



**Standard of the Camera & Imaging Products Association**

*White Paper*  
*of*  
*CIPA DC- x 007- 2009*

**Multi-Picture Format**

**This translation has been made based on the original White Paper. In the event of any doubts arising as the contents, the original Standard is to be the final authority.**

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## 1. Background and Objective

As the performance and capabilities of digital cameras have increased, there have been calls for summarizing and recording not only Individual Image data, but also multiple image data which are interrelated in order to display image data with specified pixel count on a monitor. One method of linking and recording multiple images is to record the images as Individual Image files, then to record the information linking the files as a separate file. Other methods are to store the linked image files in a single folder, or to record the links based on a file name. These methods offer the benefit of permitting each image to be operated using existing players. However, as users operate or move files between recording media, image files may become scattered and lost, and their links may be broken. To resolve these problems, it was decided to set a format for recording multiple image data as a single file.

Table 1 shows the type of containable images specified in this specification.

**Table 1 The type of containable images specified in this specification**

Type information	Sub-Type(s)	Description
Large Thumbnails	Class 1	VGA equivalent
	Class 2	Full HD equivalent
Multi-View Individual Images*	Panorama	
	Disparity	
	Multi-Angle	
Other Images		

Large Thumbnails are defined as two kinds: mainly class 1 (VGA) to be displayed on the monitors of compact devices, and class 2 (equivalent to full HD) to be displayed on a high-definition television. Multi-View Individual Images\* are defined as a type with three sub-types: Panorama images (image recorded by dividing the photographed range into multiple shots), Disparity images, and Multi-Angle images which is an image taken from different directions.

Because usage of this standard is likely to expand later, an "undefined" type was established.

Figure 1 and Figure 2 show the use cases with this specification.

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\* See § 4 for "Individual Image"

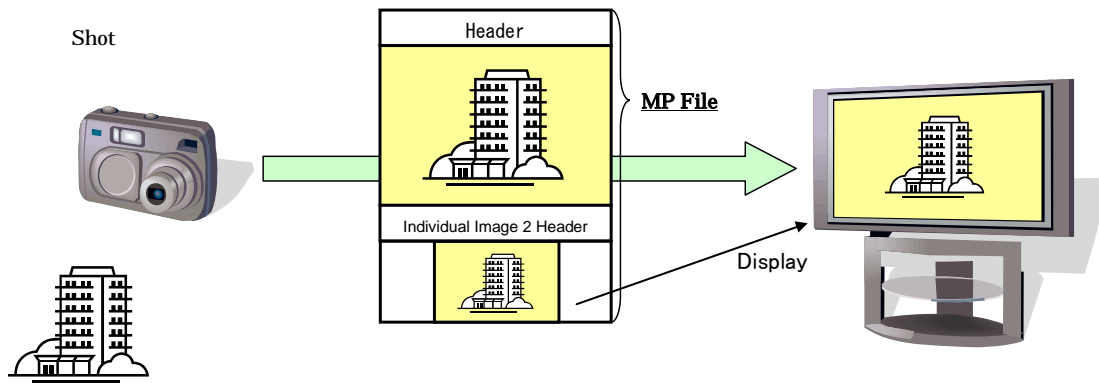


Figure 1 Use Case of Large Thumbnails for Displays

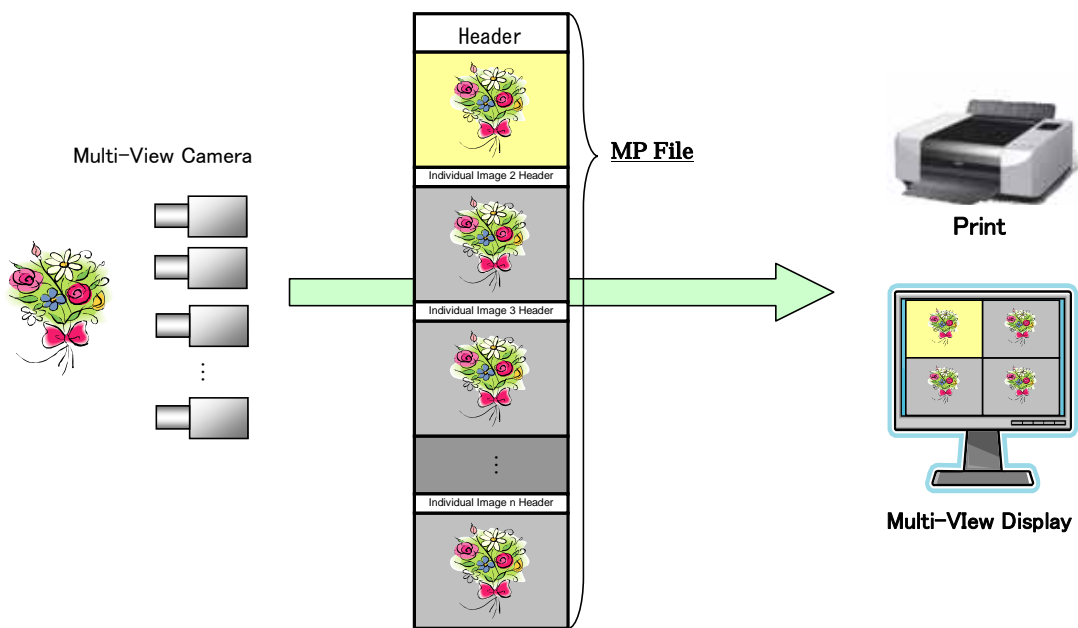


Figure 2 Use Case of Multi-View Images

## 2. Scope

This document specifies an image data format and metadata tags used by digital cameras and other imaging products including software

## 3. General Structure

This document specifies a file format to achieve the above objectives. The file format includes MP extensions which enable to store multiple Individual Images in a single file. Individual Image has the same structure as Exif JPEG data.

### 3.1. Baseline MP File

A Baseline MP file consists of a Primary Image and an additional duplicate image that has been formatted for optimal viewing on TVs and other viewing devices. Baseline MP file uses Exif extensions, and specifies a file format including MP extensions which enable to store the Primary Image and additional image(s).

### 3.2. Extended MP File

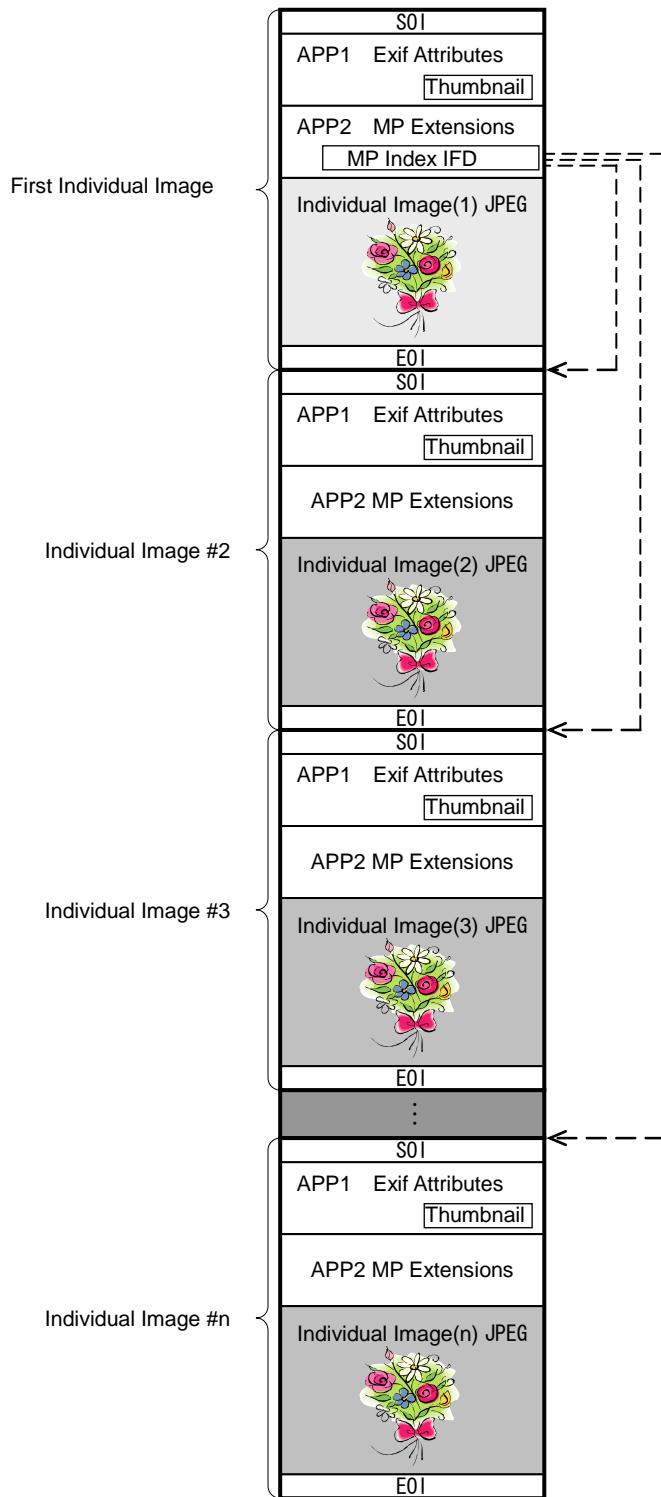
An Extended MP file consists of a collection of images that correspond to one of the MP Types defined in this specification. Multi-view is defined as MP Type, and Multi-view has 3 sub-types: Panorama, Disparity, and Multi-Angle. Other images may also be recorded with this file format. Extended MP file uses Exif extensions, and specifies a file format including MP extensions which enable to store multiple images. The Extended MP file has a new file extension.

## 4. Data Structure

### 4.1. Basic MP File Structure

Figure 3 shows the basic structure of an MP File. An MP File contains two or more Individual Images - of which the top most Individual Image is called the First Individual Image. The MP Extensions are specified in the APP2 marker segment which follows immediately after the Exif Attributes in the APP1 marker segment except as otherwise specified. Each Individual Image adheres to the structure of a valid JPEG image, delimited by an SOI and EOI marker. This specification does not define any restrictions for data between the EOI marker of one Individual Image and the SOI marker of the following Individual Image.

Table 2 lists the tags defined in this specification.



**Figure 3 Basic MP File format data structure**

**Table 2 The Tags defined in this specification**

Tag Name	Field Name
MP Format Version Number	<i>MPFVersion</i>
Number of Images	<i>NumberOfImages</i>
MP Entry Information	<i>MPEntry</i>
Individual Image Unique ID list	<i>ImageUIDList</i>
Total Number of Captured Frames	<i>TotalFrames</i>
MP Individual Image Number	<i>MPIndividualNum</i>
Panorama Scanning Orientation	<i>PanOrientation</i>
Panorama Horizontal Overlap	<i>PanOverlap_H</i>
Panorama Vertical Overlap	<i>PanOverlap_V</i>
Base Viewpoint Number	<i>BaseViewpointNum</i>
Convergence Angle	<i>ConvergenceAngle</i>
Baseline Length	<i>BaselineLength</i>
Divergence Angle	<i>VerticalDivergence</i>
Horizontal Axis Distance	<i>AxisDistance_X</i>
Vertical Axis Distance	<i>AxisDistance_Y</i>
Collimation Axis Distance	<i>AxisDistance_Z</i>
Yaw Angle	<i>YawAngle</i>
Pitch Angle	<i>PitchAngle</i>
Roll Angle	<i>RollAngle</i>