page attribute. By combining these descriptions, description patterns increase. Here, a desirable description example for ARIB-TTML closed caption file exchange more reliably is described.

1 Example of description by page

Except for the animation operation, as shown in Figure G3-1, the range where there is no change in the display of closed caption text on the receiver is set as one page. It is desirable to describe, it by separating it with the div element directly under the body element. At that time, describe the time information by the begin attribute and the end attribute in the div element.

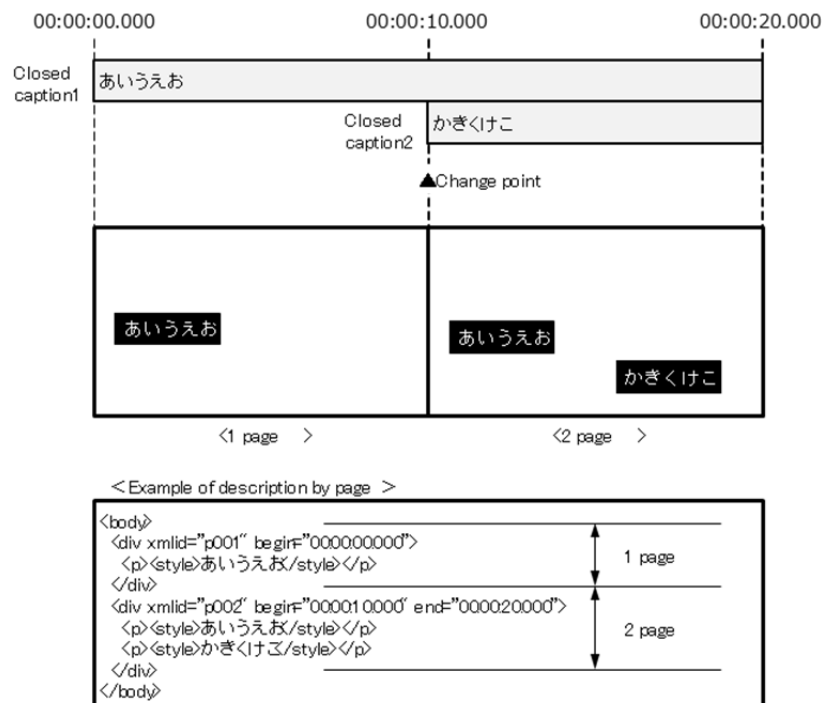


Figure G3-1 Example of description by page

On the other hand, place div element such as p element of all closed captions to be displayed in the program below the div element immediately below the body element, images and sounds, and when this is sent as one ARIB-TTML document, there are the following problems.

- Since closed captions are not repeatedly transmitted, it is transmitted to the receiver only once at the start of the program, and closed captions are not displayed when reception (viewing) is started from the middle of the program.
- If all closed caption data to be displayed in the program is stored in the receiver, if it is desired to replace only a specific closed caption sentence in the middle of the program, it is necessary to replace with the ARIB-TTML closed caption from the modification point to the end of broadcasting, it is complicated to deal with production and transmission of closed captions.

It is necessary to send it by dividing it into page units, even when viewing is started from the middle of the program, closed captions are correctly displayed and it is necessary to be able to modify (replace) specific closed caption sentences during program transmission.

Although it is possible to send it by page unit at the sending stage, it is easy to grasp the unit sent out by preliminarily dividing it into page units at the stage of closed caption production, and editing work such as replacement of closed caption texts will be easy.

2 Description example for extracting ARIB-TTML document on page unit

Since ARIB-TTML documents are desirably separated by div elements on a page unit basis, as an extraction specification of ARIB-TTML document to be stored in the MFU, by specifying the xml:id value of the div element in the page unit with the page attribute of the arib-ttex:resource element, the description becomes simple, it is also desirable from the viewpoint of preventing extraction omission.

Annex 4 Closed caption display area

In case of broadcasting by down-converting a program or the like produced by the ultra high definition television (UHDTV) method to HDTV, the area for displaying at the same position ratio so that the digital closed caption defined by ARIB STD-B36 converted from the ARIB - TTML caption can be displayed without lacking is shown.

In the classification of the display reproduction range of ARIB TR-B4 "Safety Zone on Aspect Ratio 16: 9 Screen", the closed caption display area applies to the important information range. The percentage of the important information range with respect to the information effective scanning is defined as 90% width and 90% length. However, when moving to the target safety zone, it is 95% lateral and 95% vertical.

The closed caption display area is an area designated by the number of vertical and horizontal pixels (effective pixels) that can display closed captions on the closed caption plane and the coordinates (base point coordinates) from the upper left corner of the closed caption plane.

Figure G4-1 shows the relationship between the closed caption display area and the closed caption plane that needs to be taken into consideration when creating closed captions.

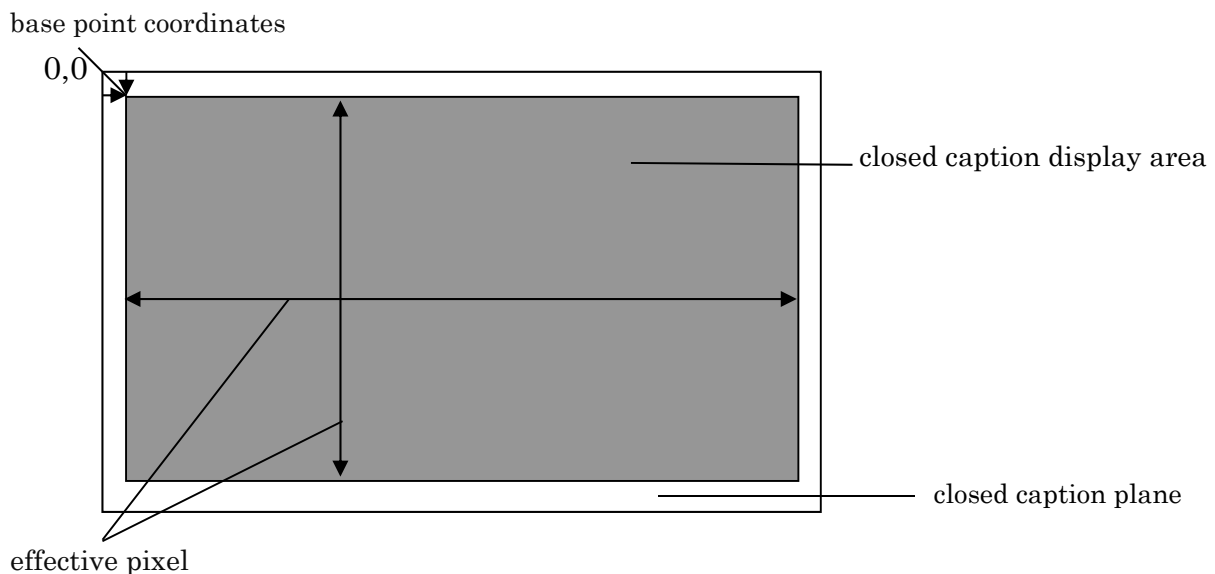


Figure G4-1 Subtitle plane and subtitle display area

When the display format code is "4 K", since the horizontal direction is 3840 (pixels) and the vertical direction is 2160 (pixels),

effective pixels (horizontal) are	$3840 \times 0.9 = 3456$ (pixels).
effective pixels (vertical) are	$2160 \times 0.9 = 1944$ (pixels).
base point coordinates (horizontal) are	$(3840 - 3456) / 2 = 192$ (pixels)
base point coordinates (vertical) are	$(2160 - 1944) / 2 = 108$ (pixels)

The Closed caption display area is obtained from the base point coordinates and effective pixels as follows.

The minimum value of the closed caption display area (horizontal) are
base point coordinate (horizontal) = 192 (pixel)

The maximum value of the closed caption display area (horizontal) are
 $192 + 3456 - 1 = 3647$ (pixels)

The minimum value of the closed caption display area (vertical) are
base point coordinates (vertical) = 108 (pixels)

The maximum value of the closed caption display area (vertical) are

$$108 + 1944 - 1 = 2051 \text{ (pixels)}$$

The other display modes are summarized as shown in Table G4-1.

Table G4-1 Display mode

mode	closed caption plane horizontal × vertical	Base point coordinates		Effective pixel		Closed caption display area	
		horizontal	vertical	horizontal	vertical	horizontal	vertical
8K	7680×4320	384	216	6912	3888	384~7295	216~4103
4K	3840×2160	192	108	3456	1944	192~3647	108~251
2K	1920×1080	96	54	1728	972	96~1823	54~1025

(Unit: pixel)

EXCHANGE FORMAT OF THE DIGITAL CLOSED CAPTION
FILE FOR DIGITAL TELEVISION BROADCASTING SYSTEM
(SECOND GENERATION)

ARIB STANDARD

ARIB STD-B69 Version 1.1-E1

(March 24, 2017)

This Document is based on the ARIB standard of " EXCHANGE FORMAT
OF THE DIGITAL CLOSED CAPTION FILE FOR DIGITAL TELEVISION
BROADCASTING SYSTEM (ARIB STD-B69 Version 1.1)" in Japanese edition
and translated into English in December, 2018

Published by

Association of Radio Industries and Businesses

11F, Nittochi Building,

1-4-1 Kasumigaseki, Chiyoda-ku, Tokyo 100-0013, Japan

TEL 03-5510-8590

FAX 03-3592-1103

Printed in Japan

All rights reserved
