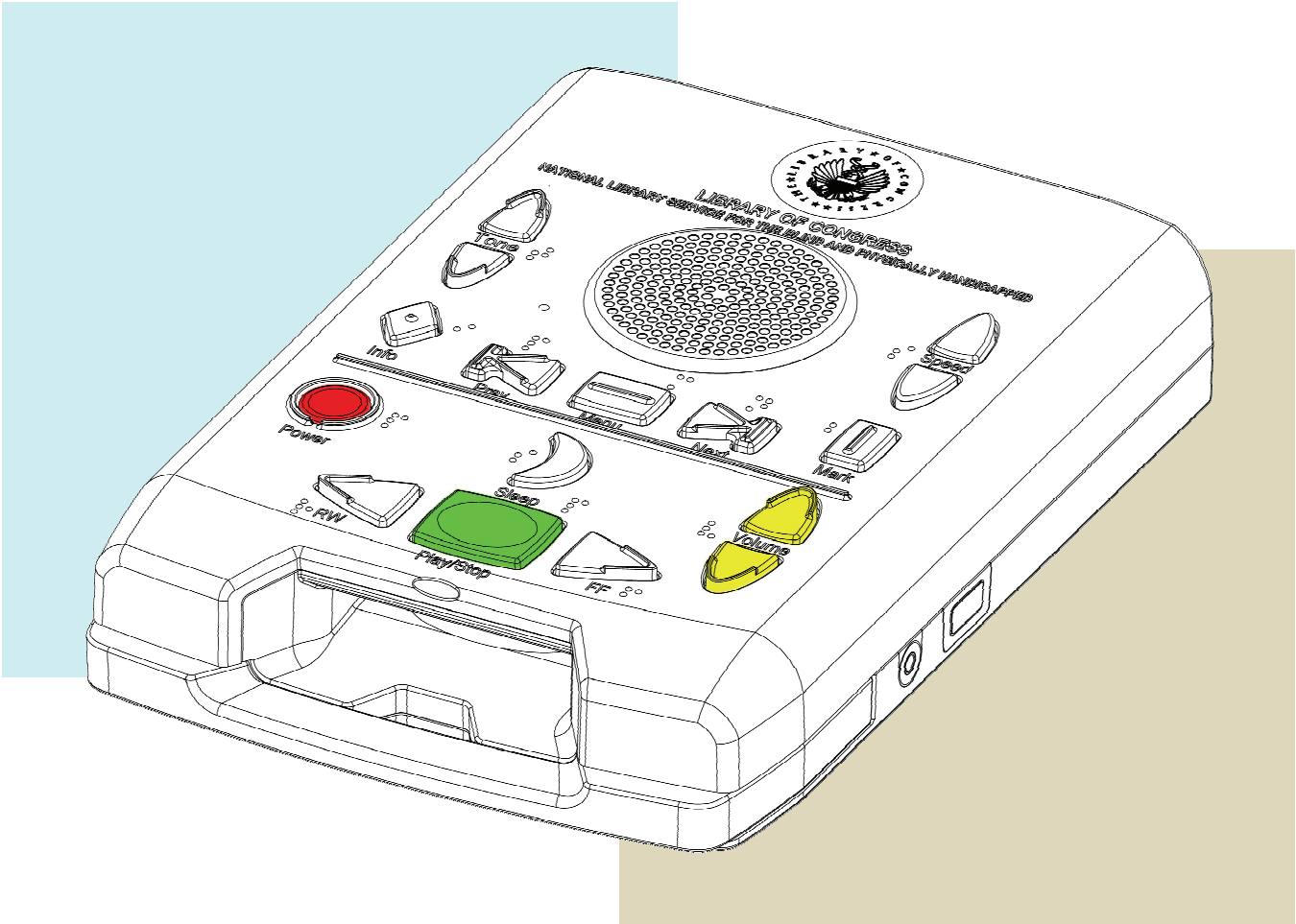
National Library Service for the Blind and Physically Handicapped

The Library of Congress

Network Guideline **NG03:2008**

Requirements for Digital Talking Books to Ensure Correct Operation in DS1 and DA1 Players



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1 Scope and Background

This document describes the requirements for the set of files that comprise a digital talking book (DTB) compliant with ANSI/NISO Z39.86-2002 for use with the NLS digital talking book machine (DTBM).

Many requirements set forth in this document are to ensure that books will play correctly and efficiently on NLS digital talking-book machines (DS1 and DA1). Those requirements that are "best practices" and not essential to playback on NLS players are marked with a check mark (✓).

Production of a digital talking book comprises three major steps:

1. **The print book is narrated and recorded digitally.**
   Guidance for this step can be found in the NLS document "Requirements for Digital Audio Master Recordings of Books Originated by Network Libraries."
   PCM "WAV" files are created in this step.

2. **The digital audio files are "marked up" with navigation points and book metadata following the ANSI/NISO Z39.86 standard.**
   An ANSI/NISO Z39.86 DTB is created in this step.

3. **The DTB is protected to comply with copyright law (Public Law 104-1975)**
   A protected DTB is created in this final step.

Many of the requirements in this document relate to the content of files comprising the digital talking book that are not created or changed directly by library personnel creating DTBs. NLS suggests that these requirements be built into the tools used to produce DTBs. These requirements are designated with a note [*Production Tool Requirement*].
Requirements related to copyright protection are indicated with a note [*Protection Tool requirement*]. Network libraries should ensure that the tools purchased to produce DTBs for the NLS player comply with these requirements.

The NLS digital talking book machines do not make use of the text elements for navigation labels and points in a DTB. Text elements are useful during the production process. Commercial third-party DTB players and future NLS players may use text elements. A network library may choose to omit text elements for locally produced books.

This document should be considered a guideline unless the DTB is created for distribution by NLS. If distributed by NLS, this document should be considered a specification.

2 Reference Documents

In the event of conflict between the publications referenced herein and the content of this specification, this specification shall be considered a superseding requirement.

American National Standards Institute (ANSI)

ANSI/NISO Z39.86-2002
Specifications for the Digital Talking Book

The document cited above is available from:
American National Standards Institute, Inc.
11 West 42nd Street
New York, NY 10036
Or from:
http://www.niso.org/standards/resources/Z39-86-2002.html

National Library Service for the Blind and Physically Handicapped

NLS Specification 300
Book Mastering

Guidelines for Applying Navigation Markers to Digital Talking Books

NG02:2008
Production of Digitally Recorded Audio Masters for Books Originated by Network Libraries

NLS Specification 1202
Requirements for Distribution Source Files, Review Copies, and Blank Recordable Compact Disc

The documents cited above are available from:
National Library Service for the Blind and Physically Handicapped
Library of Congress
1291 Taylor Street, NW
Washington, DC 20542
Or from:
http://www.loc.gov/nls/specs/

European Telecommunications Standards Institute

ETSI TS 126 290 release 7
Extended Adaptive Multi-rate-Wideband (AMR-WB+) codec;
Transcoding functions
(also published as 3GPP TS 26.290 release 7)

ETSI TS 126 244 release 7
Transparent end-to-end packet switched streaming service; 3GPP file format (3GP) (also published as 3GPP TS 26.244 release 7)

The documents cited above are available from:
http://www.3gpp.org/ftp/Specs/html-info/26244.htm

International Standards Organization

ISO 8601 Numeric Representation of Date and Time

The document cited above is available from:
http://www.iso.org/iso/en/prods-services/popstds/datesandtime.html

DAISY Consortium

DAISY Protected Digital Book Specification 2.0

The document cited above it available from:
http://www.daisy.org/projects/pdtb/

3 Requirements

3.1 Files

3.1.1 General

The DTB files are defined by ANSI/NISO Z39.86-2002.

3.1.1.1 File names

a. All alphabetic characters shall be in lower case. ✓

b. Book-specific file names [excludes document type definitions (DTD) and entity files], shall have a maximum of ten alphanumeric characters followed by the appropriate file extension required by ANSI/NISO Z39.86-2002 or as specified elsewhere in this document. ✓

> *Note:* This numbering scheme is required for network books distributed by NLS. It is a best practice but not a requirement for the book to play.
>
> This ten character sequence is referred to as the "Book Designator" elsewhere in this document.

c. SMIL files, (where a DTB contains more than one SMIL file and all audio files with the exception of the announcement and headings files,) shall have a sequence indicator consisting of a hyphen and four digits (including any leading zeroes needed to meet the four-digit requirement) appended to the Book Designator in the file name. The range of sequence indicators shall begin with -0001 (e.g., 56123-0001.3gp), and the sequence shall be continuous. For audio files holding the content of the DTB, the last two digits of the sequence indicator shall equal the two-digit side number (described in NLS Specification 1202, section 3.3.2.1e) for the corresponding WAV file. Any other audio files present in the DTB (other than the announcement and headings files, whose file names are prescribed) shall be assigned sequence indicators commencing after the number of the final audio content file. ✓
[*Production Tool Requirement*]

d. The DTB-specific audio files shall maintain their file names, except that they shall carry the appropriate file extension required by ANSI/NISO Z39.86-2002 or ETSI TS 126 244 release 7, as appropriate (e.g., 56123ann.3gp).
[*Production Tool Requirement*]

e. Media change message files (see 3.2.1.1) shall be named "insertn.3gp" where "n" is the number of the cartridge to be inserted. ✓
[*Production Tool Requirement*]

3.1.1.2 Unique Identifier (UID)

The UID shall consist of the lower-case character string "us-ntwk-ccccnnnnnnnnnn" "cccc" represents the library's code and "nnnnnnnnnn" represents the Book Designator (see 3.1.1.1b) assigned to the network book. ✓

> *Note:* This format of UID is required for books distributed by NLS. It is not a requirement for the book to play. The inclusion of the library's code identifier (e.g. dc7a) is to ensure that all book identifiers are unique across the NLS network.

3.1.2 Audio Files

3.1.2.1 Compression

All DTB audio files shall be compressed with an AMR-WB+ audio encoder conforming to the requirements of section 3.4.1. The suggested AMR-WB+ settings are: **mode 23** and **ISF 1 (ISF index 8)**[1]

> *Note:* The NLS DTB player is able to play audio files compressed with other AMR-WB+ modes and Internal Sampling Frequencies however these settings provide the best balance of audio fidelity and file size.
>
> The player is also capable of playing audio compressed with MPEG1/Layer3 (MP3), however for voice reproduction at least twice the bit rate is required for audio quality equivalent to AMR-WB+.
>
> The master recording (the source file that is to be compressed) is recorded at 44.1ksps/16bit as per the *Network Guideline for Digital Book Recording*.

3.1.2.2 Time Offset

The clipEnd time for each audio fragment shall be placed no closer than 200ms following the end of the narration of that fragment.

> *Note:* This is to ensure that audio is not clipped due to time delays introduced in the audio compression, decompression and formatting functions.
>
> The user would typically mark the end of the audio using the DTB production tool and the tool itself would enforce this requirement (move the clipEnd marker if it was less than 200ms from the end of audio).

[*Production Tool Requirement*]

3.1.2.3 Sound Quality

Compressed audio files shall be of acceptable subjective sound quality when compared to the WAV file conforming to the requirements of the *Digitally Recorded Book Network Guide.*
[*Production Tool Requirement*]

> Note: An implementation of an AMR-WB+ encoder conforming to the 3GPP standard will produce audio of high subjective sound quality when used to compress speech with the settings prescribed in 3.1.2.1. Material containing music or voice-over music may require a higher bit rate than that specified for speech to achieve acceptable sound quality.

3.1.2.4 Source

The source for each compressed file shall be identical to DTB-specific WAV file used when creating the DTB metadata files.

> *Note:* The navigation timing of the DTB is created using the source WAV files. These must be used, unaltered, to create the compressed files or the navigation points will be incorrect.

3.1.3 SMIL Synchronization File

The SMIL file(s) shall conform to the normative requirements of section 7 of ANSI/NISO Z39.86-2002.

[1] These settings result in a compressed bit rate of 24kbps and a frame duration of 20ms.

3.1.3.1 SMIL Validity

The SMIL file(s) shall be well-formed and valid to the DTB-specific SMIL DTD of Appendix 2 of ANSI/NISO Z39.86-2002.
[*Production Tool Requirement*]

3.1.3.2 SMIL Audio Clips

3.1.3.2.1 clipBegin and clipEnd Required

In all SMIL audio elements, both clipBegin and clipEnd must be present and valued.
[*Production Tool Requirement*]

> Note: DA1 Navigation by "phrase" is performed using SMIL segments. These tags are required for this functionality to perform correctly.

3.1.3.2.2 SMIL Pauses

The clipBegin time for each audio fragment shall be placed not more than 100ms before the beginning of narration of that fragment. The clipEnd time shall be placed so as to preserve the pause that follows the end of the narration of that fragment. (See also section 3.1.2.2.)

> Note: A minimum of silence predeeding the clip maximizes the responsiveness of the DTB to navigation actions.

3.1.3.3 SMIL Metadata

SMIL metadata shall conform to the requirements of section 7.5 of ANSI/NISO Z39.86-2002, and the element "dtb:generator" shall identify the production tool and software version used to produce the DTB.
[*Production Tool Requirement*] ✓

> Note: dtb:generator identifies the tool that was used to create the DTB. While not used directly by the player, it is useful in finding books for recall should a fault related to a particular tool or software version be found after the book is in circulation.

3.1.3.4 Escapable Structures

If any structures are to be escapable, the SMIL file(s) shall conform to the normative requirements of section 7.4.1 of ANSI/NISO Z39.86-2002.
[*Production Tool Requirement*]

> Note: The DA1 and DS1 players do not give the user the ability to escape an "Escapable Structure". Books may be produced with this feature for third party or future NLS players that may use this feature.

3.1.3.5 Skippable Structures

If any structures are to be skippable, the SMIL file(s) shall conform to the normative requirements of section 7.4.3 of ANSI/NISO Z39.86-2002.
[*Production Tool Requirement*]

3.1.3.5.1 defaultState Values

Unless otherwise specified the value of defaultState shall be set to "true" for all skippable structures. The value of the defaultState for a given customTest element must be the same in all SMIL files for a DTB.

> Note: The DA1 and DS1 NLS players do not give the user the ability to control whether to skip or play "Skippable Structures." To ensure that all material is played and not skipped by the NLS DA1 and DS1 player, the defaultState for Skippable Structures should be set to true.

3.1.3.6 Opening Announcements for the DTB

The opening announcements shall be referenced by the first SMIL file such that they are the first audio encountered in normal playback.

3.1.3.7 Excluded Audio

The SMIL shall be structured so that the item listed below is not played during DTB playback.

a. All announcements related to cassette usage

> Note: The audio files may be recorded for use on cassette tapes and DTBs. It is possible to have material contained in the audio files that is not intended to be played on the DTB (e.g., cassette announcements). Audio segments intended to be rendered by the DTBM must be marked by a SMIL segment to be played.

3.1.3.8 SMIL Structure

At a minimum, one <par> (see ANSI/NISO Z39.86-2002, section 7.3 for definition) shall be included for each structural element in the book for which an NCX entry has been created.
[*Production Tool Requirement*]

3.1.3.9 SMIL File Size and Number

SMIL files exceeding 100 kilobytes must be divided into multiple SMIL files.
The number of SMIL files should not exceed 100.
[*Production Tool Requirement*]

> Note: SMIL files of excessive length slow the response of the DTBM to user actions (like Next/Previous Chapter). Some production tools will make many very small SMIL files.
>
> The ability to set this limit is a requirement of the production tool; however the user must explicitly set the 100 kilobyte limit as a parameter.

3.1.3.10 Segments

A segment is a short section of audio such as a paragraph, list item, table row, etc.; it has no heading and is not part of the hierarchical structure of the book. When required, specified segments shall be represented by <par>s or <seq>s in the SMIL file(s).
[*Production Tool Requirement*]

> Note: For guidance, consult "Guidelines for Applying Navigation Markers to Digital Talking Books (DTBs)".
>
> This allows the navigation by "phrase" to be used on these segments even though there is no explicit navigation point defined.

3.1.4 Navigation Control File (NCX)

The NCX file shall conform to the normative requirements of section 8 of ANSI/NISO Z39.86-2002.
[*Production Tool Requirement*]

3.1.4.1 NCX Validity

The NCX file shall be well-formed and valid to the NCX DTD of Appendix 3 of ANSI/NISO Z39.86-2002.
[*Production Tool Requirement*]

Non-ASCII characters in all <text> elements shall be represented as numeric character references or as UTF-8 multibyte sequences.
[*Production Tool Requirement*] ✓

3.1.4.2 Audio Heading Clips

The set of audio clips of the docTitle, docAuthor, and NCX headings shall be collected in a single, separate file that shall be compressed and shall be included on each cartridge.

3.1.4.2.1 clipBegin Timing

The clipBegin time for each audio clip shall be not more than 100ms before the beginning of narration in that clip. (See section 3.1.3.2.2.)

3.1.4.2.2 clipBegin and clipEnd Required

In all audio elements, both clipBegin and clipEnd must be present and valued.
[*Production Tool Requirement*]

> Note: The Audio Heading Clips are used for rapid rendering of headings when moving forward and backward by Chapter/Section/Page etc.

3.1.4.3 navLabel Content

3.1.4.3.1 navLabel Content for navPoints

Each navLabel within a navPoint shall contain both text and audio elements. The audio element shall contain a pointer to an audio clip of the heading of the navigable section of the book referenced by its parent navPoint. The audio clip shall be contained in the Audio Heading Clip file described in section 3.1.4.2. The audio and text content shall match the print headings found in the body of the book, rather than the table of contents. Line breaks and font information cannot appear in the text element. However their intent should be captured, if possible, using punctuation.

> Note: Audio NavLabels are required for operation of DTBs on the DS1 and DA1. Text NavLabels are not required but can be useful in the production process and for third party players that may render text for low vision readers.

3.1.4.3.2 navLabel Content for navTargets

Each navLabel within a navTarget shall contain both text and audio elements. The audio element shall contain a pointer to an audio clip as follows:

a. For note references (noteRefs), the audio clip shall contain the identifier (e.g., “note” or “footnote”) followed by the reference number. If the reference is a symbol, the audio clip shall contain only the identifier.

b. For page numbers (pageNums), the audio clip shall contain the identifier “page” followed by the page number. For special page numbers, the audio clip shall contain the identifier followed by the number as it appears in the print book, e.g., “page roman four” for iv; “page A one” for A-1.

c. For line numbers (lineNums), the audio clip shall contain the identifier “line” followed by the line number.

The audio clip shall be contained in the Audio Heading Clip file described in section 3.1.4.2.

The text element shall contain only the appropriate number without the identifier “note,” “page,” or “line,” except for noteRefs indicated only by a symbol, for which it shall contain an asterisk. The text for special page numbers shall match the print book

3.1.4.4 docTitle

The docTitle element shall contain an audio element containing a pointer to an audio clip of the book’s title and a text element containing the book’s title. The audio clip shall be contained in the Audio Heading Clip file described in section 3.1.4.2.

> Note: docTitle and docAuthor marked segments are played when the cartridge is inserted to identify the book.
>
> The text element is not required but can be useful in the production process and for third party players that may render text for low vision readers.

3.1.4.5 docAuthor

The docAuthor element shall contain an audio element containing a pointer to an audio clip of the book's author's name, preceded by any relevant phrase (e.g., “by,” “edited by,” “compiled by”) and a text element containing the book author name. The audio clip shall be contained in the Audio Heading Clip file described in section 3.1.4.2.

> Note: docTitle and docAuthor creation is sometimes enforced by the DTB production tool. The actual audio that is recorded in these clips is under the control of the user and must conform to these requirements.

3.1.4.6 NCX Metadata

NCX metadata shall conform to the requirements of section 8.4.1 of ANSI/NISO Z39.86-2002 and contain the element “dtb:generator.”
[*Production Tool Requirement*]

3.1.4.7 NavPoints

3.1.4.7.1 NCX Nesting

When multiple levels of structures are included in the NCX, those levels must be reflected in properly nested navPoints.
[*Production Tool Requirement*]

3.1.4.7.2 Class Attribute on navPoints

Each navPoint shall have a class attribute drawn exactly from Table I, corresponding as closely as possible to the type of book structure marked by the navPoint.

> Note: The player will announce the navigation level in response to the user pressing the "Menu" button based on the class attribute. It is essential that the class attribute matches exactly one of the terms from table I. If this is not done, "Level 1 jump," "Level 2 jump," etc. will be rendered instead.

3.1.4.7.3 pageRefs

Each navPoint beginning on a page whose number is included in a navList of page numbers shall contain a pageRef attribute.
[*Production Tool Requirement*]

3.1.4.8 NavLists

If it is required that any of the book structures listed below be made separately navigable in the SMIL file(s), a navList is required for each, conforming to the normative requirements of ANSI/NISO Z39.86-2002.

- footnote reference (noteRef)
- page number (pageNum)
- line number (lineNum)

Each navList element shall have a class attribute describing the book structures it contains; the class attribute shall be the DTBook element name included in parentheses in the list above.

For each navTarget, the navLabel audio and text content shall be as specified in section 3.1.4.3.2; and the content element shall point to the SMIL time container that contains the footnote reference, page number, or line number.

navLists are not required for other book structures, and are forbidden for segments.
[*Production Tool Requirement*]

3.1.4.8.1 Value Attribute

Each navTarget whose navLabel text element consists of an integer shall include a value attribute. The value attribute shall contain an Arabic integer corresponding to the navTarget's text element value.

navTargets for frontmatter pages with Roman numbers and for pages with compound numbers (e.g., A-15) shall not include a value attribute. navTargets for page ranges (e.g., 25-26) shall have a value attribute equal to the first page number of the range. Note references and line numbers shall be repeated as necessary. Gaps in the sequence of values are acceptable, for example if only explanatory notes are read.
[*Production Tool Requirement*]

3.1.5 Package File (OPF)

The OPF shall conform to the normative requirements of section 3 of ANSI/NISO Z39.86-2002.
[*Production Tool Requirement*]

3.1.5.1 OPF Validity

The OPF shall be well-formed and valid to the Open eBook Forum (OEBF) Publication Structure 1.0.1, package DTD referenced by section 3 of ANSI/NISO Z39.86-2002.
[*Production Tool Requirement*]

3.1.5.2 OPF Metadata

The OPF metadata required by ANSI/NISO Z39.86-2002 shall be created during the book production process by the network library.

3.1.5.2.1 Metadata Content

The following metadata items shall be defined in the OPF:

nls:recordingAgency	included in the OPF x-metadata and shall contain the full name of the agency that made the original recording from which the DTB was created.
dc:Title	Title of the DTB. For magazines the issue date should be included as it appears on the cover of the print magazine, except that the date is to be placed within parentheses, e.g., Smart Computing (December 2006).
dtb:producedDate	Date of the first build of the DTB in the format “yyyy-mm-dd” and shall not be changed.
dtb:revision	A non-negative integer. For the first build, the revision shall be “0,” and the revision shall be incremented for each subsequent build.
dtb:revisionDate	Date of the most recent revision of the DTB in the format “yyyy-mm-dd” and shall equal “dtb:producedDate” for revision “0.”
dtb:revisionDescription	A text string describing the reason for the revision; “dtb:revisionDescription” shall be present and valued for all revisions greater than “0,” and shall not be present for revision “0.”
dc:Date	The year and month of “dtb:revisionDate” in the format “yyyy-mm.”
dtb:narrator	Narrator’s name, entered last name first, e.g., Smith, John.
dc:Publisher	The agency responsible for making the DTB available should be included here.
dc:Format	ANSI/NISO Z39.86-2002
dc:Identifier	UID. See Section 3.1.1.2 for format.
dc:Language	For example “en” for English, “es” for Spanish, “de” for German, and “fr” for French.
dc:Rights	“Further reproduction or distribution in other than a specialized format is prohibited.”
dtb:multimediaType	“audioNCX”
dtb:audioFormat	For AMR-WB+ this would be “3gpp.” This entry should describe the format in which the audio files in the DTB file set are written.

dtb:totalTime	Total playing time of the DTB, i.e., the sum of the durations of all the audio elements of the SMIL files governing the playback of the magazine. For <seq>s and <par>s whose <customTest> elements have been set to defaultState="false," audio referenced by these SMIL nodes shall be counted toward "dtb:totalTime" as if the defaultState had been set to "true." This time value shall be accurate to within plus or minus 1 second. Numeric representation of time shall be in the format "`01:23:45.678`" [*Production Tool Requirement*]

Note: dtb:totalTime is calculated by the DTB production tool based on the book content.

nls:labelBrailleTitle	Contarcted braille title: 3 lines: 14 cells, 11 cells , 10 cells max
nls:labelBrailleAuthor	Contracted braille author: 1 line: 14 cells max
nls:labelBrailleSequence	Braille cartridge number: 4 cells max *(only for multi-cartridge books)*
nls:labelPrintLargeTitle	30 point title: 3.225 inches (232 points) max
nls:labelPrintTitle	14 point title: up to three lines, each 2.33 inches (168 points) max
nls:labelPrintAuthor	14 point author: up to two lines each line 2.33 inches (168 points) max
nls:labelPrintSequence	Cartridge number: 14 point: six characters *(e.g. 1 of 2) (only for multi-cartridge books)*
nls:labelPrintLargeAuthor	30 point author: 1.850 inches (133 points) max
nls:labelPrintCopyright	8 point date and copyright holder: one line 2.33 inches (168 points) max

Note: This information is used to generate labels for DTB cartridges.

- Elements that contain multiple print or braille lines shall use the character sequence
 to indicate a new line.
- Characters in the contracted braille strings shall employ North American ASCII Braille.
- Note: Total of nls:printTitle + nls:printAuthor is a maximum of 4 lines

Non-ASCII characters in all <metadata> element content shall be represented as numeric character references or as UTF-8 multibyte sequences. Many other OPF metadata items are allowed under ANSI/NISO Z39.86-2002. Network libraries should consult the standard, Section 3.2 Publication Metadata, for further information.
[*Production Tool Requirement*]

3.1.5.3 OPF Manifest

The manifest shall conform to the normative requirements of section 3.3 of ANSI/NISO Z39.86-2002.
[*Production Tool Requirement*]

3.1.5.4 OPF Spine

The spine shall conform to the normative requirements of section 3.4 of ANSI/NISO Z39.86-2002.
[*Production Tool Requirement*]

3.1.6 distInfo File

If a distInfo file is required, it shall conform to the normative requirements of section 11 of ANSI/NISO Z39.86-2002.
[*Production Tool Requirement*]

3.1.6.1 distInfo Validity

The distInfo file shall be well-formed and valid to the Distribution Information DTD of Appendix 6 of ANSI/NISO Z39.86-2002.
[*Production Tool Requirement*]

3.1.7 Textual Content File

If a textual content file is required, it shall conform to the normative requirements of section 4 of ANSI/NISO Z39.86-2002.
[*Production Tool Requirement*]

3.1.7.1 Textual Content File Validity

The textual content file shall be well-formed and valid to the DTBook DTD of Appendix 1 of ANSI/NISO Z39.86-2002.
[*Production Tool Requirement*]

3.1.8 Resource File

If a resource file is required, it shall conform to the normative requirements of section 10 of ANSI/NISO Z39.86-2002.

3.1.8.1 Resource Validity

The resource file shall be well-formed and valid to the Resource DTD of Appendix 5 of ANSI/NISO Z39.86-2002.

3.1.9 Complete DTB

3.1.9.1 Files to Include and their Conformance

The complete DTB, consisting of all required files, shall conform to the normative requirements of ANSI/NISO Z39.86-2002 and all applicable requirements of this specification.

3.1.9.2 Files to Include on each DTB Cartridge

All DTDs and entity files referenced by any DTB files or by any DTDs shall be included on each cartridge of the DTB and shall be listed in the Package File manifest.

3.2 Book Media

3.2.1 Multiple Cartridge Books

If the final length of a book will exceed the capacity of a single DTB flash cartridge, it shall be formatted as a multiple media DTB.

3.2.1.1 Media Change Messages

Media change messages for multiple cartridge books shall be in separate audio files. Each message shall be “insert cartridge n,” where “n” is the sequence number of the cartridge to be inserted. ✓

3.3 Copyright Protection

3.3.1 Protection

All DTBs protected by copyright shall be protected according to the *DAISY Protected Digital Talking Book Specification, Version 2* (PDTB2).

> Note: To comply with Title 17§121(c)(3) of the United States Code (a part of the Chafee Amendment to the copyright law), DTBs of copyrighted work must be in a "specialized format." Application of protection according to the PDTB2 standard will accomplish this.

3.3.2 Filenames

Protected Digital Talking Book (PDTB) filenames shall conform to section 3.1.1.1 except where otherwise specified in this document.

3.3.2.1 Encrypted Audio File Names

Filenames for encrypted audio files shall be identical to those of the corresponding unencrypted file, and shall conform to section 3.1.1.1, except where otherwise specified in this document.
[*Protection Tool Requirement*]

3.3.2.2 Encrypted SMIL Files

File names for encrypted SMIL files shall be identical to those of the corresponding unencrypted file.
[*Protection Tool Requirement*]

3.3.2.3 Other Encrypted XML Files

3.3.2.3.1 Protected Book Package File (PPF)

i. Protected Book Package File Name

For books, the protected package file shall have the name "nnnnnnnnnn.ppf," where "nnnnnnnnnn" is the Book Designator defined in 3.1.1.1.b.
[*Protection Tool Requirement*]

ii. Protected Book Package File Validity

The PPF shall be well-formed and valid to the Open eBook Forum (OEBF) Publication Structure 1.0.1 package DTD referenced by section 3 of ANSI/NISO Z39.86-2002.
[*Protection Tool Requirement*]

iii. Protected Book Package File Metadata

PDTB metadata shall include specification version element "pdtb2:specVersion" with value "2005-1" as mandated by the Protected Digital Talking Book specification.
[*Protection Tool Requirement*]

iv. The Protected Book File Manifest

The PPF manifest shall conform to the normative requirements of section 3.3 of ANSI/NISO Z39.86-2002.
[*Protection Tool Requirement*]

v. The Protected Book File Spine

The PPF spine shall conform to the normative requirements of section 3.4 of ANSI/NISO Z39.86-2002.
[*Protection Tool Requirement*]

3.3.2.3.2 Protected Book NCX File (PNCX)

The protected NCX (PNCX) file shall have the name "nnnnnnnnnn.pncx," where "nnnnnnnnnn" is the Book Designator defined in 3.1.1.1.b.
[*Protection Tool Requirement*]

3.3.2.4 Files Comprising the Façade Book

Note: The façade book is an unencrypted DTB that an unauthorized user (with a player not containing the valid decryption key) would hear in lieu of the actual book. This façade book informs the user that they cannot play the protected book.

3.3.2.4.1 Navigation Control File

The unencrypted façade book NCX file shall have the name "`nnnnnnnnnn.ncx`," where "`nnnnnnnnnn`" is the Book Designator defined in 3.1.1.1.b.
[*Protection Tool Requirement*]

3.3.2.4.2 Façade Book SMIL Presentation File

i. Filename

The unencrypted façade book SMIL presentation file shall have the name "pdtb_protected.smil."

ii. Façade Book Presentation

The façade SMIL presentation shall present only the announcement defined in section 3.3.2.4.3ii

3.3.2.4.3 Façade Book Audio File

i. Filename

The unencrypted audio message played by the façade SMIL presentation shall have the name "`protected.mp3`".

ii. Audio File Content

The façade book announcement shall be supplied by the network library to inform the user that the book is protected and can only be played on an authorized player. The file will be in MPEG1/Layer III (mp3) format.

3.3.2.4.4 Package File

The OPF book spine for the façade book shall reference unprotected SMIL files only.

3.3.3 Media Types for Encrypted Audio Files

The media type for encrypted .3gp files shall be "`application/x-pdtb3gpp`".
[*Protection Tool Requirement*]

3.3.4 Authorization Object

Note: The decryption "symmetric keys" for all the encrypted files in the Protected DTB are themselves encrypted and reside in the Authorization Object file.

It is the content of this file that is protected by the "public" key of the asymmetric-key pair (the network key: see Appendix 4.5).

3.3.4.1 Filename

The authorization file shall have the name "uid.ao," where "uid" is the book or magazine's UID. The UID is specified in section 3.1.1.2.
[*Protection Tool requirement*]

3.3.4.2 Issuer Element

The dc metadata for the <issuer> element shall read:

<issuer uid="DAISY.us-ntwk-xxxx">
Network Library Name
</issuer>

Where "xxxx" is the network library's four character CMLS code, and "Network Library Name" is the name of the library creating the DTB.

3.3.4.3 Content Keys

The authorization file shall contain exactly two content keys.
One content key shall have a media attribute with the value "text," i.e.,
<ContentKey media = "text">
One content key shall have a media attribute with the value "audio", i.e.,
<ContentKey media = "audio">
The use of <ContentKey media = "all"> is prohibited.
[*Protection Tool Requirement*]

3.3.4.4 Rights Expression

The XML encoding in ODRL for the rights expression shall be:

```
<odrl-ex:rights>
       <odrl-ex:agreement>
              <odrl-ex:asset>
                     <odrl-ex:context>
                            <odrl-dd:uid>uid</odrl-dd:uid>
                     </odrl-ex:context>
              </odrl-ex:asset>
              <odrl-ex:permission>
                     <odrl-dd:play/>
              </odrl-ex:permission>
       </odrl-ex:agreement>
</odrl-ex:rights>
```

where

"uid" is the book or magazine's UID
"odrl-dd" is the namespace prefix for http://odrl.net/1.1/ODRL-DD

and

"odrl-ex" is the namespace prefix for http://odrl.net/1.1/ODRL-EX
[*Protection Tool Requirement*]

3.3.5 Encryption Options

3.3.5.1 Public Key

The key name used in all books shall be in the form "DAISY.us-nls.ntwk-xxx," corresponding to the NLS public collection key; where "xxx" is a unique character string depending on the key in use.

> Note: The "public" key is used in the encrypting process. It can be freely shared and cannot be used to decrypt the files. The DTB itself contains the corresponding "private" key to decrypt the book.

3.3.5.2 Audio Encryption

All audio files shall be encrypted except the DTB audio headings file and those that are a part of the façade book.

3.3.5.3 XML Encryption

3.3.5.3.1 Protected NCX (PNCX)

The PNCX file shall be encrypted at the <navPoint> and <navTarget> level.
[*Protection Tool Requirement*]

3.3.5.3.2 SMIL files

All encrypted SMIL files shall be encrypted at the <audio> media element level.
[*Protection Tool Requirement*]

3.3.6 Files to Include On Each PDTB Cartridge

All document type definitions (DTDs) and entity files referenced by any PDTB files or by any DTDs shall be included on each USB cartridge of the PDTB and shall be listed in both the Protected Package File manifest (PPF) and the Façade Book Package File manifest (OPF).

3.4 Production Tools

3.4.1 Audio Compression

3.4.1.1 Audio Encoder

The encoder used to compress the audio files for the DTB shall be fully compliant with the standard for Extended Adaptive Multi-Rate-Wideband (AMR-WB+), ETSI TS 126 290 release 7.
[*Production Tool Requirement*]

3.4.1.1 Audio File Format

The 3GPP file format shall be used to store the compressed AMR-WB+ frames. The 3GPP files will be fully compliant with ETSI TS 126 244 release 7 with the following restrictions:
[*Production Tool Requirement*]

3.4.1.1.1 Sample Size Box Format

The Sample Size box, "stsz" contained within the Sample Table, "stbl" box of the sound track's Media Information, "minf" box, shall contain only the elements "sample_size" and "sample_count." "sample_size" shall be the size of, and "sample_count" the number of AMR-WB+ superframes contained within the track.
[*Production Tool Requirement*]

> Note: The 3GPP file format is defined by the 3rd Generation Partnership Project (3GPP) of the European Telecommunications Standards Institute (ETSI). The file format for AMR-WB+ is formally referred to as 3GPP. The preferred file extension is 3GP, although 3GPP is also acceptable according to the standard.

3.4.2 Parser

The parser used to validate the OPF, NCX, SMIL, distInfo, resource, and textual content files shall be a validating XML parser compliant with the applicable standard referenced by ANSI/NISO Z39.86-2002.

3.4.3 Other Validation Tools

Any other software or other tools used to validate DTB content shall be capable of detecting deviations from the requirements of ANSI/NISO Z39.86-2002.

Table 1 - Class Attributes

Book Structure	Description	Class Attribute
Acknowledgments	acknowledgements before main book content	acknowledgements
	acknowledgements after main book content	acknowledgements/c
Act	act in a play	act
Activity	activity in a craft book for example	activity
Address	speech	speech
Afterword		afterword
Alphabetical Division	division within index, glossary, etc.	alphadiv
Annotation	Library of Congress annotation only	annotation
Answers	collection of answers	answers
Appendices	collection of appendices	appendices
Appendix	single appendix	appendix
Article	magazine article	article
Author's note	author's note before main book content	authnote
	author's note after main book content	authnote/c
Backmatter	material after the main body of the book, but is not adequately described by any other category in this table	concluitem
Biographical notes	collection of biographical notes	bionotes
Biography	biography of author, editor, illustrator, contributor, etc. *(not "about the author")*	biography
Bibliography		bibliography
Book	portion of a large work, entitled "book"	book
Captions	collection of captions to photos, illustrations, maps, etc.	captions
Cast of characters	cast of characters before main book content	cast
	cast of characters after main book content	cast/c
Chapter		chapter
Chronology	chronology before main book content	chronology
	chronology after main book content	chronology/c
Closing announcements	closing announcements of a DTB	close
Conclusion		conclusion
Contents	table of contents	contents
Day	as a diary or journal entry	day
Discography		discography
Dramatis personae	cast of characters	cast
Entry	entry in a diary or journal	entry
Epilogue		epilogue
Essay		essay
Exercise	exercise as in a "how to" book	exercise
Fable		fable
Family tree	family tree before main book content	tree
	family tree after main book content	tree/c
Filmography		filmography
Foreword		foreword
Frontmatter	material before the main body of the book, but is not adequately described by any other category in this table	prelimitem
Further reading		readings
Genealogy	genealogy before main book content	tree
	genealogy after main book content	tree/c
Glossary		glossary

Illustrations	collection of illustration captions	captions
Index		index
Ingredients	list of ingredients within a recipe	ingredients
Introduction		introduction
Lesson	lesson in a “how to” book	lesson
Letter	correspondence	letter
Maps	collection of map captions	captions
Materials	list of supplies as in a craft book	materials
Month	as a diary or journal entry	month
Notes	collection of end notes, author’s notes, etc.	notes
Novelette		novelette
Novella		novella
Opening announcements	first audio encountered in normal playback	open
Part		part
Photographs	collection of photograph captions	captions
Poem		poem
Postscript		postscript
Prayer		prayer
Preface		preface
Prelude		prelude
Project		project
Prologue		prologue
Proverb	as in the Bible or a book of proverbs	proverb
Psalm	as in the Bible	psalm
Questions	collection of questions	questions
Questions and Answers	collection of questions and answers	qanda
Recipe		recipe
Recommended reading	recommended reading before main book content	readings/p
	recommended reading after main book content	readings/c
References	collection of references before main book content	references/p
	collection of references after main book content	references/c
Resources	collection of resources before main book content	resources/p
	collection of resources after main book content	resources/c
Scene	in a play	scene
Section		section
Selected references		references
Sources		sources
Song		song
Sonnet		poem
Speech		speech
Stanza		stanza
Steps	collection of steps as in a recipe or set of instructions	steps
Story		story
Subsection		subsection
Suggested reading		readings
Summary		summary
Supplement		supplement
Supplies		supplies
Synopsis		synopsis
Table of contents		contents
Tale		tale
Testament		testament
Time line	time line before main book content	timeline
	time line after main book content	timeline/c
Unit		unit

Verse	in Bible or poem	verse
Vocabulary	vocabulary before main book content	vocabulary
	vocabulary after main book content	vocabulary/c
Volume		volume
Week	as a diary or journal entry	week
Year	as a diary or journal entry	year

4. Appendix

4.1 Use of Commercial DTB Production Tools

Software tools can be employed in creating digital talking books. They automate many functions and will ensure the creation of a DTB compliant with the ANSI/NISO Z39.86 standard. Where possible such tools should enforce the requirements in this document.

Figure 1 illustrates the use of such a tool in creating a DTB. The information entered in the dialog box is used to create the DTB's package file (OPF). The requirements of 3.1.1.1, 3.1.1.2 are observed in the entries.

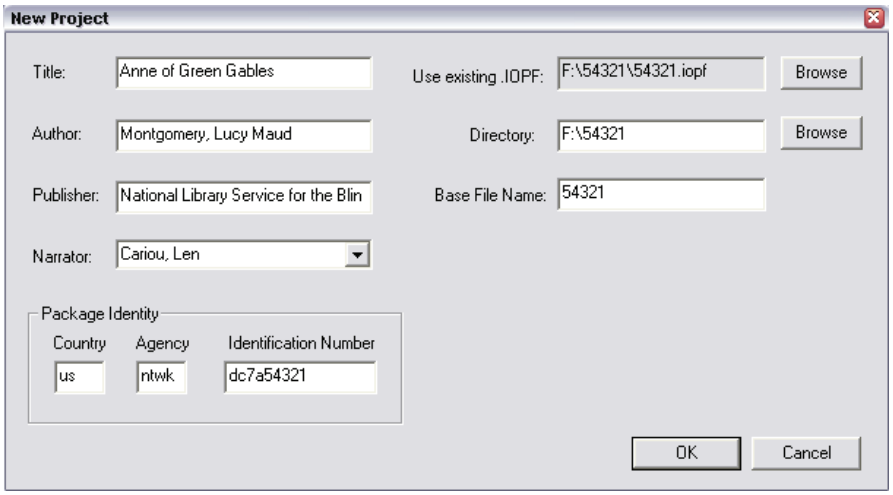

Figure 1. Creating a DTB with Commercial DTB Production Tool

Figure 2 shows the screen where book metadata, described in 3.1.5.2, is entered or edited. The tool modifies the entries in the package file (OPF) based on the fields in this screen.

Figure 3 illustrates an example of setting the audio compression parameters within a production tool. The parameters specified in 3.1.2.1 and 3.1.3.9 are entered through this screen.

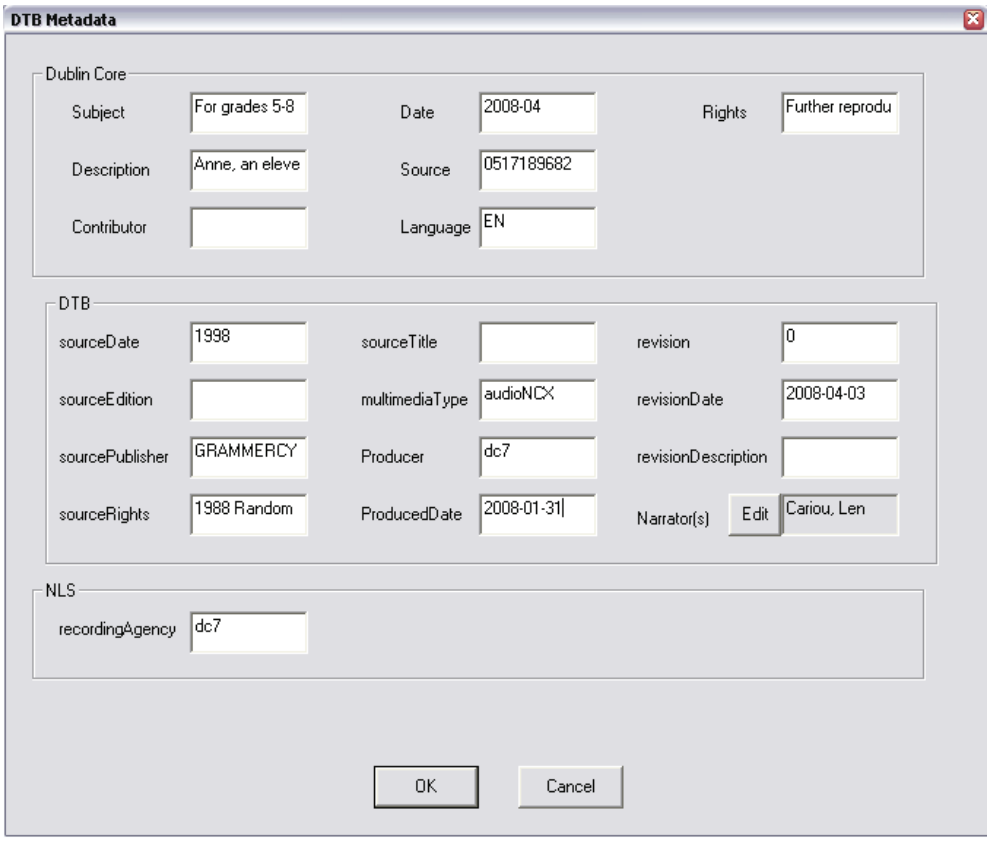

Figure 2. DTB production tool screen to edit Package File metadata

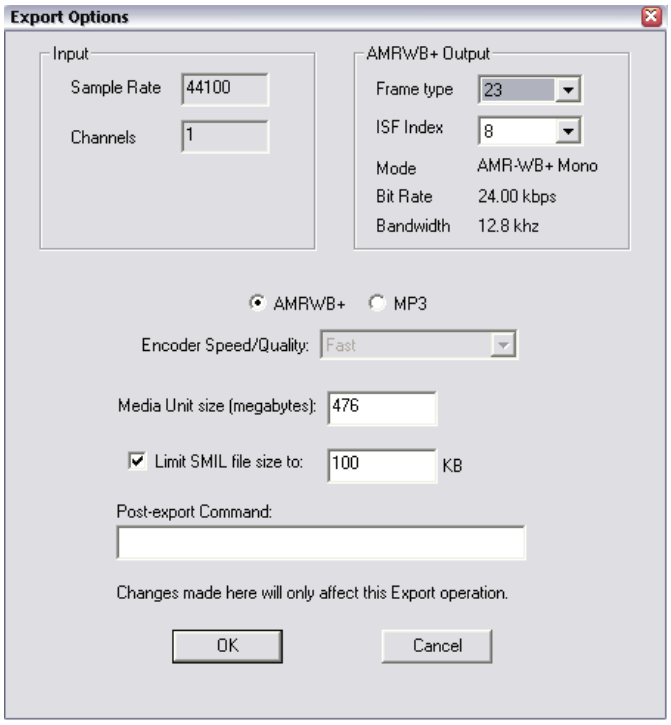

Figure 3. Setting the parameters, within a DTB production tool, for audio compression when creating the DTB after markup and recording

4.2 Example of Package File (OPF)

This is an example of a package file of an ANSI/NISO Z39.86 digital talking book generated by a production tool. The appropriate values were entered using the graphical user interface screens illustrated in Appendix 4.1

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<!DOCTYPE package PUBLIC "+//ISBN 0-9673008-1-9//DTD OEB 1.0.1 Package//EN" "oebpkg101.dtd">
<package unique-identifier="uid" xmlns="http://openebook.org/namespaces/oeb-package/1.0/">
  <metadata>
    <dc-metadata xmlns:dc="http://purl.org/dc/elements/1.0/">
      <dc:Title>Anne of Green Gables</dc:Title>
      <dc:Creator role="aut">Montgomery, Lucy Maud</dc:Creator>
      <dc:Subject>For grades 5-8</dc:Subject>
      <dc:Description>Anne, an eleven-year-old orphan, is sent by mistake to live with a lonely,
middle-aged brother and sister on a Prince Edward Island farm in Canada. There she proceeds to make
an indelible impression on everyone around her. Complete and unabridged text. For grades 5-8 and
older readers.   1908.</dc:Description>
      <dc:Publisher>National Library Service for the Blind</dc:Publisher>
      <dc:Date>2008-04</dc:Date>
      <dc:Format>ANSI/NISO Z39.86-2002</dc:Format>
      <dc:Identifier id = "uid" scheme="DTB">us-ntwk-dc7a54321</dc:Identifier>
      <dc:Source>0517189682</dc:Source>
      <dc:Language>EN</dc:Language>
      <dc:Rights>Further reproduction or distribution in other than a specialized format is
prohibited</dc:Rights>
    </dc-metadata>
    <x-metadata>
      <meta name="dtb:sourceDate" content="1998"/>
      <meta name="dtb:sourcePublisher" content="GRAMMERCY"/>
      <meta name="dtb:sourceRights" content="1988 Random House Value Publishing, Inc."/>
      <meta name="dtb:multimediaType" content="audioNCX"/>
      <meta name="dtb:narrator" content="Cariou, Len"/>
      <meta name="dtb:producer" content="dc7"/>
      <meta name="dtb:producedDate" content="2008-01-31"/>
      <meta name="dtb:revision" content="0"/>
      <meta name="dtb:revisionDate" content="2008-01-31"/>
      <meta name="dtb:revisionDescription" content=""/>
      <meta name="dtb:totalTime" content="10:42:12.048"/>
      <meta name="nls:recordingAgency" content="dc7"/>
      <meta name="dtb:audioFormat" content="3gpp"/></x-metadata>
      <meta name="nls:labelBrailleTitle" content="anne ( gre5&#10;ga#s"/>
      <meta name="nls:labelBrailleAuthor" content="montgom)y1 l"/>
      <meta name="nls:labelBrailleSequence" content=""/>
      <meta name="nls:labelPrintLargeTitle" content="Anne of Green G"/>
      <meta name="nls:labelPrintTitle"
                  content="Anne of Green Gables "/>
      <meta name="nls:labelPrintAuthor" content="Montgomery, Lucy Maud"/>
      <meta name="nls:labelPrintLargeAuthor" content="Montgom."/>
      <meta name="nls:labelPrintCopyright" content="1988, Random House Value Publishing, Inc."/>
    </x-metadata>
  </metadata>
  <manifest>
      <item id="opf" href="54321.opf" media-type="text/xml"/>
      <item id="pkgdtd" href="oebpkg101.dtd" media-type="text/xml"/>
      <item id="pkgent" href="oeb1.ent" media-type="text/xml"/>
      <item id="ncx" href="54321.ncx" media-type="text/xml"/>
      <item id="ncx_dtd" href="ncx110.dtd" media-type="text/xml"/>
      <item id="tgp_1" href="54321-0001.3gp" media-type="audio/3gpp"/>
      <item id="tgp_2" href="54321-0002.3gp" media-type="audio/3gpp"/>
      <item id="tgp_3" href="54321-0003.3gp" media-type="audio/3gpp"/>
      <item id="tgp_4" href="54321-0004.3gp" media-type="audio/3gpp"/>
      <item id="tgp_5" href="54321-0005.3gp" media-type="audio/3gpp"/>
      <item id="tgp_6" href="54321-0006.3gp" media-type="audio/3gpp"/>
      <item id="tgp_7" href="54321-0007.3gp" media-type="audio/3gpp"/>
      <item id="doa" href="54321ann.3gp" media-type="audio/3gpp"/>
      <item id="hdgs" href="54321hdgs.3gp" media-type="audio/3gpp"/>
      <item id="smil_dtd" href="dtbsmil110.dtd" media-type="text/xml"/>
      <item id="smil_0" href="54321.smil" media-type="application/smil"/>
  </manifest>
```

4.3 Example of Files Comprising an Unprotected DTB

File Name	Size	Purpose
54321.ncx	13 KB	**Navigation Control file (NCX)** exposes the hierarchical structure of a DTB to allow the user to navigate through it
54321.opf	4 KB	**Package file (OPF)** contains administrative information about the DTB, the files that comprise it, and how these files interrelate
54321.smil	13 KB	**Synchronized Multimedia Integration Language (SMIL) file** defines markup for timing and layout for the audio files making up the DTB.
54321-0001.3gp	15,595 KB	**AMR-WB+ files** contains the compressed audio as AMR-WB+ frames in a 3GP file format.
54321-0002.3gp	15,540 KB	
54321-0003.3gp	15,595 KB	
54321-0004.3gp	15,522 KB	
54321-0005.3gp	15,598 KB	
54321-0006.3gp	15,578 KB	
54321-0007.3gp	6,426 KB	
54321ann.3gp	7,21 KB	**AMR-WB+ announcement file** contains the compressed audio for book announcements.
54321hdgs.3gp	191 KB	**AMR-WB+ headings file** contains the compressed audio for navigation elements. This is what the player renders when a user navigates using hierarchical markup (e.g., the chapter names).
dtbsmil110.dtd	4 KB	**Document Type Definition file** defines the structure of the SMIL file. Used to validate the file but not actually required to play the DTB.
ncx110.dtd	6 KB	**Document Type Definition file** defines the structure of the NCX file. Used to validate the file but not actually required to play the DTB.
oeb1.ent	29 KB	**Entity File** defines the structure of the OPF. Used to validate the file but not actually required to play the DTB.
oebpkg101.dtd	8 KB	**Document Type Definition file** defines the structure of the OPF. Used to validate the file but not actually required to play the DTB.

4.4 Example of Files Comprising a Protected DTB

File Name	Purpose	Encryption
54321.ncx	Façade Book **Navigation Control file (NCX)**	Unencrypted
54321.opf	Façade Book **Package file (OPF)**	Unencrypted
54321.ppf	**Protected Package file (PPF)**	Unencrypted
54321.pncx	**Protected Navigation Control file (NCX)**	Partially encrypted using XML encryption
54321.smil	**Synchronized Multimedia Integration Language (SMIL) file**	Partially encrypted using XML Encryption
54321-0001.3gp	**AMR-WB+ files**	Encrypted
54321-0002.3gp		
54321-0003.3gp		
54321-0004.3gp		
54321-0005.3gp		
54321-0006.3gp		
54321-0007.3gp		
54321ann.3gp	**Encrypted AMR-WB+ announcement file**	Encrypted
54321hdgs.3gp	**AMR-WB+ headings file**	Unencrypted
dtbsmil110.dtd	**Document Type Definition file**	Unencrypted
ncx110.dtd	**Document Type Definition file**	Unencrypted
oeb1.ent	**Entity File**	Unencrypted
oebpkg101.dtd	**Document Type Definition file**	Unencrypted
pdtb_protected.smil	Façade Book **SMIL presentation**	Unencrypted
protected.mp3	Façade Book **announcement**	Unencrypted
us-ntwk-dc7a54321.ao	**Authorization object** contains the symmetric keys for the encrypted files encrypted in the network public key.	Partially encrypted using XML Encryption

4.5 NLS Network Public Key

This is a public key that can be used to encrypt DTBs, using the DAISY Protected Digital Talking Book Standard 2, so that DTBs are only accessible by eligible NLS readers.


```xml
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<!-- Library of Congress NLS/BPH Key Exchange Object -->
<KeyExchange xmlns="http://www.daisy.org/DRM/2005/KeyExchange"
        xmlns:ds="http://www.w3.org/2000/09/xmldsig#"
        xmlns:xe="http://www.w3.org/2000/09/xmlenc#">

  <Issuer uid="DAISY.us-nls">National Library Service for the Blind and Physically Handicapped
  </Issuer>

  <ds:KeyInfo>
    <ds:KeyValue>
      <ds:RSAKeyValue>
        <ds:Modulus>
AN6YFZGlAnHLlOdOR88nhQkQWkQcAmPdxBYep6lF+3VDDDGtgTRTQL+zRKBygdw/CQN2cs9bTPB6Fn6V90O5vEzMjhYPZZc2dWW
DjbcAgCYpl/RPllSXpFFEAabBm7tRDKo3UvqQda4s3eqKXQsWFpNaA1qINFuUJNjasIozDWMX</ds:Modulus>
        <ds:Exponent>AQAB</ds:Exponent>
      </ds:RSAKeyValue>
    </ds:KeyValue>
    <ds:KeyName>DAISY.us-nls.ntwk-1</ds:KeyName>
  </ds:KeyInfo>

</KeyExchange>
```

4.6 North American ASCII Braille

Braille to be embossed on labels applied to DTB cartridges is represented in the DTB package file as North American ASCII braille. North American ASCII braille is a subset of the ASCII character set. It is used for coding contracted braille. It consists of 64 of the printable ASCII characters (32 to 95 inclusive) to represent all possible dot combinations in six-dot braille.

ASCII Value	*ASCII Character*	*Braille Dots*	*Braille*
32	**(space)**		
33	**!**	**2.3.4.6**	⠮
34	**"**	**5**	⠐
35	**#**	**3.4.5.6**	⠼
36	**$**	**1.2.4.6**	⠫
37	**%**	**1.4.6**	⠩
38	**&**	**1.2.3.4.6**	⠯
39	**'**	**3**	⠄
40	**(**	**1.2.3.5.6**	⠷
41	**)**	**2.3.4.5.6**	⠾
42	*****	**1.6**	⠡
43	**+**	**3.4.6**	⠬
44	**,**	**6**	⠠
45	**-**	**3.6**	⠤
46	**.**	**4.6**	⠨
47	**/**	**3.4**	⠌
48	**0**	**3.5.6**	⠴
49	**1**	**2**	⠂
50	**2**	**2.3**	⠆
51	**3**	**2.5**	⠒
52	**4**	**2.5.6**	⠲
53	**5**	**2.6**	⠢
54	**6**	**2.3.5**	⠖
55	**7**	**2.3.5.6**	⠶
56	**8**	**2.3.6**	⠦
57	**9**	**3.5**	⠔
58	**:**	**1.5.6**	⠱
59	**;**	**5.6**	⠰
60	**<**	**1.2.6**	⠣
61	**=**	**1.2.3.4.5.6**	⠿
62	**>**	**3.4.5**	⠜
63	**?**	**1.4.5.6**	⠹

ASCII Value	*ASCII Character*	*Braille Dots*	*Braille*
64	**@**	**4**	⠈
65	**A**	**1**	⠁
66	**B**	**1.2**	⠃
67	**C**	**1.4**	⠉
68	**D**	**1.4.5**	⠙
69	**E**	**1.5**	⠑
70	**F**	**1.2.4**	⠋
71	**G**	**1.2.4.5**	⠛
72	**H**	**1.2.5**	⠓
73	**I**	**2.4**	⠊
74	**J**	**2.4.5**	⠚
75	**K**	**1.3**	⠅
76	**L**	**1.2.3**	⠇
77	**M**	**1.3.4**	⠍
78	**N**	**1.3.4.5**	⠝
79	**O**	**1.3.5**	⠕
80	**P**	**1.2.3.4**	⠏
81	**Q**	**1.2.3.4.5**	⠟
82	**R**	**1.2.3.5**	⠗
83	**S**	**2.3.4**	⠎
84	**T**	**2.3.4.5**	⠞
85	**U**	**1.3.6**	⠥
86	**V**	**1.2.3.6**	⠧
87	**W**	**2.4.5.6**	⠺
88	**X**	**1.3.4.6**	⠭
89	**Y**	**1.3.4.5.6**	⠽
90	**Z**	**1.3.5.6**	⠵
91	**[**	**2.4.6**	⠪
92	****	**1.2.5.6**	⠳
93	**]**	**1.2.4.5.6**	⠻
94	**^**	**4.5**	⠘
95	**_**	**4.5.6**	⠸