Major graphic file formats

There are many graphic file formats, if we include the proprietary types. The PNG, JPEG, and GIF formats are most often used to display images on the Internet. These graphic formats are listed and briefly described below, separated into the two main families of graphics: raster and vector.

Raster formats

For a description of the technology aside from the format, see Raster graphics.

The JPEG (Joint Photographic Experts Group) image files are a lossy format (in many cases). The DOS filename extension is *JPG*, although other operating systems may use *JPEG*. Nearly all digital cameras have the option to save images in JPEG format. The JPEG format supports 8-bit per color - red, green, and blue, for 24-bit total - and produces relatively small file sizes. Fortunately, the compression in most cases does not detract noticeably from the image. But JPEG files do suffer generational degradation when repeatedly edited and saved. Photographic images are best stored in a lossless non-JPEG format if they will be re-edited in future, or if the presence of small "artifacts" (blemishes), due to the nature of the JPEG compression algorithm (in most of the compressing tools), is unacceptable. JPEG is also used as the image compression algorithm in many Adobe PDF files.

The **PGF** (Progressive Graphics File) is a newly introduced wavelet-based bitmapped image format that employs lossless and lossy data compression. PGF was created to improve upon and replace the JPEG format. It was developed at the same time as JPEG 2000 but with a different focus: speed over compression ratio.

TIFF

The TIFF (Tagged Image File Format) is a flexible image format that normally saves 16-bit per color - red, green and blue for a total of 48-bits - or 8-bit per color - red, green and blue for a total of 24-bits - and uses a filename extension of *TIFF* or *TIF*. TIFF's flexibility is both a feature and a curse, with no single reader capable of handling all the different varieties of TIFF files. TIFF can be lossy or lossless. Some types of TIFF offer relatively good lossless compression for bi-level (black and white, no grey) images. Some high-end digital cameras have the option to save images in the TIFF format, using the LZW compression algorithm for lossless storage. The TIFF image format is not widely supported by web browsers, and should not be used on the World Wide Web. TIFF is still widely accepted as a photograph file standard in the printing industry. TIFF is capable of handling device-specific color spaces, such as the CMYK defined by a particular set of printing press inks.

The RAW image format is a file option available on some digital cameras. It usually uses a lossless compression and produces file sizes much smaller than the TIFF format. Unfortunately, the RAW format is not standard among all camera manufacturers and some graphic programs and image editors may not accept the RAW format. The better graphic editors can read some manufacturer's RAW formats, and some (mostly higher-end) digital cameras also support saving images in the TIFF format directly. Adobe's Digital Negative Specification is an attempt at standardizing the various "raw" file formats used by digital cameras.

The PNG (Portable Network Graphics) file format is regarded, and was made as, the free and open-source successor to the GIF file format. The PNG file format supports true color (16 million colors) whereas the GIF file format only allows 256 colors. PNG excels when the image has large areas of uniform color. The lossless PNG format is best suited for editing pictures, and the lossy formats like JPG are best for final distribution of photographic-type images because of smaller file size. Many older browsers do not yet support the PNG file format, however with the release of Internet Explorer 7 all popular modern browsers fully support PNG. The Adam7-interlacing allows an early preview even when only a small percentage of the data of the image has been transmitted.

GIF (Graphic Interchange Format) is limited to an 8-bit palette, or 256 colors. This makes the GIF format suitable for storing graphics with relatively few colors such as simple diagrams, shapes, logos and cartoon style images. The GIF format supports animation and is still widely used to provide image animation effects. It also uses a lossless compression that is more effective when large areas have a single color, and ineffective for detailed images or dithered images.

The BMP (bit mapped) format is used internally in the Microsoft Windows operating system to handle graphics images. These files are typically not compressed resulting in large files. The main advantage of BMP files is their wide acceptance, simplicity, and use in Windows programs. However, they may pose problems for users of other operating systems. Commonly, BMP files are used for Microsoft's Paint program. Since most BMP files are uncompressed, and BMP's RLE compression has serious limits [*citation needed*], the large size of BMP files makes them unsuitable for file transfer. However, Bit Map images are suitable for background images and wallpapers. This is especially true for screen shots. In addition, images from scanners are usually stored in BMP files.

The HDP format *(formally known as **WDP**)* is the newly introduced image format by Microsoft for media print quality, lossless image compression. This image standard has a specific applicability to mostly print media due to its size although it is rumored to be the standard for Microsoft Office 2007 and the brand new Windows Vista operating system. This format is very similar to the TIFF format, but can handle a much larger range of image types and qualities such as 8, 16, and 32 bits per channel processing, N-Channel support, and embedded tiling.

The XPM format is the default X Window System picture format (very popular in the Linux world). Its structure is based on the string format of the C programming language. Because XPM was designed to be human-readable, and is stored as uncompressed plain-text, the file size of these pictures can be more than twice as large as uncompressed binary bitmap files (such as BMP, uncompressed TIFF, MacOS-PICT, or Irix-RGB formats). This format is unsupported by most non-Unix software and operating systems (though many web-browsers retain display support for the XBM subset, which was the minimal image format in the early days of the WWW).

The MrSID (Multiresolution Seamless Image Database) format is a wavelet compression format used mostly by Geographic Information Systems to store massive satellite imagery for map software.

] Vector formats

> *See also: Encapsulated PostScript, PDF, SWF, Windows Metafile, AutoCAD DXF, and CorelDRAW CDR*

As opposed to the raster image formats above (where the data describes the characteristics of each individual pixel), vector image formats contain a geometric description which can be rendered smoothly at any desired display size.

Vector file formats can contain bitmap data as well. 3D graphic file formats are technically vector formats with pixel data texture mapping on the surface of a vector virtual object, warped to match the angle of the viewing perspective.

At some point, all vector graphics must be rasterized in order to be displayed on digital monitors. However vector images can be displayed with analog CRT technology such as that used in some electronic test equipment, medical monitors, radar displays, laser shows and early video games. Plotters are printers that use vector data rather than pixel data to draw graphics.

SVG (Scalable Vector Graphics) is an open standard created and developed by the World Wide Web Consortium to address the need (and attempts of several corporations) for a versatile, scriptable and all-

purpose vector format for the web and otherwise. The SVG format does not have a compression scheme of its own, but due to the textual nature of XML, an SVG graphic can be compressed using a program such as gzip. Because of its scripting potential, SVG is a key component in web applications: interactive web pages that look and act like applications.