Optical Storage Technology Association

Digital Music, Photo, and Video Collections

MPV Music Profile Specification

Working Draft
Revision 0.91

8 December 2003

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ABSTRACT

The Music Profile specification defines metadata and practices for processing and playback of collections of digital music collections stored on an optical disc and other storage media such as memory cards and computer harddrives or exchanged via internet protocols.

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RELEASE HISTORY

Version	*Date*	*Comments*
0.21	2 December 2002	First release to OSTA membership.
0.30	7 January 2003	Updated logo, contact info, copyright. No other changes.
0.40	18 January 2003	Completed draft spec.
0.50	20 January 2003	
0.70	22 January 2003	
0.75	31 January 2003	
0.76	24 March 2003	Reflects inputs from OSTA Multiread Committee review
0.80	14 July 2003	Acting on suggested changes from many parties. Added ID3v1 compatibility; changed to Music Manifest file type; added new media types; Changed OrigIndex to TrackNumber. Added SetNumber, NumSets, NumTracks. Added additional music metadata properties. Added AudioWithStills asset.
0.90	25 July 2003	Released for public comment.
0.91	8 Dec 2003	Changed mimetype and extension for ATRAC3

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Chapter 1: Introduction

1.1 Executive Summary

MPV (MusicPhotoVideo) provides multimedia playlists. MPV is an open specification that makes easier the representation, exchange, processing and playback of collections of digital media content, including music, still images, stills with audio, still sequences, video clips, and audio clips.

Applications and devices and users that use MPV benefit even when they only interact with music and audio in basic ways; such as personal music collections that can be burned on CDs by many software applications.

MPV uses a text-based format that is easily understood and also easy to produce and consume programmatically in firmware or computer software. MPV does *not* tackle a large number of problems at once – instead, it focuses on a few key problems that it solves with simple but robust approaches. Where possible and practical, it supports use of established specifications and standards.

The development and promotion of MPV is sponsored by the Optical Storage Technology Assocation (OSTA). The specification development and promotion process is open to all members; all organizations and individuals are welcomed as members. The association includes over 50 member companies from all over the world that produce products that collectively represent a majority marketshare in mainstream recordable optical storage categories.

MPV is not only a specification. It also includes a compliance test suite and processes, compliance testing materials, a logo program for compliant products, and a website. These materials and procedures are made available and administered by OSTA at a modest cost. OSTA charges no royalty for use of the specification or logo. In addition, sample open-source code implementations of key steps in processing MPV content are being contributed by interested parties.

The specification is being developed in phases and results in "profiles". Each profile in MPV defines only those formats and practices that are necessary for the key tasks targeted by the profile. A number of candidate profiles for development have been identified, including:

- **Basic Profile**: key tasks: defining content collections, renditions, identifiers, and access to other metadata
- **Presentation Profile**: key tasks: organizing a content collection into a presentation
- **Music Profile**: key tasks: listening to a music collection and interactively browsing content collections
- **Photo/Video Profile**: key tasks: interactively browsing content collections and viewing a photo/video slideshow
- **Internet Profile**: key task: interacting with and sending collections of photo-video content over the web and email
- **Disc Archive Profile**: key task: interoperability of photo archives on recordable optical discs
- **Editing Profile**: key task: modifying existing collections of photo-video content.
- **Printing Profile:** key task: printing collections of photo-video content
- **Container Profile**: key task: storing photo-video content collections in containers

Underlying all profiles is the "Core", which defines the overall framework of all MPV profiles. The Basic and Presentation Profiles, for example, build on the Core and, when implemented in consumer electronics devices like DVD players or in application software, can provide compelling playback of photo-video slideshows and interactive browsing of photo-video content. The Presentation Profile is also used by the Music Profile to as a music playlist.

MPV technology has three central components: Collections, Metadata, and Identification. Each of these make reference in various ways to data files containing the music, photo, or video content. This information may be augmented by information from various profiles. For example, the Presentation profile provides information that may be used by player applications and devices to provide an attractive playback user experience.

1.2 Terms of Use

This section of the specification is descriptive and not intended to be complete nor definitive. Please refer to the definitive statement of licensing terms at the beginning of the MPV specification document for a precise and legal description.

The MPV specification is developed using an open process. The resulting specification is available from OSTA. No royalty is charged by OSTA for use of the specification. The overall desire is to develop a specification that is not subject to separate licensing requirements or royalty. During the development process, the expectation is that all participants contribute their efforts and intellectual property without any expectation or requirement for compensation. However, OSTA does not warrant that the specification is not or will not be subject to such claims by other parties.

MPV is not only a specification. It also includes a compliance test suite and processes, compliance testing materials, a logo program for compliant products, and a website. These materials and procedures are made available and administered by OSTA at a modest cost. OSTA charges no royalty for use of the specification. In addition, some sample open-source code implementations of key steps in processing MPV content may be contributed by interested parties.

Chapter 2: MPV Music Profile 1.0

The MPV Music Profile allows users, via applications and devices, to create and playback collections of music organized into albums / playlists. The MPV Music Profile extends the existing MPV Core specification and Basic and Presentation Profiles by augmenting this framework with additional metadata and practices specific to music.

A user may organize their music content into collections and burn it on a recordable CD or DVD. When the music collections are represented on the disc using MPV files that implement the MPV Music Profile, then a playback application or device can quickly start playback as soon as the disc is inserted and allow the user to easily navigate and playback the music, equally well and quickly regardless of whether the disc has 15, 150, or 1500 songs on it. Of course, in addition to basic music playback, an application or device can show basic music information like title, artist and genre – this may be retrieved from the music files themselves or from the MPV collection. Additional content may also be part of the collection and is available to be shown by the playback application or device, such as artwork related to the music, lyrics, and even music videos of the songs.

The Music Profile provides a basic set of metadata which represents data and conventions used by software applications that create and play compressed audio music on PCs or consumer electronics devices and music publishers of music CDs.

2.1 MPV Music Profile Introduction

The MPV Music Profile 1.0 supports the following key tasks: defining collections of music, organizing music into albums and playlists, listening sequentially or shuffled to an album / playlist, and interactively browsing single or multiple album / playlists of music.

The music metadata that may be represented using the MPV Music Profile includes the following:

Music Asset ("Song", "Track"): Filename, Title, Princpal artist, Album title, Genre, Playing time, Date recorded, Track number, Num Tracks, Set number, Num sets, Artwork, Music videos, Performed by, Music by, Lyrics by, Arranged by, More info URL, Encoded bitrate, Lyrics, Rights, Identifier, Description, Format.

The MPV Music Profile can also organize music content in useful and novel ways. For example, a music asset may have multiple representations, such as multiple bitrate encodings, multiple format encodings (which may enhance compatibility with devices), and multiple representations, such as audio-only, video-with-audio, and song artwork.

Album ("Playlist") of Music: Title, Principal Artist, Description, Identifier, Artwork, Music Entries

The capabilities of the MPV Music Profile allows discs to be produced that have variable user experiences depending on the type of device used to play them. For example, a low-cost CD player could just play MP3 music

and display information on a 4 line LCD display. A capable DVD player could play music videos and display music information on a multi-line graphical display along with artwork and lyrics.

MPV also allows music to be organized into hierarchical playlists, allowing users to navigate among playlists that may be both pre-generated or created on-the-fly by the playback application.

2.2 Formalities For Use of the MPV Music Profile

The mechanism that MPV uses to add capabilities to the Core specification is the Profile. MPV Core sets out specific formalities to follow when a MPV Profile is used -- an MPV file must declare which profiles it implements and it must declare the namespaces of the profiles. This allows a processing application to quickly determine whether a given MPV file meets its expectations for processing.

PROFILE COMPONENTS

The MPV Music Profile 1.0 makes use of two other specifications:

- MPV Core Specification 1.0
- MPV Presentation Profile Specification 1.0

The MPV Music Profile 1.0 includes the schema and practices detailed by this document.

COMPATIBILITY

The MPV Music Profile 1.0 is an extension of the MPV Core Specification 1.0 and is fully compatibile with the MPV framework it establishes. Thus MPV files that implement the MPV Music Profile should be usable in basic ways by MPV-aware applications and devices not focused on music playback. This means, for example, that a MPV playback application or device can read and playback MPV music collections even if it doesn't understand the MPV Music Profile; however, the music-specific information will be ignored and the playback experience will be less full-featured than in a MPV Music Profile player.

SCHEMA NAMESPACE

To use the MPV Music Profile, this information must be present in the namespace declarations in the MPV file:

Schema	Namespace Identifier	Schema Location	Conventional Namespace Prefix
Music Profile	http://ns.osta.org/mpv/music/1.0/	lax/profiles/music/profile.xsd	mpvm:

The schema location may be specified optionally. Multiple schema variations may exist depending on the degree of validation desired by the developer. Typical variations include "lax", "strict", and "fixed". These schema will all implement the grammar of the MPV Music Profile but will vary in the degree of flexibility and conformance requirements that they embody.

PROFILE IDENTIFIER

This information must be present in the Profile section of the MPV Manifest.

Music Profile Name	http://ns.osta.org/mpv/music/1.0/

EXAMPLE

```
<?xml version="1.0" encoding="UTF-8"?>
<file:Manifest
        xmlns:file="http://ns.osta.org/manifest/1.0/"
        xmlns:mpv="http://ns.osta.org/mpv/1.0/"
        xmlns:mpvp="http://ns.osta.org/mpv/presentation/1.0/"
        xmlns:mpvm="http://ns.osta.org/mpv/music/1.0/"
        xmlns:nmf="http://ns.osta.org/nmf/1.0/" >
  <nmf:Metadata>
    <ManifestProperties xmlns="http://ns.osta.org/manifest/1.0/">
      <ProfileBag>
          <Profile>http://ns.osta.org/mpv/basic/1.0/</Profile>
          <Profile>http://ns.osta.org/mpv/presentation/1.0/</Profile>
          <Profile>http://ns.osta.org/mpv/music/1.0/</Profile>
      </ProfileBag>
    </ManifestProperties>
  </nmf:Metadata>

...

</file:Manifest>
```

Chapter 3: MPV Music Schema Introduction

3.1 Introduction

The MPV Music Profile makes use of the existing MPV Core specification and Basic and Presentation Profiles for creating collections of music and organizing them into albums / playlists. The MPV Music Profile augments this framework with additional metadata and practices specific to music.

The Music Profile provides a basic set of metadata which represents data and conventions used by software applications that create and play audio music on PCs or consumer electronics devices and music publishers of music CDs. The music metadata that may be represented using the MPV Music Profile includes the following:

Music Asset ("Song", "Track"): Asset Filename, Title, Princpal artist, Album title, Genre, Playing time, Year recorded, Original order, Artwork, Music video, Performed by, Music by, Lyrics by, Arranged by, More info, Average encoded bitrate, Lyrics, Rights, Identifier, Description, Format,

Album ("Playlist") of Music: Title, Principal Artist, Description, Identifier, Artwork, Music Entries

3.2 Examples

MPV Music playlists can range from simple to sophisticated, depending on the amount of available information and the ability of the creating application or device. Playback applications and devices determine the extent to which they use available information and the presentation of that information.

3.2.1 Namespaces and Profiles

All MPV files begin with a preamble that declares the XML namespaces and profiles used by the file. The *xmlns:xyz="namespace identifier"* sequence assigns a shortcut prefix (xyz) to represent the unique namespace identifier within the file. Use of namespaces allows the same element name to be used from different schema without ambiguity. For example, <*foo:Element*> and <*bar:Element*> are different if the namespace identifiers for each prefix are different and are the same if the namespace identifiers are the same.

A typical preamble:

```
<?xml version="1.0" encoding="UTF-8"?>
<file:Manifest xmlns:file="http://ns.osta.org/manifest/1.0/"
  xmlns:mpv="http://ns.osta.org/mpv/1.0/"
```

```
  xmlns:mpvp="http://ns.osta.org/mpv/presentation/1.0/"
  xmlns:mpvm="http://ns.osta.org/mpv/music/1.0/"
 xmlns:dc="http://ns.osta.org/nmf/1.0/dc/"
 xmlns:nmf="http://ns.osta.org/nmf/1.0/">
  <nmf:Metadata>
     <ManifestProperties xmlns="http://ns.osta.org/manifest/1.0/">
          <ProfileBag>
              <Profile>http://ns.osta.org/mpv/basic/1.0/</Profile>
              <Profile>http://ns.osta.org/mpv/presentation/1.0/</Profile>
              <Profile>http://ns.osta.org/mpv/music/1.0/</Profile>
          </ProfileBag>
    </ManifestProperties>
  </nmf:Metadata>
...
```

The Music profile in the manifest properties. As a best practice, the Basic profile also SHOULD be listed in the manifest. If an <mpvp:Album> element is provided, then the Presentation profile SHOULD be listed in the manifest. Adding the Basic and Presentation profile entries allow players that only understand those profiles to provide at least simple playback of a MPV file implementing the Music Profile.

3.2.2 Simple Example

This example MPV Music Profile file has 6 songs with only file location info for each item. There is no <mpvp:Album> playlist, so the sequence is the order of appearance in the mpv:AssetList. This example is the simplest form of using MPV for music playlists. Note that the file location of each song is provided in the two filesystems that typically occur on a CD, which are Joliet and ISO9660-1.

Even with this very simple usage, this MPV playlist adds value to the user's playback experience because the order of music playback is specified explicitly and is different from the sort order of the music by filename or file date.

```
<?xml version="1.0" encoding="UTF-8"?>
<file:Manifest xmlns:file="http://ns.osta.org/manifest/1.0/"
  xmlns:mpv="http://ns.osta.org/mpv/1.0/" xmlns:mpvm="http://ns.osta.org/mpv/music/1.0/"
  xmlns:dc="http://ns.osta.org/nmf/1.0/dc/" xmlns:nmf="http://ns.osta.org/nmf/1.0/">
  <nmf:Metadata>
     <ManifestProperties xmlns="http://ns.osta.org/manifest/1.0/">
          <ProfileBag>
              <Profile>http://ns.osta.org/mpv/basic/1.0/</Profile>
              <Profile>http://ns.osta.org/mpv/music/1.0/</Profile>
          </ProfileBag>
    </ManifestProperties>
  </nmf:Metadata>
  <mpv:AssetList>
     <mpv:Audio mpv:id="01-GREAT-SWING-CLASSICS.MP3-20021202031833-a">
          <mpv:LastURL mpv:filesystem="Joliet">Great%20Swing%20Classics%20in%20HI-
  FI/Benny%20Goodman%20And%20His%20Orchestra%20-
  %20Jumpin'%20At%20The%20Woodside.mp3</mpv:LastURL>
          <mpv:LastURL mpv:filesystem="ISO9660-1">GREAT_SW/BENNY_GO.MP3</mpv:LastURL>
     </mpv:Audio>
     <mpv:Audio mpv:id="02-GREAT-SWING-CLASSICS.MP3-20021202031833-a">
          <mpv:LastURL mpv:filesystem="Joliet">Great%20Swing%20Classics%20in%20HI-
  FI/Duke%20Ellington%20And%20His%20Orchestra%20-%20Harlem%20Air%20Shaft.mp3</mpv:LastURL>
          <mpv:LastURL mpv:filesystem="ISO9660-1">GREAT_SW/DUKE_ELL.MP3</mpv:LastURL>
     </mpv:Audio>
     <mpv:Audio mpv:id="03-GREAT-SWING-CLASSICS.MP3-20021202031833-a">
          <mpv:LastURL mpv:filesystem="Joliet">Great%20Swing%20Classics%20in%20HI-
  FI/Stan%20Kenton%20And%20His%20Orchestra%20-%20Intermission%20Riff.mp3</mpv:LastURL>
          <mpv:LastURL mpv:filesystem="ISO9660-1">GREAT_SW/STAN_KEN.MP3</mpv:LastURL>
```

```
      </mpv:Audio>
      <mpv:Audio mpv:id="04-GREAT-SWING-CLASSICS.MP3-20021202031833-a">
         <mpv:LastURL mpv:filesystem="Joliet">Great%20Swing%20Classics%20in%20HI-
  FI/Harry%20James%20And%20His%20Orchestra%20-
  %20I'm%20Beginning%20To%20See%20The%20Lig.mp3</mpv:LastURL>
         <mpv:LastURL mpv:filesystem="ISO9660-1">GREAT_SW/HARRY_J2.MP3</mpv:LastURL>
      </mpv:Audio>
      <mpv:Audio mpv:id="05-GREAT-SWING-CLASSICS.MP3-20021202031833-a">
         <mpv:LastURL mpv:filesystem="Joliet">Great%20Swing%20Classics%20in%20HI-
  FI/Glen%20Gray%20And%20The%20Casa%20Loma%20Orchestra%20-
  %20Just%20An%20Old%20Manuscri.mp3</mpv:LastURL>
         <mpv:LastURL mpv:filesystem="ISO9660-1">GREAT_SW/GLEN_GR2.MP3</mpv:LastURL>
      </mpv:Audio>
      <mpv:Audio mpv:id="06-GREAT-SWING-CLASSICS.MP3-20021202031833-a">
         <mpv:LastURL mpv:filesystem="Joliet">Great%20Swing%20Classics%20in%20HI-
  FI/Les%20Brown%20And%20His%20Orchestra%20-
  %20A%20Good%20Man%20Is%20Hard%20To%20Find.mp3</mpv:LastURL>
         <mpv:LastURL mpv:filesystem="ISO9660-1">GREAT_SW/LES_BROW.MP3</mpv:LastURL>
      </mpv:Audio>
   </mpv:AssetList>
</file:Manifest>
```

3.2.3 Rich Example

In contrast to the previous example, this example of a MPV Music Profile file has much more information. In this case, two songs are specified along with a lot of information about the music including album artwork and music videos for the first song, and also a playlist (the *mpvp:Album* element) is provided that specified album/playlist-level information.

Careful reading of the contents of the *mpv:AssetList* in this example will show that not only the music songs but also still image and video assets are listed plus statements that relate the assets to each other. Not all these assets are considered "primary", in other words, the user doesn't want to interact with all assets equally. Primary assets are the ones that match the user's idea of what the primary content is, such as a set of music songs. The *mpvp:Album* element is used to identify the primary assets, the sequence in which they should be presented, and other presentation information.

This example also illustrates how MPV Music Profile can be applied to a "hybrid" disc, such as a disc with that is both a DVD-Video disc and also contains MPV Music playlists and MP3 music of the songs. When played in a DVD-Video player, the user may enjoy watching the DVD-Video content, such as a music performance. In this case, no MPV Music information is used, just DVD-Video content and navigation. However, when played in a car stereo, only the MPV Music information is used and the player plays the MP3 music tracks that are also on the disc.

Some players will support both DVD-Video and MPV Music-based playback. In that case, for example, the MPV Music playback application may choose to allow the user to playback the associated music video for a track. In this example, the music video specified in the MPV playlist is actually the same music video played in DVD-Video mode, but it is accessed in a different way.

```
<?xml version="1.0" encoding="UTF-8"?>
<file:Manifest xmlns:file="http://ns.osta.org/manifest/1.0/"
  xmlns:mpv="http://ns.osta.org/mpv/1.0/"
  xmlns:mpvp="http://ns.osta.org/mpv/presentation/1.0/"
  xmlns:mpvm="http://ns.osta.org/mpv/music/1.0/"
 xmlns:dc="http://ns.osta.org/nmf/1.0/dc/"
 xmlns:nmf="http://ns.osta.org/nmf/1.0/">
  <nmf:Metadata>
```

```
    <ManifestProperties xmlns="http://ns.osta.org/manifest/1.0/">
       <ProfileBag>
        <Profile>http://ns.osta.org/mpv/basic/1.0/</Profile>
        <Profile>http://ns.osta.org/mpv/presentation/1.0/</Profile>
        <Profile>http://ns.osta.org/mpv/music/1.0/</Profile>
       </ProfileBag>
    </ManifestProperties>
 </nmf:Metadata>

 <mpvp:Album>  <!-- This defines an album / playlist presentation of the assets -->
   <nmf:Metadata>  <!-- Album / playlist-level information -->
     <dc:Properties>
        <dc:description>14 swing classics re-recorded in the '50s by the original artists
 for great sound with all the integrity and excitement of the original
 performances.</dc:description>
        <dc:identifier>7243 5 21223 2 5 Capitol Jazz</dc:identifier>
        <dc:rights>(P) and (C) 1999 Capitol Records, Inc.  All rights
 reserved.</dc:rights>
        <dc:title>Music by Album and Track</dc:title>
    </dc:Properties>
    <mpvm:MusicProperties>
        <mpvm:AlbumTitle>Great SWING CLASSICS in HI-FI</mpvm:AlbumTitle>
        <mpvm:Genre>Jazz</mpvm:Genre>
        <mpvm:MoreInfoURL>www.bluenote.com</mpvm:MoreInfoURL>
    </mpvm:MusicProperties>
   </nmf:Metadata>
   <mpvp:Foreground>  <!-- music playback sequence -->
       <mpv:AudioRef mpv:idRef="01-GREAT-SWING-CLASSICS.MP3-20021202031833-a"/>
       <mpv:AudioRef mpv:idRef="02-GREAT-SWING-CLASSICS.MP3-20021202031833-a"/>
   </mpvp:Foreground>
 </mpvp:Album>

 <mpv:AssetList>  <!-- This is the per-asset info -->
    <mpv:Audio mpv:id="01-GREAT-SWING-CLASSICS.MP3-20021202031833-a">
     <mpv:ContentID>urn:osta-
 org:mpv:dsig:md5:all:93446AEFA3B340DA971BAF09B17DBC394</mpv:ContentID>
    <mpv:LastURL mpv:filesystem="Joliet">Benny%20Goodman%20And%20His%20Orchestra%20-
 %20Jumpin'%20At%20The%20Woodside.mp3</mpv:LastURL>
     <mpv:LastURL mpv:filesystem="ISO9660-1">BENNY_GO.MP3</mpv:LastURL>
      <nmf:Metadata>
       <dc:Properties>
          <dc:creator>Benny Goodman and his Orchestra</dc:creator>
          <dc:description/>
          <dc:format>audio/mpeg</dc:format>
          <dc:identifier/>
          <dc:title>Jumpin' At The Woodside</dc:title>
       </dc:Properties>
        <mpvm:MusicProperties>
          <mpvm:AlbumTitle>Great SWING CLASSICS in HI-FI</mpvm:AlbumTitle>
          <mpvm:ArrangedBy>Count Basie;Jimmy Mundy</mpvm:ArrangedBy>
          <mpvm:Genre>Jazz</mpvm:Genre>
          <mpvm:MusicBy>Count Basie</mpvm:MusicBy>
          <mpvm:NumTracks>14</mpvm:NumTracks>
          <mpvm:PlayingTime>208.6</mpvm:PlayingTime>
          <mpvm:PrincipalArtist>Benny Goodman</mpvm:PrincipalArtist>
          <mpvm:Recorded>1954-11-09</mpvm:Recorded>
          <mpvm:TrackNumber>1</mpvm:TrackNumber>
        </mpvm:MusicProperties>
```

```
    </nmf:Metadata>
    <mpv:Related mpv:relationship="urn:osta-org:mpv:music:artwork">
        <mpv:StillRef mpv:idRef="01-GREAT-SWING-CLASSICS.MP3-20021202031833-b"/>
    </mpv:Related>
    <mpv:Related mpv:relationship="urn:osta-org:mpv:music:video">
        <mpv:VideoRef mpv:idRef="01-GREAT-SWING-CLASSICS.MP3-20021202031833-c"/>
    </mpv:Related>
</mpv:Audio>

<!-- artwork for the first song -->
<mpv:Still mpv:id="01-GREAT-SWING-CLASSICS.MP3-20021202031833-b">
   <mpv:LastURL
mpv:filesystem="Joliet">Artwork/Benny%20Goodman%20And%20His%20Orchestra.jpg</mpv:LastURL>
   <mpv:LastURL mpv:filesystem="ISO9660-1">ARTWORK/BENNY_GO.JPG</mpv:LastURL>
    <nmf:Metadata>
       <dc:Properties>
         <dc:format>image/jpeg</dc:format>
       </dc:Properties>
    </nmf:Metadata>
</mpv:Still>

<!-- music video for the first song -->
<mpv:Video mpv:id="01-GREAT-SWING-CLASSICS.MP3-20021202031833-c">
   <!-- note use of a video segment of a DVD-Video disc. This won't play on a PC unless
it is unencrypted -->
   <mpv:LastURL>VIDEO_TS/VTS_01_1.VOB</mpv:LastURL>
    <nmf:Metadata>
      <dc:Properties>
         <dc:format>video/mpeg</dc:format>
      </dc:Properties>
    </nmf:Metadata>
</mpv:Video>

<mpv:Audio mpv:id="02-GREAT-SWING-CLASSICS.MP3-20021202031833-a">
    <mpv:ContentID>urn:osta-
org:mpv:dsig:md5:all:EF886AEFA3B340DA971BAF09B17DBC122</mpv:ContentID>
    <mpv:LastURL mpv:filesystem="Joliet">Duke%20Ellington%20And%20His%20Orchestra%20-
%20Harlem%20Air%20Shaft.mp3</mpv:LastURL>
    <mpv:LastURL mpv:filesystem="ISO9660-1">DUKE_ELL.MP3</mpv:LastURL>
    <nmf:Metadata>
      <dc:Properties>
          <dc:creator>Duke Ellington and his Orchestra</dc:creator>
          <dc:description/>
          <dc:format>audio/mpeg</dc:format>
          <dc:identifier/>
          <dc:title>Harlem Air Shaft</dc:title>
      </dc:Properties>
      <mpvm:MusicProperties>
          <mpvm:AlbumTitle>Great SWING CLASSICS in HI-FI</mpvm:AlbumTitle>
          <mpvm:Genre>Jazz</mpvm:Genre>
          <mpvm:MusicBy>Duke Ellington</mpvm:MusicBy>
          <mpvm:NumTracks>14</mpvm:NumTracks>
          <mpvm:PlayingTime>234.12</mpvm:PlayingTime>
          <mpvm:PrincipalArtist>Duke Ellington</mpvm:PrincipalArtist>
          <mpvm:Recorded>1955-11-17</mpvm:Recorded>
          <mpvm:TrackNumber>2</mpvm:TrackNumber>
       </mpvm:MusicProperties>
    </nmf:Metadata>
```

```
    </mpv:Audio>
  </mpv:AssetList>
</file:Manifest>
```

Filenames of assets are specified using the *mpv:LastURL* element. Pathnames can be relative or absolute; relative names begin relative to the location of the MPV file. Pathnames are to be specified using URL-compliant syntax. This includes translation of special characters like the space (" ") into equivalent representations like "%20" and use of prefixes like *file:///* to introduce absolute pathnames to local files. Multiple pathnames may be specified for any given asset; they are interpreted as alternate paths to the same set of bits. A processing application tries them sequentially to try and locate the asset.

The term "LastURL" is used to emphasize that it's value is a URL to the last-known location of the file; because media files may be moved or renamed independently of the MPV file, it is possible that the media file has moved and must be searched for. The *mpv:InstanceID* and *mpv:ContentID* elements, if provided, are identifiers that can be used to find files that cannot be located by any of the *LastURL* entries.

3.3 Use of Existing MPV Specifications

The MPV Music Profile uses MPV is a manner consistent with these the existing MPV Core specification and the MPV Basic Profile and Presentation Profile specifications. For metadata, it incorporates the MPV Dublin Core NMF specification for those properties that can be represented in that manner.

3.4 MPV Music Profile Metadata Introduction

The MPV Core specification already supports an mpv:Audio asset type. The MPV Presentation Profile specification describes how to create playlists ("mpvp:Album") of assets, such as music and images. To this framework, the MPV Music Profile adds extensive metadata specifically about music; the existing framework continues to be used in a manner fully consistent with existing specifications.

Metadata	***MPV Music Profile***	***Discussion***
Music Asset ("Song", "Track")	**Subelements of the mpv:Audio asset**	
Pathname	mpv:LastURL	one or more pathnames that should resolve to the music file. Each pathname is specific to a filesystem, so there can be different names for each filesystem on a CD.
Format	nmf:Metadata|dc:Properties|dc:format	use MPV-provided list of well-known MIME types or vendor-specific extended types
Title	nmf:Metadata|dc:Properties|dc:title	the music "title"
Album Title	nmf:Metadata|mpvm:MusicProperties|mpvm:AlbumTitle	Title of the overall collection from which the music came

Performed by	nmf:Metadata|dc:Properties|dc:creator	Overall name(s) of the performers or performing group in plain text.
Princpal artist	nmf:Metadata|mpvm:MusicProperties|mpvm:PrincipalArtist	Principal artist
Band, Orchestra, Accompaniment	nmf:Metadata|dc:Properties|dc:contributor	Band, orchestra, accompaniment
Music by	nmf:Metadata|mpvm:MusicProperties|mpvm:MusicBy	Composer name(s) in free form plain text.
Lyrics by	nmf:Metadata|mpvm:MusicProperties|mpvm:LyricsBy	Lyricist name(s) in free form plain text.
Arranged by	nmf:Metadata|mpvm:MusicProperties|mpvm:ArrangedBy	Arranger name(s) in free form plain text.
Produced By	nmf:Metadata|mpvm:MusicProperties|ProducedBy	Producer name(s) in free form plain text.
Genre	nmf:Metadata|mpvm:MusicProperties|mpvm:Genre	Predefined set of genres can be extended simply by using a new name.
Date Recorded	nmf:Metadata|dcterms:Properties|dcterms:created	recorded date-time, e.g. `2002-10-03T21:07:00Z`
Identifier	nmf:Metadata|dc:Properties|dc:identifier	Catalog number, UPC, etc. A text string, not classified in any way and not guaranteed unique.
Description	nmf:Metadata|dc:Properties|dc:description	Commentary, message, description
Keywords	nmf:Metadata|dc:Properties|dc:subject	Semicolon separated list of plain text keywords or phrases for search. Semi-colon can be used by escaping with backslash, e.g. \;
Rights	nmf:Metadata|dc:Properties|dc:rights	Free-form plain text
Language	nmf:Metadata|dc:Properties|dc:language	"<language>_<territory>" where <language> is from **[ISO639-1]** and <territory> is **[ISO3166-1]** Example: "en_US"
Rendition using another encoder	mpv:Rendition mpv:renditionType="alt" |mpv:AudioRef	Refers to an alternate encoding of the asset.
Rendition with another bitrate	mpv:Rendition mpv:renditionType="subsampled" |mpv:AudioRef	Refers to another encoding of the asset at a different bitrate. Use mpvm:EncodedBitrate or interrogate the file for more information.
Encoded Bitrate	nmf:Metadata|mpvm:MusicProperties|mpvm:EncodedBitrate	Maximum bitrate in bps of the encoded asset. For variable bitrate-encoded assets, this is the maximum value; for constant bitrate encoded assets, it is the average value.
Asset artwork	mpv:Related mpv:relationship="urn:osta-	Refers to an image or

	org:mpv:music:artwork”|mpv:StillRef	other content that is artwork related to the asset. The referenced asset does not have to be a Still, it can be any asset type. The “dc:title” of the related asset can be used to describe the artwork. Described in detail in Section 5.2, Artwork for an Asset
Music video	mpv:Related mpv:relationship=”urn:osta-org:mpv:music:video”|mpv:VideoRef	Refers to a video that is of the same music as the primary music track.
Online Info	nmf:Metadata|mpvm:MusicProperties|mpvm:MoreInfoURL	URL to follow to get more info about the music.
Playing Time	nmf:Metadata|mpvm:MusicProperties|mpvm:PlayingTime	in seconds, duration. Decimal values are allowed, such as 134.58 sec. means 134 and 58/100 seconds.
Track Number	nmf:Metadata|mpvm:MusicProperties|mpvm:TrackNumber	sequence order of the audio track on the original media, such as an audio CD. Starts with 1, not 0.
Number Tracks	nmf:Metadata|mpvm:MusicProperties|mpvm:NumTracks	Number of tracks on the original compilation. Starts with 1, not 0.
Set Number in Collection	nmf:Metadata|mpvm:MusicProperties|mpvm:SetNumber	sequence order of the disc or storage media from an original collection. Starts with 1, not 0. Default value is 1.
Number Sets in Collection	nmf:Metadata|mpvm:MusicProperties|mpvm:NumSets	Number of discs in an original collection of discs. Starts with 1, not 0. Default value is 1.
PlayCount	nmf:Metadata|mpvm:MusicProperties|mpvm:PlayCount	Number of times a given asset has been played.
Lyrics	nmf:Metadata|mpvm:MusicProperties|mpvm:Lyrics	Includes text, time offset, language
Mood	nmf:Metadata|mpvm:MusicProperties|mpvm:Mood	What mood is this music? (e.g. mellow, wild)
Tempo	nmf:Metadata|mpvm:MusicProperties|mpvm:Tempo	What tempo is this music? (e.g. fast, slow)
Situation	nmf:Metadata|mpvm:MusicProperties|mpvm:Situation	What situation is this music for? (e.g dance, dinner)
Medium	nmf:Metadata|dcterms:Properties|dcterms:medium	Original music release medium conformant to **[ID3v240]**
Original file and filename	mpv:Related mpv:relationship=”copyOf”|mpv:AudioRef	If the target file was copied from another location, this relationship can be recorded as a

		"copyOf". The referenced Audio asset can have the filename of that asset.
Extra Data	nmf:Metadata and mpv:Metadata	Any metadata that an application whichs to create can go into these containers.
Key-Value Pairs	nmf:Metadata|mpvm:Properties|mpvm:KeyValue|mpvmkv:Key nmf:Metadata|mpvm:Properties|mpvm:KeyValue|mpvmkv:Value	Arbitrary key-value pairs

Album ("Playlist") of Music	**mpvp:Album**	
Number of Entries	implicit – number of entries in the foreground	
Title	nmf:Metadata|dc:Properties|dc:title	
Performed By	nmf:Metadata|dc:Properties|dc:creator	Performer names
Principal Artist	nmf:Metadata|mpvm:MusicProperties|mpvm:PrincipalArtist	Principal artist's name
Description	nmf:Metadata|dc:Properties|dc:description	
Identifier	nmf:Metadata|dc:Properties|dc:identifier	catalog number, IDC
Rights	nmf:Metadata|dc:Properties|dc:rights	Free-form plain text
Album Artwork	mpvp:Album|mpv:Related mpv:relationship="urn:osta-org:mpv:music:artwork"|mpv:StillRef	
Music Playlist Items	mpvp:Album|mpvp:Foreground	This content is played as the principal content of the music playlist.
Playlist accompaniment	mpvp:Album|mpvp:Background	This content is played as background to the music content in the foreground. For example, it could specify images.
Key-Value Pairs	nmf:Metadata|mpvm:Properties|mpvm:KeyValue|mpvmkv:Key nmf:Metadata|mpvm:Properties|mpvm:KeyValue|mpvmkv:Value	Arbitrary key-value pairs
Extra Data	mpv:Metadata and nmf:Metadata anywhere	

3.5 Use of Dublin Core Metadata

To promote interoperability, MPV makes use of the Dublin Core metadata [DC-NMF] to represent essential metadata across all types of assets. Thus, the dc:title element is used to specify the title of a music asset just the same as the title of an image or video asset.

In the previous section, the Dublin Core metadata elements were mixed into the overall set of music metadata properties and assets. To clarify usage of the DC metadata, this section extracts just the Dublin Core elements from the previous section and groups them together for convenience.

Music Asset ("Song", "Track")	**mpv:Audio subelements**	

Performed by	nmf:Metadata|dc:Properties|dc:creator	Performer Names
Band, Orchestra, Accompaniment	nmf:Metadata|dc:Properties|dc:contributor	Band, orchestra, accompaniment
Description	nmf:Metadata|dc:Properties|dc:description	Commentary, message, description
Format	nmf:Metadata|dc:Properties|dc:format	use MPV-provided list of well-known MIME types
Identifier	nmf:Metadata|dc:Properties|dc:identifier	Catalog number, UPC, etc. A text string, not classified in any way and not guaranteed unique.
Keywords	nmf:Metadata|dc:Properties|dc:subject	Semicolon separated list of plain text keywords or phrases for search. Semi-colon can be used by escaping with backslash, e.g. \;
Language	nmf:Metadata|dc:Properties|dc:language	"<language>_<territory>" where <language> is from **[ISO639-1]** and <territory> is **[ISO3166-1]** Example: "en_US"
Publisher	nmf:Metadata|dc:Properties|dc:publisher	Free-form plain text
Rights	nmf:Metadata|dc:Properties|dc:rights	Free-form plain text
Title	nmf:Metadata|dc:Properties|dc:title	Free-form plain text
Created Date	nmf:Metadata|dcterms:Properties|dcterms:created	date-time music performed or recorded
Medium	nmf:Metadata|dcterms:Properties|dcterms:medium	Original music release medium conformant to **[ID3v240]**

Album ("Playlist") of Music	**mpvp:Album subelements**	
Performed By	nmf:Metadata|dc:Properties|dc:creator	
Band, Orchestra, Accompaniment	nmf:Metadata|dc:Properties|dc:contributor	Band, orchestra, accompaniment
Description	nmf:Metadata|dc:Properties|dc:description	
Identifier	nmf:Metadata|dc:Properties|dc:identifier	catalog number, IDC
Publisher	nmf:Metadata|dc:Properties|dc:publisher	Free-form plain text
Rights	nmf:Metadata|dc:Properties|dc:rights	Free-form plain text
Title	nmf:Metadata|dc:Properties|dc:title	

Chapter 4: MPV Music Profile – Using MPV Playlists

4.1 MPV Music Playlists

MPV playlists are a central concept in MPV that provide for user-friendly organization and navigation of the music, photo, and video (and other) content on a storage media. A MPV playlist identifies the primary assets to be presented to the user, such as a set of music songs. The playlist also specifies the sequence in which assets should be presented and other presentation characteristics.

MPV playlists are implemented according to the MPV Presentation Profile specification **[MPV-Pres]**. This MPV Music Profile document specifies the details of this usage. The basic structure of an MPV playlist uses the <mpvp:Album> element, which may contain metadata, foreground and background content, and related and rendition assets.

```
...
<mpvp:Album>
   <mpv:Metadata> ... </mpv:Metadata>
   <nmf:Metadata> ... </nmf:Metadata>
   <mpvp:Background> ... </mpvp:Background>
   <mpvp:Foreground> ... </mpvp:Foreground>
   <mpv:Rendition> ... </mpv:Rendition>
   <mpv:Related> ... </mpv:Related>
</mpvp:Album>
...
```

MPV is focused on interoperability of content produced and consumed on both PCs and consumer electronics devices. Unlike CE-focused solutions, it is expected that users will organize media files into folders/directories of their own choosing and give files long filenames. This means that it isn't possible to specify content location and playback order simply by requiring specific directory and filenames. Instead, MPV provides an approach that allows the content to be located anywhere and with any name.

In addition, many related media assets may go onto a storage media such as CD that are used to enhance access and playback performance and to provide enhanced playback and printing experiences. The MPV playlist allows this content to be managed to present the user a simple high-level interaction with their content.

4.1.1 Number of Playlists per MPV File

A MPV file conforming to the MPV Music Profile 1.0 MAY contain zero or more playlists. Additionally, the MPV playlist MAY reference assets in another MPV file. These featuers can be useful for applications that are using an

MPV file as a database. However, this usage is not recommended for MPV files that desire the highest interoperability because these features requires advanced processsing by the MPV reader.

For general interoperabilty, including use with consumer electronics devices, a MPV Music Profile file SHOULD have at most one playlist; in other words, only the first <mpvp:Album> element. Alternately, it is understood that only the first <mpvp:Album> element in a MPV Music Profile file MUST be processed by a conformant player.

4.1.2 Metadata Usage

Metadata placed on the mpvp:Album element has the scope of the whole album or playlist. For example, the mpvm:PrincipalArtist element can be used with either a single music asset or on the mpvp:Album.

Album ("Playlist") of Music	**mpvp:Album**	
Number of Entries	implicit – number of entries in the foreground	
Title	nmf:Metadata|dc:Properties|dc:title	
Performed By	nmf:Metadata|dc:Properties|dc:creator	Performer names
Principal Artist	nmf:Metadata|mpvm:MusicProperties|mpvm:PrincipalArtist	Principal artist's name
Description	nmf:Metadata|dc:Properties|dc:description	
Identifier	nmf:Metadata|dc:Properties|dc:identifier	catalog number, IDC
Album Artwork	mpvp:Album|mpv:Related mpv:relationship="urn:osta-org:mpv:music:artwork"|mpv:StillRef	
Music Playlist Items	mpvp:Album|mpvp:Foreground	This content is played as the principal content of the music playlist.
Playlist accompaniment	mpvp:Album|mpvp:Background	This content is played as background to the music content in the foreground. For example, it could specify images.
Key-Value Pairs	nmf:Metadata|mpvm:Properties|mpvm:KeyValue|mpvmkv:Key nmf:Metadata|mpvm:Properties|mpvm:KeyValue|mpvmkv:Value	Arbitrary key-value pairs
Extra Data	mpv:Metadata and nmf:Metadata anywhere	

4.1.3 Background Usage

The mpvp:Background element is used in the MPV Music Profile to provide background presentation content to the music in the foreground. It is applied at the discretion of the playback application or device. If it is a simple device or application with no visual presentation capabilities, the mpvp:Background content SHOULD be ignored.

If the application or device has visual presentation capabilities, the mpvp:Background content may be processed. The recommended content is a series of mpv:StillRef elements that refer to still images that may be displayed behind the foreground content. This can be used in both browse/menu mode as well as playback mode. All the **[MPV-Pres]** properties may be applied, such as transitions. These are honored at the discretion of the playback application.

4.1.4 Foreground Usage

The MPV music playlist contains a foreground list (*mpvp:Foreground*) of music assets identified using the *mpv:AudioRef* element. This defines the set of primary music items in the playlist and their sequence. In addition to the referenced audio assets, the mpv:AssetList in the MPV file may also contain still image, video, and other kinds

of assets. The *mpvp:Album* makes it easy to identify which assets in the *mpv:AssetList* are primary by explicitly identififying them.

4.1.5 Related and Rendition Assets

A *mpvp:Album* may identify renditions and related assets. Album artwork may be specified using a *mpv:Related* element with an *urn:osta-org:mpv:music:artwork* relationship identifier. A pre-generated playback video of the whole album/playlist may be specified using a *mpv:Rendition* element with a *mpv:renditionUsage="show"*.

4.2 Groups of Assets in Playlists

There may be situations in which a playlist has so many assets that it is inconvenient to navigate one item at a time. The playback application or device MAY choose to implement a FastForward or FastRewind type of behaviour that jumps ahead by multiples of items.

MPV-generating applications may also choose to group assets within playlists. The playback application MAY choose to implement FastForward or FastRewind behaviour by jumping ahead by groups; group navigation can also be explicit, if desired by the playback application or device.

Groups are specified using standard MPV functionality. A group of assets to be played sequentially is gathered together using the mpv:Seq asset. The playback behaviour of an application or device that encounters a mpv:Seq asset is to play the contents sequentially.

When mpv:Seqs are used with a mpvp:Album, only the mpv:Seq assets are listed in the album. Then processing application or device must then play the mpv:Seq contents.

EXAMPLE

```
<?xml version="1.0" encoding="UTF-8"?>
<file:Manifest xmlns:file="http://ns.osta.org/manifest/1.0/"
xmlns:mpv="http://ns.osta.org/mpv/1.0/"
xmlns:mpvp="http://ns.osta.org/mpv/presentation/1.0/"
xmlns:mpvm="http://ns.osta.org/mpv/music/1.0/" xmlns:dc="http://purl.org/dc/elements/1.1/"
xmlns:dcterms="http://http://purl.org/dc/terms/" xmlns:nmf="http://ns.osta.org/nmf/1.0/">
  <nmf:Metadata>
    <ManifestProperties xmlns="http://ns.osta.org/manifest/1.0/">
      <ProfileBag>
        <Profile>http://ns.osta.org/mpv/basic/1.0/</Profile>
        <Profile>http://ns.osta.org/mpv/presentation/1.0/</Profile>
        <Profile>http://ns.osta.org/mpv/music/1.0/</Profile>
      </ProfileBag>
    </ManifestProperties>
    <Properties xmlns="http://purl.org/dc/terms/">
      <created>2003-01-29T15:51:41Z</created>
      <modified>2003-01-29T15:51:41Z"/></modified>
    </Properties>
  </nmf:Metadata>

    <mpvp:Album>
    <nmf:Metadata>
      <dc:Properties>
        <dc:rights/>
        <dc:title>Piet's favorite Jazz</dc:title>
      </dc:Properties>
```

```
      <mpvm:MusicProperties>
        <mpvm:AlbumTitle/>
        <mpvm:Genre>Jazz</mpvm:Genre>
      </mpvm:MusicProperties>
    </nmf:Metadata>
    <mpvp:Foreground>
      <mpv:SeqRef mpv:idRef="IDSeq0001"/>
      <mpv:SeqRef mpv:idRef="IDSeq0002"/>
    </mpvp:Foreground>
  </mpvp:Album>


  <mpv:AssetList>
    <mpv:Seq mpv:id="IDSeq0001">
       <mpv:AudioRef mpv:idRef="ID000001"/>
       <mpv:AudioRef mpv:idRef="ID000002"/>
       <mpv:AudioRef mpv:idRef="ID000003"/>
    </mpv:Seq>
    <mpv:Seq mpv:id="IDSeq0002">
       <mpv:AudioRef mpv:idRef="ID000004"/>
       <mpv:AudioRef mpv:idRef="ID000005"/>
       <mpv:AudioRef mpv:idRef="ID000006"/>
    </mpv:Seq>
    <mpv:Audio mpv:id="ID000001">
      <nmf:Metadata>
        <Properties xmlns="http://purl.org/dc/elements/1.1">
          <creator/>
          <format>audio/mpeg</format>
          <title>Ghostbuster's Theme.mp3</title>
        </Properties>
        <MusicProperties xmlns="http://ns.osta.org/mpv/music/1.0/">
          <AlbumTitle>GhostBusters</AlbumTitle>
          <Genre>theme</Genre>
          <PlayingTime>246.48</PlayingTime>
        </MusicProperties>
      </nmf:Metadata>
      <mpv:LastURL>Ghostbuster's%20Theme.mp3</mpv:LastURL>
    </mpv:Audio>

    <mpv:Audio mpv:id="ID000002">
      <nmf:Metadata>
        <Properties xmlns="http://purl.org/dc/elements/1.1">
          <creator/>
          <format>audio/mpeg</format>
          <title>Beach Boys</title>
        </Properties>
        <MusicProperties xmlns="http://ns.osta.org/mpv/music/1.0/">
          <AlbumTitle>Made In USA</AlbumTitle>
          <Genre/>
          <PlayingTime>119.96</PlayingTime>
        </MusicProperties>
      </nmf:Metadata>
      <mpv:LastURL>409D.MP3</mpv:LastURL>
    </mpv:Audio>
...
  </mpv:AssetList>
</file:Manifest>
```

4.3 Linked Playlists

The **[MPV-Core]** specification established the structure and nomenclature of MPV files and assets. The MPV file is an XML document that is called an MPV Manifest and the outer-most element of a MPV file is a <file:Manifest>.

One very useful capability that [MPV-Core] provides is to link manifests to one another. The <mpv:ManifestLink> element creates a link to another MPV file. In this manner, just as with the WorldWideWeb, an endless chain of linked MPV files can be created.

Typically, when applied to a removable storage media like a CD, DVD, or memory card, all the links will be self-contained within the media. In this case, typically a file using the distinguished filename "index.mum" will contain a top-level list of linked playlists.

EXAMPLE:

In this example, a playlist consists only of links to three other playlists. Each playlist link has a screen-resolution image representation that can be used to enhance to a graphical presentation. Note that the filesystem location and names of these playlists is arbitrary and may be located at the choice of the authoring application or device. Inspection of the linked playlists shows that they are specific orderings of the music – by genre, by artist, and by album. Thus the example is typical of a top-level playlist (e.g. an index.mum) which provides for access to other playlists with specific content organization. Each of the specific playlists could be further organized into additional playlists, e.g. one for each genre, artist, and album.

```
<?xml version="1.0" encoding="UTF-8"?>
<file:Manifest xmlns:file="http://ns.osta.org/manifest/1.0/"
  xmlns:mpv="http://ns.osta.org/mpv/1.0/"
  xmlns:mpvp="http://ns.osta.org/mpv/presentation/1.0/"
  xmlns:mpvm="http://ns.osta.org/mpv/music/1.0/" xmlns:nmf="http://ns.osta.org/nmf/1.0/">
  <nmf:Metadata>
    <ManifestProperties xmlns="http://ns.osta.org/manifest/1.0/">
      <InstanceID>23686AEFA3B340DAAC1BAF09B17DBCBC9</InstanceID>
      <ProfileBag>
          <Profile>http://ns.osta.org/mpv/basic/1.0/</Profile>
          <Profile>http://ns.osta.org/mpv/music/1.0/</Profile>
          <Profile>http://ns.osta.org/mpv/presentation/1.0/</Profile>
      </ProfileBag>
    </ManifestProperties>
  </nmf:Metadata>

  <mpvp:Album mpv:id="ALB001">
    <nmf:Metadata>
       <Properties xmlns="http://purl.org/dc/elements/1.1/">
          <creator>Pieter van Zee</creator>
          <description>A collection of my favorites songs from the 40's and
  50's</description>
          <title>Golden Oldies party music</title>
        </Properties>
       <Properties xmlns="http://purl.org/dc/terms/1.1/">
          <created>2002-12-01T23:11:00Z</created>
        </Properties>
     </nmf:Metadata>
     <mpvp:Background>
          <mpv:StillRef mpv:idRef="ID000000"/>
     </mpvp:Background>
     <mpvp:Foreground>
```

```
        <mpv:ManifestLinkRef mpv:idRef="ID000100"/>
        <mpv:ManifestLinkRef mpv:idRef="ID000200"/>
        <mpv:ManifestLinkRef mpv:idRef="ID000300"/>
    </mpvp:Foreground>
 </mpvp:Album>

 <mpv:AssetList>
  <!—background image for the playlist presentation -->
  <mpv:Still mpv:id="ID000000">
    <mpv:LastURL mpv:filesystem="Joliet">Playlists/Artwork/index.jpg</mpv:LastURL>
    <mpv:LastURL mpv:filesystem="ISO9660-1">PLAYLIST/ARTWORK/INDEX.JPG</mpv:LastURL>
  </mpv:Still>

   <!-- ManifestLink -->
   <mpv:ManifestLink mpv:id="ID000100">
      <mpv:InstanceID>EF886AEFA3B340DA971BAF09B17DBC122</mpv:InstanceID>
      <mpv:LastURL mpv:filesystem="Joliet">Playlists/by genre.mum</mpv:LastURL>
      <mpv:LastURL mpv:filesystem="ISO9660-1">PLAYLIST/BY_GENRE.mum</mpv:LastURL>
      <nmf:Metadata>
          <Properties xmlns="http://purl.org/dc/elements/1.1/">
            <title>By Genre</title>
          </Properties>
      </nmf:Metadata>
      <mpv:Rendition mpv:renditionUsage="screen">
          <mpv:StillRef mpv:idRef="ID000101"/>
      </mpv:Rendition>
   </mpv:ManifestLink>
   <!-- thumbnail stand-in for the manifest -->
  <mpv:Still mpv:id="ID000101">
    <mpv:LastURL mpv:filesystem="Joliet">Playlists/Artwork/by genre.jpg</mpv:LastURL>
    <mpv:LastURL mpv:filesystem="ISO9660-1">PLAYLIST/ARTWORK/BY_GENRE.JPG</mpv:LastURL>
  </mpv:Still>

   <!-- ManifestLink -->
   <mpv:ManifestLink mpv:id="ID000200">
      <mpv:InstanceID>34FE6AEFA3B340DA891BAF09B17DBC992</mpv:InstanceID>
      <mpv:LastURL mpv:filesystem="Joliet">Playlists/by artist.mum</mpv:LastURL>
      <mpv:LastURL mpv:filesystem="ISO9660-1">PLAYLIST/BY_ARTIS.mum</mpv:LastURL>
       <nmf:Metadata>
          <Properties xmlns="http://purl.org/dc/elements/1.1/">
            <title>By Artist</title>
          </Properties>
       </nmf:Metadata>
      <mpv:Rendition mpv:renditionUsage="screen">
          <mpv:StillRef mpv:idRef="ID000201"/>
      </mpv:Rendition>
   </mpv:ManifestLink>
   <!-- thumbnail stand-in for the manifest -->
  <mpv:Still mpv:id="ID000201">
    <mpv:LastURL mpv:filesystem="Joliet">Playlists/Artwork/by artist.jpg</mpv:LastURL>
    <mpv:LastURL mpv:filesystem="ISO9660-1">PLAYLIST/ARTWORK/BY_ARTIS.JPG</mpv:LastURL>
  </mpv:Still>

   <!-- ManifestLink -->
   <mpv:ManifestLink mpv:id="ID000300">
      <mpv:InstanceID>93486AEFA3B340DA231BAF09B17DBCEFB</mpv:InstanceID>
      <mpv:LastURL mpv:filesystem="Joliet">Playlists/by album.mum</mpv:LastURL>
      <mpv:LastURL mpv:filesystem="ISO9660-1">PLAYLIST/BY_ALBUM.mum</mpv:LastURL>
```

```
      <nmf:Metadata>
        <Properties xmlns="http://purl.org/dc/elements/1.1/">
          <title>By Album</title>
        </Properties>
      </nmf:Metadata>
     <mpv:Rendition mpv:renditionUsage="screen">
        <mpv:StillRef mpv:idRef="ID000301"/>
     </mpv:Rendition>
   </mpv:ManifestLink>
   <!-- thumbnail stand-in for the manifest -->
   <mpv:Still mpv:id="ID000301">
     <mpv:LastURL mpv:filesystem="Joliet">Playlists/Artwork/by album.jpg</mpv:LastURL>
     <mpv:LastURL mpv:filesystem="ISO9660-1">PLAYLIST/ARTWORK/BY_ALBUM.JPG</mpv:LastURL>
   </mpv:Still>
  </mpv:AssetList>
</file:Manifest>
```

This example would exist in the context of the following sample filesystem organization on a CD.

```
/index.mum
/Playlists/by album.mum
/Playlists/by artist.mum
/Playlists/by genre.mum
/Playlists/Artwork/by album.jpg
/Playlists/Artwork/by artist.jpg
/Playlists/Artwork/by genre.jpg
/Playlists/Artwork/index.jpg
```

4.4 Links to Foreign Playlists

Many music playlist formats exist. Since they are not in the MPV format, they are considered “foreign playlists”. MPV Music Profile allows links and references to foreign playlists, and applications and devices that understand foreign playlist formats can access them. In general, however, a MPV Music Profile player MUST understand only MPV playlists.

Foreign playlist assets are represented using the mpv:Document asset type. Note that mpv:ManifestLink assets must references filse that are in the MPV format. When a foreground asset of the current playlist/album is a mpv:Document that is of a playlist type known to the MPV Music Profile reader, the reader SHOULD present the document as a link. If the link is selected by the user, the foreign playlist is loaded.

The type of playlist is recorded using nmf:Metadata|dc:Properties|format. The list of playlist media types is in Section 6.1, Music Manifest File Types & Extensions.

EXAMPLE:

In this example, a playlist consists only of links to two foreign M3U playlists. Note how the MPV wrapper is used to organize and represent information about the less-capable M3U playlists.

```
<?xml version="1.0" encoding="UTF-8"?>
<file:Manifest xmlns:file="http://ns.osta.org/manifest/1.0/"
  xmlns:mpv="http://ns.osta.org/mpv/1.0/"
  xmlns:mpvp="http://ns.osta.org/mpv/presentation/1.0/"
  xmlns:mpvm="http://ns.osta.org/mpv/music/1.0/" xmlns:nmf="http://ns.osta.org/nmf/1.0/">
  <nmf:Metadata>
    <ManifestProperties xmlns="http://ns.osta.org/manifest/1.0/">
```

```
      <InstanceID>23686AEFA3B340DAAC1BAF09B17DBCBC9</InstanceID>
      <ProfileBag>
         <Profile>http://ns.osta.org/mpv/basic/1.0/</Profile>
         <Profile>http://ns.osta.org/mpv/music/1.0/</Profile>
         <Profile>http://ns.osta.org/mpv/presentation/1.0/</Profile>
      </ProfileBag>
    </ManifestProperties>
  </nmf:Metadata>

  <mpvp:Album mpv:id="ALB001">
    <nmf:Metadata>
       <Properties xmlns="http://purl.org/dc/elements/1.1/">
         <creator>Pieter van Zee</creator>
         <description>A collection of my favorites songs from the 40's and
  50's</description>
         <title>Golden Oldies party music</title>
       </Properties>
      <Properties xmlns="http://purl.org/dc/terms/1.1/">
         <created>2002-12-01T23:11:00Z</created>
       </Properties>
    </nmf:Metadata>
    <mpvp:Foreground>
        <mpv:DocumentRef mpv:idRef="ID000100"/>
        <mpv:DocumentRef mpv:idRef="ID000200"/>
    </mpvp:Foreground>
  </mpvp:Album>

  <mpv:AssetList>

    <!-- Document -->
    <mpv:Document mpv:id="ID000100">
      <mpv:InstanceID>EF886AEFA3B340DA971BAF09B17DBC122</mpv:InstanceID>
      <mpv:LastURL mpv:filesystem="Joliet">Playlists/by%20genre.m3u</mpv:LastURL>
      <mpv:LastURL mpv:filesystem="ISO9660-1">PLAYLIST/BY_GENRE.M3U</mpv:LastURL>
      <nmf:Metadata>
         <Properties xmlns="http://purl.org/dc/elements/1.1/">
           <format>audio/x-mpegurl</format>
           <title>By Genre</title>
         </Properties>
      </nmf:Metadata>
      <mpv:Rendition mpv:renditionUsage="screen">
         <mpv:StillRef mpv:idRef="ID000101"/>
      </mpv:Rendition>
    </mpv:ManifestLink>
    <!-- thumbnail stand-in for the manifest -->
    <mpv:Still mpv:id="ID000101">
      <mpv:LastURL mpv:filesystem="Joliet">Playlists/Artwork/by%20genre.jpg</mpv:LastURL>
      <mpv:LastURL mpv:filesystem="ISO9660-1">PLAYLIST/ARTWORK/BY_GENRE.JPG</mpv:LastURL>
    </mpv:Still>

    <!-- Document -->
    <mpv:Document mpv:id="ID000200">
      <mpv:InstanceID>34FE6AEFA3B340DA891BAF09B17DBC992</mpv:InstanceID>
      <mpv:LastURL mpv:filesystem="Joliet">Playlists/by%20artist.m3u</mpv:LastURL>
      <mpv:LastURL mpv:filesystem="ISO9660-1">PLAYLIST/BY_ARTIS.M3U</mpv:LastURL>
       <nmf:Metadata>
         <Properties xmlns="http://purl.org/dc/elements/1.1/">
           <format>audio/x-mpegurl</format>
```

```
          <title>By Artist</title>
        </Properties>
      </nmf:Metadata>
     <mpv:Rendition mpv:renditionUsage="screen">
        <mpv:StillRef mpv:idRef="ID000201"/>
     </mpv:Rendition>
   </mpv:ManifestLink>
   <!-- thumbnail stand-in for the manifest -->
  <mpv:Still mpv:id="ID000201">
    <mpv:LastURL mpv:filesystem="Joliet">Playlists/Artwork/by%20artist.jpg</mpv:LastURL>
    <mpv:LastURL mpv:filesystem="ISO9660-1">PLAYLIST/ARTWORK/BY_ARTIS.JPG</mpv:LastURL>
  </mpv:Still>

 </mpv:AssetList>
</file:Manifest>
```

This example would exist in the context of the following sample filesystem organization on a CD.

```
/index.mum
/Playlists/by artist.m3u
/Playlists/by genre.m3u
/Playlists/Artwork/by artist.jpg
/Playlists/Artwork/by genre.jpg
```

4.5 Default Playlists

When a MPV file has more than one playlist (mpvp:Album), the default playlist is the first one in the file. For best interoperability, however, a MPV file has only one playlist. Instead, the default playlist behaviour is determined by the order in which playlists are processed by the application or device that is accessing them.

The default playlist is the first playlist that is encountered. Because the Music Profile specification fixed the algorithm by which MPV music manifest files are searched for, this is deterministic. *Index.mum* is the first file searched for, followed by *indexmum.xml*, *album.mum*, and *albummum.xml*. Then files with the *.mum* extension are processed in alphabetical order. If no file is found in the current directory, children, parent, and sibling directories are searched.

How the default playlist is processed is up to the processing application or device. The recommended best practices are that when the user is "browsing" or viewing a menu, the contents of the default list SHOULD be presented to the user. When the user is "playing/showing", the contents of the list SHOULD be recursively played or interpreted. When a manifestLink is played, the behaviour is to open the file referenced by the link and play it.

For example, in "browse / menu" mode, the example file above would be presented to the user as a menu from which he could choose which playlist to use next. When in "playback" mode, the "By genre.mum" MPV file would be opened and it would be played.

4.6 Dynamic Playlists

So far, we have described how to create playlists of fixed collections of music. However, it is valuable to be able to represent the set of selection criteria that produced a given collection. This allows for round-trip editing and update of playlists and music collections when applied to an evolving collection of music over time.

Dynamic playlists also allow the more advanced player applications and devices to dynamically extend the playlists to reflect the music that is currently actually available. This is particularly valuable for hard-drive applications of MPV music playlists, where the user is regularly adding more music to a collection.

Imagine, for example, a harddrive-based music jukebox that contained your ever-growing complete collection of music. As you add new CDs to the collection, your jukebox playlists are automatically updated to include the new music selections. In addition, each time you insert a disc of music into the music jukebox, the MPV-aware jukebox offers to incrementally add more music to the disc from it's collection that met the specified selection criteria of the playlists on the disc.

Support for dynamic playlists MAY be implemented in a maker or player application or device.

4.6.1 Specifying Dynamic Playlists

Dynamic playlists are specified essentially like database queries. They are stored as metadata on the mpvp:Foreground and mpvp:Background elements of an mpvp:Album. A processing application would apply them to the set of assets listed in the mpv:AssetList. Of course, this list may shrink or grow as more or less music is added to it.

Dynamic playlists can be specified with or without a set of static asset references. For the MPV Music Profile 1.0, a MPV playlist on removable storage media MUST include static asset references; it MAY include dynamic playlist queries that represent the selection criteria for the static assets that are specified.

4.6.2 Playlist Query Language

MPV Music Profile 1.0 allows applications to specify XPath queries that result in a list of assets that represent a MPV playlist. Since MPV is an XML-based grammar, it can use the widely adopted grammar called XPath [XPATH] that provides an industry-standard means to express selection criteria for one or more elements of an XML document.

Software SDKs that process XPath queries are widely available for most PC and server computing platforms and several multiplatform implementations are available. Low-end platforms, however, may not wish to support XPath queries because of the firmware and runtime memory requirements.

The XPath expression is executed relative to the <mpv:AssetList> node in the target MPV manifest file. The resulting list of assets that match the statement are treated for that instance as members of the playlist.

EXAMPLE

Todo

4.7 Best Practices for Generating Playlists

There are any number of ways for applications and devices to produce playlists. They may be the result of extensive manual user interaction. Or they may be generated automatically based on music metadata such as Principal Artist, Genre,and Album Title.

4.7.1 Top-Level Playlist

The most important best practice is to provide a top-level playlist, such as an index.mum. This gives the playback application or device the best ability to navigate contents in the order intended by the creator application.

4.7.2 "All Music" Playlist

It is RECOMMENDED that at least one playlist on a storage media play all the music. If this playlist is also the first playlist in the top-level playlist, it is the playlist that gets played first when a default playlist is used.

4.7.3 Local mpv:AssetList

Thus far, we have described putting the mpv:AssetList in each MPV playlist file. For broadest ineroperability with all types of devices and applications, the assetlist MUST be in the same MPV files as the playlist (mpvp:Album).

4.7.4 Centralized mpv:AssetList

However, if interoperability is not the core objective, then an application or device MAY keep the playlists and assetlist in separate files. For example, a jukebox device such as the one described in Section 4.6, Dynamic Playlists, might store the mpv:AssetList representing the full set of music assets in a separate MPV file and create separate playlists expressed using dynamic playlists. This approach is efficient and scalable because it avoids duplicating information about the assets in more than one place. In addition to dynamic playlists, this approach can also accommodate static playlists by using the mpv:manifestLinkIdRef attribute in the mpv:AudioRef asset reference in the mpvp:Foreground or Background.

Usage of a centralized assetlist is defined by MPV Core and is quite practical for many applications, but it is not required of applications and devices that support the MPV Music Profile 1.0 specification for use on removable storage media because it requires a more capable playback device or application and additional computing resources. It is suitable for management of assets on non-removable media, such as a computer or device harddrive.

Chapter 5: MPV Music Schemas In Detail

5.1 Multiple Renditions of a Music Asset

The file specified in the primary asset should generally be the highest quality encoding while maintaining high compatibility with typical players. It may be useful to specify multiple renditions of a music asset. For example, if space is available on the storage media, multiple encodings of the same music asset can be specified, increasing the compatibility of the music disc with multiple players that may have different supported codecs and sustained throughputs.

Renditions of a music asset are specified using the <mpv:Rendition> tag and appropriate mpv:renditionUsage attribute values. For music asset renditions based on subsampling, the "subsampled" value of the mpv:renditionUsage attribute is the most appropriate. In addition, there may be multiple codec encodings of a given asset. These are encoding using the "alt" value of the mpv:renditionUsage attribute.

RenditionUsage	Description
Alt	Alternate codec encoding of the same music asset. Metadata on the asset that is referenced can indicate the codec (nmf:Metadata|dc:Properties|dc:format) and bitrate (nmf:Metadata|mpvm:Properties|mpvm:EncodedBitrate).
Subsampled	An encoding in the same codec as the primary asset but with a lesser bitrate. Metadata on the asset that is referenced can indicate the bitrate (nmf:Metadata|mpvm:Properties|mpvm:EncodedBitrate).

mpvm:EncodedBitrate	*D*escribes the throughput in bits-per-second of the content as an integer value. For variable-bitrate-encoded assets, use the maximum value. For constant-bitrate-encoded assets, use the constant value. Typical values are 32000, 64000, 96000, 128000, 160000, 192000, 256000, 320000 Note that these values are not Kbps values, where K=1024, but kbps values where k=1000.

EXAMPLE

In this example, a primary MP3 file encoded at 160kbps has a MP3 file rendition encoded at 64kbps and a WMA file alternate rendition encoded at 64kbps.

```
...
<mpv:AssetList>
 <!-- This is the per-asset info -->
 <mpv:Audio mpv:id="ID01-GREAT-SWING-CLASSICS-20021202031833-a">
    <mpv:LastURL>01%20Great%20Swing%20Classics.mp3</mpv:LastURL>
     <nmf:Metadata>
       <dc:Properties>
          <dc:creator>Benny Goodman and his Orchestra</dc:creator>
          <dc:format>audio/mpeg</dc:format>
          <dc:title>Jumpin' At The Woodside</dc:title>
       </dc:Properties>
       <mpvm:MusicProperties>
          <mpvm:AlbumTitle>Great SWING CLASSICS in HI-FI</mpvm:AlbumTitle>
          <mpvm:EncodedBitrate>160000</mpvm:EncodedBitrate>
          <mpvm:Genre>Jazz</mpvm:Genre>
       </mpvm:MusicProperties>
    </nmf:Metadata>
    <mpv:Rendition mpv:renditionUsage="subsampled">
        <mpv:AudioRef mpv:idRef="ID01-GREAT-SWING-CLASSICS-20021202031833-R1"/>
    </mpv:Related>
    <mpv:Related mpv:relationship="alt">
        <mpv:AudioRef mpv:idRef="ID01-GREAT-SWING-CLASSICS-20021202031833-R2"/>
    </mpv:Related>
 </mpv:Audio>
 <mpv:Audio mpv:id="ID01-GREAT-SWING-CLASSICS-20021202031833-R1">
    <mpv:LastURL>01%20Great%20Swing%20Classics.mp3</mpv:LastURL>
     <nmf:Metadata>
       <dc:Properties>
          <dc:format>audio/mpeg</dc:format>
       </dc:Properties>
       <mpvm:MusicProperties>
          <mpvm:EncodedBitrate>64000</mpvm:EncodedBitrate>
       </mpvm:MusicProperties>
    </nmf:Metadata>
 </mpv:Audio>
 <mpv:Audio mpv:id="ID01-GREAT-SWING-CLASSICS-20021202031833-R2">
    <mpv:LastURL>01%20Great%20Swing%20Classics.wma</mpv:LastURL>
     <nmf:Metadata>
       <dc:Properties>
          <dc:format>audio/x-ms-wma</dc:format>
       </dc:Properties>
       <mpvm:MusicProperties>
          <mpvm:EncodedBitrate>64000</mpvm:EncodedBitrate>
       </mpvm:MusicProperties>
    </nmf:Metadata>
 </mpv:Audio>
```

5.2 Artwork for an Asset

The MPV Music Profile allows rich types of artwork for an asset to be specified. A generating application can specify multiple kinds of artwork with any given music asset. The generating application has a choice: it can use the generic "relationship" string of "urn:osta-org:mpv:music:artwork", or if available, a more specific relationship may be specified.

A processing application that doesn't care about specific types of artwork can do a string match against the more generic "urn:osta-org:mpv:music:artwork" relationship, while more specific needs can also be matched. Note also that multiple related assets can be identified that refer to the same physical asset. For example, the cover artwork may also be artwork of a performance.

Relationship type on an asset	***Meaning***
urn:osta-org:mpv:music:artwork	Unspecified artwork.
urn:osta-org:mpv:music:artwork:coverFront	Front cover artwork of the media case containing this music asset
urn:osta-org:mpv:music:artwork:coverBack	Back cover artwork of the media case containing this music asset
urn:osta-org:mpv:music:artwork:leaflet	Front cover artwork of the media case containing this music asset
urn:osta-org:mpv:music:artwork:media	Artwork on the media containing this music asset
urn:osta-org:mpv:music:artwork:artist	Artwork depicting one or more artists of the music.
urn:osta-org:mpv:music:artwork:ensemble	Artwork depicting the performing ensemble, e.g. a band or orchestra.
urn:osta-org:mpv:music:artwork:conductor	
urn:osta-org:mpv:music:artwork:performedBy	
urn:osta-org:mpv:music:artwork:musicBy	
urn:osta-org:mpv:music:artwork:lyricsBy	
urn:osta-org:mpv:music:artwork:recordingLocation	
urn:osta-org:mpv:music:artwork:recordingSession	
urn:osta-org:mpv:music:artwork:performance	
urn:osta-org:mpv:music:artwork:screenCapture	
urn:osta-org:mpv:music:artwork:illustration	
urn:osta-org:mpv:music:artwork:artistLogo	
urn:osta-org:mpv:music:artwork:publisherLogo	
urn:osta-org:mpv:music:artwork:thumbnail	32x32, GIF or PNG

EXAMPLE

In this example, a JPEG file is related to a MP3 file and identified as an image of a performance of the music asset.

```
...
<mpv:AssetList>
  <!-- This is the per-asset info -->
  <mpv:Audio mpv:id="ID01-GREAT-SWING-CLASSICS-20021202031833-a">
     <mpv:LastURL>01%20Great%20Swing%20Classics.mp3</mpv:LastURL>
     <nmf:Metadata>
       <dc:Properties>
         <dc:creator>Benny Goodman and his Orchestra</dc:creator>
         <dc:format>audio/mpeg</dc:format>
         <dc:title>Jumpin' At The Woodside</dc:title>
       </dc:Properties>
       <mpvm:MusicProperties>
```

```
            <mpvm:AlbumTitle>Great SWING CLASSICS in HI-FI</mpvm:AlbumTitle>
            <mpvm:ArrangedBy>Count Basie;Jimmy Mundy</mpvm:ArrangedBy>
            <mpvm:Genre>Jazz;Swing</mpvm:Genre>
            <mpvm:MusicBy>Count Basie</mpvm:MusicBy>
            <mpvm:PlayingTime>208.12</mpvm:PlayingTime>
            <mpvm:PrincipalArtist>Benny Goodman</mpvm:PrincipalArtist>
            <mpvm:Recorded>1954-11-09</mpvm:Recorded>
            <mpvm:TrackNumber>1</mpvm:TrackNumber>
          </mpvm:MusicProperties>
        </nmf:Metadata>
        <mpv:Related mpv:relationship="urn:osta-org:mpv:music:artwork:coverFront">
            <mpv:StillRef mpv:idRef="ID01-GREAT-SWING-CLASSICS-20021202031833-R1"/>
        </mpv:Related>
        <mpv:Related mpv:relationship="urn:osta-org:mpv:music:artwork:performance">
            <mpv:StillRef mpv:idRef="ID01-GREAT-SWING-CLASSICS-20021202031833-R2"/>
        </mpv:Related>
    </mpv:Audio>
    <mpv:Still mpv:id="ID01-GREAT-SWING-CLASSICS-20021202031833-R1">
      <mpv:LastURL>01%20Great%20Swing%20Classics.jpg</mpv:LastURL>
       <nmf:Metadata>
         <dc:Properties>
            <dc:format>image/jpeg</dc:format>
            <dc:title>Benny Goodman in concert</dc:title>
         </dc:Properties>
       </nmf:Metadata>
    </mpv:Still>
...
</mpv:AssetList>
```

5.3 Asset-related Content

The MPV Music Profile allows rich types of artwork for an asset to be specified. A generating application can specify multiple kinds of artwork with any given music asset. The generating application has a choice: it can use the generic "relationship" string of "urn:osta-org:mpv:music:artwork", or if available, a more specific relationship may be specified.

urn:osta-org:mpv:music:manuscript	The sheet music manuscript. Asset will be of Still, StillMultishotSequence, or Document.

5.4 Music Identification

One of the three MPV core concepts is identification. Every asset can have zero or more mpv:ContentID elements which contain strongly-typed identifiers. **[MPVCore]** defines a basic identification scheme based on the MD5 algorithm to provide a statistically unique identifier. Other identification schemes may be defined by OSTA or any other organization.

OSTA MD5 Digital Signatures

The following informative discussion is derived from [MPVCore], which provides the normative reference. OSTA-defined digital signatures take the form

urn:osta-org:mpv:dsig:<algorithm>:<params>:<value>

Example: `"urn:osta-org:mpv:dsig:md5:all:EF886AEFA3B340da971BAF09B17DBC122"`

Two MD5-hash-based digital signatures that are useful for music are:

urn:osta-org:mpv:dsig:md5:all:<value>

Every byte in the entire file is processed.

urn:osta-org:mpv:dsig:md5:head:<byte count>:<value>

Only the <byte count> integer number of bytes from the start of the file is processed. This is attractive to robustly refer to very large files or to files that are frequently edited or appended and for which the head can generate an approximately unique signature. If unspecified, the default byte count is 8192. Example: `"urn:osta-org:mpv:dsig:md5:head:30000:EF886AEFA3B340da971BAF09B17DBC122"`

urn:osta-org:mpv:dsig:md5:tail:<byte count>:<value>

Only the <byte count> integer number of bytes from the end of the file is processed. This is attractive to quickly detect changes in files that are frequently edited or appended. If unspecified, the default byte count is 8192. Example: `"urn:osta-org:mpv:dsig:md5:tail:30000:EF886AEFA3B340da971BAF09B17DBC122"`

In addition, a MD5 signature for the body of specific file types may be defined.

MUSICCD IDENTIFER DIGITAL SIGNATURES FOR MUSIC

Specific audio tracks of a CDDA CD, generally known as a music CD, can be identified using an identifier described by **[ID3v240]** as the MusicCDIdentifier, MCDI. More information about the origins of and an algorithm for computing the MCDI is given in Appendix II: Music CD Identifer.

One digital signature format is defined by **[ID3v240]**, known as a MusicCDIdentifier (MCDI). A sample implementation is provided by **[FreeDB]**.

[ID3v240] defines the Music CD Identifer as follows:

> This frame is intended for music that comes from a CD, so that the CD can be identified in databases such as the CDDB [CDDB]. The frame consists of a binary dump of the Table Of Contents, TOC, from the CD, which is a header of 4 bytes and then 8 bytes/track on the CD plus 8 bytes for the 'lead out' making a maximum of 804 bytes. The offset to the beginning of every track on the CD should be described with a four bytes absolute CD-frame address per track, and not with absolute time. This frame requires a present and valid "TRCK" frame, even if the CD's only got one track. There may only be one "MCDI" frame in each tag.

OSTA defines a ContentID that uses the MCDI, allowing a unique identifier for music published on a CD.

urn:osta-org:mpv:dsig:mcdi:<mcdi value in hex>:<track number>

This signature should allow music tracks that originat from a CD to be identified.
Example: `"urn:osta-org:mpv:dsig:mcdi:EF886AEFA3B340da971BAF09B17D:2"`

OTHER DIGITAL SIGNATURES FOR MUSIC

A number of digital signatures for music have been defined. Organizations with specific algorithms may wish to define a digital signature syntax for use with MPV files. OSTA is able to maintain a list of defined digital signatures for general reference.

5.5 Music-specific Metadata

As identified by Section 3.5, Use of Dublin Core Metadata, some music metadata is recorded using the Dublin Core metadata properties. Additional music-specific properties are defined by the MPV Music Profile.

AlbumTitle
ArrangedBy
EncodedBitrate
Genre
KeyValue
Lyrics
LyricsBy
Mood
MoreInfoURL
MusicBy
NumSets
NumTracks
PlayCount
PlayingTime
PrincipalArtist
ProducedBy
SetNumber
Situation
Tempo
TrackNumber

They are specified as NMF metadata, meaning that they are conformant to the [NMF] specification. NMF requires all metadata elements to be organized alphabetically and has other constraints.

General Usage is as subelements of the <mpvm:MusicProperties> element.

```
 <mpv:Audio mpv:id="ID01-GREAT-SWING-CLASSICS-20021202031833-a">
...
    <nmf:Metadata>
...
      <mpvm:MusicProperties>
...
      </mpvm:MusicProperties>
    </nmf:Metadata>
...
 </mpv:Audio>
```

MPVM:MUSICPROPERTIES

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="http://ns.osta.org/mpv/music/1.0/"
xmlns="http://ns.osta.org/mpv/music/1.0/" xmlns:nmft="http://ns.osta.org/nmf/1.0/tools/"
xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:nmf="http://ns.osta.org/nmf/1.0/"
xmlns:mpvmLyric="http://ns.osta.org/mpv/music/1.0/lyric/" elementFormDefault="qualified"
attributeFormDefault="qualified">
    <xs:import namespace="http://ns.osta.org/nmf/1.0/" schemaLocation="../../imports/nmf/base.xsd"/>
```

```
    <xs:annotation>
        <xs:documentation>The MPV Music Properties schema</xs:documentation>
    </xs:annotation>
    <!--
            name for BySchemaProperties element
            -->
    <xs:element name="MusicProperties" type="BySchemaPropsType"
substitutionGroup="nmf:BySchemaPropsBase"/>
    <!--
        top-level schema element type
        -->
    <xs:complexType name="BySchemaPropsType">
        <xs:complexContent>
            <xs:extension base="nmf:BySchemaPropsType">
                <xs:sequence>
                    <xs:element ref="AlbumTitle" minOccurs="0"/>
                    <xs:element ref="ArrangedBy" minOccurs="0"/>
                    <xs:element ref="EncodedBitrate" minOccurs="0"/>
                    <xs:element ref="Genre" minOccurs="0"/>
                    <xs:element ref="KeyValue" minOccurs="0"/>
                    <xs:element ref="Lyrics" minOccurs="0"/>
                    <xs:element ref="LyricsBy" minOccurs="0"/>
                    <xs:element ref="Mood" minOccurs="0"/>
                    <xs:element ref="MoreInfoURL" minOccurs="0"/>
                    <xs:element ref="MusicBy" minOccurs="0"/>
                    <xs:element ref="NumSets" minOccurs="0"/>
                    <xs:element ref="NumTracks" minOccurs="0"/>
                    <xs:element ref="PlayCount" minOccurs="0"/>
                    <xs:element ref="PlayingTime" minOccurs="0"/>
                    <xs:element ref="PrincipalArtist" minOccurs="0"/>
                    <xs:element ref="ProducedBy" minOccurs="0"/>
                    <xs:element ref="Recorded" minOccurs="0"/>
                    <xs:element ref="SetNumber" minOccurs="0"/>
                    <xs:element ref="Situation" minOccurs="0"/>
                    <xs:element ref="Tempo" minOccurs="0"/>
                    <xs:element ref="TrackNumber" minOccurs="0"/>
                </xs:sequence>
            </xs:extension>
        </xs:complexContent>
    </xs:complexType>

    <xs:element name="AlbumTitle" type="AlbumTitleType"/>
    <xs:complexType name="AlbumTitleType">
        <xs:simpleContent>
            <xs:extension base="xs:string"/>
        </xs:simpleContent>
    </xs:complexType>

    <xs:element name="ArrangedBy" type="ArrangedByType"/>
    <xs:complexType name="ArrangedByType">
        <xs:simpleContent>
            <xs:extension base="xs:string"/>
        </xs:simpleContent>
    </xs:complexType>

    <xs:element name="EncodedBitrate" type="EncodedBitrateType"/>
```

```
<xs:complexType name="EncodedBitrateType">
    <xs:simpleContent>
        <xs:extension base="xs:int"/>
    </xs:simpleContent>
</xs:complexType>

<xs:element name="Genre" type="GenreType"/>
<xs:simpleType name="GenreType">
    <xs:union memberTypes="GenreBaseType xs:anyURI"/>
</xs:simpleType>
<xs:simpleType name="GenreBaseType">
    <xs:restriction base="xs:string">
        <!-- Consistent with ID3v1 Genre from id3.org -->
        <xs:enumeration value="Blues"/>          <!-- ID3v1 Genre # 0. -->
        <xs:enumeration value="ClassicRock"/>    <!-- ID3v1 Genre # 1. -->
        <xs:enumeration value="Country”/>        <!-- ID3v1 Genre # 2. -->
        <xs:enumeration value="Dance”/>          <!-- ID3v1 Genre # 3. -->
        <xs:enumeration value="Disco”/>          <!-- ID3v1 Genre # 4. -->
        <xs:enumeration value="Funk”/>           <!-- ID3v1 Genre # 5. -->
        <xs:enumeration value="Grunge”/>         <!-- ID3v1 Genre # 6. -->
        <xs:enumeration value="Hip-Hop”/>        <!-- ID3v1 Genre # 7.  -->
        <xs:enumeration value="Jazz”/>           <!-- ID3v1 Genre # 8. -->
        <xs:enumeration value="Metal”/>          <!-- ID3v1 Genre # 9. -->
        <xs:enumeration value="New Age”/>        <!-- ID3v1 Genre # 10. -->
        <xs:enumeration value="Oldies”/>         <!-- ID3v1 Genre # 11. -->
        <xs:enumeration value="Other”/>          <!-- ID3v1 Genre # 12. -->
        <xs:enumeration value="Pop”/>            <!-- ID3v1 Genre # 13. -->
        <xs:enumeration value="R&B”/>            <!-- ID3v1 Genre # 14. -->
        <xs:enumeration value="Rap”/>            <!-- ID3v1 Genre # 15. -->
        <xs:enumeration value="Reggae”/>         <!-- ID3v1 Genre # 16. -->
        <xs:enumeration value="Rock”/>           <!-- ID3v1 Genre # 17. -->
        <xs:enumeration value="Techno”/>         <!-- ID3v1 Genre # 18. -->
        <xs:enumeration value="Industrial”/>     <!-- ID3v1 Genre # 19. -->
        <xs:enumeration value="Alternative”/>    <!-- ID3v1 Genre # 20. -->
        <xs:enumeration value="Ska”/>            <!-- ID3v1 Genre # 21. -->
        <xs:enumeration value="Death Metal”/>    <!-- ID3v1 Genre # 22. -->
        <xs:enumeration value="Pranks”/>         <!-- ID3v1 Genre # 23. -->
        <xs:enumeration value="Soundtrack”/>     <!-- ID3v1 Genre # 24. -->
        <xs:enumeration value="Euro-Techno”/>    <!-- ID3v1 Genre # 25. -->
        <xs:enumeration value="Ambient”/>        <!-- ID3v1 Genre # 26. -->
        <xs:enumeration value="Trip-Hop”/>       <!-- ID3v1 Genre # 27. -->
        <xs:enumeration value="Vocal”/>          <!-- ID3v1 Genre # 28. -->
        <xs:enumeration value="Jazz+Funk”/>      <!-- ID3v1 Genre # 29. -->
        <xs:enumeration value="Fusion”/>         <!-- ID3v1 Genre # 30. -->
        <xs:enumeration value="Trance”/>         <!-- ID3v1 Genre # 31. -->
        <xs:enumeration value="Classical”/>      <!-- ID3v1 Genre # 32. -->
        <xs:enumeration value="Instrumental”/>   <!-- ID3v1 Genre # 33. -->
        <xs:enumeration value="Acid”/>           <!-- ID3v1 Genre # 34. -->
        <xs:enumeration value="House”/>          <!-- ID3v1 Genre # 35. -->
        <xs:enumeration value="Game”/>           <!-- ID3v1 Genre # 36. -->
        <xs:enumeration value="Sound Clip”/>     <!-- ID3v1 Genre # 37. -->
        <xs:enumeration value="Gospel”/>         <!-- ID3v1 Genre # 38. -->
        <xs:enumeration value="Noise”/>          <!-- ID3v1 Genre # 39. -->
        <xs:enumeration value="AlternRock”/>     <!-- ID3v1 Genre # 40. -->
        <xs:enumeration value="Bass”/>           <!-- ID3v1 Genre # 41. -->
        <xs:enumeration value="Soul”/>           <!-- ID3v1 Genre # 42. -->
```

```
<xs:enumeration value="Punk”/>              <!-- ID3v1 Genre # 43. -->
<xs:enumeration value="Space”/>             <!-- ID3v1 Genre # 44. -->
<xs:enumeration value="Meditative”/>        <!-- ID3v1 Genre # 45. -->
<xs:enumeration value="Instrumental Pop”/>  <!-- ID3v1 Genre # 46. -->
<xs:enumeration value="Instrumental Rock”/> <!-- ID3v1 Genre # 47. -->
<xs:enumeration value="Ethnic”/>            <!-- ID3v1 Genre # 48. -->
<xs:enumeration value="Gothic”/>            <!-- ID3v1 Genre # 49. -->
<xs:enumeration value="Darkwave”/>          <!-- ID3v1 Genre # 50. -->
<xs:enumeration value="Techno-Industrial”/> <!-- ID3v1 Genre # 51. -->
<xs:enumeration value="Electronic”/>        <!-- ID3v1 Genre # 52. -->
<xs:enumeration value="Pop-Folk”/>          <!-- ID3v1 Genre # 53. -->
<xs:enumeration value="Eurodance”/>         <!-- ID3v1 Genre # 54. -->
<xs:enumeration value="Dream”/>             <!-- ID3v1 Genre # 55. -->
<xs:enumeration value="Southern Rock”/>     <!-- ID3v1 Genre # 56. -->
<xs:enumeration value="Comedy”/>            <!-- ID3v1 Genre # 57. -->
<xs:enumeration value="Cult”/>              <!-- ID3v1 Genre # 58. -->
<xs:enumeration value="Gangsta”/>           <!-- ID3v1 Genre # 59. -->
<xs:enumeration value="Top 40”/>            <!-- ID3v1 Genre # 60. -->
<xs:enumeration value="Christian Rap”/>     <!-- ID3v1 Genre # 61. -->
<xs:enumeration value="Pop/Funk”/>          <!-- ID3v1 Genre # 62. -->
<xs:enumeration value="Jungle”/>            <!-- ID3v1 Genre # 63. -->
<xs:enumeration value="Native American”/>   <!-- ID3v1 Genre # 64. -->
<xs:enumeration value="Cabaret”/>           <!-- ID3v1 Genre # 65. -->
<xs:enumeration value="New Wave”/>          <!-- ID3v1 Genre # 66. -->
<xs:enumeration value="Psychadelic”/>       <!-- ID3v1 Genre # 67. -->
<xs:enumeration value="Rave”/>              <!-- ID3v1 Genre # 68. -->
<xs:enumeration value="Showtunes”/>         <!-- ID3v1 Genre # 69. -->
<xs:enumeration value="Trailer”/>           <!-- ID3v1 Genre # 70. -->
<xs:enumeration value="Lo-Fi”/>             <!-- ID3v1 Genre # 71. -->
<xs:enumeration value="Tribal”/>            <!-- ID3v1 Genre # 72. -->
<xs:enumeration value="Acid Punk”/>         <!-- ID3v1 Genre # 73. -->
<xs:enumeration value="Acid Jazz”/>         <!-- ID3v1 Genre # 74. -->
<xs:enumeration value="Polka”/>             <!-- ID3v1 Genre # 75. -->
<xs:enumeration value="Retro”/>             <!-- ID3v1 Genre # 76. -->
<xs:enumeration value="Musical”/>           <!-- ID3v1 Genre # 77. -->
<xs:enumeration value="Rock & Roll”/>       <!-- ID3v1 Genre # 78. -->
<xs:enumeration value="Hard Rock”/>         <!-- ID3v1 Genre # 79. -->

 <!-- Consistent with ID3v1 Genre Extensions -->
<xs:enumeration value="Folk"/>              <!-- ID3v1 Genre Extension # 80. -->
<xs:enumeration value="Folk-Rock"/>         <!-- ID3v1 Genre Extension # 81. -->
<xs:enumeration value="National Folk"/>     <!-- ID3v1 Genre Extension # 82. -->
<xs:enumeration value="Swing"/>             <!-- ID3v1 Genre Extension # 83. -->
<xs:enumeration value="Fast Fusion"/>       <!-- ID3v1 Genre Extension # 84. -->
<xs:enumeration value="Bebob"/>             <!-- ID3v1 Genre Extension # 85. -->
<xs:enumeration value="Latin"/>             <!-- ID3v1 Genre Extension # 86. -->
<xs:enumeration value="Revival"/>           <!-- ID3v1 Genre Extension # 87. -->
<xs:enumeration value="Celtic"/>            <!-- ID3v1 Genre Extension # 88. -->
<xs:enumeration value="Bluegrass"/>         <!-- ID3v1 Genre Extension # 89. -->
<xs:enumeration value="Avantgarde"/>        <!-- ID3v1 Genre Extension # 90. -->
<xs:enumeration value="Gothic Rock"/>       <!-- ID3v1 Genre Extension # 91. -->
<xs:enumeration value="Progressive Rock"/>  <!-- ID3v1 Genre Extension # 92. -->
<xs:enumeration value="Psychedelic Rock"/>  <!-- ID3v1 Genre Extension # 93. -->
<xs:enumeration value="Symphonic Rock"/>    <!-- ID3v1 Genre Extension # 94. -->
<xs:enumeration value="Slow Rock"/>         <!-- ID3v1 Genre Extension # 95. -->
<xs:enumeration value="Big Band"/>          <!-- ID3v1 Genre Extension # 96. -->
```

```
            <xs:enumeration value="Chorus"/>          <!-- ID3v1 Genre Extension # 97. -->
            <xs:enumeration value="Easy Listening"/> <!-- ID3v1 Genre Extension # 98. -->
            <xs:enumeration value="Acoustic"/>        <!-- ID3v1 Genre Extension # 99. -->
            <xs:enumeration value="Humour"/>          <!-- ID3v1 Genre Extension #100. -->
            <xs:enumeration value="Speech"/>          <!-- ID3v1 Genre Extension #101. -->
            <xs:enumeration value="Chanson"/>         <!-- ID3v1 Genre Extension #102. -->
            <xs:enumeration value="Opera"/>           <!-- ID3v1 Genre Extension #103. -->
            <xs:enumeration value="Chamber Music"/>   <!-- ID3v1 Genre Extension #104. -->
            <xs:enumeration value="Sonata"/>          <!-- ID3v1 Genre Extension #105. -->
            <xs:enumeration value="Symphony"/>        <!-- ID3v1 Genre Extension #106. -->
            <xs:enumeration value="Booty Bass"/>      <!-- ID3v1 Genre Extension #107. -->
            <xs:enumeration value="Primus"/>          <!-- ID3v1 Genre Extension #108. -->
            <xs:enumeration value="Porn Groove"/>     <!-- ID3v1 Genre Extension #109. -->
            <xs:enumeration value="Satire"/>          <!-- ID3v1 Genre Extension #110. -->
            <xs:enumeration value="Slow Jam"/>        <!-- ID3v1 Genre Extension #111. -->
            <xs:enumeration value="Club"/>            <!-- ID3v1 Genre Extension #112. -->
            <xs:enumeration value="Tango"/>           <!-- ID3v1 Genre Extension #113. -->
            <xs:enumeration value="Samba"/>           <!-- ID3v1 Genre Extension #114. -->
            <xs:enumeration value="Folklore"/>        <!-- ID3v1 Genre Extension #115. -->
            <xs:enumeration value="Ballad"/>          <!-- ID3v1 Genre Extension #116. -->
            <xs:enumeration value="Power Ballad"/>    <!-- ID3v1 Genre Extension #117. -->
            <xs:enumeration value="Rhythmic Soul"/> <!-- ID3v1 Genre Extension #118. -->
            <xs:enumeration value="Freestyle"/>       <!-- ID3v1 Genre Extension #119. -->
            <xs:enumeration value="Duet"/>            <!-- ID3v1 Genre Extension #120. -->
            <xs:enumeration value="Punk Rock"/>       <!-- ID3v1 Genre Extension #121. -->
            <xs:enumeration value="Drum Solo"/>       <!-- ID3v1 Genre Extension #122. -->
            <xs:enumeration value="A capella"/>       <!-- ID3v1 Genre Extension #123. -->
            <xs:enumeration value="Euro-House"/>      <!-- ID3v1 Genre Extension #124. -->
            <xs:enumeration value="Dance Hall"/>      <!-- ID3v1 Genre Extension #125. -->

        </xs:restriction>
    </xs:simpleType>

    <xs:element name="LyricsBy" type="LyricsByType"/>
    <xs:complexType name="LyricsByType">
        <xs:simpleContent>
            <xs:extension base="xs:string"/>
        </xs:simpleContent>
    </xs:complexType>

    <xs:element name="Lyrics" type="LyricsType"/>
    <xs:complexType name="LyricsType">
        <xs:complexContent>
            <xs:element name="Lang" type="xs:string" minOccurs="0"/>
            <xs:element ref="LyricPart" type="LyricPartType" minOccurs="0" maxOccurs="unbounded"/>
        </xs:complexContent>
    </xs:complexType>

    <xs:element name="LyricPart" type="LyricPartType"/>
    <xs:complexType name="LyricPartType">
        <xs:complexContent>
            <xs:element name="TimeOffset" type="xs:float" minOccurs="0"/>
            <xs:element name="Text" type="xs:string" minOccurs="0" maxOccurs="unbounded"/>
        </xs:complexContent>
    </xs:complexType>
```

```
<xs:element name="MoreInfoURL" type="MoreInfoURLType"/>
<xs:complexType name="MoreInfoURLType">
    <xs:simpleContent>
        <xs:extension base="xs:string"/>
    </xs:simpleContent>
</xs:complexType>

<xs:element name="Mood" type="MoodType"/>
<xs:complexType name="MoodType">
    <xs:simpleContent>
        <xs:extension base="xs:string"/>
    </xs:simpleContent>
</xs:complexType>

<xs:element name="MusicBy" type="MusicByType"/>
<xs:complexType name="MusicByType">
    <xs:simpleContent>
        <xs:extension base="xs:string"/>
    </xs:simpleContent>
</xs:complexType>

<xs:element name="NumSets" type="NumSetsType"/>
<xs:complexType name="NumSetsType">
    <xs:simpleContent>
        <xs:extension base="xs:int"/>
    </xs:simpleContent>
</xs:complexType>

<xs:element name="NumTracks" type="NumTracksType"/>
<xs:complexType name="NumTracksType">
    <xs:simpleContent>
        <xs:extension base="xs:int"/>
    </xs:simpleContent>
</xs:complexType>

<xs:element name="PlayCount" type="PlayCountType"/>
<xs:complexType name="PlayCountType">
    <xs:simpleContent>
        <xs:extension base="xs:int"/>
    </xs:simpleContent>
</xs:complexType>

<xs:element name="PrincipalArtist" type="PrincipalArtistType"/>
<xs:complexType name="PrincipalArtistType">
    <xs:simpleContent>
        <xs:extension base="xs:string"/>
    </xs:simpleContent>
</xs:complexType>

<xs:element name="PlayingTime" type="PlayingTimeType"/>
<xs:complexType name="PlayingTimeType">
    <xs:simpleContent>
        <xs:extension base="xs:float"/>
    </xs:simpleContent>
</xs:complexType>
```

```
    <xs:element name="ProducedBy" type="ProducedByType"/>
    <xs:complexType name="ProducedByType">
        <xs:simpleContent>
            <xs:extension base="xs:string"/>
        </xs:simpleContent>
    </xs:complexType>

    <xs:element name="Recorded" type="RecordedType"/>
    <xs:complexType name="RecordedType">
        <xs:simpleContent>
            <xs:extension base="xs:date"/>
        </xs:simpleContent>
    </xs:complexType>

    <xs:element name="SetNumber" type="SetNumberType"/>
    <xs:complexType name="SetNumberType">
        <xs:simpleContent>
            <xs:extension base="xs:int"/>
        </xs:simpleContent>
    </xs:complexType>

    <xs:element name="Situation" type="SituationType"/>
    <xs:complexType name="SituationType">
        <xs:simpleContent>
            <xs:extension base="xs:string"/>
        </xs:simpleContent>
    </xs:complexType>

    <xs:element name="Tempo" type="TempoType"/>
    <xs:complexType name="TempoType">
        <xs:simpleContent>
            <xs:extension base="xs:string"/>
        </xs:simpleContent>
    </xs:complexType>

    <xs:element name="TrackNumber" type="TrackNumberType"/>
    <xs:complexType name="TrackNumberType">
        <xs:simpleContent>
            <xs:extension base="xs:int"/>
        </xs:simpleContent>
    </xs:complexType>

</xs:schema>
```

5.6 Album/Playlist-level <mpvm:MusicProperties> Music Metadata

The Music Profile defines a schema for music properties. This schema can be used on all audio assets by specifying the root element of the mpvm schema as the only child of the nmf:Metadata element.

The guiding practice for applications and devices that process and present MPV music content based on this schema is that music properties on an mpvp:Album apply also to the tracks contained by that album.

5.7 <mpvm:AudioWithStills> Music and Stills Asset

The MPV Music Profile defines a new composite asset type, AudioWithStills. The AudioWithStills asset is the counterpart to the StillWithAudio asset defined by **[MPVCore]**. AudioWithStills can be used to define a composite playback experience in which an Audio asset is played "in the foreground", while Still assets are displayed according to the presentation specified.

One use of this asset type is for synchronized music and visual display, such as for karaoke or presentations in which the audio display is primary.

Example:

```
...
  <mpv:AssetList>
    <mpvm:AudioWithStills mpv:id="ID000100">
       <mpv:InstanceID>AB893AF0A33B40AD971BFA09B17DBC193</mpv:InstanceID>
       <nmf:Metadata>
         <Properties xmlns="http://purl.org/dc/elements/1.1/">
            <format>image/tiff</format>
            <title>June 9, 2002, 14:34</title>
         </Properties>
       </nmf:Metadata>
       <mpv:AudioRef mpv:idRef="ID000101"/>
       <mpv:StillRef mpv:idRef="ID000102/>
       <mpv:StillRef mpv:idRef="ID000103"/>
    </mpvm:AudioWithStills>
    <mpv:Audio mpv:id="ID001200">
       <mpv:ContentID>urn:osta-
  org:mpv:dsig:md5:all:AB893AF0A33B40AD971BFA09B17DBC145</mpv:ContentID>
       <mpv:LastURL>Songs/My Gal.mp3</mpv:LastURL>
    </mpv:Audio>
    <mpv:Still mpv:id="ID001300">
          <mpv:ContentID>urn:osta-
  org:mpv:dsig:md5:all:AB893AF0A33B40AD971BFA09B17DBC136</mpv:ContentID>
       <mpv:LastURL>screem/Slide1.JPG</mpv:LastURL>
    </mpv:Still>
    <mpv:Stillmpv:id="ID001400">
       <mpv:ContentID>urn:osta-
  org:mpv:dsig:md5:all:AB893AF0A33B40AD971BFA09B17DBC192</mpv:ContentID>
       <mpv:LastURL>screen/Slide2.JPG</mpv:LastURL>
    </mpv:Still>
  </mpv:AssetList>
...
```

element **mpvm:AudioWithStills,** complexType **mpvm:AudioWithStillsType**

diagram

namespace http://ns.osta.org/mpv/music/1.0/

type **mpvm:AudioWithStillsType**

children **mpv:ContentID mpv:DocumentID mpv:InstanceID mpv:Metadata nmf:Metadata mpv:StillRef mpv:AudioRef CaptureDur mpv:Related mpv:Rendition**

attributes

Name	Type	Use	Default	Fixed
mpv:id	xs:ID			

source
```
<xs:element name="AudioWithStills" type="mpv:AudioWithStillsType"
substitutionGroup="mpv:CompositeAssetBase"/>
```

source
```
<xs:complexType name="AudioWithStillsType">
 <xs:complexContent>
  <xs:extension base="mpv:CompositeAssetBaseType">
   <xs:sequence>
    <xs:element ref="mpv:AudioRef"/>
    <xs:element ref="mpv:StillRef" maxOccurs="unbounded"/>
    <xs:element name="DisplayRate" type="xs:string" minOccurs="0"/>
    <xs:group ref="mpv:RelationsElemGroup"/>
   </xs:sequence>
  </xs:extension>
 </xs:complexContent>
</xs:complexType>
```

DisplayRate

The value of DisplayRate is a sequence of still-to-still durations that indicate the display rate. The semicolon character ";" is used as a delimiter and the path begins with an algorithm declaration. The only rate algorithm defined by MPV is "FrameToFrame".

The frame to frame algorithm uses the following DisplayRate syntax described in BNF. This BNF conforms to the BNF usage from IETF specifications such as in [URI]. Clock value is always in relative time in seconds to the previous frame.

DisplayRate	=	"FrameToFrame:" (<offset-clock-value> ";")? <frame-clock-value>
offset-clock-value	=	"o" <clock-value>
frame-clock-value	=	<clock-value> (";" <clock-value>)*
clock-value	=	<decimal number> ("." <decimal number>)?
decimal-number	=	[0-9] [0-9]*

There are as many as N clock values for N images. N clock values are possible and not N-1 because the first value optionally can be used to indicate the offset time between an arbitrary timepoint and when the first frame is captured. The last value provided is reused for all subsequent durations.

Example:
"FrameToFrame:0.3": any number of still images, each 0.3 seconds after the previous.

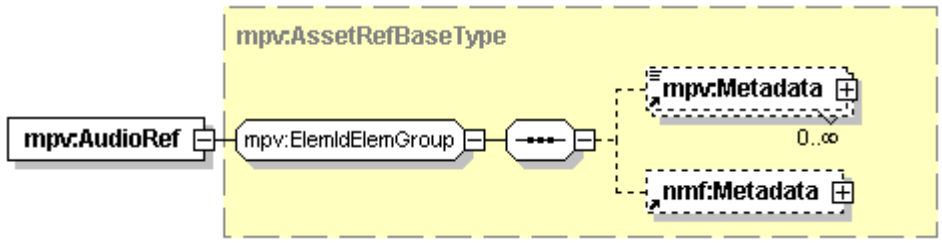
"FrameToFrame:0.4;0.4;0.4": 4 images, each 0.4 seconds after the previous.

"FrameToFrame:o3.1;0.4;0.4;0.4": 4 images, the first 3.1 seconds from when timing began, each frame 0.4 seconds after the previous.

"FrameToFrame:120;210;70": 4 images, the second taken 120 seconds after the first, the third taken 210 seconds after the second, the fourth taken 70 seconds after the third.

element **mpvm:AudioWithStillsRef**

diagram



namespace http://ns.osta.org/mpv/music/1.0/

type **mpv:AssetRefBaseType**

children **mpv:Metadata nmf:Metadata**

used by complexType **mpv:AudioWithStillsType**

attributes

Name	Type	Use	Default	Fixed
manifestLinkIDRef	xs:NCName	optional		
listIDRef	xs:NCName	optional		
mpv:id	xs:ID			
idRef	xs:NCName	required		

source

```
<xs:element name="AudioWithStillRef" type="mpv:AssetRefBaseType" substitutionGroup="mpv:AssetRefBase"/>
```

idRef

Provides the “mpv:id” value of the referenced asset. When no listIDRef is present, the AssetList in the current manifest is used. When no manifestLinkIDRef is present, the current manifest is used.

listIDRef

Provides the “mpv:id” value of the AssetList or MarkList that contains the referenced asset. When no listIDRef is present, the AssetList in the same manifest is used.

manifestLinkIDRef

Provides the “mpv:id” value of the ManifestLink asset that contains the referenced asset. When no manifestLinkIDRef is present, the current manifest is used.

5.8 MPV Music Profile Example

```
<?xml version="1.0" encoding="UTF-8"?>
<file:Manifest xmlns:file="http://ns.osta.org/manifest/1.0/"
  xmlns:mpv="http://ns.osta.org/mpv/1.0/"
  xmlns:mpvp="http://ns.osta.org/mpv/presentation/1.0/"
  xmlns:mpvm="http://ns.osta.org/mpv/music/1.0/" xmlns:dc="http://ns.osta.org/nmf/1.0/dc/"
  xmlns:nmf="http://ns.osta.org/nmf/1.0/">
  <nmf:Metadata>
   <ManifestProperties xmlns="http://ns.osta.org/manifest/1.0/">
```

```
        <ProfileBag>
        <Profile>http://ns.osta.org/mpv/basic/1.0/</Profile>
        <Profile>http://ns.osta.org/mpv/presentation/1.0/</Profile>
        <Profile>http://ns.osta.org/mpv/music/1.0/</Profile>
        </ProfileBag>
</ManifestProperties>
</nmf:Metadata>
<mpvp:Album>
   <nmf:Metadata>
      <dc:Properties>
        <dc:description>14 swing classics re-recorded in the '50s by th original artists
for great sound with all the integrity and excitement of the original
performances.</dc:description>
        <dc:identifier>7243 5 21223 2 5 Capitol Jazz</dc:identifier>
        <dc:rights>(P) and (C) 1999 Capitol Records, Inc.  All rights
reserved.</dc:rights>
        <dc:title/>
      </dc:Properties>
      <mpvm:MusicProperties>
        <mpvm:AlbumTitle>Great SWING CLASSICS in HI-FI</mpvm:AlbumTitle>
        <mpvm:Genre>Jazz</mpvm:Genre>
        <mpvm:MoreInfoURL>www.bluenote.com</mpvm:MoreInfoURL>
      </mpvm:MusicProperties>
   </nmf:Metadata>
<mpvp:Foreground>
        <mpv:AudioRef mpv:idRef="01-GREAT-SWING-CLASSICS-20021202031833-a"/>
        <mpv:AudioRef mpv:idRef="02-GREAT-SWING-CLASSICS-20021202031833-a"/>
</mpvp:Foreground>
</mpvp:Album>
<mpv:AssetList>
<mpv:Audio mpv:id="01-GREAT-SWING-CLASSICS-20021202031833-a">
        <mpv:LastURL>01%20Great%20Swing%20Classics.wma</mpv:LastURL>
        <nmf:Metadata>
        <dc:Properties>
          <dc:creator>Benny Goodman and his Orchestra</dc:creator>
          <dc:description/>
          <dc:format>audio/x-ms-wma</dc:format>
          <dc:identifier/>
          <dc:title>Jumpin' At The Woodside</dc:title>
        </dc:Properties>
        <mpvm:MusicProperties>
          <mpvm:AlbumTitle>Great SWING CLASSICS in HI-FI</mpvm:AlbumTitle>
          <mpvm:ArrangedBy>Count Basie;Jimmy Mundy</mpvm:ArrangedBy>
          <mpvm:Genre>Jazz</mpvm:Genre>
          <mpvm:MusicBy>Count Basie</mpvm:MusicBy>
          <mpvm:NumTracks>14</mpvm:NumTracks>
          <mpvm:PlayingTime>208.12</mpvm:PlayingTime>
          <mpvm:PrincipalArtist>Benny Goodman</mpvm:PrincipalArtist>
          <mpvm:Recorded>1954-11-09</mpvm:Recorded>
          <mpvm:TrackNumber>1</mpvm:TrackNumber>
        </mpvm:MusicProperties>
        </nmf:Metadata>
</mpv:Audio>
<mpv:Audio mpv:id="02-GREAT-SWING-CLASSICS-20021202031833-a">
        <mpv:LastURL>02%20Great%20Swing%20Classics.wma</mpv:LastURL>
        <nmf:Metadata>
        <dc:Properties>
          <dc:creator>Duke Ellington and his Orchestra</dc:creator>
```

```
          <dc:description/>
          <dc:format>audio/x-ms-wma</dc:format>
          <dc:identifier/>
          <dc:title>Harlem Air Shaft</dc:title>
        </dc:Properties>
        <mpvm:MusicProperties>
          <mpvm:AlbumTitle>Great SWING CLASSICS in HI-FI</mpvm:AlbumTitle>
          <mpvm:Genre>Jazz</mpvm:Genre>
          <mpvm:MusicBy>Duke Ellington</mpvm:MusicBy>
          <mpvm:NumTracks>14</mpvm:NumTracks>
          <mpvm:PlayingTime>236.36</mpvm:PlayingTime>
          <mpvm:PrincipalArtist>Duke Ellington</mpvm:PrincipalArtist>
          <mpvm:Recorded>1955-11-17</mpvm:Recorded>
          <mpvm:TrackNumber>2</mpvm:TrackNumber>
        </mpvm:MusicProperties>
       </nmf:Metadata>
  </mpv:Audio>
  </mpv:AssetList>
</file:Manifest>
```

Chapter 6: MPV Music Profile Extensions to MPV Core Specification

6.1 Music Manifest File Types & Extensions

For systems in which file type is carried by the file name extension, such as Microsoft Windows and Unix, the Music Manifest file will utilize an extension. The MPV Music Profile defines two extensions a manifest may carry.

.mum

This extension identifies a file to be a **MU**sic **M**anifest (MUM).

Usage is case insensitive. This extension may be registered by an application to provide default and alternate processors of Music Manifests.

.xml

This extension identifies a file as containing XML content. Usage is case insensitive. A Music Manifest should only use this extension if it expects to be processed by a general-purpose XML processor such as Microsoft Internet Explorer. It is recommended that the manifest include an XML processing instruction specifying a stylesheet to use for presentation.

This extension may be registered by an application to provide general purpose XML content processing. An application should register this extension with care, as many types of content may carry the .xml extension and an application should do its best to handle this content in a general fashion.

For example, Microsoft Internet Explorer 5.5 and above registers this extension; when it processes the file, it looks for a stylesheet processing instruction. IE renders the results of applying the stylesheet to the XML content. This separation of content and presentation allows IE to be a general purpose XML processing engine and suitable for handling the .xml extension.

The Apple Macintosh operating system uses an internal file type stored as a resource value of the data fork of a file. The following file type may be used for Music Manifests on Macintosh systems. Apple no longer requires file type registration.

.mum

This Apple Macintosh file type identifies the file to contain a Music Manifest. Usage is case sensitive. This extension may be registered by an application to provide a default processor of Music Manifests.

Some applications examine leading characters of a file in an attempt to determine its file type. No byte sequences can be counted on to always be present, but generally all XML documents in the UTF-8 charsets begin with hexadecimal 3C 3F 78 6D 6C, ("<?xml"). While this will identify the document as an XML document, it does NOT

identify it as an Music Manifest. This requires parsing the document to locate the outer element defined by the manifest schema.

6.2 Music Manifest MIME Media Type

MIME media types are widely used in internet applications to indicate the type of a file or content in a manner external of the file and independent of the name of the file or any information embedded in the file [MIME-2]. IANA maintains a registry of MIME media types and the set of MIME media types IANA thinks is registered at any time can be found at [MIMETYPES-REG].

The MIME media types that can be used for a Music Manifest are:

application/vnd.osta-org.mum+xml

This MIME media type identifies the content to be a Music Manifest. Usage is case sensitive. This media type may be registered with internet browsers by an application to provide the default processor of a Music Manifest.

application/xml

This MIME media type identifies the content as containing XML content. Usage is case sensitive. A Music Manifest should only use this MIME type if it expects to be processed by a general-purpose XML processor such as Microsoft Internet Explorer. It is recommended that the manifest include an XML processing instruction specifying a stylesheet to use for presentation.

This MIME media type may be registered by an application to provide general purpose XML content processing. An application should register this media type with care, as many types of content may carry the application/xml media type and an application should do its best to handle this content in a general fashion.

For example, Microsoft Internet Explorer 5.5 and above registers this media type; when it processes the file, it looks for a stylesheet processing instruction. IE renders the results of applying the stylesheet to the XML content. This separation of content and presentation allows IE to be a general purpose XML processing engine and suitable for handling the .xml extension.

6.3 Choosing Which File Type and MIME Media Type to Use

For products authoring Music Manifests, the choice of file extension and MIME media type is important. The product should consider the contexts in which it expects the manifest to be used. The primary decision factor is whether the product expects the manifest to be used in an environment that is explicitly MPV-aware or one that is not.

A MPV-aware environment will have the **.mum** file extension and **application/vnd.osta-org.mum+xml** media type registered to an application. A MPV-unaware environment will not.

Generally speaking, it is preferable to use a Music Manifest in an MPV-aware environment because the MPV-aware application is better able to utilize fully the MPV capabilities. In particular, an MPV-aware environment will likely handle better the situation in which the default lastURL reference in invalid; it should use other available lastURL values or the identifiers available on an asset to fixup the lastURL value.

6.4 Finding a Music Manifest File

The Music Manifest is the essential document to be managed and manipulated for collections of music content. MPV collections define a structured association of assets and provide access to metadata about those assets.

When searching a file system for a Music Manifest, they can be located by name or by extension. When requested by name, the manifest is either found or not found. If not found, the algorithm defined elsewhere for lastURL fixup should be applied.

The MPV Music Profile defines the following algorithm that describes how to locate a MPV manifest when no name of one is known.

```
If dealing with a removable storage unit, e.g. an optical disc inserted, the starting
current working directory is the root directory.

If dealing with a user's personal computer "login" account, there may be a set of
directories to be considered in sequence that will lead to the "root" Music Manifest for
the account.  Best Practices for which directories to consider are defined elsewhere.

If browsing a filesystem, the current working directory is decided by the application
conducting the search.

The scan algorithm to find a Music Manifest from a given current working directory is:

     In the current working directory, look for a file with one of the following
     case-insensitive names according to the order given.
          INDEX.MUM
          INDEXMUM.XML
          ALBUM.MUM
          ALBUMMUM.XML
          <any name>.MUM, in an undefined order when more than one is present

     If no matching file is found, the child directories of the current directory are
     scanned in an alphabetical breadth-first traversal to a depth of one subdirectory.

     If no matching file is found, the parent and parent sibling directories of the
     current directory are scanned in an alphabetical breadth-first traversal to a
     height of one parent directory.

Files matching the pattern are processed in the order encountered.  When a Music Manifest
is encountered, it is opened and scanned for an MPV Album (Presentation Profile) or
AssetList.  The first MPV Album encountered is used for presentation; if none is found, the
AssetList is used.
```

The rationale behind this search algorithm is to first locate any top-level manifest containing MPV information, with a fallback of then finding named Music Manifests. It is allowed for the MPV document to be located up to one directory down.

N.B. By allowing the Music Manifest to carry the .XML extension or type, general purpose XML processors can operate on the MPV document and apply XML processing capabilities. For example, with Microsoft Internet Explorer 5.5 and above, an XML processing instruction in the ALBUMMUM.XML file can invoke a style sheet that can transform the MPV document into an attractive browser-based presentation.

The search algorithm covers all of the following directories, where CWD is the current working directory. Naturally, when the path cannot be reached, it stops.

```
/R1/P1/CWD
/R1/P1/CWD/C1
/R1/P1/CWD/C2
```

```
/R1/P1/CWD/C3
/R1/P2
/R1/P3
```

But not these:

```
/R2
/R2/P2
/R1/P2/D1
/R1/P1/CWD/C1/E1
```

In each of the directories scanned, the application shall search for all of the possible Music Manifest file names.

6.5 Media Types and File Formats

MPV is an open asset management / playlist format that can support an expandable set of defined media file formats. Formats are identified using MIME media types, as is well-established practice for internet-era standards.

The **[MPV-Core]** specification defines the following music audio formats.

MEDIA TYPES FOR MPV:AUDIO FROM [MPV-CORE]

MIME Media Type	Mac File Type	PC File Suffixes	Description
audio/basic	ULAW	au, snd	8K, mono audio
audio/midi	MIDI	mid, midi	Musical Instrument Digital Interface sound file
audio/mpeg	MPEG	mp1, mp2, mp3, mpg, mpeg, m2a, m3a	MPEG audio layers 1, 2, and 3 as defined by **[MIMEMPEG]**
audio/wav	WAVE	wav	WAVE file
audio/x-aiff	AIFF	aif, aiff	Audio interchange file format
audio/x-ms-wma		wma	Windows Media Audio

This MPV Music Profile specification defines the following additional music audio formats.

ADDITIONAL MEDIA TYPES FOR MPV:AUDIO

MIME Media Type	Mac File Type	PC File Suffixes	Description
audio/ac3		ac3	Dolby Digital 5.1 audio used widely for DVD-Video
audio/MP4A-LATM		aac, m4a, mp4, mpeg4	Audio using MPEG4 AAC with Low-overhead Audio Transport Multiplex as defined in **[MIMEMPEG4]**
audio/mpa	MPEG	mpa	MPEG1 or 2 audio sent by RTP as defined by **[MIMEMPA]**
audio/at3plus		.omg .oma when OpenMG DRM is applied	Sony's ATRAC3plus format

MEDIA TYPES FOR MPV:DOCUMENT

The MPV Music Profile can support links to other playlists using the mpv:Document asset type and an appropriate MIME type entry in nmf:Metadata|dc:Properties|dc:format.

MIME Media Type	Mac File Type	PC File Suffixes	Description
audio/x-mpegurl		m3u	widely used simple playlist format for music files

application/mpeg4-iod
InitialObjectDescriptor

6.6 Embedded Media Types for MPV Music Profile

6.6.1 Audio File with ID3v2 Tagged Embedded Still Picture

The MPV Core specification [MPVCore] defines embedded media types in Appendix I.1. An embedded media type defines a means for referencing an asset that is embedded in a container format. The approach utilized is consistent with URL construction, namely to define a fragment identifier syntax for a specific container media type.

The ID3v2 specifications [ID3-230][ID3-240] supported still pictures embedded in MPEG1 and MPEG2 audio files and other other file types. The pictures can be usd for artwork. In contrast, the MPV Music Profile represents artwork as a discrete asset related to the music's audio asset. It is required for the MPV Music Profile to be able to reference still picture content embedded in MPEG1 and 2 files conformant to the ID3v2 specification.

To do so, the MPV Music Profile defines a new embedded media type and fragment identifier syntax.

MPV defines two embedded media types that are shown below for ID3v2 **[ID3-230, ID3-240]** embedded pictures.

ID3V2 EMBEDDED MEDIA TYPE FOR MPV:STILL PICTURES

MIME Media Type	Mac File Type	PC File Suffixes	Description
image/vnd.osta-org.ID3v2.APIC	Typically MPEG, but ID3v2 can be used in other formats too	Typically mp3, but ID3v2 can be used in other formats too	ID3v2-conformant embedded picture

FRAGMENT IDENTIFIER SYNTAX FOR ID3V2 EMBEDDED MEDIA TYPE

The Fragment Identifier is the text that follows the '#' character in a URL, as in
"<base URL>#<fragment identifier>"

Fragment Identifier Syntax	Picture Type
#ID3v2.APIC$<pictureType>	The following <pictureType> values are defined by ID3v2: $00 Other $01 32x32 pixels 'file icon' (PNG only) $02 Other file icon $03 Cover (front) $04 Cover (back) $05 Leaflet page $06 Media (e.g. label side of CD)

	$07 Lead artist/lead performer/soloist $08 Artist/performer $09 Conductor $0A Band/Orchestra $0B Composer $0C Lyricist/text writer $0D Recording Location $0E During recording $0F During performance $10 Movie/video screen capture $11 A bright coloured fish $12 Illustration $13 Band/artist logotype $14 Publisher/Studio logotype

Only one embedded picture of each PictureType is allowed in a ID3v2-conformant audio file.

Example URLs	Comment
music.mp3#ID3v2.APIC$00	Other
music.mp3#ID3v2.APIC$01	32x32 pixels 'file icon' (PNG only)
music.mp3#ID3v2.APIC$02	Other file icon
music.mp3#ID3v2.APIC$03	Cover (front)
music.mp3#ID3v2.APIC$04	Cover (back)
music.mp3#ID3v2.APIC$05	Leaflet page
music.mp3#ID3v2.APIC$06	Media (e.g. label side of CD)
music.mp3#ID3v2.APIC$07	Lead artist/lead performer/soloist
music.mp3#ID3v2.APIC$08	Artist/performer
music.mp3#ID3v2.APIC$09	Conductor
music.mp3#ID3v2.APIC$0A	Band/Orchestra
music.mp3#ID3v2.APIC$0B	Composer
music.mp3#ID3v2.APIC$0C	Lyricist/text writer
music.mp3#ID3v2.APIC$0D	Recording Location
music.mp3#ID3v2.APIC$0E	During recording
music.mp3#ID3v2.APIC$0F	During performance
music.mp3#ID3v2.APIC$10	Movie/video screen capture
music.mp3#ID3v2.APIC$11	A bright coloured fish
music.mp3#ID3v2.APIC$12	Illustration
music.mp3#ID3v2.APIC$13	Band/artist logotype
music.mp3#ID3v2.APIC$14	Publisher/Studio logotype

EXAMPLE

```
<mpv:AssetList>
   <mpv:Audio mpv:id="ID000001">
     <mpv:LastURL>music.mp3</mpv:LastURL>
     <nmf:Metadata>
       <dc:Properties>
         <dc:format>audio/mpeg</dc:format>
       </dc:Properties>
     </nmf:Metadata>
     <mpv:Related mpv:relationship="urn:osta-org:mpv:music:artwork:coverFront">
       <mpv:StillRef mpv:idRef="ID000001A"/>
     </mpv:Related>
   </mpv:Audio>
```

```
    <mpv:Still mpv:id="ID000001A">
      <mpv:LastURL>music.mp3#ID3v2.APIC$03</mpv:LastURL>
      <nmf:Metadata>
        <dc:Properties>
          <dc:format>image/vnd.osta-org.ID3v2.APIC</dc:format>
        </dc:Properties>
      </nmf:Metadata>
    </mpv:Still>
</mpv:AssetList>
```

Chapter 7: MPV Music Profile Mapping To Other Music Metadata Formats

7.1 ID3 and OSTA MPV Music Profile

The ID3 specifications are popular metadata representations for music. More information can be found in [ID3-230] and [ID3-240]. The OSTA MPV Music Profile specification provides similar capabilities within the context of the XML-based MPV specification framework.

The following mapping table can be used to associate ID3V1.0 and V1.1 terms and concepts with MPV Music Profile terms and concepts. ID3v2.0 provides much more extensive metadata and is not supported with the MPV Music Profile 1.0.

ID3	***MPV Music Profile***	***Discussion***
ID3v1	**All specified under mpv:Audio|nmf:Metadata**	
Song title	dc:Properties|dc:title	
Artist	dc:Properties|dc:creator	mpvm:MusicProperties:PrincipalArtist can be used in addition, but dc:creator MUST always be provided.
Album	mpvm:MusicProperties:AlbumTitle	
Year	mpvm:MusicProperties:Recorded	
Comment	dc:Properties|dc:description	
Genre	mpvm:MusicProperties:Genre	

ID3v1.1	**All specified under mpv:Audio|nmf:Metadata**	
Song title	dc:Properties|dc:title	
Artist	dc:Properties|dc:creator	mpvm:MusicProperties:PrincipalArtist can be used in addition, but dc:creator MUST always be provided.
Album	mpvm:MusicProperties:AlbumTitle	
Year	mpvm:MusicProperties:Recorded	
Comment	dc:Properties|dc:description	
Album Track	mpvm:MusicProperties:TrackNumber	
Genre	mpvm:MusicProperties:Genre	

ID3v2.3	**All specified under**	

	mpv:Audio|nmf:Metadata	
Song title	dc:Properties|dc:title	
Artist	dc:Properties|dc:creator	mpvm:MusicProperties:PrincipalArtist can be used in addition, but dc:creator MUST always be provided.
Album	mpvm:MusicProperties:AlbumTitle	
Year	mpvm:MusicProperties:Recorded	
Comment	dc:Properties|dc:description	
Album Track	mpvm:MusicProperties:TrackNumber	
Genre	mpvm:MusicProperties:Genre	

ID3v2 Frame, Name	**V2.3**	**V2.4**	**All specified under mpv:Audio|nmf:Metadata unless noted**
AENC, Audio encryption	X	X	
APIC, Attached picture	X	X	The <mpv:Still> referenced by mpv:Audio|mpv:Related|mpv:StillRef, where the mpv:relationship is one of the artwork identifiers
ASPI, Audio seek point index	-	X	
COMM, Comments	X	X	dc:Properties|dc:description
COMR, Commercial frame	X	X	
ENCR, Encryption method registration	X	X	
EQUA, Equalisation	X	Use EQU2	
EQU2, Equalisation (2)	-	X	
ETCO, Event timing codes	X	X	
GEOB, General encapsulated object	X	X	Asset referenced by mpv:Audio|mpv:Related|mpv:<assettype>Ref
GRID, Group identification registration	X	X	
IPLS, Involved people list	X	Use TMCL, TIPL	
LINK, Linked information	X	X	
MCDI, Music CD identifier	X	X	mpv:Audio|mpv:ContentID where the ContentID is urn:osta-org:mpv:dsig:mcdi:<mcdi value in hex>:<track number>
MLLT, MPEG location lookup table	X	X	
OWNE, Ownership frame	X	X	
PRIV, Private frame	X	X	use mpv:Metadata or nmf:Metadata to hold user data conforming to their own schema
PCNT, Play counter	X	X	
POPM, Popularimeter	X	X	
POSS, Position synchronisation frame	X	X	
RBUF, Recommended buffer size	X	X	
RVAD, Relative volume adjustment	X	Use RVA2	
RVA2, Relative volume adjustment (2)	-	X	
RVRB, Reverb	X	X	
SEEK, Seek frame	-	X	
SIGN, Signature frame	-	X	
SYLT, Synchronised lyric/text	X	X	mpvm:MusicProperties|mpvm:Lyrics
SYTC, Synchronised tempo codes	X	X	
TALB, Album/Movie/Show title	X	X	mpvm:MusicProperties|AlbumTitle
TBPM, BPM (beats per minute)	X	X	

TCOM, Composer	X	X	
TCON, Content type	X	X	mpvm:MusicProperties|Genre
TCOP, Copyright message	X	X	dc:Properties|dc:rights
TDAT, Date	X	Use TDRC	mpvm:MusicProperties:Recorded
TDEN, Encoding time	-	X	
TDLY, Playlist delay	X	X	
TDOR, Original release time	-	X	
TDRC, Recording time	-	X	mpvm:MusicProperties:Recorded
TDRL, Release time	-	X	dcterms:Properties:dcterms:issued
TDTG, Tagging time	-	X	
TENC, Encoded by	X	X	
TEXT, Lyricist/Text writer	X	X	mpvm:MusicProperties|LyricsBy
TFLT, File type	X	X	dc:Properties|dc:format
TIME, Time	X	Use TDRC	mpvm:MusicProperties:Recorded
TIPL, Involved people list	-	X	mpvm:MusicProperties|LyricsBy or MusicBy or ArrangedBy
TIT1, Content group description	X	X	
TIT2, Title/songname/content description	X	X	dc:Properties|dc:title
TIT3, Subtitle/Description refinement	X	X	dc:Properties|dc:description
TKEY, Initial key	X	X	
TLAN, Language(s)	X	X	dc:Properties|dc:language
TLEN, Length	X	X	mpvm:MusicProperties|PlayingTime (floating point value in seconds)
TMCL, Musician credits list	-	X	mpvm:MusicProperties|PerformedBy
TMED, Media type	X	X	dcterms:Properties|dcterms:medium
TMOO, Mood	-	X	mpvm:MusicProperties|Mood
TOAL, Original album/movie/show title	X	X	
TOFN, Original filename	X	X	Value of mpv:Audio|mpv:LastURL with the mpv:filesystem set to the filesystem of the original filename
TOLY, Original lyricist(s)/text writer(s)	X	X	
TOPE, Original artist(s)/performer(s)	X	X	
TORY, Original release year	X	Use TDOR	
TOWN, File owner/licensee	X	X	
TPE1, Lead performer(s)/Soloist(s)	X	X	mpvm:MusicProperties:PrincipalArtist Comment: dc:creator MUST always be provided. It can be same as PrincipalArtist or more complete.
TPE2, Band/orchestra/accompaniment	X	X	dc:Properties|dc:contributor
TPE3, Conductor/performer refinement	X	X	dc:Properties|dc:contributor
TPE4, Interpreted, remixed, or otherwise modified by	X	X	
TPOS, Part of a set/Total number sets	X	X	mpvm:MusicProperties:SetNumber and mpvm:MusicProperties:NumSets
TPRO, Produced notice	-	X	
TPUB, Publisher	X	X	dc:Properties|dc:publisher
TRCK, Track number/Position in set	X	X	mpvm:MusicProperties:TrackNumber and mpvm:MusicProperties:NumTracks
TRDA, Recording dates	X	Use TDRC	mpvm:MusicProperties:Recorded
TRSN, Internet radio station name	X	X	
TRSO, Internet radio station owner	X	X	

TSIZ, Size	X	Depr.	
TSOA, Album sort order	-	X	
TSOP, Performer sort order	-	X	
TSOT, Title sort order	-	X	
TSRC, ISRC (international standard recording code)	X	X	dc:Properties|dc:identifier
TSSE, Software/Hardware and settings used for encoding	X	X	
TSST, Set subtitle	-	X	
TXXX, User defined text information frame	X	X	use mpv:Metadata or nmf:Metadata to hold user data conforming to their own schema
TYER, Year	X	Use TDRC	mpvm:MusicProperties:Recorded
UFID, Unique file identifier	X	X	mpv:Audio|mpv:ContentID
USER, Terms of use	X	X	
USLT, Unsynchronised lyric/text transcription	X	X	mpvm:MusicProperties|Lyrics
WCOM, Commercial information	X	X	
WCOP, Copyright/Legal information	X	X	
WOAF, Official audio file webpage	X	X	mpvm:MusicProperties|MoreInfo
WOAR, Official artist/performer webpage	X	X	
WOAS, Official audio source webpage	X	X	
WORS, Official Internet radio station homepage	X	X	
WPAY, Payment	X	X	
WPUB, Publishers official webpage	X	X	
WXXX, User defined URL link frame	X	X	

Notes on ID3v2.3 and V2.4
All MPV Music Profile text strings are UTF-8 encoded. ID3v2.3 text strings may be either ISO8859-1 encoded or UTF16 encoded. ID3v2.4 text strings may also be UTF-8 or UTF-16BE encoded. Applications working with both ID3v2.x information and MPV Music Profile content must do the appropriate conversion.

7.1.1 Genre Mapping

ID3v1 [ID3] defines a set of genre category names and associated genre identitifier numbers. MPV Music Profile makes use of the same genre names; numbers are not used. However, the Genre are listed in the Music Profile XML Schema in the same order as the ID3v1 genre are defined, make mapping straight forward for implementers.

ID3v1 Genre Number	MPV Music Profile Genre Name
0	Blues
1	Classic Rock
2	Country
3	Dance
4	Disco
5	Funk
6	Grunge
7	Hip-Hop
8	Jazz
9	Metal
10	New Age

11	Oldies
12	Other
13	Pop
14	R&B
15	Rap
16	Reggae
17	Rock
18	Techno
19	Industrial
20	Alternative
21	Ska
22	Death Metal
23	Pranks
24	Soundtrack
25	Euro-Techno
26	Ambient
27	Trip-Hop
28	Vocal
29	Jazz+Funk
30	Fusion
31	Trance
32	Classical
33	Instrumental
34	Acid
35	House
36	Game
37	Sound Clip
38	Gospel
39	Noise
40	AlternRock
41	Bass
42	Soul
43	Punk
44	Space
45	Meditative
46	Instrumental Pop
47	Instrumental Rock
48	Ethnic
49	Gothic
50	Darkwave
51	Techno-Industrial
52	Electronic
53	Pop-Folk
54	Eurodance
55	Dream
56	Southern Rock
57	Comedy
58	Cult
59	Gangsta
60	Top 40
61	Christian Rap
62	Pop/Funk
63	Jungle

64	Native American
65	Cabaret
66	New Wave
67	Psychadelic
68	Rave
69	Showtunes
70	Trailer
71	Lo-Fi
72	Tribal
73	Acid Punk
74	Acid Jazz
75	Polka
76	Retro
77	Musical
78	Rock & Roll
79	Hard Rock
80	Folk
81	Folk-Rock
82	National Folk
83	Swing
84	Fast Fusion
85	Bebob
86	Latin
87	Revival
88	Celtic
89	Bluegrass
90	Avantgarde
91	Gothic Rock
92	Progressive Rock
93	Psychedelic Rock
94	Symphonic Rock
95	Slow Rock
96	Big Band
97	Chorus
98	Easy Listening
99	Acoustic
100	Humour
101	Speech
102	Chanson
103	Opera
104	Chamber Music
105	Sonata
106	Symphony
107	Booty Bass
108	Primus
109	Porn Groove
110	Satire
111	Slow Jam
112	Club
113	Tango
114	Samba
115	Folklore
116	Ballad

117	Power Ballad
118	Rhythmic Soul
119	Freestyle
120	Duet
121	Punk Rock
122	Drum Solo
123	A capella
124	Euro-House
125	Dance Hall

7.2 WinAMP M3U and OSTA MPV Music Profile

The WinAMP M3U playlist is commonly encountered. The following illustrates mapping M3U playlist to the MPV Music Profile.

M3U Playlist	***MPV Music Profile***	***Discussion***
Song title	mpv:Audio|nmf:Metadata|dc:title	
Filename	mpv:Audio|mpv:LastURL	
Duration	mpvm:MusicProperties:PlayingTime	

7.3 OSTA MultiAudio and OSTA MPV Music Profile

The MultiAudio specification, already developed by OSTA **[MultiAudio]**, is an earlier generation of technology specific to audio. MPV integrates music, photos, and video and can be used to create and exchange multimedia playlists and collections. Implementers are encouraged to utilize MPV.

The OSTA MultiAudio specification provides a CD or DVD table of contents and playlist representation for compressed audio content on data discs. This binary format is suitable for implementation in very resource-constrained devices.

The OSTA MPV Music Profile specification provides similar capabilities within the context of the XML-based MPV specification framework. This allows a single consistent multimedia album format to span music, photo, and video content. For consumer electronics devices able to provide an implementation of the MPV framework, the MPV Music Profile offers a means to support all multimedia content within a constent framework and single firmware implementation.

The following mapping table can be used to associate MultiAudio terms and concepts with MPV Music Profile terms and concepts:

MultiAudio	***MPV Music Profile***	***Discussion***
TrackEntry	**mpv:Audio asset**	
Pathname	mpv:Audio|mpv:LastURL	
Track Name	dc:Properties|dc:title	
Performer Name	dc:Properties|dc:creator	mpvm:MusicProperties:PrincipalArtist can also be used to refine dc:creator.

Composer Name	mpvm:MusicProperties:MusicBy	
Songwriter Name	mpvm:MusicProperties:LyricsBy	
ArrangerName	mpvm:MusicProperties:ArrangedBy	
AlbumName	mpvm:MusicProperties:AlbumTitle	
Genre	mpvm:MusicProperties:Genre	
Playing Time	mpvm:MusicProperties:PlayingTime	
Year Recorded	mpvm:MusicProperties:Recorded	
Track Order	mpvm:MusicProperties:TrackNumber	
Number of Channels		
Average Encoded Bitrate	mpvm:MusicProperties:EncodedBitrate	Use average bitrate for CBR encoded assets.
Maximum Bitrate	mpvm:MusicProperties:EncodedBitrate	Use maximum bitrate for VBR encoded assets.
Sample Rate		
Extra Data	mpv:Metadata and nmf:Metadata	
Playlist	**mpvp:Album**	
Number of Tracks	mpvm:MusicProperties:NumTracks	
Playlist Name	dc:Properties|dc:title	
Playlist Description	dc:Properties|dc:description	
Track Indexes	mpvp:Album:Foreground contents	
Extra Data	mpv:Metadata and nmf:Metadata	
Playlist Directory	**mpvp:Album**	
Name	dc:Properties|dc:title	
Description	dc:Properties|dc:description	
Tracklist Pathnames	mpvp:AlbumRef or mpv:ManifestLinkRef in the mpvp:Album:Foreground	
Playlist Indexes	mpvp:AlbumRef or mpv:ManifestLinkRef in the mpvp:Album:Foreground	
Extra Data	mpv:Metadata and nmf:Metadata	
TOC_Header	**file:Manifest|nmf:Metadata**	
Version Number	encoded into profile and namespace identifiers	
UUID	mpvId:InstanceID	
Volume Name	dc:Properties|dc:title	
Data Preparer Identifier		
Publisher Identifier	dc:Properties|dc:publisher	
Copyright	dc:Properties|dc:rights	
Creation Date and Time	dcterms:Properties|dcterms:created	
Modification Date and Time	dcterms:Properties|dcterms:modified	
Effective Date and Time	dcterms:Properties|dcterms:issued	
Expiration Date and Time		
Number of Playlist Directories	Implicit	
Number of Tracks	mpvm:MusicProperties:NumTracks	
Number of Playlists	Implicit	
Extra Data	mpv:Metadata and nmf:Metadata	

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Appendix II: Music CD Identifer

OSTA does not endorse the use of any specific music identification service. However, [ID3v240] defines a MusicCDIdentifier based on the CDDB ID calculating function developed by Ti Kan, ti@amb.org, for use in xmcd, http://amb.org/xmcd/ and used by **[CDDB]** and **[FreeDB]** and other music identification services to access information about music CDs. This description is excerpted from **[FreeDB]** and Copyright(c) 2003 FreeDB.org.

```
The disc ID is a 8-digit hexadecimal (base-16) number, computed using data from a CD's
Table-of-Contents (TOC) in MSF (Minute Second Frame) form.  The algorithm is listed below in
Appendix A.

It is crucial that your software computes the disc ID correctly. If it does not generate the
disc ID correctly, it will not be compatible with the freedb.  Moreover, if your software
submits freedb entries with bad disc IDs to the freedb archives, it could compromise the
integrity of the freedb.

We suggest installing one of the disc ID generator programs listed on the
freedb web page in the downloads/misc section, and then testing the disc
ID code in your software by comparing the disc ID generated by the program
with that of your software for as large a number of CDs as possible.
Alternatively you can e.g. use xmcd and compare the DiscID generated by xmcd
with that of your software. Bugs in disc ID calculation can be subtle, and
history shows that it sometimes takes hundreds of discs to find problems.

APPENDIX A - CDDB/FREEDB DISCID ALGORITHM
-----------------------------------------

The following is a C code example that illustrates how to generate the
CDDB/freedb disc ID. [...] A text description
of the algorithm follows, which should contain the necessary information
to code the algorithm in any programming language.


struct toc {
     int   min;
     int   sec;
     int   frame;
};

struct toc cdtoc[100];

int
read_cdtoc_from_drive(void)
{
     /* Do whatever is appropriate to read the TOC of the CD
      * into the cdtoc[] structure array.
      */
     return (tot_trks);
```



```
}

int
cddb_sum(int n)
{
     int   ret;

     /* For backward compatibility this algorithm must not change */

     ret = 0;

     while (n > 0) {
          ret = ret + (n % 10);
          n = n / 10;
     }

     return (ret);
}

unsigned long
cddb_discid(int tot_trks)
{
     int   i,
           t = 0,
           n = 0;

     /* For backward compatibility this algorithm must not change */

     i = 0;

     while (i < tot_trks) {
          n = n + cddb_sum((cdtoc[i].min * 60) + cdtoc[i].sec);
          i++;
     }

     t = ((cdtoc[tot_trks].min * 60) + cdtoc[tot_trks].sec) -
         ((cdtoc[0].min * 60) + cdtoc[0].sec);

     return ((n % 0xff) << 24 | t << 8 | tot_trks);
}

main()
{
     int tot_trks;

     tot_trks = read_cdtoc_from_drive();
     printf("The discid is %08x", cddb_discid(tot_trks));
}
```

This code assumes that your compiler and architecture support 32-bit integers.

The cddb_discid function computes the discid based on the CD's TOC data in MSF form. The frames are ignored for this purpose. The function is passed a parameter of tot_trks (which is the total number of tracks on the CD), and returns the discid integer number.

It is assumed that cdtoc[] is an array of data structures (records) containing the fields min, sec and frame, which are the minute, second and frame offsets (the starting location) of each track. This information is read from the TOC of the CD. There are actually tot_trks + 1 "active" elements in the array, the last one being the offset of the lead-out (also known as track 0xAA).

The function loops through each track in the TOC, and for each track it takes the (M * 60) + S (total offset in seconds) of the track and feeds it to cddb_sum() function, which simply adds the value of each digit in the decimal string representation of the number. A running sum of this result for each track is kept in the variable n.

At the end of the loop:
1. t is calculated by subtracting the (M * 60) + S offset of the lead-out minus

the (M * 60) + S offset of first track (yielding the length of the disc in seconds).

2. The result of (n modulo FFh) is left-shifted by 24 bits.

3. t is left shifted by 8.

The bitwise-OR operation of result 2., 3. and the tot_trks number is used as the discid.

The discid is represented in hexadecimal form for the purpose of xmcd cddb file names and the DISCID= field in the xmcd cddb file itself. If the hexadecimal string is less than 8 characters long, it is zero-padded to 8 characters (i.e., 3a8f07 becomes 003a8f07). All alpha characters in the string should be in lower case, where applicable.

Important note for clients using the MS-Windows MCI interface:

The Windows MCI interface does not recognize data tracks, as you find them on CD Extra CD's. Therefore a wrong disc ID is generated for CD Extra's when using the MCI interface to read the TOC. Because of this, using the MCI interface should only be the last resort - if possible you should use other methods to read the TOC, like ASPI calls. An example disc ID calculator using ASPI can be found on the freedb website along with the sourcecode.
If for some reason, there is no other way for your program, than to use the MCI interface, here is the description how to do so:
The Windows MCI interface does not provide the MSF location of the lead-out. Thus, you must compute the lead-out location by taking the starting position of the last track and add the length of the last track to it. However, the MCI interface returns the length of the last track as ONE FRAME SHORT of the actual length found in the CD's TOC. In most cases this does not affect the disc ID generated, because we truncate the frame count when computing the disc ID anyway. However, if the lead-out track has an actual a frame count of 0, the computed quantity (based on the MSF data returned from the MCI interface) would result in the seconds being one short and the frame count be 74. For example, a CD with the last track at an offset of 48m 32s 12f and having a track length of 2m 50s 63f has a lead-out offset of 51m 23s 0f long. Windows MCI incorrectly reports the length as 2m 50s 62f, which would yield a lead-out offset of 51m 22s 74f, which causes the resulting truncated disc length to be off by one second. This will cause an incorrect disc ID to be generated. You should thus add one frame to the length of the last track when computing the location of the lead-out.

The easiest way for Windows clients to compute the lead-out given information in MSF format is like this:

(offset_minutes * 60 * 75) + (offset_seconds * 75) + offset_frames +
(length_minutes * 60 * 75) + (length_seconds * 75) + length_frames + 1 = X

Where X is the offset of the lead-out in frames. To find the lead-out in seconds, simply divide by 75 and discard the remainder.

Appendix III: Topics for Consideration & Comment

1. should MPV Music Profile recognize some other XML encoding of music properties or define its own. If some other, which and why.
2. should the Music Profile include metadata that captures “voting” status as music properties?
3. should the MusicProfile include more metadata for use by online music services. If so, what.
4. Should we define MIME types and fragment accessors for various MPEG4 embedded content