INVENTION DISCLOSURE

1. **Invention Title.**

Method for exposing a multi-track media track description

2. **Invention Summary.**
Media resources often consist of multiple tracks of information, e.g. main video track, main audio track and multiple subtitle tracks. This invention is a method for a media player to expose the metadata that describes these tracks in a way that is independent of the track composition of the media resource and the media resource format.

3. **Invention Description**.

a. **Describe the invention in detail.**
Media resources often contain multiple video, audio, text and data tracks that are used to deliver different viewing experiences. The primary experience is viewing the main video and audio track. A hearing impaired viewer might additionally view the closed caption track. A viewer proficient in a language other than the main audio language might view a subtitle track or an alternate audio track containing a translation of the main audio track. A programmer might provide interactive applications in an ETV data track. Media players need information about the types of tracks in a media resource in order to provide user controls to make viewing selections.

The structure of the data that describes the set of tracks in a media resource is specific to the media format [MPEG-2 TS][WEBM][OGG]. Further, new types of tracks, with new data values to describe them, are often defined over the life of a media format specification. Finally, the types of media tracks contained in a media resource vary by geographic region and media program distributor. This media resource data is hereafter referred to as track description data.

Media player vendors want to:

1) Provide players that support several media formats.
2) Provide a media player implementation that is independent of geographic region and service provider.
3) Provide a media player that can support new types of track description data without updating the media player.

The fact that there is not mechanism to expose track description that applies to all media formats and is independent of the type and structure of track description data makes 1) difficult and 2) and 3) impossible. It would be valuable to media player vendors and service providers if a method existed that would allow media players to make track description data available to application software, which is more easily localized and upgraded, in a media format and track-type independent way.

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This invention describes two new methods:

Method 1. How a media player can make track description data available to applications that need to make use of that data, in a manner that is independent of media format, and uses software interfaces commonly available in media players.

Method 2. How a media player can extract track description data to make it available to applications, in a way that is independent of the meaning of the data.

All media formats contain an internal representation of:
- The tracks in a media resource of that format
- The meaning of those tracks.

This representation will change if the track composition of the media resource changes, as can be the case in a live program or in a program described by a playlist.

Many, if not most, media players, provide a software interface, often referred to as Timed Text Track, the purpose of which is for the media player to make text tracks in the media resource, such as subtitles, available to application software.

Figure is an example showing the relationship between tracks in an MPEG-2 TS media resource, the track description data and the HTML5 media resource software interface for Timed Text Tracks. Each data track in the media resource is represented as a Text Track in the media player. Each data table in a data track is used to create a Cue in the Text Track representing that data track. The Cue start time and end time is set to the current play time in the media resource. The data table is the contents of the Cue. It is relevant to the invention that the start time, end time and Cue contents can be created by the media player without any built-in knowledge of the syntax or semantics of the data track information. The media player Text Track mechanism makes the Cues, and thereby the contents of the data track, available to the application.

Figure

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The Program Map Table (PMT) in a MPEG-2 TS identifies the tracks in the TS that constitute the program and contains track description data. The PMT itself is carried in a TS track periodically as a table whose structure is shown in Figure .

Fields applying to program . . .		
Length of PMT stream info		
1st stream	Stream type	
	Packet ID	
	Descriptor(s)	
2nd stream	Stream type	
	Packet ID	
	Descriptor(s)	

Figure

Method 1 specifies that the media player take each track description data table received in the media resource and copy it, without interpretation, into a Cue in the media players Timed Text Track representation. The Timed Text Track software interface makes the track description data available to the application with no additional information required by the media player - since a media player that can play a particular media format must already understand the structure of the track description data for that media format. It is relevant to the invention that, in general, the track description information in the media format will vary by geographic region, service provider and over time as new track types are defined. Method 1 enables the media player to expose this information in a manner that is independent of these variables.

Method 2 utilizes the track description data that is made available to the application, in a media format independent way, to identify all of the tracks in the media resource in a manner independent of the format of that media resource. Method 2 has the following steps

Step 1. The media player maps the media resource tracks to the media player representation of those tracks in a consistent manner - the video, audio and data tracks must appear in the media player representation of the media resource in the same order as they appear in the media resource itself.

Step 2. The media player maps the data in the data tracks into Cues in the Timed Text Track in the same manner as was done for the track description data in Method 1.

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With the track description data exposed via Method 1 and the defined ordering of mapping media resource tracks to the media player representation of those tracks, the application has sufficient information to identify all of the tracks in the media resource without requiring the media player to have the equivalent amount of information. This is a significant advantage because applications are more often localized by geographic region and service provider and are easier to update than is the case of media players.

The result of Step 2 is that the application can has sufficient information to interpret the Cues on all data tracks in the media resource, again in a manner that does not require data track specific knowledge in the media player.

b. Why was the invention developed? What problem(s) does the invention solve? How is it better?

Cable TV services in MPEG-2 TS such as closed captioning, subtitles, ETV, ad-insertion, secondary audio program and descriptive video service need to be supported in HTML5 browsers. There is no definition of how this was to be done. HTML5 browsers are distributed globally, must support other media formats such as WebM and Ogg and should be able to support the afore-mentioned services, as well as others. There was no defined way to accomplish this.

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c. **Briefly outline the potential commercial value and customers of the invention.**
North American cable operators expect HTML5 browser software to be in IP platforms they deliver service to. It is critical that the TV services enabled by this invention also be delivered. Services similar to these need to be provided worldwide across a variety of application environments including HTML5, Apple iOS and Microsoft SilverLight.

4. **HOW is this invention different from existing products, processes, systems?**
The state-of-the art is that media players have hardcoded software, specific to the media formats supported, that interpret track description data and the data in specific data tracks. There is no method, to the inventors' knowledge, to move this to application software.