PNG Metadata Format Specification

The PNG native format encodes the complete contents of a PNG file chunk by chunk, except for the IDAT chunks that contain the actual image data. Chunks that are not defined in the PNG 1.2 specification are stored under the UnknownChunks element. Note that it is the responsibility of application software to implement the rules for PNG readers, writers, and editors (*e.g.*, the rules concerning unsafe-to-copy chunks) described in the PNG specification. The Image I/O library is not, in and of itself, a PNG reader, writer, or editor in the sense of the specification. Rather, it is a tool that may be used to build PNG readers, writers, and editors.

The image's actual width, height, bit depth, and color type will override any values passed to the writer via metadata, with one exception. If the image has an IndexColorModel, the color table entries will be checked to determine if they form a uniform grayscale ramp. If so, the image will normally be encoded using as grayscale instead of palette color. However, if the color type set in the metadata is "Palette", palette color will be used.

If no metadata is supplied when encoding an image, the header is initialized from the image being encoded, and no optional chunks are included.

The semantics of the standard chunks are described in the [PNG specification](http://www.libpng.org/pub/png/spec/). Note that there are some restrictions on which chunks may appear for each color type. In particular,

* A PLTE chunk may not appear in a Gray or GrayAlpha image
* hIST and tRNS chunks require a prior PLTE chunk
* A tRNS chunk may not appear in GrayAlpha and RGBA images

The child nodes of the bKGD, sBIT, and tRNS chunks must match the image's color type.

Certain chunks may meaningfully appear multiple times in a PNG file, in particular the text-related chunks. In order to simplify the metadata format, multiple instances of these chunks are consolidated under a single parent node (*e.g.*, the tEXt node), which may have zero or more children (*e.g.*, tEXtEntry nodes). If no children are present, no chunk will be written. Similarly, unknown chunks are stored as children of a single UnknownChunks node.

It is not possible to control the ordering of the chunks as they are written, or to determine the order of the chunks in a file being read.

<!DOCTYPE "javax\_imageio\_png\_1.0" [  
  
 <!ELEMENT "javax\_imageio\_png\_1.0" (IHDR?, PLTE?, bKGD?, cHRM?,   
 gAMA?, hIST?, iCCP?, iTXt?, pHYS?, sBIT?, sPLT?, sRGB?, tEXt?,   
 tIME?, tRNS?, zTXt?, UnknownChunks?)>  
  
 <!ELEMENT "IHDR" EMPTY>  
 <!-- The IHDR chunk, containing the header -->  
 <!ATTLIST "IHDR" "width" #CDATA #REQUIRED>  
 <!-- The width of the image in pixels -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 1 (inclusive) -->  
 <!-- Max value: 2147483647 (inclusive) -->  
 <!ATTLIST "IHDR" "height" #CDATA #REQUIRED>  
 <!-- The height of the image in pixels -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 1 (inclusive) -->  
 <!-- Max value: 2147483647 (inclusive) -->  
 <!ATTLIST "IHDR" "bitDepth" ("1" | "2" | "4" | "8" | "16")  
 #REQUIRED>  
 <!-- The bit depth of the image samples -->  
 <!ATTLIST "IHDR" "colorType" ("Grayscale" | "RGB" | "Palette" |   
 "GrayAlpha" | "RGBAlpha") #REQUIRED>  
 <!-- The color type of the image -->  
 <!ATTLIST "IHDR" "compressionMethod" ("deflate") #REQUIRED>  
 <!-- The compression used for image data, always "deflate" -->  
 <!ATTLIST "IHDR" "filterMethod" ("adaptive") #REQUIRED>  
 <!-- The filtering method used for compression, always "adaptive" -->  
 <!ATTLIST "IHDR" "interlaceMethod" ("none" | "adam7") #REQUIRED>  
 <!-- The interlacing method, "none" or "adam7" -->  
  
 <!ELEMENT "PLTE" (PLTEEntry)\*>  
 <!-- The PLTE chunk, containing the palette -->  
 <!-- Min children: 1 -->  
 <!-- Max children: 256 -->  
  
 <!ELEMENT "PLTEEntry" EMPTY>  
 <!-- A palette entry -->  
 <!ATTLIST "PLTEEntry" "index" #CDATA #REQUIRED>  
 <!-- The index of a palette entry -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
 <!ATTLIST "PLTEEntry" "red" #CDATA #REQUIRED>  
 <!-- The red value of a palette entry -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
 <!ATTLIST "PLTEEntry" "green" #CDATA #REQUIRED>  
 <!-- The green value of a palette entry -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
 <!ATTLIST "PLTEEntry" "blue" #CDATA #REQUIRED>  
 <!-- The blue value of a palette entry -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
  
 <!ELEMENT "bKGD" (bKGD\_Grayscale | bKGD\_RGB | bKGD\_Palette)>  
 <!-- The bKGD chunk, containing the background color -->  
  
 <!ELEMENT "bKGD\_Grayscale" EMPTY>  
 <!-- A grayscale background color, for Gray and GrayAlpha images -->  
 <!ATTLIST "bKGD\_Grayscale" "gray" #CDATA #REQUIRED>  
 <!-- A gray value to be used as a background -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 65535 (inclusive) -->  
  
 <!ELEMENT "bKGD\_RGB" EMPTY>  
 <!-- An RGB background color, for RGB and RGBAlpha images -->  
 <!ATTLIST "bKGD\_RGB" "red" #CDATA #REQUIRED>  
 <!-- A red value to be used as a background -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 65535 (inclusive) -->  
 <!ATTLIST "bKGD\_RGB" "green" #CDATA #REQUIRED>  
 <!-- A green value to be used as a background -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 65535 (inclusive) -->  
 <!ATTLIST "bKGD\_RGB" "blue" #CDATA #REQUIRED>  
 <!-- A blue value to be used as a background -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 65535 (inclusive) -->  
  
 <!ELEMENT "bKGD\_Palette" EMPTY>  
 <!-- A background palette index -->  
 <!ATTLIST "bKGD\_Palette" "index" #CDATA #REQUIRED>  
 <!-- A palette index to be used as a background -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
  
 <!ELEMENT "cHRM" EMPTY>  
 <!-- The cHRM chunk, containing color calibration -->  
 <!ATTLIST "cHRM" "whitePointX" #CDATA #REQUIRED>  
 <!-- The CIE x coordinate of the white point, multiplied by 1e5 -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 65535 (inclusive) -->  
 <!ATTLIST "cHRM" "whitePointY" #CDATA #REQUIRED>  
 <!-- The CIE y coordinate of the white point, multiplied by 1e5 -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 65535 (inclusive) -->  
 <!ATTLIST "cHRM" "redX" #CDATA #REQUIRED>  
 <!-- The CIE x coordinate of the red primary, multiplied by 1e5 -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 65535 (inclusive) -->  
 <!ATTLIST "cHRM" "redY" #CDATA #REQUIRED>  
 <!-- The CIE y coordinate of the red primary, multiplied by 1e5 -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 65535 (inclusive) -->  
 <!ATTLIST "cHRM" "greenX" #CDATA #REQUIRED>  
 <!-- The CIE x coordinate of the green primary, multiplied by 1e5 -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 65535 (inclusive) -->  
 <!ATTLIST "cHRM" "greenY" #CDATA #REQUIRED>  
 <!-- The CIE y coordinate of the green primary, multiplied by 1e5 -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 65535 (inclusive) -->  
 <!ATTLIST "cHRM" "blueX" #CDATA #REQUIRED>  
 <!-- The CIE x coordinate of the blue primary, multiplied by 1e5 -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 65535 (inclusive) -->  
 <!ATTLIST "cHRM" "blueY" #CDATA #REQUIRED>  
 <!-- The CIE y coordinate of the blue primary, multiplied by 1e5 -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 65535 (inclusive) -->  
  
 <!ELEMENT "gAMA" EMPTY>  
 <!-- The gAMA chunk, containing the image gamma -->  
 <!ATTLIST "gAMA" "value" #CDATA #REQUIRED>  
 <!-- The image gamma, multiplied by 1e5 -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 2147483647 (inclusive) -->  
  
 <!ELEMENT "hIST" (hISTEntry)\*>  
 <!-- The hIST chunk, containing histogram information -->  
 <!-- Min children: 1 -->  
 <!-- Max children: 256 -->  
  
 <!ELEMENT "hISTEntry" EMPTY>  
 <!-- A histogram entry -->  
 <!ATTLIST "hISTEntry" "index" #CDATA #REQUIRED>  
 <!-- The palette index of this histogram entry -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
 <!ATTLIST "hISTEntry" "value" #CDATA #REQUIRED>  
 <!-- The frequency of this histogram entry -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 65535 (inclusive) -->  
  
 <!ELEMENT "iCCP" EMPTY>  
 <!-- The iCCP chunk, containing an ICC color profile -->  
 <!-- User object: array of byte -->  
 <!-- Min length: 0 -->  
 <!-- Max length: 2147483647 -->  
 <!ATTLIST "iCCP" "profileName" #CDATA #REQUIRED>  
 <!-- The name of this ICC profile -->  
 <!-- Data type: String -->  
 <!ATTLIST "iCCP" "compressionMethod" ("deflate") #REQUIRED>  
 <!-- The compression method used to store this ICC profile -->  
  
 <!ELEMENT "iTXt" (iTXtEntry)\*>  
 <!-- The iTXt chunk, containing internationalized text -->  
 <!-- Min children: 1 -->  
 <!-- Max children: 2147483647 -->  
  
 <!ELEMENT "iTXtEntry" EMPTY>  
 <!-- A localized text entry -->  
 <!ATTLIST "iTXtEntry" "keyword" #CDATA #REQUIRED>  
 <!-- The keyword -->  
 <!-- Data type: String -->  
 <!ATTLIST "iTXtEntry" "compressionFlag" ("TRUE" | "FALSE")  
 #REQUIRED>  
 <!ATTLIST "iTXtEntry" "compressionMethod" #CDATA #REQUIRED>  
 <!-- The compression method used to store this iTXt entry -->  
 <!-- Data type: String -->  
 <!ATTLIST "iTXtEntry" "languageTag" #CDATA #REQUIRED>  
 <!-- The ISO tag describing the language this iTXt entry -->  
 <!-- Data type: String -->  
 <!ATTLIST "iTXtEntry" "translatedKeyword" #CDATA #REQUIRED>  
 <!-- The translated keyword for iTXt entry -->  
 <!-- Data type: String -->  
 <!ATTLIST "iTXtEntry" "text" #CDATA #REQUIRED>  
 <!-- The localized text -->  
 <!-- Data type: String -->  
  
 <!ELEMENT "pHYS" EMPTY>  
 <!-- The pHYS chunk, containing the pixel size and aspect ratio -->  
 <!ATTLIST "pHYS" "pixelsPerUnitXAxis" #CDATA #REQUIRED>  
 <!-- The number of horizontal pixels per unit, multiplied by 1e5 -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 2147483647 (inclusive) -->  
 <!ATTLIST "pHYS" "pixelsPerUnitYAxis" #CDATA #REQUIRED>  
 <!-- The number of vertical pixels per unit, multiplied by 1e5 -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 2147483647 (inclusive) -->  
 <!ATTLIST "pHYS" "unitSpecifier" ("unknown" | "meter") #REQUIRED>  
 <!-- The unit specifier for this chunk (i.e., meters) -->  
  
 <!ELEMENT "sBIT" (sBIT\_Grayscale | sBIT\_GrayAlpha | sBIT\_RGB |   
 sBIT\_RGBAlpha | sBIT\_Palette)>  
 <!-- The sBIT chunk, containing significant bit information -->  
  
 <!ELEMENT "sBIT\_Grayscale" EMPTY>  
 <!-- Significant bit information for gray samples -->  
 <!ATTLIST "sBIT\_Grayscale" "gray" #CDATA #REQUIRED>  
 <!-- The number of significant bits of the gray samples -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
  
 <!ELEMENT "sBIT\_GrayAlpha" EMPTY>  
 <!-- Significant bit information for gray and alpha samples -->  
 <!ATTLIST "sBIT\_GrayAlpha" "gray" #CDATA #REQUIRED>  
 <!-- The number of significant bits of the gray samples -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
 <!ATTLIST "sBIT\_GrayAlpha" "alpha" #CDATA #REQUIRED>  
 <!-- The number of significant bits of the alpha samples -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
  
 <!ELEMENT "sBIT\_RGB" EMPTY>  
 <!-- Significant bit information for RGB samples -->  
 <!ATTLIST "sBIT\_RGB" "red" #CDATA #REQUIRED>  
 <!-- The number of significant bits of the red samples -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
 <!ATTLIST "sBIT\_RGB" "green" #CDATA #REQUIRED>  
 <!-- The number of significant bits of the green samples -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
 <!ATTLIST "sBIT\_RGB" "blue" #CDATA #REQUIRED>  
 <!-- The number of significant bits of the blue samples -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
  
 <!ELEMENT "sBIT\_RGBAlpha" EMPTY>  
 <!-- Significant bit information for RGBA samples -->  
 <!ATTLIST "sBIT\_RGBAlpha" "red" #CDATA #REQUIRED>  
 <!-- The number of significant bits of the red samples -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
 <!ATTLIST "sBIT\_RGBAlpha" "green" #CDATA #REQUIRED>  
 <!-- The number of significant bits of the green samples -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
 <!ATTLIST "sBIT\_RGBAlpha" "blue" #CDATA #REQUIRED>  
 <!-- The number of significant bits of the blue samples -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
 <!ATTLIST "sBIT\_RGBAlpha" "alpha" #CDATA #REQUIRED>  
 <!-- The number of significant bits of the alpha samples -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
  
 <!ELEMENT "sBIT\_Palette" EMPTY>  
 <!-- Significant bit information for RGB palette entries -->  
 <!ATTLIST "sBIT\_Palette" "red" #CDATA #REQUIRED>  
 <!-- The number of significant bits of the red palette entries -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
 <!ATTLIST "sBIT\_Palette" "green" #CDATA #REQUIRED>  
 <!-- The number of significant bits of the green palette entries -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
 <!ATTLIST "sBIT\_Palette" "blue" #CDATA #REQUIRED>  
 <!-- The number of significant bits of the blue palette entries -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
  
 <!ELEMENT "sPLT" (sPLTEntry)\*>  
 <!-- The sPLT chunk, containing a suggested palette -->  
 <!-- Min children: 1 -->  
 <!-- Max children: 256 -->  
  
 <!ELEMENT "sPLTEntry" EMPTY>  
 <!-- A suggested palette entry -->  
 <!ATTLIST "sPLTEntry" "index" #CDATA #REQUIRED>  
 <!-- The index of a suggested palette entry -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
 <!ATTLIST "sPLTEntry" "red" #CDATA #REQUIRED>  
 <!-- The red value of a suggested palette entry -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
 <!ATTLIST "sPLTEntry" "green" #CDATA #REQUIRED>  
 <!-- The green value of a suggested palette entry -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
 <!ATTLIST "sPLTEntry" "blue" #CDATA #REQUIRED>  
 <!-- The blue value of a suggested palette entry -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
 <!ATTLIST "sPLTEntry" "alpha" #CDATA #REQUIRED>  
 <!-- The blue value of a suggested palette entry -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
  
 <!ELEMENT "sRGB" EMPTY>  
 <!-- The sRGB chunk, containing rendering intent information -->  
 <!ATTLIST "sRGB" "renderingIntent" ("Perceptual" |   
 "Relative colorimetric" | "Saturation" |   
 "Absolute colorimetric") #REQUIRED>  
 <!-- The rendering intent -->  
  
 <!ELEMENT "tEXt" (tEXtEntry)\*>  
 <!-- The tEXt chunk, containing text -->  
 <!-- Min children: 1 -->  
 <!-- Max children: 2147483647 -->  
  
 <!ELEMENT "tEXtEntry" EMPTY>  
 <!-- A text entry -->  
 <!ATTLIST "tEXtEntry" "keyword" #CDATA #REQUIRED>  
 <!-- The keyword -->  
 <!-- Data type: String -->  
 <!ATTLIST "tEXtEntry" "value" #CDATA #REQUIRED>  
 <!-- The text -->  
 <!-- Data type: String -->  
  
 <!ELEMENT "tIME" EMPTY>  
 <!-- The tIME chunk, containing the image modification time -->  
 <!ATTLIST "tIME" "year" #CDATA #REQUIRED>  
 <!-- The year when the image was last modified -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 65535 (inclusive) -->  
 <!ATTLIST "tIME" "month" #CDATA #REQUIRED>  
 <!-- The month when the image was last modified, 1 = January -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 1 (inclusive) -->  
 <!-- Max value: 12 (inclusive) -->  
 <!ATTLIST "tIME" "day" #CDATA #REQUIRED>  
 <!-- The day of the month when the image was last modified -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 1 (inclusive) -->  
 <!-- Max value: 31 (inclusive) -->  
 <!ATTLIST "tIME" "hour" #CDATA #REQUIRED>  
 <!-- The hour when the image was last modified -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 23 (inclusive) -->  
 <!ATTLIST "tIME" "minute" #CDATA #REQUIRED>  
 <!-- The minute when the image was last modified -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 59 (inclusive) -->  
 <!ATTLIST "tIME" "second" #CDATA #REQUIRED>  
 <!-- The second when the image was last modified, 60 = leap second -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 60 (inclusive) -->  
  
 <!ELEMENT "tRNS" (tRNS\_Grayscale | tRNS\_RGB | tRNS\_Palette)>  
 <!-- The tRNS chunk, containing transparency information -->  
  
 <!ELEMENT "tRNS\_Grayscale" EMPTY>  
 <!-- A grayscale value that should be considered transparent -->  
 <!ATTLIST "tRNS\_Grayscale" "gray" #CDATA #REQUIRED>  
 <!-- The gray value to be considered transparent -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 65535 (inclusive) -->  
  
 <!ELEMENT "tRNS\_RGB" EMPTY>  
 <!-- An RGB value that should be considered transparent -->  
 <!ATTLIST "tRNS\_RGB" "red" #CDATA #REQUIRED>  
 <!-- The red value to be considered transparent -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 65535 (inclusive) -->  
 <!ATTLIST "tRNS\_RGB" "green" #CDATA #REQUIRED>  
 <!-- The green value to be considered transparent -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 65535 (inclusive) -->  
 <!ATTLIST "tRNS\_RGB" "blue" #CDATA #REQUIRED>  
 <!-- The blure value to be considered transparent -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 65535 (inclusive) -->  
  
 <!ELEMENT "tRNS\_Palette" EMPTY>  
 <!-- A palette index that should be considered transparent -->  
 <!ATTLIST "tRNS\_Palette" "index" #CDATA #REQUIRED>  
 <!-- A palette index to be considered transparent -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
 <!ATTLIST "tRNS\_Palette" "alpha" #CDATA #REQUIRED>  
 <!-- The transparency associated with the palette entry -->  
 <!-- Data type: Integer -->  
 <!-- Min value: 0 (inclusive) -->  
 <!-- Max value: 255 (inclusive) -->  
  
 <!ELEMENT "zTXt" (zTXtEntry)\*>  
 <!-- The zTXt chunk, containing compressed text -->  
 <!-- Min children: 1 -->  
 <!-- Max children: 2147483647 -->  
  
 <!ELEMENT "zTXtEntry" EMPTY>  
 <!-- A compressed text entry -->  
 <!-- User object: array of byte -->  
 <!-- Min length: 0 -->  
 <!-- Max length: 2147483647 -->  
 <!ATTLIST "zTXtEntry" "keyword" #CDATA #REQUIRED>  
 <!-- The keyword -->  
 <!-- Data type: String -->  
 <!ATTLIST "zTXtEntry" "compressionMethod" ("deflate")  
 #REQUIRED>  
 <!-- The compressed text -->  
  
 <!ELEMENT "UnknownChunks" (UnknownChunk)\*>  
 <!-- A set of unknown chunks -->  
 <!-- Min children: 1 -->  
 <!-- Max children: 2147483647 -->  
  
 <!ELEMENT "UnknownChunk" EMPTY>  
 <!-- Unknown chunk data stored as a byte array -->  
 <!-- User object: array of byte -->  
 <!-- Min length: 0 -->  
 <!-- Max length: 2147483647 -->  
 <!ATTLIST "UnknownChunk" "type" #CDATA #REQUIRED>  
 <!-- The 4-character type of the unknown chunk -->  
 <!-- Data type: String -->  
]>